UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

Form 10-K

☒ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2019

or

☐ **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from to

Commission file number: 000-30171

SANGAMO THERAPEUTICS, INC.

(Exact name of registrant as specified in its charter)

Delaware	**68-0359556**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**
7000 Marina Blvd. Brisbane, California	**94005**
(Address of principal executive offices)	**(Zip Code)**

(510) 970-6000
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	**Trading Symbol(s)**	**Name of each exchange on which registered**
Common Stock, par value $0.01 per share	**SGMO**	**Nasdaq Global Select Market**

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes ☒ No ☐

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Exchange Act. Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or emerging growth company. See the definition of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer	☒	Accelerated filer	☐
Non-accelerated filer	☐	Smaller reporting company	☐
		Emerging growth company	☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes ☐ No ☒

The aggregate market value of the voting stock held by non-affiliates of the registrant based upon the closing sale price of the common stock on June 30, 2019 (the last business day of the registrant's most recently completed second fiscal quarter), as reported on the Nasdaq Global Select Market was $1,244,723,752. For purposes of this calculation, directors and executive officers of the registrant have been deemed affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of February 21, 2020, a total of 116,022,630 shares of common stock $0.01 par value per share were outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Certain information required by Part III, Items 10-14 of this Form 10-K is incorporated by reference to the registrant's definitive Proxy Statement for the 2020 Annual Meeting of Stockholders to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Form 10-K, provided that if such Proxy Statement is not filed within such period, such information will be included in an amendment to this Form 10-K to be filed within such 120-day period.

TABLE OF CONTENTS

		Page
	PART I	
Item 1.	Business	4
Item 1A.	Risk Factors	29
Item 1B.	Unresolved Staff Comments	54
Item 2.	Properties	54
Item 3.	Legal Proceedings	54
Item 4.	Mine Safety Disclosures	54
	PART II	
Item 5.	Market for the Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities	55
Item 6.	Selected Financial Data	56
Item 7.	Management's Discussion and Analysis of Financial Condition and Results of Operations	56
Item 7A.	Quantitative and Qualitative Disclosures About Market Risk	63
Item 8.	Financial Statements and Supplementary Data	65
Item 9.	Changes in and Disagreements with Accountants on Accounting and Financial Disclosure	101
Item 9A.	Controls and Procedures	101
Item 9B.	Other Information	104
	PART III	
Item 10.	Directors, Executive Officers and Corporate Governance	105
Item 11.	Executive Compensation	105
Item 12.	Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters	106
Item 13.	Certain Relationships and Related Transactions, and Director Independence	106
Item 14.	Principal Accounting Fees and Services	106
	PART IV	
Item 15.	Exhibits, Financial Statement Schedules	107
Item 16.	Form 10-K Summary	110

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

Some statements contained in this report are "forward-looking statements" within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, or the Exchange Act. These statements relate to our future events, including our anticipated operations, research, development and commercialization activities, clinical trials, operating results and financial condition. These forward-looking statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performances or achievements expressed or implied by the forward-looking statements. Forward-looking statements may include, but are not limited to, statements about:

- our strategy;
- anticipated product candidate development and potential commercialization of any resulting products;
- the initiation, scope, rate of progress, enrollment, anticipated results and timing of our preclinical studies and clinical trials and those of our collaborators or strategic partners;
- the therapeutic and commercial potential of, and the ability of Sangamo and our collaborators or strategic partners to advance the development of, product candidates using our zinc finger protein, or ZFP, technology platform, including our ability to effectively deliver our zinc finger nucleases, or ZFNs, and ZFP transcription factors, or ZFP-TFs, to produce a clinical benefit;
- the benefits of the acquisition of Sangamo Therapeutics France S.A.S., or Sangamo France (formerly known as TxCell S.A.);
- our ability to establish and maintain collaborative, licensing and other similar arrangements, including whether or not the collaboration and licensing agreement and stock purchase agreement with Biogen MA, Inc. and Biogen International GmbH, collectively Biogen, become effective;
- anticipated revenues from existing and new collaborations and the timing thereof;
- our research and development and other expenses;
- our ability to obtain adequate preclinical and clinical supplies of our product candidates from current and potential new suppliers and manufacturers;
- the ability of Sangamo and our collaborators or strategic partners to obtain and maintain regulatory approvals for product candidates using our ZFP technology platform;
- our ability to comply with, and the impact of, regulatory requirements, obligations and restrictions on our business;
- our ability to protect our intellectual property and operate our business without infringing upon the intellectual property rights of others, including our ability to obtain rights to the gene transfer technologies required to develop and commercialize our product candidates;
- our estimates regarding the sufficiency of our cash resources and our expenses, capital requirements and need for additional financing, and our ability to obtain additional financing;
- our ability to manage the growth of our business;
- our projected operating and financial performance;
- our operational and legal risks; and
- our plans, objectives, expectations and intentions and any other statements that are not historical facts.

In some cases, you can identify forward-looking statements by terms such as: "anticipates," "believes," "continues," "could," "estimates," "expects," "intends," "may," "plans," "seeks," "should," "will" and similar expressions intended to identify forward-looking statements. These statements reflect our current views with respect to future events, are based on assumptions and are subject to risks and uncertainties. Given these risks and uncertainties, you should not place undue reliance on these forward-looking statements. We discuss many of these risks in greater detail under the headings "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations" in this Form 10-K. Except as required by law, we undertake no obligation to update or revise any forward-looking statements to reflect new information or future events or developments. Readers are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date of this Annual Report on Form 10-K.

PART I

ITEM 1 – BUSINESS

OVERVIEW

We are a clinical stage biotechnology company focused on translating ground-breaking science into genomic medicines with the potential to transform patients' lives using our platform technologies in gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation.

Our strategy is to maximize the value and therapeutic use of our technology platforms. For certain therapies, we intend to capture the value of our proprietary gene therapy and genome editing products by incorporating these technologies into our manufacturing, development and commercial operations. For other therapies, we intend to partner with biopharmaceutical companies to develop products as appropriate. Decisions to partner product candidates will be based on review of our internal resources, internal know-how, and commercial considerations. In our proprietary clinical development programs, we are focused on three therapeutic areas: inherited metabolic diseases, or IMDs, central nervous system, or CNS, diseases and immunology, which comprises inflammatory and autoimmune diseases.

We are a leader in the research and development of zinc finger proteins, or ZFPs, a naturally occurring class of transcription factor proteins found in humans and other species. We have used our internal know-how and technical expertise to develop a proprietary synthetic ZFP platform with potential clinical utility in *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation. ZFPs can be engineered to make zinc finger nucleases, or ZFNs, proteins that can be used to specifically modify DNA sequences by knocking in or knocking out select genes, or genome editing, and ZFP transcription-factors, or ZFP-TFs, proteins that can be used to selectively increase or decrease gene expression. In the process of developing this platform, we have additionally accrued significant scientific, manufacturing, development capabilities, and related know-how that are broadly applicable to the field of gene therapy and have used this knowledge to advance a gene therapy platform.

We have a substantial intellectual property portfolio protecting our technology and product candidates. We continue to license and file new patent applications to strengthen and consolidate our existing patent portfolio. We believe that our intellectual property position is critical to our ability to research, develop, manufacture and commercialize gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation products and services.

Business Updates

In February 2020, we entered into a global licensing collaboration agreement with Biogen for the research, development and commercialization of gene regulation therapies for the treatment of neurological diseases, including ST-501 a preclinical ZFP-TF product candidate for tauopathies including Alzheimer's disease, and ST-502, a preclinical ZFP-TF product candidate for alpha-synuclein related diseases including Parkinson's disease, among other targets. After the collaboration agreement becomes effective, Biogen will pay us an upfront payment of $125.0 million. Concurrently with the execution of the collaboration agreement, we also entered into a stock purchase agreement with Biogen MA, Inc. pursuant to which Biogen MA, Inc. agreed to acquire $225.0 million of shares of our common stock. We are also eligible to receive research, development, regulatory and commercial milestone payments that could total up to approximately $2.37 billion if Biogen selects all of the targets allowed under the agreement and all the specified milestones set forth in the agreement are achieved, which includes up to $925.0 million in pre-approval milestone payments and up to $1,445.0 million in first commercial sale and other sales-based milestone payments. The consummation of the transactions under each of the Biogen collaboration agreement and the stock purchase agreement is subject to the satisfaction of customary closing conditions, including the expiration or termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended. For more information regarding the Biogen agreements, see "—Collaborations—Biogen."

In late December 2019, we completed the transfer to Pfizer of the SB-525 hemophilia A gene therapy investigational new drug, or IND, application for which we earned a $25.0 million milestone payment under the terms of our collaboration agreement with Pfizer for the global development and commercialization of gene therapies for hemophilia A. In 2019, we also completed the manufacturing technology transfer to Pfizer. Pfizer is now advancing SB-525 into a Phase 3 registrational clinical study, which is expected to provide the basis for seeking regulatory approval as a therapeutic. We presented updated follow-up of the Phase 1/2 Alta Study assessing SB-525 in adult patients with severe hemophilia A in partnership with Pfizer at the 61stAmerican Society of Hematology, or ASH, annual meeting in December 2019. The data showed that SB-525 was generally well tolerated and demonstrated sustained increased Factor VIII levels following treatment with SB-525 through to 44 weeks, the extent of follow-up for the longest treated patient in the 3e13 vg/kg dose cohort.

We are also evaluating our wholly-owned investigational ST-920 gene therapy for Fabry disease, a rare inherited metabolic disease. In 2019, the IND was accepted by the U.S. Food and Drug Administration, or FDA, and a clinical trial authorization, or CTA, was granted in the United Kingdom. The FDA also granted Orphan Drug Designation to ST-920 for the

treatment of Fabry disease. We are currently evaluating ST-920 in adult males with classic Fabry disease in the Phase 1/2 STAAR study, an open-label, dose-ascending clinical trial.

We presented preliminary data from the Phase 1/2 THALES Study assessing ST-400, investigational *ex vivo* gene-edited cell therapy in patients with transfusion-dependent beta thalassemia in partnership with Sanofi at ASH. In December 2019, we also achieved a $7.5 million milestone from Sanofi for the first patient dosed in its Phase 1/2 PRECIZN-1 trial evaluating BIVV003, investigational *ex vivo* gene-edited cell therapy for the treatment of sickle cell disease, or SCD.

In late 2019, we received CTA authorization in the United Kingdom for the Phase 1/2 STEADFAST clinical study evaluating the CAR-Treg cell therapy TX200 for kidney transplantation, which we expect to initiate in 2020.

Finally, in November 2019, we established a new Scientific Advisory Board comprising industry and academic international thought leaders who will advise us on our current and future clinical programs and research and development strategy.

INTRODUCTION TO OUR TECHNOLOGY

We conduct research & development across four distinct but complementary technology platforms – gene therapy, *ex vivo* cell therapy, *in vivo* genome editing, and *in vivo* genome regulation. We believe that the optionality and diversity inherent to our technology platforms enables us to design therapeutic approaches to resolve the underlying genetic causes of disease, using whichever technology is best suited to deliver that treatment.

ZFPs are Naturally Occurring Transcription Factors in Humans

ZFPs are naturally occurring transcription factors in humans. A transcription factor recognizes and binds to a specific DNA sequence within or near a particular gene and causes expression of that gene to be “turned on” (activated) or “turned off” (repressed). ZFPs are the most common class of naturally occurring transcription factors in a wide range of organisms from yeast to humans. Functional domains may be added to ZFPs that enable genome editing (with enzymes such as nucleases or integrases) or genome regulation (with activators and repressors) at a specific genomic site determined by the ZFP DNA-binding domain.

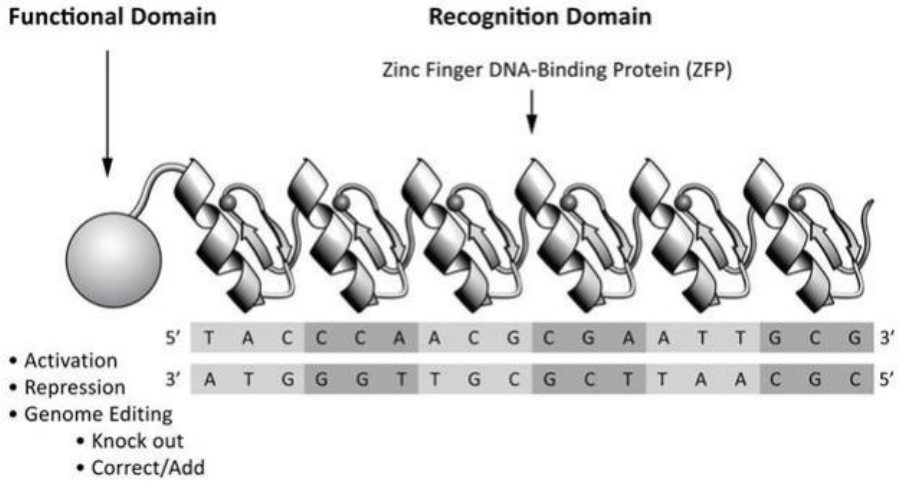


Figure 1:

Schematic of the two-domain structure of a ZFP and its therapeutic functional domain

Consistent with the structure of natural ZFPs, we take a modular approach to the design of the proteins that we engineer. The ZFP portion of our engineered proteins, the DNA-recognition domain, is typically composed of four to six zinc fingers. Each individual finger recognizes and binds to a three or four base pair sequence of DNA and multiple fingers can be linked together to recognize longer stretches of DNA, thereby improving specificity. By modifying the amino acid sequence of a ZFP, we can engineer novel ZFPs capable of recognizing the unique DNA sequences of a chosen genomic target. The engineered ZFP DNA-binding domain is then linked to a functional domain. The ZFP DNA-binding domain brings this functional domain to the target of interest. Our ability to use our highly specific ZFPs to precisely target a DNA sequence to a

gene of interest provides us with a range of genome editing and genome regulation functionalities that can be applied to multiple cell types.

Our engineered ZFPs can be attached to a cleavage domain of a restriction endonuclease, an enzyme that cuts DNA, creating a zinc finger nuclease, or ZFN. When a pair of ZFNs binds DNA in the correct orientation and spacing, a cut is introduced into the DNA sequence between the ZFP binding sites. DNA binding by both ZFNs is necessary for cleavage, and the two halves of the endonuclease must be present in the correct orientation to interact with one another in order to mediate DNA cleavage. This break in the DNA triggers a natural process of DNA repair within the cell. This endogenous DNA repair process may be harnessed to achieve one of several outcomes that may be therapeutically useful (Figure 2). If cells are treated with ZFNs alone, the repair process joins the two ends of the broken DNA together and frequently results in the loss (deletion) or addition (insertion) of a small amount of genetic material at the site of the break. These insertions and deletion events are collectively known as "indels". These disrupt the target DNA sequence and result in the expression of a truncated or non-functional protein from the targeted gene, effectively “knocking out” the gene function. ZFN-mediated genome editing can be used to disrupt genes that are involved in disease pathology. We are using ZFN-mediated genome editing of the *BCL11A* erythroid specific enhancer, or ESE, in hematopoietic stem progenitor cells, or HSPCs, as the basis of a potential long-lasting and once only treatment for beta thalassemia (ST-400) and SCD (BIVV-003).

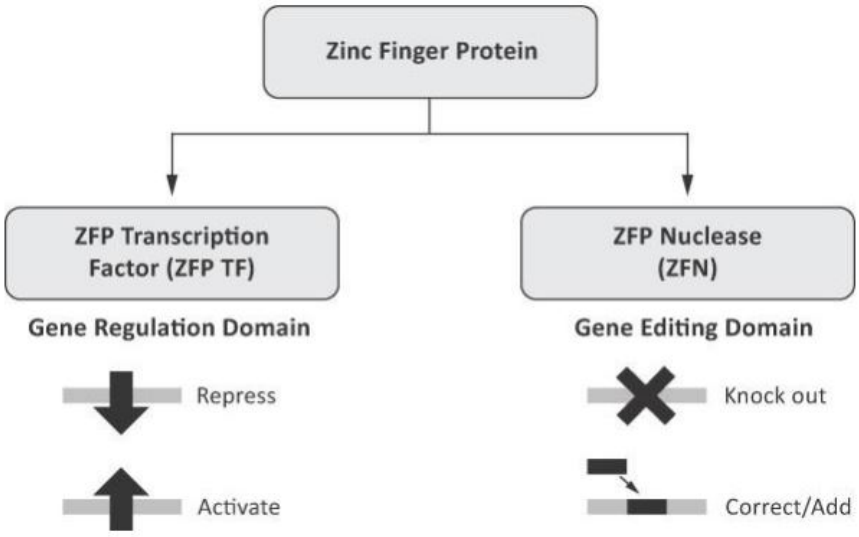


Figure 2:

Schematic of ZFP genome editing and genome regulation

In contrast, if cells with a mutation in a particular gene are treated not only with ZFNs, but also with an additional DNA sequence that encodes the correct gene sequence (referred to as a “donor” DNA) and with ZFNs that recognize and bind to sequences flanking the mutation, the cell’s repair machinery can use the donor DNA as a template to correct the mutated gene. This ZFN-mediated gene correction enables the corrected gene to be expressed in its natural chromosomal context and may provide a novel approach for the precise repair of DNA sequence mutations responsible for certain monogenic diseases. In addition to providing a donor sequence that encodes a complete gene, a new copy of a gene can also be precisely added into the genome at a specific location. The ability to precisely place a gene-sized segment of DNA specifically into a pre-determined location in the genome broadens the range of mutations of a gene that can be corrected in a single step. It also reduces the insertional mutagenesis concerns associated with traditional integrating gene replacement approaches such as lentiviruses, in which the insertion of a new corrective copy of the gene typically occurs at random locations in the genome. Our ZFN technology is used to insert a gene encoding a therapeutic protein into a location such as the Albumin gene, an approach that we are investigating as a single and potentially curative treatment for mucopolysaccharidosis type II (MPS II) as well as several other rare diseases.

We are also evaluating ZFP-TFs, which have the potential to regulate the expression of a target gene (Figure 2). For instance, attaching an activation domain to a ZFP will cause a target gene to be expressed at increased levels, relative to an untreated cell. Alternatively, a repression domain causes the gene to be downregulated or completely turned off. We have several preclinical programs evaluating the potential of ZFP-TFs that have been designed to down regulate the expression of genes as potential treatments for CNS diseases, including programs for Alzheimer’s disease and Parkinson’s disease (being

evaluated pursuant to a collaboration agreement with Biogen) and partnered programs for Huntington's disease (being evaluated pursuant to a collaboration agreement with Takeda Pharmaceutical Company Limited, or Takeda), and amyotrophic lateral sclerosis, or ALS (being evaluated pursuant to a collaboration agreement with Pfizer Inc., or Pfizer).

ZFPs provide the Opportunity to Develop a New Class of Human Therapeutics

We believe that our ZFP technology provides a unique and proprietary basis for a broad new class of drugs that have differentiated technical advantages over small-molecule drugs, protein pharmaceuticals, RNA-based therapeutics, conventional gene therapy approaches and other gene and genome editing platforms, potentially enabling us to develop therapies that address a broad range of unmet medical needs.

We can generate highly specific ZFNs for genome editing and ZFP-TFs for genome regulation using a range of proprietary methods. We are developing delivery strategies to administer these therapeutics, including using mRNA, adeno-associated virus, or AAV, adenovirus, plasmid, lipid nanoparticles and direct injection into brain tissue or into the cerebrospinal fluid. As more genes and DNA sequences are linked to specific diseases, we believe that the clinical breadth and scope of our ZFP therapeutic reagents will continue to expand.

THERAPEUTIC PRODUCT DEVELOPMENT

We focus on translating ground-breaking science into genomic medicines with the potential to transform patients' lives using our platform technologies in gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation.

Our Product Development Programs

Projected pipeline progress in 2020

Gene therapy programs

SB-525

SB-525 continues to be developed as an investigational gene therapy for severe hemophilia A, under a global collaboration with Pfizer, for the research, development and commercialization of gene therapy product candidates for severe hemophilia A. Under this agreement, we conducted the Phase 1/2 clinical trial and certain manufacturing activities for SB-525, while Pfizer is now handling the subsequent worldwide development, manufacturing, marketing and commercialization of SB-525.

In 2017, we initiated the Phase 1/2 Alta study to evaluate the safety and efficacy of SB-525 in adults with severe hemophilia A. The Alta study is an open label, ascending dose clinical trial in up to 20 adults with severe hemophilia A. In December 2019, we and Pfizer announced updated initial data from the Phase 1/2 Alta study evaluating SB-525 including data from 11 patients treated across four ascending dose cohorts: 9e11 vg/kg (2 patients), 2e12 vg/kg (2 patients), 1e13 vg/kg (2 patients) and 3e13 vg/kg (5 patients). Dose dependent increases in factor VIII, or FVIII, activity over baseline were observed across the dose cohorts. FVIII is an essential blood-clotting protein encoded by the *F8* gene. A lower-dose cohort indicated durable FVIII activity with up to 52 weeks of follow-up. In the 3e13 vg/kg dose cohort, patients achieved normal range FVIII activity within 5-7 weeks of treatment with SB-525. The first two patients treated in this cohort (Patients 7 and 8) achieved stable FVIII levels, demonstrating durability in the normal range through 44 and 37 weeks, respectively, as measured by the chromogenic assay. The two patients most recently treated in this cohort (Patients 10 and 11), with 22 and 12 weeks of follow-up, respectively, demonstrated a similar pattern of FVIII expression. The FVIII expression pattern observed in Patient 9 differed from that of other patients in the cohort. Seven weeks following treatment, Patient 9 achieved normal range FVIII levels. Beginning at week 13, FVIII levels in that patient fluctuated in a range below normal, but still well above the level needed to prevent spontaneous bleeding. At week 18, FVIII levels in Patient 9 began to increase, and as of the latest measurement at week 24, continued to rise. No patient in the 3e13 vg/kg dose cohort experienced bleeding events up to 44 weeks of follow-up, and no patient in this dose cohort required factor replacement following initial use of prophylactic factor.

SB-525 was generally well tolerated across all dose cohorts. The treatment-related adverse events include: alanine aminotransferase, or ALT, elevation (36.4%, n=4), pyrexia (27.3%, n=3), increased aspartate aminotransferase (18.2%, n=2), tachycardia (18.2% n=2), fatigue (9.1%, n=1), hypotension (9.1%, n=1) and myalgia (9.1%, n=1). One patient in the 3e13 vg/kg cohort experienced a treatment-related serious adverse event of hypotension (grade 3), as well as a fever (grade two), six hours following dosing with SB-525 that fully resolved within 24 hours. No similar events were reported in the other patients dosed in that cohort. No patients treated with SB-525 experienced an ALT elevation associated with loss of Factor VIII expression. In the 3e13 vg/kg dose cohort, four patients experienced transient low grade ALT elevations (>1.5 x baseline) that were managed with a tapering course of oral steroids. The study does not use corticosteroids prophylactically, initiating them only in the event of an ALT elevation that is greater than 1.5x baseline.

In late December 2019, we completed the transfer to Pfizer of the SB-525 hemophilia A gene therapy IND application for which we earned a $25.0 million milestone payment under the terms of our collaboration agreement with Pfizer for the global development and commercialization of gene therapies for hemophilia A. In 2019, we also completed the manufacturing technology transfer to Pfizer. Pfizer is now advancing SB-525 into a Phase 3 registrational clinical study, which is expected to provide the basis for seeking regulatory approval as a therapeutic.

Based on the results from the Alta study, the FDA has granted regenerative medicine advanced therapy, or RMAT, designation for SB-525 gene therapy to treat severe hemophilia A. RMAT designation is granted to regenerative medicine therapies intended to treat, modify, reverse, or cure a serious condition, for which preliminary clinical evidence indicates that the medicine has the potential to address an unmet medical need. The RMAT designation includes all the benefits of the fast track and breakthrough therapy designation programs, including early interactions with the FDA. SB-525 has also been granted Orphan Drug and Fast Track designation by the FDA, as well as Orphan Medicinal Product designation by the European Medicines Agency, or EMA.

ST-920 and ST-101

We are also evaluating our wholly-owned investigational ST-920 gene therapy for Fabry disease, a rare inherited metabolic disease. In 2019, the IND was accepted by the FDA and a CTA was granted in the United Kingdom. The FDA also granted Orphan Drug Designation to ST-920 for the treatment of Fabry disease. We are currently evaluating ST-920 in adult males with classic Fabry disease in the Phase 1/2 STAAR study, an open-label, dose-ascending clinical trial.

In late 2019, we announced plans to advance ST-101, a wholly-owned investigational gene therapy for phenylketonuria, or PKU, a rare inherited disorder that originates from a defect in the PAH gene and results in harmful accumulation of phenylalanine in cells throughout the body. We anticipate filing an IND for ST-101 with the FDA in 2021.

***Ex vivo* gene-edited cell therapy programs**

ST-400 and BIVV-003

In January 2014, we entered into an exclusive worldwide collaboration and license agreement with Bioverativ Inc., (now Sanofi Genzyme, a global business unit of Sanofi, or Sanofi), to develop therapeutics for hemoglobinopathies, focused on beta thalassemia and SCD. Under the agreement, we are developing ST-400 and BIVV-003, *ex vivo* gene-edited cell therapies, for hemoglobinopathies including transfusion dependent beta thalassemia and SCD, respectively. ST-400 and BIVV-003 are related product candidates using the same technology involving gene editing of a patient's own hematopoietic stem progenitor cells using non-viral delivery of ZFN technology. We are conducting the Phase 1/2 THALES study, an open-label, single arm clinical trial to evaluate the safety and efficacy of ST-400 in up to six subjects with beta thalassemia. Recruitment of the Thales study is ongoing, with five of six patients enrolled. In August 2019 a third patient was dosed in the THALES study, and following dosing of this subject we achieved a $6.0 million milestone with Sanofi and also received $2.1 million from the

California Institute for Regenerative Medicine. In December 2019, the first subject was dosed in the SCD Phase 1 clinical trial, and following the dosing of this subject we achieved a $7.5 million milestone with Sanofi. Sanofi is recruiting the Phase 1/2 PRECIZN-1 study, an open-label, single arm clinical trial to evaluate the safety and efficacy of BIVV-003 in subjects with sickle cell disease. Sanofi is responsible for the subsequent development, manufacturing and commercialization of all licensed products.

In December 2019, we presented preliminary results from the first three patients treated in the THALES study evaluating ST-400. In the THALES study, HSPCs are collected from the patient, modified using ZFN gene editing technology to disrupt the ESE of the BCL11A gene, and cryopreserved prior to infusion back into the patient following myeloablative conditioning with busulfan.

As of the data cut date for the presentation, the three patients treated with ST-400 experienced prompt hematopoietic reconstitution, demonstrating neutrophil engraftment in 14-22 days and platelet engraftment in 22-35 days. No emerging clonal hematopoiesis had been observed as measured by on-target indel pattern monitoring in the three treated patients. Reported adverse events are consistent with the known toxicities of mobilization, apheresis, and myeloablative busulfan conditioning. Details of the date for each of three patients follows:

- Patient 1, age 36, has a β^0/β^0 genotype, the most severe form of TDT. Following ST-400 infusion, fetal hemoglobin levels increased to approximately 2.7 g/dL at Day 56 and remained elevated compared to baseline at 0.9 g/dL at week 39, the most recent measurement at the time of the data cut. After an initial transfusion-free duration of 6 weeks, the patient resumed intermittent packed red blood cell, or PRBC, transfusions, with an overall 33% reduction in annualized PRBC units transfused since engraftment. Patient 1 experienced one treatment-related serious adverse event, hypersensitivity during ST-400 infusion considered by the investigator to be likely related to the product cryoprotectant excipient, DMSO, and which resolved by the end of the infusion.

- Patient 2, age 30, is homozygous for the severe β+ IVS-I-5 (G>C) mutation. Following ST-400 infusion, fetal hemoglobin levels increased as compared with baseline, but have been <1 g/dL through to 26 weeks, the lowest induction level observed in the three patients treated to date. The patient is currently receiving intermittent PRBC transfusions.

- Patient 3, age 23, has a β0/β+ genotype that includes the severe IVS-II-654 (C>T) mutation. Following ST-400 infusion, fetal hemoglobin levels have increased as compared to baseline and were continuing to rise as of the latest measurement of 2.8 g/dL at Day 90. Following an initial transfusion-free period of seven weeks, the patient has received two PRBC transfusions commencing at 62 days post-infusion.

Not included in the presentation of the preliminary data discussed above are Patient 4, age 18 with a β^{WT} (αα)/β^o (αααα) genotype, and Patient 5, age 35 with a β^o/β+ (severe IVS-I-110 G>A) genotype, each of which were dosed after the time of the data cut. We expect to enroll a sixth and final patient in the study in the coming months.

Kite Collaboration and TX200

In February 2018, we entered into a global collaboration and license agreement with Kite Pharma, Inc., or Kite, a wholly-owned subsidiary of Gilead Sciences, Inc., or Gilead, for the research, development and commercialization of engineered cell therapies for cancer. Under this agreement, which we amended and restated in September 2019, we are working together with Kite on a research program to design ZFNs and viral vectors to disrupt and insert select genes in T-cells and natural killer cells, or NK-cells, including the insertion of genes that encode chimeric antigen receptors, or CARs, T-cell receptors, or TCRs, and NK-cell receptors, or NKRs, directed to mutually agreed targets. Kite is responsible for all clinical development and commercialization of any resulting products and has announced that they expect to initiate a clinical trial in 2020 evaluating KITE-037, an allogeneic anti-CD19 CAR-T cell therapy.

Following the October 2018 acquisition of Sangamo Therapeutics France S.A.S., or Sangamo France (formerly TxCell, S.A.), we are evaluating the potential of CAR-Tregs (regulatory T-cells, or Tregs), genetically modified with a CAR in solid organ transplantation. We are also conducting preclinical studies to determine whether such agents have potential clinical utility in autoimmune and inflammatory diseases, such as multiple sclerosis, or MS, and inflammatory bowel diseases, or IBD. In addition, we intend to use our ZFN gene editing technology to potentially develop next-generation autologous and allogeneic CAR-Treg cell therapies for use in the treatment of autoimmune and inflammatory diseases. In late 2019, a CTA was granted in Europe for TX200, an autologous CAR-Treg cell therapy for the prevention of solid organ transplant rejection. We expect to initiate the TX200 clinical trial in 2020.

***In vivo* genome editing programs**

We have three proprietary *in vivo* genome editing programs being evaluated in Phase 1/2 clinical trials: SB-913 (Mucopolysaccharidosis type II, or MPS II), SB-318 (MPS I), and SB-FIX (hemophilia B). In April 2019, we announced that

we did not plan to treat additional patients in our SB-913, SB-318 and SB-FIX clinical trials with first generation ZFNs given that clinical benefit has not been demonstrated in the analyses conducted to date.

We are planning a new clinical trial for SB-913 to treat MPS II to evaluate second-generation ZFNs and other potential modifications that have the potential to enhance the clinical efficacy of this product. These include modifications that have the potential to enhance the efficiency of *in vivo* delivery of the ZFNs. We expect to use data from the new study evaluating second generation ZFNs to make a Phase 3 decision for the SB-913 program and to define the next steps, if any, for the SB-318 and SB-FIX programs.

***In vivo* genome regulation programs**

We have several ongoing preclinical programs evaluating our ZFP-TF, genome regulation technology. ZFP-TFs act at the DNA level to selectively repress or activate the expression of specific genes to achieve a desired therapeutic effect. Genome regulation differs from other genome editing approaches as it is designed to enable precise, robust, and long-term activation or repression of a selected gene following a single AVV administration and does not cut or modify the target DNA. We are developing ZFP-TFs as a novel therapeutic approach for CNS diseases.

In March and April 2019, we presented preclinical data describing the effects of ZFP-TFs targeting the gene that encodes tau protein, delivered with AAVs in the mouse and nonhuman primate, or NHP, brain. Certain CNS diseases known as tauopathies, including dementias such as Alzheimer's disease, are associated with tau proteins that have become dysfunctional as a result of their misfolding and accumulating in brain tissues. Intra-hippocampal ZFP-TF delivery to adult mice resulted in more than 80% tau reduction, and intravenous ZFP-TF administration reduced tau levels by 50-70% across the entire mouse brain. AAV ZFP-TFs targeting tau were administered to the adult NHP hippocampus using real-time MRI-guided stereotaxic infusion. The lowering of tau in the hippocampus and entorhinal cortex of NHP was correlated with transgene expression levels. The treatment was well-tolerated for the duration of the study. We believe that together, these preclinical data from mice and NHPs highlight the potential for a single administration of a ZFP-TF to lower tau as a treatment for tauopathies, including Alzheimer's disease.

In December 2019, we nominated ST-501 as a preclinical ZFP-TF product candidate for tauopathies including Alzheimer's disease, with IND submission anticipated in 2021. We also nominated ST-502 as a preclinical ZFP-TF product candidate for alpha-synuclein related diseases, including Parkinson's disease, with IND submission anticipated in 2022. In February 2020, we entered into a collaboration and license agreement with Biogen to further develop ST-501 and ST-502, among other targets. For more information regarding the Biogen collaboration, see "—Collaborations—Biogen."

In December 2017, we entered into a research collaboration and license agreement with Pfizer for the development and commercialization of potential gene therapy products that use ZFP-TFs to treat ALS, and frontotemporal lobar degeneration, or FTLD, linked to mutations in the *C9ORF72* gene. Under this agreement, we are working with Pfizer on a research program to identify, characterize and preclinically develop ZFP-TFs that satisfy pre-agreed criteria. Pfizer is responsible for subsequent development, manufacturing and commercialization of all licensed products.

Pursuant to a collaboration agreement with Takeda, we have a preclinical program for Huntington's disease in which we are evaluating a ZFP-TF designed to differentially down regulate the mutated disease-causing huntingtin gene, or HTT gene, while preserving the expression of the normal version of the gene.

Legacy Clinical Research Programs

SB-728– Human Immunodeficiency Virus, or HIV, and Acquired Immunodeficiency Syndrome, or AIDS

HIV infection results in the death of immune cells, particularly CD4+ T-cells, and leads to AIDS, a condition in which the body's immune system is depleted to such a degree that the patient is unable to fight off common infections. Ultimately, these patients succumb to opportunistic infections or cancers.

Currently, there are over 30 antiretroviral drugs approved by the FDA to treat people infected with HIV. While these drugs can suppress virus in the blood to undetectable levels, they cannot eliminate the reservoir of cells containing genomically-integrated HIV from the body. Hence, individuals infected with HIV need to take antiretroviral drugs continuously. There is no therapeutic approach available that protects CD4+ T-cells, suppresses viral load, reduces the viral reservoir and that does not require daily dosing.

SB-728 uses our ZFN-mediated genome editing technology to disrupt the *CCR5* gene in cells of a patient's immune system to make these cells permanently resistant to HIV infection. *CCR5* is a co-receptor for HIV entry into T-cells and if *CCR5* is not expressed on the cell surface HIV cannot infect them or infects them with lower efficiency. The aim of this approach is to provide the patient with a population of HIV-resistant cells that can fight HIV and opportunistic infections, by mimicking the naturally occurring *CCR5 delta-32* mutation that renders a population of individuals largely resistant to infection

by the most common strains of HIV. We are evaluating this genome editing approach to disrupt the *CCR5* gene in both T-cells and HSPCs as two potential therapeutic candidates, SB-728-T and SB-728-HSPC, respectively.

We have conducted several clinical trials with SB-728-T, which were designed to evaluate safety and tolerability of SB-728-T, as well as the effect of SB-728-T on subjects' CD4 T-cell counts, levels of *CCR5*-modified T-cells, viral burden during a treatment interruption from anti-retroviral therapy, or ART, and measure of the viral reservoir. The data to date have demonstrated an ability to efficiently knock out the *CCR5* gene in T-cells by ZFN-driven genome editing and grow the cells *ex vivo*, that a single infusion of SB-728-T led to proven engraftment, expansion and persistence of T-cells *in vivo*, sustained increases in CD4 T-cell counts, a significant and continuous decay of the HIV reservoir and the ability of certain subjects to control their viral loads for prolonged periods in the absence of ART. Over 100 subjects have been treated to date and the treatment appears to be well-tolerated.

In addition, we have an ongoing investigator-sponsored Phase 1/2 clinical trial (SB-728mR-HSPC) to investigate SB-728-HSPC as a self-renewable and potentially lifelong source of HIV-resistant immune cells.

We plan to advance the SB-728 program through potential future collaborations.

COLLABORATIONS

We have established collaborative and strategic partnerships for several of our therapeutic programs and also for several non-therapeutic applications of our technology. We will continue to pursue further partnerships when appropriate with selected pharmaceutical and biotechnology companies to fund internal research and development activities and to assist in product development and commercialization. Decisions to partner product candidates will be based on review of our internal resources, internal know-how, and commercial considerations. We are applying our ZFP technology platform to several commercial applications in which our products provide us and our strategic partners and collaborators with potential technical, competitive and economic advantages.

Biogen

In February 2020, we entered into a global licensing collaboration agreement with Biogen for the research, development and commercialization of gene regulation therapies for the treatment of neurological diseases. We plan to leverage our proprietary ZFP technology delivered via AAV to modulate expression of key genes involved in neurological diseases.

Under the Biogen collaboration agreement, we will grant to Biogen an exclusive, royalty bearing and worldwide license, under our relevant patents and know-how, to develop, manufacture and commercialize certain ZFP and/or AAV-based products directed to up to 12 neurological disease gene targets selected by Biogen. Biogen has already selected three of these: ST-501 for tauopathies including Alzheimer's disease, ST-502 for synucleinopathies including Parkinson's disease, and a third undisclosed neuromuscular disease target. Biogen has exclusive rights to nominate up to nine additional targets over a target selection period of five years. For each gene target selected by Biogen, we will perform early research activities, costs for which will be shared by the companies, aimed at the development of the combination of proprietary CNS delivery vectors and ZFP-TFs targeting therapeutically relevant genes. Biogen will then assume responsibility and costs for the IND-enabling studies, clinical development, related regulatory interactions, and global commercialization. We will primarily be responsible for GMP manufacturing activities for the initial clinical trials for the first three products of the collaboration and plan to leverage our in-house manufacturing capacity. Biogen will assume responsibility for GMP manufacturing activities beyond the first clinical trial for each of the first three products. Subject to certain exceptions set forth in the Biogen collaboration agreement, we will be prohibited from developing, manufacturing or commercializing any therapeutic product directed to the targets selected by Biogen.

After the Biogen collaboration agreement becomes effective, Biogen will pay us an upfront payment of $125.0 million. We are also eligible to receive research, development, regulatory and commercial milestone payments that could total up to approximately $2.37 billion if Biogen selects all of the targets allowed under the agreement and all the specified milestones set forth in the agreement are achieved, which includes up to $925.0 million in pre-approval milestone payments and up to $1,445.0 million in first commercial sale and other sales-based milestone payments. In addition, we will also be eligible to receive tiered high single-digit to sub-teen royalties on potential net commercial sales of licensed products arising from the collaboration. These royalty payments will be subject to reduction due to patent expiration, entry of biosimilar products to the market and payments made under certain licenses for third-party intellectual property.

The Biogen collaboration agreement will continue, on a product-by-product and country-by-country basis, until the expiration of the applicable royalty term. Biogen has the right to terminate the collaboration agreement, in its entirety or on target-by-target basis, for any reason after a specified notice period. Each party has the right to terminate this agreement on account of the other party's bankruptcy or material, uncured breach. In addition, we may terminate the collaboration agreement if Biogen challenges any patents licensed by us to Biogen.

Concurrently with the execution of the collaboration agreement, we also entered into a stock purchase agreement with Biogen MA, Inc., pursuant to which Biogen MA, Inc. will purchase 24,420,157 shares of our common stock, or the Biogen Shares, at a price per share of $9.2137, for an aggregate purchase price of $225.0 million.

Pursuant to the terms of the stock purchase agreement, Biogen has agreed not to, without our prior written and subject to specified conditions and exceptions, directly or indirectly acquire shares of our outstanding common stock, seek or propose a tender or exchange offer or merger between the parties, solicit proxies or consents with respect to any matter, or undertake other specified actions related to the potential acquisition of additional equity interests in us. Subject to customary exceptions, such standstill restrictions expire on the earlier of the three-year anniversary of the effectiveness of the Biogen collaboration agreement and the date that Biogen beneficially owns less than 5% of our common stock.

The stock purchase agreement also provides that until the first anniversary of the effectiveness of the Biogen collaboration agreement, Biogen will hold and not sell any of the Biogen Shares and from the first anniversary through the second anniversary, Biogen will hold and not sell at least 50% of the Biogen Shares, in addition to being subject to certain volume limitations. The stock purchase agreement further provides that, subject to certain limitations, upon Biogen's request, we will register for resale any of the Biogen Shares on a registration statement to be filed with the SEC, until such time as all remaining Biogen Shares may be sold pursuant to Rule 144 promulgated under the Securities Act during any 90-day period.

In addition, Biogen has agreed that, excluding specified extraordinary matters, it will vote the Biogen Shares in accordance with our recommendation and has granted us an irrevocable proxy with respect to the foregoing. Such voting provisions expire on the earlier of (i) the two-year anniversary of the effectiveness of the Biogen collaboration agreement, (ii) the date that Biogen beneficially owns less than 5% of our common stock and (iii) the date the Biogen collaboration agreement is terminated; provided, however, that in no event shall such expiration date be prior to the one-year anniversary of the effectiveness of the Biogen collaboration agreement.

The consummation of the transactions under each of the Biogen collaboration agreement and the stock purchase agreement is subject to the satisfaction of customary closing conditions, including the expiration or termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended.

Kite

In February 2018, we entered into a collaboration and license agreement with Kite, a wholly-owned subsidiary of Gilead, which became effective in April 2018 and was amended and restated in September 2019, for the research, development and commercialization of potential engineered cell therapies for cancer. Kite will be responsible for all clinical development and commercialization of any resulting products and has announced that it expects to initiate a clinical trial evaluating KITE-037, an allogeneic anti-CD19 CAR-T cell therapy, in 2020.

Subject to the terms of this agreement, we granted Kite an exclusive, royalty-bearing, worldwide, sublicensable license, under our relevant patents and know-how, to develop, manufacture and commercialize, for the purpose of treating cancer, specific cell therapy products that may result from the research program and that are engineered *ex vivo* using selected ZFNs and AAVs developed under the research program, to express CARs, TCRs or NKRs directed to candidate targets.

During the research program term and subject to certain exceptions, except pursuant to this agreement, we will be prohibited from researching, developing, manufacturing and commercializing, for the purpose of treating cancer, any cell therapy product that, as a result of *ex vivo* genome editing, expresses a CAR, TCR or NKR that is directed to a target expressed on or in a human cancer cell. After the research program term concludes and subject to certain exceptions, except pursuant to this agreement, we will be prohibited from developing, manufacturing and commercializing, for the purpose of treating cancer, any cell therapy product that, as a result of *ex vivo* genome editing, expresses a CAR, TCR or NKR that is directed to a candidate target.

We received a $150.0 million upfront payment from Kite when the agreement became effective in April 2018. In addition, Kite reimburses our direct costs to conduct the joint research program, and Kite will be responsible for all subsequent development, manufacturing and commercialization of any licensed products. We are also eligible to receive contingent development- and sales-based milestone payments that could total up to $3.01 billion if all the specified milestones set forth in this agreement are achieved. Of this amount, approximately $1.26 billion relates to the achievement of specified research, clinical development, regulatory and first commercial sale milestones, and approximately $1.75 billion relates to the achievement of specified sales-based milestones if annual worldwide net sales of licensed products reach specified levels. Each development- and sales-based milestone payment is payable (i) only once for each licensed product, regardless of the number of times that the associated milestone event is achieved by such licensed product, and (ii) only for the first ten times that the associated milestone event is achieved, regardless of the number of licensed products that may achieve such milestone event. In addition, we will be entitled to receive escalating, tiered royalty payments with a percentage in the single digits based on potential future annual worldwide net sales of licensed products. These royalty payments will be subject to reduction due to patent expiration, entry of biosimilar products to the market and payments made under certain licenses for third-party intellectual property.

Kite has the right to terminate this agreement, in its entirety or on a per licensed product or per candidate target basis, for any reason after a specified notice period. Each party has the right to terminate this agreement on account of the other party's bankruptcy or material, uncured breach.

Pfizer

We have two separate collaboration agreements with Pfizer. In May 2017, we entered into an exclusive, global collaboration and license agreement with Pfizer, pursuant to which we established a collaboration for the research, development and commercialization of SB-525, our gene therapy product candidate for hemophilia A, and closely related products, which we amended in December 2019.

Under this agreement, we were responsible for conducting the Phase 1/2 clinical trial and certain manufacturing activities for SB-525, while Pfizer is responsible for subsequent worldwide development, manufacturing, marketing and commercialization of SB-525. We may also collaborate in the research and development of additional AAV-based gene therapy products for hemophilia A.

We received an upfront fee of $70.0 million and achieved a $25.0 million milestone in December 2019 upon completion of the transfer of the IND for SB-525 to Pfizer. We are eligible to receive further development milestone payments contingent on the achievement of specified clinical development, intellectual property, regulatory and first commercial sale milestones for SB-525 and potentially other products. The total amount of potential clinical development, intellectual property, regulatory, and first commercial sale milestone payments, assuming the achievement of all specified milestones in this agreement, is $475.0 million, which includes up to $300.0 million for SB-525 and up to $175.0 million for other products that may be developed under the agreement, subject to reduction on account of payments made under certain licenses for third party intellectual property. In addition, Pfizer agreed to pay us royalties for each potential licensed product developed under the agreement that are an escalating tiered, double-digit percentage of the annual net sales of such product and are subject to reduction due to patent expiration, entry of biosimilar products to the market and payment made under certain licenses for third party intellectual property.

Subject to the terms of the agreement, we granted Pfizer an exclusive, worldwide, royalty-bearing license, with the right to grant sublicenses, to use certain technology controlled by us for the purpose of developing, manufacturing and commercializing SB-525 and related products. Pfizer granted us a non-exclusive, worldwide, royalty free, fully paid license, with the right to grant sublicenses, to use certain manufacturing technology developed under the agreement and controlled by Pfizer to manufacture our products that utilize the AAV delivery system. During a specified period, neither we nor Pfizer will be permitted to clinically develop or commercialize, outside of the collaboration, certain AAV-based gene therapy products for hemophilia A.

Unless earlier terminated, the agreement has a term that continues, on a per product and per country basis, until the later of (i) the expiration of patent claims that cover the product in a country, (ii) the expiration of regulatory exclusivity for a product in a country, and (iii) 15 years after the first commercial sale of a product in a country. Pfizer has the right to terminate the agreement without cause in its entirety or on a per product or per country basis. The agreement may also be terminated by either party based on an uncured material breach by the other party or the bankruptcy of the other party. Upon termination for any reason, the license granted by us to Pfizer to develop, manufacture and commercialize SB-525 and related products will automatically terminate. Upon termination by us for cause or by Pfizer any country or countries, Pfizer will automatically grant us an exclusive, royalty-bearing license under certain technology controlled by Pfizer to develop, manufacture and commercialize SB-525 in the terminated country or countries.

In December 2017, we entered into a separate exclusive, global collaboration and license agreement with Pfizer for the development and commercialization of potential gene therapy products that use ZFP-TFs to treat ALS and FTLD linked to mutations of the *C9ORF72* gene. Pursuant to this agreement, we agreed to work with Pfizer on a research program to identify, characterize and preclinically develop ZFP-TFs that bind to and specifically reduce expression of the mutant form of the *C9ORF72* gene.

We received a $12.0 million upfront payment from Pfizer and are eligible to receive up to $60.0 million in development milestone payments from Pfizer contingent on the achievement of specified preclinical development, clinical development and first commercial sale milestones, and up to $90.0 million commercial milestone payments if annual worldwide net sales of the licensed products reach specified levels. In addition, Pfizer will pay us royalties based on an escalating tiered, mid- to high-single digit percentage of the annual worldwide net sales of the licensed products. These royalty payments are subject to reduction due to patent expiration, entry of biosimilar products to the market and payments made under certain licenses for third party intellectual property. Each party will be responsible for the cost of its performance of the research program. Pfizer will be operationally and financially responsible for subsequent development, manufacturing and commercialization of the licensed products.

Subject to the terms of the agreement, we granted Pfizer an exclusive, worldwide, royalty-bearing, license under our relevant patents and know-how to develop, manufacture and commercialize gene therapy products that use resulting ZFP-TFs that satisfy pre-agreed criteria. During a specified period, neither our company nor Pfizer will be permitted to research, develop, manufacture or commercialize outside of the collaboration any ZFPs that specifically bind to the *C9ORF72* gene.

Unless earlier terminated, the agreement has a term that continues, on a per licensed product and per country basis, until the later of (i) the expiration of patent claims that cover the licensed product in a country, (ii) the expiration of regulatory exclusivity for a licensed product in a country, and (iii) 15 years after the first commercial sale of a licensed product in a major market country. Pfizer has the right to terminate the agreement without cause in its entirety or on a per product or per country basis. The agreement may also be terminated by either party based on an uncured material breach by the other party or the bankruptcy of the other party. The agreement will also terminate if we are unable to identify any lead candidates for development within a specified period of time or if Pfizer elects not to advance a lead candidate beyond a certain development milestone within a specified period of time. Upon termination for any reason, the license granted by us to Pfizer to develop, manufacture and commercialize licensed products under the agreement will automatically terminate. Upon termination by us for cause or by Pfizer without cause for any licensed product or licensed products in any country or countries, we will have the right to negotiate with Pfizer to obtain a non-exclusive, royalty-bearing license under certain technology controlled by Pfizer to develop, manufacture and commercialize the licensed product or licensed products in the terminated country or countries.

Following termination by us for Pfizer's material breach, either party will not be permitted to research, develop, manufacture or commercialize ZFPs that specifically bind to the *C9ORF72* gene for a period of time.

Sanofi

In January 2014, we entered into an exclusive worldwide collaboration and license agreement with Sanofi to develop therapeutics for hemoglobinopathies, focused on beta thalassemia and SCD. Under the agreement, we are jointly conducting two research programs: the beta thalassemia program and the SCD program. In the beta thalassemia program, we are responsible for all discovery, research and development activities through the first human clinical trial. In the SCD program, both parties are responsible for research and development activities through the submission of an IND application for ZFP therapeutics intended to treat SCD.

Under both programs, Sanofi is responsible for subsequent worldwide clinical development, manufacturing and commercialization of licensed products developed under the agreement. At the end of the specified research terms for each program or under certain specified circumstances, Sanofi has the right to step in and take over any of our remaining activities. Furthermore, we have an option to co-promote in the United States any licensed products to treat beta thalassemia and SCD developed under the agreement, and Sanofi will compensate us for such co-promotion activities. Subject to the terms of the agreement, we have granted Sanofi an exclusive, royalty-bearing license, with the right to grant sublicenses, to use certain ZFP and other technology controlled by us for the purpose of researching, developing, manufacturing and commercializing licensed products developed under the agreement. We have also granted Sanofi a non-exclusive, worldwide, royalty-free, fully paid license, with the right to grant sublicenses, under our interest in certain other intellectual property developed pursuant to the agreement. During the term of the agreement, we are not permitted to research, develop, manufacture or commercialize, outside of the agreement, certain gene therapy products that target genes relevant to the licensed products.

Under the agreement, we received an upfront license fee of $20.0 million, a $6.0 million milestone in August 2019, upon dosing of the third subject in the ST-400 beta thalassemia Phase 1 clinical trial, a $7.5 million milestone in December 2019 upon dosing of the first subject in the SCD Phase 1 clinical trial, and are eligible to receive additional development and sales milestone payments upon the achievement of specified regulatory, clinical development and sales milestones. The total amount of potential regulatory, clinical development, and sales milestone payments, assuming the achievement of all specified milestones in the agreement, is $276.3 million. In addition, we will receive royalty payments for each licensed product that are a tiered double-digit percentage of annual net sales of each product.

The agreement may be terminated by (i) us or Sanofi for the uncured material breach of the other party, (ii) us or Sanofi for the bankruptcy or other insolvency proceeding of the other party; (iii) Sanofi, upon 180 days' advance written notice to us and (iv) Sanofi, for certain safety reasons upon written notice to, and after consultation with, us. As a result, actual future milestone payments could be lower than the amounts stated above.

Takeda

In January 2012, we entered into a collaboration and license agreement with Shire International GmbH, a wholly-owned subsidiary of Takeda, which we amended and restated in September 2015, to research, develop and commercialize human therapeutics and diagnostics for monogenic diseases based on our ZFP technology. We received an upfront license fee of $13.0 million in 2012 and recognized a $1.0 million milestone payment in 2014. Pursuant to the amended and restated agreement, Takeda has an exclusive, worldwide license to ZFP therapeutics for treating Huntington's disease.

Under the amended and restated agreement, Takeda has full control over, and full responsibility for the costs of, the Huntington's disease program, subject to certain obligations, including the obligation to retain us to perform ZFP design, optimization and assessment services and to reimburse us for the costs of such services. Takeda does not have any milestone payment obligations but is required to pay single digit percentage royalties to us, up to a specified maximum cap, on the commercial sales of ZFP therapeutic products for Huntington's disease. During the term of the amended and restated agreement, we are not permitted to research, develop or commercialize, outside of the agreement, certain products that target the *HTT* gene.

Under the amended and restated agreement, we have full control over, and full responsibility for the costs of, the hemophilia A and B programs returned to us by Takeda, subject to certain diligence obligations. We also granted Takeda a right of first negotiation to obtain a license to such programs under certain circumstances. We are required to pay single digit percentage royalties to Takeda, up to a specified maximum cap, on commercial sales of therapeutic products from the programs returned to us by Takeda.

The amended and restated agreement may be terminated by (i) us or Takeda, in whole or in part, for the uncured material breach of the other party, (ii) us or Takeda for the bankruptcy or other insolvency proceeding of the other party and (iii) Takeda, in its entirety, effective upon at least 90 days' advance written notice.

Other Partnerships

In addition to our partnerships for the development of human therapeutic applications, we have also licensed our technology in several other areas, such as plant agriculture and research reagents, including the production of transgenic animals and cell-line engineering. These license partners include Dow AgroSciences LLC, Sigma-Aldrich Corporation, Genentech, Inc., Open Monoclonal Technology, Inc. and F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc.

INTELLECTUAL PROPERTY

Patents and licenses are important to our business. Our strategy is to file or license patent applications to protect technology, inventions and improvements to inventions that we consider important for the development of our genome editing and genome regulation technologies. We seek patent protection and licenses that relate to our technology and candidates in our pipeline and/or may be important to our future. We have filed numerous patents and patent applications with the U.S. Patent and Trademark Office, or U.S. PTO, and foreign jurisdictions. This proprietary intellectual property includes methods relating to the design of zinc finger proteins, Transcription Activator-Like Effector, or TALE, proteins and Clustered Regularly Interspaced Short Palindromic Repeats, or CRISPR/Cas editing systems, therapeutic applications of genome editing technology, enabling technologies related to our platform and the use of genome editing across a variety of applications. We rely on a combination of patent, copyright, trademark, proprietary know–how, continuing technological innovations, trade secret laws, as well as confidentiality agreements, materials transfer agreements, research agreements and licensing agreements, to establish and protect our proprietary rights.

In-Licensed Technology

We have exclusively licensed intellectual property directed to the design, selection, and use of ZFPs, ZFNs and ZFP-TFs for genome editing and genome regulation from the California Institute of Technology, or Cal Tech, and the University of Utah, or Utah. These licenses grant us exclusive rights to make, use and sell ZFPs, ZFNs and ZFP-TFs under two families of patent filings. As of February 14, 2020, these patent families encompass four U.S. and over 20 foreign active granted patents, with two pending U.S. patent applications. The patent expiration dates are based on 20 years from the filing date of the earliest non-provisional patent application in each patent family, however, patents in our portfolio may be subject to patent term adjustment, or PTA (due to delays in patent prosecution by the U.S. PTO), patent term extension, or PTE (due to review of a patented product by a regulatory agency), or terminal disclaimers, or TD, each of which could positively or negatively impact the estimated expiration date.

Our license agreement with Cal Tech granted us a worldwide exclusive license to certain patents related to chimeric nucleases for genome targeting for all fields of use, which expire in September 2023, absent any PTA, PTE or TD. Our license agreement with Utah granted us a worldwide exclusive license to technology and patents relating to the use of ZFNs for all fields of use, which expire in January 2023, absent any PTA, PTE or TD.

We have also entered into licenses potentially useful for specific therapeutic uses of our genome editing technologies with the Regents of the University of California, or UC, and the Children's Medical Center Corporation, or CMCC. The patents included in these licenses relate to CNS disorders and hemoglobinopathies, respectively. These licenses include three patent families, including three issued U.S. patents, 12 allowed or granted foreign patents, 25 pending foreign patent applications and three pending U.S. patent applications. The UC patents expire in May of 2021, the first CMCC patent family expires in September 2029, and the second expires in November 2033, in each case, absent any PTA, PTE or TD.

Our subsidiary, Sangamo France, has a license agreement with the University of British Columbia pursuant to which it exclusively licensed the right to the CAR for use in TX200. This license includes one patent family which expires in September 2038, absent any PTA, PTE or TD.

Our Intellectual Property

In addition to our in-licensed patent portfolio, we have numerous issued patents and pending patent filings directed to the design, composition and use of ZFPs, ZFNs, ZFP-TFs, TALE proteins and CRISPR/Cas editing systems and other technologies related to our program.

Some of the earliest zinc finger patents in our portfolio began expiring in 2015, with the average expiration of our currently issued patents expiring late-2026. However, we have continued to build on this patent portfolio and have been issued additional patents and have applications pending that provide protection for our ZFP technology. Additionally, patents that may be issued from our pending applications will extend the patent exclusivity of our patent estate.

We believe that our licensed patents and patent applications, as well as our issued patents and pending patent applications, in the aggregate, will provide us with a substantial intellectual property position in our commercial development of our gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation programs. In this regard, patents issued to us, applied for by us, or exclusively and non-exclusively licensed to us, cover the following types of inventions, processes and products:

- *ZFP and ZFN design, engineered nucleases (e.g., CAS), and compositions (four patents issued with expiration dates ranging from 2029 to 2036), absent any PTA, PTE or TD):* Includes DNA target site selection, zinc finger binding domain design, nuclease domain design, linker design, DNA nickases, ZFP libraries databases and methods of construction, as well as methods to increase zinc finger binding specificity (see, e.g., US9982245, US10066242, US10113207);
- *ZFP Therapeutics (three patents issued with expiration dates ranging from 2028 to 2031, absent any PTA, PTE or TD):* Methods relating to activation and inhibition of endogenous genes, identification of accessible regions within chromatin, including treatment of Huntington's disease, HIV, cancer therapeutics, modulation of cardiac contractility and methods to regulate the glucocorticoid receptor (see, e.g., US9943565);
- *Nuclease Therapeutics (12 patents issued with expiration dates ranging from 2031 to 2036, absent any PTA, PTE or TD):* Treatments for HIV, beta thalassemia and SCD, hemophilia IMDs, genome editing, Parkinson's Disease, regulation of the expression of PD1; Immunomodulatory therapeutics; Cystic Fibrosis; CNS disease; Severe combined immunodeficiency, Modified T-cells, including HLA knock out and methods of editing stem cells (see, e.g., US9877988, US9963715, US10072066, US10081661, US10143760); and
- *Non-Therapeutic Applications of ZFPs and Nucleases (seven patents issued with expiration dates ranging from 2028 to 2035, absent any PTA, PTE or TD):* Identification of regulatory sequences, analysis of gene regulation, structure and biological function, methods of agricultural biotechnology, methods of altering cellular differentiation state, development of cell lines for improved protein production, methods of transgenic animal development, engineering of stem cells, methods of genome editing (see, e.g., US9890395).

The patent positions of pharmaceutical and biotechnology firms, including our patent position, are uncertain and involve complex legal and factual questions for which important legal tenets are largely unresolved and are subject to interpretation and refinement by the court system. Patent applications may not result in the issuance of patents and the coverage claimed in a patent application may be significantly reduced before a patent is issued. Although we have filed for patents on some aspects of our technology, we cannot provide assurances that patents will be issued as a result of these pending applications or that any patent that has been or may be issued will be upheld. The laws of some foreign countries may not protect our proprietary rights to the same extent as do the laws of the United States. For example, our issued European patents EP2171052 and EP2527435 have been opposed in Europe. Our EP2281050 case was revoked during Opposition in November 2016. The claims of these patents may be amended such that claim scope is reduced or the patents may be revoked as a result of these procedures.

Obtaining and maintaining our patent protection depends on compliance with various procedural, document submission, fee payment and other requirements imposed by governmental patent agencies, and our patent protection could be reduced or eliminated for non-compliance with these requirements. Periodic maintenance fees, renewal fees, annuity fees and various other governmental fees on patents and/or applications will be due to be paid to the U.S. PTO and various governmental patent agencies outside of the United States in several stages over the lifetime of the patents and/or applications.

We have systems in place to remind us to pay these fees, and we employ an outside firm and rely on our outside counsel to pay these fees due to non-U.S. patent agencies. The U.S. PTO and various non-U.S. governmental patent agencies require compliance with a

number of procedural, documentary, fee payment and other similar provisions during the patent application process. We employ professionals to help us comply, and in many cases, an inadvertent lapse can be cured by payment of a late fee or by other means in accordance with the applicable rules. However, there are situations in which non-compliance can result in abandonment or lapse of the patent or patent application, resulting in partial or complete loss of patent rights in the relevant jurisdiction. In such an event, our competitors might be able to enter the market and this circumstance would have a material adverse effect on our business. We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on product candidates in all countries throughout the world would be prohibitively expensive, and our intellectual property rights in some countries outside the United States can be less extensive than those in the United States. In addition, the laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the United States. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own products and further, may export otherwise infringing products to territories where we have patent protection, but enforcement is not as strong as that in the United States. These products may compete with our products and our patents or other intellectual property rights may not be effective or sufficient to prevent them from competing.

Many companies have encountered significant problems in protecting and defending intellectual property rights in foreign jurisdictions. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents, trade secrets and other intellectual property protection, particularly those relating to biotechnology products, which could make it difficult for us to stop the infringement of our patents or marketing of competing products in violation of our proprietary rights generally. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business, could put our patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop or license. We may not be able to prevent, alone or with our licensors, misappropriation of our intellectual property rights, particularly in countries where the laws may not protect those rights as fully as in the United States.

In the future, third parties may assert patent, copyright trademark, and other intellectual property rights to technologies that are important to our business. The outcome following any potential legal assertions of invalidity and unenforceability is unpredictable. Any claims asserting that our products infringe or may infringe proprietary rights of third parties, if determined adversely to us, could significantly harm our business. See “Risk Factors—*Risks Relating to Our Intellectual Property*”.

COMPETITION

We, and our licensed partners, are leaders in the research, development, and commercialization of gene therapies, *ex vivo* gene-edited cell therapies, *in vivo* genome editing and i*n vivo* genome regulation using ZFP DNA-binding proteins.

We are aware of several companies focused on other methods for editing genes and regulating gene expression and a limited number of commercial and academic groups pursuing the development of ZFP genome regulation and genome editing technologies. The fields of gene therapy, gene-edited cell therapy, genome editing and genome regulation are highly competitive, and we expect competition to persist and intensify in the future from a number of different sources, including pharmaceutical and biotechnology companies; academic and research institutions; and government agencies that will seek to develop ZFPs as well as technologies that will compete with our ZFP technology platform, such as TALE proteins and the CRISPR/Cas9 editing system.

Accordingly, our competitors may succeed in obtaining patent protection, receiving FDA approval, or commercializing competitive products before us. If we commence commercial product sales, we may be competing against companies with greater marketing, sales, distribution and manufacturing capabilities, areas in which we have limited or no experience. In addition, any product candidate that we successfully develop may compete with existing products that have long histories of safe and effective use.

Although we are in the clinical development phase of operations and have no current therapeutic product sales, we believe the following companies, products and/or technologies may potentially be competitive with our technology or our product candidates under development:

- Protein pharmaceuticals under development at pharmaceutical and biotechnology companies such as Pfizer, Bayer AG, Novo Nordisk A/S, Sanofi, Takeda, BioMarin Pharmaceutical Inc., Biogen, Acceleron Pharma Inc.,

ArmaGen, Inc., Amicus Therapeutics, Inc., Protalix Biotherapeutics, Inc., F. Hoffman-LaRoche Ltd., Novartis AG, or Novartis, and numerous other pharmaceutical and biotechnology firms.

- Gene therapy companies developing gene-based products in clinical trials. Orchard Therapeutics plc's Strimvelis™ (acquired from GlaxoSmithKline plc, or GSK) is approved in Europe, Spark Therapeutics, Inc.'s LUXTURNA™ is approved in the United States and Europe, and bluebird bio's ZYNTEGLO™ is approved in Europe. Other competitors in this category may include, but not be limited to, uniQure N.V., BioMarin Pharmaceutical Inc., REGENXBIO Inc., Ultragenyx Pharmaceutical Inc., Voyager Therapeutics, Inc., Takeda, Pfizer, Freeline Therapeutics, Amicus Therapeutics, Inc., and Novartis.
- Cell therapy companies developing cell-based products. Novartis' Kymriah™ and Gilead's Yescarta™, two gene-modified cell-based therapies, are approved in both the United States and Europe. Other competitors in this category may include, but not be limited to, Adaptimmune Therapeutics PLC, bluebird bio, Inc., Cellectis S.A., Sana, Lyell, Inc., Kite/Gilead, AvroBio, Inc., Medeor Therapeutics, Inc., CRISPR Therapeutics AG, Intellia Therapeutics, Inc., Casebia Therapeutics, Targazyme, Inc., ZIOPHARM Oncology, Inc., Tmunity Therapeutics, Inc., Caladrius Biosciences, Inc., TRACT Therapeutics, Inc., Cellenkos™, Inc., Regcell Co., Ltd., Allogene, Fate Therapeutics, NKarta Therapeutics and Bristol Myers Squibb.
- Nuclease technologies under development for therapeutic applications of genome modification including companies such as Editas Medicine, Inc., CRISPR Therapeutics AG, Caribou Biosciences, Inc. and Intellia Therapeutics, Inc. developing the CRISPR/Cas9 editing system, Cellectis S.A. developing TALE nucleases and meganucleases, bluebird bio, Inc. developing Homing Endonucleases and MegaTALs and Precision BioSciences, Inc. developing meganucleases.
- Antisense therapeutics and RNA interference technology, including RNAi and microRNA, which are technologies that may compete with us in the development of novel therapeutic products acting through the regulation of gene expression. These technologies are being developed by several companies including Alnylam Pharmaceuticals, Inc., Ionis Pharmaceuticals, Inc., Moderna, Inc., Sanofi and Regulus Therapeutics Inc.
- Small molecules in development from both in-house drug discovery programs of pharmaceutical companies such as Pfizer, GSK, Novartis AG and Merck & Co., Inc., as well as from biotechnology companies with expertise and capabilities in small molecule discovery and development such as Gilead, Sanofi, Bristol Myers Squibb, and Global Blood Therapeutics, Inc., which has a small molecule product in development for SCD.
- Monoclonal antibody companies and product candidates from certain biotechnology firms such as Genentech, Inc. and Amgen Inc.

We expect to face intense competition from other companies for collaborative arrangements with pharmaceutical and biotechnology companies for establishing relationships with academic and research institutions, for licenses to proprietary technology and for subjects in our clinical trials of treatments for rare diseases. These competitors, either alone or with their collaborative partners, may succeed in developing technologies or products that are more effective or less costly than ours.

Our ability to compete successfully will depend, in part, on our ability to:

- develop safe, efficacious and commercially attractive proprietary products;
- obtain access to gene transfer technology on commercially reasonable terms;
- obtain required regulatory approvals;
- obtain reimbursement for our products in approved indications;
- attract and retain qualified scientific and product development personnel;
- enter into collaborative and strategic partnerships with others, including our competitors, to develop our technology and product candidates;
- obtain and enforce patents, licenses or other proprietary protection for our products and technologies;
- formulate, manufacture, market and sell any product that we develop;
- develop and maintain products that reach the market first and are technologically superior to or are of lower cost than other products in the market; and
- recruit subjects into our clinical trials in a timely fashion

MANUFACTURING

We currently rely on contract manufacturing organizations, or CMOs, to produce our preclinical and clinical product candidates in accordance with FDA and EMA mandated regulations, also known as current good manufacturing practices, or cGMPs. We employ a technical operations staff in the areas of process development, analytical development, quality control, quality assurance, project management, and manufacturing to facilitate appropriate oversight of our CMOs, support of our regulatory filings and execution of clinical trials. We are building a cGMP manufacturing facility in our new headquarters building in Brisbane, CA. This facility is being designed to manufacture Phase 1/2 clinical trial supplies for our gene therapy and cell therapy pipeline and potentially collaboration programs and is currently anticipated to become operational in 2020. We are also building a cell therapy manufacturing facility at our site in Valbonne, France. We intend to continue to rely on CMOs for the manufacture of our product candidates for any Phase 3 clinical trials, and if approved, for commercial supply. We believe this balanced approach to manufacturing, investing in internal capacity/capabilities while strengthening our commitment to external capacity, will enable us to meet our anticipated pipeline needs. Additionally, in 2019 we signed an expanded services agreement with Brammer Bio MA, a Thermo Fisher Scientific, Inc. subsidiary, or Brammer, which provided us with access to dedicated AAV manufacturing capacity up to 2000-L bioreactor scale capable of handling large-scale, commercial-grade runs for products such as ST-920, our gene therapy product candidate for Fabry disease. The agreement also allows us to leverage Brammer's viral vector manufacturing know-how in our new Brisbane facility in order to provide a seamless transition from early development to late-stage clinical trials and commercial-scale manufacturing.

We currently leverage three distinct manufacturing platforms: AAV vector production for our genome editing and gene therapy product candidates, HSPC modification for our cell therapy product candidates and engineered T-cell therapies. We use a commercial scale baculovirus manufacturing platform to manufacture AAV vectors for genome editing and gene therapy, with each AAV vector packaging a different transgene specific to the target indication or ZFN. The manufacturing process for our HSPC cell therapy product candidates utilizes the patient's own HSPCs. These HSPCs are transfected using mRNA to produce ZFNs that target specific DNA sites, resulting in modified HSPCs. The third platform utilizes our ZFN technology to transform CAR-Tregs for autologous and allogeneic cell therapies. With the acquisition of Sangamo France, we also added capabilities to manufacture regulatory T-cells in therapeutic quantities to be used to treat inflammatory and autoimmune disorders.

GOVERNMENT REGULATION

We operate within the heavily regulated pharmaceutical framework and much of our operations, including nonclinical and clinical trials, development, manufacturing, commercialization, marketing and reimbursement are subject to regulatory approvals. Relevant regulatory authorities include, but are not limited to, the FDA, the EMA, Commission of the European Union, or EU, Member State agencies, including the UK Medicines and Healthcare Products Regulatory Agency, or MHRA.

In the United States, the FDA regulates biologic products including gene therapy and human cellular therapy products under the Federal Food, Drug, and Cosmetic Act, or the FDCA, the Public Health Service Act, or the PHSA, and regulations and guidance implementing these laws. The FDCA, PHSA and their corresponding regulations govern, among other things, the testing, manufacturing, safety, efficacy, labeling, packaging, storage, record keeping, distribution, reporting, advertising and other promotional practices involving biologic products. Applications to the FDA are required before conducting human clinical testing of biologic products and in the EU approval must be obtained from the EMA. FDA approval also must be obtained before marketing of biologic products. The process of obtaining regulatory approvals and the subsequent compliance with appropriate federal, state, local and foreign statutes and regulations require the expenditure of substantial time and financial resources and we may not be able to obtain the required regulatory approvals.

Accelerated Assessment

A number of agencies, including the FDA and the EMA, have accelerated approval programs, including for innovative products and in areas of high unmet medical need, such as PRIME in the EU. These programs require a certain level of evidence demonstrating safety and efficacy in patients from early stage clinical trials. Entry into one of these accelerated schemes may result in assistance with the scientific opinion and faster approval timelines. Some of these programs may offer joint approval and reimbursement advice. It is noted that even applications in an accelerated assessment scheme may be assessed under standard timelines, where the regulatory authority deems it necessary to address more questions.

U.S. Biologic Products Development Process

Our product candidates must be approved by the FDA before they may be legally marketed in the United States. The process required by the FDA before a biologic product candidate may be marketed in the United States generally involves the following:

- completion of preclinical laboratory tests and *in vivo* studies in accordance with the FDA's current Good Laboratory Practice, or GLP, regulations and applicable requirements for the humane use of laboratory animals or other applicable regulations;
- submission to the FDA of an application for an IND exemption, which allows human clinical trials to begin unless FDA objects within 30 days;
- approval by an independent institutional review board, or IRB, reviewing each clinical site before each clinical trial may be initiated;
- performance of adequate and well-controlled human clinical trials according to the FDA's Good Clinical Practice, or GCP, regulations, and any additional requirements for the protection of human research subjects and their health information, to establish the safety and efficacy of the proposed biologic product candidate for its intended use;
- preparation and submission to the FDA of a biologics license application, or BLA, for marketing approval that includes substantial evidence of safety, purity and potency from results of nonclinical testing and clinical trials;
- review of the product by an FDA advisory committee, if applicable;
- satisfactory completion of an FDA inspection of the manufacturing facility or facilities where the biologic product candidate is produced to assess compliance with cGMP requirements and to assure that the facilities, methods and controls are adequate to preserve the biologic product candidate's identity, safety, strength, quality, potency and purity;
- potential FDA audit of the nonclinical and clinical trial sites that generated the data in support of the BLA; and
- payment of user fees and FDA review and approval, or licensure, of the BLA.

Before testing any biologic product candidate in humans, including a gene therapy product candidate, the product candidate must undergo preclinical testing. Preclinical tests, also referred to as nonclinical studies, include laboratory evaluations of product chemistry, toxicity and formulation, as well as *in vivo* studies to assess the potential safety and activity of the product candidate and to establish a rationale for therapeutic use. The conduct of the preclinical tests must comply with federal regulations and requirements including GLPs.

Concurrent with clinical trials, companies usually must complete some long-term preclinical testing, such as animal tests of reproductive adverse events and carcinogenicity, and must also develop additional information about the chemistry and physical characteristics of the drug and finalize a process for manufacturing the drug in commercial quantities in accordance with cGMP requirements. The manufacturing process must be capable of consistently producing quality batches of the drug candidate and, among other things, the manufacturer must develop methods for testing the identity, strength, quality and purity of the final drug product. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the drug candidate does not undergo unacceptable deterioration over its shelf life.

Human gene transfer protocols are subject to the FDA's oversight and other clinical trial regulations, and oversight at the local level as set forth in National Institutes of Health, or NIH, Guidelines. Specifically, under the NIH Guidelines, supervision of human gene transfer trials includes evaluation and assessment by an institutional biosafety committee, or IBC, a local institutional committee that reviews and oversees research utilizing recombinant or synthetic nucleic acid molecules at that institution. The IBC assesses the safety of the research and identifies any potential risk to public health or the environment, and such review may result in some delay before initiation of a clinical trial. Compliance with the NIH Guidelines is mandatory for investigators at institutions receiving NIH funds for research involving recombinant DNA. However, many companies and other institutions, not otherwise subject to the NIH Guidelines, voluntarily follow them.

The clinical trial sponsor must submit the results of the preclinical tests, together with manufacturing information, analytical data, any available clinical data or literature and a proposed clinical protocol, to the FDA as part of the IND. Some preclinical testing may continue even after the IND is submitted. The IND automatically becomes effective 30 days after receipt by the FDA, unless the FDA places the clinical trial on a clinical hold. In such a case, the IND sponsor and the FDA must resolve any outstanding concerns before the clinical trial can begin. The FDA also may impose clinical holds on a biologic product candidate at any time before or during clinical trials due to safety concerns or non-compliance. If the FDA imposes a clinical hold, trials may not recommence without FDA authorization and then only under terms authorized by the FDA. Accordingly, we cannot be sure that submission of an IND will result in the FDA allowing clinical studies to begin, or that, once begun, issues will not arise that suspend or terminate such studies.

EU Drug Development Process

Similar to the United States, the EU regulatory framework sets both EU-wide and national, Member State-specific requirements for the development and approval of medicinal products. Article 8(3) of Directive 2001/83/EC sets out the contents of a marketing authorization, or MA, application and all the information that must be submitted for the evaluation of a medicinal product. Certain preclinical (also termed "non-clinical") data is required in order to enable clinical trials and later be used in dossier for a marketing authorization application. All studies should take place in accordance with GLP and all applicable EMA, Commission and European Pharmacopoeia guidelines on preclinical studies, including guidance on quality, non-clinical and clinical aspects of medicinal products containing genetically modified cells.

The requisite amount of preclinical data enables the design of a clinical trial, from Phase 1 (first-in-human clinical trials) through to Phases 2 and 3, which are safety and efficacy and dosing studies and similar restrictions and requirements apply as in the U.S. regarding preclinical data, approvals for trials using vectors. The preclinical tests should establish parameters such as toxicity, pharmacodynamics and pharmacokinetic properties, the quality of gene transfer medicinal products. Due to the particular nature of gene therapy medicinal products, it is recognized that that it may not always be possible for the non-clinical safety studies to be in conformity with the principles of GLP and a proper justification should be submitted where a pivotal non-clinical safety study has not been conducted under GLP rules.

Clinical studies are crucial to obtaining the required data and the requirements governing the conduct of clinical trials are further analyzed below.

All medicinal products and advanced therapy medicinal products, or ATMPs, must be manufactured in accordance with the guidelines on Good Manufacturing Practice, or GMP, and in a GMP licensed facility, which can be subject to GMP inspections.

Human Clinical Trials Under an IND

Clinical trials involve the administration of the biologic product candidate to healthy volunteers or patients under the supervision of qualified investigators which generally are physicians not employed by, or under, the control of the trial sponsor. Clinical trials are conducted under written study protocols detailing, among other things, the objectives of the clinical trial, dosing procedures, subject selection and exclusion criteria and the parameters to be used to monitor subject safety, including stopping rules that assure a clinical trial will be stopped if certain adverse events should occur. Each protocol and any amendments to the protocol must be submitted to the FDA as part of the IND. Clinical trials must be conducted and monitored in accordance with the FDA's regulations comprising the GCP requirements, including the requirement that all research subjects provide informed consent.

Further, each clinical trial must be reviewed and approved by an IRB at or servicing each institution at which the clinical trial will be conducted. An IRB is charged with protecting the welfare and rights of trial participants and considers items such as whether the risks to individuals participating in the clinical trials are minimized and are reasonable in relation to anticipated benefits. The IRB also approves the form and content of the informed consent that must be signed by each clinical trial subject, or their legal representative, reviews and approves the study protocol, and must monitor the clinical trial until completed.

Human clinical trials typically are conducted in three sequential phases that may overlap or be combined:

- *Phase 1.* The biologic product candidate initially is introduced into a small number of human subjects and tested for safety, dosage tolerance, absorption, metabolism, distribution, excretion and, if possible, to gain an early understanding of its effectiveness. Phase 1 clinical trials of gene therapies are typically conducted in patients rather than healthy volunteers.
- *Phase 2.* The biologic product candidate is evaluated in a limited patient population to identify possible adverse effects and safety risks, to preliminarily evaluate the efficacy of the product candidate for specific targeted diseases and to determine dosage tolerance, optimal dosage and dosing schedule.
- *Phase 3.* Phase 3 clinical trials are commonly referred to as "pivotal" studies, which typically denotes a study which presents the data that the FDA or other relevant regulatory agency will use to determine whether or not to approve a biologic product. In Phase 3 studies, the biologic product candidate is administered to an expanded patient population, generally at multiple geographically dispersed clinical trial sites in adequate and well-controlled clinical trials to generate sufficient data to statistically confirm the potency and safety of the product for approval. These clinical trials are intended to establish the overall risk/benefit ratio of the product candidate and provide an adequate basis for product labeling.

Post-approval clinical trials, sometimes referred to as Phase 4 clinical trials, may be conducted after initial approval. These clinical trials are used to gain additional experience from the treatment of patients in the intended therapeutic indication,

particularly for long-term safety follow-up. Sometimes approval for a product is conditional upon the completion of post-marketing clinical studies.

During all phases of clinical development, regulatory agencies (such as the FDA, the EMA and other comparable regulatory agencies) require extensive monitoring and auditing of all clinical activities, clinical data and clinical trial investigators. Annual progress reports detailing the results of the clinical trials must be submitted to the FDA.

Written IND safety reports must be promptly submitted to the FDA, the NIH and the investigators for: serious and unexpected adverse events; any findings from other trials, *in vivo* laboratory tests or *in vitro* testing that suggest a significant risk for human subjects; or any clinically important increase in the rate of a serious suspected adverse reaction over that listed in the protocol or investigator brochure. The sponsor must submit an IND safety report within 15 calendar days after the sponsor determines that the information qualifies for reporting. The sponsor also must notify the FDA of any unexpected fatal or life-threatening suspected adverse reaction within seven calendar days after the sponsor's initial receipt of the information.

The FDA or the sponsor or its data safety monitoring board may suspend a clinical trial at any time on various grounds, including a finding that the research subjects or patients are being exposed to an unacceptable health risk. Similarly, an IRB can suspend or terminate approval of a clinical trial at its institution if the clinical trial is not being conducted in accordance with the IRB's requirements or if the biologic product candidate has been associated with unexpected serious harm to patients.

The FDA usually recommends that sponsors observe subjects for potential gene therapy-related delayed adverse events for up to a 15-year period, including a minimum of five years of annual examinations followed by 10 years of annual queries, either in person or by questionnaire. In January 2020, the FDA issued draft guidance to elaborate on many of the factors that should be considered for this long-term observation.

In the EU, clinical trials almost always require approval from a national competent authority of the relevant Member State and an approval from an Ethics Committee. If the medicinal product is considered to be a genetically modified organism, or GMO, then GMO approval must also be obtained. There is no harmonization between Member States regarding the approach to and timelines of GMO approval, which results in significant challenges and time restrictions.

The conduct of clinical trials should follow the approved clinical trial protocol and be in accordance with the principles of GCP. Gene therapy medicinal products are in addition subject to the rules of GCP for ATMPs (currently in draft form), which outline specific additional safeguards and requirements. Record retention requirements are increased for ATMPs and there are relevant long-term follow up and human safety and traceability requirements.

Compliance with cGMP Requirements

Manufacturers of biologics must comply with applicable current Good Manufacturing Practices, or cGMP, regulations, including quality control and quality assurance and maintenance of records and documentation. Manufacturers and others involved in the manufacture and distribution of such products also must register their establishments with the FDA and certain state agencies. Both domestic and foreign manufacturing establishments must register and provide additional information to the FDA upon their initial participation in the manufacturing process. Any material changes to the manufacturing equipment, process or location of the approved manufacturing site must be reported to the relevant agency/authority. Establishments may be subject to periodic, unannounced inspections by government authorities (including regulatory agencies) to ensure compliance with cGMP requirements and other laws. Discovery of problems may result in a government entity placing restrictions on a product, manufacturer or holder of an approved BLA, and may extend to requiring withdrawal of the product from the market, issue warning or similar letters or seeking civil, criminal or administrative sanctions against the company. The FDA will not approve a BLA unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product within required specification.

Concurrent with clinical trials, companies usually complete additional preclinical studies and must also develop additional information about the physical characteristics of the biologic product candidate as well as finalize a process for manufacturing the product candidate in commercial quantities in accordance with cGMP requirements. To help reduce the risk of the introduction of adventitious agents or of causing other adverse events with the use of biologic products, the PHSA emphasizes the importance of manufacturing control for products whose attributes cannot be precisely defined. The manufacturing process must be capable of consistently producing quality batches of the product candidate and, among other requirements, the sponsor must develop methods for testing the identity, strength, quality, potency and purity of the final biologic product. Additionally, appropriate packaging must be selected and tested and stability studies must be conducted to demonstrate that the biologic product candidate does not undergo unacceptable deterioration over its shelf life.

U.S. Review and Approval Processes

The results of the preclinical tests and clinical trials, together with detailed information relating to the product's Chemistry, Manufacturing and Controls, or CMC, and proposed labeling, among other things, are submitted to the FDA as part of a BLA requesting approval to market the product for one or more indications.

Under the Prescription Drug User Fee Act, or PDUFA, as amended, each BLA must be accompanied by a significant user fee. The FDA adjusts the PDUFA user fees on an annual basis. The PDUFA also imposes an annual program fee for approved biologics. Fee waivers or reductions are available in certain circumstances, including a waiver of the application fee for the first application filed by a small business.

The FDA reviews a BLA within 60 days of submission to determine if it is substantially complete before the agency accepts it for filing. The FDA may refuse to file any BLA that it deems incomplete or not properly reviewable at the time of submission and may request additional information. In that event, the BLA must be resubmitted with the additional information. The resubmitted application also is subject to review before the FDA accepts it for filing. Once the submission is accepted for filing, the FDA begins an in-depth, substantive review of the BLA.

The FDA reviews the BLA to determine, among other things, whether the proposed product candidate is safe and potent, or effective, for its intended use, has an acceptable purity profile and whether the product candidate is being manufactured in accordance with cGMP to assure and preserve the product candidate's identity, safety, strength, quality, potency and purity. The FDA may refer applications for novel biologic products or biologic products that present difficult questions of safety or efficacy to an advisory committee, typically a panel that includes clinicians and other experts, for review, evaluation and a recommendation as to whether the application should be approved and under what conditions. The FDA is not bound by the recommendations of an advisory committee, but it considers such recommendations carefully when making decisions. During the product approval process, the FDA also will determine whether a risk evaluation and mitigation strategy, or REMS, is necessary to assure the safe use of the product candidate. REMS use risk minimization strategies beyond the professional labeling to ensure that the benefits of the product outweigh the potential risks. To determine whether a REMS is needed, the FDA will consider the size of the population likely to use the product, seriousness of the disease, expected benefit of the product, expected duration of treatment, seriousness of known or potential adverse events, and whether the product is a new molecular entity. A REMS could include medication guides, physician communication plans and elements to assure safe use, such as restricted distribution methods, patient registries and other risk minimization tools. If the FDA concludes a REMS is needed, the sponsor of the BLA must submit a proposed REMS; the FDA will not approve the BLA without a REMS, if required.

Before approving a BLA, the FDA will inspect the facilities at which the product candidate is manufactured. The FDA will not approve the product candidate unless it determines that the manufacturing processes and facilities are in compliance with cGMP requirements and adequate to assure consistent production of the product candidate within required specifications. Additionally, before approving a BLA, the FDA typically will inspect one or more clinical sites to assure that the clinical trials were conducted in compliance with IND trial requirements and GCP requirements.

On the basis of the BLA and accompanying information, including the results of the inspection of the manufacturing facilities, the FDA may issue an approval letter or a complete response letter. An approval letter authorizes commercial marketing of the biologic product with specific prescribing information for specific indications. A complete response letter generally outlines the deficiencies in the submission and may require substantial additional testing or information in order for the FDA to reconsider the application. If and when those deficiencies have been addressed to the FDA's satisfaction in a resubmission of the BLA, the FDA will issue an approval letter.

If a product candidate receives regulatory approval, the approval may be significantly limited to specific diseases and dosages or the indications for use may otherwise be limited. Further, the FDA may require that certain contraindications, warnings or precautions be included in the product labeling. The FDA may impose restrictions and conditions on product distribution, prescribing or dispensing in the form of a REMS, or otherwise limit the scope of any approval. In addition, the FDA may require post-marketing clinical trials, sometimes referred to as Phase 4 clinical trials, designed to further assess a biologic product's safety and effectiveness, and testing and surveillance programs to monitor the safety of approved products that have been commercialized.

The FDA has agreed to specified performance goals in the review of BLAs under the PDUFA. One such goal is to review standard BLAs in 10 months after the FDA accepts the BLA for filing, and priority BLAs in six months, whereupon a review decision is to be made. The FDA does not always meet its PDUFA goal dates for standard and priority BLAs and its review goals are subject to change from time to time. The review process and the PDUFA goal date may be extended by three months if the FDA requests or the BLA sponsor otherwise provides additional information or clarification regarding information already provided in the submission within the last three months before the PDUFA goal date.

EU Review and Approval Process

Before a medicinal product can be placed on the market in the EU, it must have received an MA. This could either be at national or EU level under a mutual recognition, decentralized or centralized procedure. Our product candidates are innovative treatments, which will bear the classification of ATMP and/or orphan status. As such, the appropriate authorization procedure is the centralized procedure, which involves an MA being granted by the European Commission following a positive opinion by the EMA. A centralized MA is simultaneously valid in all EU Member States and the European Economic Area, or EEA, (Iceland, Liechtenstein and Norway). A centralized MA also results in a single set of product information (patient information leaflet, labelling and summary of product characteristics) for all EU Member States.

The timeline for the grant of a centralized MA since the time of the application is 210 days for the assessment of the application (including "clock stops" for the applicant to prepare answers to the questions from the EMA). The Committee for Medicinal Products for Human Use, or the CHMP, may either provide a positive or negative opinion. Following a positive opinion, the European Commission will usually issue its legally binding MA after 67 days. A negative opinion may be appealed by the applicant who must submit a request for re-examination within 60 days. There is the possibility for accelerated timelines of drug applications for eligible applicants, which can reduce the timeline to 150 days, if the applicant can produce sufficient justification.

If the MA application contains less comprehensive than the required standard as at the time of the application, when there are public health grounds and often in the case of orphan medicinal products, the EMA may recommend to the European Commission that it issues a different type of an MA, as follows: (a) a Conditional MA (valid for one year and renewable), when the medicinal product shows a positive benefit-risk balance and targets an unmet medical need and it is expected that the applicant will be able to provide comprehensive data in due course; or (b) an MA under 'exceptional circumstances', when it is not expected that the applicant will be able to provide comprehensive efficacy and safety data (often for very rare indications).

Post-approval Requirements

Rigorous and extensive FDA regulation of biologic products continues after approval, particularly with respect to cGMP requirements. Manufacturers are required to comply with applicable requirements in the cGMP regulations, including quality control and quality assurance and maintenance of records and documentation. Other post-approval requirements applicable to biologic products include reporting of cGMP deviations that may affect the identity, potency, purity and overall safety of a distributed product, record-keeping requirements, reporting of adverse effects, reporting updated safety and efficacy information and complying with electronic record and signature requirements. After a BLA is approved, the product also may be subject to official lot release. If the product is subject to official release by the FDA, the manufacturer submits samples of each lot of product to the FDA, together with a release protocol, showing a summary of the history of manufacture of the lot and the results of all tests performed on the lot. The FDA also may perform certain confirmatory tests on lots of some products before releasing the lots for distribution. In addition, the FDA conducts laboratory research related to the regulatory standards on the safety, purity, potency and effectiveness of biologic products. Failure to comply with the FDA's post-approval regulations can result in withdrawal of product approval and licensure.

A sponsor also must comply with the FDA's or appropriate national authority's advertising and promotion requirements, such as the prohibition on promoting products for uses or in patient populations that are not described in the product's approved labeling (known as "off-label use"). Discovery of previously unknown problems or the failure to comply with the applicable regulatory requirements may result in restrictions on the marketing of a product or withdrawal of the product from the market as well as possible civil or criminal sanctions. In addition, changes to the manufacturing process or facility generally require prior FDA approval before being implemented and other types of changes to the approved product, such as adding new indications and additional labeling claims, are also subject to further FDA review and approval.

Orphan and RMAT designation

We maintain product candidates that have obtained FDA and EU orphan designation. See the "—Therapeutic Product Development" section above. These products are intended for treating rare conditions that affect fewer than 200,000 people in the U.S., or that affect more than 200,000 persons but are not expected to recover the costs of developing and marketing a treatment drug. In the EU, these rare conditions are defined as having a prevalence of no more than five in every 10,000 people in the EU. Once a medicinal product with orphan designation obtains a marketing approval, it can benefit from a marketing exclusivity period in respect of the specific orphan indication for which the drug has been approved for a period of seven years in the U.S. and for up to ten years in the EU. This measure is intended at incentivizing the development of medicines for rare diseases. The product must be able to maintain its orphan designation, by reference to the criteria of (a) prevalence of the condition and (b) significant benefit of the product over competing products. If the manufacturer is no longer able to assert that the product meets the orphan designation criteria or is not able to provide sufficient quantities, it may lose the orphan market exclusivity.

We have also received RMAT designation for our SB-525 product candidate to treat severe hemophilia A. RMAT designation is intended to expedite review of a cell therapy, therapeutic tissue engineering product, human cell and tissue product, or any combination product using such therapies or products, intended to treat, modify, reverse, or cure a serious or life-threatening disease or condition and for which preliminary clinical evidence indicates the potential to address unmet medical needs for such a disease or condition.

RMAT designation provides potential benefits that include more frequent meetings with the FDA to discuss the development plan for the product candidate, and eligibility for rolling review and priority review of the related BLA. Products granted RMAT designation may also be eligible for accelerated approval on the basis of a surrogate or intermediate endpoint reasonably likely to predict long-term clinical benefit, or reliance upon data obtained from a meaningful number of sites, including through expansion to additional sites. However, RMAT designation does not change the FDA's standards for product approval. Additionally, RMAT designation can be revoked if the criteria for eligibility cease to be met as clinical data emerges.

Clinical Trial Data Disclosure

Many jurisdictions have mandatory clinical trial information obligations on sponsors. In the EU this is under the Transparency Regulation No. 1049/2001, EMA Policy 0043, EMA Policy 0070, as well as the new Clinical Trials Regulation No. 536/2014, all of which impose on sponsors the obligation to make publicly available certain information stemming from clinical studies. In the EU, the transparency framework provides for a wide right for (EU-based at the moment) interested parties to submit an access to documents request to the EMA for information included in the marketing authorization application dossier for approved medicinal products. Only very limited information is exempted from disclosure (i.e. commercially confidential information, which is construed increasingly narrowly and protected personal data). It is possible for competitors to access and use this data in their own research and development programs anywhere in the world, once this data is in the public domain.

Additional Regulation

Although we currently do not have any products on the market, we may be subject to additional healthcare regulation and enforcement by the federal government and by authorities in the states and foreign jurisdictions in which we conduct our business. Such laws include, without limitation:

- the federal healthcare Anti-Kickback Statute, which prohibits, among other things, persons from knowingly and willfully soliciting, offering, receiving or providing remuneration, directly or indirectly, overtly or covertly, in cash or in kind, to induce or reward, or in return for, either the referral of an individual for, or the purchase, order or recommendation of, any good or service, for which payment may be made under a federal healthcare program such as Medicare and Medicaid;
- federal civil and criminal false claims laws, including the federal False Claims Act, and civil monetary penalty laws, which prohibit, among other things, individuals or entities from knowingly presenting, or causing to be presented, to the federal government, including the Medicare and Medicaid programs, claims for payment or approval that are false or fraudulent or making a false statement to avoid, decrease or conceal an obligation to pay money to the federal government;
- the federal Health Insurance Portability and Accountability Act of 1996, or HIPAA, which imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also created federal criminal laws that prohibit, among other things, knowingly and willfully falsifying, concealing or covering up a material fact or making any materially false statements in connection with the delivery of or payment for healthcare benefits, items or services;
- HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act, or HITECH, and their implementing regulations, which impose obligations, including mandatory contractual terms, with respect to safeguarding the privacy, security and transmission of individually identifiable health information held by certain healthcare providers, health plans and healthcare clearinghouses, known as covered entities, and individuals and entities that perform services for them that involve individually identifiable health information, known as business associates;
- the federal Physician Payments Sunshine Act created under the Patient Protection and Affordable Care Act of 2010, as amended by the Health Care and Education Reconciliation Act of 2010, or collectively, the ACA, which requires certain manufacturers of drugs, devices, biologics and medical supplies to report annually to the Centers for Medicare and Medicaid Services, or CMS, information related to payments and other transfers of value to physicians, as defined by such law, and teaching hospitals, and ownership and investment interests held by physicians and their immediate family members;
- analogous state and foreign laws and regulations, such as state anti-kickback and false claims laws, may apply to sales or marketing arrangements and claims involving healthcare items or services reimbursed by non-governmental third-party payors, including private insurers; some state laws require

pharmaceutical companies to comply with the pharmaceutical industry's voluntary compliance guidelines and the relevant compliance guidance promulgated by the federal government, require drug manufacturers to report information related to payments and other transfers of value to other healthcare providers and healthcare entities, marketing expenditures; or drug pricing; and/or ensure the registration of sales personnel; and

- state and foreign laws govern the privacy and security of health information in specified circumstances, many of which differ from each other in significant ways and often are not preempted by HIPAA, thus complicating compliance efforts.

If our operations are found to be in violation of any of such laws or any other governmental regulations that apply to us, we may be subject to significant penalties, including, without limitation, civil and criminal penalties, damages, fines, the curtailment or restructuring of our operations, exclusion from participation in federal and state healthcare programs, individual imprisonment, suspension or withdrawal of our marketing and commercialization in respect of our commercially approved products, and additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, any of which could adversely affect our ability to operate our business and our financial results. Responding to investigations can be time-and resource-consuming and can divert management's attention from the business. Any such investigation or settlement could increase our costs or otherwise have an adverse effect on our business. See "Risk Factors—*Our current and future relationships with healthcare providers, customers and third-party payors subject us to applicable anti- kickback, fraud and abuse and other healthcare laws and regulations. If we fail to comply with federal, state and foreign laws and regulations, including healthcare, privacy and data security laws and regulations, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.*"

Healthcare Reform

The U.S. and some foreign jurisdictions are considering enacting or have enacted a number of additional legislative and regulatory proposals to change the healthcare system in ways that could affect our ability to sell our product candidates profitably, if approved. Among policy makers and payors in the United States and elsewhere, there is significant interest in promoting changes in healthcare systems with the stated goals of containing healthcare costs, improving quality and expanding access. In the United States, the pharmaceutical industry has been a particular focus of these efforts, which include major legislative initiatives, such as the ACA, to reduce the cost of care through changes in the healthcare system, including limits on the pricing, coverage, and reimbursement of pharmaceutical and biopharmaceutical products, especially under government-funded health care programs, and increased governmental control of drug pricing. The ACA and its implementing regulations, among other things, addressed a new methodology by which rebates owed by manufacturers under the Medicaid Drug Rebate Program are calculated for certain drugs and biologics, including products similar to our product candidates, that are inhaled, infused, instilled, implanted or injected, increased the minimum Medicaid rebates owed by manufacturers under the Medicaid Drug Rebate Program, extended the Medicaid Drug Rebate Program to utilization of prescriptions of individuals enrolled in Medicaid managed care organizations, subjected manufacturers to new annual fees and taxes for certain branded prescription drugs, created a new Patient Centered Outcomes Research Institute, which provides incentives to programs that increase the federal government's comparative effectiveness research, established a new Medicare Part D coverage gap discount program, in which manufacturers must now agree to offer 70% point-of-sale discounts off negotiated prices of applicable brand drugs to eligible beneficiaries during their coverage gap period, as a condition for the manufacturer's outpatient drugs to be covered under Medicare Part D, and created a licensure framework for follow-on biologic products.

There remain legal and political challenges to certain aspects of the ACA, as well as efforts by the current administration to repeal or replace certain aspects of the ACA. Several bills affecting the implementation of certain taxes under the ACA have been signed into law. The Tax Cuts and Jobs Act of 2017, or Tax Act, included a provision that repealed, effective January 1, 2019, the tax-based shared responsibility payment imposed by the ACA on certain individuals who fail to maintain qualifying health coverage for all or part of a year that is commonly referred to as the "individual mandate". In addition, the 2020 federal spending package permanently eliminated, effective January 1, 2020, the ACA-mandated "Cadillac" tax on high-cost employer-sponsored health coverage and medical device tax and, effective January 1, 2021, also eliminates the health insurer tax. In addition, the Bipartisan Budget Act of 2018, or the BBA, among other things, amended the ACA, effective January 1, 2019, to close the coverage gap in most Medicare drug plans, commonly referred to as the "donut hole."

On December 14, 2018, a Texas U.S. District Court Judge ruled that the ACA is unconstitutional in its entirety because the "individual mandate" was repealed by Congress as part of the Tax Act. Additionally, on December 18, 2019, the U.S. Court of Appeals for the 5th Circuit upheld the District Court ruling that the individual mandate was unconstitutional and remanded the case back to the District Court to determine whether the remaining provisions of the ACA are invalid as well.

Other legislative changes have been proposed and adopted in the United States since the ACA was enacted. In August 2011, the Budget Control Act of 2011, among other things, created measures for spending reductions by Congress. A Joint

Select Committee on Deficit Reduction, tasked with recommending a targeted deficit reduction of at least $1.2 trillion for the years 2013 through 2021, was unable to reach required goals, thereby triggering the legislation's automatic reduction to several government programs. This includes aggregate reductions of Medicare payments to providers of 2% per fiscal year, which went into effect in April 2013, and, due to subsequent legislative amendments to the statute, including the Bipartisan Budget Act of 2018, will remain in effect through 2029 unless additional Congressional action is taken. In January 2013, the American Taxpayer Relief Act of 2012, or the ATRA, was signed into law, which, among other things, further reduced Medicare payments to several providers, including hospitals and cancer treatment centers, and increased the statute of limitations period for the government to recover overpayments to providers from three to five years.

Also, there has been heightened governmental scrutiny recently over pharmaceutical pricing practices in light of the rising cost of prescription drugs and biologics. Such scrutiny has resulted in several recent Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for pharmaceutical products. At the federal level, the current administration's budget proposal for fiscal year 2020 contained further drug price control measures that could be enacted during the budget process or in other future legislation, including, for example, measures to permit Medicare Part D plans to negotiate the price of certain drugs under Medicare Part B, to allow some states to negotiate drug prices under Medicaid, and to eliminate cost sharing for generic drugs for low-income patients. Further, the current administration released a "Blueprint" to lower drug prices and reduce out-of-pocket costs of drugs that contains additional proposals to increase drug manufacturer competition, increase the negotiating power of certain federal healthcare programs, incentivize manufacturers to lower the list price of their products, and reduce the out-of-pocket costs of drug products paid by consumers. The Department of Health and Human Services, or HHS, has solicited feedback on some of these measures and, at the same, has implemented others under its existing authority. While some of these and other measures may require additional authorization to become effective, Congress and the current administration have each indicated that it will continue to seek new legislative and/or administrative measures to control drug costs. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, designed to encourage importation from other countries and bulk purchasing.

In the United States, the EU and other potentially significant markets for our product candidates, government authorities and third-party payors are increasingly attempting to limit or regulate the price of medical products and services, particularly for new and innovative products and therapies, which has resulted in lower average selling prices. Furthermore, the increased emphasis on managed healthcare in the United States and on country and regional pricing and reimbursement controls in the EU will put additional pressure on product pricing, reimbursement and usage, which may adversely affect our future product sales and results of operations. These pressures can arise from rules and practices of managed care groups, judicial decisions and governmental laws and regulations related to Medicare, Medicaid and healthcare reform, pharmaceutical reimbursement policies and pricing in general.

See "Risk Factors—*Recently enacted and future legislation, including potentially unfavorable pricing regulations or other healthcare reform initiatives, may increase the difficulty and cost for us to obtain regulatory approval of and commercialize our product candidates and affect the prices we may obtain.*"

Pricing, Coverage and Reimbursement

Pricing and reimbursement of a therapeutic product will largely determine the affordability of the product, and whether the product is prescribed and supplied to patients and private insurance companies may take into account government reimbursement methodologies. Due to these proposed and enacted laws, as well as other actions, significant uncertainty exists as to the coverage and reimbursement status of any product candidates for which we obtain regulatory approval, particularly for novel products. In both domestic and foreign markets, sales and reimbursement of any approved products will depend, in part, on the extent to which third-party payors, such as government health programs, commercial insurance and managed healthcare organizations provide coverage, and establish adequate reimbursement levels, for such products. Third-party payors are increasingly challenging the prices charged for medical products and services and imposing controls to manage costs. Third-party payors may limit coverage to specific products on an approved list, also known as a formulary, which might not include all of the FDA-approved products for a particular indication. Additionally, we may need to conduct expensive pharmacoeconomic studies in order to demonstrate the cost-effectiveness of our products. If third-party payors do not consider our products to be cost-effective compared to other therapies, these payors may not cover our products after approved as a benefit under their plans or, if they do, the level of reimbursement may not be sufficient to allow us to sell our products on a profitable basis. See "Risk Factors—*Even if we are able to commercialize our product candidates, the products may not receive coverage and adequate reimbursement from third-party payors in the United States and in other countries in which we seek to commercialize our products, which could harm our business*."

In the EU, pricing and reimbursement are the prerogative of Member States. Therefore, the requirements around reimbursement of medicinal products can vary widely. Each Member State can follow its own approach, subject to common rules of transparency, competition, and freedom of trade and movement in the EU. Many Member States, including France, Germany and the United Kingdom, follow a health technology assessment, or HTA, procedure for medicinal products in order to assess the cost-effectiveness of a product which could then be recommended for reimbursement under the national health services. There is increasingly exchange of information concerning HTAs on a voluntary basis among EU Member States. In the United Kingdom, the National Institute for Health and Care Excellence is the body which conducts HTAs and issues guidance to be followed by the regional health bodies called clinical commissioning groups.

Privacy Regulation

We are required to comply with privacy and data security laws in the United States and in other foreign jurisdiction in which we operate, such as the EU General Data Protection Regulation, or GDPR, and the California Consumer Privacy Act of 2018, or CCPA, which apply to the collection, use, disclosure, transfer, or other processing of personal data. The collection, use, disclosure, transfer or other processing of personal data regarding individuals in the European Union, including personal health data, is subject to GDPR, which became effective on May 25, 2018. The GDPR, which is wide-ranging in scope, imposes several requirements relating to the control over personal data by individuals to whom the personal data relates, the information provided to the individuals, the documentation we must maintain, the security and confidentiality of the personal data, data breach notification and the use of third party processors in connection with the processing of personal data. The GDPR also imposes strict rules on the transfer of personal data out of the European Union, provides an enforcement authority and authorizes the imposition of large penalties for noncompliance, including the potential for fines of up to €20 million or 4% of the annual global revenues of the noncompliant company, whichever is greater. The GDPR requirements apply not only to third-party transactions, but also to transfers of information between us and our subsidiaries such as Sangamo France, including employee information. The GDPR has increased our responsibility and potential liability in relation to personal data that we process compared to prior European Union law, particularly in light of the acquisition of Sangamo France, and we may be required to put in place additional mechanisms to ensure compliance with the GDPR, which could divert management's attention and increase our cost of doing business. However, despite our ongoing efforts to bring our practices into compliance with the GDPR, we may not be successful either due to various factors within our control or other factors outside our control. It is also possible that local data protection authorities may have different interpretations of the GDPR, leading to potential inconsistencies amongst various European Union Member States. Any failure or alleged failure (including as a result of deficiencies in our policies, procedures or measures relating to privacy, data security, marketing or communications) by us to comply with laws, regulations, policies, legal or contractual obligations, industry standards or regulatory guidance relating to privacy or data security, may result in governmental investigations and enforcement actions, litigation, fines and penalties or adverse publicity.

In the United States, California adopted the CCPA, which became effective in January 2020. The CCPA establishes a privacy framework for covered businesses, including an expansive definition of personal information and data privacy rights for California residents. The CCPA includes a framework with potentially severe statutory damages and private rights of action. The CCPA requires covered companies to provide new disclosures to California consumers (as that word is broadly defined in the CCPA), provide such consumers new ways to opt-out of certain sales of personal information and allow for a new cause of action for data breaches. It remains unclear how the CCPA will be interpreted, but as currently written, it will likely impact our business activities and exemplifies the vulnerability of our business to not only cyber threats but also the evolving regulatory environment related to personal data. As we expand our operations, the CCPA may increase our compliance costs and potential liability. Some observers have noted that the CCPA could mark the beginning of a trend toward more stringent privacy legislation in the United States. Other states are beginning to pass similar laws.

Compliance with these and any other applicable privacy and data security laws and regulations is a rigorous and time-intensive process, and we may be required to put in place additional mechanisms ensuring compliance with the new data protection rules. If we fail to comply with any such laws or regulations, we may face significant fines and penalties that could adversely affect our business, financial condition and results of operations. Furthermore, the laws are not consistent, and compliance in the event of a widespread data breach is costly. See "Risk Factors—*Our current and future relationships with healthcare providers, customers and third-party payors subject us to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations. If we fail to comply with federal, state and foreign laws and regulations, including healthcare, privacy and data security laws and regulations, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.*"

Employees

As of February 21, 2020, we had 354 full-time employees. Approximately 290 of these employees are located in California, seven of these employees are located in London, United Kingdom and the remaining 57 employees are located in

France. None of our employees located in California or London are represented by a collective bargaining organization or covered by a collective bargaining agreement, nor have we experienced work stoppages. Our employees located in France are represented by the Confédération Française de l'Encadrement - Confédération Générale des Cadres. We believe that our relations with our employees are good.

Corporate Information

We were incorporated in June 1995 in the state of Delaware and in January 2017, we changed our name from "Sangamo BioSciences, Inc." to "Sangamo Therapeutics, Inc." Our principal executive offices are located at 7000 Marina Blvd, Brisbane, California 94005. Our telephone number is (510) 970-6000. SANGAMO®, Better Therapeutics By Design®, ZFP Therapeutic® and Engineering Genetic Cures® are our registered trademarks in the United States and Sangamo Therapeutics™ and Pioneering Genetic Cures™ are our trademarks. All other trademarks or trade names referred to in this Annual Report on Form 10-K are the property of their respective owners.

Available information

Our website is located at *www.sangamo.com*. This Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act, are available (free of charge) on our website as soon as reasonably practicable after we electronically file this material with, or furnish it to, the Securities and Exchange Commission, or SEC. Information found on, or accessible through, our website is not a part of, and is not incorporated into, this Annual Report on Form 10-K. In addition, the SEC maintains a website at www.sec.gov that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC.

ITEM 1A – RISK FACTORS

An investment in our common stock involves significant risk. This Form 10-K contains forward-looking information based on our current expectations. Because our actual results may differ materially from any forward-looking statements made by or on our behalf, this section includes a discussion of important factors that could affect our actual future results, including, but not limited to, our revenues, expenses, net loss and net loss per share. You should carefully consider the information described in the following risk factors, together with the other information appearing elsewhere in this report, before making an investment decision regarding our common stock.

Risks Relating to Research, Development, Commercialization and Regulatory Approval of our Products and Technology

Our success depends substantially on the results of clinical trials of our therapeutic programs and ability to obtain regulatory approval of our product candidates, and we may be unable to demonstrate safety and efficacy of our product candidates.

We are a clinical-stage biotechnology company and have ongoing clinical trials evaluating product candidates that use our platform technologies in gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation. We do not have any products that have obtained regulatory approval and are substantially dependent on the results of clinical trials of our therapeutic programs. However, there is no guarantee that we will be able to achieve positive final safety and efficacy results in our current or future clinical trials for our product candidates. If we fail to demonstrate safety or obtain positive clinical trial results, are unable to meet the expected timeline of these clinical trials or release of data for these programs, or if we are unable to obtain regulatory approval of our product candidates, our anticipated revenue from our product candidates and our prospects for profitability would be adversely affected, which would have an adverse effect on our business operations and financial conditions, which may cause a significant decline in our stock price.

We are exposed to numerous risks associated with conducting required clinical trials for the development of our product candidates, and there is no guarantee that we will be successful in any of our clinical trials or obtain marketing approval for any of our product candidates.

We must conduct extensive clinical trials to demonstrate the safety and efficacy of our product candidates before we can obtain marketing approval for any such candidates. We have limited experience in conducting later stage clinical trials and may not possess the necessary resources and expertise to complete such trials. Clinical testing is expensive, time consuming and uncertain. We cannot guarantee that any clinical trials will be conducted as planned or completed on schedule, if at all. A failure of one or more clinical trials can occur at any stage. Events that may prevent successful or timely completion of clinical development include, among others:

- delays in reaching a consensus with regulatory authorities on trial design;

- delays in reaching agreement on acceptable terms with prospective clinical research organizations, or CROs, and clinical trial sites;
- delays in opening clinical trial sites or obtaining required institutional review board, or IRB, or independent ethics committee approval at each clinical trial site;
- delays in recruiting and enrolling suitable subjects to participate in our clinical trials;
- imposition of a clinical hold by regulatory authorities as a result of a serious adverse event or after an inspection of our clinical trial operations or trial sites;
- failure by us, any CROs we engage or any other third parties to adhere to clinical trial requirements;
- failure to perform in accordance with the FDA, GCP, or applicable regulatory guidelines in the EU and other countries;
- delays in the testing, validation, manufacturing and delivery of our product candidates to the clinical sites, including delays by third parties with whom we have contracted to perform certain of those functions, or as a result of manufacturing or formulation changes to our product candidates;
- delays in having subjects complete participation in a trial or return for post-treatment follow-up;
- clinical trial sites or subjects dropping out of a trial;
- selection of clinical endpoints that require prolonged periods of clinical observation or analysis of the resulting data;
- occurrence of serious adverse events or other safety concerns associated with the product candidate that are viewed to outweigh its potential benefits, result in approval delays or other regulatory restrictions, or harm our reputation;
- occurrence of serious adverse events or other safety concerns in trials of the same class of agents conducted by other sponsors;
- failure to demonstrate that a product candidate is safe and effective for its proposed indication;
- changes in regulatory requirements and guidance that require amending or submitting new clinical protocols;
- unexpected costs and expenses and lack of sufficient funding for these programs; and
- loss of licenses to critical intellectual properties.

We have not yet reached agreement with regulatory authorities on the complete development pathway for certain product candidates, and such authorities have the ability to change decisions or guidance with respect to approvable endpoints, particularly as the technology continues to develop in these areas. Due to the novelty of certain programs, the endpoints needed to support regulatory approvals will likely be different from those originally anticipated. Any inability to successfully complete preclinical and clinical development of our product candidates, or complete such trials in the time frames anticipated, could result in additional costs to us or impair our ability to generate revenues from product sales, or achieve regulatory and commercialization milestones and royalties, or shorten any periods during which we may have exclusivity.

Even if a product candidate were to successfully obtain approval from the FDA and comparable foreign regulatory authorities, any approval might contain significant limitations related to use restrictions for specified age groups, warnings, precautions or contraindications, or may be subject to burdensome post-approval study or risk management requirements. Also, any regulatory approval of our current or future product candidates, once obtained, may be withdrawn. If we are unable to obtain and maintain regulatory approval for our product candidates in one or more jurisdictions, or any approval contains significant limitations, we would not be able to generate anticipated revenues or become profitable, which would have an adverse effect on our business operations and financial conditions.

Success in research and preclinical studies or early clinical trial results may not be indicative of results obtained in later trials. Likewise, preliminary, initial or interim data from clinical trials should be considered carefully and with caution since the final data may be materially different from the preliminary, initial or interim data, particularly as more patient data become available.

Results from preclinical studies or early clinical trials are not necessarily predictive of future clinical trial results, and interim results of a clinical trial are not necessarily indicative of final results. Our product candidates may fail to show the desired safety and efficacy in clinical development despite demonstrating positive results in preclinical studies or having successfully advanced through initial clinical trials or preliminary stages of clinical trials. From time to time, we have and may in the future publish or report preliminary, initial or interim data. Preliminary, initial or interim data from our clinical trials and those of our partners may not be indicative of the final results of the trial and are subject to the risk that one or more of the clinical outcomes may materially change as patient enrollment continues and/or more patient data become available. In this regard, such data may show initial evidence of clinical benefit, but as patients continue to be followed and more patient data becomes available, there is a risk that any therapeutic effects will not be durable in patients and/or will decrease over time, or

cease entirely. Preliminary, initial or interim data also remain subject to audit and verification procedures that may result in the final data being materially different from such preliminary, initial or interim data. As a result, preliminary, initial or interim data should be considered carefully and with caution until the final data are available.

There is no guarantee that any of our pending clinical trials will be successful. Moreover, we have pending clinical trials involving our zinc finger nucleases, or ZFN, technology, where the clinical benefit has not been demonstrated in analyses conducted to date in the ongoing clinical trials. Although we are planning new clinical trials to evaluate updated ZFNs and other potential modifications to enhance the *in vivo* delivery of the ZFNs, there can be no assurance that we will be able to effectively deliver ZFNs to produce a clinical benefit to patients treated with our product candidates. In addition, our viral delivery systems and ZFN technologies continue to evolve and neither has been fully validated in human clinical trials for the therapeutic areas we are pursuing. If our viral delivery systems or ZFN technologies do not meet the safety criteria or cannot produce the desirable efficacy results we expect, we may be forced to suspend or terminate the affected program or seek alternative technologies to deliver ZFNs.

In addition, there is a high failure rate for drugs, biologic products and cell therapies proceeding through clinical trials. Many companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late-stage clinical trials even after achieving promising results in preclinical testing and earlier-stage clinical trials. Data obtained from preclinical and clinical activities are subject to varying interpretations, which may delay, limit or prevent regulatory approval. Any such setbacks could adversely affect our business, financial condition, results of operations and prospects.

Our product candidates are subject to a lengthy and uncertain regulatory approval process in each jurisdiction where approval is sought.

A regulatory authority such as the FDA or the EMA, must approve any human therapeutic product before it can be marketed in such jurisdiction. The process for receiving regulatory approval is long and uncertain, and a potential product may not withstand the rigors of testing under the regulatory approval processes. Before commencing clinical trials in humans in the United States, we must submit an Investigational New Drug application, or IND, to the FDA. Certain countries outside of the United States have a similar process that requires the submission of a clinical trial application much like the IND prior to the commencement of human clinical trials. In the EU, for example, a clinical trial authorization, or CTA, must be submitted for each clinical protocol to each country's national health authority and an independent ethics committee. Only after an IND becomes effective and/or the applicable CTA has been accepted may clinical trials begin. See "Business—Government Regulation" for details regarding the regulatory approval processes applicable to our product candidates. While there is some overlap, the regulatory requirements to conduct clinical trials and seek marketing approval vary by jurisdiction. There is no guarantee that the safety studies and other data generated will be sufficient to permit us to conduct clinical trials in all jurisdictions where planned, or once generated, that such clinical trial data will be sufficient to obtain marketing approval in all jurisdictions in which we intend to seek such approval. If we are not able to obtain the necessary regulatory approvals to conduct our clinical trials, or commercialize our products, or if such approvals are delayed or suspended, it would have an adverse effect on our business operations and trading price of our common stock.

We may not be able to find suitable patients or find it difficult to enroll patients for our clinical trials, which could delay or prevent us from proceeding with clinical trials of our product candidates.

Identifying and qualifying patients to participate in clinical trials of our product candidates is critical to our success. The timing of our clinical trials depends on our ability to recruit patients to participate as well as completion of required follow-up periods. For example, hemophilia trials often take longer to enroll due to the availability of existing treatments. There are also a number of other product candidates in development by our competitors, who compete for the same limited patient populations. We infused the first patient in the Phase 1/2 clinical trial evaluating ST-400 for the treatment of beta thalassemia in the first quarter of 2019 and have enrolled five out of the six targeted as of the date of this report. If we are not able to enroll the necessary number of patients in a timely manner, we may not be able to complete our clinical trials. We may face similar challenges or delays in our other or potential future clinical trials. If patients are unwilling to participate in our gene therapy studies because of negative publicity from adverse events related to the biotechnology or gene therapy fields, competitive clinical trials for similar patient populations or for other reasons, the timeline for recruiting patients, conducting studies and obtaining regulatory approval of our product candidates may be delayed. These delays could result in increased costs, delays in advancing our product candidates, delays in testing the effectiveness of our product candidates or termination of the clinical trials altogether.

We may not be able to identify, recruit and enroll a sufficient number of patients, or those with required or desired characteristics, to complete our clinical trials in a timely manner. Patient enrollment and trial completion is affected by factors including:

- size of the patient population and process for identifying subjects;
- design of the trial protocol;

- eligibility and exclusion criteria;
- perceived risks and benefits of the product candidate under study;
- perceived risks and benefits of gene therapy-based approaches to treatment of diseases;
- availability of competing therapies and clinical trials;
- severity of the disease under investigation;
- availability of genetic testing for potential patients;
- proximity and availability of clinical trial sites for prospective subjects;
- ability to obtain and maintain subject consent;
- risk that enrolled subjects will drop out before completion of the trial;
- patient referral practices of physicians; and
- ability to monitor subjects adequately during and after treatment.

If we have difficulty enrolling a sufficient number of patients to conduct our clinical trials as planned, we may need to delay, limit or terminate ongoing or planned clinical trials, or expand to additional jurisdictions, which could impose additional challenges on our company and expose us to risks. If we are not successful in conducting our clinical trials as planned, it would have an adverse effect on our business, financial condition, results of operations and prospects.

We may encounter difficulties that may delay, suspend or scale back our efforts to advance additional research programs through preclinical development, IND and foreign equivalent submissions and into clinical development.

We intend to advance early research programs through preclinical development and to submit new INDs, CTAs and equivalent filings in foreign regulatory jurisdictions necessary to commence and conduct human clinical trials evaluating the preclinical candidates in our pipeline. The preparation and submission of INDs and their foreign equivalents requires us to conduct rigorous and time-consuming preclinical testing, studies, and prepare documentation relating to, among other things, the toxicity, safety, manufacturing, chemistry and clinical protocol of our product candidates. We may experience unforeseen difficulties that could delay or otherwise prevent us from executing this strategy successfully. For example, we may encounter problems in the manufacturing of our products and fail to demonstrate consistency in the formulation of the drug. Our preclinical tests may produce negative or inconclusive results, which may lead us to decide, or regulators may require us, to conduct additional preclinical testing. If we cannot obtain positive results in preclinical testing, we may decide to abandon the projects altogether. In addition, our ability to complete and submit certain IND applications and foreign equivalent filings depends on the support of our partners and the timely performance of their obligations under relevant collaboration agreements. If our partners are not able to perform such obligations or if they choose to slow down or delay the progress, we may not be able to prepare and submit the intended INDs or their foreign equivalents on a timely basis or at all. Furthermore, the submission of several INDs and their foreign equivalents involves significant cost and labor, and we may not have sufficient resources and personnel to complete the filing of all intended INDs and their foreign equivalents, which may force us to scale back the number of INDs and their foreign equivalents or forego potential INDs and foreign equivalents that we believe are promising. Any delay, suspension or reduction of our efforts to pursue our preclinical and IND strategy could have an adverse effect on our business and cause our stock price to decline.

Special regulatory designations, such as RMAT, or orphan drug designations, may not be available for our product candidates or may not lead to a faster development or regulatory review or approval process.

We have received RMAT, designation for our product candidate to treat severe hemophilia A. Additionally, some of our product candidates have also been granted Orphan Drug Designation by the FDA, and some have also been designated Orphan Medicinal Products by the EMA. Regulatory authorities in some jurisdictions, including the United States and the EU, may designate drugs for relatively small patient populations as orphan drugs. For additional information regarding these special regulatory designations, see “Business—Government Regulation.”

If we request such designations for our other current or future product candidates, there can be no assurances that the FDA or the EMA will grant any of our product candidates such designations. Additionally, such designations do not guarantee that any regulatory agency will accelerate regulatory review of, or ultimately approve, those product candidates, nor does it limit the ability of any regulatory agency to grant such designations to product candidates of other companies that treat the same indications as our product candidates prior to our product candidates receiving exclusive marketing approval. Such designations can also be revoked. RMAT designation can be revoked if the criteria for eligibility cease to be met as clinical data emerges. Orphan drug exclusivity may be revoked if any regulatory agency determines that the request for designation was materially defective or if the manufacturer is unable to assure sufficient quantity of the product to meet the needs of patients with the rare disease or condition.

Our product candidates may cause undesirable side effects or have other properties that could delay or prevent their regulatory approval, limit the approved indications or commercial potential, or result in significant negative consequences following any potential marketing approval.

During the conduct of clinical trials, patients report changes in their health, including illnesses, injuries and discomforts, to their study doctor. Often, it is not possible to determine whether or not the product candidate being studied caused these conditions, particularly as many of the diseases we are studying have complex comorbidities. If clinical experience indicates that our product candidates have side effects or cause serious or life-threatening side effects, the development of the product candidate may fail or be delayed, or, if the product candidate has received regulatory approval, such approval may be revoked, which would severely harm our business, prospects, operating results and financial condition.

There have been several significant adverse side effects in gene therapy treatments in the past, including reported cases of leukemia and death seen in other trials using other genomic therapies. Gene therapy is still a relatively new approach to disease treatment and additional adverse side effects could develop. There also is the potential risk of significantly delayed adverse events following exposure to gene therapy products due to persistent biologic activity of the genetic material or other components of products used to carry the genetic material. Possible adverse side effects that could occur with treatment with gene therapy products include an immunologic reaction early after administration that, while not necessarily adverse to the patient's health, could substantially limit the effectiveness of the treatment.

Even if our product development efforts are successful and even if the requisite regulatory approvals are obtained, our products may not gain market acceptance among physicians, patients, healthcare payors and the medical community.

Even if we obtain regulatory approval for any of our product candidates that we may develop or acquire in the future, the applicable product may not gain market acceptance among physicians, healthcare payors, patients or the medical community. Market acceptance of any of our product candidates for which we receive approval depends on a number of factors, including:

- the efficacy and safety of such product candidates as demonstrated in clinical trials;
- the clinical indications and patient populations for which the product candidate is approved;
- acceptance by physicians, major cancer treatment centers and patients of the drug as a safe and effective treatment;
- the adoption of novel gene therapies by physicians, hospitals and third-party payors;
- the potential and perceived advantages of product candidates over alternative treatments;
- the safety of product candidates seen in a broader patient group, including its use outside the approved indications;
- any restrictions on use together with other medications;
- the prevalence and severity of any side effects;
- product labeling or product insert requirements of the FDA or other regulatory authorities;
- the timing of market introduction of our products as well as competitive products;
- the development of manufacturing and distribution processes for our product candidates;
- the cost of treatment in relation to alternative treatments;
- the availability of coverage and adequate reimbursement and the willingness of patients to pay out-of-pocket in the absence of coverage or inadequacy of reimbursement by third-party payors and government authorities;
- relative convenience and ease of administration; and
- the effectiveness of our sales and marketing efforts and those of our collaborators.

If any of our product candidates are approved but fail to achieve market acceptance among physicians, patients, healthcare payors or treatment centers, we will not be able to generate significant revenues, which would compromise our ability to become profitable.

Even if we are able to commercialize our product candidates, the products may not receive coverage and adequate reimbursement from third-party payors in the United States and in other countries in which we seek to commercialize our products, which could harm our business.

Our ability to commercialize any product successfully will depend, in part, on the extent to which coverage and adequate reimbursement for these products and related treatments will be available. Government authorities and third-party payors, such as private health insurers and health maintenance organizations, determine which medications they will cover and establish reimbursement levels, which can affect demand for, or the price of, any product candidate for which we obtain regulatory approval. Given the nature of the product candidates that we are developing, some patients may require treatment

only one time (*e.g.*, single dose administration), and there is substantial uncertainty about the pricing structure for such products, and the level of coverage and reimbursement that will be available for a shift to single-dose treatment as compared to chronic therapy over a patient's lifetime. If other companies establish a new pricing structure or business model, including payment based on demonstration of long term efficacy, our ability to price or obtain reimbursement for our products may be adversely affected. If such pricing structure or business model do not adequately fund the costs of our research and development, manufacturing and commercialization efforts, our business may be adversely affected.

In addition to uncertainty about the potential pricing structure for certain of our product candidates, cost containment is a recurrent trend in the healthcare industry. Government authorities and third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. We cannot be sure that coverage and adequate reimbursement will be available for any product that we commercialize and, if reimbursement is available, what the level of reimbursement will be. If reimbursement is not available or is available only at limited levels, we may be unable to successfully commercialize any product candidate for which we obtain regulatory approval. Our inability to promptly obtain coverage and profitable reimbursement rates from both government-funded and private payors for any approved products that we develop could have an adverse effect on our operating results, our ability to raise capital needed to commercialize products and our overall financial condition.

Recently enacted and future legislation, including potentially unfavorable pricing regulations or other healthcare reform initiatives, may increase the difficulty and cost for us to obtain regulatory approval of and commercialize our product candidates and affect the prices we may obtain.

The regulations that govern, among other things, regulatory approvals, coverage, pricing and reimbursement for new drug products vary widely from country to country. In the United States and some foreign jurisdictions, there have been a number of legislative and regulatory changes and proposed changes regarding the healthcare system that could prevent or delay regulatory approval of our product candidates, restrict or regulate post-approval activities and affect our ability to successfully sell any product candidates for which we obtain regulatory approval. Also, there has been heightened governmental scrutiny recently over pharmaceutical pricing practices in light of the rising cost of prescription drugs and biologics. Such scrutiny has resulted in several recent Congressional inquiries and proposed and enacted federal and state legislation designed to, among other things, bring more transparency to product pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for pharmaceutical products. At the state level, legislatures have increasingly passed legislation and implemented regulations designed to control pharmaceutical and biological product pricing, including price or patient reimbursement constraints, discounts, restrictions on certain product access and marketing cost disclosure and transparency measures, and, in some cases, have been designed to encourage importation from other countries and bulk purchasing. For a discussion of health reform activity and the current pricing framework, see "Business—Government Regulation—Healthcare Reform" and "—Pricing, Coverage and Reimbursement."

The continuing efforts of the government, insurance companies, managed care organizations and other payors of healthcare services to contain or reduce costs of healthcare and/or impose price controls may adversely affect:

- the demand for our product candidates, if we obtain regulatory approval;
- our ability to set a price that we believe is fair for our products;
- our ability to generate revenue and achieve or maintain profitability;
- the level of taxes that we are required to pay; and
- the availability of capital.

Any reduction in reimbursement from Medicare or other government programs may result in a similar reduction in payments from private payors, which may adversely affect our future profitability.

Even if we obtain regulatory approval for a product candidate, our products will remain subject to regulatory scrutiny.

Even if we obtain regulatory approval in a jurisdiction, the regulatory authority may still impose significant restrictions on the indicated uses or marketing of our product candidates, or impose ongoing requirements for potentially costly post-approval studies, post-market surveillance or patient or drug restrictions. For example, the FDA typically advises that patients treated with gene therapy undergo follow-up observations for potential adverse events for a 15-year period. Additionally, the holder of an approved BLA is required to comply with FDA rules and is subject to FDA review and periodic inspections, in addition to other potentially applicable federal and state laws, to ensure compliance with good manufacturing practices, or GMP, and adherence to commitments made in the BLA.

If we or a regulatory agency discovers previously unknown problems with a product such as adverse events of unanticipated severity or frequency, or problems with the facility where the product is manufactured, a regulatory agency may impose restrictions relative to that product or the manufacturing facility, including requiring recall or withdrawal of the product

from the market or suspension of manufacturing. Moreover, product labeling, advertising and promotion for any approved product will be subject to regulatory requirements and continuing regulatory review. Failure to comply with such requirements, when and if applicable, could subject us to a number of actions ranging from warning letters to product seizures or significant fines, among other actions. See "Business—Government Regulation—U.S. Review and Approval Processes" for more information.

Any government investigation of alleged violations of laws or regulations could require us to expend significant time and resources in response and could generate negative publicity. The occurrence of any event or penalty described above may inhibit our ability to commercialize our product candidates and generate revenues.

Our employees or contractors may engage in misconduct or other improper activities, including noncompliance with research, development, manufacturing or regulatory standards and requirements, which could cause significant liability for us and harm our reputation.

We are exposed to the risk of fraud or other misconduct by our employees and contractors, including intentional failures to comply with FDA regulations or similar regulations of comparable foreign regulatory authorities, provide accurate information to the FDA or comparable foreign regulatory authorities, comply with manufacturing standards we have established, comply with federal and state healthcare fraud and abuse laws and regulations and similar laws and regulations established and enforced by comparable foreign regulatory authorities, report financial information or data accurately or disclose unauthorized activities to us. Misconduct by our employees and contractors could also involve the improper use of information obtained in the course of clinical trials, which could result in regulatory sanctions and serious harm to our reputation. It is not always possible to identify and deter such misconduct, and the precautions we take to detect and prevent this activity may not be effective in controlling unknown or unmanaged risks or losses or in protecting us from governmental investigations or other actions or lawsuits stemming from a failure to be in compliance with such laws or regulations. If any such actions are instituted against us, and we are not successful in defending ourselves or asserting our rights, those actions could have a significant impact on our business and results of operations, including the imposition of significant civil, criminal and administrative penalties, damages, fines, disgorgement, personal imprisonment, exclusion from government funded healthcare programs, such as Medicare and Medicaid, additional reporting requirements and oversight if we become subject to a corporate integrity agreement or similar agreement to resolve allegations of non-compliance with these laws, and the curtailment or restructuring of our operations.

We may use our financial and human resources to pursue a particular research program or product candidate and fail to capitalize on programs or product candidates that may be more profitable or for which there is a greater likelihood of success.

We have limited resources, and may forego or delay pursuit of certain programs or product candidates that later prove to have greater commercial potential. Our resource allocation decisions may cause us to fail to capitalize on viable commercial products or profitable market opportunities, or pursue partnering arrangements rather than retain sole responsibility for development. Our current and future research and development programs for product candidates may not yield any commercially viable products. If we do not accurately evaluate the commercial potential or target market for a particular product candidate, we may pursue opportunities that end up having a number of competitors that are more advance than our product candidates, or relinquish valuable rights to that product candidate through strategic collaboration, licensing or other royalty arrangements in cases where it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate. We may also allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement or that do not prove to have viable commercial opportunities. Any failure to use our financial and human resources efficiently could harm our business and operations.

Even if our technology proves to be effective, it still may not lead to commercially viable products.

Even if we, our collaborators or strategic partners are successful in using our zinc finger protein, or ZFP, technology in drug discovery, protein production, therapeutic development or other areas in which we have licensed our technology, such as plant agriculture, they may not be able to commercialize the resulting products or may decide to use other methods competitive with this technology. To date, no company has received marketing approval or has developed or commercialized any therapeutic or agricultural products based on our ZFP technology. Should our technology fail to provide safe, effective, useful or commercially viable approaches to the discovery and development of these product candidates, this would significantly limit our business and future growth and would adversely affect our value.

Risks Relating to Manufacturing

We are building a manufacturing facility that could support future clinical production of our product candidates. We have no experience as a company manufacturing pharmaceutical products, and there can be no assurance that we will

be able to build a compliant manufacturing facility or, if built, we will be able to successfully manufacture any of our product candidates.

We expect to utilize both contract manufacturing organizations, or CMOs, and our own facility to meet our projected needs for clinical supply. We intend to expand our manufacturing capacity by designing and building a manufacturing facility in Brisbane, California that we plan to initially use to support our clinical supply needs. To meet these objectives we will need to transition manufacturing processes and know-how of our product candidates to our own facility. Transferring manufacturing processes and know-how is complex and involves review and incorporation of both documented and undocumented processes that may have evolved over time. In addition, transferring production to different facilities may require utilization of new or different processes to meet the specific requirements of a given facility. Additional studies may also need to be conducted to support the transfer of certain manufacturing processes and process improvements. We cannot be certain that all relevant know-how and data has been adequately incorporated into the manufacturing process until the completion of studies (and the related evaluations) intended to demonstrate the comparability of material previously produced with that generated by our CMOs. Although some of our employees have experience in the manufacturing of pharmaceutical products from prior employment at other companies, we, as a company, have no prior experience in pharmaceutical product manufacturing, and operating this facility will require us to comply with complex regulations and to continue to hire and retain experienced scientific, quality control, quality assurance and manufacturing personnel. Designing and building a manufacturing facility has been and will continue to be time-consuming and expensive, and we may experience delays or cost overruns. In addition, government approvals will be required for us to operate a manufacturing facility and can be time-consuming to obtain. As a manufacturer of pharmaceutical products, we also will be required to demonstrate and maintain cGMP compliance. These requirements include, among other things, quality control, quality assurance and the maintenance of records and documentation. Furthermore, establishing manufacturing operations will require a reallocation of other resources, particularly the time and attention of our senior management. Even if we are able to establish our own manufacturing capabilities, we could encounter challenges in operating the manufacturing facility in compliance with cGMP, regulatory or other applicable requirements, resulting in potential negative consequences, including regulatory actions, which could undermine our ability to utilize this facility for our own manufacturing needs. Any failure or delay in the development of our manufacturing capabilities could adversely impact the development of our product candidates.

We operate laboratory and manufacturing as part of our facilities. If we use chemical biological and hazardous materials in a manner that causes injury or violates laws, we may be liable for damages.

There are risks associated with manufacturing our product candidates including, among others, cGMP compliance, cost overruns, technical problems with process scale-up, process reproducibility, stability issues, lot consistency, yields and timely availability of raw materials. Even if efficacy and safety data from our clinical trials would otherwise support regulatory approval for a product candidate, there is no assurance that we or any third-party manufacturer will be able to manufacture our product candidates to specifications at levels necessary to support or maintain regulatory approval by the FDA or other regulatory authorities.

For example, some of our product candidates are biologics and their manufacture involves complex processes, including the development of cell lines or cell systems to produce the biologic, with the challenge of significant variability. Further, there are difficulties in growing large quantities of such cells, consistently and sufficiently isolating certain types of cells and harvesting and purifying the biologic produced by them. The cost to manufacture biologics is generally far higher than traditional small molecule chemical compounds, and the manufacturing process can be difficult to reproduce. Additionally, our research and development activities involve the controlled use of potentially harmful biological materials as well as hazardous materials, chemicals, and various radioactive compounds typically employed in the study of molecular and cellular biology. We routinely use cells in culture and gene delivery vectors, and we employ small amounts of radioisotopes in trace experiments. Although we maintain up-to-date licensing and training programs, we cannot completely eliminate the risk of accidental contamination or injury from the use, storage, handling, or disposal of these materials. In the event of contamination or injury, we could be held liable for damages that result, and any liability could exceed our resources. We currently carry insurance covering certain claims arising from our use of these materials. However, if we are unable to maintain our insurance coverage at a reasonable cost and with adequate coverage, our insurance may not cover any liability that may arise. We are subject to federal, state, and local laws and regulations governing the use, storage, handling, and disposal of these materials and specified waste products.

Thus, there is no guarantee we will be successful in establishing a larger-scale commercial manufacturing process for our pipeline product candidates or obtaining the needed manufacturing capacity. Due to the high cost to manufacture, inherent uncertainty related to manufacturing costs, and uncertainty in our patient population, there is risk that some of our product candidates may not be commercially viable.

Supply interruptions may disrupt our inventory levels and the availability of our product candidates, and cause delays in obtaining regulatory approval, which could harm our business by reducing our potential revenues.

Our product candidates are manufactured using technically complex processes requiring specialized facilities, highly specific raw materials and other production constraints. The complexity of these processes, as well as strict government standards for the manufacture and storage of our products candidates, subjects us to production risks. While product batches released for use in clinical trials undergo sample testing, some defects may only be identified following product release. In addition, process deviations or unanticipated effects of approved process changes may result in these intermediate products not complying with stability requirements or specifications. For example, our product candidates must be stored and transported at temperatures within a certain range. If these environmental conditions deviate, our product candidates' remaining shelf-lives could be impaired or their efficacy and safety could be adversely affected, making them no longer suitable for use.

The occurrence, or suspected occurrence, of production and distribution difficulties can lead to lost inventories, with consequential reputational damage and the risk of product liability. The investigation and remediation of any identified problems can cause development delays and substantial expense. Any unforeseen failure in the storage of the product or loss in supply could delay our clinical trials and, with respect to our product candidates that may be approved, result in a loss of our market share and negatively affect our business, financial condition, results of operations and prospects.

We currently rely on third parties to conduct some or all aspects of manufacturing of our product candidates for preclinical and clinical development. If one of our third-party manufacturers fails to perform adequately or fulfill our needs, we may be required to incur significant costs and devote significant efforts, to find new suppliers or manufacturers.

We currently have limited experience in clinical-scale manufacturing of our product candidates and we rely upon third-party CMOs to manufacture and supply drug product for our preclinical and clinical studies. Although we are in the process of building out a cGMP compliant manufacturing facility in our Brisbane facility, it is not yet ready, and will only manufacture limited quantities of our product candidates for our early stage clinical trials. We intend to continue to rely on third parties for the manufacture of product candidates for later stage clinical trials, and commercial-scale manufacturing for any approved product. The manufacture of pharmaceutical products in compliance with the FDA's cGMP requires significant expertise and capital investment, including the development of advanced manufacturing techniques and process controls. Manufacturers of pharmaceutical products often encounter difficulties in production, including difficulties with production costs and yields, quality control, including stability of the product candidate and quality assurance testing, shortages of qualified personnel, as well as compliance with strictly enforced cGMP requirements, other federal and state regulatory requirements and foreign regulations. If our manufacturers were to encounter any of these difficulties or otherwise fail to comply with their obligations to us or under applicable regulations, our ability to provide study biologics in our clinical studies would be jeopardized. Any delay or interruption in the supply of clinical study materials could delay the completion of our clinical studies, increase the costs associated with maintaining our clinical study programs and, depending upon the period of delay, require us to commence new studies at significant additional expense or terminate the studies completely.

We and our CMOs must comply with cGMP requirements enforced by the FDA through its facilities inspection program. These requirements include, among other things, quality control, quality assurance and the maintenance of records and documentation. We and our CMOs may be unable to comply with these cGMP requirements and with other FDA, state and foreign regulatory requirements. The FDA or similar foreign regulatory agencies may also implement new standards at any time, or change their interpretation and enforcement of existing standards for manufacture, packaging or testing of products. We have limited control over our manufacturers' compliance with these regulations and standards. Failure to comply with these requirements may result in fines and civil penalties, suspension of production, suspension or delay in product approval, product seizure or recall or withdrawal of product approval. If the safety of any product supplied is compromised due to our manufacturers' failure to adhere to applicable laws or for other reasons, we may not be able to obtain regulatory approval for or successfully commercialize our products and we may be held liable for any injuries sustained as a result. Any of these factors could cause a delay of clinical studies, regulatory submissions, approvals or commercialization of our product candidates, entail higher costs or impair our reputation.

Our current agreements with our CMOs do not provide for the entire supply of the drug product necessary for all anticipated clinical studies or for full scale commercialization. If we and our CMOs cannot agree to the terms and conditions for them to provide the drug product necessary for our clinical and commercial supply needs, we may not be able to manufacture the product candidate until a qualified alternative manufacturer is identified, which could also delay the development of, and impair our ability to commercialize our product candidates.

The number of third-party CMOs with the necessary manufacturing and regulatory expertise and facilities is limited, and it could be expensive and take a significant amount of time to arrange for alternative CMOs, which could have an adverse effect on our business. New manufacturers of any product candidate would be required to qualify under applicable regulatory requirements and would need to have sufficient rights under applicable intellectual property laws to the method of manufacturing the product candidate. Obtaining the necessary FDA approvals or other qualifications under applicable regulatory requirements and ensuring non-infringement of third-party intellectual property rights could result in a significant interruption of supply and could require the new manufacturer to bear significant additional costs which may be passed on to us.

Risks Relating to our Industry

Our product candidates are based on novel technologies, which makes it difficult to predict the timing and costs of development and of subsequently obtaining regulatory approval.

We have concentrated our research and development efforts on gene therapy, gene-edited cell therapy, genome editing and genome regulation. The regulatory approval process for novel product candidates such as ours is unclear and may be lengthier and more expensive than the process for other, better-known or more extensively studied product candidates.

Adverse developments in clinical trials of gene therapy products conducted by others may cause the FDA or other oversight bodies to change the requirements for approval of our product candidates.

These regulatory review committees and advisory groups, and any new guidelines they promulgate, may lengthen the regulatory review process, require us to perform additional preclinical studies or clinical trials, increase our development costs, lead to changes in regulatory positions and interpretations, delay or prevent approval and commercialization of our current or future product candidates or lead to significant post-approval limitations or restrictions. As we advance our product candidates, we will be required to consult with these regulatory and advisory groups and comply with applicable guidelines. If we fail to do so, we may be required to delay or discontinue development of our product candidates. These additional processes may result in a review and approval process that is longer than we otherwise would have expected. Delay or failure to obtain, or unexpected costs in obtaining, the regulatory approval necessary to bring a potential product to market could decrease our ability to generate sufficient product revenue, and our business, financial condition, results of operations and prospects would be harmed. Even if our product candidates are approved, we expect that the FDA will require us to submit follow-up data regarding our clinical trial subjects for a number of years after any approval. If this follow-up data shows negative long-term safety or efficacy outcomes for these patients, the FDA may revoke its approval or change the label of our products in a manner that could have an adverse impact on our business.

In addition, adverse developments in clinical trials of gene therapy or cell therapy products conducted by others may cause the FDA or other oversight bodies to change the requirements for approval of our product candidates. The FDA and EMA have only very recent and limited experience in the approval of *in vivo* gene therapy products. As a result, it is difficult to determine how long it will take or how much it will cost to obtain regulatory approvals for our product candidates.

If we or our competitors develop, acquire, or market technologies or products that are more effective than ours, our financial condition and ability to successfully market or commercialize our product candidates or be profitable would be adversely affected.

The biotechnology and pharmaceutical industries are highly competitive and subject to significant and rapid technological change. We are aware of several companies focused on other methods for editing cells, editing genes and regulating gene expression and a limited number of commercial and academic groups pursuing the development of genome editing and genome regulation technology. The field of applied gene-edited cell therapy, genome editing and genome regulation is highly competitive and we expect competition to persist and intensify in the future from a number of different sources, including pharmaceutical and biotechnology companies, academic and research institutions, and government agencies that will seek to develop competing products as well as technologies that will compete with our ZFP technology platform. For example, in genome editing and gene therapy products, competing proprietary technologies with our product development focus include but are not limited to, recombinant proteins, other gene therapy/cDNAs, antisense, siRNA and microRNA approaches, exon skipping, small molecule drugs, monoclonal antibodies, CRISPR/Cas technology and TALE proteins, meganucleases, and MegaTALs. See “Business—Competition” for more information on the competition we may face.

Any products that we or our collaborators or strategic partners develop by using our ZFP technology platform will enter into highly competitive markets. Even if we are able to generate products that are safe and effective for their intended use, competing technologies may prove to be more effective or less expensive, which, to the extent these competing technologies achieve market acceptance, will limit our revenue opportunities. In some cases, competing technologies have proven to be effective and less expensive. Competing technologies may include other methods of regulating gene expression or modifying genes. ZFNs and ZFP-TFs have broad application in the life sciences industry and compete with a broad array of new technologies and approaches being applied to genetic research by many companies.

In addition to possessing competing technologies, our competitors include pharmaceutical and biotechnology companies with:

- substantially greater capital resources than ours;
- larger research and development staffs and facilities than ours; and
- greater experience in product development and in obtaining regulatory approvals and patent protection.

These organizations also compete with us to attract qualified personnel, attract parties for acquisitions, joint ventures or other collaborations and license the proprietary technologies of academic and research institutions that are competitive with

our technology, which may preclude us from pursuing similar opportunities. Accordingly, our competitors may succeed in obtaining patent protection or commercializing products before us. Even if our product candidate is more effective, it may be disadvantaged if it is not first to market. In addition, any products that we develop may compete with existing products or services that are well established in the marketplace. Further, some of our product candidates in development are designed to use once. Any success in developing single-dose therapeutics could cause us to lose potential recurring revenues from therapeutics that are designed to be taken over a patient's lifetime.

Negative public opinion and increased regulatory scrutiny of gene therapy and genomic medicines may damage public perception of the safety of our product candidates and adversely affect our ability to conduct our business or obtain regulatory approvals for our product candidates.

Genetically modified products are currently subject to public debate and heightened regulatory scrutiny, either of which could prevent or delay production of agricultural products. Gene therapy remains a novel technology, with only two *in vivo* gene therapy products approved for a genetic disease to date in the United States and only a few *in vivo* gene therapy products for genetic diseases approved to date in the EU. Public perception may be influenced by claims that gene therapy is unsafe, and gene therapy may not gain the acceptance of the public or the medical community. For example, reports of serious adverse events in a retroviral gene transfer trial for infants with X-linked severe combined immunodeficiency (X-linked SCID) in France and subsequent FDA actions putting related trials on hold in the United States had a significant negative impact on the public perception and stock price of certain companies involved in gene therapy, whether or not the specific company was involved with retroviral gene transfer, or whether the specific company's clinical trials were placed on hold in connection with these events. Other adverse events could occur in the field of gene therapy and genomic medicine that could result in increased regulatory scrutiny, potential regulatory delays or negative impact on public perception of gene therapy and genomic medicines, which could cause our stock price to decline.

In particular, our success will depend upon physicians who specialize in the treatment of genetic diseases targeted by our product candidates, prescribing treatments that involve the use of our product candidates in lieu of, or in addition to, existing treatments with which they are familiar and for which greater clinical data may be available.

Even if the regulatory approval for genetically modified products developed using our technology is obtained, our success will also depend on public acceptance of the use of genetically modified products including drugs, plants, and plant products. Claims that genetically modified products are unsafe for consumption or pose a danger to the environment may influence public attitudes. Our genetically modified products may not gain public acceptance. More restrictive government regulations or negative public opinion would have an adverse effect on our business, financial condition, results of operations and prospects and may delay or impair the development and commercialization of our product candidates or demand for any products we may develop. For example, earlier gene therapy trials led to several well-publicized adverse events, including cases of leukemia and death seen in other trials using other vectors. Serious adverse events in our clinical trials, or other clinical trials involving gene therapy products or our competitors' products, even if not ultimately attributable to the relevant product candidates, and the resulting publicity, could result in increased government regulation, unfavorable public perception, potential regulatory delays in the testing or approval of our product candidates, stricter labeling requirements for those product candidates that are approved and a decrease in demand for any such product candidates.

Our current and future relationships with healthcare providers, customers and third-party payors subject us to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations. If we fail to comply with federal, state and foreign laws and regulations, including healthcare, privacy and data security laws and regulations, we could face substantial penalties and our business, results of operations, financial condition and prospects could be adversely affected.

Healthcare providers, physicians and third-party payors will play a primary role in the recommendation and prescription of any product candidates for which we obtain regulatory approval. Arrangements with healthcare providers, third-party payors and customers may expose us to broadly applicable fraud and abuse and other healthcare laws and regulations that may constrain the business or financial arrangements and relationships through which we would market, sell and distribute our products. As a biotechnology company, even though we will not control referrals of healthcare services or bill directly to Medicare, Medicaid or other third-party payors, federal and state healthcare laws and regulations pertaining to fraud and abuse and patients' rights are and will be applicable to our business. For details regarding the restrictions under applicable federal and state healthcare laws and regulations that may affect our ability to operate see "Business—Government Regulation—Additional Regulation".

The scope and enforcement of each of these laws is uncertain and subject to rapid change in the current environment of healthcare reform, especially in light of the lack of applicable precedent and regulations. Scrutiny has also increased, which has led to a number of investigations, prosecutions, convictions and settlements in the healthcare industry. Responding to investigations can be time-and resource-consuming and can divert management's attention from the business. Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. If our operations or if any physicians or other healthcare providers or entities with whom we expect to do

business are found to not be in compliance with applicable laws or applicable regulations, we and they could be subjected to significant civil, criminal and administrative enforcement actions, see "Business—Government Regulation—Additional Regulation".

Further, we are required to comply with privacy and data security laws, such as the GDPR and the CCPA, which apply to the collection, use, disclosure, transfer, or other processing of personal data. For more information regarding these regulations, see "Business—Government Regulation—Privacy Regulation". Any failure or alleged failure (including as a result of deficiencies in our policies, procedures or measures relating to privacy, data security, marketing or communications) by us to comply with laws, regulations, policies, legal or contractual obligations, industry standards or regulatory guidance relating to privacy or data security, may result in governmental investigations and enforcement actions, litigation, fines and penalties or adverse publicity. In addition, new regulation, legislative actions or changes in interpretation of existing laws or regulations regarding data privacy and security (together with applicable industry standards) may increase our costs of doing business. In this regard, we expect that there will continue to be new proposed laws, regulations and industry standards relating to privacy and data protection in the United States, the EU and other jurisdictions, and we cannot determine the impact such future laws, regulations and standards will have on our business.

Product liability lawsuits against us could cause us to incur substantial liabilities and to limit commercialization of any products that we may develop.

We face an inherent risk of product liability exposure related to the testing of our product candidates in human clinical trials and will face an even greater risk if we commercially sell any products that we may develop. Product liability claims may be brought against us by subjects enrolled in our clinical trials, patients, healthcare providers or others using, administering or selling our products. If we cannot successfully defend ourselves against claims that our product candidates or products caused injuries, we could incur substantial liabilities. Regardless of merit or eventual outcome, liability claims may result in:

- decreased demand for any product candidates or products that we may develop;
- termination of clinical trial sites or entire trial programs;
- injury to our reputation and significant negative media attention;
- withdrawal of clinical trial participants;
- significant costs to defend the related litigation;
- substantial monetary awards to trial subjects or patients;
- loss of revenue;
- diversion of management and scientific resources from our business operations; and
- the inability to commercialize any products that we may develop.

We currently hold product liability insurance coverage at a level that we believe is customary for similarly situated companies and adequate to provide us with insurance coverage for foreseeable risks, but which may not be adequate to cover all liabilities that we may incur. Insurance coverage is increasingly expensive. We may not be able to maintain insurance coverage at a reasonable cost or in an amount adequate to satisfy any liability that may arise. We intend to expand our insurance coverage for products to include the sale of commercial products if we obtain regulatory approval for our product candidates in development, but we may be unable to obtain commercially reasonable product liability insurance for any products that receive regulatory approval. Large judgments have been awarded in class action lawsuits based on drugs that had unanticipated side effects. A successful product liability claim or series of claims brought against us, particularly if judgments exceed our insurance coverage, could decrease our cash and adversely affect our business.

Risks Relating to our Finances

We have incurred significant operating losses since inception and anticipate that we will incur continued losses for the foreseeable future.

We have generated operating losses since we began operations in 1995. The extent of our future losses and the timing of profitability are uncertain, and we expect to incur losses for the foreseeable future. We have been engaged in developing our ZFP technology since inception, which has and will continue to require significant research and development expenditures. To date, we have generated our funding from issuance of equity securities, revenues derived from collaboration agreements, other strategic partnerships in non-therapeutic applications of our technology, federal government research grants and grants awarded by research foundations. We expect to continue to incur additional operating losses for the next several years as we continue to advance our product candidates. If the time required to generate significant product revenues and achieve profitability is longer than we currently anticipate or if we are unable to generate liquidity through equity financing or other sources of funding, we may be forced to curtail or suspend our operations.

We may be unable to raise additional capital on favorable terms, if at all, which would harm our ability to develop our technology and product candidates, and could delay or terminate some or all of our programs. Future sales and issuances could also result in dilution to our stockholders.

We have incurred significant operating losses and negative operating cash flows since inception and have not achieved profitability. We expect capital outlays and operating expenditures to increase over the next several years as we expand our infrastructure and research and product development activities. While we believe our available cash resources, as well as funds received from corporate collaborators, strategic partners and research grants will enable us to maintain our currently planned operations through at least the next 12 months from the date the financial statements are issued, we will need to raise substantial additional capital to fund the development, manufacturing and potential commercialization of our product candidates. The February 2020 collaboration agreement and stock purchase agreements with Biogen are not yet effective, and we will not receive the upfront payment or the proceeds from the sale of our common stock until they become effective and customary closing conditions are met. We regularly consider fund raising opportunities and may decide, from time to time, to raise capital based on various factors, including market conditions and our plans of operation. In addition, as we focus our efforts on proprietary human therapeutics, we will need to seek FDA approvals of potential products, a process that could cost in excess of hundreds of millions of dollars per product. We may experience difficulties in accessing the capital market due to external factors beyond our control such as volatility in the equity markets for emerging biotechnology companies and general economic and market conditions both in the United States and abroad. We cannot be certain that we will be able to obtain financing on terms acceptable to us, or at all. Our failure to obtain adequate and timely funding will adversely affect our business and our ability to develop our technology and products candidates.

To the extent we raise additional capital by issuing equity securities, our stockholders may experience substantial dilution. We may sell common stock, convertible securities or other equity securities in one or more transactions at prices and in a manner we determine from time to time. If we sell common stock, convertible securities or other equity securities in more than one transaction, investors may be materially diluted by subsequent sales. These sales may also result in material dilution to our existing stockholders, and new investors could gain rights superior to our existing stockholders.

Our ability to use net operating losses to offset future taxable income may be subject to limitations.

Although certain amount of our federal net operating loss carryforwards carry forward indefinitely (but are subject to a percentage limitation), a significant amount of our federal and all of our state net operating loss carryforwards will begin to expire, if not utilized, beginning in 2024 and 2029, respectively. The net operating loss carryforwards subject to expiration could expire unused and be unavailable to offset future income tax liabilities. In addition, under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, and corresponding provisions of state law, if a corporation undergoes an “ownership change,” which is generally defined as a greater than 50 percentage point change in its equity ownership value over a three-year period, the corporation’s ability to use its pre-change net operating loss carryforwards and other pre-change tax attributes to offset its post-change income or taxes may be limited. We have experienced an ownership change in the past and we may also experience additional ownership changes in the future as a result of subsequent shifts in our stock ownership, some of which may be outside of our control. If an ownership change occurs and our ability to use our net operating loss carryforwards is materially limited, it would harm our future operating results by effectively increasing our future tax obligations. In addition, at the state level, there may be periods during which the use of net operating loss carryforwards is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed. As a result, if we earn net taxable income, we may be unable to use all or a material portion of our net operating loss carryforwards and other tax attributes, which could potentially result in increased future tax liability to us and adversely affect our future cash flows.

Risks Relating to our Reliance on Third Parties

If conflicts arise between us and our contractors, collaborators or strategic partners, these parties may act in their self-interest, which may limit our ability to implement our strategies and otherwise harm our business and prospects.

If conflicts arise between our contractors, corporate or academic collaborators or strategic partners and us, the other party may act in its self-interest, which may limit our ability to implement our strategies. Some of our academic collaborators and strategic partners are conducting multiple product development efforts within each area that is the subject of the collaboration with us. Our collaborators or strategic partners may develop, either alone or with others, products in related fields that are competitive with the products or potential products that are the subject of these collaborations. Competing products, either developed by the collaborators or strategic partners or to which the collaborators or strategic partners have rights, may result in the withdrawal of partner support for our product candidates.

Some of our collaborators or strategic partners could also become our competitors in the future. Our collaborators or strategic partners could develop or invest in competing products, preclude us from entering into collaborations with their competitors, fail to obtain timely regulatory approvals, terminate their agreements with us prematurely, or fail to devote sufficient resources to the development and commercialization of product candidates covered by the applicable agreement.

In addition, conflicts could arise between us and our collaborators resulting from disputes regarding our or our collaborators' or strategic partners' performance under the applicable agreement, including disputes arising from alleged breaches of our agreements with our collaborators and strategic partners. For example, we have certain confidentiality obligations to our collaborators and strategic partners under our agreements with them, and it is possible that, in connection with the data security incident we disclosed in April 2018, we could be subject to claims that we have breached our confidentiality obligations, which could result in damages payable by us and/or the affected collaborator or strategic partner seeking to terminate its agreement with us.

Any of these developments could harm our product development efforts and otherwise adversely affect our business and prospects.

Our collaborators and strategic partners may control aspects of our research, development and manufacturing programs, including but not limited to, our clinical trials, which could result in delays and other obstacles in the commercialization of our proposed products.

We depend on third-party collaborators and strategic partners to design and conduct our clinical trials for some of our therapeutic programs. As a result, we may not be able to conduct these programs in the manner or on the time schedule we currently contemplate, which may negatively impact our business operations. In addition, if any of these collaborators or strategic partners withdraws support for our programs or proposed products or otherwise impair their development; our business could be negatively affected.

Our lack of control over the clinical development in our agreements with Biogen, Kite, Sanofi and Pfizer could cause delays or other difficulties in the development and commercialization of our product candidates, which may prevent us from completing the intended IND filings in a timely fashion and receiving any milestone, royalty payments and other benefits under the agreement. In addition, under their respective agreements, our third-party collaborators have certain rights to terminate the agreements by providing us with advance notices, therefore, the actual milestone payments that we may receive under these agreements may be substantially lower than the full amounts provided for under these agreements.

Our license collaborators or strategic partners may decide to adopt alternative technologies or products, or may be unable to develop commercially viable products with our technology, which would negatively impact our revenues and our strategy to develop these products.

Our collaborators or strategic partners may adopt alternative technologies, which could decrease the marketability of ZFP technology. Additionally, because many of our collaborators or strategic partners are likely to be working on more than one development project, they could choose to shift their resources to projects other than those they are working on with us. If they do so, this would delay our ability to test our technology and would delay or terminate the development of potential products based on our ZFP technology. Further, our collaborators and strategic partners may elect not to develop products arising out of our collaborative and strategic partnering arrangements or to devote sufficient resources to the development, manufacturing, marketing or sale of these products. If they terminate the collaborative relationship with us, we will be required to seek the support of other partners or collaborators. We may not have sufficient resources and expertise to develop these programs by ourselves, and we may not be able to identify a suitable partner or negotiate a favorable collaboration agreement to allow us to continue the development of these programs. If any of these events occur, we may not be able to develop our technologies or commercialize our products.

Commercialization of our technologies will depend, in part, on strategic partnering with other companies. If we are not able to find partners in the future or if our partners do not diligently pursue product development efforts, we may not be able to develop our technologies or product candidates, which could slow our growth and decrease the value of our stock.

We expect to rely, to some extent, on our strategic partners to provide funding in support of our research and to perform independent research and preclinical and clinical testing. Our technology is broad-based, and we do not currently possess the resources necessary to fully develop and commercialize potential products that may result from our technologies or the resources or capabilities to complete the lengthy marketing approval processes that may be required for the products. Therefore, we plan to rely on strategic partnerships to help us develop and commercialize our products. We have entered into collaborative agreements to provide funding and assistance in the development of certain product candidates through the clinical trial process. For example, we have an agreement with Biogen for ST-501, a preclinical ZFP-TF product candidate for tauopathies including Alzheimer's disease, ST-502, a preclinical ZFP-TF product candidate for alpha-synuclein related diseases including Parkinson's disease, among other targets for gene regulation therapies for the treatment of neurological diseases, we also have an agreement with Kite for potential engineered cell therapies for cancer, two separate agreements with Pfizer, one for SB-525 for hemophilia A, and another for amyotrophic lateral sclerosis and frontotemporal lobar degeneration linked to mutations of the *C9ORF72* gene, and an agreement with Sanofi for our beta thalassemia and sickle cell disease product candidates.

If we are unable to find additional partners or if the partners are unable or unwilling to advance our programs, or if they do not diligently pursue product approval, this may slow our progress and adversely affect our ability to generate revenues.

In addition, our partners may sublicense or abandon development programs or we may have disagreements or disputes with our partners, which would cause associated product development to slow or cease. In addition, the business or operations of our partners may change significantly through restructuring, acquisition or other strategic transactions or decisions that may negatively impact their ability to advance our programs.

The loss of partnering agreements or inability to find future partnering agreements may delay or terminate the potential development or commercialization of products we may derive from our technologies, but it may also delay or terminate our ability to test our product candidates. If any partner fails to conduct the collaborative activities successfully or in a timely manner, the preclinical or clinical development or commercialization of the affected product candidates or research programs could be delayed or terminated.

Under typical partnering agreements, we would expect to receive revenue for the research and development of our product candidates based on achievement of specific milestones, as well as royalties based on a percentage of sales of the commercialized products. Achieving these milestones will depend, in part, on the efforts of our partner as well as our own. If we, or any partner, fail to meet specific milestones, then the partnership may be terminated, which could reduce our revenues.

Risks Relating to our Intellectual Property

Because it is difficult and costly to protect and maintain our proprietary rights, and third parties may have filed patent applications that are similar to ours, we may not be able to obtain or maintain proprietary protection of our technologies and products or we may only obtain protection in limited jurisdictions.

Our commercial success may depend in part on obtaining and enforcing patent protection for our technology and successfully defending any of our patents that may be challenged. Obtaining and enforcing pharmaceutical and biotechnology patents is costly, time consuming and complex, and we may not be able to file and prosecute all necessary or desirable patent applications, or maintain, enforce and license any patents that may issue from such patent applications, at a reasonable cost or in a timely manner. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. The patent positions of pharmaceutical and biotechnology companies can be highly uncertain and can involve complex legal and factual questions. No consistent policy regarding the breadth of claims allowed in biotechnology patents has emerged to date. Accordingly, we cannot predict the breadth of claims that may issue from any patent applications that we own or license, nor are we able to predict whether any third-party patents might issue with claims that are relevant to our product candidates or technologies. Even if patents do successfully issue and even if such patents cover our product candidates, third parties may challenge their validity, enforceability or scope, which may result in such patents being narrowed or invalidated. There is no assurance that all of the potentially relevant prior art relating to our patents and patent applications has been found, which can invalidate a patent or prevent a patent from issuing from a pending patent application. Furthermore, if third parties have filed similar patent applications, an interference or derivation proceeding in the United States can be initiated by the United Stated Patent and Trademark Office, a third party, or by us to determine who was the first to invent any of the subject matter covered by the patent claims of our applications.

We are a party to various license agreements that grant us rights under specified patents and patent applications. We are also party to various license agreements by which we grant third parties rights under specified patents and patent applications. Our current licenses contain performance obligations. If we fail to meet those obligations, the licenses could be terminated. If we are unable to continue to license these technologies on commercially reasonable terms, or at all, we may be forced to delay or terminate aspects of our product development and research activities.

With respect to our present and any future sublicenses, because our rights derive from those granted to our sublicensor, we are subject to the risk that our sublicensor may fail to perform its obligations under the master license or fail to inform us of useful improvements in, or additions to, the underlying intellectual property owned by the original licensor.

We are unable to exercise the same degree of control over intellectual property that we license from third parties as we exercise over our internally developed intellectual property. We do not control the prosecution of certain of the patent applications that we license from third parties; therefore, the patent applications may not be prosecuted as we desire or in a timely manner.

The degree of future protection for our proprietary rights is uncertain, and we cannot ensure that:

- we or our licensors were the first to make the inventions covered by each of our pending patent applications;
- we or our licensors were the first to file patent applications for these inventions;
- the patents of others will not have an adverse effect on our ability to do business;
- others will not independently develop similar or alternative technologies or reverse engineer any of our products, processes or technologies;
- any of our pending patent applications will result in issued patents;

- any patents issued or licensed to us, our collaborators or strategic partners will provide a basis for commercially viable products or will provide us with any competitive advantages;
- any patents issued or licensed to us will not be challenged and invalidated by third parties; or
- we will develop additional products, processes or technologies that are patentable.

Others have filed and in the future are likely to file patent applications that are similar to ours. We are aware that there are academic groups and other companies that are attempting to develop technology that is based on the use of zinc finger, TALE, CRISPR/Cas and other DNA-binding proteins, and that these groups and companies have filed patent applications. Several patents with claims directed to this technology have issued, although we have no current plans to use the claimed inventions. If these or other patent applications issue as patents, it is possible that the holder of any patent or patents granted on these applications may bring an infringement action against us, our collaborators, or strategic partners claiming damages and seeking to enjoin commercial activities relating to the affected products and processes. The costs of litigating the claim could be substantial regardless of outcome. Moreover, we cannot predict whether we, our collaborators, or strategic partners would prevail in any actions. In addition, if the relevant patent claims were upheld as valid and enforceable and our products or processes were found to infringe a patent or patents, we or our collaborators may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, and we may be prevented from making, using, or selling the relevant product or process unless we or our collaborators could obtain a license or were able to design around the patent claims. We can give no assurance that such a license would be available to us or our collaborators on commercially reasonable terms, or at all, or that we would be able to successfully design around the relevant patent claims. There may be significant litigation in the genomics or cell therapy industry regarding patent and other intellectual property rights, which could subject us to litigation. If we become involved in litigation, it could consume a substantial portion of managerial and financial resources.

We rely on trade secrets to protect technology where we believe patent protection is not appropriate or obtainable. Trade secrets, however, are difficult to protect. While we require employees, academic collaborators and consultants to enter into confidentiality agreements, we may not be able to adequately protect our trade secrets or other proprietary information or enforce these confidentiality agreements.

Our collaborators, strategic partners, and scientific advisors have rights to publish data and information in which we may have rights. If we cannot maintain the confidentiality of our technology and other confidential information in connection with our collaborations and strategic partnerships, then we may not be able to receive patent protection or protect our proprietary information.

Patent terms may be inadequate to protect our competitive position on our product candidates for an adequate amount of time, and may vary based on jurisdiction.

Patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years from its earliest U.S. non-provisional filing date or from the filing date of the corresponding international application. Various extensions may be available. However, the life of a patent, and the protection it affords, is limited. Even if patents covering our product candidates are obtained, once the patent life has expired for a product, we may be open to competition from generic medications. Given the amount of time required for the development, testing and regulatory review of new product candidates, patents protecting such candidates might expire before or shortly after such candidates are commercialized. As a result, our owned and licensed patent portfolio may not provide us with sufficient rights to exclude others from commercializing products similar or identical to ours.

If we are unable to protect the confidentiality of our trade secrets, the value of our technology could be adversely affected and our business would be harmed.

We rely on trade secret protection and confidentiality agreements to protect proprietary know-how that is not patentable or that we elect not to patent, processes for which patents are difficult to enforce and any other elements of our product candidate discovery and development processes that involve proprietary know-how, information or technology that is not covered by patents. However, trade secrets can be difficult to protect. We seek to protect our proprietary technology and processes, in part, by entering into confidentiality agreements with our employees, consultants, scientific advisors, collaborators, partners and contractors. We also seek to preserve the integrity and confidentiality of our data and trade secrets by maintaining physical security of our premises and physical and electronic security of our information technology systems. While we have confidence in these individuals, organizations and systems, agreements or security measures have been and may in the future be breached, and we may not have adequate remedies for any breach. See also the risk factor titled, "Significant disruptions of our information technology systems or data security incidents could result in significant financial, legal, regulatory, business and reputational harm to us." In addition, our trade secrets may otherwise become known or be independently discovered by competitors.

Although we expect all of our employees and consultants to assign their inventions to us, and all of our employees, consultants, advisors, collaborators, partners and any third parties who have access to our proprietary know-how, information or

technology to enter into confidentiality agreements, we cannot provide any assurances that all such agreements have been duly executed or that our trade secrets and other confidential proprietary information will not be disclosed or that competitors will not otherwise gain access to our trade secrets or independently develop substantially equivalent information and techniques. Misappropriation or unauthorized disclosure of our trade secrets could impair our competitive position and may have an adverse effect on our business. Additionally, if the steps taken to maintain our trade secrets are deemed inadequate, we may have insufficient recourse against third parties for misappropriating the trade secret. In addition, others may independently discover our trade secrets and proprietary information. For example, the FDA, as part of its Transparency Initiative, is currently considering whether to make additional information publicly available on a routine basis, including information that we may consider to be trade secrets or other proprietary information, and it is not clear at the present time how the FDA's disclosure policies may change in the future, if at all.

Further, the laws of some foreign countries do not protect proprietary rights to the same extent or in the same manner as the laws of the United States. As a result, we may encounter significant problems in protecting and defending our intellectual property both in the United States and abroad. If we are unable to prevent material disclosure of the non-patented intellectual property related to our technologies to third parties, and there is no guarantee that we will have any such enforceable trade secret protection, we may not be able to establish or maintain a competitive advantage in our market, which could adversely affect our business, results of operations and financial condition.

We may not be successful in obtaining or maintaining necessary rights to gene or cell therapy product components and processes for our development pipeline through acquisitions and in-licenses.

Presently, we believe we have rights to the intellectual property, through licenses from third parties and under patents that we own, to develop our gene and cell therapy product candidates. Because our programs may involve additional product candidates, such as TX200 and potential future CAR-Treg therapies that may require the use of proprietary rights held by third parties, the growth of our business will likely depend in part on our ability to acquire, in-license or use these proprietary rights. In addition, our product candidates may require specific formulations to work effectively and efficiently and these rights may be held by others. We may be unable to acquire or in-license any compositions, methods of use, processes or other third-party intellectual property rights from third parties that we identify on commercially reasonable terms, if at all. The licensing and acquisition of third-party intellectual property rights is a competitive area, and a number of more established companies are also pursuing strategies to license or acquire third-party intellectual property rights that we may consider attractive. These established companies may have a competitive advantage over us due to their size, cash resources and greater clinical development and commercialization capabilities.

For example, we sometimes collaborate with U.S. and foreign academic institutions to accelerate our preclinical research or development under written agreements with these institutions. Typically, these institutions provide us with an option to negotiate a license to any of the institution's rights in technology resulting from the collaboration. Regardless of such right of first negotiation for intellectual property, we may be unable to negotiate a license within the specified time frame or under terms that are acceptable to us. If we are unable to do so, the institution may offer the intellectual property rights to other parties, potentially blocking our ability to pursue our program.

In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. We also may be unable to license or acquire third-party intellectual property rights on terms that would allow us to make an appropriate return on our investment. If we are unable to successfully obtain rights to required third-party intellectual property rights, our business, financial condition and prospects for growth could suffer.

If we fail to comply with our obligations in the agreements under which we license intellectual property rights from third parties or otherwise experience disruptions to our business relationships with our licensors, we could lose license rights that are important to our business.

We are a party to a number of intellectual property license agreements that are important to our business and expect to enter into additional license agreements in the future. Our existing license agreements impose, and we expect that future license agreements will impose, various diligence, milestone, royalty and other obligations on us. If we fail to comply with our obligations under these agreements, or we are subject to a bankruptcy, the licensor may have the right to terminate the license, in which event we would not be able to market products covered by the license.

We may need to obtain licenses from third parties to advance our research or allow commercialization of our product candidates, and we have done so from time to time. We may fail to obtain any of these licenses at a reasonable cost or on reasonable terms, if at all. In that event, we may be required to expend significant time and resources to develop or license replacement technology. If we are unable to do so, we may be unable to develop or commercialize the affected product candidates, which could harm our business significantly. We cannot provide any assurances that third-party patents do not exist that might be enforced against our current product candidates or future products, resulting in either an injunction prohibiting our sales, or, with respect to our sales, an obligation on our part to pay royalties and/or other forms of compensation to third parties.

In many cases, patent prosecution of our in-licensed technology is controlled solely by the licensor. If our licensors fail to obtain and maintain patent or other protection for the proprietary intellectual property we license from them, we could lose our rights to the intellectual property or our exclusivity with respect to those rights, and our competitors could market competing products using the intellectual property. In certain cases, we control the prosecution of patents resulting from licensed technology. In the event we breach any of our obligations related to such prosecution, we may incur significant liability to our licensing partners. Licensing of intellectual property is of critical importance to our business and involves complex legal, business and scientific issues and is complicated by the rapid pace of scientific discovery in our industry. Disputes may arise regarding intellectual property subject to a licensing agreement, including:

- the scope of rights granted under the license agreement and other interpretation-related issues;
- the extent to which our technology and processes infringe on intellectual property of the licensor that is not subject to the licensing agreement;
- the sublicensing of patent and other rights under our collaborative development relationships;
- our diligence obligations under the license agreement and what activities satisfy those diligence obligations;
- the ownership of inventions and know-how resulting from the joint creation or use of intellectual property by our licensors and us and our partners; and
- the priority of invention of patented technology.

If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates.

In addition, the agreements under which we currently license intellectual property or technology from third parties are complex, and certain provisions in such agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could narrow what we believe to be the scope of our rights to the relevant intellectual property or technology, or increase what we believe to be our financial or other obligations under the relevant agreement, either of which could have an adverse effect on our business, financial condition, results of operations, and prospects. If disputes over intellectual property that we have licensed prevent or impair our ability to maintain our current licensing arrangements on acceptable terms, we may be unable to successfully develop and commercialize the affected product candidates, which could have an adverse effect on our business, financial conditions, results of operations, and prospects. As an example, Sangamo France has exclusively licensed the right to the CAR for use in TX200 from the University of British Columbia, or UBC. Should UBC terminate this license agreement, we may have to develop or acquire the appropriate CAR which would extend our anticipated development timeline and add expense, and which could result in our failure to realize the anticipated benefits of the acquisition of Sangamo France.

We may be involved in patent or intellectual property lawsuits or similar disputes involving patents under our control or patents of third-parties claiming infringement, which lawsuits could be expensive, time-consuming and impair or prevent development and commercialization activities.

Our commercial success depends in part on our avoiding infringement of the patents and proprietary rights of third parties. There is a substantial amount of litigation, both within and outside the United States, involving patent and other intellectual property rights in the biotechnology and pharmaceutical industries, including patent infringement lawsuits, interferences, oppositions, *ex parte* reexaminations, post-grant review, and *inter partes* review proceedings before the U.S. Patent and Trademark Office, or U.S. PTO, and corresponding foreign patent offices. Numerous U.S. and foreign issued patents and pending patent applications, which are owned by third parties, exist in the fields in which we are pursuing development candidates. As the biotechnology and pharmaceutical industries expand and more patents are issued, the risk increases that our product candidates may be subject to claims of infringement of the patent rights of third parties.

Third parties may assert that we are employing their proprietary technology without authorization, and such parties may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater resources. There may be third-party patents or patent applications with claims to materials, formulations, methods of manufacture or methods for treatment related to the use or manufacture of our product candidates. For example, we are aware of certain patents held by a third party related to certain vector manufacturing methods that are currently being used in certain of our product candidates. We have not yet finalized the commercial scale manufacturing process for any of our product candidates. If our commercial scale manufacturing process utilizes these vector manufacturing methods, and if these third-party patents are in force at the time of commercialization, we may need to use or develop a non-infringing manufacturing method or seek a license to these patents. In any event, if any third-party patents were held by a court of competent jurisdiction to cover the manufacturing methods of any of our product candidates, any molecules formed during the manufacturing process or any final product itself, the holders of any such patents may be able to block our ability to commercialize such product candidate unless we obtained a license under the applicable patents, or until such patents expire. Similarly, if any third-party patents were held by a court of competent jurisdiction to cover aspects of our formulations, processes for manufacture or methods of use,

including combination therapy, the holders of any such patents may be able to block our ability to develop and commercialize the applicable product candidate unless we obtained a license, or until such patents expires. Moreover, because patent applications can take many years to issue, there may be currently pending patent applications that may later result in issued patents that our product candidates may infringe.

Defense of these claims, regardless of their merit, would involve substantial litigation expense and would be a substantial diversion of employee resources from our business. In the event of a successful claim of infringement against us, we may have to pay substantial damages, including treble damages and attorneys' fees for willful infringement, pay royalties, redesign our infringing products or obtain one or more licenses from third parties, which may be impossible or require substantial time and monetary expenditure.

Competitors may also infringe our patents or the patents of our licensors. To counter infringement or unauthorized use, we may be required to file infringement claims, which can be expensive and time-consuming. In addition, in an infringement proceeding, a court may decide that a patent of ours or our licensors is not valid, is unenforceable, in whole or in part, or may refuse to stop the other party from using the technology at issue on the grounds that our patents do not cover the technology in question. An adverse result in any litigation or defense proceedings could put one or more of our patents at risk of being invalidated, held unenforceable or interpreted narrowly and could put our patent applications at risk of not issuing. Moreover, if we or one of our licensing partners initiated legal proceedings against a third party to enforce a patent covering one of our product candidates, the defendant could counterclaim that the patent covering our product candidate is invalid and/or unenforceable. Such proceedings could result in revocation or amendment to our patents in such a way that they no longer cover our product candidate. The outcome following legal assertions of invalidity and unenforceability is unpredictable. With respect to the validity question, for example, we cannot be certain that there is no invalidating prior art, of which we and the patent examiner were unaware during prosecution. If a defendant were to prevail on a legal assertion of invalidity and/or unenforceability, we would lose at least part, and perhaps all, of the patent protection on our product candidates. Such a loss of patent protection could have an adverse impact on our business.

Interference or derivation proceedings provoked by third parties or brought by us or declared by the U.S. PTO may be necessary to determine the priority of inventions or other matters of inventorship with respect to our patents or patent applications or those of our licensors. An unfavorable outcome could expose us to significant monetary damages, result in the loss of valuable intellectual property, require us to cease using the related technology or to attempt to license rights to it from the prevailing party. Our business could be harmed if the prevailing party does not offer us a license on commercially reasonable terms or at all, or if a non-exclusive license is offered and our competitors gain access to the same technology. Our defense of litigation, interference, derivation, or other proceedings may fail and, even if successful, may result in substantial costs and distract our management and other employees. We may not be able to prevent, alone or with our licensors, misappropriation of our intellectual property rights, particularly in countries where the laws may not protect those rights as fully as in the United States.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation or administrative proceedings, there is a risk that some of our confidential information could be compromised by disclosure. In addition, any uncertainties resulting from the initiation and continuation of any litigation could have an adverse effect on our ability to raise additional funds or otherwise have an adverse effect on our business, results of operations, financial condition and prospects.

We may be subject to claims that our employees, consultants or independent contractors have wrongfully used or disclosed confidential information of third parties or that our employees have wrongfully used or disclosed alleged trade secrets of their former employers.

We employ individuals who were previously employed at universities or other biotechnology or pharmaceutical companies, including our competitors or potential competitors. Although we try to ensure that our employees, consultants and independent contractors do not use the proprietary information or know-how of others in their work for us, we may be subject to claims that we or our employees, consultants or independent contractors have inadvertently or otherwise used or disclosed intellectual property, including trade secrets or other proprietary information, of any of our employee's former employer or other third parties. Litigation may be necessary to defend against these claims. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights or personnel, which could adversely impact our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and be a distraction to management and other employees.

Changes in patent law could diminish the value of patents in general, thereby impairing our ability to protect our products.

As is the case with other biotechnology companies, our success is heavily dependent on intellectual property, particularly patents. Obtaining and enforcing patents in the biotechnology industry involve both technological and legal complexity, and is therefore costly, time-consuming and inherently uncertain. Changes in either the patent laws or interpretation

of the patent laws in the United States or in other jurisdictions in which we seek patent protection could increase the uncertainties and costs surrounding the prosecution of patent applications and the enforcement or defense of issued patents. The United States enacted the Leahy-Smith America Invents Act, or the America Invents Act, which includes a number of significant changes that affect the way patent applications will be prosecuted and also may affect patent litigation. These include allowing third party submission of prior art to the U.S. PTO during patent prosecution and additional procedures to attack the validity of a patent by U.S. PTO administered post-grant proceedings, including post-grant review, *inter partes* review, and derivation proceedings. Because of a lower evidentiary standard in U.S. PTO proceedings compared to the evidentiary standard in United States federal courts necessary to invalidate a patent claim, a third party could potentially provide evidence in a U.S. PTO proceeding sufficient for the U.S. PTO to hold a claim invalid even though the same evidence would be insufficient to invalidate the claim if first presented in a district court action. In addition, the challenged patents are not accorded the presumption of validity as they are in Federal District Court. Accordingly, a third party may attempt to use the U.S. PTO procedures to invalidate our patent claims that would not have been invalidated if first challenged by the third party as a defendant in a district court action. Therefore, the America Invents Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our owned or in-licensed patent applications and the enforcement or defense of our owned or in-licensed issued patents, all of which could have an adverse effect on our business, financial condition, results of operations, and prospects. Moreover, recent U.S. Supreme Court rulings have narrowed the scope of patent protection available in certain circumstances and weakened the rights of patent owners in certain situations. In addition to increasing uncertainty with regard to our ability to obtain patents in the future, this combination of events has created uncertainty with respect to the value of patents, once obtained. Depending on decisions by the U.S. Congress, the federal courts, the U.S. PTO, and similar legislative, judicial and regulatory bodies in other jurisdictions, the laws and regulations governing patents could change in unpredictable ways that would weaken our ability to obtain new patents or to enforce our existing patents and patents that we might obtain in the future.

We may be unable to license gene transfer technologies that we may need to commercialize our zinc finger protein technology and potential products, if approved.

In order to regulate or modify a gene in a cell, the ZFP must be efficiently delivered to the cell. We have licensed certain gene transfer technologies for our ZFP in research, including AAV and mRNA technology and we are evaluating these systems and other technologies that may need to be used in the delivery of ZFP into cells for *in vitro* and *in vivo* applications. We have not developed our own gene transfer technologies, and we rely on our ability to enter into license agreements to provide us with rights to the necessary gene transfer technology. Our approach has been to license appropriate technology as required. For example, we are aware of certain patents held by a third party related to certain vector manufacturing methods that are currently being used in certain of our product candidates. We have not yet finalized the commercial scale manufacturing process for any of our product candidates. If our commercial scale manufacturing process utilizes these vector manufacturing methods, and if these third-party patents are in force at the time of commercialization, we may need to use or develop a non-infringing manufacturing method or seek a license to these patents. However, we may not be able to license the gene transfer technologies on reasonable terms, if at all, required to develop and commercialize our product candidates. The inability to obtain a license to use gene transfer technologies with entities that own such technology on reasonable commercial terms, if at all, could delay or prevent the preclinical evaluation, drug development collaborations, clinical testing, and/or commercialization of our therapeutic product candidates.

We are conducting proprietary research to discover new product candidates. These programs increase our financial risk of product failure, may significantly increase our research expenditures, and may involve conflicts with future collaborators and strategic partners.

Our proprietary research programs consist of research that is funded solely by us or by grant funding and in which we retain exclusive rights to therapeutic products generated by such research. This is in contrast to certain of our research programs that may be funded by corporate partners in which we may share rights to any resulting products. Conducting proprietary research programs may not generate corresponding revenue and may create conflicts with our collaborators or strategic partners over rights to our intellectual property with respect to our proprietary research activities. Any conflict with our collaborators or strategic partners could reduce our ability to enter into future collaborations or partnering agreements and negatively impact our relationship with existing collaborators and partners that could reduce our revenue and delay or terminate our product development. As we continue to focus our strategy on proprietary research and therapeutic development, we expect to experience greater business risks, expend significantly greater funds and require substantial commitments of time from our management and staff.

Risks Relating to our Business Operations

Significant disruptions of our information technology systems or data security incidents could result in significant financial, legal, regulatory, business and reputational harm to us.

We are increasingly dependent on information technology systems and infrastructure to operate our business, which are large and complex. In the ordinary course of our business, we collect, store, process and transmit large amounts of sensitive information, including intellectual property, proprietary business information, personal information and other confidential information. It is critical that we do so in a secure manner to maintain the confidentiality, integrity and availability of such sensitive information. We have also outsourced elements of our operations (including elements of our information technology infrastructure) to third parties, and as a result, we manage a number of third-party vendors who may or could have access to our computer networks or our confidential information. Many of those third parties in turn subcontract or outsource some of their responsibilities to third parties. While all information technology operations are inherently vulnerable to inadvertent or intentional security breaches, incidents, attacks and exposures, the size, complexity, accessibility and distributed nature of our information technology systems, and the large amounts of sensitive information stored on those systems, make such systems potentially vulnerable to unintentional or malicious, internal and external attacks on our technology environment. Attacks of this nature are increasing in their frequency, levels of persistence, sophistication and intensity.

Significant disruptions of our, our third-party vendors' and/or business partners' information technology systems or other similar data security incidents could adversely affect our business operations and/or result in the loss, misappropriation, and/or unauthorized access, use or disclosure of, or the prevention of access to, sensitive information, which could result in financial and reputational harm to us. For example, in April 2018, we announced a data security incident involving the compromise of a then senior executive's company email account. Upon learning of the incident on March 28, 2018, external network security experts were promptly engaged, and the incident response team worked diligently to investigate the incident. We also promptly notified federal law enforcement of the incident. The investigation concluded that the incident was limited to the compromise of the then senior executive's company email account for approximately 11 weeks. The investigation did not reveal any evidence that our network or other information technology systems were otherwise compromised in connection with the incident or that the incident resulted in the disclosure of or access to personal information about patients or other individuals besides the holder of the company email account that was affected. However, proprietary, confidential and other sensitive information of ours and that of other entities was accessed and may have been compromised as a result of the incident. Unforeseen developments related to this incident could occur, which could have a further adverse impact on us. We do not maintain cyber liability insurance and will therefore have no coverage for any losses resulting from this data security incident. Any litigation or regulatory review arising from this incident could result in significant legal exposure to us. In addition, information technology system disruptions, whether from attacks on our technology environment or from computer viruses, natural disasters, terrorism, war and telecommunication and electrical failures, could result in a material disruption of our facility, development programs and our business operations. For example, the loss of clinical trial data from completed or future clinical trials could result in delays in our regulatory approval efforts and significantly increase our costs to recover or reproduce the data.

While we aware of the company email incident described above, there is no way of knowing with certainty whether we have experienced any other data security incidents that have not been discovered. While we have no reason to believe this to be the case, attackers have become very sophisticated in the way they conceal access to systems, and many companies that have been attacked are not aware that they have been attacked. Any event, including the company email incident described above, that leads to unauthorized access, use or disclosure of personal information could, among other consequences, disrupt our business, harm our reputation, compel us to comply with applicable federal and/or state breach notification laws and foreign law equivalents. In addition, failure to maintain effective internal accounting controls related to security breaches and cybersecurity in general could impact our ability to produce timely and accurate financial statements and subject us to regulatory scrutiny. Moreover, data security incidents and other inappropriate access can be difficult to detect, and any delay in identifying them may lead to increased harm of the type described above. While we have implemented security measures intended to protect our information technology systems and infrastructure, there can be no assurance that such measures will successfully prevent service interruptions or further security incidents.

We plan to continue to operate the acquired Sangamo France business in France and the Sangamo UK business in the United Kingdom, which may expose us to unanticipated costs or events.

Sangamo France's historical operations have been based in France and we plan to continue to operate the acquired Sangamo France business in France. Our operation of the acquired Sangamo France business in France involves significant risks, including:

- difficulty hiring and retaining appropriate personnel due to intense competition for such limited resources;
- disruptions in relations with our employees, including legacy Sangamo France employees; and
- compliance with regulatory requirements, including local French employment regulations and organized labor in France.

In addition, we have operations and conduct business through our UK subsidiary. As a result of our operations outside of the United States, we have become more exposed to fluctuations in currency exchange rates between the Euro and the U.S.

dollar and between the Pound Sterling and the U.S. Dollar. Given the volatility of currency exchange rates, there is no assurance that we will be able to effectively manage currency transaction and/or conversion risks. To date, we have not entered into derivative instruments to offset the impact of foreign exchange fluctuations, which fluctuations could have an adverse effect on our financial condition and results of operations. In any event, difficulties resulting from these and other risks related to our operations outside of the United States could expose us to increased expenses, impair our development efforts, adversely affect our financial condition and results of operations, and harm our competitive position.

We may face difficulties as we expand our operations into countries in which we have no prior operating experience, and we may be exposed to risks associated with our operations and clinical trials in foreign jurisdictions, which could adversely affect our business.

In addition to Sangamo France and Sangamo UK, we may expand our global footprint in order to enter into new markets. Operating in foreign jurisdictions requires significant resources and management attention and subjects us to regulatory, economic and political risks that are different from those we face in the United States. We cannot be sure that any further international expansion will be successful.

Certain countries in to which we may expand, may have less political, social or economic stability and less developed infrastructure and legal systems. In addition, it may be difficult for us to understand and accurately predict taste preferences and purchasing habits of consumers in these new geographic markets. It will be costly to establish, develop and maintain international operations and develop and promote our products, if and when approved, in international markets. We may also encounter regulatory, legal, personnel, technological and other difficulties that increase our expenses and/or delay our ability to become profitable in such countries, which could have an adverse effect on our business and operations. Consequently, we are, and will continue to be, subject to risks inherent with operating in foreign countries, in addition to those specific risks associated with Sangamo France and Sangamo UK, which include:

- the increased complexity and costs inherent in managing international operations, including in geographically disparate locations;
- diverse regulatory, financial and legal requirements, and any future changes to such requirements, in one or more countries where we are located or do business;
- differing payor reimbursement regimes, governmental payors or patient self-pay systems and price controls;
- adverse tax consequences, including changes in applicable tax laws and regulations;
- applicable trade laws, tariffs, export quotas, custom duties or other trade restrictions, and any changes to them;
- economic weakness, including inflation, or political or economic instability in particular foreign economies and markets;
- compliance with tax, employment, immigration and labor laws for employees living or traveling abroad;
- foreign currency fluctuations, which could result in increased operating expenses or reduced revenues, and other obligations incident to doing business or operating in another country;
- liabilities for activities of, or related to, our international operations;
- challenges inherent in efficiently managing employees in diverse geographies, including the need to adapt systems, policies, benefits and compliance programs to differing labor and other regulations;
- workforce uncertainty in countries where labor unrest is more common than in the United States; and
- laws and regulations relating to data security and the unauthorized use of, or access to, commercial and personal information.

The withdrawal of the United Kingdom from the European Union, commonly referred to as "Brexit," may adversely impact our ability to obtain regulatory approvals of our product candidates in the European Union, result in restrictions or imposition of taxes and duties for importing our product candidates into the European Union, and may require us to incur additional expenses in order to develop, manufacture and commercialize our product candidates in the European Union.

Following the result of a referendum in 2016, the United Kingdom left the European Union on January 31, 2020 pursuant to formal withdrawal agreements between the United Kingdom and the European Union. Under these agreements, the United Kingdom will be subject to a transition period until December 31, 2020, during which European Union rules will continue to apply. Negotiations between the United Kingdom and the European Union are expected to continue in relation to the customs and trading relationship between the United Kingdom and the European Union following the expiry of the transition period.

A significant proportion of the regulatory framework in the United Kingdom applicable to our business and our product candidates is derived from European Union directives and regulations, and as such, following the transition period, Brexit could negatively impact the regulatory regime with respect to the development, manufacture, importation, approval and commercialization of our product candidates in the United Kingdom or the European Union. Any delay in obtaining, or an inability to obtain, any clinical trial authorizations or marketing approvals, as a result of Brexit or otherwise, would prevent us from developing or commercializing our product candidates in the United Kingdom or the European Union and restrict our ability to generate revenue and achieve and sustain profitability. In addition, we may be required to pay taxes or duties or be subjected to other hurdles in connection with the importation of our clinical trial materials and/or our product candidates into the European Union or into the United Kingdom from the European Union, or we may incur expenses in establishing a manufacturing facility in the European Union in order to circumvent such hurdles. If any of these outcomes occur, we may be forced to restrict or delay efforts to seek regulatory approval in the United Kingdom or the European Union for our product candidates, or incur significant additional expenses to operate our business, which could significantly and significantly harm or delay our ability to generate revenues or achieve profitability of our business. Any further changes in international trade, tariff and import/export regulations as a result of Brexit or otherwise may impose unexpected duty costs or other non-tariff barriers on us. These developments, or the perception that any of them could occur, may significantly reduce global trade and, in particular, trade between the impacted nations and the United Kingdom. It is also possible that Brexit may negatively affect our ability to attract and retain employees, particularly those from the European Union.

We and third parties on which we rely may be adversely affected by natural disasters and catastrophic or other events outside of our control, and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster or event.

Natural disasters could severely disrupt our facilities and our operations and have a negative impact on our business, financial condition, results of operations and prospects. If a natural disaster, pandemic or epidemic (such as the recently reported coronavirus outbreak originating in China that has resulted in global impacts on business and operations), political crisis, power outage or any other event that is out of our control occurred that prevented us or third parties on which we rely from using all or a significant portion of our or their facilities, that damaged critical infrastructure or that otherwise disrupted our or their operations, it may be difficult or, in certain cases, impossible for us to continue our business and operations for a substantial period of time. The disaster recovery and business continuity plans we have in place currently are limited and may not prove adequate in the event of a serious disaster or similar event. We may incur substantial expenses as a result of the limited nature of our disaster recovery and business continuity plans, which could have an adverse effect on our business, financial condition, results of operations and prospects. Such disasters or events occurring at facilities of third parties on which we rely could also negatively impact our business and operations.

We will need to grow the size of our organization, and we may experience difficulties in managing this growth and attracting and retaining employees.

We will need to grow the size of our organization in order to support our continued development and potential commercialization of our product candidates. In particular, we will need to add substantial numbers of additional personnel and other resources to support our development and potential commercialization of our product candidates. As our operations expand, we will also need to manage additional relationships with various strategic partners, suppliers and other third parties. We may not be able to attract or retain employees with the appropriate levels of experience and skills to accomplish our objectives. As our development and commercialization plans and strategies continue to develop, or as a result of any future acquisitions, our need for additional managerial, operational, manufacturing, sales, marketing, financial and other resources will increase. Future growth will also impose significant added responsibilities on members of management.

Our future financial performance and our ability to commercialize our product candidates and to compete effectively will depend, in part, on our ability to manage any future growth effectively. To that end, we must be able to manage our development efforts and preclinical studies and clinical trials effectively and hire, train and integrate additional management, research and development, manufacturing, administrative and sales and marketing personnel. Our failure to accomplish any of these tasks could prevent us from successfully growing our company.

We are dependent on certain key members of our executive team and certain of our scientific and manufacturing personnel, the loss of whose services may adversely impact the achievement of our objectives. While we have entered into employment agreements with each of our executive officers, any of them could leave our employment at any time, as all of our employees are “at will” employees. We do not have “key person” insurance on any of our employees. The loss of the services of one or more of such key employees might impede the achievement of our research, development and commercialization objectives.

Recruiting and retaining other qualified employees for our business, including scientific and technical personnel is, and will continue to be, critical to our success. There currently is a shortage of skilled individuals with substantial gene therapy experience, which is likely to continue. As a result, competition for skilled personnel, including in gene therapy research and vector manufacturing, is intense and the turnover rate can be high. We may not be able to attract and retain personnel on

acceptable terms given the competition among numerous pharmaceutical and biotechnology companies and academic institutions for individuals with similar skill sets. In addition, failure to succeed in preclinical or clinical trials or applications for marketing approval may make it more challenging to recruit and retain qualified personnel. The inability to recruit, or loss of services of certain executives or key employees, may impede the progress of our research, development and commercialization objectives and have an adverse effect on our business, financial condition, results of operations and prospects.

We may not successful in our efforts to identify, discover or acquire new potential product candidates and may fail to capitalize on programs or product candidates that may be a greater commercial opportunity or for which there is a greater likelihood of success.

Part of our business strategy is to expand our product candidate pipeline by identifying and validating new product candidates, which we may develop ourselves, in-license or otherwise acquire from others. In the event that our existing product candidates do not receive regulatory approval or are not successfully commercialized, then the success of our business will depend on our ability to continue to expand our product pipeline through in-licensing or other acquisitions. We may be unable to identify relevant product candidates. If we do identify such product candidates, we may be unable to reach acceptable terms with any third party from which we desire to in-license or acquire them. Further, while we seek to mitigate risks and liabilities of potential acquisitions and in-licensing transactions through, among other things, due diligence, there may be risks and liabilities that such due diligence efforts fail to discover, that are not disclosed to us, or that we inadequately assess, or that we are not able to effectively manage. Additionally, we may not realize the anticipated benefits of such transactions for a variety of reasons, including the possibility that acquired product candidates, such as TX200, prove not to be safe or effective in clinical trials, the integration of an acquired product candidate, technology or business gives rise to unforeseen difficulties and expenditures, or that the expected benefits will not otherwise be realized or will not be realized within the expected timeframe.

Additionally, because we have limited resources, we may forego or delay pursuit of opportunities with certain programs or product candidates or for indications that later prove to have greater commercial potential. Our spending on current and future research and development programs may not yield any commercially viable products. If we do not accurately evaluate the commercial potential for a particular product candidate, we may relinquish valuable rights to that product candidate through strategic collaboration, licensing or other arrangements in cases in which it would have been more advantageous for us to retain sole development and commercialization rights to such product candidate. Alternatively, we may allocate internal resources to a product candidate in a therapeutic area in which it would have been more advantageous to enter into a partnering arrangement.

Risks Relating to our Common Stock and Corporate Organization

Our stock price has been volatile and may continue to be volatile, which could result in substantial losses for investors, and could be influenced by public perception of genomic medicines and the biotechnology sector.

Our stock price has been volatile and may continue to be volatile, which could cause stockholders to incur substantial losses. An active public market for our common stock may not be sustained, and the market price of our common stock may continue to be highly volatile. The market price of our common stock has fluctuated significantly in response to various factors, some of which are beyond our control, including but not limited to the following:

- announcements by us or collaborators providing updates on the progress or development status of product candidates or data from clinical trials;
- initiation or termination of clinical trials;
- changes in market valuations of similar companies;
- overall market and economic conditions, including the equity markets for emerging biotechnology companies;
- deviations in our results of operations from the guidance given by us;
- announcements by us or our competitors of new or enhanced products, technologies or services or significant contracts, acquisitions, strategic relationships, joint ventures or capital commitments;
- announcement of changes in business and operations by our collaborators and partners, or changes in our existing collaboration agreements;
- changes in public opinion of gene therapy and genomic medicines;
- regulatory developments, including increased regulatory scrutiny of gene therapy and genomic medicines;
- changes, by one or more of our security analysts, in recommendations, ratings or coverage of our stock;
- additions or departures of key personnel; and
- sales of our common stock or other securities by us, management or directors, liquidation of institutional funds that comprised large holdings of our stock and decreases in our cash balances.

These external events may have a negative impact on public perception of our business, which could cause our stock price to be volatile, and could result in a decline in the value of your investment in our company.

Actual or potential sales of significant amounts of shares of our common stock into the market could cause the market price of our common stock to fall or prevent it from increasing for numerous reasons.

Sales of a substantial number of shares of our common stock in the public market could occur at any time. These sales, or the perception in the market that holders of a large number of shares intend to sell shares, could reduce the market price of our common stock. Our outstanding shares of common stock may be freely sold in the public market at any time to the extent permitted by Rules 144 and 701 under the Securities Act of 1933, as amended, or the Securities Act, or to the extent such shares have already been registered under the Securities Act and are held by non-affiliates of ours. We have filed registration statements registering all shares of common stock that we may issue under our equity compensation plans. Such shares can be freely sold in the public market upon issuance, subject to volume limitations and black-out periods applicable to affiliates.

In addition, in accordance with the guidelines specified under Rule 10b5-1 of the Securities Exchange Act of 1934, as amended, or the Exchange Act, and our policies regarding stock transactions, certain of our employees, executive officers and directors have adopted, and may continue to adopt, stock trading plans pursuant to which they have arranged to sell shares of our common stock from time to time in the future. Generally, sales under such plans by our executive officers and directors require public filings. Our employees, executive officers, directors and affiliated stockholders also may buy or sell additional shares outside of a Rule 10b5-1 plan when they are not in possession of material, nonpublic information. Actual or potential sales of our common stock by such persons could be viewed negatively by other investors, and could cause the price of our common stock to fall or prevent it from increasing.

If securities or industry analysts do not publish research or publish inaccurate or unfavorable research about our business, our stock price and trading volume could decline.

The trading market for our common stock will depend in part on the research and reports that securities or industry analysts publish about us or our business. In the event securities or industry analysts who cover us downgrade our stock or publish inaccurate or unfavorable research about our business, our stock price would likely decline. If one or more of these analysts cease coverage of our company or fail to publish reports on us regularly, demand for our stock could decrease, which might cause our stock price and trading volume to decline.

We do not intend to pay dividends on our common stock so any returns will be limited to the value of our stock.

We have never declared or paid any cash dividends on our common stock. We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. Any return to stockholders will therefore be limited to the appreciation of their stock.

Anti-takeover provisions in our certificate of incorporation, Delaware law and our bylaws could make an acquisition of our company more difficult and could prevent attempts by our stockholders to remove or replace current management.

Anti-takeover provisions of Delaware law and in our certificate of incorporation and our bylaws may discourage, delay or prevent a change in control of our company, even if a change in control would be beneficial to our stockholders. In addition, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors. In particular, under our certificate of incorporation our board of directors may issue up to 5,000,000 shares of preferred stock with rights and privileges that might be senior to our common stock, without the consent of the holders of the common stock. Moreover, without any further vote or action on the part of the stockholders, the board of directors would have the authority to determine the price, rights, preferences, privileges, and restrictions of the preferred stock. This preferred stock, if it is ever issued, may have preference over, and harm the rights of, the holders of common stock. Although the issuance of this preferred stock would provide us with flexibility in connection with possible acquisitions and other corporate purposes, this issuance may make it more difficult for a third party to acquire a majority of our outstanding voting stock.

Similarly, our authorized but unissued common stock is available for future issuance without stockholder approval. Our certificate of incorporation further provides that stockholders may not take action by written consent.

In addition, our amended and restated bylaws:

- establish advance notice requirements for nominations for election to the board of directors or proposing matters that can be acted upon at stockholders' meetings; and
- prohibit stockholders from calling a special meeting of stockholders.

We are also subject to Section 203 of the General Corporation Law of the State of Delaware, which provides, subject to certain exceptions, that if a person acquires 15% of our voting stock, the person is an "interested stockholder" and may not

engage in “business combinations” with us for a period of three years from the time the person acquired 15% or more or our voting stock. The application of Section 203 may, in some circumstances, deter or prevent a change in control of our company even when such change may be beneficial to our stockholders.

Our amended and restated bylaws provide that a state or federal court located within the State of Delaware will be the exclusive forum for the adjudication of certain disputes, which could limit our stockholders’ ability to obtain a favorable judicial forum for disputes with us or our directors, officers, or employees.

Our amended and restated bylaws provide that a state or federal court located within the State of Delaware is the sole and exclusive forum for:

- any derivative action or proceeding brought on our behalf;
- any action asserting a claim of breach of a fiduciary duty owed by any director, officer or other employee or stockholder of Sangamo to us or our stockholders;
- any action asserting a claim arising pursuant to any provision of the General Corporation Law of the State of Delaware, our charter or our bylaws, as to which the General Corporation Law of the State of Delaware confers jurisdiction on the Court of Chancery of the State of Delaware; and
- any action asserting a claim governed by the internal affairs doctrine.

This provision further provides that any person or entity that acquires any interest in shares of our capital stock will be deemed to have notice of and consented to the provisions of such provision.

While this provision does not apply to suits brought to enforce a duty or liability created by the Exchange Act or the Securities Act, or any claim for which the federal courts have exclusive jurisdiction, this provision may nonetheless limit a stockholder’s ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers, or other employees, which may discourage lawsuits against us and our directors, officers, and other employees. If a court were to find this provision to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving the dispute in other jurisdictions, which could seriously harm our business.

ITEM 1B – UNRESOLVED STAFF COMMENTS

None.

ITEM 2 – PROPERTIES

Our corporate headquarters occupies approximately 87,700 square feet of office and research and development laboratory facilities in Brisbane, California, pursuant to a lease that expires in May 2029. We also lease approximately 45,600 square feet of research and office space in Richmond, California, subject to leases that expire in August 2026. We also lease approximately 20,800 square feet of office, research and development space in Valbonne, France, subject to leases that expire beginning in June 2025 through March 2028. We believe that our facilities are currently adequate to meet our needs. As we continue to expand our operations, we may need to lease or purchase additional facilities.

ITEM 3 – LEGAL PROCEEDINGS

We are not a party to any material pending legal proceeding. From time to time, we may be involved in legal proceedings arising in the ordinary course of business.

ITEM 4 – MINE SAFETY DISCLOSURES

Not Applicable.

PART II

ITEM 5 – MARKET FOR THE REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information

Our common stock trades on the Nasdaq Global Select Market under the symbol "SGMO."

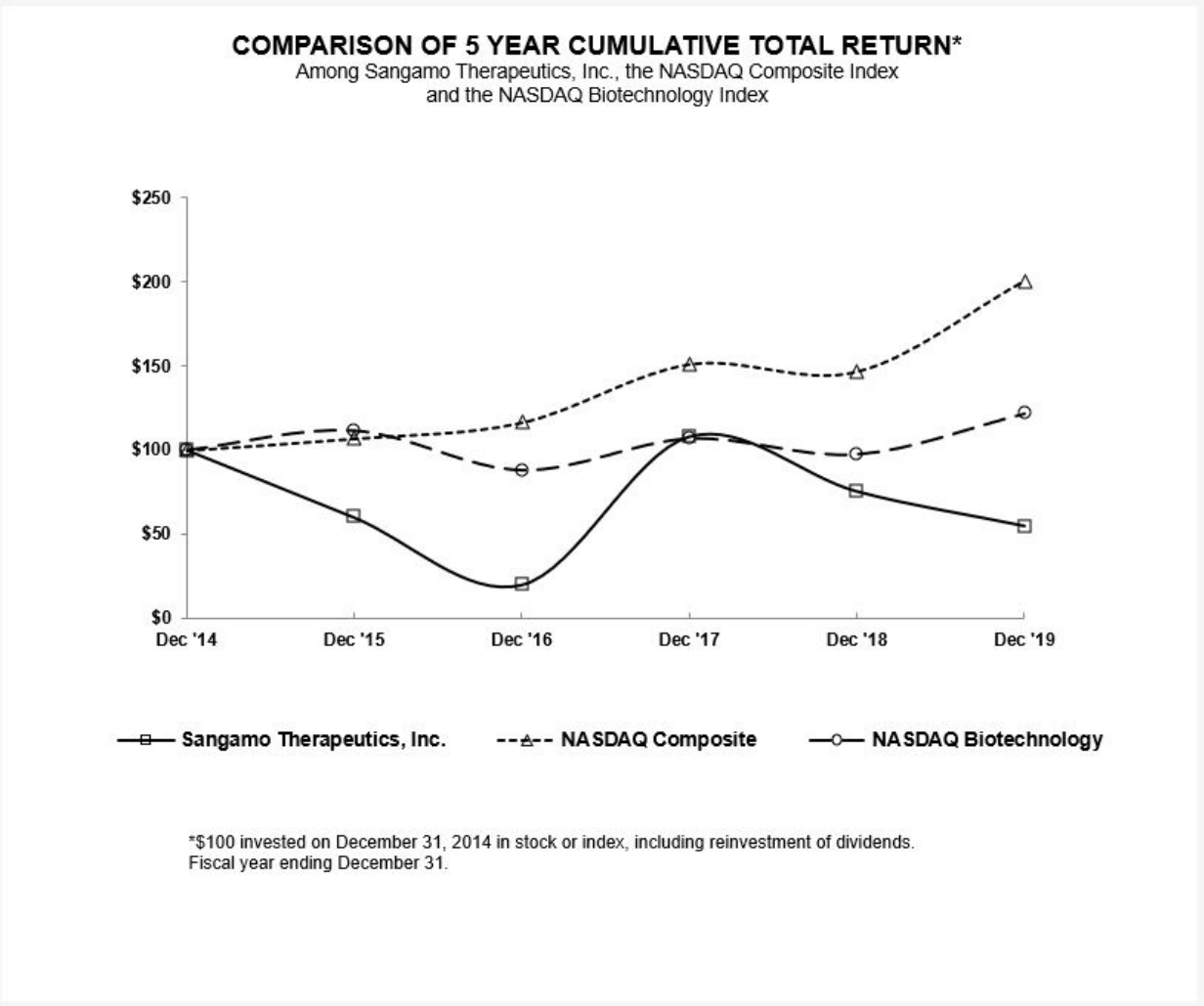
Holders

As of February 21, 2020, there were 55 holders of record of our common stock. This number does not include "street name," or beneficial holders, whose shares are held of record by banks, brokers, financial institutions and other nominees.

Dividends

We have not paid dividends on our common stock, and currently do not plan to pay any cash dividends in the foreseeable future.

Stock Performance Graph



The above Stock Performance Graph and related information shall not be deemed "soliciting material" or to be "filed" with the SEC nor shall such information be incorporated by reference into any future filing under the Securities Act or the Exchange Act, each as amended, except to the extent that the Company specifically incorporates it by reference into such filing.

ITEM 6 – SELECTED FINANCIAL DATA

The following Selected Financial Data should be read in conjunction with "Item 7 – Management's Discussion and Analysis of Financial Condition and Results of Operations" and "Item 8 – Financial Statements and Supplementary Data" included elsewhere in this Annual Report on Form 10-K. Historical results are not necessarily indicative of future results.

	Year Ended December 31,				
	2019	2018	2017	2016	2015
	(In thousands, except per share data)				
Statement of Operations Data:					
Revenues	$ 102,428	$ 84,452	$ 36,567	$ 19,389	$ 39,539
Operating expenses:					
Research and development	145,922	114,866	65,728	65,618	67,198
General and administrative	61,686	46,736	27,200	26,330	19,197
Total operating expenses	207,608	161,602	92,928	91,948	86,395
Loss from operations	(105,180)	(77,150)	(56,361)	(72,559)	(46,856)
Interest and other income, net	9,761	8,261	1,793	887	431
Benefit from income taxes	—	—	—	14	5,722
Net loss	(95,419)	(68,889)	(54,568)	(71,658)	(40,703)
Net loss attributable to non-controlling interest	(233)	(555)	—	—	—
Net loss attributable to Sangamo Therapeutics, Inc. stockholders	$ (95,186)	$ (68,334)	$ (54,568)	$ (71,658)	$ (40,703)
Basic and diluted net loss per share attributable to Sangamo Therapeutics, Inc. stockholders	$ (0.85)	$ (0.70)	$ (0.70)	$ (1.02)	$ (0.58)
Shares used in computing basic and diluted net loss per share attributable to Sangamo Therapeutics, Inc. stockholders	112,114	96,941	78,084	70,553	69,757

	As of December 31,				
	2019	2018	2017	2016	2015
	(In thousands)				
Balance Sheet Data:					
Cash, cash equivalents, marketable securities, and interest receivable	$ 384,988	$ 400,508	$ 244,560	$ 142,759	$ 209,307
Working capital	335,601	332,010	203,538	136,289	192,485
Total assets	637,516	590,395	286,741	157,891	217,235
Accumulated deficit	(656,985)	(562,696)	(495,479)	(440,911)	(369,253)
Total stockholders' equity	432,739	367,257	187,900	136,195	192,439

Sangamo France was acquired in October 2018 and the results of operations have been included in the selected consolidated financial data since the date of acquisition (see *Note 5 – Acquisition of Sangamo France* to our Consolidated Financial Statements).

ITEM 7 – MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

The discussion in "Management's Discussion and Analysis of Financial Condition and Results of Operations" contains trend analysis, estimates and other forward-looking statements within the meaning of Section 27A of the Securities Act, as amended, and Section 21E of the Exchange Act, as amended. These forward-looking statements include, without limitation, statements containing the words "believes," "anticipates," "expects," "continue," "intend," "plan," "will," and other words of similar import or the negative of those terms or expressions. Such forward-looking statements are subject to known and unknown risks, uncertainties, estimates and other factors that may cause our actual results, performance or achievements, or industry results, to be materially different from any future results, performance or achievements expressed or implied by such forward-looking statements. Actual results could differ materially from those set forth in such forward-looking statements as a result of, but not limited to, the "Risk Factors" described in Part I, Item 1A of this Annual Report on form 10-K. You should

read the following discussion and analysis along with the "Selected Financial Data" and the Consolidated Financial Statements and notes attached to those statements included elsewhere in this report.

In addition, the section of this "Management's Discussion and Analysis of Financial Condition and Results of Operations" generally discusses 2019 and 2018 items and year-to-year comparisons between 2019 and 2018. Discussions of 2017 items and year-to-year comparisons between 2018 and 2017 are not included in this Annual Report on Form 10-K and can be found in "Management's Discussion and Analysis of Financial Condition and Results of Operations" in Part II, Item 7 of our Annual Report on Form 10-K for the fiscal year ended December 31, 2018, filed with the SEC on March 1, 2019.

Overview

We are a clinical stage biotechnology company focused on translating ground-breaking science into genomic medicines with the potential to transform patients' lives using our platform technologies in gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation.

Our strategy is to maximize the value and therapeutic use of our technology platforms. For certain therapies, we intend to capture the value of our proprietary gene therapy, cell therapy, genome editing and genome regulation products by incorporating these technologies into our manufacturing, development and commercial operations. For other therapies, we intend to partner with biopharmaceutical companies to develop products as appropriate. Decisions to partner product candidates will be based on review of our internal resources, internal know-how, and commercial considerations. In our proprietary clinical development programs, we are focused on three therapeutic areas: IMDs, CNS diseases and immunology, which comprises inflammatory and autoimmune diseases.

We are a leader in the research and development of ZFPs, a naturally occurring class of transcription factor proteins found in humans and other species. We have used our internal know-how and technical expertise to develop a proprietary synthetic ZFP platform with potential clinical utility in *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation. ZFPs can be engineered to make ZFNs that can be used to specifically modify DNA sequences by knocking in or knocking out select genes, or genome editing ZFP-TFs proteins that can be used to selectively increase or decrease gene expression. In the process of developing this platform, we have additionally accrued significant scientific, manufacturing, development capabilities, and related know-how that are broadly applicable to the field of gene therapy and have used this knowledge to advance a gene therapy platform.

We have a substantial intellectual property portfolio protecting our technology and product candidates. We continue to license and file new patent applications to strengthen and consolidate our existing patent portfolio. We believe that our intellectual property position is critical to our ability to research, develop, manufacture and commercialize gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation products and services.

Business Updates

In February 2020, we entered into a global licensing collaboration agreement with Biogen for the research, development and commercialization of gene regulation therapies for the treatment of neurological diseases, including ST-501 a preclinical ZFP-TF product candidate for tauopathies including Alzheimer's disease, and ST-502, a preclinical ZFP-TF product candidate for alpha-synuclein related diseases including Parkinson's disease, among other targets. After the collaboration agreement becomes effective, Biogen will pay us an upfront payment of $125.0 million. Concurrently with the execution of the collaboration agreement, we also entered into a stock purchase agreement with Biogen MA, Inc., pursuant to which Biogen MA, Inc. agreed to acquire $225.0 million of shares of our common stock. We are also eligible to receive research, development, regulatory and commercial milestone payments that could total up to approximately $2.37 billion if Biogen selects all of the targets allowed under the agreement and all the specified milestones set forth in the agreement are achieved, which includes up to $925.0 million in pre-approval milestone payments and up to $1,445.0 million in first commercial sale and other sales-based milestone payments. The consummation of the transactions under each of the Biogen collaboration agreement and the stock purchase agreement is subject to the satisfaction of customary closing conditions, including the expiration or termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended. For more information regarding the Biogen transactions, see "Business – Collaborations – Biogen" in Part I, Item 1 of this Annual Report on Form 10-K.

Certain Components of Results of Operations

Our revenues have consisted primarily of revenues from upfront licensing fees, reimbursements for research services, milestones achievements and research grant funding. We expect revenues to continue to fluctuate from period to period and there can be no assurance that new collaborations or partner reimbursements will continue beyond their initial terms or that we are able to meet the milestones specified in these agreements.

We have incurred net losses since inception and expect to incur losses in the future as we continue our research and development activities. To date, we have funded our operations primarily through the issuance of equity securities and revenues from collaborations and research grants.

We expect to continue to devote substantial resources to research and development in the future and expect research and development expenses to increase in the next several years if we are successful in advancing our gene therapy and our genome editing programs in the clinic and progressing our earlier stage product candidates into clinical trials. Pursuant to the terms of the agreements with Kite, Pfizer and Sanofi, certain expenses related to research and development activities will be reimbursed to us. The reimbursement funds to be received from Kite, Pfizer and Sanofi will be recognized as revenue as the related costs are incurred and collection is reasonably assured.

General and administrative expenses consist primarily of salaries and personnel related expenses for executive, finance and administrative personnel, stock-based compensation expenses, professional fees, allocated facilities expenses, patent prosecution expenses and other general corporate expenses. As we continue to advance our product candidates into and through the clinic, we expect the growth of our business to require increased general and administrative expenses.

Comparability

We adopted Accounting Standards Codification, or ASC, Topic 842, *Leases*, or ASC Topic 842, on January 1, 2019, resulting in changes to our accounting policy for leases. We used the modified retrospective approach and recognized the cumulative effect of initially applying ASC Topic 842 as an adjustment to the opening balances of the lease related accounts and accumulated deficit at January 1, 2019. Accordingly, comparative information has not been adjusted and continues to be reported under previous accounting standards. Refer to Note 1 in Part II, Item 8 of this Annual Report on Form 10-K for additional information and details on lease related accounts impacted by ASC Topic 842.

Critical Accounting Policies and Estimates

The accompanying discussion and analysis of our financial condition and results of operations are based upon our Consolidated Financial Statements and the related disclosures, which have been prepared in accordance with accounting principles generally accepted in the United States. The preparation of these financial statements requires us to make estimates, assumptions and judgments that affect the reported amounts in our Consolidated Financial Statements and accompanying notes. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results may differ from these estimates under different assumptions or conditions. We believe the following policies to be the most critical to an understanding of our financial condition and results of operations because they require us to make estimates, assumptions and judgments about matters that are inherently uncertain.

Revenue Recognition

Effective January 1, 2018, we adopted the provisions of ASC Topic 606, *Revenue from Contracts with Customers*, or ASC Topic 606, resulting in a change to our accounting policy for revenue recognition. ASC Topic 606 establishes a unified model to determine how revenue is recognized.

Contract revenues are derived from collaboration agreements and research activity grants and licensing. Research and licensing agreements typically include upfront signing or license fees, cost reimbursements, research services, minimum sublicense fees, milestone payments and royalties on future licensee's product sales. We have both fixed and variable consideration. Non-refundable upfront fees and funding of research and development activities are considered fixed, while milestone payments are generally identified as variable consideration. Our research grants are typically multi-year agreements and provide for the reimbursement of qualified expenses for research and development as defined under the terms of the grant agreement. Revenues under research grant agreements are generally recognized when the related qualified research expenses are incurred. Deferred revenue represents the portion of research or license payments received but not earned.

In determining the appropriate amount of revenue to be recognized as we fulfill our obligations under our agreements, we perform the following steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when (or as) we satisfy each performance obligation.

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account in ASC Topic 606. Our performance obligations include license rights, development services, and services associated with the regulatory submission and approval processes. Revenues from research services earned under collaboration agreements are generally recognized as revenue as the related services are provided. Revenues from non-refundable upfront

fees are recognized over time either by measuring progress towards satisfaction of the relevant performance obligation, using the input method (i.e. cumulative actual costs incurred relative to total estimated costs) or on a straight-line basis when a performance obligation is expected to be satisfied evenly over a period of time (or when the entity has a stand-ready obligation). Significant management judgment is required to determine the level of effort required under an arrangement and the period over which we expect to complete our performance obligations under the arrangement which may include total internal personnel costs and external costs to be incurred as well as, in certain cases, the estimated stand-ready obligation period. Changes in these estimates can have a material effect on revenue recognized. If we cannot reasonably estimate when our performance obligations either are completed or become inconsequential, then revenue recognition is deferred until we can reasonably make such estimates. We include the unconstrained amount of estimated variable consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur. At the end of each subsequent reporting period, we re-evaluate the estimated variable consideration included in the transaction price and any related constraint, and if necessary, adjust our estimate of the overall transaction price. Revenue is then recognized over the remaining estimated period of performance using the cumulative catch-up method. The estimated period of performance and project costs, such as personnel and manufacturing cost, are reviewed quarterly and adjusted, as needed, to reflect our current assumptions regarding the timing and costs of our deliverables.

As part of the accounting for these arrangements, we must develop assumptions that require judgment to determine the stand-alone selling price of each performance obligation identified in the contract. We used key assumptions to determine the stand-alone selling price, which may include forecasted revenues, development timelines, reimbursement rates for personnel costs, discount rates and probabilities of technical and regulatory success. Related costs and expenses under these arrangements have historically approximated the revenues recognized.

Revenues from collaboration agreements and research activity grants as a percentage of total revenues were as follows:

	Year Ended December 31,		
	2019	2018	2017
Pfizer	40 %	47 %	47 %
Kite	34 %	30 %	—
Sanofi	22 %	16 %	34 %

Receivables from collaborations are typically unsecured and are concentrated in the biopharmaceutical industry. Accordingly, we may be exposed to credit risk generally associated with biopharmaceutical companies or specific to our collaboration agreements. To date, we have not experienced any losses related to these receivables.

Funds received from third parties under contract or funds received from grant arrangements are generally recorded as revenue if we are deemed to be the principal participant in the arrangements because the activities under the contracts or grants are part of our development programs. Contract funds received are not refundable and are recognized when the related qualified research and development costs are incurred and there is reasonable assurance that the funds will be received. Funds received in advance are recorded as deferred revenue.

Valuation of Long-lived Assets including Goodwill and Intangible Assets

We allocate the fair value of purchase consideration in a business combination to the tangible assets acquired, liabilities assumed, and intangible assets acquired based on their estimated fair values. Any excess of purchase price over the fair value of net assets acquired is recorded as goodwill. Such valuations require management to make significant estimates and assumptions, especially with respect to intangible assets. Significant estimates in valuing certain intangible assets include, but are not limited to, future expected cash flows from acquired in-process research and development, or IPR&D, projects. Management's estimates of fair value are based upon assumptions believed to be reasonable, but which are inherently uncertain and unpredictable and, as a result, actual results may differ from estimates. Allocation of purchase consideration to identifiable assets and liabilities affects our amortization expense, as acquired finite-lived intangible assets are amortized over the useful life, whereas any indefinite lived intangible assets, including goodwill, are not amortized. During the measurement period, which is not to exceed one year from the acquisition date, we may record adjustments to the assets acquired and liabilities assumed, with the corresponding offset to goodwill. Upon the conclusion of the measurement period, any subsequent adjustments are recorded to earnings.

We review goodwill and indefinite-lived intangible assets for impairment at least annually or more frequently if events or changes in circumstances would more likely than not reduce the fair value these assets below their carrying values. As of December 31, 2019, no impairment of goodwill or indefinite-lived intangible assets has been identified.

Long-lived assets, including property and equipment and finite-lived intangible assets, are reviewed for possible impairment whenever events or circumstances indicate that the carrying amount of such assets may not be recoverable. The evaluation is performed at the lowest level for which identifiable cash flows are largely independent of the cash flows of other assets and liabilities. Recoverability of these assets is measured by a comparison of the carrying amounts to the future undiscounted cash flows the assets are expected to generate from the use and eventual disposition. If such review indicates that the carrying amount of property and equipment and intangible assets is not recoverable, the carrying amount of such assets is reduced to fair value. We have not recorded any significant impairment charges during the years presented.

Results of Operations

Years Ended December 31, 2019, 2018 and 2017

Revenues

	Year Ended December 31, (In thousands, except percentage values)							
	2019	2018	Change	%	2018	2017	Change	%
Revenues	$ 102,428	$ 84,452	$ 17,976	21 %	$ 84,452	$ 36,567	$ 47,885	131 %

Total revenues consisted of revenues from collaboration agreements and research grants. We anticipate revenues over the next several years will be derived primarily from our collaboration agreements with Biogen, Kite, Pfizer and Sanofi as we continue to recognize upfront and milestone payments received under such agreements over time.

The increase of $18.0 million in revenues in 2019 compared to 2018 was primarily attributed changes in the transaction prices of the Pfizer and Sanofi collaborations as a result of a $25.0 million milestone achievement upon completion of the transfer of the IND for SB-525 to Pfizer, $7.5 million pertaining to a milestone achievement with Sanofi upon dosing of the first subject in the sickle cell disease Phase 1 clinical trial in December 2019, and a $6.0 million milestone achievement with Sanofi upon dosing of the third subject in the Phase 1/2 THALES study in August 2019. In addition, we recorded an increase of $8.8 million related to our agreement with Kite. Approximately $2.0 million out of the milestones achieved in 2019 was deferred and is expected to be recognized in 2020. These amounts were partially offset by a decrease in revenues due to a change in project scope related to our hemophilia A agreement with Pfizer, which resulted in a change in the measurement of proportional performance. During 2019, revenues related to our collaborative agreements with Pfizer, Kite and Sanofi represented 40%, 34% and 22%, respectively, of total revenues.

Operating Expenses

	Year Ended December 31, (In thousands, except percentage values)							
	2019	2018	Change	%	2018	2017	Change	%
Operating expenses:								
Research and development	$ 145,922	$ 114,866	$ 31,056	27 %	$ 114,866	$ 65,728	$ 49,138	75 %
General and administrative	61,686	46,736	14,950	32 %	46,736	27,200	19,536	72 %
Total expenses	$ 207,608	$ 161,602	$ 46,006	28 %	$ 161,602	$ 92,928	$ 68,674	74 %

Research and Development Expenses

The increase of $31.1 million in research and development expenses in 2019 compared to 2018 was primarily due to a $13.7 million increase in salaries and benefits expense reflecting headcount growth in our development and technical operations teams that support clinical development trials, a $9.0 million increase in facility expense primarily related to our new Brisbane facility, a $3.7 million increase in laboratory supply expense, a $2.8 million increase in clinical, research and preclinical expenses, and a $1.9 million increase in stock compensation expense. These increases were primarily due to the growth of our business required to support the continued advancement of our product candidates into clinical trials. The main drivers of these increases were in our IMD clinical programs and preclinical and research programs, which increased approximately $24.2 million and $16.0 million, respectively.

The table below shows research and development expenses related to our clinical and preclinical programs.

	Year Ended December 31, (In thousands)		
Programs	**2019**	**2018**	**2017**
Human Therapeutic Programs			
Hemophilia clinical programs	$ 12,805	$ 23,006	$ 14,715
IMD clinical programs	61,845	37,668	11,428
Beta thalassemia clinical program	13,634	12,317	11,354
HIV (SB-728) clinical programs	1,762	1,612	2,473
Non-human Therapeutic Programs			
Preclinical and research programs	55,762	39,779	25,414
Other clinical programs and non-therapeutic programs	114	484	344
Total research and development expenses	$ 145,922	$ 114,866	$ 65,728

The length of time required to complete our development programs and our development costs for those programs may be impacted by the scope and timing of enrollment in clinical trials for our product candidates, our decisions to pursue development programs in other therapeutic areas, and whether we pursue development of our product candidates with a partner or collaborator or independently. For example, our product candidates are being developed in multiple therapeutic areas, and we do not yet know how many of those therapeutic areas we will continue to pursue. Furthermore, the scope and number of clinical trials required to obtain regulatory approval for each pursued therapeutic area is subject to the input of the applicable regulatory authorities, and we have not yet sought such input for all potential therapeutic areas that we may elect to pursue, and even after having given such input, applicable regulatory authorities may subsequently require additional clinical studies prior to granting regulatory approval based on new data generated by us or other companies, or for other reasons outside of our control. As a condition to any regulatory approval, we may also be subject to post-marketing development commitments, including additional clinical trial requirements. As a result of the uncertainties discussed above, we are unable to determine the duration of or completion costs associated with our development programs.

In any event, our potential therapeutic products are subject to a lengthy and uncertain regulatory process that may not result in our receipt of any necessary regulatory approvals. Failure to receive the necessary regulatory approvals would prevent us from commercializing the product candidates affected. In addition, clinical trials of our product candidates may fail to demonstrate safety and efficacy, which could prevent or significantly delay regulatory approval. A discussion of the risks and uncertainties with respect to our research and development activities, including completing the development of our product candidates, and the consequences to our business, financial position and growth prospects can be found in “Risk Factors” in Part I, Item 1A of this Annual Report on Form 10-K.

General and Administrative Expenses

The increase of $15.0 million in 2019 compared to 2018 was primarily due to a $9.5 million increase in salaries and benefits expense related to headcount growth, a $2.7 million increase in facility expense, primarily related to our new Brisbane facility, and a $2.8 increase in stock-based compensation. The increases were primarily due to the growth of our business to support the continued advancement of our product candidates into clinical trials.

Interest and other income, net

The increase of $1.5 million in 2019 compared to 2018 was primarily due to an increase of $1.7 million in other income from Sangamo France during the year, which was partially offset by decrease of $0.3 million in foreign exchange losses.

Benefit from income taxes

Benefit from income taxes was $0.0 million for 2019, 2018, and 2017. We recognized an immaterial amount of income tax expense/benefit during each of these years.

As of December 31, 2019, we had net operating loss carryforwards for federal and state income tax purposes of approximately $489.4 million and $164.7 million, respectively. The federal net operating loss generated before 2018 will begin to expire in 2024 and will keep expiring through 2037, if not utilized. Federal net operating losses generated in 2018 will carry forward indefinitely. If not utilized, the state net operating loss carryforwards will begin to expire in 2029. We also have federal and state research tax credit carryforwards of $16.4 million and $15.2 million, respectively. The federal research credits

began to expire in 2018 while the state research credits have no expiration date. Utilization of our net operating loss carryforwards and research tax credit carryforwards may be subject to substantial annual limitations due to the ownership change limitations provided by the Internal Revenue Code and similar state provisions. The annual limitation could result in the expiration of the net operating loss carryforwards and research tax credit carryforwards before use. Due to the carryforwards related to the net operating losses and research and development tax credits, we do not expect to pay any taxes related to income in the near future.

Liquidity and Capital Resources

Liquidity

Since inception, we have incurred significant net losses and we have funded our operations primarily through the issuance of equity securities and revenues from collaborations and research grants. Since the beginning of 2017, we have received significant amounts of capital as upfront payments under the following collaboration arrangements: $70.0 million received in May 2017 from Pfizer under our hemophilia A agreement, $12.0 million received in January 2018 from Pfizer under our *C9ORF72* agreement, and $150.0 million received in April 2018 under our collaboration agreement with Kite. Our collaboration agreements provide for the payment of development, regulatory, and commercial milestones. Our recent agreements with Biogen are not yet effective, as such we have not yet received the upfront payment of $125.0 million under the Biogen collaboration agreement or sold the $225.0 million of shares of our common stock under the stock purchase agreement. For more information, see “Business – Collaborations” in Part I, Item 1 of this Annual Report on Form 10-K.

In April 2019, we completed an underwritten public offering of our common stock, in which we sold an aggregate of 12.7 million shares of our common stock at a public offering price of $11.50 per share. The net proceeds to us from the sale of shares in this offering, after deducting underwriting discounts and commissions and other estimated offering expenses, were approximately $136.3 million.

As of December 31, 2019, we had cash, cash equivalents, marketable securities and interest receivable totaling $385.0 million compared to $400.5 million as of December 31, 2018. The decrease was primarily attributable to the operating expenditures, partially offset by the proceeds from the underwritten public offering completed in April 2019, and payments received under our collaboration arrangements. Our most significant use of capital pertains to our employee compensation and external research and development expenses, such as manufacturing, clinical trials and preclinical activity related to our therapeutic programs. Cash in excess of immediate requirements is invested in accordance with our investment policy with a view toward capital preservation and liquidity.

Cash Flows

Operating activities. Net cash (used in) provided by operating activities primarily reflects our net operating losses, adjusted for non-cash items including stock-based compensation expense. Net cash used in operating activities was $144.4 million in 2019 compared to net cash provided by operating activities of $36.6 million in 2018. Net cash used in operating activities in 2019 primarily reflected our net loss of $95.4 million, a decrease in deferred revenues of $35.7 million, and an increase in accounts receivable of $32.2 million, partially offset by stock-based compensation of $19.3 million.

Investing activities. Net cash used in investing activities was $59.8 million in 2019, $178.1 million in 2018 and $77.4 million in 2017. The decrease in net cash used in 2019 compared to 2018 reflected the 2018 acquisition of Sangamo France. Additional cash flows used in investing activities for all periods were primarily related to net purchases of marketable securities and purchases of property and equipment.

Financing activities. Net cash provided by financing activities was $142.0 million in 2019, $231.7 million in 2018, and $97.5 million in 2017. Net cash provided by financing activities in 2019 mainly reflected $136.3 million received related to our April 2019 underwritten public offering and $6.1 million related to proceeds from the exercise of stock options and restricted stock units and purchases under the employee stock purchase plan.

Operating Capital and Capital Expenditure Requirements

We anticipate continuing to incur operating losses for at least the next several years. While we expect our rate of cash usage to increase in the future, in particular to support our product development endeavors, we believe that the available cash resources as well as funds received from corporate collaborators, strategic partners and research grants, will enable us to maintain our currently planned operations through at least the next 12 months from the date the financial statements are issued. Future capital requirements will be substantial and if our capital resources are insufficient to meet future capital requirements, we will need to raise additional capital to fund our operations through equity or debt financing. We regularly consider fund raising opportunities and may decide, from time to time, to raise capital based on various factors, including market conditions and our plans of operation. Additional capital may not be available on terms acceptable to us, or at all. If adequate funds are not available, or if the terms of potential funding sources are unfavorable, our business and our ability to advance our product

candidate pipeline would be harmed. Furthermore, any sales of additional equity securities may result in dilution to our stockholders, and any debt financing may include covenants that restrict our business.

Our future capital requirements will depend on many forward looking factors, including the following:

- the initiation, progress, timing and completion of clinical trials for our product candidates and potential product candidates;
- the outcome, timing and cost of regulatory approvals;
- the success of our collaboration agreements;
- delays that may be caused by changing regulatory requirements;
- the number of product candidates that we pursue;
- the costs involved in filing and prosecuting patent applications and enforcing and defending patent claims;
- the timing and terms of future in-licensing and out-licensing transactions;
- the cost and timing of establishing sales, marketing, manufacturing and distribution capabilities;
- the cost of procuring clinical and commercial supplies of our product candidates;
- the extent to which we acquire or invest in businesses, products or technologies, including the costs associated with such acquisitions and investments; and
- the possible costs of litigation.

Off Balance Sheet Arrangements

We do not have any off balance sheet arrangements as defined in Item 303(a)(4)(ii) of Regulation S-K.

Contractual Obligations and Commercial Commitments

As of December 31, 2019, we had contractual obligations and commercial commitments as follows (in thousands):

	Payments Due by Period				
Contractual Obligations	**Total**	**Less Than 1 Year**	**1-3 Years**	**4-5 Years**	**More Than 5 Years**
Operating leases	$ 58,119	$ 5,870	$ 12,858	$ 13,250	$ 26,141
License obligations	1,176	223	363	260	330
Manufacturing obligations	9,814	6,814	3,000	—	—
Total contractual obligations	$ 69,109	$ 12,907	$ 16,221	$ 13,510	$ 26,471

Operating leases consist of base rents for facilities we occupy in Brisbane, California; Richmond, California; and Valbonne, France.

License obligations includes an ongoing license maintenance fee associated with cancellable in-licensed patent agreements.

Manufacturing obligations include a fee of $6.3 million for dedicated capacity pursuant to the development and manufacturing services agreement with Brammer, and an option agreement with Brammer entered in 2019, which consists of $1.5 million future payments to assist us in establishing our manufacturing capabilities in Brisbane, California, and a minimum purchase commitment of $2.0 million through December 2021 under manufacturing-related supplier arrangements.

ITEM 7A – QUANTITATIVE AND QUALITATIVE DISCLOSURES ABOUT MARKET RISK

Our exposure to market risk relates to our cash, cash equivalents and investments. The goals of our investment policy are preservation of capital, fulfillment of liquidity needs and capturing a market rate of return based on our investment policy parameters and market conditions. We select investments that maximize interest income to the extent possible within these guidelines. To achieve our goals, we maintain a portfolio of cash equivalents and investments in securities of high credit quality and with varying maturities to match projected cash needs.

The securities in our investment portfolio are not leveraged and are classified as available-for-sale. The majority of these available-for-sale securities are short-term in nature and subject to minimal interest rate risk. Our investments currently consist of commercial paper, corporate debt securities and U.S. government-sponsored entity debt securities. Our investment policy, approved by our Board of Directors, limits the amount we may invest in any one type of investment issuer, thereby reducing credit risk concentrations. All investments have a fixed interest rate and are carried at market value, which approximates cost. We do not use derivative financial instruments in our investment portfolio. We do not believe that a change in interest rates would have a material negative impact on the value of our investment portfolio.

Foreign Currency Exchange Risk

We have operations in the United States as well as in Europe. The functional currency of each foreign subsidiary is the local currency. We are exposed to foreign currency risk, primarily through operations of our subsidiaries in Europe which conduct business primarily in Euros. We record gains and losses within our stockholders' equity due to the translation of our subsidiaries' financial statements into U.S. dollars.

A 10% strengthening/(weakening) in the rates used to translate the results of our foreign subsidiaries would have increased/(decreased) net loss for the year ended December 31, 2019 by approximately $1.8 million and would not have materially impacted our operating loss.

Additionally, we incur foreign currency transaction gains and losses related to the level of activity between the United States and Europe. In 2019, we incurred foreign currency transaction losses of $0.9 million. A 10% unfavorable change in the Euro and U.S. dollar exchange rate on December 31, 2019 would have had an immaterial impact on foreign currency transaction losses for 2019.

As of December 31, 2019 and 2018, we maintained cash balances of approximately $22.6 million and $8.9 million, respectively, denominated in a foreign currency in the United States. A hypothetical 10% change in foreign exchange rates would have increased/(decreased) net loss for the year ended December 31, 2019 by approximately $2.3 million and would not have materially impacted our operating loss.

ITEM 8 – FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

SANGAMO THERAPEUTICS, INC.

INDEX TO CONSOLIDATED FINANCIAL STATEMENTS

	Page
Report of Independent Registered Public Accounting Firm	66
Consolidated Balance Sheets	68
Consolidated Statements of Operations	69
Consolidated Statements of Comprehensive Loss	70
Consolidated Statements of Stockholders' Equity	71
Consolidated Statements of Cash Flows	72
Notes to Consolidated Financial Statements	73

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Board of Directors and Stockholders of Sangamo Therapeutics, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Sangamo Therapeutics, Inc. (the Company) as of December 31, 2019 and 2018, the related consolidated statements of operations, comprehensive loss, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2019, and the related notes (collectively referred to as the "consolidated financial statements"). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2019 and 2018, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2019, in conformity with U.S. generally accepted accounting principles.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the Company's internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control-Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) and our report dated February 28, 2020 expressed an unqualified opinion thereon.

Adoption of New Accounting Standards

As discussed in Note 1 to the consolidated financial statements, the Company changed its method of accounting for leases as a result of the adoption of Accounting Standards Update ("ASU") No. 2016-02, "Leases (Topic 842)," effective January 1, 2019 using the modified retrospective approach with a cumulative-effect adjustment.

As discussed in Note 1 to the consolidated financial statements, the Company changed its method of accounting for revenue as a result of the adoption of ASU No. 2014-09 "Revenue from Contracts with Customers (Topic 606)," as amended, effective January 1, 2018 using the modified retrospective method.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

Critical Audit Matter

The critical audit matter communicated below is a matter arising from the current period audit of the financial statements that was communicated or required to be communicated to the audit committee and that: (1) relates to accounts or disclosures that are material to the financial statements and (2) involved our especially challenging, subjective, or complex judgments. The communication of the critical audit matter does not alter in any way our opinion on the financial statements, taken as a whole, and we are not, by communicating the critical audit matter below, providing separate opinions on the critical audit matter or on the accounts or disclosures to which it relates.

Accounting for Revenue from Collaboration Agreements

Description of the Matter

As of December 31, 2019, the Company had collaboration and license agreements with Kite Pharma, Inc., Pfizer Inc. and Sanofi Genzyme to research, develop and commercialize various research programs. As discussed in Note 1 of the consolidated financial statements, the Company recognizes revenues from research services generally as services are provided while revenues from non-refundable upfront fees are recognized over time either by measuring progress towards satisfaction of the relevant performance obligation using the input method (i.e. cumulative actual costs incurred relative to total estimated costs) or on a straight-line basis when a performance obligation is expected to be satisfied evenly over a period of time (when the entity has a stand-ready obligation).

Auditing the Company's estimated measure of progress was complex and involved significant judgment. In particular, the measure of revenues from upfront non-refundable fees is affected by management's estimates of the total costs required to complete the performance obligations including the total internal personnel costs and external costs to be incurred as well as, in certain cases, the estimated stand-ready obligation period. Changes in these estimates can have a material effect on revenue recognized.

How We Addressed the Matter in Our Audit

We obtained an understanding, evaluated the design and tested the operating effectiveness of controls over the Company's collaboration revenue recognition process. As part of our testing, we considered controls over the development of the estimates of total costs and stand-ready obligation period described above and other inputs used in the determination of the total expected inputs, as well as controls over the completeness and accuracy of the data used.

Our audit procedures included, among others, gaining an understanding and testing the Company's estimates of total expected costs (and estimated period as applicable) by project, and testing the completeness and accuracy of the underlying data used by the Company in its revenue recognition model. We performed inquiries of the research and development personnel responsible for the specific development projects to corroborate management's assumptions used in the Company's estimates of total expected costs (and estimated period as applicable) by project, evaluated any changes in the product development timeline and/or increases or decreases in the total expected costs by project on a quarterly basis, and examined evidence supporting key inputs of the revenue recognition model including assessing whether actual costs incurred were appropriate under the terms of the respective contracts. We compared the estimates of total expected costs by project to actual costs incurred on a quarterly basis to evaluate management's ability to forecast costs. We also tested the amount of historical costs incurred under each project and the calculation of amounts recognized under the revenue recognition model (including recalculation of straight-line stand-ready obligation amounts).

/s/ ERNST & YOUNG LLP

We have served as the Company's auditor since 1997.

Redwood City, California
February 28, 2020

SANGAMO THERAPEUTICS, INC.

CONSOLIDATED BALANCE SHEETS

(in thousands, except share and per share amounts)

	December 31, 2019	December 31, 2018
ASSETS		
Current assets:		
Cash and cash equivalents	$ 80,428	$ 140,418
Marketable securities	282,046	259,715
Interest receivable	682	375
Accounts receivable	36,909	4,673
Prepaid expenses and other current assets	5,408	5,340
Total current assets	405,473	410,521
Marketable securities, non-current	21,832	—
Property and equipment, net	29,926	78,723
Intangible assets	53,156	54,243
Goodwill	39,273	40,044
Operating lease right-of-use assets	77,289	—
Other non-current assets	9,067	3,364
Non-current restricted cash	1,500	3,500
Total assets	$ 637,516	$ 590,395
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable and accrued liabilities	$ 17,556	$ 21,457
Accrued compensation and employee benefits	13,605	9,490
Deferred revenues	38,711	47,564
Total current liabilities	69,872	78,511
Deferred revenues, non-current	81,432	108,273
Long-term portion of lease liabilities	41,192	27,689
Deferred income tax	6,570	6,705
Other non-current liabilities	5,711	1,960
Total liabilities	204,777	223,138
Commitments and contingencies		
Stockholders' equity:		
Preferred stock, $0.01 par value, 5,000,000 shares authorized and no shares issued or outstanding	—	—
Common stock, $0.01 par value; 160,000,000 shares authorized, 115,972,708 and 102,187,471 shares issued and outstanding at December 31, 2019 and 2018, respectively	1,160	1,022
Additional paid-in capital	1,090,828	929,632
Accumulated deficit	(656,985)	(562,696)
Accumulated other comprehensive loss	(2,449)	(1,440)
Total Sangamo Therapeutics, Inc. stockholders' equity	432,554	366,518
Non-controlling interest	185	739
Total stockholders' equity	432,739	367,257
Total liabilities and stockholders' equity	$ 637,516	$ 590,395

See accompanying Notes to Consolidated Financial Statements.

SANGAMO THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

(in thousands, except per share amounts)

	Year Ended December 31,		
	2019	**2018**	**2017**
Revenues	$ 102,428	$ 84,452	$ 36,567
Operating expenses:			
Research and development	145,922	114,866	65,728
General and administrative	61,686	46,736	27,200
Total operating expenses	207,608	161,602	92,928
Loss from operations	(105,180)	(77,150)	(56,361)
Interest and other income, net	9,761	8,261	1,793
Loss before income taxes	(95,419)	(68,889)	(54,568)
Benefit from income taxes	—	—	—
Net loss	(95,419)	(68,889)	(54,568)
Net loss attributable to non-controlling interest	(233)	(555)	—
Net loss attributable to Sangamo Therapeutics, Inc. stockholders	$ (95,186)	$ (68,334)	$ (54,568)
Basic and diluted net loss per share attributable to Sangamo Therapeutics, Inc. stockholders	$ (0.85)	$ (0.70)	$ (0.70)
Shares used in computing basic and diluted net loss per share attributable to Sangamo Therapeutics, Inc. stockholders	112,114	96,941	78,084

See accompanying Notes to Consolidated Financial Statements.

SANGAMO THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS

(in thousands)

	Year Ended December 31,		
	2019	**2018**	**2017**
Net loss	$ (95,419)	$ (68,889)	$ (54,568)
Foreign currency translation adjustment	(1,573)	(1,148)	—
Net pension losses	(28)	(21)	—
Change in unrealized gain (loss) on available-for-sale securities	592	(4)	(306)
Comprehensive loss	(96,428)	(70,062)	(54,874)
Comprehensive loss attributable to non-controlling interest	(233)	(574)	—
Comprehensive loss attributable to Sangamo Therapeutics, Inc.	$ (96,195)	$ (69,488)	$ (54,874)

See accompanying Notes to Consolidated Financial Statements.

SANGAMO THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(in thousands, except share amounts)

	Common Stock		Additional Paid-in Capital	Accumulated Deficit	Accumulated Other Comprehensive Income/ (Loss)	Non-Controlling Interest	Total Stockholders' Equity
	Shares	Amount					
Balances at December 31, 2016	70,871,902	$ 709	$ 576,377	$ (440,911)	$ 20	$ —	$ 136,195
Issuance of common stock upon exercise of stock options and in connection with restricted stock units, net of tax	2,101,489	21	15,078	—	—	—	15,099
Issuance of common stock under employee stock purchase plan	253,994	2	816	—	—	—	818
Issuance of common stock under public offering, net of issuance costs	12,371,149	124	81,449	—	—	—	81,573
Stock-based compensation	—	—	9,089	—	—	—	9,089
Net unrealized loss on marketable securities, net of tax	—	—	—	—	(306)	—	(306)
Net loss	—	—	—	(54,568)	—	—	(54,568)
Balances at December 31, 2017	85,598,534	856	682,809	(495,479)	(286)	—	187,900
Cumulative-effect adjustment of ASC Topic 606 on January 1, 2018	—	—	—	1,117	—	—	1,117
Issuance of common stock upon exercise of stock options and in connection with restricted stock units, net of tax	2,103,727	20	14,447	—	—	—	14,467
Issuance of common stock under employee stock purchase plan	328,710	4	1,480	—	—	—	1,484
Issuance of common stock under public offering, net of issuance costs	14,156,500	142	215,616	—	—	—	215,758
Stock-based compensation	—	—	14,677	—	—	—	14,677
Additional paid-in capital for Acquisition of Sangamo France	—	—	603	—	—	—	603
Non-controlling interest upon Acquisition of Sangamo France	—	—	—	—	—	1,313	1,313
Foreign currency translation adjustment	—	—	—	—	(1,129)	(19)	(1,148)
Net pension losses	—	—	—	—	(21)	—	(21)
Net unrealized loss on marketable securities, net of tax	—	—	—	—	(4)	—	(4)
Net loss	—	—	—	(68,334)	—	(555)	(68,889)
Balances at December 31, 2018	102,187,471	1,022	929,632	(562,696)	(1,440)	739	367,257
Cumulative-effect adjustment of ASC Topic 842 on January 1, 2019	—	—	—	897	—	—	897
Issuance of common stock upon exercise of stock options and in connection with restricted stock units, net of tax	885,873	9	3,668	—	—	—	3,677
Issuance of common stock under employee stock purchase plan	249,364	2	2,042	—	—	—	2,044
Issuance of common stock under public offering, net of issuance costs	12,650,000	127	136,181	—	—	—	136,308
Stock-based compensation	—	—	19,330	—	—	—	19,330
Acquisition of additional shares of Sangamo France	—	—	—	—	—	(321)	(321)
Issuance costs related to Sangamo France Acquisition	—	—	(25)	—	—	—	(25)
Foreign currency translation adjustment	—	—	—	—	(1,573)		(1,573)
Net pension losses	—	—	—	—	(28)	—	(28)
Net unrealized gain on marketable securities, net of tax	—	—	—	—	592	—	592
Net loss	—	—	—	(95,186)	—	(233)	(95,419)
Balances at December 31, 2019	115,972,708	$ 1,160	$ 1,090,828	$ (656,985)	$ (2,449)	$ 185	$ 432,739

See accompanying Notes to Consolidated Financial Statements.

SANGAMO THERAPEUTICS, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(in thousands)

	Year Ended December 31,		
	2019	**2018**	**2017**
Operating Activities:			
Net loss	$ (95,419)	$ (68,889)	$ (54,568)
Adjustments to reconcile net loss to net cash (used in) provided by operating activities:			
Depreciation and amortization	3,930	2,359	1,498
Amortization of discount on marketable securities	(4,708)	(5,829)	(673)
Amortization and other changes in right-of-use assets	5,677	—	—
Gain on free shares	(488)	—	—
Net loss on disposal of property and equipment	68	—	12
Stock-based compensation	19,330	14,677	9,089
Net loss on lease termination	218	—	—
Build-to-suit leases	—	966	80
Net changes in operating assets and liabilities:			
Interest receivable	(307)	(135)	(16)
Accounts receivable	(32,236)	(1,330)	1,629
Prepaid expenses and other assets	(6,660)	(2,828)	(669)
Accounts payable and accrued liabilities	(4,192)	(6,372)	3,219
Accrued compensation and employee benefits	4,129	2,604	2,594
Deferred revenues	(35,693)	99,364	48,984
Long-term portion of lease liabilities	(1,800)	—	—
Other non-current liabilities	3,749	1,963	—
Net cash (used in) provided by operating activities	(144,402)	36,550	11,179
Investing Activities:			
Acquisition, net of cash acquired	—	(75,647)	—
Purchases of marketable securities	(443,711)	(451,239)	(252,328)
Maturities of marketable securities	404,847	391,845	178,675
Purchases of property and equipment	(20,675)	(43,065)	(3,751)
Purchase of additional Sangamo France shares	(262)	—	—
Net cash used in investing activities	(59,801)	(178,106)	(77,404)
Financing Activities:			
Proceeds from public offering of common stock, net of issuance costs	136,308	215,758	81,573
Taxes paid related to net share settlement of equity awards	(422)	(254)	(654)
Proceeds from issuance of common stock under employee stock purchase plan	2,044	1,484	818
Proceeds from exercise of stock options and restricted stock units	4,099	14,721	15,753
Net cash provided by financing activities	142,029	231,709	97,490
Effects of exchange rate changes on cash and cash equivalents	184	439	—
Net (decrease) increase in cash, cash equivalents, and restricted cash	(61,990)	90,592	31,265
Cash, cash equivalents, and restricted cash, beginning of period	143,918	53,326	22,061
Cash, cash equivalents, and restricted cash, end of period	$ 81,928	$ 143,918	$ 53,326
Supplemental disclosure of non-cash investing activities:			
Non-controlling interest for acquisition	$ —	$ 1,313	$ —
Property and equipment included in unpaid liabilities	$ 2,114	$ 4,953	$ 1,214
Build-to-suit leases included in build-to-suit liabilities	$ —	$ 2,950	$ 20,793
Right-of-use assets obtained in exchange for lease obligations	$ 31,291	$ —	$ —

See accompanying Notes to Consolidated Financial Statements

SANGAMO THERAPEUTICS, INC.

NOTES TO CONSOLIDATED FINANCIAL STATEMENTS

NOTE 1 – ORGANIZATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Business Overview

Sangamo Therapeutics, Inc. ("Sangamo" or "the Company") was incorporated in the State of Delaware in June 1995 and changed its name from Sangamo Biosciences, Inc. in January 2017. Sangamo is a clinical-stage biotechnology company focused on translating ground-breaking science into genomic medicines with the potential to transform patients' lives using our platform technologies in gene therapy, *ex vivo* gene-edited cell therapy, *in vivo* genome editing and *in vivo* genome regulation.

Basis of Presentation

The accompanying Consolidated Financial Statements have been prepared in conformity with generally accepted accounting principles in the United States of America ("U.S. GAAP") and include the accounts of the Company and its subsidiaries. All intercompany balances and transactions have been eliminated in the Consolidated Financial Statements. For consolidated entities where we own or are exposed to less than 100% of the economics, we record net loss attributable to non-controlling interests on our Consolidated Statements of Operations equal to the percentage of the economic or ownership interest retained in such entities by the respective noncontrolling parties.

Going Concern

Sangamo is currently working on a number of long-term development projects that will involve experimental technology. The projects may require several years and substantial expenditures to complete and ultimately may be unsuccessful. The Company plans to finance operations with available cash resources, collaborations and strategic partnerships funds, research grants and from the issuance of equity or debt securities. Sangamo believes that its available cash, cash equivalents and investments as of December 31, 2019, and expected revenues from collaborations, strategic partnerships and research grants, will be adequate to fund its operations at least through the next 12 months from the date the financial statements are issued. Sangamo will require substantial additional financial resources to complete the development and commercialization of its products including ZFP therapeutic products. Additional capital may not be available on terms acceptable to the Company, or at all. If adequate funds are not available, or if the terms of potential funding sources are unfavorable, the Company's business and ability to develop its technology and therapeutic products would be harmed. Furthermore, any sales of additional equity securities may result in dilution to the Company's stockholders, and any debt financing may include covenants that restrict the Company's business.

Reclassifications

Certain prior period amounts in the accompanying Consolidated Financial Statements have been reclassified to conform to the current period presentation.

Summary of Significant Accounting Policies

Use of Estimates

The preparation of the accompanying Consolidated Financial Statements in conformity with U.S. GAAP requires management to make estimates and assumptions that affect the amounts reported in the financial statements and the accompanying notes. On an ongoing basis, management evaluates its estimates including critical accounting policies or estimates related to revenue recognition, clinical trial accruals, fair value of assets and liabilities, including from acquisitions, and stock-based compensation. Estimates are based on historical experience and on various other market specific and other relevant assumptions that the Company believes to be reasonable under the circumstances, the results of which form the basis for making judgments about the carrying values of assets and liabilities that are not readily apparent from other sources. Actual results could differ from those estimates. In March 2019, the Company recorded an adjustment to revenue related to a change in estimate in connection with the hemophilia A collaboration agreement with Pfizer Inc. ("Pfizer"). This adjustment was a direct result of the decision to increase the project scope during the first quarter of 2019 and the corresponding costs, both of which resulted in a decrease in the measure of proportional performance. In December 2019, the Company updated its estimated project cost and related revenues upon the transfer of the investigational new drug ("IND") for Pfizer SB-525. This adjustment directly resulted in a decrease in project scope during the fourth quarter of 2019 and a decrease in the corresponding costs, which resulted in an increase in the measure of proportional performance. These adjustments increased revenue by $5.7 million, decreased net loss by $5.7 million and decreased the Company's basic net loss per share by $0.05 for the year ended December 31, 2019.

Revenue Recognition

Effective January 1, 2018, the Company adopted the provisions of Accounting Standards Codification ("ASC") Topic 606, *Revenue from Contracts with Customers* ("ASC Topic 606") using the modified retrospective method, resulting in a change to its accounting policy for revenue recognition. ASC Topic 606 establishes a unified model to determine how revenue is recognized.

The Company's contract revenues are derived from collaboration agreements and research activity grants and licensing. Research and licensing agreements typically include upfront signing or license fees, cost reimbursements, research services, minimum sublicense fees, milestone payments and royalties on future licensee's product sales. The Company has both fixed and variable consideration. Non-refundable upfront fees and funding of research and development activities are considered fixed, while milestone payments are generally identified as variable consideration. Sangamo's research grants are typically multi-year agreements and provide for the reimbursement of qualified expenses for research and development as defined under the terms of the grant agreement. Revenues under research grant agreements are generally recognized when the related qualified research expenses are incurred. Deferred revenue represents the portion of research or license payments received but not earned.

In determining the appropriate amount of revenue to be recognized as it fulfills its obligations under its agreements, the Company performs the following steps: (i) identification of the promised goods or services in the contract; (ii) determination of whether the promised goods or services are performance obligations, including whether they are distinct in the context of the contract; (iii) measurement of the transaction price, including the constraint on variable consideration; (iv) allocation of the transaction price to the performance obligations based on estimated selling prices; and (v) recognition of revenue when (or as) the Company satisfies each performance obligation.

A performance obligation is a promise in a contract to transfer a distinct good or service to the customer and is the unit of account in ASC Topic 606. The Company's performance obligations include license rights, development services and services associated with regulatory submission and approval processes. Revenues from research services earned under collaboration agreements are generally recognized as revenue as the related services are provided. Revenues from non-refundable upfront fees are recognized over time either by measuring progress towards satisfaction of the relevant performance obligation, using the input method (i.e. cumulative actual costs incurred relative to total estimated costs) or on a straight-line basis when a performance obligation is expected to be satisfied evenly over a period of time (or when the entity has a stand-ready obligation). Significant management judgment is required to determine the level of effort required under an arrangement, and the period over which the Company expects to complete its performance obligations under the arrangement which may include total internal personnel costs and external costs to be incurred as well as, in certain cases, the estimated stand-ready obligation period. Changes in these estimates can have a material effect on revenue recognized. If the Company cannot reasonably estimate when its performance obligations either are completed or become inconsequential, then revenue recognition is deferred until the Company can reasonably make such estimates. The Company includes the unconstrained amount of estimated variable consideration in the transaction price. The amount included in the transaction price is constrained to the amount for which it is probable that a significant reversal of cumulative revenue recognized will not occur. At the end of each subsequent reporting period, the Company re-evaluates the estimated variable consideration included in the transaction price and any related constraint and, if necessary, adjusts its estimate of the overall transaction price. Revenue is then recognized over the remaining estimated period of performance using the cumulative catch-up method. The estimated period of performance and project costs, such as personnel and manufacturing cost, are reviewed quarterly and adjusted, as needed, to reflect the Company's current assumptions regarding the timing of its deliverables.

As part of the accounting for these arrangements, the Company must develop assumptions that require judgment to determine the stand-alone selling price of each performance obligation identified in the contract. The Company uses key assumptions to determine the stand-alone selling price, which may include forecasted revenues, development timelines, reimbursement rates for personnel costs, discount rates and probabilities of technical and regulatory success. Related costs and expenses under these arrangements have historically approximated the revenues recognized.

Revenues from collaboration agreements and research activity grants as a percentage of total revenues were as follows:

	Year Ended December 31,		
	2019	2018	2017
Pfizer Inc.	40 %	47 %	47 %
Kite Pharma, Inc.	34 %	30 %	—
Sanofi Genzyme	22 %	16 %	34 %

Receivables from collaborations are typically unsecured and are concentrated in the biopharmaceutical industry. Accordingly, the Company may be exposed to credit risk generally associated with biopharmaceutical companies or specific to its collaboration agreements. To date, the Company has not experienced any losses related to these receivables.

Funds received from third parties under contract or funds received from grant arrangements are generally recorded as revenue if the Company is deemed to be the principal participant in the arrangements because the activities under the contracts or grants are part of the Company's development programs. Contract funds received are not refundable and are recognized when the related qualified research and development costs are incurred and there is reasonable assurance that the funds will be received. Funds received in advance are recorded as deferred revenue.

Business Combinations

The Company accounts for acquisitions using the acquisition method of accounting, which requires that assets acquired, including in-process research and development ("IPR&D") projects, liabilities assumed and any non-controlling interests in the acquired target in an acquisition be recorded at their fair values as of the acquisition date on the Company's Consolidated Balance Sheets. Any excess of purchase price over the fair value of net assets acquired is recorded as goodwill. The determination of estimated fair value requires the Company to make significant estimates and assumptions. As a result, the Company may record adjustments to the fair values of assets acquired and liabilities assumed within the measurement period (up to one year from the acquisition date) with the corresponding offset to goodwill. Transaction costs associated with business combinations are expensed as they are incurred.

Goodwill and Intangible Assets

Goodwill represents the excess of the consideration transferred over the estimated fair values of assets acquired and liabilities assumed in a business combination. Intangible assets with indefinite useful lives are related to purchased IPR&D projects and are measured at their respective fair values as of the acquisition date. Goodwill and intangible assets with indefinite useful lives are not amortized. Intangible assets related to IPR&D projects are considered to be indefinite-lived until the completion or abandonment of the associated research and development efforts. If and when development is complete, which generally occurs if and when regulatory approval to market a product is obtained, the associated assets would be deemed finite-lived and would then be amortized based on their respective estimated useful lives at that point in time. The Company tests goodwill and indefinite-lived intangible assets for impairment on an annual basis and between annual tests if the Company becomes aware of any events occurring or changes in circumstances that would indicate the fair values of the assets are below their respective carrying amounts. As of December 31, 2019, no impairment of goodwill or indefinite-lived intangible assets has been identified.

Valuation of Long-Lived Assets

Long-lived assets, including property and equipment and finite-lived intangible assets, are reviewed for impairment whenever facts or circumstances either internally or externally may suggest that the carrying value of an asset may not be recoverable. Recoverability of these assets is measured by comparison of the carrying amount of each asset to the future undiscounted cash flows expected to result from the use of the asset and its eventual disposition. If the asset is considered to be impaired, the amount of any impairment is measured as the difference between the carrying value and the fair value of the impaired asset. As of December 31, 2019, no impairment of any long-lived assets has been identified.

Fair Value Measurements

The carrying amounts for financial instruments consisting of cash and cash equivalents, accounts receivable, accounts payable and accrued liabilities approximate fair value due to their short maturities. Marketable securities are stated at their estimated fair values. The free share asset/liability is measured using a binomial-lattice pricing model and is reviewed each reporting period and adjusted, as needed, and is expected to approximate fair value.

Cash, Cash Equivalents and Restricted Cash

Sangamo considers all highly-liquid investments purchased with original maturities of three months or less at the purchase date to be cash equivalents. Cash and cash equivalents consist of cash, deposits in demand money market accounts, and commercial paper. Restricted cash consists of a letter of credit for $1.5 million as a deposit for the Brisbane lease.

A reconciliation of cash, cash equivalents and restricted cash reported within the Consolidated Balance Sheets to the amounts reported within the accompanying Consolidated Statements of Cash Flows is as follows (in thousands):

	As of December 31,		
	2019	2018	2017
Cash and cash equivalents	$ 80,428	$ 140,418	$ 49,826
Non-current restricted cash	1,500	3,500	3,500
Cash, cash equivalents and restricted cash as reported within the Consolidated Statements of Cash Flows	$ 81,928	$ 143,918	$ 53,326

Marketable Securities

Sangamo classifies its marketable securities as available-for-sale and records its investments at estimated fair value based on quoted market prices or observable market inputs of almost identical assets, with the unrealized holding gains and losses included in accumulated other comprehensive loss (“AOCI”). The Company classifies those investments that are not required for use in current operations and that mature in more than 12 months as non-current marketable securities in the accompanying Consolidated Balance Sheets.

The Company’s investments are subject to a periodic impairment review. The Company recognizes an impairment charge, if material, when a decline in the fair value of its investments below the cost basis is judged to be other-than-temporary. The Company considers various factors in determining whether to recognize an impairment charge, including the length of time and extent to which the fair value has been less than the Company’s cost basis, the financial condition and near-term prospects of the investee and the Company’s intent and ability to hold the investment for a period of time sufficient to allow for any anticipated recovery in the market value. Realized gains and losses on available-for-sale securities are included in other income, net, which are determined using the specific identification method.

Property and Equipment

Property and equipment are stated at cost, less accumulated depreciation and amortization. Depreciation is calculated using the straight-line method based on the estimated useful lives of the related assets which is generally three to five years. For leasehold improvements, amortization is calculated using the straight-line method based on the shorter of the useful life or the lease term. The Company reviews its property and equipment for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable.

Research and Development Expenses

Research and development expenses consist primarily of personnel costs, including salaries, benefits and stock-based compensation, clinical studies performed by contract research organizations ("CROs"), materials and supplies and overhead allocations consisting of various support and facility-related costs. Research and development costs are expensed as incurred.

General and Administrative Expenses

General and administrative expenses consist of finance, human resources, legal and other administrative activities. These expenses consist primarily of personnel costs, including salaries, benefits and stock-based compensation, facilities and overhead costs, legal expenses, and other general and administrative costs.

Stock-based Compensation

The Company measures and recognizes compensation expense for all stock-based payment awards made to Sangamo employees and directors, including employee share options, restricted stock units (“RSUs”) and employee stock purchases related to the 2010 Employee Stock Purchase Plan (“ESPP”), as amended, based on estimated fair values at the award grant date. The fair value of stock-based awards is amortized over the vesting period of the award using a straight-line method.

To estimate the fair value of an award, the Company uses the Black-Scholes option pricing model. This model requires inputs such as expected life, expected volatility and risk-free interest rate. These inputs are subjective and generally require significant analysis and judgment to develop. While estimates of expected life and volatility are derived primarily from the Company’s historical data, the risk-free rate is based on the U.S. Treasury yield curve in effect at the time of grant commensurate with the expected life assumption. The Company accounts for forfeitures in the period they occur.

Income Taxes

Income tax expense has been provided using the liability method. Deferred tax assets and liabilities are determined based on the difference between the financial statement and tax bases of assets and liabilities as measured by the enacted tax rates that will be in effect when these differences reverse. The Company provides a valuation allowance against net deferred tax assets if, based upon the available evidence, it is not more likely than not that the deferred tax assets will be realized.

The Company recognizes a tax benefit from an uncertain tax position only if it is more likely than not that the tax position will be sustained on examination by the taxing authorities, based on the technical merits of the position. The tax benefits recognized in the Company's consolidated financial statements from such positions are measured based on the largest benefit that has a greater than 50% likelihood of being realized. The Company recognizes interest and penalties associated with tax matters as part of the income tax provision and includes accrued interest and penalties with the related income tax liability within account payable and accrued liabilities on its Consolidated Balance Sheets.

Foreign Currency Translation

The functional currency of the Company's foreign subsidiaries is primarily the Euro. Assets and liabilities denominated in foreign currencies are translated to U.S. dollars using the exchange rates at the balance sheet date. Foreign currency translation adjustments are recorded as a component of AOCI within stockholders' equity. Revenues and expenses from the Company's foreign subsidiaries are translated using the monthly average exchange rates in effect during the period in which the transactions occur. Foreign currency transaction gains and losses are recorded in interest and other income, net, on the Company's Consolidated Statements of Operations.

Net Loss Per Share

Basic net loss per share attributable to Sangamo Therapeutics, Inc. stockholders has been computed by dividing net loss attributable to Sangamo Therapeutics, Inc. stockholders by the weighted-average number of shares of common stock outstanding during the period. Diluted net loss per share attributable to Sangamo Therapeutics, Inc. stockholders is calculated by dividing net loss attributable to Sangamo Therapeutics, Inc. stockholders by the weighted-average number of shares of common stock plus potential dilutive securities outstanding during the period.

The total number of shares subject to stock options and RSUs outstanding and the ESPP shares reserved for issuance, which are all anti-dilutive, were excluded from consideration in the calculation of diluted net loss per share attributable to Sangamo Therapeutics, Inc. stockholders. Stock options and RSUs outstanding and ESPP shares reserved for issuance as of December 31, 2019, 2018 and 2017 were 10,750,550, 9,048,793, and 8,367,628, respectively.

Segments

The Company operates in one segment. Management uses one measure of profitability and does not segregate its business for internal reporting. As of December 31, 2019 and 2018, substantially all of the Company's assets were maintained in the United States. For the years ended December 31, 2019, 2018 and 2017, substantially all of the Company's revenues and operating expenses were generated and incurred in the United States.

Recent Accounting Pronouncements

Recently Adopted

Simplified Disclosure

In August 2018, the Securities and Exchange Commission ("SEC") adopted amendments to certain disclosure requirements in Securities Act Release No. 33-10532, *Disclosure Update and Simplification*, as updated. These amendments eliminate, modify, or integrate into other SEC requirements certain disclosure rules. Among the amendments is the requirement to present an analysis of changes in stockholders' equity in the interim financial statements included in quarterly reports on Form 10-Q. The analysis, which can be presented as a footnote or separate statement, is required for the current and comparative quarter and year-to-date interim periods. The amendments are effective for all filings made on or after November 5, 2018. The Company's adoption of these SEC amendments had no material effect on the Company's reporting of financial position, results of operations, cash flows or stockholders' equity.

Accounting for Leases

In February 2016, the Financial Accounting Standards Board ("FASB") issued ASU 2016-2, *Leases* ("ASC Topic 842"). ASC Topic 842 amends a number of aspects of lease accounting, including requiring lessees to recognize almost all leases with a term greater than one year as a right-of-use ("ROU") asset and corresponding liability, measured at the present value of the lease payments. On January 1, 2019, the Company adopted ASC Topic 842 using the modified retrospective

approach with a cumulative-effect adjustment of $0.9 million reflected as a decrease to the opening balance of accumulated deficit as of the adoption date. Results for the year ended December 31, 2019 are presented under ASC Topic 842. No prior period amounts were adjusted and continue to be reported in accordance with previous lease guidance, ASC Topic 840 – *Leases* ("ASC Topic 840").

ASC Topic 842 provides a number of optional practical expedients in transition. The Company elected the practical expedients to not reassess its prior conclusions about lease identification under the new standard, to not reassess lease classification, and to not reassess initial direct costs. The Company did not elect the practical expedient allowing the use-of-hindsight, which would require the Company to reassess the lease term of its leases based on all facts and circumstances through the effective date. The Company also did not elect the practical expedient pertaining to land easements, as this is not applicable to the current contract portfolio.

The impact of the adoption of ASC Topic 842 on the accompanying Consolidated Balance Sheet as of January 1, 2019 was as follows (in thousands):

	December 31, 2018	Adjustments Due to the Adoption of ASC Topic 842	January 1, 2019
Assets:			
Property and equipment, net	$ 78,723	$ (62,500)	$ 16,223
Operating lease right-of-use assets	—	8,753	8,753
Prepaid rent	—	36,025	36,025
Liabilities:			
Operating lease liabilities - current[(1)]	—	1,408	1,408
Deferred rent[(1)]	271	(271)	—
Build-to-suit lease obligation[(2)]	27,689	(27,689)	—
Operating lease liabilities - long-term[(2)]	—	7,933	7,933
Accumulated deficit	(562,696)	897	(561,799)

(1) Operating lease liabilities – current and deferred rent are included in accounts payable and accrued liabilities on the Consolidated Balance Sheets.
(2) Build-to-suit lease obligation and operating lease liabilities – long-term are included in long-term portion of lease liabilities on the Consolidated Balance Sheets.

The adjustments due to the adoption of ASC Topic 842 primarily related to the recognition of operating lease ROU assets and operating lease liabilities for the Company's leases. In addition, the adoption of ASC Topic 842 resulted in a change in accounting of the build-to-suit component of two leases under ASC Topic 840 to operating leases under ASC Topic 842. As a result, the Company derecognized the estimated fair value of the building shells that were included in Property and equipment, net as of December 31, 2018, as the Company had been deemed to own these buildings under ASC Topic 840. For a description of the leases, see "Note 7 – *Commitments and Contingencies – Leases*" in these Consolidated Financial Statements.

Not Yet Adopted

Collaborative Arrangements

In November 2018, the FASB issued ASU 2018-18, *Collaborative Arrangements (ASC Topic 808): Clarifying the Interaction between Topic 808 and Topic 606* ("ASC Topic 808"), which clarifies that certain transactions between participants in a collaborative arrangement should be accounted for under ASC Topic 606 when the counterparty is a customer. In addition, ASC Topic 808 precludes an entity from presenting consideration from a transaction in a collaborative arrangement as revenue from contracts with customers if the counterparty is not a customer for that transaction. This guidance will be effective for the Company beginning January 1, 2020. The Company has determined the adoption of ASU 2018-18 will not have a material impact on its Consolidated Financial Statements.

Goodwill Impairment Testing

In January 2017, the FASB issued ASU No. 2017-4, *Intangibles – Goodwill and Other (Topic 350): Simplifying the Test of Goodwill Impairment* ("ASU 2017-4"). The new guidance simplifies the subsequent measurement of goodwill by eliminating Step 2 from the goodwill impairment test. ASU 2017-4 requires goodwill impairment to be measured as the amount by which a reporting unit's carrying amount exceeds its fair value, not to exceed the carrying amount of its goodwill. ASU

2017-4 requires prospective application and is effective for annual periods beginning after December 15, 2019. ASU 2017-4 will require the Company to amend its methodology for determining any goodwill impairment beginning in 2020. The Company does not expect the adoption of ASU 2017-4 to have a material impact on its Consolidated Financial Statements.

Credit Losses

In June 2016, the FASB issued ASU No. 2016-13, *Financial Instruments – Credit Losses (Topic 326)* ("ASU 2016-13"). ASU 2016-13 implements an impairment model, known as the current expected credit loss model that is based on expected losses rather than incurred losses. Under the new guidance, an entity will recognize as an allowance its estimate of expected credit losses. ASU 2016-13 is effective for all interim and annual reporting periods beginning after December 15, 2019 and must be adopted using a modified retrospective approach, with certain exceptions. Early adoption is permitted. The Company does not expect the adoption of ASU 2016-13 to have a material impact on its Consolidated Financial Statements.

Income Taxes

In December 2019, the FASB issued ASU No. 2019-12, *Income Taxes – Simplifying the Accounting for Income Taxes* ("ASU 2019-12"). The guidance removes exceptions to the general principles in *Income Taxes (Topic 740)* for allocating tax expense between financial statement components, accounting basis differences stemming from an ownership change in foreign investments and interim period income tax accounting for year-to-date losses that exceed projected losses. The guidance becomes effective for annual reporting periods beginning after December 15, 2020 and interim periods within those fiscal years with early adoption permitted. The Company plans to adopt ASU 2019-12 effective January 1, 2020 and does not expect this adoption to have a material impact on its Consolidated Financial Statements.

NOTE 2 – FAIR VALUE MEASUREMENT

The Company measures certain assets and liabilities at fair value on a recurring basis, including cash equivalents, available-for-sale securities and the free share asset/liability. The accounting guidance establishes a three-tier hierarchy, which prioritizes the inputs used in the valuation methodologies in measuring fair value as follows:

Level 1: Unadjusted quoted prices in active markets that are accessible at the measurement date for identical, unrestricted assets or liabilities;

Level 2: Quoted prices in markets that are not active, or inputs which are observable, either directly or indirectly, for substantially the full term of the asset or liability; and

Level 3: Prices or valuation techniques that require inputs that are both significant to the fair value measurement and unobservable (*i.e.* supported by little or no market activity).

The fair value measurements of the Company's cash equivalents, available-for-sale securities and the free share asset/liability are identified at the following levels within the fair value hierarchy (in thousands):

	December 31, 2019			
	Fair Value Measurement			
	Total	Level 1	Level 2	Level 3
Assets:				
Cash equivalents:				
Money market funds	$ 30,496	$ 30,496	$ —	$ —
Commercial paper securities	2,999	—	2,999	—
Total	33,495	30,496	2,999	—
Marketable securities:				
Commercial paper securities	155,368	—	155,368	—
Corporate debt securities	95,017	—	95,017	—
U.S. government-sponsored entity debt securities	53,493	—	53,493	—
Total	303,878	—	303,878	—
Total cash equivalents and marketable securities	$ 337,373	$ 30,496	$ 306,877	$ —
Free shares asset	$ 236	$ —	$ —	$ 236

	December 31, 2018			
	Fair Value Measurement			
	Total	Level 1	Level 2	Level 3
Assets:				
Cash equivalents:				
Money market funds	$ 103,291	$ 103,291	$ —	$ —
Total	103,291	103,291	—	—
Marketable securities:				
Commercial paper securities	177,224	—	177,224	—
Corporate debt securities	63,870	—	63,870	—
U.S. government-sponsored entity debt securities	18,621	—	18,621	—
Total	259,715	—	259,715	—
Total cash equivalents and marketable securities	$ 363,006	$ 103,291	$ 259,715	$ —
Liabilities:				
Free shares liability	$ 154	$ —	$ —	$ 154

Cash Equivalents and Marketable Securities

The Company generally classifies its marketable securities and some cash equivalents as Level 2. Instruments are classified as Level 2 when observable market prices for identical securities that are traded in less active markets are used. When observable market prices for identical securities are not available, such instruments are priced using benchmark curves, benchmarking of like securities, sector groupings, matrix pricing and valuation models. These valuation models are proprietary to the pricing providers or brokers and incorporate a number of inputs, including in approximate order of priority: benchmark yields, reported trades, broker/dealer quotes, issuer spreads, two-sided markets, benchmark securities, bids, offers and reference data including market research publications. For certain security types, additional inputs may be used, or some of the standard inputs may not be applicable. Evaluators may prioritize inputs differently on any given day for any security based on market conditions, and not all inputs listed are available for use in the evaluation process for each security evaluation on any given day.

Free Shares Asset/Liability

As a result of the July 20, 2018 Share Purchase Agreement ("Sangamo France SPA") to acquire Sangamo France (see Note 5 – *Acquisition of Sangamo France*), the Company entered into arrangements with the holders of approximately 477,000 "free shares" of Sangamo France pursuant to which the Company has the right to purchase such shares from the holders (a call option) and such holders have the right to sell to the Company such shares from time to time through mid-2021 (a put option). The Company initially recorded a liability of $0.2 million on the acquisition date. The put options were classified within Level 3 of the fair value hierarchy as the Company utilized a binomial-lattice pricing model (the "Monte Carlo simulation model") that involved certain market conditions to estimate the fair value of the options. The assumptions used in this simulation model are reviewed on a quarterly basis and adjusted, as needed. Subsequent changes in the fair value of the free shares are recorded in general and administrative expenses in the Consolidated Statements of Operations. During the year, the Company purchased approximately 111,000 shares of the 477,000 total free shares for a cash payment of approximately $0.3 million upon exercise of the put options. As of December 31, 2019, approximately 366,000 free shares remain outstanding and subject to purchase by the Company.

The free shares liability was approximately $0.2 million at December 31, 2018 and the Company recognized a gain due to an increase in the fair value of the free shares of approximately $0.5 million for the year ended December 31, 2019, offset by approximately $0.1 million for the shares purchased during the year, bringing the balance to an asset of approximately $0.2 million at December 31, 2019.

Free Shares valuation assumptions:	December 31, 2019	December 31, 2018
Sangamo Stock Price (USD)	$ 8.68	$ 11.48
Sangamo France Stock Price (EUR)	€ 2.14	€ 2.58
USD/ EUR Exchange Rate	0.91	0.87
Estimated Correlation Sangamo and Sangamo France Stock Prices	100.0 %	—
Sangamo Stock Price (USD) Volatility Estimate	72.5 %	79.9 %
Sangamo France Stock Price (EUR) Volatility Estimate	72.5 %	8.6 %
USD/ EUR Exchange Rate Volatility Estimate	6.6 %	7.7 %
Risk Free Rate and Cost of Debt by Expected Exercise Date	Varies	Varies

NOTE 3 – MARKETABLE SECURITIES

The table below summarizes the Company's cash equivalents and available-for-sale securities (in thousands):

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized Losses	Estimated Fair Value
December 31, 2019				
Cash equivalents:				
Money market funds	$ 30,496	$ —	$ —	$ 30,496
Commercial paper securities	2,998	1	—	2,999
Total	33,494	1	—	33,495
Available-for-sale securities:				
Commercial paper securities	155,230	145	(7)	155,368
Corporate debt securities	94,905	115	(3)	95,017
U.S. government-sponsored entity debt securities	53,411	91	(9)	53,493
Total	303,546	351	(19)	303,878
Total cash equivalents and available-for-sale securities	$ 337,040	$ 352	$ (19)	$ 337,373
December 31, 2018				
Cash equivalents:				
Money market funds	$ 103,291	$ —	$ —	$ 103,291
Total	103,291	—	—	103,291
Available-for-sale securities:				
Commercial paper securities	177,353	—	(129)	177,224
Corporate debt securities	63,981	—	(111)	63,870
U.S. government-sponsored entity debt securities	18,640	—	(19)	18,621
Total	259,974	—	(259)	259,715
Total cash equivalents and available-for-sale securities	$ 363,265	$ —	$ (259)	$ 363,006

The fair value of investments available-for-sale by contractual maturity were as follows (in thousands):

	December 31,	
	2019	2018
Maturing in one year or less	$ 282,046	$ 259,715
Maturing after one year through five years	21,832	—
Total investments available-for-sale	$ 303,878	$ 259,715

The Company had no material realized losses from the sale of available-for-sale securities for the years ended December 31, 2019, 2018 or 2017. Sangamo has the intent and ability to hold its investments for a period of time sufficient to allow for any anticipated recovery in market value. No investments were other-than-temporarily impaired at either December 31, 2019 or 2018.

NOTE 4 – MAJOR CUSTOMERS, PARTNERSHIPS AND STRATEGIC ALLIANCES

Collaboration Agreements

Kite

In February 2018, the Company entered into a global collaboration and license agreement with Kite Pharma, Inc. ("Kite"), which became effective on April 5, 2018, and was amended and restated in September 2019, for the research, development and commercialization of potential engineered cell therapies for cancer. In this collaboration, Sangamo is working together with Kite on a research program under which the companies are designing zinc finger nucleases ("ZFNs") and viral vectors to disrupt and insert certain genes in T-cells and natural killer cells ("NK-cells") including the insertion of genes that encode chimeric antigen receptors ("CARs"), T-cell receptors ("TCRs"), and NK-cell receptors ("NKRs") directed to mutually agreed targets. Kite is responsible for all clinical development and commercialization of any resulting products and has announced that they expect to initiate a clinical trial evaluating KITE-037, an allogeneic anti-CD19 CAR-T cell therapy, in 2020.

Subject to the terms of this agreement, the Company granted Kite an exclusive, royalty-bearing, worldwide sublicensable license under the Company's relevant patents and know-how to develop, manufacture and commercialize, for the purpose of treating cancer, specific cell therapy products that may result from the research program and that are engineered *ex vivo* using selected ZFNs and viral vectors developed under the research program to express CARs, TCRs or NKRs directed to candidate targets.

During the research program term and subject to certain exceptions, except pursuant to this agreement, the Company is prohibited from researching, developing, manufacturing and commercializing, for the purpose of treating cancer, any cell therapy product that, as a result of *ex vivo* genome editing, expresses a CAR, TCR or NKR that is directed to a target expressed on or in a human cancer cell. After the research program term concludes and subject to certain exceptions, except pursuant to this agreement, the Company will be prohibited from developing, manufacturing and commercializing, for the purpose of treating cancer, any cell therapy product that, as a result of *ex vivo* genome editing, expresses a CAR, TCR or NKR that is directed to a candidate target.

Following the effective date, in April 2018, the Company received a $150.0 million upfront payment from Kite. In addition, Kite will reimburse the Company's direct costs to conduct service under the joint research program provisions of the agreement, and Kite will be responsible for all subsequent development, manufacturing and commercialization of any licensed products. Sangamo is also eligible to receive contingent development- and sales-based milestone payments that could total up to $3.01 billion if all of the specified milestones in this agreement are achieved. Of this amount, approximately $1.26 billion relates to the achievement of specified research, clinical development, regulatory and first commercial sale milestones, and approximately $1.75 billion relates to the achievement of specified sales-based milestones if annual worldwide net sales of licensed products reach specified levels. Each development- and sales-based milestone payment is payable (i) only once for each licensed product, regardless of the number of times that the associated milestone event is achieved by such licensed product, and (ii) only for the first ten times that the associated milestone event is achieved, regardless of the number of licensed products that may achieve such milestone event. In addition, the Company will be entitled to receive escalating, tiered royalty payments with a percentage in the single digits based on potential future annual worldwide net sales of licensed products. These royalty payments will be subject to reduction due to patent expiration, entry of biosimilar products to the market and payments made under certain licenses for third-party intellectual property.

The initial research term of the agreement is six years. Kite has an option to extend the research term for up to two additional one-year periods for a separate fee of $10.0 million per year. All contingent payments under the agreement, when earned, will be non-refundable and non-creditable. In connection with the amendment and restatement of the agreement in September 2019, the Company entered into a new research plan with Kite, with estimated reimbursable service costs of approximately $3.4 million. The Company concluded the transaction price under this agreement is $189.3 million and includes the upfront license fee of $150.0 million and $39.3 million estimated reimbursable service costs for identified research projects over the estimated performance period. The Company concluded that the estimated fees for the presumed exercise of the research term extension options and all milestone amounts are fully constrained. As part of its evaluation of the constraint, the Company considered numerous factors, including the fact that achievement of the milestones at this time is uncertain and contingent upon future periods when the uncertainty related to the variable consideration is resolved. The Company will re-evaluate the transaction price, including the estimated variable consideration included in the transaction price and all constrained amounts, in each reporting period and as uncertain events are resolved or other changes in circumstances occur. None of the development and sales-based milestone payments have been included in the transaction price.

The Company assessed the agreement with Kite in accordance with ASC Topic 606 and concluded that Kite is a customer. Kite has the right to terminate this agreement, in its entirety or on a per licensed product or per candidate target basis,

for any reason after a specified notice period. Each party has the right to terminate this agreement on account of the other party's bankruptcy or material, uncured breach.

The Company has identified the primary performance obligations within the Kite agreement as: (1) a license to the technology along with the stand by ready obligation to perform research services, and (2) the on-going research services. Revenue from the upfront license fee relates to access to the license and Company's obligation to stand-ready to perform such research services as additional targets are selected by Kite. As a result of this obligation to perform research services when and if requested throughout the duration of the contract, the fee for the license and the stand-ready obligation will be recognized over time on a straight-line basis through June 2024, the estimated period of the stand-ready obligation. Revenue from the reimbursable costs related to the integrated service deliverable is recognized as the research services are performed. Related costs and expenses under these arrangements have historically approximated the revenues recognized. The estimated period of performance and project cost is reviewed quarterly and adjusted, as needed, to reflect the Company's current assumptions regarding the timing of its deliverables. As of December 31, 2019, and 2018 the Company had deferred revenue of $106.5 million and $131.5 million, respectively, related to this agreement.

Revenues recognized under the agreement were as follows (in thousands):

	Year Ended December 31,	
	2019	2018
Revenue related to Kite agreement:		
Recognition of license and stand-ready fee	$ 24,977	$ 18,545
Research services	9,373	6,972
Total	$ 34,350	$ 25,517

Pfizer

SB-525 Global Collaboration and License Agreement

In May 2017, the Company entered into an exclusive, global collaboration and license agreement with Pfizer, pursuant to which it established a collaboration for the research, development and commercialization of SB-525, its gene therapy product candidate for hemophilia A, and closely related products.

Under this agreement, the Company is responsible for conducting the Phase 1/2 clinical trial and certain manufacturing activities for SB-525, while Pfizer is responsible for subsequent worldwide development, manufacturing, marketing and commercialization of SB-525. Sangamo may also collaborate in the research and development of additional adeno-associated virus ("AAV") based gene therapy products for hemophilia A.

The Company originally received an upfront fee of $70.0 million and is eligible to receive development milestone payments contingent on the achievement of specified clinical development, intellectual property, regulatory and first commercial sale milestones for SB-525 and potentially other products. In addition, Sangamo is eligible to receive up to $208.5 million in payments upon the achievement of specified clinical development, intellectual property and regulatory milestones and up to $266.5 million in payments upon first commercial sale milestones for SB-525 and potentially other products. The total amount of potential clinical development, intellectual property, regulatory, and first commercial sale milestone payments, assuming the achievement of all specified milestones in the hemophilia A Pfizer agreement, is up to $475.0 million, which includes up to $300.0 million for SB-525 and up to $175.0 million for other products that may be developed under the agreement, subject to reduction on account of payments made under certain licenses for third party intellectual property. In addition, Pfizer agreed to pay the Company royalties for each potential licensed product developed under the agreement based on an escalating tiered, double-digit percentage of the annual net sales of such product. These royalties are subject to reduction due to patent expiration, entry of biosimilar products to the market and payment made under certain licenses for third-party intellectual property. To date, a $25.0 million milestone has been achieved, however no products have been approved and therefore no royalty fees have been earned under the hemophilia A Pfizer agreement.

The Company assessed the agreement with Pfizer in accordance with ASC Topic 606 and concluded that Pfizer is a customer. As of December 31, 2019, the total transaction price under this agreement is $105.0 million, which represents the upfront and research services fees of $80.0 million and one unconstrained milestone in the amount of $25.0 million. Sangamo is responsible for internal and external research costs as part of the upfront fee and has the ability to request additional reimbursement from Pfizer if certain conditions are met. None of the clinical or regulatory milestones have been included in the transaction price, as all such milestone amounts are fully constrained. As part of its evaluation of the constraint, the Company considered numerous factors, including the fact that achievement of the milestones at this time is uncertain and contingent upon future periods when the uncertainty related to the variable consideration is resolved. The Company will re-evaluate the

transaction price, including its estimated variable consideration included in the transaction price and all constrained amounts in each reporting period and as uncertain events are resolved or other changes in circumstances occur.

Subject to the terms of the agreement, the Company granted Pfizer an exclusive worldwide royalty-bearing license, with the right to grant sublicenses, to use certain technology controlled by the Company for the purpose of developing, manufacturing and commercializing SB-525 and related products. Pfizer granted the Company a non-exclusive, worldwide, royalty free, fully paid license, with the right to grant sublicenses, to use certain manufacturing technology developed under the agreement and controlled by Pfizer to manufacture the Company's products that utilize the AAV delivery system. During a specified period, neither the Company nor Pfizer will be permitted to clinically develop or commercialize, outside of the collaboration, certain AAV-based gene therapy products for hemophilia A.

Unless earlier terminated, the agreement has a term that continues on a per product and per country basis until the later of (i) the expiration of patent claims that cover the product in a country, (ii) the expiration of regulatory exclusivity for a product in a country, and (iii) 15 years after the first commercial sale of a product in a country. Pfizer has the right to terminate the agreement without cause in its entirety or on a per product or per country basis. The agreement may also be terminated by either party based on an uncured material breach by the other party or the bankruptcy of the other party. Upon termination for any reason, the license granted by the Company to Pfizer to develop, manufacture and commercialize SB-525 and related products will automatically terminate. Upon termination by the Company for cause or by Pfizer in any country or countries, Pfizer will automatically grant the Company an exclusive, royalty-bearing license under certain technology controlled by Pfizer to develop, manufacture and commercialize SB-525 in the terminated country or countries.

The Company has identified one performance obligation within the hemophilia A Pfizer agreement as a license to the technology and on-going research services. The Company concluded that the license is not discrete, as it does not have stand-alone value to Pfizer apart from the research services to be performed by the Company pursuant to the agreement. As a result, the Company recognizes revenue from the upfront payment based on proportional performance of the on-going services through 2020, the estimated period the Company will perform research services. The estimate of progress towards the satisfaction of its performance obligation and project cost is reviewed quarterly and adjusted, as needed, to reflect the Company's current assumptions regarding the timing of its deliverables. As of December 31, 2019 and 2018, the Company had deferred revenue of $4.0 million and $10.0 million, respectively, related to this agreement.

In December 2019, the Company entered into an amendment to the collaboration agreement, pursuant to which the Company transferred the IND for SB-525 to Pfizer. Upon this transfer the Company achieved a $25.0 million milestone as the conditions for achieving the milestone were met. The Company recognized approximately $23.7 million attributed to this milestone as revenue during the year ended December 31, 2019. The balance of this payment of $1.3 million will be recognized as revenue commensurate with the provision of research services over the remaining term of the agreement.

Revenues recognized under the agreement were as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Revenue related to Pfizer SB-525 agreement:			
Recognition of upfront fee and research services	$ 15,697	$ 37,810	$ 17,008
Milestone achievement	23,662	—	—
Total	$ 39,359	$ 37,810	$ 17,008

The Company adopted ASC Topic 606 effective January 1, 2018, using the modified retrospective method. The impact on the hemophilia A Pfizer agreement was to increase the amount of the recognition of the up-front payment by approximately $5.2 million. This amount resulted in a decrease to the opening balance of accumulated deficit and a decrease to deferred revenues, respectively.

In the first quarter of 2019, the Company updated its estimated project cost and related revenues under this program. This adjustment was a direct result of the increase in project scope during the first quarter of 2019 and the corresponding costs, which resulted in a decrease in the measure of proportional performance. In December 2019, the Company updated its estimated project cost and related revenues upon transfer of the IND for SB-525 to Pfizer. This adjustment was a direct result of the decrease in project scope during the fourth quarter of 2019 and the corresponding costs, which resulted in an increase in the measure of proportional performance. During the year ended December 31, 2019, the Company recognized $15.7 million in revenues related to the Pfizer SB-525 agreement, which included approximately $8.7 million acceleration in revenues recorded in the three months ended December 31, 2019 related to the updated estimated project cost, offset by approximately $3.0 million reduction in revenues recorded in the three months ended March 31, 2019 related to the updated estimated project cost.

C9ORF72 Research Collaboration and License Agreement

In December 2017, the Company entered into a separate exclusive, global collaboration and license agreement with Pfizer for the development and commercialization of potential gene therapy products that use ZFP transcription factors ("TFs") to treat amyotrophic lateral sclerosis ("ALS") and frontotemporal lobar degeneration ("FTLD") linked to mutations of the *C9ORF72* gene. Pursuant to this agreement, the Company agreed to work with Pfizer on a research program to identify, characterize and preclinically develop ZFP-TFs that bind to and specifically reduce expression of the mutant form of the *C9ORF72* gene.

The Company received a $12.0 million upfront payment from Pfizer and is eligible to receive up to $60.0 million in development milestone payments from Pfizer contingent on the achievement of specified preclinical development, clinical development and first commercial sale milestones, and up to $90.0 million commercial milestone payments if annual worldwide net sales of the licensed products reach specified levels. In addition, Pfizer will pay the Company royalties based on an escalating tiered, mid- to high-single digit percentage of the annual worldwide net sales of the licensed products. These royalty payments are subject to reduction due to patent expiration, entry of biosimilar products to the market and payments made under certain licenses for third party intellectual property. Each party will be responsible for the cost of its performance of the research program. Pfizer will be operationally and financially responsible for subsequent development, manufacturing and commercialization of the licensed products.

The Company assessed the agreement with Pfizer in accordance with ASC Topic 606 and concluded that Pfizer is a customer. The Company concluded the total transaction price under this agreement is $12.0 million, which represents the upfront fee. None of the clinical or regulatory milestones have been included in the transaction price, as all milestone amounts are fully constrained. As part of its evaluation of the constraint, the Company considered numerous factors, including the fact that achievement of the milestones at this time is uncertain and contingent upon future periods when the uncertainty related to the variable consideration is resolved. The Company will re-evaluate the transaction price, including its estimated variable consideration included in the transaction price and all constrained amounts, in each reporting period and as uncertain events are resolved or other changes in circumstances occur.

Subject to the terms of this agreement, the Company granted Pfizer an exclusive, royalty-bearing, worldwide license under the Company's relevant patents and know-how to develop, manufacture and commercialize gene therapy products that use resulting ZFP-TFs that satisfy pre-agreed criteria. During a specified period, neither the Company nor Pfizer will be permitted to research, develop, manufacture or commercialize outside of the collaboration any ZFPs that specifically bind to the *C9ORF72* gene.

Unless earlier terminated, the agreement has a term that continues on a per licensed product and per country basis until the later of (i) the expiration of patent claims that cover the licensed product in a country, (ii) the expiration of regulatory exclusivity for a licensed product in a country, and (iii) 15 years after the first commercial sale of a licensed product in a major market country. Pfizer also has the right to terminate the agreement without cause in its entirety or on a per product or per country basis. The agreement may also be terminated by either party based on an uncured material breach by the other party or the bankruptcy of the other party. The agreement will also terminate if the Company is unable to identify any lead candidates for development within a specified period of time or if Pfizer elects not to advance a lead candidate beyond a certain development milestone within a specified period of time. Upon termination for any reason, the license granted by the Company to Pfizer to develop, manufacture and commercialize licensed products under the agreement will automatically terminate. Upon termination by the Company for cause or by Pfizer without cause for any licensed product or licensed products in any country or countries, the Company will have the right to negotiate with Pfizer to obtain a non-exclusive, royalty-bearing license under certain technology controlled by Pfizer to develop, manufacture and commercialize the licensed product or licensed products in the terminated country or countries.

Following termination by the Company for Pfizer's material breach, Pfizer will not be permitted to research, develop, manufacture or commercialize ZFPs that specifically bind to the *C9ORF72* gene for a period of time. Following termination by Pfizer for the Company's material breach, the Company will not be permitted to research, develop, manufacture or commercialize ZFPs that specifically bind to the *C9ORF72* gene for a period of time.

The Company has identified the performance obligation within this agreement as a license to the technology and on-going research services. The Company concluded that the license is not discrete as it does not have stand-alone value to Pfizer apart from the services to be performed by the Company pursuant to the agreement. As a result, the Company recognizes revenue from the upfront payment based on proportional performance of the on-going services over the estimated period the Company will perform research services. The estimation of progress towards the satisfaction of its performance obligation and project cost is reviewed quarterly and adjusted, as needed, to reflect the Company's current assumptions regarding the timing of its deliverables. As of December 31, 2019 and 2018, the Company had deferred revenue of $8.0 million and $9.8 million, respectively, related to this agreement.

Revenues recognized under the agreement were as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Recognition of upfront fee related to Pfizer *C9ORF72* agreement	$ 1,827	$ 2,188	$ —

Sanofi

In January 2014, the Company entered into an exclusive worldwide collaboration and license agreement with Bioverativ Inc., (now Sanofi Genzyme, a global business unit of Sanofi S.A. ("Sanofi")), to develop therapeutics for hemoglobinopathies, focused on beta thalassemia and sickle cell disease ("SCD"). The agreement was originally signed with Biogen MA Inc., who subsequently assigned it to Bioverativ Inc., which was later acquired by Sanofi. Under the agreement, the Company is jointly conducting two research programs: the beta thalassemia program and the SCD program. In the beta thalassemia program, the Company is responsible for all discovery, research and development activities through the first human clinical trial. In the SCD program, both parties are responsible for research and development activities through the submission of an IND application for ZFP therapeutics intended to treat SCD.

Under both programs, Sanofi is responsible for subsequent worldwide clinical development, manufacturing and commercialization of licensed products developed under the agreement. At the end of the specified research terms for each program or under certain specified circumstances, Sanofi has the right to step in and take over any of the Company's remaining activities. Furthermore, the Company has an option to co-promote in the U.S. any licensed products to treat beta thalassemia and SCD developed under the agreement, and Sanofi will compensate the Company for such co-promotion activities. Subject to the terms of the agreement, the Company has granted Sanofi an exclusive, royalty-bearing license, with the right to grant sublicenses, to use certain ZFP and other technology controlled by the Company for the purpose of researching, developing, manufacturing and commercializing licensed products developed under the agreement. The Company also granted Sanofi a non-exclusive worldwide, royalty-free fully paid license with the right to grant sublicenses, under the Company's interest in certain other intellectual property developed pursuant to the agreement. During the term of the agreement, the Company is not permitted to research, develop, manufacture or commercialize, outside of the agreement, certain gene therapy products that target genes relevant to the licensed products.

Under the agreement, the Company received an upfront license fee of $20.0 million and is eligible to receive development and sales milestone payments upon the achievement of specified regulatory, clinical development and sales milestones. In addition, the Company will also be eligible to receive up to $115.8 million in payments upon the achievement of specified clinical development and regulatory milestones, as well as up to $160.5 million in payments upon the achievement of specified sales milestones. The total amount of potential regulatory, clinical development, and sales milestone payments, assuming the achievement of all specified milestones in the agreement, is up to $276.3 million. In addition, the Company will receive royalty payments for each licensed product that are a tiered double-digit percentage of annual net sales of each product. Sanofi reimburses Sangamo for agreed upon costs incurred in connection with research and development activities conducted by Sangamo. To date, a $6.0 million milestone has been achieved related to ST-400 for beta thalassemia and another $7.5 million milestone has been achieved related to SCD, however no products have been approved and therefore no royalty fees have been earned under the Sanofi agreement.

The agreement may be terminated by (i) the Company or Sanofi for the uncured material breach of the other party, (ii) the Company or Sanofi for the bankruptcy or other insolvency proceeding of the other party; (iii) Sanofi, upon 180 days' advance written notice to the Company and (iv) Sanofi, for certain safety reasons upon written notice to, and after consultation with, the Company. As a result, actual future milestone payments could be lower than the amounts stated above.

All contingent payments under the agreement, when earned, will be non-refundable and non-creditable. The transaction price as of December 31, 2019 of $89.2 million includes the upfront license fee of $20.0 million, milestones of $13.5 million achieved to date and $55.7 million of estimated research service fees for identified research projects over the estimated performance period, as all unachieved milestone amounts are fully constrained. As part of its evaluation of the constraint, the Company considered numerous factors, including the fact that achievement of the milestones at this time is uncertain and contingent upon future periods when the uncertainty related to the variable consideration is resolved. The Company will re-evaluate the transaction price, including the estimated variable consideration included in the transaction price and all constrained amounts, in each reporting period and as uncertain events are resolved or other changes in circumstances occur. None of the clinical or regulatory milestones have been included in the transaction price.

The Company assessed the agreement with Sanofi in accordance with ASC Topic 606 and concluded that Sanofi is a customer. The Company has identified the performance obligations within this arrangement as a license to the technology and on-going research services activities. The Company concluded that the license is not discrete as it does not have stand-alone value to Sanofi apart from the research services to be performed pursuant to the agreement. As a result, the Company recognizes revenue from the upfront payment based on proportional performance of the ongoing services through 2022, the

estimated period the Company will perform research services. The estimate of progress towards the satisfaction of performance obligation and project cost is reviewed quarterly and adjusted, as needed, to reflect the Company's current assumptions regarding the timing of its deliverables. Revenue from the reimbursable costs related to the integrated service deliverable is recognized as the research services are performed. Related costs and expenses under these arrangements have historically approximated the revenues recognized. As of December 31, 2019 and 2018, the Company had deferred revenue of $1.7 million and $4.6 million, respectively, related to this agreement.

In August 2019, the Company achieved a $6.0 million milestone with Sanofi upon dosing of the third subject in the ST-400 beta thalassemia Phase 1 clinical trial. The Company recognized approximately $5.7 million attributed to this milestone as revenue during the year ended December 31, 2019.

In December 2019, the Company achieved a $7.5 million milestone with Sanofi upon dosing of the first subject in the SCD Phase 1 clinical trial. The Company recognized approximately $7.1 million attributed to this milestone as revenue during the year ended December 31, 2019.

Revenues recognized under the agreement were as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Revenue related to Sanofi agreement:			
Recognition of upfront fee	$ 3,494	$ 4,013	$ 1,769
Research services	6,367	9,503	10,489
Milestone achievement	12,819	—	—
Total	$ 22,680	$ 13,516	$ 12,258

The Company adopted ASC Topic 606 effective January 1, 2018, using the modified retrospective method. The impact on the Sanofi agreement was to reduce the amount of the recognition of the up-front payment by approximately $4.1 million. This amount resulted in an increase to the opening balance of accumulated deficit and an increase to deferred revenues.

California Institute for Regenerative Medicine

In May 2018, the California Institute for Regenerative Medicine ("CIRM") granted a Strategic Partnership Award for $8.0 million to fund the clinical studies of a potentially curative ZFP therapeutic for the treatment of beta thalassemia based on the application of Sangamo's ZFN genome editing technology. The grant exists through December 31, 2022 and provides matching funds to support the evaluate ST-400, a gene-edited cell therapy candidate for people with transfusion-dependent beta thalassemia. As of December 31, 2019, the Company had received $5.2 million under the award.

Under the terms of the CIRM grants, the Company is obligated to pay royalties and licensing fees based on a low single digit royalty percentage on net sales of CIRM-funded product candidates or CIRM-funded technology. The Company has the option to decline any and all amounts awarded by CIRM and as an alternative to revenue sharing, the Company has the option to convert the award to a loan. No such election has been made as of the date of the issuance of these financial statements. In the event that the Company terminates a CIRM-funded clinical trial, it will be obligated to repay the remaining CIRM funds on hand. As of December 31, 2019 and 2018, $5.7 million and $1.8 million, respectively, including accrued interest, related to this award is recorded as a loan in other long-term liabilities on the Consolidated Balance Sheets.

Amended Collaboration and License Agreement with Takeda

In January 2012, the Company entered into a collaboration and license agreement with Shire International GmbH, a wholly-owned subsidiary of Takeda Pharmaceutical Company Limited ("Takeda"), to research, develop and commercialize a ZFP therapeutic for treating Huntington's disease. The Company received an upfront license fee of $13.0 million. In 2014, Sangamo recognized a $1.0 million milestone payment related to the hemophilia program. Takeda does not have any milestone payment obligations, but is required to pay single digit percentage royalties to the Company, up to a specified maximum cap, on the commercial sales of therapeutic products for Huntington's disease. The Company is required to pay single digit percentage royalties to Takeda, up to a specified maximum cap, on commercial sales of therapeutic products from programs returned under the original agreement (which include blood clotting Factors VIII and IX) that use two zinc fingers.

Pursuant to the agreement, the Company granted Takeda an exclusive, world-wide, royalty-bearing license, with the right to grant sublicenses, to use the Company's ZFP technology for the purpose of developing and commercializing human therapeutic and diagnostic products for the Huntingtin gene ("*HTT* gene"). During the term of the agreement, the Company is not permitted to research, develop or commercialize, outside of the agreement, certain products that target the *HTT* gene. The agreement may be terminated by (i) the Company or Takeda, in whole or in part, for the uncured material breach of the other

party, (ii) the Company or Takeda for the bankruptcy or other insolvency proceeding of the other party and (iii) Takeda, in its entirety, effective upon at least 90 days' advance written notice.

The Company assessed the agreement with Takeda in accordance with ASC Topic 606 and concluded that Takeda is a customer. The Company has concluded that the license is not a separate unit of accounting as it does not have stand-alone value to Takeda apart from the research services to be performed pursuant to the Takeda agreement. The Company satisfied the deliverables and research services responsibilities within the amended arrangement which were completed in 2017. As a result, the Company recognized the remaining $2.3 million of deferred revenue from the upfront payment during the year ended December 31, 2017.

Revenues recognized under the Takeda agreement for the years ended December 31, 2019, 2018 and 2017, were $0.0 million, $0.0 million and $2.4 million, respectively.

Agreement with Sigma-Aldrich Corporation

In 2007, Sangamo entered into a license agreement with Sigma-Aldrich Corporation ("Sigma") to provide Sigma with access to Sangamo's proprietary ZFP technology and the exclusive right to use the technology to develop and commercialize research reagent products and services in the research field, excluding certain agricultural research uses that Sangamo previously licensed to Dow AgroSciences LLC ("DAS"), a wholly-owned subsidiary of Dow Chemical Company. Sangamo developed laboratory research reagents using its ZFP technology over a three-year research services period. Sangamo has since transferred the ZFP manufacturing technology to Sigma.

In October 2009, Sangamo expanded its license agreement with Sigma. In addition to the original terms of the license agreement, Sigma received exclusive rights to develop and distribute ZFP-modified cell lines for commercial production of protein pharmaceuticals and certain ZFP-engineered transgenic animals for commercial applications. Under the terms of the agreement, Sigma made an upfront cash payment of $20.0 million consisting of a $4.9 million purchase of 636,133 shares of Sangamo common stock, valued at $4.9 million, and a $15.1 million upfront license fee. Sangamo is also eligible to receive commercial license fees of $5.0 million based upon a percentage of net sales and sublicensing revenue and thereafter a reduced royalty rate of 10.5% of net sales and sublicensing revenue. In addition, upon the achievement of certain cumulative commercial milestones, Sigma will make milestone payments to Sangamo up to an aggregate of $25.0 million. Sangamo does not have additional ongoing performance obligations under the agreement.

Revenues recognized under the agreement with Sigma for the years ended December 31, 2019, 2018 and 2017, were $0.6 million, $0.5 million and $0.7 million, respectively.

Agreement with DAS

In 2005, Sangamo entered into an exclusive commercial license with DAS, with an initial three-year research term. Under this agreement, Sangamo is providing DAS with access to its proprietary ZFP technology and the exclusive right to use the technology to modify the genomes or alter the nucleic acid or protein expression of plant cells, plants, or plant cell cultures. Sangamo has retained rights to use plants or plant-derived products to deliver ZFP-TFs or ZFNs into humans or animals for diagnostic, therapeutic or prophylactic purposes. In 2008, DAS exercised its option and obtained a commercial license to sell products incorporating or derived from plant cells generated using the Company's ZFP technology. The exercise of the option triggered a one-time commercial license fee of $6.0 million, payment of the remaining $2.3 million of the previously agreed upon $4.0 million in research milestones, development and commercialization milestone payments for each product, and royalties on sales of products. Furthermore, DAS has the right to sublicense Sangamo's ZFP technology to third parties for use in plant cells, plants, or plant cell cultures, and Sangamo will be entitled to 25% of any cash consideration received by DAS under such sublicenses. In December 2010, the Company amended its agreement with DAS to extend the period of reagent manufacturing services and research services through December 31, 2012.

The agreement with DAS also provides for minimum sublicense fees each year due to Sangamo every October, provided the agreement is not terminated by DAS. Annual fees range from $0.3 million to $3.0 million and total $25.3 million over 11 years unless terminated at any time by DAS. The Company has identified the performance obligation within this arrangement as a license to the technology. In the event of any termination of the agreement, all rights to use the Company's ZFP technology will revert to Sangamo, and DAS will no longer be permitted to practice Sangamo's ZFP technology or to develop or, except in limited circumstances, commercialize any products derived from the Company's ZFP technology.

Revenues under the agreement with DAS were $3.0 million, $3.0 million, and $3.0 million during 2019, 2018 and 2017, respectively.

NOTE 5 – ACQUISITION OF SANGAMO FRANCE

On July 20, 2018, Sangamo entered into various agreements with the goal of eventually acquiring 100% of Sangamo France's share capital. The Company entered into the Sangamo France SPA with certain shareholders of Sangamo France, pursuant to which it acquired 13,519,036 ordinary shares of Sangamo France ("Ordinary Shares") as part of a block transaction that closed on October 1, 2018 (the "Acquisition Date"). Additionally, the Company and Sangamo France entered into a Tender Offer Agreement pursuant to which Sangamo agreed to acquire 11,528,635 Ordinary Shares for the same price per share as the Sangamo France SPA via a cash tender offer that closed on November 23, 2018. Following the block transaction, cash tender offer, and other open market purchases of shares, the Company owned 98.2% of the Ordinary Shares as of December 31, 2018 (or 25,047,671 Ordinary Shares). In addition to the Sangamo France SPA and the tender offer agreement, the Company also entered into arrangements with the holders of approximately 477,000 "free shares" of Sangamo France pursuant to which the Company has the right to purchase such shares from the holders (a call option) and such holders have the right to sell to the Company such shares from time to time through mid-2021 (a put option) (collectively the "Free Shares Options"). In June 2019, Sangamo France became a *société par actions simplifiée* ("S.A.S.") and was renamed from "TxCell" to "Sangamo Therapeutics France." During 2019, the Company acquired approximately 111,000 vested free shares, increasing its ownership of the Ordinary Shares to 98.7% as of December 31, 2019.

At the Acquisition Date, the fair value of the Free Shares Options was estimated to be a liability of $0.2 million. See Note 2 - *Fair Value Measurement – Free Shares Asset/Liability* for information regarding the valuation method. The fair value of the Free Shares Options will vary based on future changes in the Company's stock price during the option period. The fair value of the Free Shares Options was estimated to be an asset of $0.2 million as of December 31, 2019.

The acquisition of Sangamo France was accounted for as a business combination in accordance with ASC Topic 805, *Business Combinations*. The operating results of Sangamo France after the Acquisition Date have been included in the Company's Consolidated Statements of Operations. There were no purchase price adjustments subsequent to the acquisition.

There were no goodwill impairments during the years ended December 31, 2019 or 2018 and, as noted below, substantially all of the non-controlling interest on the Acquisition Date was subsequently acquired by the Company and, accordingly, substantially all of the goodwill is allocated to the Company as of December 31, 2019 and 2018.

The following table summarizes the estimated consideration transferred and the fair value of the net assets acquired as of the Acquisition Date (in thousands):

	October 1, 2018
Consideration transferred	$ 45,911
Fair value of non-controlling interest	35,829
Fair value of Sangamo France	$ 81,740
Cash	$ 4,779
Current assets	2,427
Property and equipment	1,857
IPR&D	55,019
Other assets	155
Current liabilities	(9,761)
Assumed debt liabilities	(4,933)
Deferred tax liability, net	(6,798)
Fair value of net identifiable assets acquired	42,745
Goodwill	38,995
Total fair value of net assets acquired	$ 81,740

Non-controlling Interest

The fair value of the non-controlling interest at the Acquisition Date was based on the $2.99 acquisition price per share for the 11,981,867 Ordinary Shares that were not purchased by the Company in the block transaction on the Acquisition Date. Subsequent to the Acquisition Date and through December 31, 2018, the Company acquired 11,528,635 Ordinary Shares, which when aggregated with the 13,519,036 Ordinary Shares acquired at the Acquisition Date, resulted in the Company owning 98.2% of all Ordinary Shares as of December 31, 2018. During 2019, the Company acquired approximately 111,000 vested free

shares for approximately $0.3 million of cash, pursuant to the exercise of the Free Shares Options, increasing its ownership of the Ordinary Shares to 98.7% as of December 31, 2019.

Non-controlling interest as of December 31, 2019 was as follows (in thousands):

	Total
Balance, beginning of year	$ 739
Fair value of additional shares acquired	(321)
Loss attributable to non-controlling interest	(233)
Balance, end of year	$ 185

NOTE 6 – OTHER BALANCE SHEET DETAILS

Property and Equipment, Net

Property and equipment, net consist of the following (in thousands):

	December 31,	
	2019	2018
Laboratory equipment	$ 17,179	$ 11,466
Furniture and fixtures	4,639	3,840
Leasehold improvements	13,888	3,640
Buildings	—	3,876
Construction in progress	5,901	65,211
	41,607	88,033
Less: accumulated depreciation and amortization	(11,681)	(9,310)
Property and equipment, net	$ 29,926	$ 78,723

Depreciation and amortization expense was $3.9 million in 2019, $2.4 million in 2018 and $1.5 million in 2017.

Intangible Assets

The changes in intangible assets were as follows (in thousands):

	December 31,	
	2019	2018
Balance, beginning of year	$ 54,243	$ —
Indefinite-lived assets - IPR&D	—	55,019
Foreign currency translation adjustment	(1,087)	(776)
Balance, end of year	$ 53,156	$ 54,243

Goodwill

The changes in goodwill were as follows (in thousands):

	December 31,	
	2019	2018
Balance, beginning of year	$ 40,044	$ 1,585
Goodwill acquired	—	38,995
Foreign currency translation adjustment	(771)	(536)
Balance, end of year	$ 39,273	$ 40,044

Accounts Payable and Accrued Liabilities

Accounts payable and accrued liabilities consist of the following (in thousands):

	December 31,	
	2019	2018
Accounts payable	$ 6,671	$ 3,355
Accrued research and development expenses	4,102	10,999
Operating lease liabilities - current	3,214	—
Accrued professional fees	1,118	1,930
Deferred rent	—	204
Other	2,451	4,969
Total accounts payable and accrued liabilities	$ 17,556	$ 21,457

NOTE 7 – COMMITMENTS AND CONTINGENCIES

Leases

Sangamo occupies approximately 87,700 square feet of office and research and development laboratory facilities in Brisbane, California pursuant to a lease that expires in May 2029. Sangamo also occupies approximately 45,600 square feet of research and office space in Richmond, California pursuant to leases that expire in August 2026. In addition, the Company leases approximately 20,800 square feet of office and research space in Valbonne, France subject to leases that expire beginning in June 2025 through March 2028.

Certain of these leases also include renewal options at the election of the Company to renew or extend the lease for an additional five to ten years. These optional periods have not been considered in the determination of the ROU assets or lease liabilities associated with these leases as the Company did not consider it reasonably certain it would exercise the options.

With respect to the Brisbane lease, the commencement date for approximately 35,080 square feet of the office space occurred in January 2019 while the commencement date for the remaining approximately 52,620 square feet occurred in June 2019. The Company has the right and exercised that right to make tenant improvements, including the addition of laboratory space, with a lease incentive allowance of $6.8 million on the first portion of the space occupied and $10.2 million on the portion of the lease that commenced in June 2019. As of December 31, 2019, these incentives have been received and used.

The Company performed evaluations of its contracts and determined each of its identified leases are operating leases. For the year ended December 31, 2019, the Company incurred $7.9 million of lease costs included in operating expenses in the Consolidated Statement of Operations in relation to these operating leases. Variable lease expense was $1.9 million for the year ended December 31, 2019 and was not included in the measurement of the Company’s operating ROU assets and lease liabilities. The variable expense consists primarily of the Company’s proportionate share of operating expenses, property taxes and insurance and is classified as lease expense due to the Company’s election to not separate lease and non-lease components.

Cash paid for amounts included in the measurement of operating lease liabilities for the year ended December 31, 2019 was $3.5 million and was included in net cash used in operating activities in the Company’s Consolidated Statement of Cash Flow.

Rent expense related to lease agreements was $7.9 million, $2.3 million, and $1.1 million for 2019, 2018 and 2017, respectively. Future minimum payments under lease obligations at December 31, 2019 consist of the following (in thousands):

	Total
2020	$ 5,870
2021	6,390
2022	6,468
2023	6,556
2024	6,694
Thereafter	26,141
Total lease payments	58,119
Less:	
Imputed interest	(13,713)
Total	$ 44,406
Reported as of December 31, 2019:	
Operating lease liabilities - current (included in Accounts payable and accrued liabilities on the Consolidated Balance Sheet)	$ 3,214
Operating lease liabilities - long-term	41,192
Total	$ 44,406

As of December 31, 2019, the weighted-average remaining lease term is 8.8 years and the weighted-average incremental borrowing rate used to determine the operating lease liability was 6.2% for the Company’s operating leases.

Contractual Commitments

As of December 31, 2019, the Company has manufacturing obligations that include a fee of $6.3 million for dedicated capacity pursuant to the Development and Manufacturing Services Agreement with Brammer Bio MA, now a *Thermo Fisher* Scientific Inc. subsidiary ("Brammer"). The Company also has an Option Agreement ("Option") with Brammer, entered in April 2019, whereby Brammer granted the Company an option to secure dedicated capacity for manufacturing in Brammer’s facilities. The Company paid $3.0 million for the Option, which expires on December 31, 2021. In addition, the Company agreed to pay Brammer $2.0 million, $0.5 million of which was paid upon execution of the agreement, to assist it in establishing its manufacturing capabilities in Brisbane, California, which may increase Sangamo's contractual commitments in the future. Furthermore, the Company has non-cancelable contractual commitments under manufacturing-related supplier arrangements with Brammer, which requires minimum purchase commitments totaling approximately $2.5 million through December 2021, $0.5 million of which was paid upon execution of the agreement.

The Company also has $1.2 million of license obligations related to its intellectual property.

Contingencies

Sangamo is not party to any material pending legal proceeding. From time to time, Sangamo may be involved in legal proceedings arising in the ordinary course of business.

NOTE 8 – STOCKHOLDERS’ EQUITY

Preferred Stock

The Company has 5,000,000 preferred shares authorized, which may be issued at the discretion of the Company’s Board of Director’s discretion.

Common Stock

In April 2019, Sangamo completed an underwritten public offering of its common stock, in which the Company sold an aggregate of 12.7 million shares of its common stock at a public offering price of $11.50 per share. The net proceeds to Sangamo from the sale of shares in this offering, after deducting underwriting discounts and commissions and other offering expenses, were approximately $136.3 million.

In April 2018, Sangamo completed an underwritten public offering of its common stock, in which the Company sold an aggregate of 14.2 million shares of its common stock at a public offering price of $16.25 per share. The net proceeds to Sangamo from the sale of shares in this offering, after deducting underwriting discounts and commissions and other offering expenses, were approximately $215.8 million.

In June 2017, Sangamo completed an underwritten public offering of its common stock, in which the Company sold an aggregate of 11.5 million shares of its common stock at a public offering price of $7.25 per share. The net proceeds to Sangamo from the sale of shares in this offering, after deducting underwriting discounts and commissions and other offering expenses, were approximately $78.1 million.

Stock Incentive Plan

In April 2018, the Compensation Committee of the Company's Board of Directors approved the Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan (the "2018 Plan"), subject to approval by the Company's stockholders. The 2018 Plan became effective on June 11, 2018 upon approval at the Company's Annual Meeting of Stockholders. In connection with the approval of the 2018 Plan, no additional equity awards will be granted under the 2013 Plan, however all outstanding equity awards under the 2013 Plan will continue to be subject to the terms and conditions as set forth in the agreements evidencing such awards and the terms of the 2013 Plan.

The exercise price of a stock option granted under the 2018 Plan may not be less than 100% of the fair market value of the Company's common stock subject to the stock option on the date of grant, and the option term will not exceed 10 years. If the person to whom the stock option is granted is a 10% stockholder of the Company, and the stock option granted qualifies as an incentive stock option, then the exercise price per share will not be less than 110% of the fair market value of the Company's common stock on the date of grant, and the option term will not exceed five years. Generally, stock options granted under the 2018 Plan vest over four years at a rate of 25% on the one year anniversary of the date of grant and 1/48 per month thereafter and expire 10 years after the date of grant, or earlier upon termination of employment or services to the Company.

The number of shares of common stock reserved for issuance under the 2018 Plan will be reduced: (i) on a 1-for-1 basis for each share of common stock subject to a stock option or stock appreciation right granted under the plan, (ii) by a fixed ratio of 1.33 shares of common stock for each share of common stock issued pursuant to a full-value award granted under the plan.

Shares subject to any outstanding stock options or other awards under the 2018 Plan that expire or otherwise terminate prior to the issuance of the shares subject to those stock options or awards will be available for subsequent issuance under the 2018 Plan. Any unvested shares issued under the 2018 Plan that the Company subsequently purchases, pursuant to repurchase rights under the 2018 Plan, will be added back to the number of shares reserved for issuance under the 2018 Plan on a 1-for-1 basis or a 1.33-for-1 basis (depending on the ratio at which the share reserve was debited for the original award) and will accordingly be available for subsequent issuance in accordance with the terms of the 2018 Plan.

Employee Stock Purchase Plan

In June 2018, the Company's stockholders approved the amendment and restatement of the ESPP. As amended, the ESPP provides a total reserve of 4.6 million shares of common stock for issuance under the ESPP. Eligible employees may purchase common stock at 85% of the lesser of the fair market value of the Company's common stock on the first day of the applicable two-year offering period or the last day of the applicable six-month purchase period.

Stock Option Activity

A summary of Sangamo's stock option activity is as follows:

	Number of Shares	Weighted-Average Exercise per Share Price	Weighted-Average Remaining Contractual Term	Aggregate Intrinsic Value
			(In years)	(In thousands)
Options outstanding at December 31, 2018	8,726,092	$ 11.23		
Options granted	4,530,288	$ 9.68		
Options exercised	(806,226)	$ 5.08		
Options canceled	(2,620,867)	$ 12.39		
Options outstanding at December 31, 2019	9,829,287	$ 10.71	7.91	$ 7,472
Options vested and expected to vest at December 31, 2019	9,829,287	$ 10.71	7.91	$ 7,472
Options exercisable at December 31, 2019	3,993,645	$ 10.43	6.54	$ 5,442

Newly created shares are issued upon exercises of options. There were no shares subject to Sangamo's right of repurchase as of December 31, 2019. The intrinsic value of options exercised was $4.7 million, $27.0 million and $12.3 million during 2019, 2018 and 2017, respectively.

At December 31, 2019, the aggregate intrinsic values of outstanding and exercisable options were $7.5 million and $5.4 million, respectively. The aggregate intrinsic value of options vested and expected to vest as of December 31, 2019, 2018 and 2017 was $7.5 million, $24.5 million and $71.7 million, respectively.

Restricted Stock Units

During 2019, 2018 and 2017, the Company awarded 834,745, 346,055, and 12,600 RSUs, respectively. The RSUs awarded in 2019, 2018 and 2017 had an average grant date fair value per award of $9.49, $17.87 and $15.85, respectively. These awards generally vest in a series of three successive equal annual installments. The aggregate fair value of RSUs vested during 2019, 2018 and 2017 was $2.0 million, $0.6 million and $1.2 million, respectively.

A summary of Sangamo's RSU activity is as follows:

	Number of Shares	Weighted-Average Remaining Contractual Term	Aggregate Intrinsic Value
		(In years)	(In thousands)
RSUs outstanding at December 31, 2018	322,701		
RSUs awarded	834,745		
RSUs released	(118,807)		
RSUs forfeited	(175,789)		
RSUs outstanding at December 31, 2019	862,850	1.22	$ 7,222
RSUs vested and expected to vest at December 31, 2019	862,850	1.22	$ 7,222

RSUs that vested in 2019, 2018 and 2017 were net-share settled such that the Company withheld shares with value equivalent to the employees' minimum statutory obligation for the applicable income and other employment taxes, and remitted the cash to the appropriate taxing authorities. The total shares withheld were approximately 39,160, 20,193, and 42,243 for 2019, 2018 and 2017, respectively, and were based on the value of the RSUs on their respective issuance dates as determined by the Company's closing stock price. Total payments for the employees' tax obligations to taxing authorities were $0.4 million, $0.3 million and $0.7 million in 2019, 2018 and 2017, respectively and are reflected as a financing activity within the accompanying Consolidated Statements of Cash Flows. These net-share settlements had the effect of share repurchases by the Company as they reduced and retired the number of shares that would have otherwise been issued as a result of the vesting and did not represent an expense to the Company.

As of December 31, 2019, there were 6,691,209 shares reserved for future awards under the Company's 2018 Plan and 2,757,600 shares of common stock reserved for future issuance under the ESPP.

NOTE 9 – STOCK-BASED COMPENSATION

The following table shows total stock-based compensation expense recognized in the accompanying Consolidated Statements of Operations (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Research and development	$ 10,135	$ 8,249	$ 5,031
General and administrative	9,195	6,428	4,058
Total stock-based compensation expense	$ 19,330	$ 14,677	$ 9,089

As of December 31, 2019, total stock-based compensation expense to be recognized in future periods related to unvested stock options was $37.4 million, which is expected to be expensed over a weighted-average period of 2.76 years. As of December 31, 2019, total stock-based compensation expense to be recognized in future periods related to unvested RSUs was $7.0 million, which is expected to be expensed over a weighted-average period of 2.11 years. There was no capitalized stock-based employee compensation expense as of December 31, 2019, 2018 or 2017.

Valuation Assumptions

Employee stock-based compensation expense was determined using the Black-Scholes option valuation model for stock options and employee share purchases under the ESPP. Option valuation models require the input of subjective assumptions and these assumptions can vary over time. The fair value of RSUs was based on the closing price of the underlying common stock on the date of grant.

The Company bases its determination of expected volatility through its assessment of the historical volatility of its common stock. The Company relied on its historical exercise and post-vested termination activity for estimating its expected term for use in determining the fair value of these options.

The weighted-average estimated fair value per share of options granted during 2019, 2018 and 2017 was $6.37, $11.39, and $4.10, respectively, based upon the assumptions used in the Black-Scholes valuation model. The assumptions used for estimating the fair value of the employee stock options were as follows:

	Year Ended December 31,		
	2019	2018	2017
Risk-free interest rate	1.68-2.25%	2.53-2.96%	1.81-2.28%
Expected term (in years)	5.50-5.62	5.59-5.61	5.73-5.83
Expected dividend yield of stock	—	—	—
Expected volatility	76.46-78.39%	72.33-75.49%	71.11-72.30%

Employees purchased 249,364, 328,710 and 253,994 shares of common stock through the ESPP at an average exercise price of $8.53, $4.51, and $3.22 per share during 2019, 2018 and 2017, respectively. The weighted-average estimated fair values of shares purchased under the Company's ESPP during 2019, 2018 and 2017 were $4.70, $7.07 and $2.37, respectively, based upon the assumptions used in the Black-Scholes valuation model.

The weighted–average assumptions used for estimating the fair value of the ESPP purchase rights are as follows:

	Year Ended December 31,		
	2019	2018	2017
Risk-free interest rate	1.53-2.42%	2.16-2.80%	0.44-0.76%
Expected term (in years)	0.5 – 2.0	0.5-2.0	0.5-2.0
Expected dividend yield of stock	—	—	—
Expected volatility	51.02-91.96%	73.21-83.25%	66.39-82.19%

NOTE 10 – EMPLOYEE BENEFIT PLAN

The Company sponsors a defined-contribution savings plan under Section 401(k) of the Internal Revenue Code covering all full-time employees ("Sangamo 401(k) Plan"). The Sangamo 401(k) Plan is intended to qualify under Section 401 of the Internal Revenue Code.

The Company matched employee contributions equal to 50% for the first 8% in 2019, 2018 and 2017, up to a limit of $4,000 in 2019, 2018 and 2017. Matching funds are fully vested when contributed. Contributions to the Sangamo 401(k) Plan by the Company were $0.9 million, $0.8 million, and $0.5 million for the years ended December 31, 2019, 2018 and 2017, respectively.

NOTE 11 – INCOME TAXES

The domestic and foreign components of loss before income taxes were as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Domestic	$ (77,354)	$ (65,695)	$ (54,568)
Foreign	(18,065)	(3,194)	—
Loss before income taxes	$ (95,419)	$ (68,889)	$ (54,568)

The benefit for income taxes consisted of the following (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Benefit for income taxes:			
Current:			
Federal	$ —	$ —	$ —
State	—	—	—
Foreign	—	—	—
Subtotal	—	—	—
Deferred:			
Federal	—	—	—
State	—	—	—
Foreign	—	—	—
Subtotal	—	—	—
Income tax benefit	$ —	$ —	$ —

The difference between the benefit for income taxes and the amount computed by applying the federal statutory income tax rate to loss before taxes is explained as follows (in thousands):

	Year Ended December 31,		
	2019	2018	2017
Tax at federal statutory rate[(1)]	$ (20,038)	$ (14,467)	$ (18,553)
State taxes, net	(9,597)	(2,849)	795
Federal rate change	—	—	53,045
Foreign rate differential	(665)	(177)	—
Non-deductible stock-based compensation	2,817	(2,729)	2,120
Research credits	(3,429)	(1,005)	(869)
Change in valuation allowance	29,655	20,271	(36,575)
Other	1,257	956	37
Income tax benefit	$ —	$ —	$ —

(1) For the year ended December 31, 2017 the statutory tax rate was 35%. For the years ended December 31, 2018 and 2019, as a result of Tax Reform, the statutory tax rate was decreased to 21%.

Deferred income taxes reflect the net tax effects of temporary differences between the carrying amounts of assets and liabilities for financial reporting purposes and the amounts used for income tax purposes. Significant components of the Company's deferred tax assets are as follows (in thousands):

	December 31,	
	2019	2018
Assets:		
Deferred tax assets:		
Net operating loss carryforwards	$ 133,765	$ 138,896
Research and development tax credit carryforwards	21,459	16,829
Stock-based compensation	4,194	3,801
Deferred revenue	32,171	3,191
Fixed assets	11,282	—
Lease liability	11,722	—
Build to suit lease liability	—	6,400
Accruals and reserves	675	—
Other	151	604
Total deferred tax asset	215,419	169,721
Valuation allowance	187,724	158,150
Net deferred tax assets	27,695	11,571
Liabilities:		
Intangible assets	(13,609)	(14,100)
Operating lease right-of-use assets	(20,656)	—
Fixed assets	—	(4,176)
Net deferred tax liability	(34,265)	(18,276)
Total deferred tax liability	$ (6,570)	$ (6,705)

In October 2018, the Company acquired Sangamo France. The Company recorded goodwill and intangible assets as part of accounting for the acquisition of Sangamo France. There is no corresponding tax basis for the goodwill or intangible assets. A portion of the intangible assets acquired were for the use in a particular research and development project IPR&D and are considered indefinite-lived assets with no tax basis.

The changes in the fair value of the unrealized gain/loss on securities investment are recorded as a component of accumulated other comprehensive income, net of a provision for income taxes.

A valuation allowance is recorded when it is more likely than not that all or some portion of the deferred income tax assets will not be realized. The Company regularly assesses the need for a valuation allowance against its deferred income tax assets by considering both positive and negative evidence related to whether it is more likely than not that the Company's deferred income tax assets will be realized. In evaluating the Company's ability to recover its deferred income tax assets within the jurisdiction from which they arise, the Company considers all available positive and negative evidence, including scheduled reversals of deferred income tax liabilities, projected future taxable income, tax-planning strategies, and results of recent operations. Accordingly, based upon the Company's analysis of these factors the net deferred tax assets have been substantially offset by a valuation allowance. The valuation allowance (decreased) increased by $(29.6) million, $45.3 million and $(28.9) million for the years ended December 31, 2019, 2018 and 2017, respectively.

As of December 31, 2019, Sangamo had net operating loss carryforwards for federal and state income tax purposes of approximately $489.4 million and $164.7 million, respectively. The federal net operating loss generated before 2018 will begin to expire in 2024 and will keep expiring through 2037, if not utilized. Federal net operating loss generated in 2018 will carry forward indefinitely. If not utilized, the state net operating loss carryforwards will begin to expire in 2029, respectively. The Company's French net operating loss carryforward balance is $147.9 million, which carries over indefinitely. The Company also has federal and state research tax credit carryforwards of $16.4 million and $15.2 million, respectively. The federal research credits began to expire in 2018 while the state research credits have no expiration date. Utilization of the Company's net operating loss carryforwards and research tax credit carryforwards may be subject to substantial annual limitations due to the ownership change limitations provided by the Internal Revenue Code and similar state provisions. The annual limitation could result in the expiration of the net operating loss carryforwards and research tax credit carryforwards before utilization.

On December 22, 2017, the current administration signed the Tax Cuts and Jobs Act ("Tax Reform") into legislation. The Tax Reform makes significant changes to the U.S. corporate income tax law including, but not limited to, (1) reducing the

U.S. federal corporate tax rate to 35% from 21% and (2) requiring a one-time mandatory transition tax on previously deferred foreign earnings of U.S. subsidiaries. Under ASC Topic 740, the effects of changes in tax rates and laws are recognized in the period in which the new legislation is enacted. In the case of U.S. federal income taxes, the enactment date is the date the bill becomes law.

On December 22, 2017, the SEC staff issued Staff Accounting Bulletin No. 118 ("SAB 118"), which provides guidance on accounting for the tax effects of the Tax Reform. SAB 118 provides a measurement period that should not extend beyond one year from the Tax Reform enactment date for companies to complete the accounting under ASC Topic 740 for the year ended December 31, 2018. In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Reform for which the accounting under ASC Topic 740 is complete. The Company has finished their analysis as of the measurement period closing of December 22, 2018 after application of law changes were reviewed by the Company. There were no subsequent adjustments as the conclusions have remained the same.

The Company's policy is to reinvest the earnings of its non-U.S. subsidiaries in those operations. The Company does not provide for U.S. taxes on the earnings of foreign subsidiaries because the Company intends to reinvest such earnings offshore indefinitely. However, if these funds were repatriated, the Company would be required to accrue and pay applicable U.S. taxes and withholding taxes. Due to the losses generated in foreign countries there are no earnings to repatriate.

The Company files federal and state income tax returns with varying statutes of limitations. The tax years from 2002 forward remain open to examination due to the carryover of net operating losses or tax credits. The Company also files United Kingdom and French income tax returns, and the tax years from 2008 and thereafter remain open in the United Kingdom and 2016 and thereafter in France are still subject to examination.

The Company's practice is to recognize interest and/or penalties related to income tax matters in income tax expense. As of December 31, 2019, the Company had no accrued interest and/or penalties. The unrecognized tax benefits may change during the next year for items that arise in the ordinary course of business. In the event that any unrecognized tax benefits are recognized, the effective tax rate will not be affected.

The following table summarizes the activity related to the Company's unrecognized tax benefits (in thousands):

	December 31,		
	2019	2018	2017
Beginning balance	$ 6,288	$ 5,659	$ 5,045
Additions based on tax positions related to the current year	5,393	636	622
Additions for tax positions of prior years	(51)	(7)	(8)
Reductions for tax positions of prior years	—	—	—
Ending balance	$ 11,630	$ 6,288	$ 5,659

NOTE 12 – RELATED PARTY TRANSACTION

During the year, the Company acquired 52,700 vested free shares from a former executive of Sangamo France who is now an executive of Sangamo, pursuant to the exercise of the Free Shares Options for approximately $0.1 million of cash.

NOTE 13 – QUARTERLY FINANCIAL DATA (UNAUDITED)

The following table sets forth certain unaudited quarterly financial data for the eight quarters ended December 31, 2019. The unaudited information set forth below has been prepared on the same basis as the audited information contained herein and includes all adjustments necessary to present fairly the information set forth. The operating results for any quarter are not indicative of results for any future period. All amounts are in thousands except per share amounts.

	2019				2018			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Revenues	$ 8,071	$ 17,548	$ 21,958	$ 54,851	$ 12,637	$ 21,416	$ 23,562	$ 26,837
Operating expenses	51,968	51,052	51,206	53,382	33,634	40,556	39,803	47,609
Net (loss) income	(42,203)	(30,356)	(27,361)	4,501	(20,187)	(16,640)	(12,843)	(19,219)
Net loss attributable to non-controlling interest	(53)	(72)	(54)	(54)	—	—	—	(555)
Net (loss) income attributable to Sangamo Therapeutics, Inc.	(42,150)	(30,284)	(27,307)	4,555	(20,187)	(16,640)	(12,843)	(18,664)
Basic and diluted net (loss) income per share attributable to Sangamo Therapeutics, Inc.	(0.41)	(0.26)	(0.24)	0.04	(0.23)	(0.17)	(0.13)	(0.18)

NOTE 14 – SUBSEQUENT EVENTS

In February 2020, the Company entered into a global licensing collaboration agreement with Biogen MA, Inc. and its affiliate, Biogen International GmbH, for the research, development and commercialization of gene regulation therapies for the treatment of neurological diseases. The companies plan to leverage the Company's proprietary ZFP technology delivered via AAV to modulate expression of key genes involved in neurological diseases.

Under the Biogen collaboration agreement, the Company will grant to Biogen an exclusive, royalty bearing and worldwide license, under its relevant patents and know-how, to develop, manufacture and commercialize certain ZFP and/or AAV-based products directed to up to 12 neurological disease gene targets selected by Biogen. Biogen has already selected three of these: ST-501 for tauopathies including Alzheimer's disease, ST-502 for synucleinopathies including Parkinson's disease, and a third undisclosed neuromuscular disease target. Biogen has exclusive rights to nominate up to nine additional targets over a target selection period of five years. For each gene target selected by Biogen, the Company will perform early research activities, costs for which will be shared by the companies, aimed at the development of the combination of proprietary CNS delivery vectors and ZFP-TFs (or potential other ZFP products) targeting therapeutically relevant genes. Biogen will then assume responsibility and costs for the IND-enabling studies, clinical development, related regulatory interactions, and global commercialization. The Company will be responsible for GMP manufacturing activities for the initial clinical trials for the first three products of the collaboration and plans to leverage its in-house manufacturing capacity. Biogen will assume responsibility for GMP manufacturing activities beyond the first clinical trial for each of the first three products. Subject to certain exceptions set forth in the Biogen collaboration agreement, the Company will be prohibited from developing, manufacturing or commercializing any therapeutic product directed to the targets selected by Biogen.

After the Biogen collaboration agreement becomes effective, Biogen will pay the Company an upfront payment of $125.0 million. The Company is also eligible to receive research, development, regulatory and commercial milestone payments that could total up to approximately $2.37 billion if Biogen selects all of the targets allowed under the agreement and all the specified milestones set forth in the agreement are achieved, which includes up to $925.0 million in pre-approval milestone payments and up to $1,445.0 million in first commercial sale and other sales-based milestone payments. In addition, the Company will also be eligible to receive tiered high single-digit to sub-teen royalties on potential net commercial sales of licensed products arising from the collaboration. These royalty payments will be subject to reduction due to patent expiration, entry of biosimilar products to the market and payments made under certain licenses for third-party intellectual property.

The Biogen collaboration agreement will continue, on a product-by-product and country-by-country basis, until the expiration of the applicable royalty term. Biogen has the right to terminate the collaboration agreement, in its entirety or on target-by-target basis, for any reason after a specified notice period. Each party has the right to terminate this agreement on account of the other party's bankruptcy or material, uncured breach. In addition, the Company may terminate the collaboration agreement if Biogen challenges any patents licensed by the Company to Biogen.

Concurrently with the execution of the collaboration agreement, the Company also entered into a stock purchase agreement with Biogen MA, Inc., pursuant to which Biogen will purchase 24,420,157 shares of the Company's common stock (the "Biogen Shares"), at a price per share of $9.2137, for an aggregate purchase price of $225.0 million.

Pursuant to the terms of the stock purchase agreement, Biogen has agreed not to, without the Company's prior written and subject to specified conditions and exceptions, directly or indirectly acquire shares of the Company's outstanding common stock, seek or propose a tender or exchange offer or merger between the parties, solicit proxies or consents with respect to any

matter, or undertake other specified actions related to the potential acquisition of additional equity interests in the Company. Such standstill restrictions expire on the earlier of the three-year anniversary of the effectiveness of the Biogen collaboration agreement and the date that Biogen beneficially owns less than 5% of the Company's common stock.

The stock purchase agreement also provides that until the first anniversary of the effectiveness of the Biogen collaboration agreement, Biogen will hold and not sell any of the Biogen Shares and from the first anniversary through the second anniversary, Biogen will hold and not sell at least 50% of the Biogen Shares, in addition to being subject to certain volume limitations. The stock purchase agreement further provides that, subject to certain limitations, upon Biogen's request, the Company will register for resale any of the Biogen Shares on a registration statement to be filed with the SEC, until such time as all remaining Biogen Shares may be sold pursuant to Rule 144 promulgated under the Securities Act during any 90-day period.

In addition, Biogen has agreed that, excluding specified extraordinary matters, it will vote the Biogen Shares in accordance with the Company's recommendation and has granted the Company an irrevocable proxy with respect to the foregoing. Such voting provisions expire on the earlier of (i) the two-year anniversary of the effectiveness of the Biogen collaboration agreement, (ii) the date that Biogen beneficially owns less than 5% of the Company's common stock and (iii) the date the Biogen collaboration agreement is terminated; provided, however, that in no event shall such expiration date be prior to the one-year anniversary of the effectiveness of the Biogen collaboration agreement.

The consummation of the transactions under each of the Biogen collaboration agreement and the stock purchase agreement is subject to the satisfaction of customary closing conditions, including the expiration or termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended.

ITEM 9 – CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

None.

ITEM 9A – CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures that are designed to provide reasonable assurance that information required to be disclosed in our Exchange Act reports is recorded, processed, summarized and reported within the time periods specified in the SEC's rules and forms and that such information is accumulated and communicated to our management, including our principal executive officer and principal financial officer, as appropriate, to allow timely decisions regarding required disclosure.

Under the supervision of our principal executive officer and principal financial officer, we evaluated the effectiveness of our disclosure controls and procedures (as defined in Rules 13a-15(e) and 15d-15(e) of the Exchange Act) as of December 31, 2019. Based on that evaluation, as of December 31, 2019, our principal executive officer and principal financial officer have concluded that our disclosure controls and procedures were effective at the reasonable assurance level.

Inherent Limitations on Controls and Procedures

Our management, including the principal executive officer and principal financial officer, does not expect that our disclosure controls and procedures and our internal control over financial reporting will prevent all error and all fraud. A control system, no matter how well designed and operated, can only provide reasonable assurances that the objectives of the control system are met. The design of a control system reflects resource constraints; the benefits of controls must be considered relative to their costs. Because there are inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, for our company have been or will be detected. As these inherent limitations are known features of the disclosure and financial reporting processes, it is possible to design into the processes safeguards to reduce, though not eliminate, these risks. These inherent limitations include the realities that judgments in decision-making can be faulty and that breakdowns occur because of simple error or mistake. Controls can also be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the control. The design of any system of controls is based in part upon certain assumptions about the likelihood of future events. While our disclosure controls and procedures and our internal control over financial reporting are designed to provide reasonable assurance of achieving their objectives, there can be no assurance that any design will succeed in achieving its stated goals under all future conditions. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with the policies or procedures. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining an adequate internal control over financial reporting (as such term is defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act) for our company. Our management, including our principal executive officer and principal financial officer, conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework set forth in the "Internal Control—Integrated Framework" issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on an evaluation under that framework, our management concluded that our internal control over financial reporting was effective at the reasonable assurance level as of December 31, 2019.

The effectiveness of our internal control over financial reporting as of December 31, 2019 has been audited by Ernst & Young LLP, an independent registered public accounting firm, as stated in their report, which is included herein.

Changes in Internal Control over Financial Reporting

There have been no changes in our internal control over financial reporting identified in connection with the evaluation required by Rules 13a-15(d) and 15d-15(d) of the Exchange Act that occurred during the three months ended December 31, 2019 that has materially affected, or is reasonably likely to materially affect, our internal control over financial reporting.

Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Sangamo Therapeutics, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Sangamo Therapeutics, Inc.'s internal control over financial reporting as of December 31, 2019, based on criteria established in Internal Control – Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework) (the COSO criteria). In our opinion, Sangamo Therapeutics, Inc. (the Company) maintained, in all material respects, effective internal control over financial reporting as of December 31, 2019, based on the COSO criteria.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) (PCAOB), the 2019 consolidated financial statements of the Company and our report dated February 28, 2020 expressed an unqualified opinion thereon.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting and for its assessment of the effectiveness of internal control over financial reporting included in the accompanying Management's Report on Internal Control Over Financial Reporting. Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was maintained in all material respects.

Our audit included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, testing and evaluating the design and operating effectiveness of internal control based on the assessed risk, and performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control Over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

/s/ ERNST & YOUNG LLP

Redwood City, California
February 28, 2020

ITEM 9B – OTHER INFORMATION

Item 1.01 Entry into a Material Definitive Agreement.

Collaboration and License Agreement

On February 26, 2020, we entered into a Collaboration and License Agreement (the "Biogen collaboration agreement") with Biogen MA, Inc. ("BIMA") and Biogen International GmbH ("BIG" and, together with BIMA, collectively "Biogen") for the research, development and commercialization of gene regulation therapies for the treatment of neurological diseases.

Under the Biogen collaboration agreement, we will grant to Biogen an exclusive, royalty bearing and worldwide license, under our relevant patents and know-how, to develop, manufacture and commercialize certain ZFP and/or AAV-based products directed to up to 12 neurological disease gene targets selected by Biogen. Biogen has already selected three of these: ST-501 for tauopathies including Alzheimer's disease, ST-502 for synucleinopathies including Parkinson's disease, and a third undisclosed neuromuscular disease target. Biogen has exclusive rights to nominate up to nine additional targets over a target selection period of five years. For each gene target selected by Biogen, we will perform early research activities, costs for which will be shared by the companies, aimed at the development of the combination of proprietary CNS delivery vectors and ZFP-TFs targeting therapeutically relevant genes. Biogen will then assume responsibility and costs for the IND-enabling studies, clinical development, related regulatory interactions, and global commercialization. We will be responsible for GMP manufacturing activities for the initial clinical trials for the first three products of the collaboration and plan to leverage our in-house manufacturing capacity. Biogen will assume responsibility for GMP manufacturing activities beyond the first clinical trial for each of the first three products. Subject to certain exceptions set forth in the Biogen collaboration agreement, we will be prohibited from developing, manufacturing or commercializing any therapeutic product directed to the targets selected by Biogen.

After the Biogen collaboration agreement becomes effective, Biogen will pay us an upfront payment of $125.0 million. We are also eligible to receive research, development, regulatory and commercial milestone payments that could total up to approximately $2.37 billion if Biogen selects all of the targets allowed under the Biogen collaboration agreement and all the specified milestones set forth in the Biogen collaboration agreement are achieved, which includes up to $925.0 million in pre-approval milestone payments and up to $1,445.0 million in first commercial sale and other sales-based milestone payments. In addition, we will also be eligible to receive tiered high single-digit to sub-teen royalties on potential net commercial sales of licensed products arising from the collaboration. These royalty payments will be subject to reduction due to patent expiration, entry of biosimilar products to the market and payments made under certain licenses for third-party intellectual property.

The Biogen collaboration agreement will continue, on a product-by-product and country-by-country basis, until the expiration of the applicable royalty term. Biogen has the right to terminate the Biogen collaboration agreement, in its entirety or on target-by-target basis, for any reason after a specified notice period. Each party has the right to terminate the Biogen collaboration agreement on account of the other party's bankruptcy or material, uncured breach. In addition, we may terminate the Biogen collaboration agreement if Biogen challenges any patents licensed by us to Biogen.

Stock Purchase Agreement

Concurrently with the execution of the Biogen collaboration agreement, we entered into a stock purchase agreement with BIMA, pursuant to which BIMA will purchase 24,420,157 shares of our common stock (the "Biogen Shares"), at a price per Biogen Share of $9.2137, for an aggregate purchase price of approximately $225.0 million.

Pursuant to the terms of the stock purchase agreement, BIMA has agreed not to, without our prior written and subject to specified conditions and exceptions, directly or indirectly acquire shares of our outstanding common stock, seek or propose a tender or exchange offer or merger between the parties, solicit proxies or consents with respect to any matter, or undertake other specified actions related to the potential acquisition of additional equity interests in us. Such standstill restrictions expire on the earlier of the three-year anniversary of the effectiveness of the Biogen collaboration agreement and the date that BIMA beneficially owns less than 5% of our common stock.

The stock purchase agreement also provides that until the first anniversary of the effectiveness of the Biogen collaboration agreement, BIMA will hold and not sell any of the Biogen Shares and from the first anniversary through the second anniversary, BIMS will hold and not sell at least 50% of the Biogen Shares, in addition to being subject to certain volume limitations. The stock purchase agreement further provides that, subject to certain limitations, upon BIMA's request, we will register for resale any of the Biogen Shares on a registration statement to be filed with the SEC, until such time as all remaining Biogen Shares may be sold pursuant to Rule 144 promulgated under the Securities Act of 1933, as amended (the "Securities Act") during any 90-day period.

In addition, BIMA has agreed that, excluding specified extraordinary matters, it will vote the Biogen Shares in accordance with our recommendation and has granted us an irrevocable proxy with respect to the foregoing. Such voting

provisions expire on the earlier of (i) the two-year anniversary of the effectiveness of the Biogen collaboration agreement, (ii) the date that BIMA beneficially owns less than 5% of our common stock and (iii) the date the Biogen collaboration agreement is terminated; provided, however, that in no event shall such expiration date be prior to the one-year anniversary of the effectiveness of the Biogen collaboration agreement.

The consummation of the transactions under each of the Biogen collaboration agreement and the stock purchase agreement are subject to the satisfaction of customary closing conditions, including the expiration or termination of the applicable waiting period under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended.

The foregoing is only a brief description of the material terms of the Biogen collaboration agreement and the stock purchase agreement, does not purport to be a complete statement of the rights and obligations of the parties under these agreements and the transactions contemplated thereby, and is qualified in its entirety by the full text of such agreements, copies of which will be filed with the Securities and Exchange Commission as exhibits to our Quarterly Report on Form 10-Q for the three months ending March 31, 2020.

Item 3.02. Unregistered Sales of Equity Securities

See the description set forth under Item 1.01 above with respect to the stock purchase agreement, which is incorporated into this Item 3.02 by reference. The Biogen Shares are being offered and sold to BIMA pursuant to the exemption from the registration requirements provided in Section 4(a)(2) of the Securities Act for transactions by an issuer not involving any public offering. Accordingly, the Biogen Shares have not been registered the Securities Act and may not be offered or sold in the United States except pursuant to an effective registration statement or an applicable exemption from the registration requirements of the Securities Act.

PART III

Certain information required by Part III is omitted from this Report on Form 10-K because we intend to file our definitive Proxy Statement for our next Annual Meeting of Stockholders, pursuant to Regulation 14A of the Securities Exchange Act of 1934, as amended, or the 2020 Proxy Statement, no later than April 29, 2020, and certain information to be included in the 2020 Proxy Statement is incorporated herein by reference.

ITEM 10 – DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item is to be included in our 2020 Proxy Statement as follows:

- The information relating to our directors and nominees for director is to be included in the section entitled “Election of Directors;”
- The information relating to our executive officers is to be included in the section entitled “Executive Officers;”
- The information relating to our audit committee and audit committee financial expert is to be included in the section entitled “Election of Directors – Audit Committee;”
- The information relating to the procedures by which stockholders may recommend nominees to our Board of Directors is to be included in the section entitled “Questions and Answers About These Proxy Materials and Voting;” and
- The information regarding compliance with Section 16(a) of the Exchange Act is to be included in the section entitled “Delinquent Section 16(a) Reporting.”

Such information is incorporated herein by reference to our 2020 Proxy Statement, provided that if the 2020 Proxy Statement is not filed within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, the omitted information will be included in an amendment to this Annual Report on Form 10-K filed not later than the end of such 120-day period.

ITEM 11 – EXECUTIVE COMPENSATION

The information required by this item is to be included in our 2020 Proxy Statement under the sections entitled “Executive Compensation,” “Director Compensation,” “Election of Directors—Compensation Committee Interlocks and Insider Participation” and “Report of the Compensation Committee of the Board of Directors” and is incorporated herein by reference, provided that if the 2020 Proxy Statement is not filed within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, the omitted information will be included in an amendment to this Annual Report on Form 10-K filed not later than the end of such 120-day period.

ITEM 12 – SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item with respect to equity compensation plans is to be included in our 2020 Proxy Statement under the section entitled “Equity Compensation Plan Information” and the information required by this item with respect to security ownership of certain beneficial owners and management is to be included in our 2020 Proxy Statement under the section entitled “Security Ownership of Certain Beneficial Owners and Management” and in each case is incorporated herein by reference, provided that if the 2020 Proxy Statement is not filed within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, the omitted information will be included in an amendment to this Annual Report on Form 10-K filed not later than the end of such 120-day period.

ITEM 13 – CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item is to be included in our 2020 Proxy Statement under the sections entitled “Certain Relationships and Related Transactions” and “Election of Directors—Board Independence” and is incorporated herein by reference, provided that if the 2020 Proxy Statement is not filed within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, the omitted information will be included in an amendment to this Annual Report on Form 10-K filed not later than the end of such 120-day period.

ITEM 14 – PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item is to be included in our 2020 Proxy Statement under the section entitled “Ratification of Independent Registered Public Accounting Firm” and is incorporated herein by reference, provided that if the 2020 Proxy Statement is not filed within 120 days after the end of the fiscal year covered by this Annual Report on Form 10-K, the omitted information will be included in an amendment to this Annual Report on Form 10-K filed not later than the end of such 120-day period.

PART IV

ITEM 15 – EXHIBITS, FINANCIAL STATEMENT SCHEDULES

(a) The following documents are included as part of this Annual Report on Form 10-K:

1. Financial Statements—See Index to Consolidated Financial Statements in Item 8.

2. Financial Statement Schedules—Not Applicable.

3. Exhibits

Exhibit Number	Description of Document
2.1	Share Purchase Agreement dated July 20, 2018 among the Company and the Selling TxCell Shareholders named on the signature page thereto (incorporated by reference to Exhibit 2.1 to the Company's Current Report on Form 8-K filed July 23, 2018).
2.2	Amendment Agreement to the Share Purchase Agreement dated October 1, 2018 between the Company and TxCell S.A. (incorporated by reference to Exhibit 2.2 to the Company's Current Report on Form 8-K filed November 6, 2018).
2.3	Tender Offer Agreement dated July 20, 2018 between the Company and TxCell S.A. (incorporated by reference to Exhibit 2.2 to the Company's Current Report on Form 8-K filed July 23, 2018).
2.4	Amendment No. 1 to the Tender Offer Agreement dated October 1, 2018 between the Company and TxCell S.A. (incorporated by reference to Exhibit 2.4 to the Company's Current Report on Form 8-K filed November 6, 2018).
3.1	Seventh Amended and Restated Certificate of Incorporation, as amended (incorporated by reference to Exhibit 3.1 to the Company's Quarterly Report on Form 10-Q filed August 9, 2017).
3.2	Third Amended and Restated Bylaws (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K filed June 15, 2018).
4.1	Description of Securities of the Company.
4.2	Form of Specimen Common Stock Certificate (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K filed January 6, 2017).
10.1(+)	Amended and Restated 2013 Stock Incentive Plan (the "2013 Plan") (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed May 10, 2018).
10.2(+)	2018 Equity Incentive Plan (the "2018 Plan") (incorporated by reference to Exhibit 99.1 to the Company's Registration Statement on Form S-8 (File No. 333-225552) filed June 11, 2018).
10.3(+)	2018 Equity Incentive Plan French Stock-Options Sub-Plan (the "French Options Sub-Plan") (incorporated by reference to Exhibit 10.3 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.4(+)	2018 Equity Incentive Plan French Restricted Stock Unit Award Sub-Plan (the "French RSU Sub-Plan") (incorporated by reference to Exhibit 10.4 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.5(+)	Form of Restricted Stock Unit Award Agreement under the 2013 Plan (incorporated by reference to Exhibit 10.2 to the Company's Current Report on Form 8-K filed June 14, 2013).
10.6(+)	Form of Notice of Grant of Stock Option under the 2013 Plan (incorporated by reference to Exhibit 10.3 to the Company's Current Report on Form 8-K filed June 14, 2013).
10.7(+)	Form of Stock Option Agreement under the 2013 Plan (incorporated by reference to Exhibit 10.4 to the Company's Current Report on Form 8-K filed June 14, 2013).
10.8(+)	Form of Notice of Grant of Stock Option – Director Initial Grant under the 2013 Plan (incorporated by reference to Exhibit 10.5 to the Company's Current Report on Form 8-K filed June 14, 2013).
10.9(+)	Form of Notice of Grant of Stock Option – Director Annual Grant under the 2013 Plan (incorporated by reference to Exhibit 10.6 to the Company's Current Report on Form 8-K filed June 14, 2013).
10.10(+)	Form of Automatic Stock Option Agreement under the 2013 Plan (incorporated by reference to Exhibit 10.7 to the Company's Current Report on Form 8-K filed June 14, 2013).
10.11(+)	Form of Stock Option Grant Notice and Form of Option Agreement (U.S. employees) under the 2018 Plan (incorporated by reference to Exhibit 99.2 to the Company's Current Report on Form 8-K filed June 15, 2018).
10.12(+)	Form of Stock Option Grant Notice and Form of Option Agreement (non-employee directors) under the 2018 Plan (incorporated by reference to Exhibit 99.3 to the Company's Current Report on Form 8-K filed June 15, 2018).

Exhibit Number	Description of Document
10.13(+)	Form of Stock Option Grant Notice and Form of Option Agreement (U.K. employees) under the 2018 Plan (incorporated by reference to Exhibit 99.4 to the Company's Current Report on Form 8-K filed June 15, 2018).
10.14(+)	Form of Stock Option Grant Notice (French employees) under the 2018 Plan and the French Options Sub-Plan (incorporated by reference to Exhibit 10.14 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.15(+)	Form of Stock Option Agreement (French Employees) under the 2018 Plan and the French Options Sub-Plan (incorporated by reference to Exhibit 10.15 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.16(+)	Form of Restricted Stock Unit Grant Notice and Form of Restricted Stock Unit Award Agreement (U.S. employees) under the 2018 Plan (incorporated by reference to Exhibit 99.5 to the Company's Current Report on Form 8-K filed June 15, 2018).
10.17(+)	Form of Restricted Stock Unit Grant Notice and Form of Restricted Stock Unit Award Agreement (non-employee directors) under the 2018 Plan (incorporated by reference to Exhibit 99.6 to the Company's Current Report on Form 8-K filed June 15, 2018).
10.18(+)	Form of Restricted Stock Unit Grant Notice and Form of Restricted Stock Unit Award Agreement (U.K. employees) under the 2018 Plan (incorporated by reference to Exhibit 99.7 to the Company's Current Report on Form 8-K filed June 15, 2018).
10.19(+)	Form of Restricted Stock Unit Grant Notice and Form of Restricted Stock Unit Award Agreement (French employees) under the 2018 Plan and the French RSU Sub-Plan. (incorporated by reference to Exhibit 10.19 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.20(+)	Amended and Restated Severance Plan (incorporated by reference to Exhibit 10.20 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.21(+)	Amended and Restated Incentive Compensation Plan (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed May 10, 2018).
10.22(+)	Form of Indemnification Agreement (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed August 6, 2015).
10.23(+)	Employment Agreement between the Company and Alexander (Sandy) Macrae, dated May 17, 2016 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed August 4, 2016).
10.24(+)	Employment Agreement between the Company and Sung Lee effective as of October 31, 2019.
10.25(+)	Employment Agreement between the Company and Gary Loeb effective as of June 6, 2019
10.26(+)	Employment Agreement between the Company and Rolf Andrew (Andy) Ramelmeier effective as of November 1, 2017.
10.27(+)	Employment Agreement between the Company and Stéphane Boissel, effective October 1, 2018 (incorporated by reference to Exhibit 10.27 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.28(+)	Employment Agreement between the Company and Adrian Woolfson, effective January 21 2019 (incorporated by reference to Exhibit 10.28 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.29(+)	Employment Agreement between the Company and Kathy Yi, dated February 28, 2017 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed May 10, 2017).
10.30(+)	Triple Net Laboratory Lease between the Company and Point Richmond R&D Associates II, LLC, dated May 23, 1997 (incorporated by reference to Exhibit 10.5 to the Company's Registration Statement on Form S-1 (Reg. No. 333-30314), as amended, filed February 24, 2000).
10.31	First Amendment to Triple Net Laboratory Lease between the Company and Point Richmond R&D Associates II, LLC, dated March 12, 2004 (incorporated by reference to Exhibit 10.20 to the Company's Annual Report on Form 10-K filed February 23, 2005).
10.32	Second Amendment to Triple Net Laboratory Lease between the Company and Point Richmond R&D Associates II, LLC, dated March 15, 2007 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed November 4, 2013).
10.33	Third Amendment to Triple Net Laboratory Lease between the Company and Point Richmond R&D Associates II, LLC, dated August 1, 2013 (incorporated by reference to Exhibit 10.2 to the Company's Quarterly Report on Form 10-Q filed November 4, 2013).

Exhibit Number	Description of Document
10.34	Fourth Amendment to Triple Net Laboratory Lease between the Company and Point Richmond R&D Associates II, LLC, dated June 10, 2016 (incorporated by reference to Exhibit 10.33 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.35	Fifth Amendment to Triple Net Laboratory Lease between the Company and Point Richmond R&D Associates II, LLC, dated July 10, 2017 (incorporated by reference to Exhibit 10.34 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.36	Sixth Amendment to Triple Net Laboratory Lease between the Company and Point Richmond R&D Associates II, LLC, dated May 11, 2018 (incorporated by reference to Exhibit 10.9 to the Company's Quarterly Report on Form 10-Q filed August 8, 2018).
10.37	Lease Agreement between the Company and Marina Boulevard Property, LLC dated November 3, 2017 (incorporated by reference to Exhibit 10.21 to the Company's Annual Report on Form 10-K filed March 1, 2018).
10.38	First Amendment to Lease Agreement between the Company and Marina Boulevard Property, LLC dated January 1, 2019 (incorporated by reference to Exhibit 10.37 to the Company's Annual Report on Form 10-K (File No. 000-30171), filed with the SEC on March 1, 2019).
10.39	Amended and Restated Sales Agreement between the Company and Cowen LLC, dated May 26, 2017 (incorporated by reference to Exhibit 1.1 to the Company's Current Report on Form 8-K filed May 26, 2017).
10.40†	Amended and Restated Collaboration and License Agreement between the Company and Shire International GmbH, dated September 1, 2015 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed October 30, 2015).
10.41†	Global Research, Development and Commercialization Collaboration and License Agreement between the Company and Biogen MA Inc. (Bioverativ Inc.), dated January 8, 2014 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed May 7, 2014).
10.42†	Letter Amendment to Global Research, Development and Commercialization Collaboration and License Agreement between the Company and Biogen MA Inc. (Bioverativ Inc.), dated December 14, 2015 (incorporated by reference to Exhibit 10.63 to the Company's Annual Report on Form 10-K filed February 18, 2016).
10.43†	Letter Agreement and Waiver between the Company and Biogen MA Inc. (Bioverativ Inc.), dated March 24, 2016 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed May 5, 2016).
10.44†	Collaboration and License Agreement between the Company and Pfizer Inc., dated May 10, 2017 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed August 9, 2017).
10.45‡	Letter Amendment, dated December 17, 2019, to the Collaboration and License Agreement between the Company and Pfizer Inc., dated May 10, 2017.
10.46†	Research Collaboration and License Agreement between the Company and Pfizer Inc., dated December 28, 2017 (incorporated by reference to Exhibit 10.40 to the Company's Annual Report on Form 10-K filed March 1, 2018).
10.47†	Collaboration and License Agreement between the Company and Kite Pharma, Inc., dated February 20, 2018 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed May 10, 2018).
10.48‡	Amendment No. 1 to Research Collaboration and License Agreement between the Company and Pfizer Inc., dated as of December 27, 2017, dated as of March 21, 2019 (incorporated by reference to Exhibit 10.3 to the Company's Quarterly Report on Form 10-Q filed May 8, 2019).
10.49†	Amended and Restated Collaboration and License Agreement between the Company and Kite Pharma, Inc., dated September 11, 2019 (incorporated by reference to Exhibit 10.1 to the Company's Quarterly Report on Form 10-Q filed November 6, 2019).
21.1	Subsidiaries of the Company
23.1	Consent of Independent Registered Public Accounting Firm.
24.1	Power of Attorney (included on signature page).
31.1	Rule 13a-14(a) Certification of Principal Executive Officer.
31.2	Rule 13a-14(a) Certification of Principal Financial Officer.
32.1*	Certification Pursuant to 18 U.S.C. Section 1350.

Exhibit Number	Description of Document
101.INS	XBRL Instance Document - the instance document does not appear in the Interactive Data File because its XBRL tags are embedded within the Inline XBRL document.
101.SCH	XBRL Taxonomy Extension Schema Document
101.CAL	XBRL Taxonomy Extension Calculation Linkbase Document
101.DEF	XBRL Taxonomy Extension Definition Linkbase Document
101.LAB	XBRL Taxonomy Extension Label Linkbase Document
101.PRE	XBRL Taxonomy Extension Presentation Linkbase Document
104	The cover page from Sangamo's Annual Report on Form 10-K for the year ended December 31, 2019, is formatted in Inline XBRL and it is contained in Exhibit 101

† *Confidential treatment has been granted for certain information contained in this document pursuant to an order of the SEC. Such information has been omitted and filed separately with the SEC.*

‡ Certain portions of this exhibit (indicated by "[*]") have been omitted because they are both (i) not material and (ii) would be competitively harmful if publicly disclosed.

(+) Indicates management contract or compensatory plan or arrangement.

* *The certifications attached as Exhibit 32.1 accompany this Annual Report on Form 10-K pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, and shall not be deemed "filed" by the Company for purposes of Section 18 of the Securities Exchange Act of 1934, as amended.*

ITEM 16 – FORM 10-K SUMMARY

None.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized, on February 28, 2020.

Date: February 28, 2020

SANGAMO THERAPEUTICS, INC.

By: / S / ALEXANDER MACRAE

Alexander Macrae
President, and Chief Executive Officer

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Alexander Macrae, Sung H. Lee, and Gary Loeb, and each of them, as his or her true and lawful attorneys-in-fact and agents, each with the full power of substitution, for him or her and in his or her name, place or stead, in any and all capacities, to sign any and all amendments (including post-effective amendments) to this Annual Report on Form 10-K, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite and necessary to be done in and about the premises, as fully to all intents and purposes as he or she might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or their, his or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

Signature	Title	Date
/ S / ALEXANDER MACRAE **Alexander Macrae**	President, Chief Executive Officer (Principal Executive Officer) and Director	February 28, 2020
/ S / SUNG H. LEE **Sung H. Lee**	Executive Vice President and Chief Financial Officer (Principal Financial Officer)	February 28, 2020
/ S / PRATHYUSHA DURAIBABU **Prathyusha Duraibabu**	Vice President, Finance (Principal Accounting Officer)	February 28, 2020
/ S / H. STEWART PARKER **H. Stewart Parker**	Director and Chairwoman of the Board	February 28, 2020
/ S / ROBERT F. CAREY **Robert F Carey**	Director	February 28, 2020
/ S / STEPHEN G. DILLY, M.B.B.S, PH.D. **Stephen G. Dilly, M.B.B.S, Ph.D.**	Director	February 28, 2020
/ S / JAMES R. MEYERS **James R. Myers**	Director	February 28, 2020
/ S / JOHN MARKELS, PH.D. **John Markels, Ph.D.**	Director	February 28, 2020
/ S / SAIRA RAMASASTRY **Saira Ramasastry**	Director	February 28, 2020
/ S / KAREN SMITH, M.D, PH.D., M.B.A., L.L.M. **Karen Smith, M.D., Ph.D., M.B.A., L.L.M.**	Director	February 28, 2020
/ S / JOSEPH S. ZAKRZEWSKI **Joseph S. Zakrzewski**	Director	February 28, 2020

DESCRIPTION OF CAPITAL STOCK

References herein to "Sangamo," "our," "we," "us" and the "Company" refer only to Sangamo Therapeutics, Inc. and not to any of our subsidiaries.

General

Our seventh amended and restated certificate of incorporation, as amended, or the Restated Certificate, authorizes us to issue 160,000,000 shares of common stock, par value $0.01 per share, and 5,000,000 shares of preferred stock, par value $0.01 per share.

The following summary description of our capital stock is based on the provisions of the Restated Certificate, our second amended and restated bylaws, as amended, or the Bylaws, and the applicable provisions of the General Corporation Law of the State of Delaware, or DGCL. This information may not be complete in all respects and is qualified entirely by reference to the provisions of the Restated Certificate, the Bylaws and the DGCL. The Restated Certificate and the Bylaws are filed as exhibits to this Annual Report on Form 10-K to which this Description of Capital Stock is an exhibit.

Common Stock

Shares of our common stock are the only security of the Company registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended, or the Exchange Act. The holders of common stock are entitled to one vote per share on all matters to be voted on by the stockholders. Stockholders have no cumulative voting rights. Subject to the preferences of any outstanding shares of preferred stock, the holders of common stock are entitled to receive ratably any dividends our board of directors declares out of funds legally available for the payment of dividends. If we are liquidated, dissolved or wound up, the holders of common stock are entitled to share pro rata all assets remaining after payment of liabilities and liquidation preferences of any outstanding shares of preferred stock. Holders of common stock have no preemptive rights or rights to convert their common stock into any other securities. There are no redemption or sinking fund provisions applicable to the common stock.

Preferred Stock

Pursuant to the Restated Certificate, our board of directors has the authority, without further action by the stockholders, to issue shares of preferred stock in one or more series. Our board of directors also has the authority to determine or alter the designation, rights, preferences, privileges and restrictions granted to or imposed upon any unissued series of preferred stock, any or all of which may be greater than the rights of the common stock. Our board of directors, without stockholder approval, may issue preferred stock with voting, conversion or other rights that are superior to the voting and other rights of the holders of common stock. The issuance of preferred stock may have the effect of delaying, deferring or preventing a change of control of Sangamo without further action by the stockholders, and may have the effect of delaying or preventing changes in management of Sangamo. In addition, the issuance of preferred stock may have the effect of decreasing the market price of the common stock and may adversely affect the voting power of holders of common stock and reduce the likelihood that common stockholders will receive dividend payments and payments upon liquidation.

Antitakeover Effects of Provisions of our Restated Certificate, Bylaws and Delaware Law

Our Restated Certificate and Bylaws

As noted above, our board of directors, without stockholder approval, has the authority under our Restated Certificate to issue preferred stock with rights superior to the rights of the holders of common stock. As a result, the issuance of preferred stock may have the effect of delaying, deferring or preventing a change of control of Sangamo without further action by the stockholders and may adversely affect the voting and other rights of the holders of common stock. Our Restated Certificate also requires that any action required or permitted to be taken by our stockholders must be effected at a duly called annual or special meeting of the stockholders and may not be effected

by a consent in writing. Further, our Restated Certificate provides that a special meeting of the stockholders may be called only by our board of directors.

In addition to the provisions noted above, our Bylaws further establish advance notice procedures with respect to stockholder proposals and nomination of candidates for election as directors other than nominations made by or at the direction of the board of directors or a committee of the board of directors. Although our stockholders may amend, repeal or alter our Bylaws by a vote of at least a majority of the outstanding shares of our capital stock entitled to vote, our board of directors may also unilaterally adopt, repeal, alter, amend and rescind our Bylaws by a vote of at least a majority of board of directors. Finally, our board of directors has the ability to elect a director to fill a vacancy created by the expansion of the board of directors or due to the resignation or departure of an existing board member.

These provisions may have the effect of delaying, deferring or preventing a change in control and may also delay or prevent changes in management of Sangamo, which could have an adverse effect on the market price of our stock. These and other provisions are intended to enhance the likelihood of continued stability in the composition of our board of directors and to discourage certain types of transactions that may involve an actual or threatened change of control. However, such provisions could have the effect of discouraging others from making tender offers for our shares and, as a consequence, such provisions also may inhibit fluctuations in the market price of our shares that could result from actual or rumored takeover attempts.

Section 203 of the General Corporation Law of the State of Delaware

We are subject to Section 203 of the DGCL which regulates acquisitions of some Delaware corporations. In general, Section 203 prohibits, with some exceptions, a publicly held Delaware corporation such as us from engaging in a "business combination" with an "interested stockholder" for a period of three years following the time that the stockholder became an interested stockholder, unless:

- prior to the time the stockholder became an interested stockholder, the board of directors of the corporation approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder;

- upon consummation of the transaction which resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding for purposes of determining the number of shares outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned by (a) persons who are directors and also officers and (b) employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or

- at or subsequent to the time the stockholder became an interested stockholder, the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66⅔% of the outstanding voting stock which is not owned by the interested stockholder.

Section 203 of the DGCL generally defines a "business combination" to include any of the following:

- any merger or consolidation involving the corporation and the interested stockholder;

- any sale, lease, exchange, mortgage, transfer, pledge or other disposition involving the interested stockholder (in one transaction or a series of transactions) of assets of the corporation having an aggregate market value equal to 10% or more of the aggregate market value of either all of the assets of the corporation or its outstanding stock;

- subject to exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

- subject to exceptions, any transaction involving the corporation that has the effect, directly or indirectly, of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; and

- the receipt by the interested stockholder of the benefit, directly or indirectly (except proportionately as a stockholder of such corporation), of any loans, advances, guarantees, pledges or other financial benefits, other than certain benefits set forth in Section 203, provided by or through the corporation.

In general, Section 203 defines an "interested stockholder" as an entity or person who, together with the person's affiliates and associates, beneficially owns, or within three years prior to the time of determination of interested stockholder status did own, 15% or more of the outstanding voting stock of the corporation.

Section 203 of the DGCL could depress our stock price and delay, discourage or prohibit transactions not approved in advance by our board of directors, such as takeover attempts that might otherwise involve the payment to our stockholders of a premium over the market price of our common stock.

Forum Selection Bylaw

Unless we consent in writing to the selection of an alternative forum, to the fullest extent permitted by law, the sole and exclusive forum for (1) any derivative action or proceeding brought on behalf of Sangamo, (2) any action asserting a claim of breach of a fiduciary duty owed by any current or former director, officer, other employee or stockholder of Sangamo to Sangamo or to our stockholders, (3) any action asserting a claim arising pursuant to any provision of the DGCL, Restated Certificate, Bylaws, or as to which the DGCL confers jurisdiction on the Court of Chancery of the State of Delaware, or (4) any action asserting a claim governed by the internal affairs doctrine shall be a state or federal court located within the state of Delaware. Any person or entity purchasing or otherwise acquiring or holding any interest in shares of capital stock of Sangamo is deemed to have notice of and consented to the forum selection provisions of the Bylaws. However, this provision does not apply to actions arising under the Securities Act of 1933, as amended, or the Exchange Act, or any claim for which the federal courts have exclusive jurisdiction.

Exhibit 10.24

EXECUTIVE EMPLOYMENT AGREEMENT

Employment Agreement ("Agreement") made as of the 21st day of October by and between Sangamo Therapeutics, Inc., a Delaware corporation (the "Company"), and Sung Lee ("Executive") (collectively, the "Parties").

R E C I T A L S

WHEREAS, the Company desires to employ Executive, and Executive desires to be employed by the Company, on the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual promises set forth herein, the Parties agree follows:

1. **Employment**.

The Company hereby agrees to employ Executive and Executive hereby agrees to accept such employment, on the terms and conditions set forth in this Agreement, with a start date of October 31st 2019 (the "Effective Date").

2. **At-Will Employment**.

Executive shall be employed on an at-will basis. Either Executive or the Company may terminate employment at any time, with or without cause, and with or without advance notice.

3. **Position, Duties and Obligations**.

(a) Executive shall be appointed as the Executive Vice President and Chief Financial Officer and shall serve in such position, and in such other positions as the Board and the Company may from time to time reasonably determine, subject at all times to the direction, supervision and authority of the Chief Executive Officer.

(b) During Executive's employment, Executive shall perform Executive's duties faithfully and to the best of Executive's ability, and shall devote substantially all of Executive's business time, attention, knowledge, skills and interests to the business of the Company (and its affiliates or subsidiaries).

(c) During Executive's employment, Executive shall not, whether directly or indirectly, render any services of a commercial or professional nature to any other person or organization, whether for compensation or otherwise, without the prior written consent of the Chief Executive Officer.

(d) The foregoing in this Section 3 shall not preclude Executive from serving on any corporate, civic or charitable boards or committees on which Executive is serving as of the Effective Date and discloses to the Chief Executive Officer prior to the Effective Date or on which Executive commences service following such date with the Chief Executive Officer's

prior written approval, so long as such activities do not interfere with the performance of Executive's responsibilities hereunder.

(e) Executive's principal place of business will be located in Brisbane, California.

(f) Executive represents that Executive may enter into this Agreement, and as of the Effective Date, 1) accept employment with the Company under the terms of this Agreement, and 2) perform the duties and responsibilities contemplated by this Agreement without violating any other agreement or agreements with other parties including but not limited to and any prior employers.

4. **Compensation and Benefits**.

(a) **Base Compensation**. The Company shall pay to Executive an annual base salary of $435,000 Dollars, prorated for any partial employment period and payable in equal monthly installments in accordance with the Company's payroll schedule. The Compensation Committee of the Board shall annually review the then-current level of Executive's base salary (for increase only) to determine the amount, if any, of change to such salary.

(b) **Annual Performance Bonus**. Executive is eligible to earn an annual performance bonus commencing with the 2019 calendar year performance period. The target amount of Executive's annual cash bonus shall be 40% percent of Executive's annual base salary. The Board shall have sole discretion to determine whether any annual cash bonus will be paid based upon achievement of both corporate objectives and Executive's personal objectives, and the reasonable discretion to determine that actual amount of any such bonus. Executive must be an employee in good standing on the date that the Board makes such determination in order to earn any such bonus, which determination shall be made by the Board no later than March 31 of the calendar year first following the performance period calendar year. The actual bonus may be more or less than the target amount based upon the Company's achievement over the year. Any bonus to which Executive becomes entitled for a particular calendar year shall be paid in accordance with the terms of the applicable bonus plan, but in no event later than the second payroll period following such Board determination. The Compensation Committee of the Board shall annually review Executive's then target amount for the annual cash bonus (for increase only) to determine the amount, if any, of change to such target amount.

(c) **Executive Severance Plan**. Executive shall be deemed an Eligible Employee and an Executive Officer and entitled to receive certain severance benefits under the Sangamo Therapeutics, Inc. Executive Severance Plan dated February 6, 2019 (the "Severance Plan") subject to the terms and conditions of the Severance Plan. A copy of the Severance Plan has been provided to Executive concurrently with this Agreement. Notwithstanding the foregoing, in the event that the Company withdraws this offer after it is signed by Executive or terminates this Agreement prior to the Effective Date for any reason other than Executive's failure to successfully pass the requirements for a background check clearance, satisfactory reference check, and satisfactory proof of Executive's legal right to work in the United States required under Section 8(a) herein, then Executive shall be entitled to severance under the

Severance Plan as though his employment was terminated by the Company other than for Cause to the same extent as he would otherwise be entitled had such termination occurred after the Effective Date; provided, however, that Executive shall not be entitled to such severance if he has not notified his current employer of his intent to resign his employment at the time the Company informs him of the withdrawal or termination of this Agreement.

(d) **Benefits**. Executive will be entitled to the employee benefits generally provided to other executive officers of the Company pursuant to the terms of the applicable benefit plans. Executive will not be subject to a formal paid time off program. Executive is free to take paid time off from work for vacation, medical appointments, and other short-term absences due to illnesses or other personal reasons. If Executive desires to take time off for a duration longer than two (2) weeks manager approval is required. Unlimited paid time off is available from the first day of employment.

(e) Retention Bonus Advance. Executive shall be advanced a retention bonus (the "Retention Bonus") in the amount of two hundred thousand dollars ($200,000), payable in the first regularly rescheduled payroll after the Effective Date. Although the Retention Bonus is advanced at the beginning of Executive's employment, it is expressly conditioned on Executive not terminating employment prior to the first (1st) anniversary of the Effective Date under any circumstances other than a termination that would entitle Executive to receive benefits under the Severance Plan, and such advanced Retention Bonus shall not be deemed earned by Executive until such service condition has been met. If Executive's employment terminates at any time prior to the first (1st) anniversary of the Effective Date and Executive is not entitled to receive benefits under the Severance Plan (such termination, a "Disqualifying Termination"), then, Executive shall at the time of such Disqualifying Termination promptly repay the full Retention Bonus to the Company. In the event Executive does not earn and fails to promptly repay the Retention Bonus in connection with a Disqualifying Termination, then the Company shall be further entitled to recover from Executive its costs and expenses incurred in enforcing Executive's repayment obligation, including reasonable attorney's fees and costs.

(f) **Equity**. Subject to approval by the Company's Board of Directors (the "Board") or a committee or individual to whom the Board has delegated authority to grant stock options, we intend to grant you a stock option to purchase 262,500 shares of the Company's common stock (the "Option") under the Company's equity plan (the "Plan"), subject to the terms and conditions in the Plan and the Stock Option Agreement that will subsequently be delivered. The per share exercise price of your Option will be equal to the closing selling price per share of the Company's common stock on the grant date (or if there is no closing selling price on the grant date, then the closing selling price on the last preceding date for which such quotation exists). Unless otherwise specified in your Stock Option Agreement, your Option will be subject to a four-year vesting provision pursuant to which 25% of the total number of Option shares will vest one year from the grant date (the "Vesting Commencement Date") and the remaining 75% will vest in thirty-six successive equal monthly installments following the first anniversary of the Vesting Commencement date, provided you remain employed or are providing other qualifying services through each applicable vesting date. Following the grant of your Option, you will be

eligible to participate in the Company's equity award program under which you will be considered for additional equity awards under the Plan on an annual basis.

(g) Also, subject to approval by the Board, we intend to grant you 43,750 restricted stock units ("Restricted Stock Units") under the Plan. Each Restricted Stock Unit represents the right to receive one share of the Company's common stock upon the specified issuance date following vesting. Your Restricted Stock Units will vest in a series of three (3) successive equal annual installments upon your completion of each year of service to the Company measured from the Vesting Commencement Date. The issuance of the underlying shares of common stock in settlement of vested Restricted Stock Units will be subject to the Company's collection of all applicable withholding taxes. The Restricted Stock Units will be evidenced by the Plan's form of Restricted Stock Unit Issuance Agreement and will be subject to its terms and conditions and the Plan.

(h) You may be eligible to participate in an annual corporate bonus program under the Company's Employee Cash Bonus Plan (the "Bonus Plan") based on individual and Company performance. An employee's first date of employment must be on or before October 31st to be eligible for a performance bonus. If you start employment anytime in the year before October 31st, you will be eligible for a pro-rated bonus. While the Company reserves the right to amend and rescind both your eligibility for a bonus and your bonus target any time in accordance with the terms and conditions of the Bonus Plan, your target bonus is currently 40% of annual salary, less taxes. Whether or not you receive a bonus, and the amount of any such bonus, shall be determined in the sole discretion of the Company, and you must remain an employee of the Company in good standing on the date any such bonus is determined and paid in order to earn and receive the bonus.

(i) **Clawback**. Notwithstanding anything to the contrary in this Agreement, all compensation paid to Executive by the Company (whether payable pursuant to this Agreement or otherwise) will be subject to reduction, recovery and/or recoupment to the extent required by any present or future law, government regulation or stock exchange listing requirement (or any policy adopted by the Company which ensures compliance with the requirements of any such law, government regulation or stock exchange listing requirement).

(j) **Resignation from Positions**. Notwithstanding any other provision of this Agreement to the contrary, upon any termination of employment (whether voluntary or involuntary), Executive, upon written request from the Board, shall immediately resign from any positions Executive has with the Company (or any subsidiary), whether as an executive, officer, employee, consultant, director, trustee, fiduciary or otherwise.

5. **Confidentiality**. Executive agrees to abide by the terms and conditions of the Employee Confidential Information and Invention Assignment Agreement between Executive and the Company, a copy of which is attached as Exhibit A. Executive further agrees that at all times both during Executive's employment by the Company and after Executive's employment ends, Executive will keep in confidence and trust, and will not use or disclose, except as directed by the Company, any confidential or proprietary information of the Company.

6. **Tax Withholdings**. Any and all cash compensation and other benefits (including without limitation, base salary, annual bonus and sign-on bonus) paid to Executive under this Agreement shall be subject to all applicable tax withholding requirements, and the Company shall make such other deductions as may be required and/or allowed by applicable law and/or as authorized in writing by Executive.

7. **Arbitration**. Any dispute, controversy, or claim, whether contractual or non-contractual, between Executive and the Company shall be resolved by binding arbitration before the Judicial Arbitration and Mediation Service (the "JAMS"), in accordance with the JAMS Employment Arbitration Rules and Procedures, available at www.jamsadr.com. Executive and the Company each agree that before proceeding to arbitration, they will mediate disputes before the JAMS by a mediator approved by the JAMS. If mediation fails to resolve the matter, any subsequent arbitration shall be conducted by an arbitrator approved by the JAMS and mutually acceptable to Executive and the Company. All disputes, controversies, and claims shall be conducted by a single arbitrator, who shall: (i) allow discovery authorized by California Code of Civil Procedure Section 1282, et seq., or any other discovery required by applicable law; and (ii) issue a written award that sets forth the essential findings of fact and conclusions of law on which the award is based. The arbitrator shall have the authority to award any relief authorized by law in connection with the asserted claims or disputes. Judgment upon the arbitrator's award may be entered in any court having jurisdiction thereof. If Executive and the Company are unable to agree on the mediator or the arbitrator, then the JAMS shall select the mediator/arbitrator. The resolution of the dispute by the arbitrator shall be final, binding, non-appealable, and fully enforceable by a court of competent jurisdiction under the Federal Arbitration Act. The arbitration award shall be in writing and shall include a statement of the reasons for the award. The arbitration shall be held in San Francisco, California. The Company shall pay all JAMS, mediation, and arbitrator's fees and costs, irrespective of who raised the claim and the outcome of arbitration.

8. **Miscellaneous**.

(a) **Conditions to Agreement**. This Agreement is contingent upon a background check clearance, satisfactory reference check, and satisfactory proof of Executive's legal right to work in the United States. Executive agrees to provide any documentation or information at the Company's request to facilitate these processes.

(b) **Governing Law**. This Agreement shall be interpreted, construed, governed and enforced according to the laws of the State of California.

(c) **Attorneys' Fees**. In the event of any controversy, claim or dispute between the parties, arising out of or relating to this Agreement or the breach hereof, or the interpretation hereof, each party shall bear its own legal fees and expenses. Notwithstanding the foregoing, in the event of a finding by any court having jurisdiction over such matter that any party initiating an action under this Agreement failed to have a reasonable prospect of prevailing on its claim, the arbitrator shall have discretion to award the prevailing party attorneys' fees and costs incurred by it with respect to such claim or action. The "prevailing party" means the party determined by the arbitrator to have most nearly prevailed, even if such party did not prevail in all matters, not necessarily the one in whose favor a judgment is rendered.

(d) **Amendments**. No amendment or modification of the terms or conditions of this Agreement shall be valid unless in writing and signed by the Parties hereto.

(e) **Severability**. If any provision of this Agreement as applied to any party or to any circumstance should be adjudged by a court of competent jurisdiction (or determined by the arbitrator) to be void or unenforceable for any reason, the invalidity of that provision shall in no way affect (to the maximum extent permissible by law) the application of such provision under circumstances different from those adjudicated by the court or determined by the arbitrator, the application of any other provision of this Agreement, or the enforceability or invalidity of this Agreement as a whole. Should any provision of this Agreement become or be deemed invalid, illegal or unenforceable in any jurisdiction by reason of the scope, extent or duration of its coverage, then such provision shall be deemed amended to the extent necessary to conform to applicable law so as to be valid and enforceable or, if such provision cannot be so amended without materially altering the intention of the parties, then such provision will be stricken, and the remainder of this Agreement shall continue in full force and effect.

(f) **Successors and Assigns**. The rights and obligations of the Company under this Agreement shall inure to the benefit of and shall be binding upon the successors and assigns of the Company. Executive shall not be entitled to assign any of Executive's rights or obligations under this Agreement.

(g) **Entire Agreement**. This Agreement, along with any other agreements set forth herein, including without limitation, the Proprietary Information and Inventions Agreement, constitutes the entire agreement between the parties with respect to the employment of Executive.

(h)

SANGAMO THERAPEUTICS, INC.

By:
Name:

Title:

SUNG LEE

EXHIBIT A

EMPLOYEE CONFIDENTIAL INFORMATION AND INVENTION ASSIGNMENT AGREEMENT

In consideration of my employment or continued employment by Sangamo Therapeutics, Inc. ("Sangamo"), its direct and indirect subsidiaries, parents, affiliates, predecessors, successors and assigns (together with Sangamo, the "**Company**"), and the compensation and benefits provided to me now and during my employment with the Company, I hereby enter into this Employee Confidential Information and Invention Assignment Agreement (the "**Agreement**"), which will be deemed effective as of the first day of my employment with the Company:

1. CONFIDENTIAL INFORMATION PROTECTIONS.

1.1 **Recognition of Company's Rights; Nondisclosure.** I understand and acknowledge that my employment by Company creates a relationship of confidence and trust with respect to Company's Confidential Information (as defined below) and that Company has a protectable interest therein. At all times during and after my employment, I will hold in confidence and will not disclose, use, lecture upon, or publish any of Company's Confidential Information, except as such disclosure, use or publication may be required in connection with my work for Company, or unless an officer of Company expressly authorizes such disclosure. I will obtain Company's written approval before publishing or submitting for publication any material (written, oral, or otherwise) that discloses and/or incorporates any Confidential Information. I hereby assign to Sangamo any rights I may have or acquire in such Confidential Information and recognize that all Confidential Information shall be the sole and exclusive property of Sangamo and its assigns. I will take all reasonable precautions to prevent the inadvertent accidental disclosure of Confidential Information. Notwithstanding the foregoing, pursuant to 18 U.S.C. Section 1833(b), I shall not be held criminally or civilly liable under any federal or state trade secret law for the disclosure of a trade secret that: (1) is made in confidence to a federal, state, or local government official, either directly or indirectly, or to an attorney, and solely for the purpose of reporting or investigating a suspected violation of law; or (2) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal.

1.2 **Confidential Information.** The term **"Confidential Information"** shall mean any and all confidential knowledge, data or information of Company. By way of illustration but not limitation, **"Confidential Information"** includes (a) trade secrets, inventions, mask works, ideas, processes, formulas, software in source or object code versions, data, programs, other works of authorship, know-how, improvements, discoveries, developments, designs and techniques and any other proprietary technology and all Intellectual Property Rights therein (collectively, **"Inventions"**); (b) information regarding research, development, new products, marketing and selling, business plans, budgets and unpublished financial statements, licenses, prices and costs, margins, discounts, credit terms, pricing and billing policies, quoting procedures, methods of obtaining business, forecasts, future plans and potential strategies, financial projections and business strategies, operational plans, financing and capital-raising plans, activities and agreements, internal services and operational manuals, methods of conducting Company business, suppliers and supplier information, and purchasing; (c) information regarding customers and potential customers of Company, including customer lists, names, representatives, their needs or desires with respect to the types of products or services offered by Company, proposals, bids, contracts and their contents and parties, the type and quantity of products and services provided or sought to be provided to customers and potential customers of Company and other non-public information relating to customers and potential customers; (d) information regarding any of Company's business partners and their services, including names, representatives, proposals, bids, contracts and their contents and parties, the type and quantity of products and services received by Company, and other non-public information relating to business partners; (e) information regarding personnel, employee lists, compensation, and employee skills; and (f) any other non-public information which a competitor of Company could use to the competitive disadvantage of Company. Notwithstanding the foregoing, it is understood that, at all such times, I am free to use information which is generally known in the trade or industry through no breach of this Agreement or other act or omission by me. Further, notwithstanding the foregoing or anything to the contrary in this Agreement or any other agreement between the Company and me, nothing in this Agreement shall limit my right to discuss my employment or report possible violations of law or regulation with any federal government agency or similar

state or local agency or to discuss the terms and conditions of my employment with others to the extent expressly permitted by Section 7 of the National Labor Relations Act.

1.3 **Third Party Information.** I understand, in addition, that Company has received, and in the future will receive, from third parties their confidential and/or proprietary knowledge, data or information (**"Third Party Information"**) subject to a duty on Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During my employment and thereafter, I will hold Third Party Information in confidence and will not disclose to anyone (other than Company personnel who need to know such information in connection with their work for Company) or use, except in connection with my work for Company, Third Party Information unless expressly authorized by an officer of Company in writing.

1.4 **No Improper Use of Information of Prior Employers and Others.** During my employment by Company, I will not improperly use or disclose confidential information or trade secrets, if any, of any former employer or any other person to whom I have an obligation of confidentiality, and I will not bring onto the premises of Company any unpublished documents or any property belonging to any former employer or any other person to whom I have an obligation of confidentiality unless consented to in writing by that former employer or person.

2. ASSIGNMENTS OF INVENTIONS.

2.1 **Definitions.** As used in this Agreement, the term **"Intellectual Property Rights"** means all trade secrets, Copyrights, trademarks, mask work rights, patents and other intellectual property rights recognized by the laws of any jurisdiction or country; the term **"Copyright"** means the exclusive legal right to reproduce, perform, display, distribute and make derivative works of a work of authorship (as a literary, musical, or artistic work) recognized by the laws of any jurisdiction or country; and the term **"Moral Rights"** means all paternity, integrity, disclosure, withdrawal, special and any other similar rights recognized by the laws of any jurisdiction or country.

2.2 **Excluded Inventions and Other Inventions.** Attached hereto as **Attachment 1** is a list describing all existing Inventions, if any, that may relate to Company's business or actual or demonstrably anticipated research or development and that were made by me or acquired by me prior to the commencement of my employment with, and which are not to be assigned to, Company (**"Excluded Inventions"**). If no such list is attached, I represent and agree that it is because I have no rights in any existing Inventions that may relate to Company's business or actual or demonstrably anticipated research or development. For purposes of this Agreement, **"Other Inventions"** means Inventions in which I have or may have an interest, as of the commencement of my employment, other than Company Inventions (defined below) and Excluded Inventions. I acknowledge and agree that if I use any Excluded Inventions or any Other Inventions in the scope of my employment, or if I include any Excluded Inventions or Other Inventions in any product or service of Company, or if my rights in any Excluded Inventions or Other Inventions may block or interfere with, or may otherwise be required for, the exercise by Company of any rights assigned to Company under this Agreement, I will immediately so notify Company in writing. Unless Company and I agree otherwise in writing as to particular Excluded Inventions or Other Inventions, I hereby grant to Company, in such circumstances (whether or not I give Company notice as required above), a non-exclusive, perpetual, transferable, fully-paid and royalty-free, irrevocable and worldwide license, with rights to sublicense through multiple levels of sublicensees, to reproduce, make derivative works of, distribute, publicly perform, and publicly display in any form or medium, whether now known or later developed, make, have made, use, sell, import, offer for sale, and exercise any and all present or future rights in, such Excluded Inventions and Other Inventions. To the extent that any third parties have rights in any such Excluded Inventions or Other Inventions, I hereby represent and warrant that such third party or parties have validly and irrevocably granted to me the right to grant the license stated above.

2.3 **Assignment of Company Inventions.** Inventions assigned to Sangamo, or to a third party as directed by Sangamo pursuant to Section 2.6, are referred to in this Agreement as **"Company Inventions**.**"** Subject to Section 2.4 (Unassigned or Nonassignable Inventions) and except for Excluded Inventions set forth in **Attachment 1** and Other Inventions, I hereby assign to Sangamo all my right, title, and interest in and to any and all Inventions (and all Intellectual Property Rights with respect thereto) made, conceived, reduced to practice, or learned by me, either alone or with others, during the period of my employment by Company. To the extent required by applicable Copyright laws, I agree to assign in the future (when any copyrightable Inventions are first fixed in a tangible medium of expression) my Copyright rights in and to such Inventions. Any assignment of Company Inventions (and all Intellectual Property Rights with respect

thereto) hereunder includes an assignment of all Moral Rights. To the extent such Moral Rights cannot be assigned to Sangamo and to the extent the following is allowed by the laws in any country where Moral Rights exist, I hereby unconditionally and irrevocably waive the enforcement of such Moral Rights, and all claims and causes of action of any kind against Company or related to Company's customers, with respect to such rights. I further acknowledge and agree that neither my successors-in-interest nor legal heirs retain any Moral Rights in any Company Inventions (and any Intellectual Property Rights with respect thereto).

2.4 **Unassigned or Nonassignable Inventions.** I recognize that this Agreement will not be deemed to require assignment of any Invention that is covered under California Labor Code section 2870(a) (the "**Specific Inventions Law**"), as detailed on **Attachment 2**.

2.5 **Obligation to Keep Company Informed.** During the period of my employment and for one (1) year after termination of my employment, I will promptly and fully disclose to Company in writing all Inventions authored, conceived, or reduced to practice by me, either alone or jointly with others. In addition, I will promptly disclose to Company all patent applications filed by me or on my behalf within one (1) year after termination of employment. At the time of each such disclosure, I will advise Company in writing of any Inventions that I believe fully qualify for protection under the provisions of the Specific Inventions Law; and I will at that time provide to Company in writing all evidence necessary to substantiate that belief. Company will keep in confidence and will not use for any purpose or disclose to third parties without my consent any confidential information disclosed in writing to Company pursuant to this Agreement relating to Inventions that qualify fully for protection under the Specific Inventions Law. I will preserve the confidentiality of any Invention that does not fully qualify for protection under the Specific Inventions Law.

2.6 **Government or Third Party.** I agree that, as directed by Company, I will assign to a third party, including without limitation the United States, all my right, title, and interest in and to any particular Company Invention.

2.7 **Ownership of Work Product.** I agree that Sangamo will exclusively own all work product that is made by me (solely or jointly with others) within the scope of my employment, and I hereby irrevocably and unconditionally assign to Sangamo all right, title, and interest worldwide in and to such work product. I acknowledge that all original works of authorship which are made by me (solely or jointly with others) within the scope of my employment and which are protectable by Copyright are "works made for hire," pursuant to United States Copyright Act (17 U.S.C., Section 101). I understand and agree that I have no right to publish on, submit for publishing, or use for any publication any work product protected by this Section, except as necessary to perform services for Company.

2.8 **Enforcement of Intellectual Property Rights and Assistance.** I will assist Company in every proper way to obtain, and from time to time enforce, United States and foreign Intellectual Property Rights and Moral Rights relating to Company Inventions in any and all countries. To that end I will execute, verify and deliver such documents and perform such other acts (including appearances as a witness) as Company may reasonably request for use in applying for, obtaining, perfecting, evidencing, sustaining and enforcing such Intellectual Property Rights and the assignment thereof. In addition, I will execute, verify and deliver assignments of such Intellectual Property Rights to Sangamo or its designee, including the United States or any third party designated by Sangamo. My obligation to assist Company with respect to Intellectual Property Rights relating to such Company Inventions in any and all countries will continue beyond the termination of my employment, but Company will compensate me at a reasonable rate after my termination for the time actually spent by me at Company's request on such assistance. In the event Company is unable for any reason, after reasonable effort, to secure my signature on any document needed in connection with the actions specified in this paragraph, I hereby irrevocably designate and appoint Company and its duly authorized officers and agents as my agent and attorney in fact, which appointment is coupled with an interest, to act for and in my behalf to execute, verify and file any such documents and to do all other lawfully permitted acts to further the purposes of this Agreement with the same legal force and effect as if executed by me. I hereby waive and quitclaim to Company any and all claims, of any nature whatsoever, which I now or may hereafter have for infringement of any Intellectual Property Rights assigned under this Agreement to Sangamo.

2.9 **Incorporation of Software Code.** I agree that I will not incorporate into any Company software or otherwise deliver to Company any software code licensed under the GNU General Public License or Lesser General Public License or any other license that, by its terms, requires or conditions the use or distribution of such code on the disclosure,

licensing, or distribution of any source code owned or licensed by Company **except** in strict compliance with Company's policies regarding the use of such software.

3. **RECORDS.** I agree to keep and maintain adequate and current records (in the form of notes, sketches, drawings and in any other form that is required by Company) of all Confidential Information developed by me and all Company Inventions made by me during the period of my employment at Company, which records will be available to and remain the sole property of Company at all times.

4. **DUTY OF LOYALTY DURING EMPLOYMENT.** I agree that during the period of my employment by Company I will not, without Company's express written consent, directly or indirectly (a) engage in any other employment or (b) engage in any other activities that are competitive with, or would otherwise conflict with, my employment by Company.

5. **NO SOLICITATION OF EMPLOYEES, CONSULTANTS, OR CONTRACTORS.** I agree that during the period of my employment and for the one (1) year period after the date my employment ends for any reason, including but not limited to voluntary termination by me or involuntary termination by Company, I will not, as an officer, director, employee, consultant, owner, partner, or in any other capacity, either directly or through others, except on behalf of Company, solicit, induce, encourage, or participate in soliciting, inducing or encouraging any employee, consultant, or independent contractor of Company to terminate his, her or its relationship with Company, even if I did not initiate the discussion or seek out the contact.

6. **REASONABLENESS OF RESTRICTIONS.** I agree that I have read this entire Agreement and understand it. I agree that this Agreement does not prevent me from earning a living or pursuing my career. I agree that the restrictions contained in this Agreement are reasonable, proper, and necessitated by Company's legitimate business interests. I represent and agree that I am entering into this Agreement freely and with knowledge of its contents with the intent to be bound by the Agreement and the restrictions contained in it.

7. **NO CONFLICTING AGREEMENT OR OBLIGATION.** I represent that my employment by Company does not and will not breach any agreement with any former employer or third party, including any noncompete agreement or any agreement to keep in confidence or refrain from using information acquired by me prior to my employment by Company. I further represent that I have not entered into, and will not enter into, any agreement, either written or oral, in conflict with my obligations under this Agreement.

8. **RETURN OF COMPANY PROPERTY.** Subject to the nondisclosure requirements of Section 1.1 above, upon termination of my employment or upon Company's request at any other time, I will deliver to Company any and all of Company's property and equipment and any and all drawings, notes, memoranda, specifications, devices, formulas and documents, together with all copies thereof, and any other material containing or disclosing any Company Inventions, Third Party Information or Confidential Information of Company. I agree that I will not copy, delete, or alter any information contained upon my Company computer or Company equipment before I return it to Company. In addition, if I have used any personal computer, server, or e-mail system to receive, store, review, prepare or transmit any Company information, including but not limited to, Confidential Information, I agree to provide Company with a computer-useable copy of all such Confidential Information and then permanently delete and expunge such Confidential Information from those systems; and I agree to provide Company access to my system as reasonably requested to verify that the necessary copying and/or deletion is completed. I further agree that any property situated on Company's premises and owned by Company, including disks and other storage media, filing cabinets or other work areas, is subject to inspection by Company's personnel at any time with or without notice.

9. LEGAL AND EQUITABLE REMEDIES.

9.1 I agree that it may be impossible to assess the damages caused by my violation of this Agreement or any of its terms. I agree that any threatened or actual violation of this Agreement or any of its terms will constitute immediate and irreparable injury to Company, and Company will have the right to enforce this Agreement and any of its provisions by injunction, specific performance or other equitable relief, without bond and without prejudice to any other rights and remedies that Company may have for a breach or threatened breach of this Agreement.

9.2 In the event Company enforces this Agreement through a court or arbitration order, I agree that the restrictions of Sections 5 will remain in effect for a period of twelve (12) months from the effective date of the order enforcing the Agreement.

10. **NOTICES.** Any notices required or permitted under this Agreement will be given to Company at its headquarters location at the time notice is given, and to me at my address as listed on Company payroll, or at such other address as Company or I may designate by written notice to the other. Notice will be effective upon receipt or refusal of delivery. If delivered by certified or registered mail, notice will be considered to have been given five (5) business days after it was mailed, as evidenced by the postmark. If delivered by courier or express mail service, notice will be considered to have been given on the delivery date reflected by the courier or express mail service receipt.

11. NOTIFICATION OF NEW EMPLOYER. If I leave the employ of Company, I consent to the notification of my new employer of my rights and obligations under this Agreement, by Company providing a copy of this Agreement or otherwise.

12. GENERAL PROVISIONS.

12.1 **Governing Law.** This Agreement will be governed by and construed according to the laws of the State of California as such laws are applied to agreements entered into and to be performed entirely within California between California residents.

12.2 **Severability.** In case any one or more of the provisions, subsections, or sentences contained in this Agreement will, for any reason, be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability will not affect the other provisions of this Agreement, and this Agreement will be construed as if such invalid, illegal or unenforceable provision had never been contained in this Agreement. If moreover, any one or more of the provisions contained in this Agreement will for any reason be held to be excessively broad as to duration, geographical scope, activity or subject, it will be construed by limiting and reducing it, so as to be enforceable to the extent compatible with the applicable law as it will then appear.

12.3 **Successors and Assigns.** This Agreement is for my benefit and the benefit of Company, its successors, assigns, parent corporations, direct and indirect subsidiaries, affiliates, and purchasers, and will be binding upon my heirs, executors, administrators and other legal representatives.

12.4 **Survival.** This Agreement shall survive the termination of my employment, regardless of the reason, and the assignment of this Agreement by Company to any successor in interest or other assignee.

12.5 **Employment At-Will.** I agree and understand that nothing in this Agreement will change my at-will employment status or confer any right with respect to continuation of employment by Company, nor will it interfere in any way with my right or Company's right to terminate my employment at any time, with or without cause or advance notice.

12.6 **Waiver.** No waiver by Company of any breach of this Agreement will be a waiver of any preceding or succeeding breach. No waiver by Company of any right under this Agreement will be construed as a waiver of any other right. Company will not be required to give notice to enforce strict adherence to all terms of this Agreement.

12.7 **Export.** I agree not to export, reexport, or transfer, directly or indirectly, any U.S. technical data acquired from Company or any products utilizing such data, in violation of the United States export laws or regulations.

12.8 **Entire Agreement.** This Agreement is the final, complete and exclusive agreement of the parties with respect to the subject matter of this Agreement and supersedes and merges all prior discussions between the parties; provided, however, prior to the execution of this Agreement, if Company and I were parties to any agreement regarding the subject matter hereof, that agreement will be superseded by this Agreement prospectively only. No modification of or amendment to this Agreement, or any waiver of any rights under this Agreement, will be effective unless in writing and signed by me and an authorized officer of the Company. Any subsequent change or changes in my duties, salary or compensation will not affect the validity or scope of this Agreement. If no other agreement governs nondisclosure and assignment of inventions during any period in which I was previously engaged or am in the future engaged by Company

as an independent contractor, the obligations pursuant to sections of this Agreement titled "Confidential Information Protections" and "Assignment of Inventions" shall apply.

8.2

SUNG LEE:

I HAVE READ, UNDERSTAND, AND ACCEPT THIS AGREEMENT.

_

(Signature)

By:_____

Title:_____

Date: _____

SANGAMO THERAPEUTICS, INC.:

ACCEPTED AND AGREED:

_

(Signature)

By: _____

Title: _____

Date: _____

ATTACHMENT 1

PRIOR INVENTIONS

TO: Sangamo Therapeutics, Inc.

FROM: Sung Lee

DATE:

SUBJECT: Prior Inventions

1. Except as listed in Section 2 below, the following is a complete list of all inventions or improvements relevant to the subject matter of my employment by Sangamo Therapeutics, Inc. ("**Company**") that have been made or conceived or first reduced to practice by me alone or jointly with others prior to my engagement by Company:

No inventions or improvements.

See below:

____

____

____

Additional sheets attached.

2. Due to a prior confidentiality agreement, I cannot complete the disclosure under Section 1 above with respect to inventions or improvements generally listed below, the intellectual property rights and duty of confidentiality with respect to which I owe to the following party(ies):

Invention or Improvement Party(ies) Relationship

1.

2.

3.

Additional sheets attached.

ATTACHMENT 2

LIMITED EXCLUSION NOTIFICATION

This is to notify you in accordance with Section 2872 of the California Labor Code that the foregoing Agreement between you and Company does not require you to assign or offer to assign to Company any Invention that you develop entirely on your own time without using Company's equipment, supplies, facilities or trade secret information, except for those Inventions that either:

(a) Relate at the time of conception or reduction to practice to Company's business, or actual or demonstrably anticipated research or development; or

(b) Result from any work performed by you for Company.

To the extent a provision in the foregoing Agreement purports to require you to assign an Invention otherwise excluded from the preceding paragraph, the provision is against the public policy of this state and is unenforceable.

This limited exclusion does not apply to any patent or Invention covered by a contract between Company and the United States or any of its agencies requiring full title to such patent or Invention to be in the United States.

Exhibit 10.25

EXECUTIVE EMPLOYMENT AGREEMENT

Employment Agreement ("Agreement") made as of the 6th day of June 2019 by and between Sangamo Therapeutics, Inc., a Delaware corporation (the "Company"), and Gary Loeb ("Executive") (collectively, the "Parties").

R E C I T A L S

WHEREAS, the Company desires to employ Executive, and Executive desires to be employed by the Company, on the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual promises set forth herein, the Parties agree follows:

1. **Employment**.

The Company hereby agrees to employ Executive and Executive hereby agrees to accept such employment, on the terms and conditions set forth in this Agreement, with a start date of July 29th 2019 (the "Effective Date").

2. **At-Will Employment**.

Executive shall be employed on an at-will basis. Either Executive or the Company may terminate employment at any time, with or without cause, and with or without advance notice.

3. **Position, Duties and Obligations**.

(a) Executive shall be appointed as the Executive Vice President and Chief Legal Counsel and shall serve in such position, and in such other positions as the Board and the Company may from time to time reasonably determine, subject at all times to the direction, supervision and authority of the Chief Executive Officer.

(b) During Executive's employment, Executive shall perform Executive's duties faithfully and to the best of Executive's ability, and shall devote substantially all of Executive's business time, attention, knowledge, skills and interests to the business of the Company (and its affiliates or subsidiaries).

(c) During Executive's employment, Executive shall not, whether directly or indirectly, render any services of a commercial or professional nature to any other person or organization, whether for compensation or otherwise, without the prior written consent of the Chief Executive Officer.

(d) The foregoing in this Section 3 shall not preclude Executive from serving on any corporate, civic or charitable boards or committees on which Executive is serving as of the Effective Date and discloses to the Chief Executive Officer prior to the Effective Date or on which Executive commences service following such date with the Chief Executive Officer's

prior written approval, so long as such activities do not interfere with the performance of Executive's responsibilities hereunder.

(e) Executive's principal place of business will be located in Brisbane, California.

(f) Executive represents that Executive may enter into this Agreement, and as of the Effective Date, 1) accept employment with the Company under the terms of this Agreement, and 2) perform the duties and responsibilities contemplated by this Agreement without violating any other agreement or agreements with other parties including but not limited to and any prior employers.

4. **Compensation and Benefits**.

(a) **Base Compensation**. The Company shall pay to Executive an annual base salary of $400,000 Dollars, prorated for any partial employment period and payable in equal monthly installments in accordance with the Company's payroll schedule. The Compensation Committee of the Board shall annually review the then-current level of Executive's base salary (for increase only) to determine the amount, if any, of change to such salary.

(b) **Annual Performance Bonus**. Executive is eligible to earn an annual performance bonus commencing with the 2019 calendar year performance period. The target amount of Executive's annual cash bonus shall be 40% percent of Executive's annual base salary. The Board shall have sole discretion to determine whether any annual cash bonus will be paid based upon achievement of both corporate objectives and Executive's personal objectives, and the reasonable discretion to determine that actual amount of any such bonus. Executive must be an employee in good standing on the date that the Board makes such determination in order to earn any such bonus, which determination shall be made by the Board no later than March 31 of the calendar year first following the performance period calendar year. The actual bonus may be more or less than the target amount based upon the Company's achievement over the year. Any bonus to which Executive becomes entitled for a particular calendar year shall be paid in accordance with the terms of the applicable bonus plan, but in no event later than the second payroll period following such Board determination. The Compensation Committee of the Board shall annually review Executive's then target amount for the annual cash bonus (for increase only) to determine the amount, if any, of change to such target amount.

(c) **Executive Severance Plan**. Executive shall be deemed an Eligible Employee and an Executive Officer and entitled to receive certain severance benefits under the Sangamo Therapeutics, Inc. Executive Severance Plan dated February 6, 2019 (the "Severance Plan") subject to the terms and conditions of the Severance Plan. A copy of the Severance Plan has been provided to Executive concurrently with this Agreement. Notwithstanding the foregoing, in the event that the Company withdraws this offer after it is signed by Executive or terminates this Agreement prior to the Effective Date for any reason other than Executive's failure to successfully pass the requirements for a background check clearance, satisfactory reference check, and satisfactory proof of Executive's legal right to work in the United States required under Section 8(a) herein, then Executive shall be entitled to severance under the

Severance Plan as though his employment was terminated by the Company other than for Cause to the same extent as he would otherwise be entitled had such termination occurred after the Effective Date; provided, however, that Executive shall not be entitled to such severance if he has not notified his current employer of his intent to resign his employment at the time the Company informs him of the withdrawal or termination of this Agreement.

(d) **Benefits**. Executive will be entitled to the employee benefits generally provided to other executive officers of the Company pursuant to the terms of the applicable benefit plans. Executive will not be subject to a formal paid time off program. Executive is free to take paid time off from work for vacation, medical appointments, and other short-term absences due to illnesses or other personal reasons. If Executive desires to take time off for a duration longer than two (2) weeks manager approval is required. Unlimited paid time off is available from the first day of employment.

(e) **Equity**. Effective as of August 25th 2019 or the trading day immediately preceding in the event August 25th is not a trading day (the "Grant Date"), the Compensation Committee of the Board shall grant Executive a non-statutory stock option to purchase up to 250,000 shares of the Company's Common Stock with an exercise price per share equal to the fair market value of the Company's Common Stock on the Grant Date (the "Option") under the Company's 2018 Equity Incentive Plan (the "Plan"). The Option will be evidenced by the standard stock option agreement under the Plan and will be subject to the terms and conditions of that agreement and the Plan, with one-quarter of the Option shares vesting twelve (12) months from the Grant Date and the remainder vesting in equal monthly installments for thirty-six (36) months thereafter, provided Executive remains a full-time employee through each such vesting date. Vesting of the Option and any subsequent equity grants will cease upon termination of Executive's service by either party for any reason.

(f) **Clawback**. Notwithstanding anything to the contrary in this Agreement, all compensation paid to Executive by the Company (whether payable pursuant to this Agreement or otherwise) will be subject to reduction, recovery and/or recoupment to the extent required by any present or future law, government regulation or stock exchange listing requirement (or any policy adopted by the Company which ensures compliance with the requirements of any such law, government regulation or stock exchange listing requirement).

(g) **Resignation from Positions**. Notwithstanding any other provision of this Agreement to the contrary, upon any termination of employment (whether voluntary or involuntary), Executive, upon written request from the Board, shall immediately resign from any positions Executive has with the Company (or any subsidiary), whether as an executive, officer, employee, consultant, director, trustee, fiduciary or otherwise.

5. **Confidentiality**. Executive agrees to abide by the terms and conditions of the Employee Confidential Information and Invention Assignment Agreement between Executive and the Company, a copy of which is attached as Exhibit A. Executive further agrees that at all times both during Executive's employment by the Company and after Executive's employment ends, Executive will keep in confidence and trust, and will not use or disclose, except as directed by the Company, any confidential or proprietary information of the Company.

6. **Tax Withholdings**. Any and all cash compensation and other benefits (including without limitation, base salary, annual bonus and sign-on bonus) paid to Executive under this Agreement shall be subject to all applicable tax withholding requirements, and the Company shall make such other deductions as may be required and/or allowed by applicable law and/or as authorized in writing by Executive.

7. **Arbitration**. Any dispute, controversy, or claim, whether contractual or non-contractual, between Executive and the Company shall be resolved by binding arbitration before the Judicial Arbitration and Mediation Service (the "JAMS"), in accordance with the JAMS Employment Arbitration Rules and Procedures, available at www.jamsadr.com. Executive and the Company each agree that before proceeding to arbitration, they will mediate disputes before the JAMS by a mediator approved by the JAMS. If mediation fails to resolve the matter, any subsequent arbitration shall be conducted by an arbitrator approved by the JAMS and mutually acceptable to Executive and the Company. All disputes, controversies, and claims shall be conducted by a single arbitrator, who shall: (i) allow discovery authorized by California Code of Civil Procedure Section 1282, et seq., or any other discovery required by applicable law; and (ii) issue a written award that sets forth the essential findings of fact and conclusions of law on which the award is based. The arbitrator shall have the authority to award any relief authorized by law in connection with the asserted claims or disputes. Judgment upon the arbitrator's award may be entered in any court having jurisdiction thereof. If Executive and the Company are unable to agree on the mediator or the arbitrator, then the JAMS shall select the mediator/arbitrator. The resolution of the dispute by the arbitrator shall be final, binding, non-appealable, and fully enforceable by a court of competent jurisdiction under the Federal Arbitration Act. The arbitration award shall be in writing and shall include a statement of the reasons for the award. The arbitration shall be held in San Francisco, California. The Company shall pay all JAMS, mediation, and arbitrator's fees and costs, irrespective of who raised the claim and the outcome of arbitration.

8. **Miscellaneous**.

(a) **Conditions to Agreement**. This Agreement is contingent upon a background check clearance, satisfactory reference check, and satisfactory proof of Executive's legal right to work in the United States. Executive agrees to provide any documentation or information at the Company's request to facilitate these processes.

(b) **Governing Law**. This Agreement shall be interpreted, construed, governed and enforced according to the laws of the State of California.

(c) **Attorneys' Fees**. In the event of any controversy, claim or dispute between the parties, arising out of or relating to this Agreement or the breach hereof, or the interpretation hereof, each party shall bear its own legal fees and expenses. Notwithstanding the foregoing, in the event of a finding by any court having jurisdiction over such matter that any party initiating an action under this Agreement failed to have a reasonable prospect of prevailing on its claim, the arbitrator shall have discretion to award the prevailing party attorneys' fees and costs incurred by it with respect to such claim or action. The "prevailing party" means the party determined by the arbitrator to have most nearly prevailed, even if such party did not prevail in all matters, not necessarily the one in whose favor a judgment is rendered.

(d) **Amendments**. No amendment or modification of the terms or conditions of this Agreement shall be valid unless in writing and signed by the Parties hereto.

(e) **Severability**. If any provision of this Agreement as applied to any party or to any circumstance should be adjudged by a court of competent jurisdiction (or determined by the arbitrator) to be void or unenforceable for any reason, the invalidity of that provision shall in no way affect (to the maximum extent permissible by law) the application of such provision under circumstances different from those adjudicated by the court or determined by the arbitrator, the application of any other provision of this Agreement, or the enforceability or invalidity of this Agreement as a whole. Should any provision of this Agreement become or be deemed invalid, illegal or unenforceable in any jurisdiction by reason of the scope, extent or duration of its coverage, then such provision shall be deemed amended to the extent necessary to conform to applicable law so as to be valid and enforceable or, if such provision cannot be so amended without materially altering the intention of the parties, then such provision will be stricken, and the remainder of this Agreement shall continue in full force and effect.

(f) **Successors and Assigns**. The rights and obligations of the Company under this Agreement shall inure to the benefit of and shall be binding upon the successors and assigns of the Company. Executive shall not be entitled to assign any of Executive's rights or obligations under this Agreement.

(g) **Entire Agreement**. This Agreement, along with any other agreements set forth herein, including without limitation, the Proprietary Information and Inventions Agreement, constitutes the entire agreement between the parties with respect to the employment of Executive.

(h)

SANGAMO THERAPEUTICS, INC.

By:
Name:

Title:

GARY LOEB

EXHIBIT A

EMPLOYEE CONFIDENTIAL INFORMATION AND INVENTION ASSIGNMENT AGREEMENT

In consideration of my employment or continued employment by Sangamo Therapeutics, Inc. ("Sangamo"), its direct and indirect subsidiaries, parents, affiliates, predecessors, successors and assigns (together with Sangamo, the "**Company**"), and the compensation and benefits provided to me now and during my employment with the Company, I hereby enter into this Employee Confidential Information and Invention Assignment Agreement (the "**Agreement**"), which will be deemed effective as of the first day of my employment with the Company:

1. CONFIDENTIAL INFORMATION PROTECTIONS.

1.1 **Recognition of Company's Rights; Nondisclosure.** I understand and acknowledge that my employment by Company creates a relationship of confidence and trust with respect to Company's Confidential Information (as defined below) and that Company has a protectable interest therein. At all times during and after my employment, I will hold in confidence and will not disclose, use, lecture upon, or publish any of Company's Confidential Information, except as such disclosure, use or publication may be required in connection with my work for Company, or unless an officer of Company expressly authorizes such disclosure. I will obtain Company's written approval before publishing or submitting for publication any material (written, oral, or otherwise) that discloses and/or incorporates any Confidential Information. I hereby assign to Sangamo any rights I may have or acquire in such Confidential Information and recognize that all Confidential Information shall be the sole and exclusive property of Sangamo and its assigns. I will take all reasonable precautions to prevent the inadvertent accidental disclosure of Confidential Information. Notwithstanding the foregoing, pursuant to 18 U.S.C. Section 1833(b), I shall not be held criminally or civilly liable under any federal or state trade secret law for the disclosure of a trade secret that: (1) is made in confidence to a federal, state, or local government official, either directly or indirectly, or to an attorney, and solely for the purpose of reporting or investigating a suspected violation of law; or (2) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal.

1.2 **Confidential Information.** The term **"Confidential Information"** shall mean any and all confidential knowledge, data or information of Company. By way of illustration but not limitation, **"Confidential Information"** includes (a) trade secrets, inventions, mask works, ideas, processes, formulas, software in source or object code versions, data, programs, other works of authorship, know-how, improvements, discoveries, developments, designs and techniques and any other proprietary technology and all Intellectual Property Rights therein (collectively, **"Inventions"**); (b) information regarding research, development, new products, marketing and selling, business plans, budgets and unpublished financial statements, licenses, prices and costs, margins, discounts, credit terms, pricing and billing policies, quoting procedures, methods of obtaining business, forecasts, future plans and potential strategies, financial projections and business strategies, operational plans, financing and capital-raising plans, activities and agreements, internal services and operational manuals, methods of conducting Company business, suppliers and supplier information, and purchasing; (c) information regarding customers and potential customers of Company, including customer lists, names, representatives, their needs or desires with respect to the types of products or services offered by Company, proposals, bids, contracts and their contents and parties, the type and quantity of products and services provided or sought to be provided to customers and potential customers of Company and other non-public information relating to customers and potential customers; (d) information regarding any of Company's business partners and their services, including names, representatives, proposals, bids, contracts and their contents and parties, the type and quantity of products and services received by Company, and other non-public information relating to business partners; (e) information regarding personnel, employee lists, compensation, and employee skills; and (f) any other non-public information which a competitor of Company could use to the competitive disadvantage of Company. Notwithstanding the foregoing, it is understood that, at all such times, I am free to use information which is generally known in the trade or industry through no breach of this Agreement or other act or omission by me. Further, notwithstanding the foregoing or anything to the contrary in this Agreement or any other agreement between the Company and me, nothing in this Agreement shall limit my right to discuss my employment or report possible violations of law or regulation with any federal government agency or similar

state or local agency or to discuss the terms and conditions of my employment with others to the extent expressly permitted by Section 7 of the National Labor Relations Act.

1.3 **Third Party Information.** I understand, in addition, that Company has received, and in the future will receive, from third parties their confidential and/or proprietary knowledge, data or information (**"Third Party Information"**) subject to a duty on Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During my employment and thereafter, I will hold Third Party Information in confidence and will not disclose to anyone (other than Company personnel who need to know such information in connection with their work for Company) or use, except in connection with my work for Company, Third Party Information unless expressly authorized by an officer of Company in writing.

1.4 **No Improper Use of Information of Prior Employers and Others.** During my employment by Company, I will not improperly use or disclose confidential information or trade secrets, if any, of any former employer or any other person to whom I have an obligation of confidentiality, and I will not bring onto the premises of Company any unpublished documents or any property belonging to any former employer or any other person to whom I have an obligation of confidentiality unless consented to in writing by that former employer or person.

2. ASSIGNMENTS OF INVENTIONS.

2.1 **Definitions.** As used in this Agreement, the term **"Intellectual Property Rights"** means all trade secrets, Copyrights, trademarks, mask work rights, patents and other intellectual property rights recognized by the laws of any jurisdiction or country; the term **"Copyright"** means the exclusive legal right to reproduce, perform, display, distribute and make derivative works of a work of authorship (as a literary, musical, or artistic work) recognized by the laws of any jurisdiction or country; and the term **"Moral Rights"** means all paternity, integrity, disclosure, withdrawal, special and any other similar rights recognized by the laws of any jurisdiction or country.

2.2 **Excluded Inventions and Other Inventions.** Attached hereto as **Attachment 1** is a list describing all existing Inventions, if any, that may relate to Company's business or actual or demonstrably anticipated research or development and that were made by me or acquired by me prior to the commencement of my employment with, and which are not to be assigned to, Company (**"Excluded Inventions"**). If no such list is attached, I represent and agree that it is because I have no rights in any existing Inventions that may relate to Company's business or actual or demonstrably anticipated research or development. For purposes of this Agreement, **"Other Inventions"** means Inventions in which I have or may have an interest, as of the commencement of my employment, other than Company Inventions (defined below) and Excluded Inventions. I acknowledge and agree that if I use any Excluded Inventions or any Other Inventions in the scope of my employment, or if I include any Excluded Inventions or Other Inventions in any product or service of Company, or if my rights in any Excluded Inventions or Other Inventions may block or interfere with, or may otherwise be required for, the exercise by Company of any rights assigned to Company under this Agreement, I will immediately so notify Company in writing. Unless Company and I agree otherwise in writing as to particular Excluded Inventions or Other Inventions, I hereby grant to Company, in such circumstances (whether or not I give Company notice as required above), a non-exclusive, perpetual, transferable, fully-paid and royalty-free, irrevocable and worldwide license, with rights to sublicense through multiple levels of sublicensees, to reproduce, make derivative works of, distribute, publicly perform, and publicly display in any form or medium, whether now known or later developed, make, have made, use, sell, import, offer for sale, and exercise any and all present or future rights in, such Excluded Inventions and Other Inventions. To the extent that any third parties have rights in any such Excluded Inventions or Other Inventions, I hereby represent and warrant that such third party or parties have validly and irrevocably granted to me the right to grant the license stated above.

2.3 **Assignment of Company Inventions.** Inventions assigned to Sangamo, or to a third party as directed by Sangamo pursuant to Section 2.6, are referred to in this Agreement as **"Company Inventions**.**"** Subject to Section 2.4 (Unassigned or Nonassignable Inventions) and except for Excluded Inventions set forth in **Attachment 1** and Other Inventions, I hereby assign to Sangamo all my right, title, and interest in and to any and all Inventions (and all Intellectual Property Rights with respect thereto) made, conceived, reduced to practice, or learned by me, either alone or with others, during the period of my employment by Company. To the extent required by applicable Copyright laws, I agree to assign in the future (when any copyrightable Inventions are first fixed in a tangible medium of expression) my Copyright rights in and to such Inventions. Any assignment of Company Inventions (and all Intellectual Property Rights with respect

thereto) hereunder includes an assignment of all Moral Rights. To the extent such Moral Rights cannot be assigned to Sangamo and to the extent the following is allowed by the laws in any country where Moral Rights exist, I hereby unconditionally and irrevocably waive the enforcement of such Moral Rights, and all claims and causes of action of any kind against Company or related to Company's customers, with respect to such rights. I further acknowledge and agree that neither my successors-in-interest nor legal heirs retain any Moral Rights in any Company Inventions (and any Intellectual Property Rights with respect thereto).

2.4 **Unassigned or Nonassignable Inventions.** I recognize that this Agreement will not be deemed to require assignment of any Invention that is covered under California Labor Code section 2870(a) (the "**Specific Inventions Law**"), as detailed on **Attachment 2**.

2.5 **Obligation to Keep Company Informed.** During the period of my employment and for one (1) year after termination of my employment, I will promptly and fully disclose to Company in writing all Inventions authored, conceived, or reduced to practice by me, either alone or jointly with others. In addition, I will promptly disclose to Company all patent applications filed by me or on my behalf within one (1) year after termination of employment. At the time of each such disclosure, I will advise Company in writing of any Inventions that I believe fully qualify for protection under the provisions of the Specific Inventions Law; and I will at that time provide to Company in writing all evidence necessary to substantiate that belief. Company will keep in confidence and will not use for any purpose or disclose to third parties without my consent any confidential information disclosed in writing to Company pursuant to this Agreement relating to Inventions that qualify fully for protection under the Specific Inventions Law. I will preserve the confidentiality of any Invention that does not fully qualify for protection under the Specific Inventions Law.

2.6 **Government or Third Party.** I agree that, as directed by Company, I will assign to a third party, including without limitation the United States, all my right, title, and interest in and to any particular Company Invention.

2.7 **Ownership of Work Product.** I agree that Sangamo will exclusively own all work product that is made by me (solely or jointly with others) within the scope of my employment, and I hereby irrevocably and unconditionally assign to Sangamo all right, title, and interest worldwide in and to such work product. I acknowledge that all original works of authorship which are made by me (solely or jointly with others) within the scope of my employment and which are protectable by Copyright are "works made for hire," pursuant to United States Copyright Act (17 U.S.C., Section 101). I understand and agree that I have no right to publish on, submit for publishing, or use for any publication any work product protected by this Section, except as necessary to perform services for Company.

2.8 **Enforcement of Intellectual Property Rights and Assistance.** I will assist Company in every proper way to obtain, and from time to time enforce, United States and foreign Intellectual Property Rights and Moral Rights relating to Company Inventions in any and all countries. To that end I will execute, verify and deliver such documents and perform such other acts (including appearances as a witness) as Company may reasonably request for use in applying for, obtaining, perfecting, evidencing, sustaining and enforcing such Intellectual Property Rights and the assignment thereof. In addition, I will execute, verify and deliver assignments of such Intellectual Property Rights to Sangamo or its designee, including the United States or any third party designated by Sangamo. My obligation to assist Company with respect to Intellectual Property Rights relating to such Company Inventions in any and all countries will continue beyond the termination of my employment, but Company will compensate me at a reasonable rate after my termination for the time actually spent by me at Company's request on such assistance. In the event Company is unable for any reason, after reasonable effort, to secure my signature on any document needed in connection with the actions specified in this paragraph, I hereby irrevocably designate and appoint Company and its duly authorized officers and agents as my agent and attorney in fact, which appointment is coupled with an interest, to act for and in my behalf to execute, verify and file any such documents and to do all other lawfully permitted acts to further the purposes of this Agreement with the same legal force and effect as if executed by me. I hereby waive and quitclaim to Company any and all claims, of any nature whatsoever, which I now or may hereafter have for infringement of any Intellectual Property Rights assigned under this Agreement to Sangamo.

2.9 **Incorporation of Software Code.** I agree that I will not incorporate into any Company software or otherwise deliver to Company any software code licensed under the GNU General Public License or Lesser General Public License or any other license that, by its terms, requires or conditions the use or distribution of such code on the disclosure,

licensing, or distribution of any source code owned or licensed by Company **except** in strict compliance with Company's policies regarding the use of such software.

3. **RECORDS.** I agree to keep and maintain adequate and current records (in the form of notes, sketches, drawings and in any other form that is required by Company) of all Confidential Information developed by me and all Company Inventions made by me during the period of my employment at Company, which records will be available to and remain the sole property of Company at all times.

4. **DUTY OF LOYALTY DURING EMPLOYMENT.** I agree that during the period of my employment by Company I will not, without Company's express written consent, directly or indirectly (a) engage in any other employment or (b) engage in any other activities that are competitive with, or would otherwise conflict with, my employment by Company.

5. **NO SOLICITATION OF EMPLOYEES, CONSULTANTS, OR CONTRACTORS.** I agree that during the period of my employment and for the one (1) year period after the date my employment ends for any reason, including but not limited to voluntary termination by me or involuntary termination by Company, I will not, as an officer, director, employee, consultant, owner, partner, or in any other capacity, either directly or through others, except on behalf of Company, solicit, induce, encourage, or participate in soliciting, inducing or encouraging any employee, consultant, or independent contractor of Company to terminate his, her or its relationship with Company, even if I did not initiate the discussion or seek out the contact.

6. **REASONABLENESS OF RESTRICTIONS.** I agree that I have read this entire Agreement and understand it. I agree that this Agreement does not prevent me from earning a living or pursuing my career. I agree that the restrictions contained in this Agreement are reasonable, proper, and necessitated by Company's legitimate business interests. I represent and agree that I am entering into this Agreement freely and with knowledge of its contents with the intent to be bound by the Agreement and the restrictions contained in it.

7. **NO CONFLICTING AGREEMENT OR OBLIGATION.** I represent that my employment by Company does not and will not breach any agreement with any former employer or third party, including any noncompete agreement or any agreement to keep in confidence or refrain from using information acquired by me prior to my employment by Company. I further represent that I have not entered into, and will not enter into, any agreement, either written or oral, in conflict with my obligations under this Agreement.

8. **RETURN OF COMPANY PROPERTY.** Subject to the nondisclosure requirements of Section 1.1 above, upon termination of my employment or upon Company's request at any other time, I will deliver to Company any and all of Company's property and equipment and any and all drawings, notes, memoranda, specifications, devices, formulas and documents, together with all copies thereof, and any other material containing or disclosing any Company Inventions, Third Party Information or Confidential Information of Company. I agree that I will not copy, delete, or alter any information contained upon my Company computer or Company equipment before I return it to Company. In addition, if I have used any personal computer, server, or e-mail system to receive, store, review, prepare or transmit any Company information, including but not limited to, Confidential Information, I agree to provide Company with a computer-useable copy of all such Confidential Information and then permanently delete and expunge such Confidential Information from those systems; and I agree to provide Company access to my system as reasonably requested to verify that the necessary copying and/or deletion is completed. I further agree that any property situated on Company's premises and owned by Company, including disks and other storage media, filing cabinets or other work areas, is subject to inspection by Company's personnel at any time with or without notice.

9. LEGAL AND EQUITABLE REMEDIES.

9.1 I agree that it may be impossible to assess the damages caused by my violation of this Agreement or any of its terms. I agree that any threatened or actual violation of this Agreement or any of its terms will constitute immediate and irreparable injury to Company, and Company will have the right to enforce this Agreement and any of its provisions by injunction, specific performance or other equitable relief, without bond and without prejudice to any other rights and remedies that Company may have for a breach or threatened breach of this Agreement.

9.2 In the event Company enforces this Agreement through a court or arbitration order, I agree that the restrictions of Sections 5 will remain in effect for a period of twelve (12) months from the effective date of the order enforcing the Agreement.

10. **NOTICES.** Any notices required or permitted under this Agreement will be given to Company at its headquarters location at the time notice is given, and to me at my address as listed on Company payroll, or at such other address as Company or I may designate by written notice to the other. Notice will be effective upon receipt or refusal of delivery. If delivered by certified or registered mail, notice will be considered to have been given five (5) business days after it was mailed, as evidenced by the postmark. If delivered by courier or express mail service, notice will be considered to have been given on the delivery date reflected by the courier or express mail service receipt.

11. NOTIFICATION OF NEW EMPLOYER. If I leave the employ of Company, I consent to the notification of my new employer of my rights and obligations under this Agreement, by Company providing a copy of this Agreement or otherwise.

12. GENERAL PROVISIONS.

12.1 **Governing Law.** This Agreement will be governed by and construed according to the laws of the State of California as such laws are applied to agreements entered into and to be performed entirely within California between California residents.

12.2 **Severability.** In case any one or more of the provisions, subsections, or sentences contained in this Agreement will, for any reason, be held to be invalid, illegal or unenforceable in any respect, such invalidity, illegality or unenforceability will not affect the other provisions of this Agreement, and this Agreement will be construed as if such invalid, illegal or unenforceable provision had never been contained in this Agreement. If moreover, any one or more of the provisions contained in this Agreement will for any reason be held to be excessively broad as to duration, geographical scope, activity or subject, it will be construed by limiting and reducing it, so as to be enforceable to the extent compatible with the applicable law as it will then appear.

12.3 **Successors and Assigns.** This Agreement is for my benefit and the benefit of Company, its successors, assigns, parent corporations, direct and indirect subsidiaries, affiliates, and purchasers, and will be binding upon my heirs, executors, administrators and other legal representatives.

12.4 **Survival.** This Agreement shall survive the termination of my employment, regardless of the reason, and the assignment of this Agreement by Company to any successor in interest or other assignee.

12.5 **Employment At-Will.** I agree and understand that nothing in this Agreement will change my at-will employment status or confer any right with respect to continuation of employment by Company, nor will it interfere in any way with my right or Company's right to terminate my employment at any time, with or without cause or advance notice.

12.6 **Waiver.** No waiver by Company of any breach of this Agreement will be a waiver of any preceding or succeeding breach. No waiver by Company of any right under this Agreement will be construed as a waiver of any other right. Company will not be required to give notice to enforce strict adherence to all terms of this Agreement.

12.7 **Export.** I agree not to export, reexport, or transfer, directly or indirectly, any U.S. technical data acquired from Company or any products utilizing such data, in violation of the United States export laws or regulations.

12.8 **Entire Agreement.** This Agreement is the final, complete and exclusive agreement of the parties with respect to the subject matter of this Agreement and supersedes and merges all prior discussions between the parties; provided, however, prior to the execution of this Agreement, if Company and I were parties to any agreement regarding the subject matter hereof, that agreement will be superseded by this Agreement prospectively only. No modification of or amendment to this Agreement, or any waiver of any rights under this Agreement, will be effective unless in writing and signed by me and an authorized officer of the Company. Any subsequent change or changes in my duties, salary or compensation will not affect the validity or scope of this Agreement. If no other agreement governs nondisclosure and assignment of inventions during any period in which I was previously engaged or am in the future engaged by Company

as an independent contractor, the obligations pursuant to sections of this Agreement titled "Confidential Information Protections" and "Assignment of Inventions" shall apply.

8.2

GARY LOEB:

I HAVE READ, UNDERSTAND, AND ACCEPT THIS AGREEMENT.

_

(Signature)

By:_____

Title:_____

Date: _____

SANGAMO THERAPEUTICS, INC.:

ACCEPTED AND AGREED:

_

(Signature)

By: _____

Title: _____

Date: _____

ATTACHMENT 1

PRIOR INVENTIONS

TO: Sangamo Therapeutics, Inc.

FROM: Gary Loeb

DATE:

SUBJECT: Prior Inventions

1. Except as listed in Section 2 below, the following is a complete list of all inventions or improvements relevant to the subject matter of my employment by Sangamo Therapeutics, Inc. ("**Company**") that have been made or conceived or first reduced to practice by me alone or jointly with others prior to my engagement by Company:

No inventions or improvements.

See below:

____

____

____

Additional sheets attached.

2. Due to a prior confidentiality agreement, I cannot complete the disclosure under Section 1 above with respect to inventions or improvements generally listed below, the intellectual property rights and duty of confidentiality with respect to which I owe to the following party(ies):

Invention or Improvement Party(ies) Relationship

1.

2.

3.

Additional sheets attached.

ATTACHMENT 2

LIMITED EXCLUSION NOTIFICATION

This is to notify you in accordance with Section 2872 of the California Labor Code that the foregoing Agreement between you and Company does not require you to assign or offer to assign to Company any Invention that you develop entirely on your own time without using Company's equipment, supplies, facilities or trade secret information, except for those Inventions that either:

(a) Relate at the time of conception or reduction to practice to Company's business, or actual or demonstrably anticipated research or development; or

(b) Result from any work performed by you for Company.

To the extent a provision in the foregoing Agreement purports to require you to assign an Invention otherwise excluded from the preceding paragraph, the provision is against the public policy of this state and is unenforceable.

This limited exclusion does not apply to any patent or Invention covered by a contract between Company and the United States or any of its agencies requiring full title to such patent or Invention to be in the United States.

EXECUTIVE EMPLOYMENT AGREEMENT

Employment Agreement ("Agreement") made as of the 1st day of November, 2017 by and between Sangamo Therapeutics, Inc., a Delaware corporation (the "Company"), and Andy Ramelmeier ("Executive") (collectively, the "Parties").

R E C I T A L S

WHEREAS, the Company desires to employ Executive, and Executive desires to be employed by the Company, on the terms and conditions set forth in this Agreement.

NOW, THEREFORE, in consideration of the mutual promises set forth herein, the Parties agree follows:

1. **Employment**.

The Company hereby agrees to employ Executive and Executive hereby agrees to accept such employment, on the terms and conditions set forth in this Agreement, with a start date of January 1, 2018 (the "Effective Date").

2. **At-Will Employment**.

Executive shall be employed on an at-will basis. Either Executive or the Company may terminate employment at any time, with or without cause, and with or without advance notice.

3. **Position, Duties and Obligations**.

(a) Executive shall be appointed as the Company's Senior Vice President, Technical Operations. Executive shall serve in such position, and in such other positions as the Board and the Company may from time to time reasonably determine, subject at all times to the direction, supervision and authority of the Chief Executive Officer or such other officer as designated by the Chief Executive Officer.

(b) During Executive's employment, Executive shall perform Executive's duties faithfully and to the best of Executive's ability and shall devote substantially all of Executive's business time, attention, knowledge, skills and interests to the business of the Company (and its subsidiaries).

(c) During Executive's employment, Executive shall not, whether directly or indirectly, render any services of a commercial or professional nature to any other person or organization, whether for compensation or otherwise, without the prior written consent of the Chief Executive Officer.

(d) The foregoing in this Section 1 shall not preclude Executive from serving on any corporate, civic or charitable boards or committees on which Executive is serving as of the Effective Date and discloses to the Chief Executive Officer prior to the Effective Date or on

which Executive commences service following such date with the Chief Executive Officer's prior written approval, so long as such activities do not interfere with the performance of Executive's responsibilities hereunder.

(e) Executive's principal place of business will initially be located in Richmond, California and is anticipated to transition to Brisbane, California in connection with the Company's planned relocation to a new facility.

(f) Executive represents that Executive may enter into this Agreement, accept employment with the Company under the terms of this Agreement, and perform the duties and responsibilities contemplated by this Agreement without violating any other agreement or agreements with other parties including but not limited to prior employers.

4. **Compensation and Benefits**.

(a) **Base Compensation**. The Company shall pay to Executive an annual base salary of three hundred sixty five thousand dollars ($365,000), prorated for any partial employment period and payable in equal monthly installments in accordance with the Company's payroll schedule. The Compensation Committee of the Board shall annually review the then-current level of Executive's base salary to determine the amount, if any, of change to such salary.

(b) **Annual Performance Bonus**. Executive is not eligible to earn any performance bonus for the 2017 calendar year performance period. Commencing with the 2018 calendar year performance period, the target amount of Executive's annual cash bonus shall be thirty five percent (35%) of Executive's annual base salary. The Board shall have sole discretion to determine whether any annual cash bonus will be paid based upon achievement of both corporate objectives and Executive's personal objectives, and the sole discretion to determine that actual amount of any such bonus. Executive must be an employee in good standing on the date that the Board makes such determination in order to earn any such bonus, which determination shall be made by the Board between January 1 and March 31 of the calendar year first following the performance period calendar year. Any bonus to which Executive becomes entitled for a particular calendar year shall be paid in accordance with the terms of the applicable bonus plan, but in no event later than the second payroll period following such Board determination. The Compensation Committee of the Board shall annually review Executive's then target amount for the annual cash bonus to determine the amount, if any, of change to such target amount.

(c) **Benefits**. Executive will be entitled to the employee benefits generally provided to other executive officers of the Company. Under the Company's vacation policy, Executive will have 10 sick days, 15 vacation days and 10 Company holidays per year.

(d) **Executive Severance Plan**. Executive shall be deemed an Eligible Employee and entitled to receive certain severance benefits under the Sangamo Therapeutics, Inc. Executive Severance Plan dated March 14, 2017 (the "Plan") subject to the terms and

conditions of the Plan. A copy of the Plan has been provided to Executive concurrently with this Agreement.

(e) **Equity**. As an inducement to Executive's commencement of employment, effective as of the last business day of the month in which the Effective Date occurs, the Compensation Committee of the Board shall grant Executive a stock option to purchase up to 120,000 shares of the Company's Common Stock with an exercise price per share equal to the fair market value of the Company's Common Stock on the applicable date of grant (the "Option") under the Company's 2013 Stock Incentive Plan (the "Plan"). The Option will be evidenced by the standard stock option agreement under the Plan and will be subject to the terms and conditions of that agreement and the Plan, with one-quarter of the Option shares vesting twelve (12) months from the Effective Date and the remainder vesting in equal monthly installments for thirty-six (36) months thereafter, provided Executive remains a full-time employee through each such vesting date. Vesting of the Option and any subsequent equity grants will cease upon termination of Executive's service by either party for any reason.

(f) **Clawback**. Notwithstanding anything to the contrary in this Agreement, all compensation paid to Executive by the Company (whether payable pursuant to this Agreement or otherwise) will be subject to reduction, recovery and/or recoupment to the extent required and allowed by any present or future law, government regulation or stock exchange listing requirement (or any policy adopted by the Company which ensures compliance with the requirements of any such law, government regulation or stock exchange listing requirement).

(g) **Resignation from Positions**. Notwithstanding any other provision of this Agreement to the contrary, upon any termination of employment (whether voluntary or involuntary), Executive, upon written request from the Board, shall immediately resign from any positions Executive has with the Company (or any subsidiary), whether as an executive, officer, employee, consultant, director, trustee, fiduciary or otherwise.

5. **Confidentiality**. Executive agrees to abide by the terms and conditions of the Proprietary Information, Inventions and Materials Agreement between Executive and the Company, a copy of which is attached as Exhibit A. Executive further agrees that at all times both during Executive's employment by the Company and after Executive's employment ends, Executive will keep in confidence and trust, and will not use or disclose, except as directed by the Company, any confidential or proprietary information of the Company.

6. **Tax Withholdings**. Any and all cash compensation and other benefits (including without limitation, base salary and annual bonus) paid to Executive under this Agreement shall be subject to all applicable tax withholding requirements, and the Company shall make such other deductions as may be required and/or allowed by applicable law and/or as authorized in writing by Executive.

7. **Arbitration**. Any dispute, controversy, or claim, whether contractual or non-contractual, between Executive and the Company shall be resolved by binding arbitration before the Judicial Arbitration and Mediation Service (the "JAMS"), in accordance with the JAMS Employment Arbitration Rules and Procedures, available at www.jamsadr.com. Executive and the Company

each agree that before proceeding to arbitration, they will mediate disputes before the JAMS by a mediator approved by the JAMS. If mediation fails to resolve the matter, any subsequent arbitration shall be conducted by an arbitrator approved by the JAMS and mutually acceptable to Executive and the Company. All disputes, controversies, and claims shall be conducted by a single arbitrator, who shall: (i) allow discovery authorized by California Code of Civil Procedure Section 1282, et seq., or any other discovery required by applicable law; and (ii) issue a written award that sets forth the essential findings of fact and conclusions of law on which the award is based. The arbitrator shall have the authority to award any relief authorized by law in connection with the asserted claims or disputes. Judgment upon the arbitrator's award may be entered in any court having jurisdiction thereof. If Executive and the Company are unable to agree on the mediator or the arbitrator, then the JAMS shall select the mediator/arbitrator. The resolution of the dispute by the arbitrator shall be final, binding, non-appealable, and fully enforceable by a court of competent jurisdiction under the Federal Arbitration Act. The arbitration award shall be in writing and shall include a statement of the reasons for the award. The arbitration shall be held in San Francisco, California. The Company shall pay all JAMS, mediation, and arbitrator's fees and costs, irrespective of who raised the claim and the outcome of arbitration.

8. **Miscellaneous**.

(a) **Conditions to Agreement**. This Agreement is contingent upon a background check clearance, satisfactory reference check, and satisfactory proof of Executive's legal right to work in the United States. Executive agrees to provide any documentation or information at the Company's request to facilitate these processes.

(b) **Governing Law**. This Agreement shall be interpreted, construed, governed and enforced according to the laws of the State of California.

(c) **Attorneys' Fees**. In the event of any controversy, claim or dispute between the parties, arising out of or relating to this Agreement or the breach hereof, or the interpretation hereof, each party shall bear its own legal fees and expenses. Notwithstanding the foregoing, in the event of a finding by any court having jurisdiction over such matter that any party initiating an action under this Agreement failed to have a reasonable prospect of prevailing on its claim, the court shall have discretion to award the prevailing party attorneys' fees and costs incurred by it with respect to such claim or action. The "prevailing party" means the party determined by the court to have most nearly prevailed, even if such party did not prevail in all matters, not necessarily the one in whose favor a judgment is rendered.

(d) **Amendments**. No amendment or modification of the terms or conditions of this Agreement shall be valid unless in writing and signed by the Parties hereto.

(e) **Severability**. If any provision of this Agreement as applied to any party or to any circumstance should be adjudged by a court of competent jurisdiction (or determined by the arbitrator) to be void or unenforceable for any reason, the invalidity of that provision shall in no way affect (to the maximum extent permissible by law) the application of such provision under circumstances different from those adjudicated by the court or determined by the arbitrator, the application of any other provision of this Agreement, or the enforceability or

invalidity of this Agreement as a whole. Should any provision of this Agreement become or be deemed invalid, illegal or unenforceable in any jurisdiction by reason of the scope, extent or duration of its coverage, then such provision shall be deemed amended to the extent necessary to conform to applicable law so as to be valid and enforceable or, if such provision cannot be so amended without materially altering the intention of the parties, then such provision will be stricken, and the remainder of this Agreement shall continue in full force and effect.

(f) **Successors and Assigns**. The rights and obligations of the Company under this Agreement shall inure to the benefit of and shall be binding upon the successors and assigns of the Company. Executive shall not be entitled to assign any of her rights or obligations under this Agreement.

(g) **Entire Agreement**. This Agreement, along with any other agreements set forth herein, including without limitation, the Proprietary Information and Inventions Agreement, constitutes the entire agreement between the parties with respect to the employment of Executive.

(h) [signature page follows]

SANGAMO THERAPEUTICS, INC.

By:
Name:

Title:
ANDY RAMELMEIER

152273479 v4

EXHIBIT A

Proprietary Information, Inventions and Materials Agreement

152273479 v4

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [*], HAS BEEN OMITTED BECAUSE IT IS BOTH (I) NOT MATERIAL AND (II) WOULD BE COMPETITIVELY HARMFUL IF PUBLICLY DISCLOSED.

December 17, 2019

Sandy Macrae, Ph.D.
Chief Executive Officer
Sangamo Therapeutics, Inc.
7000 Marina Blvd
Brisbane, CA 94804

Re: SB-525 IND transfer and [*] milestone under the Collaboration and License Agreement between Sangamo Therapeutics, Inc. (“Sangamo”) and Pfizer Inc. (“Pfizer”), dated May 10, 2017 (“Collaboration Agreement”).

Dear Dr. Macrae,

This letter (“Letter Amendment”) sets forth Sangamo’s and Pfizer’s understanding and agreement related to transferring the IND for SB-525 and Pfizer potentially paying the [*] milestone for SB-525 ahead of [*] for SB-525. This Letter Amendment is an amendment to the Collaboration Agreement and capitalized terms used herein but not otherwise defined shall have the meaning ascribed to them in the Collaboration Agreement.

Section 5.2 of the Collaboration Agreement sets forth that Sangamo would retain ownership of the IND for SB-525 and shall be responsible for all regulatory activities for SB-525 in the U.S., in each case through the IND Transition Date. Although the IND Transition Date has not yet been reached, in order to advance the SB-525 development, Pfizer would like to begin the process of Sangamo transferring ownership of the IND for SB-25, namely IND 17250 (the “IND”) and transferring responsibility for all regulatory activities for SB-525. Before Pfizer can approve the IND and responsibility transfer, Pfizer must ensure the readiness of transfer of the IND, which includes but is not limited to [*] (collectively, the “Transfer Preparation Activities”), and Sangamo is willing to cooperate reasonably with and provide reasonable assistance to Pfizer in order to complete these Transfer Preparation Activities on or before [*]. Once the Transfer Preparation Activities are complete, Pfizer will promptly seek internal approval to provide written authorization to Sangamo to instruct the U.S. FDA to transfer ownership of the IND for SB-525 to Pfizer, and such approval shall not be unreasonably withheld. Immediately after

Pfizer receives such internal approval, it will inform Sangamo and Sangamo shall instruct the U.S. FDA to transfer ownership of the IND; provided that Sangamo will allow Pfizer to review and approve the instructions it intends to provide to the U.S. FDA prior to delivering such instructions to the U.S. FDA. Upon Sangamo's submission, Pfizer will timely submit to the U.S. FDA its acceptance of ownership of the IND as to effectuate its acceptance of the IND transfer by [*], or such other date as mutually agreed in writing by the Parties. The date on which Pfizer submits its acceptance of the ownership of the IND to the U.S. FDA will be the IND Transition Date under the Collaboration Agreement. In the event the Transfer Preparation Activities are not completed by [*], Sangamo and Pfizer will reasonably discuss extending such deadline, with both parties recognizing time is of the essence and that such Transfer Preparation Activities should be completed as soon as reasonably practicable. In no event will the transfer of the IND cancel the obligations of each of Sangamo and Pfizer to cooperate reasonably and provide reasonable assistance to the other party with regards to preparation of Regulatory Materials for any Product, as set forth in the Collaboration Agreement.

Section 9.4 of the Collaboration Agreement sets forth certain development milestones to be paid by Pfizer to Sangamo following the achievement of defined milestone events. The [*] would be paid [*]. Although the [*] has not yet been achieved, at [*]. As such, if Sangamo [*] as set forth in this letter, then upon Pfizer's submission of its acceptance of the ownership of the IND, the [*] milestone payment for [*] shall be due, [*]. Sangamo and Pfizer recognize and agree that [*]. In the event that [*] in accordance with the terms and conditions set forth by the Collaboration Agreement prior to this Letter Amendment.

Your signature below and return of this letter will serve as Sangamo's agreement to the content of this letter and the terms and conditions set forth herein.

Sincerely,

[*]
[*]
[*]

……
Read, Understood, and Agreed On behalf of Sangamo Therapeutics, Inc.

__/s Alexander Macrae_____
Signature

_____Alexander Macrae_____
Printed Name & Title

_____Dec 17, 2019_____
Date

Exhibit A

[*]

Exhibit 21.1

Subsidiaries of the Company

Gendaq Limited (U.K.)

Ceregene Inc. (Delaware)

Sangamo Therapeutics France S.A.S. (France)

Exhibit 23.1

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements:

1 Registration Statements (Forms S-8 No. 333-166220, 333-189621, 333-206173, 333-221827, and 333-225552) pertaining to the Amended and Restated 2013 Stock Incentive Plan, 2010 Employee Stock Purchase Plan, and 2018 Equity Incentive Plan of Sangamo Therapeutics, Inc., and

2 Registration Statements (Forms S-3 No. 333-218294 and 333-224418) and related prospectuses of Sangamo Therapeutics, Inc.;

of our reports dated February 28, 2020, with respect to the consolidated financial statements of Sangamo Therapeutics, Inc. and the effectiveness of internal control over financial reporting of Sangamo Therapeutics, Inc. included in this Annual Report (Form 10-K) of Sangamo Therapeutics, Inc. for the year ended December 31, 2019.

/s/ Ernst & Young LLP

Redwood City, California
February 28, 2020

Exhibit 31.1

CERTIFICATION

I, Alexander D. Macrae, certify that:

1. I have reviewed this annual report on Form 10-K of Sangamo Therapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 28, 2020

/s/ ALEXANDER D. MACRAE

Alexander D. Macrae

President and Chief Executive Officer

(Principal Executive Officer)

Exhibit 31.2

CERTIFICATION

I, Sung Lee, certify that:

1. I have reviewed this annual report on Form 10-K of Sangamo Therapeutics, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) for the registrant and have:

   (a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

   (b) Designed such internal control over financial reporting or caused such internal control over financial reporting to be designed under our supervision, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles;

   (c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

   (d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

   (a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

   (b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: February 28, 2020

/s/ SUNG LEE

Sung Lee

Executive Vice President and Chief Financial Officer

(Principal Financial Officer)

Exhibit 32.1

Certifications Pursuant to 18 U.S.C. §1350, as Adopted

Pursuant to §906 of the Sarbanes-Oxley Act of 2002

Pursuant to the requirement set forth in Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), 18 U.S.C. §1350, as adopted pursuant to §906 of the Sarbanes-Oxley Act of 2002, Alexander Macrae, Chief Executive Officer of Sangamo Therapeutics, Inc. (the "Company"), and Sung Lee, Chief Financial Officer of the Company, each hereby certifies in his or her capacity, that, to the best of his or her knowledge:

(1) the Company's Annual Report on Form 10-K for the year ended December 31, 2019, to which this Certification is attached as Exhibit 32.1 (the "Report") fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act; and

(2) the information contained in the Report fairly presents, in all material respects, the financial condition and results of operations of the Company.

/s/ ALEXANDER D. MACRAE

Alexander D. Macrae

President and Chief Executive Officer

(Principal Executive Officer)

Date: February 28, 2020

/s/ SUNG LEE

Sung Lee

Executive Vice President and Chief Financial Officer

(Principal Financial Officer)

Date: February 28, 2020

This certification accompanies the Annual Report on Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Sangamo Therapeutics, Inc. under the Securities Act of 1933, as amended, or the Exchange Act (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing. A signed original of this written statement required by Section 906 of the Sarbanes-Oxley Act of 2002 has been provided to Sangamo Therapeutics, Inc. and will be retained by Sangamo Therapeutics, Inc. and furnished to the Securities and Exchange Commission or its staff upon request.