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

FORM 10-Q

(Mark One)

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

For the quarterly period ended June 30, 2018

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)	**(IRS Employer Identification No.)**

501 Canal Blvd
Richmond, California 94804
(Address of principal executive offices)

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

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 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 and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted 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 and post 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 an emerging growth company. See definitions 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	☐ (Do not check if a smaller reporting company)	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 ☒

As of August 1, 2018, 101,673,757 shares of the issuer's common stock, par value $0.01 per share, were outstanding.

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SANGAMO THERAPEUTICS, INC.

PART I. FINANCIAL INFORMATION

PART II. OTHER INFORMATION

Unless the context suggests otherwise, references in this Quarterly Report on Form 10-Q, or Quarterly Report, to "Sangamo," the "Company," "we," "us," and "our" refer to Sangamo Therapeutics, Inc. and, where appropriate, our wholly owned subsidiaries.

ZFP Therapeutic®, Engineering Genetic Cures®, and Pioneering Genetic Cures® are registered trademarks of Sangamo Therapeutics, Inc. Any third-party trade names, trademarks and service marks appearing in this Quarterly Report are the property of their respective holders.

Convenience translations between Euros (€) and U.S. dollars provided herein are based on the noon buying rate in New York City for cable transfers in foreign currencies as certified for customs purposes by the Federal Reserve Bank of New York on July 27, 2018, or €1.00 = $1.166. We do not represent that Euros were, could have been, or could be, converted into U.S. dollars at such rate or at any other rate.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

Some statements contained in this report are forward-looking with respect to our operations, research, development and commercialization activities, clinical trials, operating results and financial condition. These statements involve known and unknown risks, uncertainties and other factors which 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 include, but are not limited to, statements about:

- our strategy;
- product development and commercialization of our products;
- clinical trials;
- the proposed acquisition of TxCell S.A., including the expected timing, term and anticipated benefits thereof;
- partnering, other acquisition and other strategic transactions;
- revenues from existing and new collaborations;
- our research and development and other expenses;
- sufficiency of our cash resources;
- 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” and “will.” These statements reflect our current views with respect to future events and are based on assumptions and 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 Conditions and Results of Operations” in this Quarterly Report. Except as required by law, we undertake no obligation to update any forward-looking statements to reflect events or circumstances arising after the date of such statements. Readers are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date of this Quarterly Report.

PART I. FINANCIAL INFORMATION

ITEM 1. FINANCIAL STATEMENTS

SANGAMO THERAPEUTICS, INC.

CONDENSED CONSOLIDATED BALANCE SHEETS
(Unaudited; in thousands, except share and per share amounts)

	June 30, 2018	December 31, 2017
ASSETS		
Current assets:		
Cash and cash equivalents	$ 59,406	$ 49,826
Marketable securities	480,040	193,482
Interest receivable	562	240
Accounts receivable	4,977	3,343
Prepaid expenses and other current assets	5,064	1,506
Total current assets	550,049	248,397
Marketable securities, non-current	34,182	1,012
Property and equipment, net	37,223	31,066
Goodwill	1,585	1,585
Restricted cash and other non-current assets	4,688	4,681
Total assets	$ 627,727	$ 286,741
LIABILITIES AND STOCKHOLDERS' EQUITY		
Current liabilities:		
Accounts payable and accrued liabilities	$ 14,388	$ 11,035
Accrued compensation and employee benefits	4,346	5,479
Deferred revenues	57,215	28,345
Total current liabilities	75,949	44,859
Deferred revenues, non-current	137,731	29,244
Build-to-suit lease obligation	26,180	24,738
Total liabilities	239,860	98,841
Commitments and contingencies		
Stockholders' equity:		
Common stock, $0.01 par value; 160,000,000 shares authorized, 101,623,521 and 85,598,534 shares issued and outstanding at June 30, 2018 and December 31, 2017, respectively	1,016	856
Additional paid-in capital	918,197	682,809
Accumulated deficit	(531,189)	(495,479)
Accumulated other comprehensive loss	(157)	(286)
Total stockholders' equity	387,867	187,900
Total liabilities and stockholders' equity	$ 627,727	$ 286,741

See accompanying notes.

SANGAMO THERAPEUTICS, INC.

CONDENSED CONSOLIDATED STATEMENTS OF OPERATIONS
(Unaudited; in thousands, except per share amounts)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2018	2017	2018	2017
Revenues:				
Collaboration agreements	$ 21,289	$ 7,977	$ 33,840	$ 11,283
Research grants	127	276	213	395
Total revenues	21,416	8,253	34,053	11,678
Operating expenses:				
Research and development	29,255	14,984	52,802	27,926
General and administrative	11,301	6,037	21,388	13,312
Total operating expenses	40,556	21,021	74,190	41,238
Loss from operations	(19,140)	(12,768)	(40,137)	(29,560)
Interest and other income, net	2,500	277	3,310	437
Net loss	$ (16,640)	$ (12,491)	$ (36,827)	$ (29,123)
Basic and diluted net loss per share	$ (0.17)	$ (0.17)	$ (0.40)	$ (0.41)
Shares used in computing basic and diluted net loss per share	97,267	72,527	91,831	71,780

See accompanying notes.

SANGAMO THERAPEUTICS, INC.

CONDENSED CONSOLIDATED STATEMENTS OF COMPREHENSIVE LOSS
(Unaudited; in thousands)

	Three Months Ended June 30,		Six Months Ended June 30,	
	2018	2017	2018	2017
Net loss	$ (16,640)	$ (12,491)	$ (36,827)	$ (29,123)
Change in unrealized gain (loss) on available-for-sale securities	230	(51)	131	(163)
Comprehensive loss	$ (16,410)	$ (12,542)	$ (36,696)	$ (29,286)

See accompanying notes.

SANGAMO THERAPEUTICS, INC.

CONDENSED CONSOLIDATED STATEMENTS OF CASH FLOWS
(Unaudited; in thousands)

	Six Months Ended June 30,	
	2018	**2017**
Operating Activities:		
Net loss	$ (36,827)	$ (29,123)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	1,207	618
Amortization of (discount) premium on marketable securities	(1,656)	32
Stock-based compensation	6,564	4,751
Other	465	—
Net changes in operating assets and liabilities:		
Interest receivable	(322)	(32)
Accounts receivable	(1,634)	1,477
Prepaid expenses and other assets	(3,564)	(1,039)
Accounts payable and accrued liabilities	2,733	2,654
Accrued compensation and employee benefits	(1,133)	24
Deferred revenues	138,474	64,346
Net cash provided by operating activities	104,307	43,708
Investing Activities:		
Purchases of marketable securities	(451,240)	(159,166)
Maturities of marketable securities	133,297	83,029
Purchases of property and equipment	(5,768)	(2,175)
Net cash used in investing activities	(323,711)	(78,312)
Financing Activities:		
Proceeds from public offering of common stock, net of issuance costs	215,756	81,562
Taxes paid related to net share settlement of equity awards	(57)	(7)
Proceeds from issuance of common stock	13,285	825
Net cash provided by financing activities	228,984	82,380
Net increase in cash, cash equivalents, and restricted cash	9,580	47,776
Cash, cash equivalents, and restricted cash, beginning of period	53,326	22,061
Cash, cash equivalents, and restricted cash, end of period	$ 62,906	$ 69,837
Supplemental disclosure of noncash investing activities:		
Property and equipment included in accrued liabilities	$ 1,836	$ 226

See accompanying notes.

NOTE 1—ORGANIZATION, BASIS OF PRESENTATION AND SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Overview

Sangamo Therapeutics, Inc. was incorporated in the state of Delaware in 1995 and changed its name from Sangamo Biosciences, Inc. in January 2017 ("Sangamo" or the "Company"). Sangamo is focused on the research, development and commercialization of novel genomic therapies for unmet medical needs. Sangamo's genome editing and gene regulation technology platform is enabled by the engineering of a class of transcription factors known as zinc finger DNA-binding proteins ("ZFPs").

Sangamo is currently working on a number of long-term development projects that 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, research grants and from the issuance of equity or debt securities. Sangamo believes that its available cash, cash equivalents, marketable securities and interest receivable as of June 30, 2018, along with expected revenues from collaborations, strategic partnerships and research grants, will be adequate to fund its operations at least through the next twelve months. Sangamo will need to raise substantial additional capital to fund the development, manufacturing and potential commercialization of its product candidates. Additional capital may not be available on terms acceptable to the Company, if 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 product candidates could 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.

Basis of Presentation

The accompanying unaudited condensed consolidated financial statements have been prepared in accordance with U.S. generally accepted accounting principles for interim financial information and pursuant to the rules and regulations of the Securities and Exchange Commission ("SEC"). Accordingly, they do not include all of the information and footnotes required by generally accepted accounting principles for complete financial statements. In the opinion of management, all adjustments (consisting of normal recurring adjustments) considered necessary for a fair presentation have been included. Operating results for the three and six months ended June 30, 2018 are not necessarily indicative of the results that may be expected for the year ending December 31, 2018. The condensed consolidated balance sheet data at December 31, 2017 were derived from the audited consolidated financial statements included in Sangamo's Annual Report on Form 10-K for the year ended December 31, 2017, (the "2017 Annual Report"), as filed with the SEC. The accompanying condensed consolidated financial statements and related financial information should be read in conjunction with the audited financial statements and footnotes thereto for the year ended December 31, 2017, included in the 2017 Annual Report.

Use of Estimates

The preparation of financial statements in conformity with generally accepted accounting principles 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, 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.

Cash and Cash Equivalents

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 and deposits in money market investment accounts.

Marketable Securities

Sangamo classifies its marketable securities as available-for-sale which are recorded at estimated fair value based on quoted market prices or observable market inputs of almost identical assets. Unrealized holding gains and losses are included in accumulated other comprehensive income.

The Company's investments are subject to a periodic impairment review. The Company recognizes an impairment charge 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, which is determined using the specific identification method.

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 and liabilities are stated at their estimated fair values. The counterparties to the agreements relating to the Company's investment securities consist of the US Treasury, governmental agencies and various major corporations and financial institutions with investment-grade high credit ratings.

Revenue Recognition

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

The Company's contract revenues consist of strategic partnering 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 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 grant agreements are 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 Topic 606. The Company's performance obligations include license rights, development services, and services associated with regulatory submission and approval processes. 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. 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 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.

During the six months ended June 30, 2018, revenues related to the hemophilia A collaboration agreement with Pfizer Inc. ("Pfizer") and the hemoglobinopathies agreement with Bioverativ, a Sanofi company ("Bioverativ") represented 47% and 26%, respectively, of the Company's total revenue. During the six months ended June 30, 2017, revenues related to the Company's agreements with Bioverativ and Shire International GmBH ("Shire") represented 48% and 11%, respectively, of total revenue. 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 grant arrangements are 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. Management has determined that the Company is the principal participant under the Company's non-profit grant agreement, and accordingly, the Company records amounts earned under these arrangements as revenue.

Recent Accounting Pronouncements

Recently Adopted

In May 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Updated ("ASU") 2014-09, *Revenue from Contracts with Customers* ("Topic 606"). This standard outlines a single comprehensive model for entities to use in accounting for revenue arising from contracts with customers and supersedes most current revenue recognition guidance, including industry-specific guidance. The main principle of Topic 606 is to recognize revenues when promised goods or services are transferred to customers in an amount that reflects the consideration that is expected to be received for those goods or services. Topic 606 provides companies with two implementation methods: (i) apply the standard retrospectively to each prior reporting period presented (full retrospective application); or (ii) apply the standard retrospectively with the cumulative effect of initially applying the standard as an adjustment to the opening balance of retained earnings of the annual reporting period that includes the date of initial application (modified retrospective application). The Company implemented this standard under the modified retrospective method. This guidance is effective for annual reporting periods beginning after December 15, 2017, including interim periods within that reporting period. Under Topic 606, an entity recognizes revenue when its customer obtains control of promised goods or services, in an amount that reflects the consideration which the entity expects to receive in exchange for those goods or services. To determine revenue recognition for arrangements that an entity determines are within the scope of Topic 606, the entity performs the following five steps: (i) identify the contract(s) with a customer; (ii) identify the performance obligations in the contract; (iii) determine the transaction price; (iv) allocate the transaction price to the performance obligations in the contract; and (v) recognize revenue when (or as) the entity satisfies a performance obligation. Topic 606 also impacts certain other areas, such as the accounting for costs to obtain or fulfill a contract.

The Company adopted Topic 606 effective January 1, 2018, using the modified retrospective method with a cumulative effect adjustment of $1.1 million reflected as a decrease to the opening balance of accumulated deficit and a decrease to deferred revenues, respectively. The new guidance has been applied with a cumulative effect adjustment of $5.2 million reflected as a decrease to the opening balance of accumulated deficit and a decrease to deferred revenues, respectively. The Company's contracts and agreements that were within the scope of the guidance upon adoption were Bioverativ and the hemophilia A Pfizer agreements. The impact on the Bioverativ agreement was to reduce the amount of the recognition of up-front payment by approximately $0.7 million and $1.5 million for the three and six months ended June 30, 2018, respectively, and the development and commercialization milestones are deemed constrained at June 30, 2018, as defined under Topic 606. The impact on the hemophilia A Pfizer agreement was to increase the amount of the recognition of the up-front payment by approximately $1.6 million and $2.6 million for the three and six months ended June 30, 2018, respectively, and the development and commercialization milestones are deemed constrained at June 30, 2018, as defined under Topic 606. The net impact under the modified retrospective transition approach was a decrease of $5.2 million to accumulated deficit as of June 30, 2018. With regards to Shire, Dow AgroSciences, LLC ("Dow") and Sigma-Aldrich Corporation ("Sigma"), the Company's performance obligations under those arrangements were substantially complete at December 31, 2017. Comparative information has not been adjusted and continues to be reported under previous accounting standards. All future receipts under these agreements are contingent upon the counterparties achieving specified development, commercial, and/or sales targets which would be in the form of milestones or royalties, all of which management concluded are constrained at June 30, 2018, as defined under Topic 606. See *Revenue Recognition* above.

Refer below for a summary of the amount by which each financial statement line item was affected by the impact of the cumulative adjustment and as compared with the guidance that was in effect prior to the adoption:

	Impact of Topic 606 Adoption on Condensed Consolidated Balance Sheet as of January 1, 2018		
(in thousands)	**As reported under Topic 606**	**Adjustments**	**Balances without adoption of Topic 606**
Deferred revenue, current portion	$ 29,626	$ 1,281	$ 28,345
Deferred revenue, noncurrent portion	$ 26,846	$ (2,398)	$ 29,244
Accumulated deficit	$ (494,362)	$ 1,117	$ (495,479)

(in thousands)	Impact of Topic 606 Adoption on Condensed Consolidated Balance Sheet as of June 30, 2018		
	As reported under Topic 606	Adjustments	Balances without adoption of Topic 606
Deferred revenue, current portion	$ 57,215	$ 8,744	$ 65,959
Deferred revenue, noncurrent portion	$ 137,731	$ (3,581)	$ 134,151
Accumulated deficit	$ (531,189)	$ (5,163)	$ (536,352)

(in thousands)	Impact of Topic 606 Adoption on Condensed Consolidated Statement of Operations and Comprehensive Loss for the Three Months Ended June 30, 2018			Impact of Topic 606 Adoption on Condensed Consolidated Statement of Operations and Comprehensive Loss for the Six Months Ended June 30, 2018		
	As reported under Topic 606	Adjustments	Balances without adoption of Topic 606	As reported under Topic 606	Adjustments	Balances without adoption of Topic 606
Collaboration revenue	$ 21,289	$ (2,271)	$ 19,018	$ 33,840	$ (4,047)	$ 29,793
Net loss	$ (16,640)	$ (2,271)	$ (18,911)	$ (36,827)	$ (4,047)	$ (40,874)
Net loss per share - basic and diluted:	$ (0.17)	$ (0.02)	$ (0.19)	$ (0.40)	$ (0.04)	$ (0.44)

(in thousands)	Impact of Topic 606 Adoption on Condensed Consolidated Statement of Cash Flows for the Six Months Ended June 30, 2018		
	As reported under Topic 606	Adjustments	Balances without adoption of Topic 606
Net loss	$ (36,827)	$ (4,047)	$ (40,874)
Changes in deferred revenue	$ 138,474	$ 4,047	$ 142,521

In November 2016, the FASB issued ASU 2016-18, *Statement of Cash Flows (*"Topic 230"*)*. The Company adopted Topic 230 in the beginning of fiscal 2018, which requires the statement of cash flows to explain the change during the period relating to total cash, cash equivalents, and restricted cash. The Company adopted this standard using the retrospective transition method by restating its condensed consolidated statements of cash flows to include restricted cash of $3.5 million in the beginning and ending cash, cash equivalents, and restricted cash balances. Net cash flows for the six months ended June 30, 2017, did not change as a result of including restricted cash with cash and cash equivalents when reconciling the beginning-of-period and end-of-period amounts presented on the statements of cash flows. Restricted cash was included in other non-current assets on the Company's condensed consolidated balance sheets.

Not yet adopted

In February 2016 the FASB issued ASU 2016-02, *Leases* ("ASU 2016-02"). ASU 2016-02 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 asset and corresponding liability, measured at the present value of the lease payments. The guidance will become effective for the Company beginning in the first quarter of 2019 with early adoption permitted and will be adopted using a modified retrospective approach. The Company is evaluating the impact of the adoption of this standard on its consolidated financial statements, and expect its operating lease commitments will be subject to the new standard and recognized as a right-of-use assets and operating lease liabilities upon adoption which will increase total assets and total liabilities as compared to amounts prior to adoption.

NOTE 2—FAIR VALUE MEASUREMENT

The Company measures certain financial assets and liabilities at fair value on a recurring basis, including cash equivalents, and available-for-sale marketable securities. The fair values of these assets were determined based on a three-tier hierarchy under the authoritative guidance for fair value measurements and disclosures that prioritizes the inputs used 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 and available-for-sale marketable securities are identified at the following levels within the fair value hierarchy (in thousands):

	June 30, 2018			
	Fair Value Measurements			
	Total	Level 1	Level 2	Level 3
Assets:				
Cash equivalents:				
Money market funds	$ 41,909	$ 41,909	$ —	$ —
Commercial paper securities	15,233	—	15,233	—
Total	57,142	41,909	15,233	—
Marketable securities:				
Commercial paper securities	396,993	—	396,993	—
Corporate debt securities	98,676	—	98,676	—
U.S. government-sponsored entity debt securities	18,553	—	18,553	—
Total	514,222	—	514,222	—
Total cash equivalents and marketable securities	$ 571,364	$ 41,909	$ 529,455	—

	December 31, 2017			
	Fair Value Measurements			
	Total	Level 1	Level 2	Level 3
Assets:				
Cash equivalents:				
Money market funds	$ 24,290	$ 24,290	$ —	$ —
Commercial paper securities	4,595	—	4,595	—
Total	28,885	24,290	4,595	—
Marketable securities:				
Commercial paper securities	110,247	—	110,247	—
Corporate debt securities	75,755	—	75,755	—
U.S. government-sponsored entity debt securities	8,492	—	8,492	—
Total	194,494	—	194,494	—
Total cash equivalents and marketable securities	$ 223,379	$ 24,290	$ 199,089	—

The Company generally classifies its marketable securities 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, listed 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.

NOTE 3—MARKETABLE SECURITIES

The Company 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 substantially identical assets. Unrealized holding gains and losses are included

in accumulated other comprehensive income (loss). Investments that have maturities beyond one year as of the end of the reporting period are classified as non-current.

The Company's investments are subject to a periodic impairment review. The Company recognizes an impairment charge 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, which is determined using the specific identification method

The table below summarizes the Company's investments (in thousands):

	Amortized Cost	Gross Unrealized Gains	Gross Unrealized (Losses)	Estimated Fair Value
June 30, 2018				
Cash equivalents:				
Money market funds	$ 41,909	$ —	$ —	$ 41,909
Commercial paper securities	15,232	1	—	15,233
Total	57,141	1	—	57,142
Available-for-sale securities:				
Commercial paper securities	396,958	110	(75)	396,993
Corporate debt securities	98,834	—	(158)	98,676
U.S. government-sponsored entity debt securities	18,556	—	(3)	18,553
Total	514,348	110	(236)	514,222
Total cash equivalents and available-for-sale securities	$ 571,489	$ 111	$ (236)	$ 571,364
December 31, 2017				
Cash equivalents:				
Money market funds	$ 24,290	$ —	$ —	$ 24,290
Commercial paper securities	4,595	—	—	4,595
Total	28,885	—	—	28,885
Available-for-sale securities:				
Commercial paper securities	110,365	—	(118)	110,247
Corporate debt securities	75,886	—	(131)	75,755
U.S. government-sponsored entity debt securities	8,498	—	(6)	8,492
Total	194,749	—	(255)	194,494
Total cash equivalents and available-for-sale securities	$ 223,634	—	$ (255)	$ 223,379

The Company had no material realized losses or other-than-temporary impairments of its investments for the six months ended June 30, 2018 and 2017. As of June 30, 2018, all of the Company's investments had maturity dates within one year, except for $34.2 million, which matures within 24 months. The Company has the intent and ability to hold its investments for a period of time sufficient to allow for any anticipated recovery in market value.

NOTE 4—BASIC AND DILUTED NET LOSS PER SHARE

Basic net loss per share has been computed by dividing net loss by the weighted-average number of shares of common stock outstanding during the period. Diluted net loss per share is calculated by dividing net loss by the weighted-average number of shares of common stock and potential dilutive securities outstanding during the period.

The total number of shares subject to stock options and restricted stock units outstanding, which are all anti-dilutive, were excluded from consideration in the calculation of diluted net loss per share. Stock options and restricted stock units outstanding as of June 30, 2018 and 2017 were 8,702,199 and 9,898,588, respectively.

NOTE 5—MAJOR CUSTOMERS, PARTNERSHIPS AND STRATEGIC ALLIANCES

Collaboration Agreements

Kite Pharma, Inc.

In February 2018, the Company entered into a collaboration and license agreement with Kite Pharma, Inc. ("Kite"), a wholly-owned subsidiary of Gilead Sciences, Inc., 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. The Kite agreement became effective on April 5, 2018 when the waiting periods under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended, and other customary closing conditions were completed.

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 zinc finger nucleases ("ZFNs") and adeno-associated viral vectors ("AAVs") developed under the research program, to express chimeric antigen receptors ("CARs"), T-cell receptors ("TCRs") or NK-cell receptors ("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 the joint research program, 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 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, 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 in the agreement is six years. Kite has an option to extend the research term of the agreement for up to two additional one-year periods for a separate upfront fee of $10.0 million per year. All contingent payments under the agreement, when earned, will be non-refundable and non-creditable. None of the development and sales-based milestone payments have been included in the $185.9 million transaction price, which includes the upfront license fee and estimated reimbursable service costs for identified research projects over the estimated performance period, as 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.

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 a license to the technology and on-going services. The Company concluded that the license is not discrete as it does not have stand-alone value to Kite 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 on a straight-line basis through June 2024, the estimated period the Company will perform research services. 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 June 30, 2018, the Company had deferred revenue of $144.0 million related to this

agreement. During the three months ended June 30, 2018 the Company recognized revenue of approximately $6.0 million related to the upfront fee that was received upon effectiveness of the agreement and approximately $1.5 million in research services.

Pfizer Inc.

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 AAV-based gene therapy products for hemophilia A.

The Company 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 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. To date, no milestone payments have been received and no products have been approved and therefore no royalty fees have been earned under the hemophilia A Pfizer agreement. 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 $70.0 million 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 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) fifteen 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 the performance obligations within the hemophilia A Pfizer agreement as a license to the technology and on-going 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 through 2020, the estimated period the Company will perform

research services. 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 June 30, 2018, the Company had deferred revenue of $31.9 million related to this agreement. During the three and six months ended June 30, 2018 the Company recognized revenue of $8.1 million and $15.8 million, respectively, related to the upfront fee that was received upon entering into the agreement.

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.

None of the clinical or regulatory milestones have been included in the $12.0 million 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 is 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) fifteen 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 obligations within this agreement as a license to the technology and on-going 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 through March 31, 2019 the estimated period the Company will perform research services. 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 June 30, 2018, the Company had deferred revenue of $10.9 million related to this agreement. During the three and six months ended June 30, 2018 the Company recognized revenue of $0.6 million and $1.1 million, respectively, related to the upfront fee that was received upon entering into the agreement.

Bioverativ, a Sanofi company.

In January 2014, the Company entered into an exclusive worldwide collaboration and license agreement with Bioverativ to develop therapeutics for hemoglobinopathies, focused on beta-thalassemia and sickle cell disease ("SCD"). 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 investigational new drug ("IND") application for ZFP therapeutics intended to treat SCD.

Under both programs, Bioverativ 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, Bioverativ has the right to step in and take over any of our remaining activities. Furthermore, the Company has an option to co-promote in the United States any licensed products to treat beta-thalassemia and SCD developed under the agreement, and Bioverativ will compensate the Company for such co-promotion activities. Subject to the terms of the agreement, the Company has granted Bioverativ 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 Bioverativ 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. Bioverativ reimburses Sangamo for agreed upon costs incurred in connection with research and development activities conducted by Sangamo. To date, no milestone payments have been received and no products have been approved and therefore no royalty fees have been earned under the Bioverativ agreement.

The agreement may be terminated by (i) the Company or Bioverativ for the uncured material breach of the other party, (ii) the Company or Bioverativ for the bankruptcy or other insolvency proceeding of the other party; (iii) Bioverativ, upon 180 days' advance written notice to the Company and (iv) Bioverativ, 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. None of the clinical or regulatory milestones have been included in the $75.7 million transaction price, which includes the upfront license fee and service costs over the estimated performance period, 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 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.

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 Bioverativ 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 through 2022, the estimated period the Company will perform research services. 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 June 30, 2018, the Company had deferred revenue of $6.2 million related to this agreement.

Revenues recognized under the agreement for the three and six months ended June 30, 2018 and 2017 were as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2018	2017	2018	2017
Revenue related to Bioverativ agreement:				
Recognition of upfront fee	$ 1,184	$ 442	$ 2,338	$ 884
Research services	3,332	3,068	6,560	4,777
Total	$ 4,516	$ 3,510	$ 8,898	$ 5,661

Shire International GmbH

In January 2012, the Company entered into a collaboration and license agreement with Shire 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. Shire 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 Shire, 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 Shire 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 *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 Company satisfied the deliverables and research services responsibilities within the amended arrangement which were completed in 2017. The agreement may be terminated by (i) the Company or Shire, in whole or in part, for the uncured material breach of the other party, (ii) the Company or Shire for the bankruptcy or other insolvency proceeding of the other party and (iii) Shire, in its entirety, effective upon at least 90 days' advance written notice.

The Company has concluded that the license is not a separate unit of accounting as it does not have stand-alone value to Shire apart from the research services to be performed pursuant to the Shire 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 agreement for the three and six months ended June 30, 2018 and 2017 were as follows (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2018	2017	2018	2017
Revenue related to Shire agreement:				
Recognition of upfront fee	$ —	$ 583	$ —	$ 1,167
Research services	—	3	—	110
Total	$ —	$ 586	$ —	$ 1,277

Funding from Research Foundations

California Institute for Regenerative Medicine

In May 2018, the California Institute for Regenerative Medicine ("CIRM") agreed to fund a $8.0 million Strategic Partnership Award 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. There were no revenues or related costs attributable to research and development performed under the Strategic Partnership Award during the three and six months ended June 30, 2018. As of June 30, 2018, the Company had deferred revenue of $1.7 million related to this award.

NOTE 6—INCOME TAXES

On December 22, 2017, the U.S. government enacted comprehensive tax legislation commonly referred to as the Tax Cuts and Jobs Act (the "Tax Act"). The Tax Act makes broad and complex changes to the U.S. tax code that affected 2017, the current year and onwards, including, but not limited to, a reduction of the U.S. federal corporate tax rate from as high as 35% to 21%, a general elimination of U.S. federal income taxes on dividends from foreign subsidiaries, net operating loss deduction limitations, and 100% disallowance of entertainment expense.

In addition, 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 Act. SAB 118 provides a measurement period that should not extend beyond one year from the Tax Act enactment date for companies to complete the accounting under Accounting Standards Codification 740, *Income taxes* for the year ended December 31, 2017. In accordance with SAB 118, a company must reflect the income tax effects of those aspects of the Tax Act for which the accounting under ASC 740 is complete. The Company is still within the measurement period as of June 30, 2018 and no further conclusions have been made, as the Company reviews the law change and the impact to the Company.

Due to the Company's valuation allowance against its deferred tax assets, it does not expect that the provisions of the Tax Act will have a material impact on the Company's financial position, results of operations, or income tax expense or benefit.

NOTE 7—STOCK-BASED COMPENSATION

The following table shows total stock-based compensation expense included in the condensed consolidated statements of operations for the three and six months ended June 30, 2018 and 2017 (in thousands):

	Three Months Ended June 30,		Six Months Ended June 30,	
	2018	2017	2018	2017
Research and development	$ 2,120	$ 1,218	$ 3,879	$ 2,436
General and administrative	1,394	746	2,685	2,315
Total stock-based compensation expense	$ 3,514	$ 1,964	$ 6,564	$ 4,751

NOTE 8—COMMITMENTS AND CONTINGENCIES

Brisbane Build-to-Suit Lease

In November 2017, the Company entered into a long-term property lease which includes construction by the lessor of a building with approximately 87,700 square feet of space, in Brisbane, California. Substantial completion of the building is estimated to occur in the last quarter of 2018. The lease agreement expires in May 2029, approximately ten years after substantial completion of the building. A letter of credit for $3.5 million was established as the deposit and is classified as restricted cash within restricted cash and other noncurrent assets in the accompanying financial statements. The Company has two options to extend the lease term for up to a combined additional ten years.

The Company is deemed, for accounting purposes only, to be the owner of the entire project including the building shell, even though it is not the legal owner as a result of the cold shell condition of the building and involvement in the construction process. In connection with the Company's accounting for this transaction, the Company capitalized the costs of construction as a build-to-suit property within property and equipment, net, and recognize a corresponding build-to-suit lease obligation, including interest. Fair value of the building was estimated at $20.9 million using comparable market prices per square foot for similar space for public real estate transactions in the surrounding area and is considered a Level 2 fair value measurement. As of June 30, 2018, $27.0 million was capitalized with a corresponding build-to-suit lease obligation recognized related to this lease for the building and construction costs.

Contingencies

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

NOTE 9— STOCKHOLDERS' EQUITY

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 estimated offering expenses, were approximately $215.8 million.

In May 2017, the Company entered into an amended and restated sales agreement with Cowen and Company, LLC ("Cowen") (the "ATM Facility") pursuant to which the Company may offer and sell, in its sole discretion, shares of common stock having an aggregate offering price of up to $75.0 million through Cowen acting as the Company's sales agent. Sales of the Company's common stock, if any, will be made at market prices by any method that is deemed to be an "at the market offering" as defined in Rule 415 under the Securities Act of 1933, as amended. The Company has not sold any common stock under the ATM Facility. As of June 30, 2018, the full $75.0 million provided for under the ATM Facility remained available for sale, subject to certain conditions as specified in the agreement.

NOTE 10— SUBSEQUENT EVENTS

On July 20, 2018, the Company entered into a Share Purchase Agreement (the "SPA") with certain shareholders (the "Sellers") of TxCell S.A., a French *société anonyme* ("TxCell"), and the Company and TxCell entered into a Tender Offer Agreement (the "TOA"). Pursuant to the SPA and the TOA, the Company, directly or through a subsidiary, expects to acquire 100% of the equity interests of TxCell for approximately €72 million (or approximately $84.0 million), on a debt-free and cash-free basis.

Pursuant to the SPA, the Company, directly or through a subsidiary, has agreed to purchase all of the ordinary shares of TxCell the "Ordinary Shares") held by the Sellers for €2.58 per share (or approximately $3.01 per share) in cash (such per share price being the "Offer Price" and such purchase being the "Block Transaction"). The Sellers own (or will prior to the closing of the Block Transaction own) 13,519,036 Ordinary Shares, which represent approximately 53% of the share capital and voting rights of TxCell. The completion of the Block Transaction is subject to certain conditions, including

- issuance of a fairness opinion by the independent expert to be appointed by TxCell in accordance with articles 261-1 *et seq.* of the General Regulations of the French Autorité des Marchés Financiers ("AMF") that the Offer Price is fair to TxCell's shareholders from a financial point of view, and the recommendation of the board of directors of TxCell that all holders of Ordinary Shares tender such Ordinary Shares into the Offer;
- confirmation by the French Ministry of Economy that the Block Transaction and the Offer are not subject to its prior approval pursuant to the French regulations relating to foreign investments control or, failing such confirmation, the prior approval of such transactions by the French Ministry of Economy;
- the absence of any event having a material adverse effect on the business of TxCell since December 31, 2017; and
- the receipt of appropriate clearances from French regulatory agencies relating to the performance by TxCell of activities of preparation and storage of human tissues and cells.

Promptly following the completion of the Block Transaction, the Company will be entitled to designate a number of directors on the board of directors of TxCell representing a majority of the TxCell board.

Pursuant to the TOA, the Company, directly or through a subsidiary, has agreed that, without undue delay following the completion of the Block Transaction, it will commence a cash tender offer (the "Offer") to acquire all of the Ordinary Shares of TxCell not held by the Company or any subsidiary of the Company for the Offer Price. In addition, the Company has agreed to: (a) grant to certain employees (including certain members of management) of TxCell stock options to purchase approximately 150,000 shares of Company common stock, which will be granted under the Company's existing 2018 Equity Incentive Plan, with standard vesting conditions; and (b) enter into arrangements with holders of 495,396 "free shares" of TxCell, pursuant to which the Company would purchase such shares from the holders thereof from time to time through mid-2021. The purchase price for each such free share will be based on the performance of the Company's stock price from the announcement of the transactions contemplated by the SPA and TOA (at which time each free share was valued at €2.58 per share (or approximately $3.01 per share) through the time of purchase (such that, for example, if the Company's stock price doubles during that time period, the value of each free share would similarly double).

The Sellers and TxCell have made limited representations and warranties in the SPA and TOA, respectively, as are customary for such agreements governed under French law, and TxCell has agreed to customary covenants regarding the operation of the business of TxCell and its subsidiaries after the date of the TOA and prior to the closing of the Block Transaction. The SPA and TOA also contain customary termination rights.

If, following completion of the Offer, as it may be extended, the Company owns at least 95% of the share capital and voting rights of TxCell, it plans to acquire the remaining Ordinary Shares for the Offer Price through a compulsory squeeze-out procedure under French law. At this time, the Company is assessing the accounting impact of the agreement.

ITEM 2. 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 of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. These forward-looking statements include, without limitation, statements containing the words "believes," "anticipates," "expects," "continue," "strategy," "will," "intend" 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, including but not limited to those described under the caption "Risk Factors" in Part II, Item 1A of this Quarterly Report on Form 10-Q. You should read the following discussion and analysis along with the financial statements and notes attached to those statements included elsewhere in this report and in our Annual Report on Form 10-K for the year ended December 31, 2017, or the 2017 Annual Report, as filed with the Securities and Exchange Commission, or SEC, on March 1, 2018.

Overview

We are a clinical stage biotechnology company focused on translating ground-breaking science into genomic therapies that transform patients' lives using our industry-leading platform technologies in genome editing, gene therapy, gene regulation and cell therapy.

We are a leader in the research and development of zinc finger proteins, or ZFPs, a naturally occurring class of proteins found in humans. We have used our knowledge and expertise to develop a proprietary technology platform in both genome editing and gene regulation. ZFPs can be engineered to make zinc finger nucleases, or ZFNs, proteins that can be used to specifically modify DNA sequences by adding or knocking out specific genes, or genome editing, and ZFP transcription factors, or ZFP TFs, proteins that can be used to increase or decrease gene expression, or gene regulation. In the process of developing this platform, we have accrued significant scientific, manufacturing and regulatory capabilities and know-how that are generally applicable in the broader field of gene therapy and have capitalized this knowledge into a conventional gene therapy platform based on adeno-associated viral vector, or AAV, complementary DNA, or cDNA, gene transfer.

Our strategy is to maximize the value and therapeutic use of our technology platforms. In certain therapeutic areas we intend to capture the value of our proprietary genome editing and gene therapy products by forward integrating into manufacturing, development and commercial operations. In other therapeutic areas we intend to partner with biopharmaceutical companies to develop products.

We are focused on the development of human therapeutics for diverse diseases with well-characterized genetic causes. We have several proprietary clinical and preclinical product candidates in development and have strategically partnered certain programs with biopharmaceutical companies to obtain funding for our own programs and to expedite clinical and commercial development.

We have an ongoing Phase 1/2 clinical trial evaluating SB-525, a gene therapy for the treatment of hemophilia A, a bleeding disorder. We also have ongoing Phase 1/2 clinical trials evaluating three product candidates using our proprietary *in vivo* genome editing approach: SB-FIX for the treatment of hemophilia B, a bleeding disorder; SB-318, for the treatment of Mucopolysaccharidosis Type I, or MPS I; and SB-913 for the treatment of Mucopolysaccharidosis Type II, or MPS II. MPS I and MPS II are rare lysosomal storage disorders, or LSDs. We also have an ongoing Phase1/2 clinical trial evaluating ST-400, developed using our proprietary ZFN-mediated *ex vivo* cell therapy platform, for the treatment of beta-thalassemia, a blood disorder.

We recently announced positive preliminary data from the Phase 1/2 clinical trial evaluating SB-525, or the Alta study. In the Alta study, SB-525 has been generally well tolerated to date with no treatment-related serious adverse events and no use of tapering courses of oral steroids. The fifth patient in the Alta study, the first at the third dose level, was treated in June and has achieved therapeutic Factor VIII activity levels (Epidemiological data indicate that Factor VIII activity above 12% of normal is associated with substantial reduction or elimination of spontaneous bleeds and factor usage. Den Uijl IE et al Haemophilia 2011; 17(6):849-53). A dose dependent effect has been observed in the Alta study, with patients in the second dose cohort reporting reduced use of factor replacement. We and Pfizer expect to present detailed data from the Alta study at a hematology conference in the fourth quarter of 2018.

We also recently treated the fifth and sixth patients in the Phase 1/2 clinical trial evaluating SB-913 for the treatment of MPS II, or the CHAMPIONS study, and we expect to present preliminary safety and efficacy data from this study at the Annual Symposium of the Society for the Study of Inborn Errors of Metabolism (SSIEM) in September 2018.

We also recently began enrolling our first patients into the Phase 1/2 clinical trials evaluating SB-318 for the treatment of MPS I and ST-400 for the treatment of beta-thalassemia. In addition, we have proprietary preclinical and discovery stage programs in other

LSDs, hematological disorders and monogenic diseases, including certain central nervous system, or CNS, disorders, cancer immunotherapy, immunology and infectious disease.

In July 2018, we entered into a Share Purchase Agreement, or the Purchase Agreement, with certain shareholders of TxCell S.A., or TxCell, and we and TxCell entered into a Tender Offer Agreement, or the TO Agreement. Pursuant to the Purchase Agreement and the TO Agreement, we, directly or through a subsidiary, expect to acquire 100% of the equity interests of TxCell for approximately €72 million (or approximately $84.0 million), on a debt-free and cash-free basis. Pursuant to the Purchase Agreement, we, directly or through a subsidiary, expect to purchase TxCell ordinary shares representing approximately 53% of the share capital and voting rights of TxCell for €2.58 per share (or approximately $3.01 per share) in cash, or the Offer Price. Following the completion of the transactions contemplated by the Purchase Agreement, we, directly or through a subsidiary, will commence a cash tender offer pursuant to the TO Agreement to acquire all of the TxCell ordinary shares not held by us or any Sangamo subsidiary for the Offer Price. If, following the completion of the cash tender offer, we own at least 95% of the share capital and voting rights of TxCell, we plan to acquire the remaining TxCell ordinary shares for the Offer Price through a compulsory squeeze-out procedure under French law. We refer to these transactions, collectively, as the TxCell Acquisition in this Quarterly Report on Form 10-Q. We expect to complete the TxCell Acquisition in the fourth quarter of 2018.

If consummated, we expect that the TxCell Acquisition would accelerate our entry into the clinic with a CAR-Treg (which is a regulatory T cell, or Treg, genetically modified with a chimeric antigen receptor, or CAR) therapy. In 2019, we expect to submit a clinical trial authorization application in Europe for TxCell's first CAR-Treg investigational product candidate for solid organ transplant, or TX200, and to initiate a Phase 1/2 clinical trial of TX200 later in 2019. In addition, if the TxCell Acquisition is consummated, we intend to use our ZFN gene editing technology to potentially develop next-generation autologous and allogeneic CAR-Treg cell therapies for use in treating autoimmune diseases. The completion of the TxCell Acquisition is subject to certain conditions, and is subject to a number of risks. Even if completed, the success of the TxCell Acquisition will depend, in part, on our ability to successfully combine and integrate our business with the business of TxCell and to advance the development of TX200 and TxCell's Treg technology. For additional details on these risks, see "*Risk Factors—Risks Relating to our Proposed Acquisition of TxCell*" in Part II, Item 1A of this Quarterly Report on Form 10-Q.

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., for the research, development and commercialization of potential engineered cell therapies for cancer. The Kite agreement became effective in April 2018 when the waiting periods under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended and other customary closing conditions were completed. Following the effective date, we received a $150.0 million upfront payment from Kite. In this collaboration, we are working together with Kite on a research program under which we are designing ZFNs and AAVs to disrupt and insert certain genes in T cells and natural killer, or NK, cells, including the insertion of genes that encode chimeric antigen receptors, T-cell receptors, and NK-cell receptors directed to mutually agreed targets. Kite is responsible for all clinical development and commercialization of any resulting products.

In December 2017, we entered into a research collaboration and license agreement with Pfizer Inc., or Pfizer, for the development and commercialization of potential gene therapy products that use ZFP TFs to treat amyotrophic lateral sclerosis, or ALS, and frontotemporal lobar degeneration, or FTLD, linked to mutations of 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 licensed products.

In May 2017, we entered into a global collaboration and license agreement with Pfizer for the research, development and commercialization of SB-525, our gene therapy product candidate for hemophilia A, and closely related products. Under this agreement, we are 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 and Pfizer may also collaborate in the research and development of additional AAV-based gene therapy products for hemophilia A.

We have also established a collaborative partnership with Bioverativ, a Sanofi company, or Bioverativ, to research, develop and commercialize therapeutic gene-edited cell therapy products in hemoglobinopathies, including beta-thalassemia and sickle cell disease, or SCD. Bioverativ is responsible for subsequent development, manufacturing and commercialization of licensed products.

We have a substantial intellectual property position in the genome editing field including the design, selection, composition and use of engineered ZFPs to support our research and development activities. As of June 30, 2018, we either owned outright or have exclusively licensed the commercial rights to over 870 patents issued in the United States and foreign jurisdictions, and over 680 patent applications pending worldwide. We continue to license and file new patent applications that strengthen our core and accessory patent portfolio. We believe that our intellectual property position is a critical element in our ability to research, develop and commercialize products and services based on genome editing, gene therapy, gene regulation and cell therapy.

Comparability

We adopted Accounting Standards Codification Topic 606—Revenue from Contracts with Customers, or Topic 606, on January 1, 2018, resulting in a change to our accounting policy for revenue recognition. We used the modified retrospective method and recognized the cumulative effect of initially applying Topic 606 as an adjustment to the opening balances of deferred revenues and accumulated deficit at January 1, 2018. Accordingly, comparative information has not been adjusted and continues to be reported under previous accounting standards. Refer to Note 1 in Part I, Item 1 of this Quarterly Report on Form 10-Q for additional information.

Critical Accounting Estimates

The accompanying discussion and analysis of our financial condition and results of operations are based upon our condensed 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 condensed 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. Except for the change to our accounting policy for revenue recognition as a result of adopting Topic 606, there have been no significant changes in our critical accounting policies and estimates disclosed in our 2017 Annual Report.

Results of Operations

Three and six months ended June 30, 2018 and 2017

Revenues

	Three Months Ended June 30, (in thousands, except percentage values)				Six Months Ended June 30, (in thousands, except percentage values)			
	2018	2017	Change	%	2018	2017	Change	%
Revenues:								
Collaboration agreements	$21,289	$ 7,977	$13,312	167%	$33,840	$11,283	$22,557	200%
Research grants	127	276	(149)	(54%)	213	395	(182)	(46%)
Total revenues	$21,416	$ 8,253	$13,163	159%	$34,053	$11,678	$22,375	192%

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 Kite, Pfizer and Bioverativ as we continue to recognize in revenues upfront payments received under such agreements over time.

The increase in revenues from our collaboration agreements for the three months ended June 30, 2018 were primarily due to $7.5 million in revenues related to the Kite agreement, which took effect in April 2018, $4.4 million in revenues related to the hemophilia A Pfizer agreement, $1.0 million in revenues related to our agreement with Bioverativ, and $0.6 million related to the C9ORF72 Pfizer agreement, partially offset by a decrease of $0.6 million in revenue related to our agreement with Shire International GmbH, formerly Shire AG, as we recognized the remaining deferred revenue under such agreement in December 2017. Kite included $6.0 million related to partial recognition of an upfront license fee of $150.0 million and $1.6 million from research services. The revenues from Pfizer reflect the partial recognition of an upfront fee of $70.0 million under the hemophilia A Pfizer agreement and upfront fee of $12.0 million under the C9ORF72 Pfizer agreement. Bioverativ included $0.7 million related to partial recognition of an upfront license fee of $20.0 million and $0.3. million from research services. Research grant revenues were approximately $0.1 million and $0.3 million for the three months ended June 30, 2018 and 2017, respectively.

The increase in revenues from our collaboration agreements for the six months ended June 30, 2018 were primarily attributable to $12.0 million in revenues related to the hemophilia A Pfizer Agreement, $7.5 million in revenues related to our agreement with Kite, $3.2 million in revenues related to our agreement with Bioverativ, and $1.0 million in revenues related to the C9ORF72 Pfizer agreement, partially offset by a decrease of $1.3 million in revenue from our agreement with Shire. Research grant revenues were $0.2 million for the six months ended June 30, 2018, compared to $0.4 million in the corresponding period in 2017.

Operating Expenses

	Three Months Ended June 30, (in thousands, except percentage values)				Six Months Ended June 30, (in thousands, except percentage values)			
	2018	2017	Change	%	2018	2017	Change	%
Operating expenses:								
Research and development	$29,255	$14,984	$14,271	95%	$52,802	$27,926	$24,876	89%
General and administrative	11,301	6,037	5,264	87%	21,388	13,312	8,076	61%
Total expenses	$40,556	$21,021	$19,535	93%	$74,190	$41,238	$32,952	80%

Research and Development Expenses

Research and development expenses consist primarily of salaries and personnel-related expenses, including stock-based compensation, laboratory supplies, preclinical and clinical studies, manufacturing expenses, allocated facilities expenses, contracted research expenses and expenses for technology licenses. We expect to continue to devote substantial resources to research and development in the future, including in connection with the TxCell Acquisition, and expect research and development expenses to increase in the next several years if we are successful in advancing our clinical programs and if we are able to progress our earlier stage product candidates into clinical trials.

The increase of $14.3 million in research and development expenses for the three months ended June 30, 2018 was primarily due to increases of $7.0 million in manufacturing and clinical trial expenses due to timing of manufacturing activities. A portion of the increase is also due to $2.7 million in salaries and benefits expense, $1.5 million in research and pre-clinical expense, $1.0 million in lab supply expense, $0.9 million in stock-based compensation expense, $0.7 million in facility expense, and $0.3 million in consultant expense.

The increase of $24.9 million in research and development expenses for the six months ended June 30, 2018 was primarily due to increases of $12.3 million in manufacturing and research expenses as our programs move into the clinic, $4.8 million in salaries and benefits expense, $2.6 million in research and pre-clinical expense, $1.7 million in lab supply expense, $1.4 million in stock-based compensation expense, $1.3 million in facility expense, and $0.6 million in consultant expense.

At this time, we cannot provide reliable estimates of how much time or investment will be necessary to enable our product candidates to be commercialized. For a more complete discussion of the risks and uncertainties associated with our research and development activities and the development of our product candidates, see “Risk Factors” in Part II, Item 1A of this Quarterly Report on Form 10-Q.

General and Administrative Expenses

The increase of $5.3 million in general and administrative expenses for the three months ended June 30, 2018 was primarily due to increases of $1.3 million in salaries and benefits expense, $1.0 million in consultant expense, $0.9 million in legal expense. $0.6 million in stock-based compensation expense, and $0.5 million in facility expense. The increases were primarily due to the growth of our business to support the continued advancement of our product candidates into clinical trials.

The increase of $8.1 million in general and administrative expenses for the six months ended June 30, 2018 was primarily due to increases of $2.4 million in salaries and benefits expense, $1.1 million in legal expense, $1.1 million in consultant expense, $0.8 million in facility expense, $0.5 million in audit expense, $0.4 million in business development expense, $0.4 million in stock-based compensation expense, and $0.3 million in travel expense. 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 $2.2 million and $2.9 million in interest and other income, net, for the three and six months ended June 30, 2018 and 2017, respectively, is primarily due to changes resulting from our treasury strategy.

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, payments from corporate collaborators and strategic partners, and research grants.

As of June 30, 2018, we had cash, cash equivalents, marketable securities and interest receivable, totaling $574.2 million, excluding restricted cash, compared to $244.6 million as of December 31, 2017, with the increase primarily attributable to $215.7 million net proceeds from our April 2018 issuance of common stock and $150.0 million from our February 2018 collaboration and license agreement with Kite, which became effective in April 2018.

Our most significant use of capital pertains to salaries and benefits for our employees and external research and development expenses, such as manufacturing, clinical trials and preclinical activity related to our therapeutic programs. Our cash and investment balances are held in a variety of interest bearing instruments, including obligations of U.S. government agencies, U.S. Treasury debt securities, corporate debt securities and money market funds. Cash in excess of immediate requirements is invested in accordance with our investment policy with a view toward capital preservation and liquidity.

In July 2018, we entered into the Purchase Agreement and TO Agreement. In the TxCell Acquisition, we, directly or through a subsidiary, expect to acquire 100% of the equity interests of TxCell for approximately €72 million (or approximately $83.5 million), on a debt-free and cash-free basis. See "—Overview" above for further discussion of the TxCell Acquisition.

In April 2018, we completed an underwritten public offering of our common stock, in which we sold an aggregate of 14.2 million shares of our common stock at a public offering price of $16.25 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 $215.7 million.

In February 2018, we entered into a global collaboration and license agreement with Kite for the research, development and commercialization of potential engineered cell therapies for cancer. In April 2018, the Kite agreement became effective when the waiting periods under the Hart-Scott-Rodino Antitrust Improvements Act of 1976, as amended and other customary closing conditions were satisfied. Following the effective date, we received a $150.0 million upfront payment from Kite.

In May 2017, we entered into an amended and restated sales agreement with Cowen and Company, LLC pursuant to which we may offer and sell, in our sole discretion, shares of common stock having an aggregate offering price of up to $75.0 million through Cowen acting as our sales agent. Sales of our common stock, if any, will be made at market prices by any method that is deemed to be an "at the market offering" as defined in Rule 415 under the Securities Act of 1933, as amended. We have not sold any common stock under this agreement. As of June 30, 2018, the full $75.0 million provided for under the agreement remained available for sale, subject to certain conditions as specified in the agreement. We are not able to make offers or sales under this agreement until the lock-up that was put in place in connection with the April 2018 public offering has expired.

Cash Flows

*Operating activities***.** Net cash provided by operating activities was $104.3 million and $43.7 million for the six months ended June 30, 2018 and 2017, respectively. Net cash provided by operating activities for the six months ended June 30, 2018 primarily reflected the increase in deferred revenue due to the $150.0 million upfront license payment from Kite, net loss for the period as well as increase in prepaid expenses and primarily due to increased business activities. Net cash provided by operating activities for the six months ended June 30, 2017 primarily reflected increases in deferred revenue, accrued liabilities, and stock-based compensation for the period offset by the net loss.

*Investing activities***.** Net cash used in investing activities for the six months ended June 30, 2018 was $323.7 million. Net cash provided by investing activities was $78.3 million for the six months ended June 30, 2017. Cash flows from investing activities for both periods primarily related to purchases and maturities of investments.

*Financing activities***.** Net cash provided by financing activities for the six months ended June 30, 2018 and 2017 was $229.0 million primarily related to our April 2018 underwritten public offering of our common stock, which generated net proceeds of approximately $215.7 million, with the remainder primarily related to the $13.3 million from the issuance of common stock upon exercise of stock options. Net cash provided by financing activities for the six months ended June 30, 2017 was primarily related to the completion of our June 2017 underwritten public offering of our common stock, which generated net proceeds of approximately $78.1 million.

Operating Capital and Capital Expenditure Requirements

We anticipate continuing to incur operating losses for at least the next several years. We plan to finance operations with available cash resources, collaborations and strategic partnerships, research grants and from the issuance of equity or debt securities. We believe that our available cash, cash equivalents, marketable securities and interest receivable as of June 30, 2018, along with expected revenues from collaborations, strategic partnerships and research grants, will be adequate to fund the costs of the TxCell Acquisition and to fund our operations at least through the next twelve months. However, we will need to raise substantial additional capital to fund the development, manufacturing and potential commercialization of our product candidates. 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 develop our technology and our gene therapy products 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 factors and are not limited to 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, such as the TxCell Acquisition; and
- the possible costs of litigation.

Off-Balance Sheet Arrangements

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

Contractual Obligations and Commercial Commitments

Our future minimum contractual commitments were reported in our 2017 Annual Report and there have been no material changes outside the ordinary course of business in the previously disclosed contractual commitments during the six months ended June 30, 2018. See "—Overview" above for a discussion of the TxCell Acquisition, which increased our contractual commitments subsequent to June 30, 2018.

ITEM 3. 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, are classified as available-for-sale and are, due to their short-term nature, subject to minimal interest rate risk. Our investments currently consist of U.S. Treasury securities, U.S. government-sponsored enterprise securities and corporate notes. 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. Our market risks at June 30, 2018 have not changed materially from those discussed in Item 7A of our 2017 Annual Report.

ITEM 4. 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 Securities and Exchange Commission'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 June 30, 2018. Based on that evaluation, 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.

Change in Internal Control over Financial Reporting

There has been no change in our internal control over financial reporting that occurred during the three months ended June 30, 2018 that has materially affected, or is reasonably likely to materially affect, our internal controls over financial reporting.

PART II. OTHER INFORMATION

ITEM 1. LEGAL PROCEEDINGS

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

ITEM 1A. RISK FACTORS

An investment in our common stock involves significant risk. You should carefully consider the information described in the following risk factors, together with the other information contained herein and in our Annual Report on Form 10-K filed with the Securities and Exchange Commission on March 1, 2018, including our consolidated financial statements and related notes, before making an investment decision regarding our common stock. If any of the events described in the following risk factors occurs, our business, operating results and financial condition could be seriously harmed.

Risks Relating to our Proposed Acquisition of TxCell

If we are unable to complete our proposed acquisition of TxCell, or the TxCell Acquisition, our financial condition and the market value of our common stock could be adversely affected.

On July 20, 2018, we entered into a Share Purchase Agreement, or the Purchase Agreement, with certain shareholders of TxCell, or the Selling TxCell Shareholders, and we entered into a Tender Offer Agreement, or the TO Agreement, with TxCell. Pursuant to the Purchase Agreement and the TO Agreement, we, directly or through a subsidiary, expect to acquire 100% of the equity interests of TxCell for approximately €72 million, on a debt-free and cash-free basis. Consummation of the TxCell Acquisition is subject to customary conditions to closing, including:

- issuance of a fairness opinion by the independent expert to be appointed by TxCell in accordance with articles 261-1 *et seq.* of the General Regulations of the French *Autorité des Marchés Financiers*, or AMF, that the offer price is fair to TxCell's shareholders from a financial point of view, and the recommendation of the board of directors of TxCell that all holders of ordinary shares of TxCell tender such ordinary shares into the cash tender offer for the then outstanding TxCell ordinary shares that we are required to conduct under the TO Agreement;
- confirmation by the French Ministry of Economy that the TxCell Acquisition is not subject to its prior approval pursuant to the French regulations relating to foreign investments control or, failing such confirmation, the prior approval of such acquisition by the French Ministry of Economy;
- the absence of any event having a material adverse effect on the business of TxCell since December 31, 2017; and
- the receipt of appropriate clearances from French regulatory agencies relating to the performance by TxCell of activities of preparation and storage of human tissues and cells.

If any condition to the TxCell Acquisition is not satisfied or waived, the TxCell Acquisition will not be completed. We, the Selling TxCell Shareholders and TxCell also may terminate the Purchase Agreement and the TO Agreement under certain circumstances. Any or all of the preceding could jeopardize our ability to consummate the TxCell Acquisition on the already negotiated terms. To the extent the TxCell Acquisition is not completed for any reason, we would have devoted substantial resources and management attention to the TxCell Acquisition without realizing the accompanying benefits expected by our management, and our financial condition and results of operations and the market value of our common stock may be adversely affected. We also could be subject to litigation related to any failure to complete the TxCell Acquisition or to perform our obligations under the Purchase Agreement and/or the TO Agreement, or related to any enforcement proceeding commenced against us. In addition, the TxCell Acquisition may take longer to complete than we anticipate. Any delay in completing the TxCell Acquisition could cause us not to realize some or all of the benefits that we expect to achieve. Additional risks and uncertainties associated with the TxCell Acquisition include:

- the failure to consummate the TxCell Acquisition may result in negative publicity and a negative impression of us in the investment community;
- the attention of our employees and management may be diverted due to activities related to the TxCell Acquisition; and
- disruptions from the TxCell Acquisition, whether completed or not, may harm our relationships with our employees or business partners and collaborators.

Even if the TxCell Acquisition is consummated, we may not realize the anticipated benefits of the TxCell Acquisition.

If the TxCell Acquisition is consummated, achieving the anticipated benefits of the TxCell Acquisition will depend upon many factors, such as whether the acquired TxCell operations are successfully integrated with our operations. We may not be able to

accomplish this integration process smoothly or successfully. The integration of certain operations following the TxCell Acquisition will take time and will require the dedication of significant management resources, which may temporarily distract our management's attention from the routine business of the combined company. In any event, we may encounter unexpected difficulties, or incur unexpected costs, in connection with our anticipated transition activities and integration efforts, which include:

- the potential disruption of our historical core business;
- the risk that our relative lack of experience in regulatory T cell, or Treg, development and developing product candidates and technology for immunological diseases, will not allow us to advance the development of chimeric antigen receptor Treg, or CAR-Treg, product candidates, including TX200, on the timeframes we expect, or at all;
- the strain on, and need to continue to expand, our existing operational, technical, financial and administrative infrastructure;
- the difficulties in assimilating employees and corporate cultures, including our lack of experience in maintaining positive interactions with unionized employees;
- the difficulties in effectively managing transition and integration activities given the distance between our headquarters and management team and TxCell's headquarters and management team;
- the failure to retain key managers and other personnel, including the employees from the acquired TxCell business who might experience uncertainty about their future roles with us;
- the challenges in controlling additional costs and expenses in connection with and as a result of the TxCell Acquisition; and
- the diversion of our management's attention to integration of operations and corporate and administrative infrastructures; and
- any unanticipated liabilities for activities of or related to TxCell or its operations, technologies or product candidates.

If any of these factors impairs our ability to integrate successfully, we may be required to spend time or money on integration activities that otherwise would be spent on the development and expansion of our business. If we fail to integrate or otherwise manage the acquired TxCell business successfully and in a timely manner, the combined company's potential to achieve the anticipated long-term strategic benefits of the TxCell Acquisition could be compromised and resulting operating inefficiencies could increase costs and expenses more than we planned, could negatively impact the market price of our common stock and could otherwise distract us from execution of our strategy. Failure to maintain effective financial controls and reporting systems and procedures could also adversely affect our ability to produce timely and accurate financial statements.

We intend to avail ourselves of the French tax credit for certain research and development related expenses. We may not receive the anticipated amount. In addition, upon audit by the French tax authority, we may need to make corrective actions.

We are new to the field of immunology and the use of CARs with Tregs. With the acquisition of TxCell we expect to develop a CAR-Treg for use in a patient faster than if we had developed a CAR-Treg on our own. We may not be successful at developing a CAR Treg that can be used in patients. Moreover, we may not achieve the expected accelerated development timeline.

Following the TxCell Acquisition, the combined company will have significantly increased capital requirements. We cannot be certain that we will be able to raise sufficient capital or whether the terms of any capital raised will be acceptable to us. In addition, we might need to reduce expenditures with respect to some of our own programs so that we can adequately fund TxCell's operations. Our failure to obtain adequate and timely funding will materially adversely affect our business and our ability to develop our technology and products candidates and the technology and product candidates of TxCell, including TX200.

TxCell has only limited clinical development experience and no history of commercializing human therapeutics, and risks and uncertainties related to its business may cause the combined company to underperform relative to expectations.

TxCell has only limited clinical development experience and does not have any products approved for commercial sale, which makes it difficult to evaluate the success of its current business and assess the combined company's future viability. In addition, TxCell has incurred significant research and development and other expenses related to its ongoing operations resulting in operating losses in every year since its inception in 2001. We anticipate that TxCell will continue to incur net losses in the future as a result of continued expenditures related to the development of its lead CAR-Treg product candidate, TX200, and additional research and development expenditures related to the development and potential regulatory approval of its other existing and future product candidates. Because TxCell does not generate any revenue from product sales, following the consummation of the TxCell Acquisition, we expect to invest significant time, resources and capital to support the expenditures and on-going operations of the acquired TxCell business. Such investments would reduce our cash available for our existing operations and other uses and divert significant attention of management that may otherwise be focused on development of our existing business. If we are unable to successfully develop and

obtain regulatory approval for TX200 and effectively commercialize it, we may not realize any benefit from the TxCell Acquisition, resulting in possible impairments or other charges or losses which may materially and adversely affect our results of operations and financial condition. Additionally, the business operations of TxCell differ from our business operations, and the combined business will have a different business mix than our business prior to the TxCell Acquisition, presenting different operational risks and challenges. We expect to rely on the experience and expertise of TxCell's existing management team and other key personnel in the development of TX200 and TxCell's other product candidates. If we were to lose the services of a significant portion or key individuals of this team, such development and our business could be adversely affected.

The TxCell business may also face additional risks, including risks relating to (i) the ability to advance the development of TX200 and TxCell's other product candidates through regulatory approval, (ii) competition with companies with more experience and resources in the immunology space and with companies developing other novel cellular therapies, and (iii) maintaining and obtaining intellectual property protection for TxCell's technology and product candidates. In particular, TxCell has exclusively licensed the right to the CAR for use inTX200 from the University of British Columbia, or UBC. Should UBC terminate this license agreement, TxCell may have to develop or acquire the appropriate CAR which would extend the development timeline and add expense. TxCell has also exclusively licensed the right to technology related to redirected Treg cells from the Yeda Research and Development Company, or Yeda. A patent included in this exclusive license agreement with Yeda was granted in Europe in July 2016. Subsequent to this grant, the patent was opposed by several parties in May 2017. TxCell expects the oral proceedings to this opposition will take place in November 2018. Neither we nor TxCell can predict whether TxCell and Yeda will prevail in these actions. If the opposition to this patent prevails, the issued patent may be revoked or be limited in breadth and TxCell could be prevented from making, using, or selling the relevant product or process.

Moreover, TxCell relies on agreements with third parties for its product candidate technology development, manufacture, packaging, supply, and clinical trials. The termination of any of these agreements by the third parties would have an adverse impact on the combined company's ability to develop and manufacture TxCell's product candidates. For example, TxCell has entered into an agreement with Lonza for manufacturing of TX200. Should this agreement be terminated it would adversely impact the development timeline for TX200. Finally, continued development and commercialization of TxCell's product candidates may require the combined company to secure licenses to additional technologies, which it may not be able to do on commercially reasonable terms, if at all.

TxCell will be subject to business uncertainties and contractual restrictions while the TxCell Acquisition is pending.

Uncertainty about the effect of the TxCell Acquisition on employees and counterparties may have an adverse effect on TxCell. These uncertainties may impair TxCell's ability to retain and motivate key personnel and could cause entities dealing with TxCell to defer entering into contracts with TxCell or making other decisions concerning TxCell or seek to change existing business relationships with TxCell. If the TxCell Acquisition is completed, such changes could negatively affect our results of operations and financing condition and adversely affect our ability to realize the anticipated benefits from the TxCell Acquisition. In addition, if key employees of TxCell or Sangamo depart because of uncertainty about their future roles or otherwise, our business could be harmed. These risks may be exacerbated by delays or other adverse developments with respect to the anticipated completion of the TxCell Acquisition.

We and TxCell will incur substantial direct and indirect costs as a result of the TxCell Acquisition.

We and TxCell will incur substantial expenses in connection with and as a result of completing the TxCell Acquisition and, over a period of time following the completion of the TxCell Acquisition, we expect to incur substantial additional expenses in connection with coordinating the businesses, operations, policies and procedures of the combined company. While we have assumed that a certain level of transaction expenses will be incurred, factors beyond our control could affect the total amount or the timing of these expenses. Many of the expenses that will be incurred, by their nature, are difficult to estimate accurately.

If we are unable to delist the ordinary shares of TxCell from the Euronext Paris and acquire 100% of the equity interests of TxCell, our business, financial condition and results of operations could be adversely affected.

If, following completion of the acquisition of the ordinary shares of TxCell from the Selling TxCell Shareholders pursuant to the Purchase Agreement and in the cash tender offer contemplated by the TO Agreement, we own less than 95% of the share capital and voting rights of TxCell, we will not be able to delist the ordinary shares of TxCell from the Euronext Paris and will not be able to acquire the remaining ordinary shares of TxCell for some period of time, if ever. Maintaining the listing of the ordinary shares on the Euronext Paris will result in additional expenditures, which could have an adverse effect on our financial condition and results of operations. In addition, until such time, if ever, that we acquire 100% of the equity interests of TxCell, we will need to consider the rights of, and duties owed to, the minority shareholders of TxCell under French law when making future decisions that might impact TxCell, its business or its operations, which could adversely affect our business and our ability to realize the anticipated benefits of the TxCell Acquisition.

If the TxCell Acquisition is consummated, we plan to continue to operate the acquired TxCell business in France, which may expose us to unanticipated costs or events.

In the event that the TxCell Acquisition is consummated, TxCell's operations will remain based in France and accordingly, we plan to continue to operate the acquired TxCell business in France. Our anticipated operation of the acquired TxCell 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 TxCell employees; and
- compliance with regulatory requirements, including local French employment regulations and organized labor in France.

In addition, as a result of our anticipated operations in France, we will become more exposed to fluctuations in currency exchange rates between the Euro 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 a material adverse effect on our financial condition and results of operations. In any event, difficulties resulting from these and other risks related to our anticipated operations in France could expose us to increased expenses, impair our development efforts, adversely affect our financial condition and results of operations, and harm our competitive position.

If goodwill or other intangible assets that we record in connection with the TxCell Acquisition become impaired, our financial position in future periods could be negatively impacted.

In connection with the accounting for the TxCell Acquisition, it is expected that we will record a significant amount of intangible assets and may also record goodwill. Under GAAP, we must assess, at least annually and potentially more frequently, whether the value of goodwill and other indefinite-lived intangible assets has been impaired. Amortizing intangible assets will be assessed for impairment in the event of an impairment indicator. Events giving rise to impairment are an inherent risk in the biotechnology industry and cannot be predicted. Our results of operations and financial position in future periods could be negatively impacted should future impairments of intangible assets or goodwill occur.

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

Our success depends substantially on the results of clinical trials of our lead therapeutic programs, and we may not be able to demonstrate safety and efficacy of our product candidates.

We do not have any products that have gained regulatory approval. Our failure to enroll sufficient patients to conduct the trials, demonstrate safety or obtain positive clinical trial results, or our inability to meet the expected timeline of clinical trials or release of data for these programs would have a material adverse effect on our business operations and financial conditions, which may cause a significant decline in our stock price.

Our ability to conduct clinical trials successfully and on a timely basis for these programs is subject to a number of additional risks, including but are not limited to the following:

- disagreement with the design or implementation of our clinical trials;
- the ability to identify and recruit sufficient number of acceptable patients to complete enrollment of trials;
- failure to demonstrate that a product candidate is safe and effective for its proposed indication;
- the occurrence of unexpected adverse events or toxicity;
- disagreement with the U.S. Food and Drug Administration, or FDA, or foreign regulatory authorities, on the interpretation of data from preclinical studies or our clinical trial results;
- failure of clinical trials to meet the level of statistical significance required for approval;
- the insufficiency of data collected from clinical trials of our product candidates to support the submission and filing of a biologics license application, or BLA, or other submission or to obtain regulatory approval;
- changes in the approval policies or regulations that render our preclinical and clinical data insufficient for approval;
- failure to obtain approval of our manufacturing processes or facilities of third-party manufacturers with whom we contract for clinical and commercial supplies or our own manufacturing facility;

- defects in the preparation and manufacturing of our product candidates;
- failure by third parties, including vendors, manufacturers and clinical trial organizations, to provide timely and adequate supplies and services;
- development of similar gene therapies by our competitors;
- unexpected costs and expenses and lack of sufficient funding for these programs; and
- loss of licenses to critical intellectual properties.

We have ongoing Phase 1/2 clinical trials evaluating product candidates for the treatment of hemophilia A (SB-525), hemophilia B (SB-FIX), MPS I (SB-318) and MPS II (SB-913), an ongoing Phase 1/2 clinical trial evaluating ST-400 for the treatment of beta-thalassemia, and for TX200 in 2019 if the TX Cell Acquisition is consummated.

We recently announced positive preliminary data from the Phase 1/2 clinical trial evaluating SB-525, or the Alta study. In the Alta study, SB-525 has been generally well tolerated to date with no treatment-related serious adverse events and no use of tapering courses of oral steroids. The fifth patient in the Alta study, the first at the third dose level, was treated in June and has achieved therapeutic Factor VIII activity levels (Epidemiological data indicate that Factor VIII activity above 12% of normal is associated with substantial reduction or elimination of spontaneous bleeds and factor usage. Den Uijl IE et al Haemophilia 2011; 17(6):849-53). A dose dependent effect has been observed in the Alta study, with patients in the second dose cohort reporting reduced use of factor replacement. We and Pfizer expect to present detailed data from the Alta study at a hematology conference in the fourth quarter of 2018.

We also recently treated the fifth and sixth patients in the Phase 1/2 clinical trial evaluating SB-913 for the treatment of MPS II, or the CHAMPIONS study, and we expect to present preliminary safety and efficacy data from this study at the Annual Symposium of the Society for the Study of Inborn Errors of Metabolism (SSIEM) in September 2018.

We also recently began enrolling our first patients into the Phase 1/2 clinical trials evaluating SB-318 for the treatment of MPS I and ST-400 for the treatment of beta-thalassemia. For potential marketing application approval, additional clinical testing will be required, which involves significantly greater resources, commitments and expertise. Therefore, we may be required to scale up our operations and enter into collaborative relationships with pharmaceutical companies that could assume responsibility for late-stage development and commercialization.

We have limited experience in conducting advanced clinical trials and may not possess the necessary resources and expertise to complete such trials. We have entered into collaborative agreements to provide funding and assistance in the development of certain product candidates through the clinical trial process. However, there is no guarantee that we will be able to enter into future collaborative relationships with third parties that can provide us with the funding and expertise for later stage trials.

We have not yet reached agreement with regulatory authorities on the development pathway for our product candidates. As a result, we have not yet determined what endpoints would support approval for certain of our programs. Due to the novelty of certain programs, such as SB-318 and SB-913, the endpoints needed to support regulatory approvals may be different than originally anticipated. Even if we are able to complete Phase 1/2 trials for these programs successfully, we will likely be required to conduct additional clinical trials with larger patient populations, before obtaining the necessary regulatory approval to commercialize our products. However, there is no guarantee that the positive results achieved in earlier trials are indicative of long-term efficacy in late stage clinical trials. A number of companies in the pharmaceutical and biotechnology industries have suffered significant setbacks in late stage clinical trials even after achieving promising results in earlier-stage clinical trials. If a larger population of patients does not experience positive results, or if these results are not reproducible, our products may not receive approval from the FDA, which could have a material adverse effect on our business that would cause our stock price to decline significantly.

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. If we are unable to obtain regulatory approval for one of our product candidates in one or more jurisdictions, or any approval contains significant limitations, we may not be able to obtain sufficient funding to continue the development of that product or generate revenues attributable to that product candidate. Also, any regulatory approval of our current or future product candidates, once obtained, may be withdrawn.

Success in preclinical studies or early clinical trials may not be indicative of results obtained in later trials.

Results from preclinical studies or previous 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.

While we have achieved positive results in preclinical studies of our product candidates for hemophilia A (SB-525), hemophilia B (SB-FIX), MPS I (SB-318) and MPS II (SB-913), Phase 1/2 clinical trials have only recently begun or are expected to begin and there is no guarantee that we can achieve positive safety and efficacy results. Furthermore, all four programs are novel *in-vivo* gene therapy or genome editing therapies that utilize adeno-associated viral vector, or AAV, to deliver therapeutic levels of ZFN into the patient's blood stream. The AAV delivery system has not been validated in human clinical trials previously, and if such delivery system does 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.

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. In addition, we may experience regulatory delays or rejections as a result of many factors, including due to changes in regulatory policy during the period of our product candidate development. Any such delays could materially and adversely affect our business, financial condition, results of operations and prospects.

Our potential products are subject to a lengthy and uncertain regulatory approval process.

The FDA must approve any human therapeutic product before it can be marketed in the United States. 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, we must submit an Investigational New Drug, or IND, application to the FDA. The FDA has 30 days to comment on the application, and if the agency has no comments, we or our commercial partner may begin clinical trials. While we have stated our intention to file additional IND applications in the future, this is only a statement of intent, and we may not be able to do so because the associated product candidates may not meet the necessary preclinical requirements. In addition, there can be no assurance that, once filed, an IND application will result in the actual initiation of clinical trials or that we will be able to meet our targeted timeline for the initiation of clinical trials. Clinical trials are subject to oversight by institutional review boards, or IRBs, and the FDA. In addition, our proposed clinical studies may require review from the Recombinant DNA Advisory Committee, or RAC, which is the advisory board to the NIH focusing on clinical trials involving gene transfer.

Clinical trials:

- must be conducted in conformance with the FDA's good clinical practices, within the guidelines of the International Council for Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use, or ICH, and other applicable regulations;
- must meet requirements for IRB oversight;
- must follow Institutional Biosafety Committee, or IBC, and NIH RAC guidelines where applicable;
- must meet requirements for informed consent;
- are subject to continuing FDA or similar foreign government oversight;
- may require oversight by a Data Monitoring Committee, or DMC;
- may require large numbers of test subjects; and
- may be suspended by a commercial partner, the FDA, or us at any time if it is believed that the subjects participating in these trials are being exposed to unacceptable health risks or if the FDA finds deficiencies in the IND application or the conduct of these trials.

If we are not able to obtain the necessary regulatory approval to commercialize our products of if such approval is delayed or suspended, it would have an adverse effect on our business operations and trading price of our common stock.

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

We intend to advance early research programs through preclinical development and to file new IND applications for human clinical trials evaluating the preclinical candidates in our pipeline. The preparation and submission of IND applications 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 file certain IND applications 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 file the intended IND applications on a timely basis or at all. Furthermore, the filing of several IND applications involves significant cost and labor, and we may not have sufficient resources and personnel to complete the filing of all intended IND applications, which may force us to scale back the number of IND applications or forego potential IND applications that we believe are promising. Any delay, suspension or reduction of our efforts to pursue our preclinical and IND strategy could have a material adverse effect on our business and cause our stock price to decline.

We may not successfully identify, acquire, develop or commercialize new potential product candidates.

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 addition, 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 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. Even if we are able to successfully identify and acquire such product candidates, we cannot assure you that we will be able to successfully manage the risks associated with integrating acquired or in-licensed product candidates or technologies or the risks arising from anticipated and unanticipated problems in connection with an acquisition or in-licensing transaction. 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. Any failure in identifying and managing these risks and uncertainties effectively, including in connection with the TxCell Acquisition, would have a material adverse effect on our business. Additionally, we may not realize the anticipated benefits of such transactions, including the possibility that expected benefits will not be realized or will not be realized within the expected timeframe.

We may encounter substantial delays in our clinical trials or we may fail to demonstrate safety and efficacy to the satisfaction of applicable regulatory authorities.

Before obtaining marketing approval from regulatory authorities for the sale of our product candidates, we must conduct extensive clinical trials to demonstrate the safety and efficacy of the product candidates. Clinical testing is expensive, time consuming and uncertain as to outcome. 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 of testing. Events that may prevent successful or timely completion of clinical development include:

- delays in reaching a consensus with regulatory authorities on trial design;
- delays in reaching agreement on acceptable terms with prospective CROs and clinical trial sites;
- delays in opening clinical trial sites or obtaining required IRB or independent ethics committee approval at each clinical trial site;
- delays in recruiting 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 FDA good clinical practices, or GCP, or applicable regulatory guidelines in the European Union 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;
- 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 associated with the product candidate that are viewed to outweigh its potential benefits;

- occurrence of serious adverse events in trials of the same class of agents conducted by other sponsors; or
- changes in regulatory requirements and guidance that require amending or submitting new clinical protocols.

Any inability to successfully complete preclinical and clinical development could result in additional costs to us or impair our ability to generate revenues from product sales, regulatory and commercialization milestones and royalties. In addition, if we make manufacturing or formulation changes to our product candidates, we may need to conduct additional studies to bridge our modified product candidates to earlier versions. Clinical trial delays also could shorten any periods during which we may have the exclusive right to commercialize our product candidates or allow our competitors to bring products to market before we do, which could impair our ability to successfully commercialize our product candidates and may harm our business, financial condition, results of operations and prospects.

Additionally, if the results of our clinical trials are inconclusive or if there are safety concerns or serious adverse events associated with our product candidates, we may:

- be delayed in obtaining marketing approval for our product candidates, if at all;
- obtain approval for indications or patient populations that are not as broad as intended or desired;
- obtain approval with labeling that includes significant use or distribution restrictions or safety warnings;
- be subject to changes in the way the product is administered;
- be required to perform additional clinical trials to support approval or be subject to additional post-marketing testing requirements;
- have regulatory authorities withdraw, or suspend, their approval of the product or impose restrictions on its distribution in the form of a modified risk evaluation and mitigation strategy;
- be subject to the addition of labeling statements, such as warnings or contraindications;
- be sued; or
- experience damage to our reputation.

We may not be able to find acceptable patients or may experience delays in enrolling 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. We have been unable to enroll a patient in our hemophilia B clinical trial. If we are not able to enroll the necessary number of patients in a timely manner, we may not be able to complete the clinical trial. We may face similar challenges or delays in our other or 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.

Our current product candidates are being developed to treat rare conditions. We plan to seek initial regulatory approvals in the United States and, subsequently, the European Union. We may not be able to initiate or continue clinical trials if we cannot enroll a sufficient number of eligible patients to participate in the clinical trials required by regulatory authorities. Our ability to successfully initiate, enroll and complete a clinical trial in any foreign country is subject to numerous risks unique to conducting business in foreign countries, including:

- difficulty in establishing or managing relationships with contract research organizations, or CROs, and physicians;
- different standards for the conduct of clinical trials;
- absence in some countries of established groups with sufficient regulatory expertise for review of gene therapy protocols;
- our inability to locate qualified local consultants, physicians and partners; and
- the potential burden of complying with a variety of foreign laws, medical standards and regulatory requirements, including the regulation of pharmaceutical and biotechnology products and 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, any of which would have an adverse effect on our business, financial condition, results of operations and prospects.

Our product candidates may cause undesirable side effects or have other properties that could delay or prevent their regulatory approval, limit the 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.

As we cannot predict whether or when we will obtain regulatory approval to commercialize our product candidates, we cannot predict the timing of any future revenue from these product candidates.

We cannot commercialize any of our product candidates to generate revenue until the appropriate regulatory authorities have reviewed and approved the marketing applications for the product candidates. We cannot ensure that the regulatory agencies will complete their review processes in a timely manner or that we will obtain regulatory approval for any product candidate that we or our collaborators develop. Satisfaction of regulatory requirements typically takes many years, is dependent upon the type, complexity and novelty of the product and requires the expenditure of substantial resources. Regulatory approval processes outside the United States include all of the risks associated with the FDA approval process. In addition, we may experience delays or rejections based upon additional government regulation from future legislation or administrative action or changes in FDA policy during the period of product development, clinical trials and FDA regulatory review.

We may be unable to obtain additional orphan drug designations or orphan drug exclusivity for any product. If our competitors are able to obtain orphan drug exclusivity for products that constitute the same drug and treat the same indications as our product candidates, we may not be able to have competing products approved by the applicable regulatory authority for a significant period of time.

Regulatory authorities in some jurisdictions, including the United States and the European Union, may designate drugs for relatively small patient populations as orphan drugs. Under the Orphan Drug Act of 1983, the FDA may designate a product candidate as an Orphan Drug if it is intended to treat a rare disease or condition, which is generally defined as having a patient population of fewer than 200,000 individuals in the United States, or a patient population greater than 200,000 in the United States where there is no reasonable expectation that the cost of developing the drug will be recovered from sales in the United States. In the European Union, the European Medicines Agency's Committee for Orphan Medicinal Products grants such designation to promote the development of products that are intended for the diagnosis, prevention or treatment of a life-threatening or chronically debilitating condition affecting not more than five in 10,000 persons in the European Union. Additionally, orphan designation is granted for products intended for the diagnosis, prevention or treatment of a life-threatening, seriously debilitating or serious and chronic condition and when, without incentives, it is unlikely that sales of the drug in the European Union would be sufficient to justify the necessary investment in developing the drug or biologic product.

Our four most advanced product candidates, SB-525, SB-FIX, SB-318 and SB-913 have all been granted Orphan Drug Designation by the FDA, and SB-525 and SB-318 and SB-913 have also been designated Orphan Medicinal Products by the European Medicines Agency, or EMA. If we request such designation 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 designation. Additionally, such designation does not guarantee that any regulatory agency will accelerate regulatory review of, or ultimately approve, that product candidate, nor does it limit the ability of any regulatory agency to grant such designation to product candidates of other companies that treat the same indications as our product candidates prior to our product candidates receiving exclusive marketing approval.

Generally, if a product candidate with an orphan drug designation receives the first marketing approval for the indication for which it has such designation, the product is entitled to a period of marketing exclusivity, which precludes the FDA or the EMA from approving another marketing application for a product that constitutes the same drug treating the same indication for that marketing exclusivity period, except in limited circumstances. If another sponsor receives such approval before we do (regardless of our orphan drug designation), we will be precluded from receiving marketing approval for our product for the applicable exclusivity period. The applicable period is seven years in the United States and 10 years in the European Union. The exclusivity period in the United States can be extended by six months if the BLA sponsor submits pediatric data that fairly respond to a written request from the FDA for such data. The exclusivity period in the European Union can be reduced to six years if a product no longer meets the criteria for orphan drug designation or if the product is sufficiently profitable so that market exclusivity is no longer justified. 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.

Even if we obtain orphan drug exclusivity for a product candidate, that exclusivity may not effectively protect the product candidate from competition because different drugs can be approved for the same condition. In the United States, even after an orphan drug is approved, the FDA may subsequently approve another drug for the same condition if the FDA concludes that the latter drug is not the same drug or is clinically superior in that it is shown to be safer, more effective or makes a major contribution to patient care. In the European Union, marketing authorization may be granted to a similar medicinal product for the same orphan indication if:

- the second applicant can establish in its application that its medicinal product, although similar to the orphan medicinal product already authorized, is safer, more effective or otherwise clinically superior;
- the holder of the marketing authorization for the original orphan medicinal product consents to a second orphan medicinal product application; or
- the holder of the marketing authorization for the original orphan medicinal product cannot supply sufficient quantities of orphan medicinal product.

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 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 Bioverativ for our beta-thalassemia and sickle cell disease product candidates.

If we are unable to find additional partners or if the partners we 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.

There can be no assurance that we will be able to establish further strategic collaborations for our products. We may require significant time to secure collaborations or partners because we need to effectively market the benefits of our technology to these future collaborators and partners, which may direct the attention and resources of our research and development personnel and management away from our primary business operations. Further, each collaboration or partnering arrangement will involve the negotiation of terms that may be unique to each collaborator or partner. These business development efforts may not result in a collaboration or partnership.

The loss of 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. For more information on risks relating to our third-party collaborative agreements, see “Risks Relating to our Collaborative Relationships.”

We may be unable to license gene transfer technologies that we may need to commercialize our zinc finger protein technology.

In order to regulate or modify a gene in a cell, the zinc finger protein, or 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. 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. However, we may not be able to license the gene transfer technologies required to develop and commercialize our product candidates. 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. The inability to obtain a license to use gene transfer technologies with entities which 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.

Our gene regulation and genome editing technology is relatively new, and if we are unable to use this technology in all our intended applications, it would limit our revenue opportunities.

Our technology involves a relatively new approach to gene regulation and genome editing. Although we have generated ZFPs for thousands of gene sequences, we have not created ZFPs for all gene sequences and may not be able do so, which could limit the usefulness of our technology. In addition, while we have demonstrated the function of engineered zinc finger nucleases, or ZFNs, and ZFP transcription factors, or ZFP TFs, in mammalian cells, yeast, insects, plants and animals, we have not yet demonstrated clinical efficacy of this technology in a controlled clinical trial in humans, and the failure to do so could restrict our ability to develop commercially viable products. If we, and our collaborators or strategic partners, are unable to extend our results to new commercially important genes, experimental animal models, and human clinical studies, we may be unable to use our technology in all its intended applications.

The expected value and utility of our ZFNs and ZFP TFs is in part based on our belief that the targeted editing of genes or specific regulation of gene expression may enable us to develop a new therapeutic approach as well as to help scientists better understand the role of genes in disease, and to aid their efforts in drug discovery and development. We also believe that ZFP-mediated targeted genome editing and gene regulation will have utility in agricultural applications. There is only a limited understanding of the role of specific genes in all these fields. Life sciences companies have developed or commercialized only a few products in any of these fields based on results from genomic research or the ability to regulate gene expression. We, our collaborators or our strategic

partners, may not be able to use our technology to identify and validate drug targets or to develop commercial products in the intended markets.

Effective delivery of ZFNs and ZFP TFs into the appropriate target cells and tissues is critical to the success of the therapeutic applications of our ZFP technology. In order to have a meaningful therapeutic effect, product candidates based must be delivered to sufficient numbers of cells in the targeted tissue. The ZFN or ZFP TF must be present in that tissue for sufficient time to effect either modification of a therapeutically relevant gene or regulation of its expression. In our current clinical and preclinical programs, we administer these product candidates as a nucleic acid that encodes the ZFN or ZFP TF. We use different formulations to deliver the ZFN or ZFP TF depending on the required duration of expression, the targeted tissue and the indication that we intend to treat, including our proprietary AAV delivery system. However, there can be no assurances that we will be able to effectively deliver our ZFNs and ZFP TFs to produce a beneficial therapeutic effect.

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.

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 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.

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 payers 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 pricing by third-party payors and government authorities and the willingness of patients to pay out-of-pocket in the absence of coverage by third-party payors;
- 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 from government health administration authorities, private health insurers and other organizations.

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. A primary trend in the healthcare industry is cost containment. Government authorities and third-party payors have attempted to control costs by limiting coverage and the amount of reimbursement for particular medications. Increasingly, third-party payors are requiring that drug companies provide them with predetermined discounts from list prices and are challenging the prices charged for medical products. Third-party payors may also seek additional clinical evidence, beyond the data required to obtain regulatory approval, demonstrating clinical benefits and value in specific patient populations before covering our products for those patients. 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. Coverage and reimbursement may impact the demand for, or the price of, any product candidate for which we obtain regulatory approval. If reimbursement is not available or is available only at limited levels, we may not be able to successfully commercialize any product candidate for which we obtain regulatory approval.

There may be significant delays in obtaining coverage and reimbursement for newly approved drugs, and coverage may be more limited than the purposes for which the drug is approved by the FDA or comparable foreign regulatory authorities. Moreover, eligibility for coverage and reimbursement does not imply that any drug will be paid for in all cases or at a rate that covers our costs, including research, development, manufacture, sale and distribution. Interim reimbursement levels for new drugs, if applicable, may also not be sufficient to cover our costs and may only be temporary. Reimbursement rates may vary according to the use of the drug and the clinical setting in which it is used, may be based on reimbursement levels already set for lower cost drugs and may be incorporated into existing payments for other services. Net prices for drugs may be reduced by mandatory discounts or rebates required by government healthcare programs or private payors and by any future relaxation of laws that presently restrict imports of drugs from countries where they may be sold at lower prices than in the United States. Third-party payors in the United States often rely upon Medicare coverage policy and payment limitations in setting their own reimbursement policies. 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 a material 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. In particular, in March 2010, the Patient Protection and Affordable Care Act, as amended by the Health Care and Education Reconciliation Act, collectively, the Affordable Care Act, was enacted, which substantially changes the way health care is financed by both governmental and private insurers, and significantly impacts the U.S. pharmaceutical industry. The Affordable Care Act 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 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, provided incentives to programs that increase the federal government's comparative effectiveness research and established a new Medicare Part D coverage gap discount program, in which manufacturers must agree to offer 50% 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.

Some of the provisions of the Affordable Care Act have yet to be fully implemented, and there have been legal and political challenges to certain aspects of the Affordable Care Act. Since January 2017, President Trump has signed two executive orders and other directives designed to delay, circumvent, or loosen certain requirements mandated by the Affordable Care Act. Concurrently, Congress has considered legislation that would repeal or repeal and replace all or part of the Affordable Care Act. While Congress has not passed repeal legislation, the Tax Cuts and Jobs Act of 2017 includes a provision repealing, effective January 1, 2019, the tax-based shared responsibility payment imposed by the Affordable Care Act 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". Additionally, on January 22, 2018, President Trump signed a continuing resolution on appropriations for fiscal year 2018 that delayed the implementation of certain Affordable Care Act-mandated fees. Congress may consider other legislation to repeal or replace elements of the Affordable Care Act.

Other legislative changes have been proposed and adopted in the United States since the Affordable Care Act 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 2027 unless additional Congressional action is taken. In January 2013, President Obama signed into law the American Taxpayer Relief Act of 2012, or the ATRA, 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, some of which are included in the Trump administration's budget proposal for fiscal year 2019. At the federal level, Congress and the Trump 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 become increasingly active in passing legislation and implementing 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.

There have been, and likely will continue to be, legislative and regulatory proposals at the foreign, federal and state levels directed at broadening the availability of healthcare and containing or lowering the cost of healthcare. We cannot predict the initiatives that may be adopted in the future. 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.

Legislative and regulatory proposals have been made to expand post-approval requirements and restrict sales and promotional activities for pharmaceutical products. We cannot be sure whether additional legislative changes will be enacted, or whether the FDA regulations, guidance or interpretations will be changed, or what the impact of such changes on the regulatory approvals of our product candidates, if any, may be.

In the United States, the European Union 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. For example, in the United States, there have been several recent Congressional inquiries and proposed bills designed to, among other things, bring more transparency to drug pricing, review the relationship between pricing and manufacturer patient programs, and reform government program reimbursement methodologies for drugs. Furthermore, the increased emphasis on managed healthcare in the United States and on country and regional pricing and reimbursement controls in the European Union 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.

Price controls may be imposed in foreign markets, which may adversely affect our future profitability.

In some countries, particularly member states of the European Union, the pricing of prescription drugs is subject to governmental control. In these countries, pricing negotiations with governmental authorities can take considerable time after receipt of regulatory approval for a product. In addition, there can be considerable pressure by governments and other stakeholders on prices and reimbursement levels, including as part of cost containment measures. Political, economic and regulatory developments may further complicate pricing negotiations, and pricing negotiations may continue after reimbursement has been obtained. Reference pricing used by various European Union member states and parallel distribution, or arbitrage between low-priced and high-priced member states, can further reduce prices. In some countries, we, or our collaborators, may be required to conduct a clinical trial or other studies that compare the cost-effectiveness of our product candidates to other available therapies in order to obtain or maintain reimbursement or pricing approval. Publication of discounts by third-party payors or authorities may lead to further pressure on the prices or reimbursement levels within the country of publication and other countries. If reimbursement of our products is unavailable or limited in scope or amount, or if pricing is set at unsatisfactory levels, our business could be adversely affected.

Even if we complete the necessary preclinical and clinical studies, we cannot predict when or if we will obtain regulatory approval to commercialize a product candidate or the approval may be for a more narrow indication than we expect.

We cannot commercialize a product until the appropriate regulatory authorities have reviewed and approved the product candidate. Even if our product candidates demonstrate safety and efficacy in clinical studies, the regulatory agencies may not complete their review processes in a timely manner, or we may not be able to obtain regulatory approval. Additional delays may result if an FDA Advisory Committee or other regulatory advisory group or authority recommends non-approval or restrictions on approval. In addition, we may experience delays or rejections based upon additional government regulation from future legislation or administrative action, or changes in regulatory agency policy during the period of product development, clinical studies and the review process. Regulatory agencies also may approve a treatment candidate for fewer or more limited indications than requested or may grant approval subject to the performance of post-marketing studies. In addition, regulatory agencies may not approve the labeling claims that are necessary or desirable for the successful commercialization of our treatment candidates. For example, the development of certain product candidates for pediatric use is an important part of our current business strategy, and if we are unable to obtain regulatory approval for the desired age ranges, our business may suffer.

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 obligated to monitor and report adverse events and any failure of a product to meet the specifications in the BLA. The holder of an approved BLA must also submit new or supplemental applications and obtain FDA approval for certain changes to the approved product, product labeling or manufacturing process. Advertising and promotional materials must comply with FDA rules and are subject to FDA review, in addition to other potentially applicable federal and state laws.

In addition, product manufacturers and their facilities are subject to payment of user fees and continual review and periodic inspections by the FDA and other regulatory authorities for 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.

If we fail to comply with applicable regulatory requirements following approval of any of our product candidates, a regulatory agency may:

- issue a warning letter asserting that we are in violation of the law;

- seek an injunction or impose civil or criminal penalties or monetary fines;
- suspend or withdraw regulatory approval;
- suspend any ongoing clinical studies;
- refuse to approve a pending marketing application, such as a BLA or supplements to a BLA submitted by us;
- seize product; or
- refuse to allow us to enter into supply contracts, including government contracts.

Any government investigation of alleged violations of law 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.

Failure to obtain regulatory approval in international jurisdictions would prevent our product candidates from being marketed abroad.

In addition to regulations in the United States, to market and sell our products in the European Union, many Asian countries and other jurisdictions, we must obtain separate regulatory approvals and comply with numerous and varying regulatory requirements. The approval procedure varies among countries and can involve additional testing. The time required to obtain approval may differ substantially from that required to obtain FDA approval. The regulatory approval process outside the United States generally includes all of the risks associated with obtaining FDA approval. Clinical trials accepted in one country may not be accepted by regulatory authorities in other countries. In addition, many countries outside the United States require that a product be approved for reimbursement before it can be approved for sale in that country. A product candidate that has been approved for sale in a particular country may not receive reimbursement approval in that country. We may not be able to obtain approvals from regulatory authorities outside the United States on a timely basis, if at all. Approval by one regulatory authority outside the United States does not ensure approval by regulatory authorities in other countries or jurisdictions or by the FDA. We may not be able to file for regulatory approvals and may not receive necessary approvals to commercialize our products in any market. If we are unable to obtain approval of any of our product candidates by the FDA or regulatory authorities in the European Union, Asia or elsewhere, the commercial prospects of that product candidate may be significantly diminished, our business prospects could decline and this could materially adversely affect our business, results of operations and financial condition.

Our relationships with customers and third-party payors will be subject to applicable anti-kickback, fraud and abuse and other healthcare laws and regulations, which could expose us to significant penalties.

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. Our current and future 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. Restrictions under applicable federal and state healthcare laws and regulations that may affect our ability to operate include the following:

- the federal healthcare Anti-Kickback Statute will constrain our marketing practices, educational programs, pricing policies, and relationships with healthcare providers or other entities, by prohibiting, 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 and civil monetary penalty laws impose criminal and civil penalties, including through civil whistleblower or qui tam actions, against individuals or entities for 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, imposes criminal and civil liability for executing a scheme to defraud any healthcare benefit program and also created federal criminal laws that prohibit 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, also imposes 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 and their business associates;

- the federal Physician Payments Sunshine Act created under the Affordable Care Act requires certain manufacturers of drugs, devices, biologics and medical supplies to report annually to the Centers for Medicare & Medicaid Services, or CMS, information related to payments and other transfers of value to physicians 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, or marketing expenditures; and/or ensure the registration and compliance of sales and medical 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.

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. Federal and state enforcement bodies have recently increased their scrutiny of interactions between healthcare companies, healthcare providers and other third parties, including charitable foundations, 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. Any such investigation or settlement could increase our costs or otherwise have an adverse effect on our business.

Efforts to ensure that our business arrangements with third parties will comply with applicable healthcare laws and regulations will involve substantial costs. It is possible that governmental authorities will conclude that our business practices may not comply with current or future statutes, regulations or case law involving applicable fraud and abuse or other healthcare laws and regulations. If our operations are found to be in violation of any of these laws or any other governmental regulations that may apply to us, we may be subject to 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 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. 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, they may be subject to criminal, civil or administrative sanctions, including exclusions from government funded healthcare programs.

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

We are exposed to the risk of employee fraud or other misconduct, 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. Employee misconduct 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 employee 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 fines or other sanctions.

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.

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, and we do not own facilities for, clinical-scale manufacturing of our product candidates and we rely upon third-party contract manufacturing organizations to manufacture and supply drug product for our preclinical and clinical studies. The manufacture of pharmaceutical products in compliance with the FDA's current good manufacturing practices, or 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.

All manufacturers of our product candidates 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. Manufacturers of our product candidates 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 suppliers 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 suppliers 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 supplier is identified, which could also delay the development of, and impair our ability to commercialize, our product candidates.

The number of third-party suppliers 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 suppliers, which could have a material adverse effect on our business. New suppliers 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.

We intend to design and build 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 our 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 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 CMO. 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 would 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 will be time-consuming and expensive, and we may experience delays or cost overruns. In addition, government approvals would be required for us to operate a manufacturing facility and can be time-consuming to obtain. As a manufacturer of pharmaceutical products, we also would 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 may 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.

There are risks associated with manufacturing for clinical and commercial use. Manufacturing biological components at the appropriate scale and quality is complex and difficult.

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 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. In addition, we may not be able to manufacture our product candidates in sufficient quantities to meet the requirements for a potential launch or to meet potential future demand. If we or our third-party manufacturers are unable to produce sufficient quantities of the approved product for commercialization, either on a timely basis or at all, our commercialization efforts would be impaired, which would have a material adverse effect on our business, financial condition, results of operations and growth prospects.

We face uncertainties and risks associated with the manufacture of our product candidates. 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 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. 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.

We do not currently have the infrastructure or capability to manufacture, market and sell therapeutic products on a commercial scale.

In order for us to commercialize our therapeutic products directly, we would need to develop, or obtain through outsourcing arrangements, the capability to manufacture, market and sell our products on a commercial scale. Currently, we do not have the ability nor the financial resources to establish the infrastructure and organizations needed to execute these functions, including such infrastructure needed for the commercialization of any product based on our ZFP technology, which can be complex and costly. If we are unable to establish adequate manufacturing, sales, marketing and distribution capabilities, we will not be able to directly commercialize our therapeutics products, which would limit our future growth.

If we are unable to establish sales and marketing capabilities or enter into agreements with third parties to market and sell our product candidates, we may be unable to generate any revenue.

We do not currently have an organization for the sale, marketing and distribution of pharmaceutical products and the cost of establishing and maintaining such an organization may exceed the cost-effectiveness of doing so. In order to market any products that may be approved by the FDA and comparable foreign regulatory authorities, we must build our sales, marketing, managerial and other non-technical capabilities or make arrangements with third parties to perform these services. There are significant risks involved in building and managing a sales organization, including our ability to hire, retain and incentivize qualified individuals, generate sufficient sales leads, provide adequate training to sales and marketing personnel and effectively manage a geographically dispersed sales and marketing team. Any failure or delay in the development of our internal sales, marketing and distribution capabilities would adversely impact the commercialization of any approved products. If we are unable to establish adequate sales, marketing and distribution capabilities, whether independently or with third parties, we may not be able to generate product revenues and may not become profitable. We will be competing with many companies that currently have extensive and well-funded sales and marketing operations. Without an internal commercial organization or the support of a third party to perform sales and marketing functions, we may be unable to compete successfully against these more established companies. If we are not successful in commercializing our current or future product candidates either on our own or through collaborations with one or more third parties, our future product revenue will suffer and we would incur significant additional losses.

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

As of June 30, 2018, we had 209 full-time employees. We 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. In addition, we may not be able to attract or retain employees with the appropriate levels of experience and to 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. Our management, personnel and systems currently in place may not be adequate to support this future growth. Future growth would impose significant added responsibilities on members of management, including:

- managing our preclinical studies and clinical trials effectively;
- identifying, recruiting, maintaining, motivating and integrating additional employees;
- managing our internal development efforts effectively while complying with our contractual obligations to licensors, licensees, contractors and other third parties;
- improving our managerial, development, operational, information technology, and finance systems; and
- expanding our facilities.

As our operations expand, we will also need to manage additional relationships with various strategic partners, suppliers and other third parties. 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

Risks Relating to our Industry

If our competitors develop, acquire, or market technologies or products that are more effective than ours, this would reduce or eliminate our commercial opportunity.

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. Competing proprietary technologies with our product development focus include but are not limited to:

- For genome editing and gene therapy products:
  - 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.
- Our non-therapeutic applications compete against similar technologies:
  - *For protein production:* gene amplification, CRISPR/Cas technology, TALE technology, insulator technology, and mini-chromosomes;
  - *For target validation:* antisense, siRNA, TALE technology and CRISPR/Cas technology;
  - *For plant agriculture:* recombination approaches, mutagenesis approaches, TALE technology, CRISPR/Cas technology, mini-chromosomes; and
  - *For transgenic animals:* somatic nuclear transfer, embryonic stem cell, TALE, CRISPR/Cas technology and transposase technologies.

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. In addition, any products that we develop may compete with existing products or services that are well established in the marketplace.

Our product candidates are based on a novel technology, 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 genome editing, gene therapy, gene regulation and cell therapy. 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 products conducted by others may cause the FDA or other oversight bodies to change the requirements for approval of our product candidates. The FDA only recently approved the first *in vivo* gene therapy, LUXTURNA, and only two *in vivo* gene therapy products, uniQure N.V.'s Glybera and GlaxoSmithKline's Strimvelis, have received marketing authorization from the EMA. 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.

Our gene therapy approach utilizes vectors derived from viruses, which may be perceived as unsafe or may result in unforeseen adverse events. Negative public opinion and increased regulatory scrutiny of gene therapy 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.

Gene therapy remains a novel technology, with only one *in vivo* gene therapy product approved for a genetic disease to date in the United States and only two *in vivo* gene therapy products for genetic diseases approved to date in the European Union. 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. 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. 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.

Laws or public sentiment may limit the production of genetically modified agricultural products, and these laws could reduce our partner's ability to sell such products.

Genetically modified products are currently subject to public debate and heightened regulatory scrutiny, either of which could prevent or delay production of agricultural products. We have exclusive right to use our ZFP technology to modify the genomes or alter the nucleic acid or protein expression of plant cells, plants or plant cell cultures. The field-testing, production and marketing of genetically modified plants and plant products are subject to federal, state, local and foreign governmental regulation. Regulatory agencies administering existing or future regulations or legislation may not allow production and marketing of our genetically modified products in a timely manner or under technically or commercially feasible conditions. In addition, regulatory action or private litigation could result in expenses, delays or other impediments to our product development programs or the commercialization of resulting products.

The FDA currently applies the same regulatory standards to foods developed through genetic engineering as those applied to foods developed through traditional plant breeding. Genetically engineered food products, however, will be subject to pre-market review if these products raise safety questions or are deemed to be food additives. Governmental authorities could also, for social or other purposes, limit the use of genetically modified products created with our gene regulation technology.

Even if the regulatory approval for genetically modified products developed using our ZFP 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. The subject of genetically modified organisms has received negative publicity in the United States and particularly in Europe, and such publicity has aroused public debate. The adverse publicity in Europe could lead to greater regulation and trade restrictions on imports of genetically altered products. Similar adverse public reaction or sentiment in the United States to genetic research and its resulting products could result in greater domestic regulation and could decrease the demand for our technology and products.

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. Our net losses for the years ended December 31, 2017, 2016 and 2015 were $54.6 million, $71.7 million and $40.7 million, respectively. 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. As of June 30, 2018, we had an accumulated deficit of $532.3 million. Since our initial public offering in 2000, we have generated an aggregate of approximately $648.7 million in gross proceeds from the sale of our equity securities. 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, which would harm our ability to develop our technology and products.

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 financial resources will be adequate to sustain our current operations for at least the next twelve months, we will likely seek additional sources of capital through equity or debt financing. 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. Furthermore, 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 materially adversely affect our business and our ability to develop our technology and products candidates. Furthermore, any sales of additional equity securities may result in dilution to our stockholders and any debt financing may include business and financial covenants that restricts our operations.

We are at the development phase of operations and may not succeed or become profitable.

We began operations in 1995, are in the early phases of product development for the most advanced candidates in our therapeutics pipeline, and we have incurred significant losses since inception. To date, our revenues have been generated from collaboration agreements, other collaborations in non-therapeutic applications of our technology, federal government research grants and grants awarded by research foundations. Our focus on higher-value therapeutic product development and related collaboration requires us to incur substantial expenses associated with product development. In addition, the preclinical or clinical failure of any single product may have a significant effect on the actual or perceived value of our stock. Our business is subject to all of the risks inherent in the development of a new technology, which includes the need to:

- attract and retain qualified scientific and technical staff and management, particularly scientific staff with expertise to develop our early-stage technology into therapeutic products;
- obtain sufficient capital to support the expense of developing our technology platform and developing, testing and commercializing products;
- develop a market for our products; and
- successfully transition from a company with a research focus to a company capable of supporting commercial activities.

The comprehensive U.S. tax reform bill passed in 2017 could adversely affect our business and financial condition.

On December 22, 2017, President Trump signed into law new legislation that significantly revises the Internal Revenue Code of 1986, as amended (the Code). The newly enacted federal income tax law, among other things, contains significant changes to corporate taxation, including adoption of a flat 21% corporate tax rate, limitation of the tax deduction for interest expense to 30% of adjusted earnings (except for certain small businesses), limitation of the deduction of net operating losses generated in tax years beginning after December 31, 2017 to 80% of current year taxable income and elimination of carrybacks of such net operating losses, one time taxation of offshore earnings at reduced rates regardless of whether they are repatriated, current inclusion in U.S. federal taxable income of certain earnings of controlled foreign corporations, immediate deductions for certain new investments instead of deductions for depreciation expense over time, and modifying or repealing many business deductions and credits (including reducing the business tax credit for certain clinical testing expenses incurred in the testing of certain drugs for rare diseases or conditions generally referred to as "orphan drugs"). Notwithstanding the reduction in the corporate income tax rate, the overall impact of the new federal tax law is uncertain, and our business and financial condition could be adversely affected. In addition, it is uncertain if and to what extent various states will conform to the newly enacted federal tax law. The impact of this tax reform on holders of our common stock is also uncertain and could be adverse. Investors should consult with their legal and tax advisors with respect to this legislation and the potential tax consequences of investing in or holding our common stock.

Risks Relating to our Relationships with Collaborators and Strategic Partners

If conflicts arise between us and our 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 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 prospectus.

Our collaborators and strategic partners may control aspects of 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.

For example, under our agreements with Kite, Pfizer and Bioverativ, they have control and broad discretion over all or certain aspects of the clinical development and commercialization of any product developed under the agreement, and we will have little, if any, influence on how these programs will be conducted. Our lack of control over the clinical development in such agreements 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 collaborators or strategic partners may decide to adopt alternative technologies 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.

If the licensed products under our non-therapeutic license agreements are not successfully commercialized, or our third-party licensees terminate our agreements, our ability to generate revenue under these license agreements may be limited.

We have a number of collaboration agreements with third parties whereby we licensed our ZFP technologies to develop products in non- therapeutic fields, such as laboratory research reagents, protein pharmaceuticals, and, transgenic animals, as well as plant agriculture

We cannot be certain that we or our collaboration partners will succeed in the development of commercially viable products in these non-therapeutic fields of use, and there is no guarantee that we or our collaboration partners will achieve the milestones set forth in the respective license agreements. To the extent we or our collaboration partners do not succeed in developing and commercializing products or if we or our collaboration partners fail to achieve such milestones, our revenues and benefits under the license agreements will be limited. In the event our third party licensees decide to terminate the license agreements, our ability to generate revenue under such license agreements will cease.

Our collaborations with outside scientists may be subject to change, which could limit our access to their expertise.

We work with scientific advisors and collaborators at academic research institutions. These scientists are not our employees and may have other commitments that would limit their availability to us. Although our scientific advisors generally agree not to do competing work, if a conflict of interest between their work for us and their work for another entity arises, we may lose their services. Although our scientific advisors and academic collaborators sign agreements not to disclose our confidential information, it is possible that some of our valuable proprietary knowledge may become publicly known through them, which may cause competitive harm to our business.

Risks Relating to our Intellectual Property

Because it is difficult and costly to protect our proprietary rights, and third parties may have filed patent applications that are similar to ours, we cannot guarantee the proprietary protection of our technologies and products.

Our commercial success may depend in part on obtaining patent protection of our technology and successfully defending any of our patents that may be challenged. 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 allowed in patents we own or license that a third party may receive.

We are a party to various license agreements that give us and them 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 have been issued, although we have no current plans to use the associated inventions. If these or other patents issue, it is possible that the holder of any patent or patents granted on these applications may bring an infringement action against us, our collaborators, strategic partners, or us claiming damages and seeking to enjoin commercial activities relating to the affected products and processes. The costs of litigating the claim could be substantial. 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 the patent or patents, we or our collaborators could 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.

If we or TxCell. are unable to obtain or protect intellectual property rights related to our product candidates, we or TxCell may not be able to compete effectively in the intended markets.

We rely upon a combination of patents, trade secret protection and confidentiality agreements to protect the intellectual property related to our product candidates. The strength of patents in the biotechnology and pharmaceutical field involves complex legal and scientific questions and can be uncertain. The patent applications that we own or in-license may fail to result in issued patents with claims that cover our product candidates in the United States or in other foreign countries. 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. 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. Furthermore, even if they are unchallenged, our patents and patent applications may not adequately protect our intellectual property, provide exclusivity for our product candidates or prevent others from designing around our claims. Any of these outcomes could impair our ability to prevent competition from third parties, which may have an adverse impact on our business.

If the patent applications we hold or have in-licensed with respect to our programs or product candidates fail to issue, if their breadth or strength of protection is threatened, or if they fail to provide meaningful exclusivity for our product candidates, it could dissuade companies from collaborating with us to develop product candidates, and threaten our ability to commercialize, future products. Several patent applications covering our product candidates have been filed recently. We cannot offer any assurances about which, if any, patents will issue, the breadth of any such patent or whether any issued patents will be found invalid and unenforceable or will be threatened by third parties. Any successful opposition to these patents or any other patents owned by or licensed to us could

deprive us of rights necessary for the successful commercialization of any product candidates that we may develop. Further, if we encounter delays in regulatory approvals, the period of time during which we could market a product candidate under patent protection could be reduced. Since patent applications in the United States and most other countries are confidential for a period of time after filing, and some remain so until issued, we cannot be certain that we were the first to file any patent application related to a product candidate. Furthermore, if third parties have filed such patent applications, an interference proceeding in the United States can be initiated by a third party to determine who was the first to invent any of the subject matter covered by the patent claims of our applications. In addition, patents have a limited lifespan. In the United States, the natural expiration of a patent is generally 20 years after it is filed. 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.

In addition to the protection afforded by patents, 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 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 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 a material 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 materially adversely affect our business, results of operations and financial condition.

Third-party claims of intellectual property infringement may prevent or delay our development and commercialization efforts.

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 part*e 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. 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. Because patent applications can take many years to issue, there may be currently pending patent applications which may later result in issued patents that our product candidates may infringe. In addition, third parties may obtain patents in the future and claim that use of our technologies infringes upon these patents. If any third-party patents were held by a court of competent jurisdiction to cover the manufacturing process 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 patent expires. In either case, such a license may not be available on commercially reasonable terms or at all.

Parties making claims against us may obtain injunctive or other equitable relief, which could effectively block our ability to further develop and commercialize one or more of our product candidates. 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.

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

Presently we have rights to the intellectual property, through licenses from third parties and under patents that we own, to develop our gene therapy product candidates. Because our programs may involve additional product candidates 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. 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.

We may be involved in lawsuits or similar proceedings to protect or enforce our patents or the patents of our licensors, which could be expensive, time-consuming and unsuccessful.

Competitors may 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 and/or is not infringed, 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 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. In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO, or made a misleading statement, during prosecution. Third parties may also raise similar claims before administrative bodies in the United States or abroad, even outside the context of litigation. Such mechanisms include re-examination, post grant review, *inter partes* review and equivalent proceedings in foreign jurisdictions (e.g., opposition proceedings). 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 would have a material adverse impact on our business.

Interference proceedings provoked by third parties or brought by us may be necessary to determine the priority of inventions with respect to our patents or patent applications or those of our licensors. An unfavorable outcome could 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. Our defense of litigation or interference 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, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. There could also be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a material adverse effect on the price of our common stock.

Patent reform legislation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents.

On September 16, 2011, the Leahy-Smith America Invents Act, or the Leahy-Smith Act, was signed into law. The Leahy-Smith Act includes a number of significant changes to U.S. patent law, including provisions that affect the way patent applications will be prosecuted and may also affect patent litigation. The U.S. PTO is currently developing regulations and procedures to govern

administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act, and in particular, the first to file provisions, were enacted March 16, 2013. However, it is not clear what, if any, impact the Leahy-Smith Act will have on the operation of our business. However, the Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, all of which could have a material adverse effect on our business and financial condition.

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.

We may be subject to claims challenging the inventorship or ownership of our patents and other intellectual property.

We may also be subject to claims that former employees, collaborators or other third parties have an ownership interest in our patents or other intellectual property. Litigation may be necessary to defend against these and other claims challenging inventorship or ownership. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights, such as exclusive ownership of, or right to use, valuable intellectual property. Such an outcome could have a material adverse effect on 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.

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.

Issued patents covering our product candidates could be found invalid or unenforceable if challenged in court.

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.

In patent litigation in the United States, defendant counterclaims alleging invalidity and/or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, including patent eligible subject matter, lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the U.S. PTO, or made a misleading statement, during prosecution. Third parties may also raise similar claims before administrative bodies in the United States or abroad, even outside the context of litigation. Such mechanisms include re-examination, post grant review, and equivalent proceedings in foreign jurisdictions (e.g., opposition proceedings). Such proceedings could result in revocation or amendment to our patents in such a way that they no longer cover our product candidates. 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 would have a material adverse impact on our business.

Changes in U.S. 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 obtaining and enforcing biotechnology patents is costly, time-consuming and inherently uncertain. In addition, the United States has recently enacted and is currently implementing wide-ranging patent reform legislation. 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, and the U.S. PTO, 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 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.

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, including mobile technologies, to operate our business. 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. In addition, many of those third parties in turn subcontract or outsource some of their responsibilities to third parties. As a result, our information technology systems, including the functions of third parties that are involved or have access to those systems, is very large and complex. 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. Potential vulnerabilities can exploited from inadvertent or intentional actions of our employees, third-party vendors, business partners, or by malicious third parties. Attacks of this nature are increasing in their frequency, levels of persistence, sophistication and intensity, and are being conducted by sophisticated and organized groups and individuals with a wide range of motives (including, but not limited to, industrial espionage) and expertise, including organized criminal groups, “hacktivists,” nation states and others. In addition to the extraction of sensitive information, such attacks could include the deployment of harmful malware, ransomware, denial-of-service attacks, social engineering and other means to affect service reliability and threaten the confidentiality, integrity and availability of information. In addition, the prevalent use of mobile devices increases the risk of data security incidents.

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, legal, regulatory, business and reputational harm to us. For example, in April 2018, we announced a data security incident involving the compromise of a 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 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. Accordingly, we are still in the process of assessing the financial and other impacts on us and our business resulting from this incident. 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 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, including but not limited to personal information regarding our patients or employees, could disrupt our business, harm our reputation, compel us to comply with applicable federal and/or state breach notification laws and foreign law equivalents, subject us to time consuming, distracting and expensive litigation, regulatory investigation and oversight, mandatory corrective action, require us to verify the correctness of database contents, or otherwise subject us to liability under laws, regulations and contractual obligations, including those that protect the privacy and security of personal information. This could result in increased costs to us, and result in significant legal and financial exposure and/or reputational harm. In addition, any failure or perceived failure by us or our vendors or business partners to comply with our privacy, confidentiality or data security-related legal or other obligations to third parties, or any further security incidents or other inappropriate access events that result in the unauthorized access, release or transfer of sensitive information, which could include personally identifiable information, may result in governmental investigations, enforcement actions, regulatory fines, litigation, or public statements against us by advocacy groups or others, and could cause third parties, including clinical sites, regulators or current and potential partners, to lose trust in us or we could be subject to claims by third parties that we have breached our privacy- or confidentiality-related obligations, which could materially and adversely affect our business and prospects. 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.

If we use biological and hazardous materials in a manner that causes injury or violates laws, we may be liable for damages.

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.

Failure to attract, retain, and motivate skilled personnel and cultivate key academic collaborations will delay our product development programs and our research and development efforts.

Our success depends on our continued ability to attract, retain, and motivate highly qualified management and scientific personnel and our ability to develop and maintain important relationships with leading research and academic institutions and scientists. Competition for skilled and qualified personnel and academic and other research collaborations is intense. If we lose the services of personnel with the necessary skills, including the members of our senior management team, it could significantly impede

the achievement of our research and development objectives. If we fail to negotiate additional acceptable collaborations with academic and other research institutions and scientists, or if our existing collaborations are unsuccessful, our development programs may be delayed or may not succeed.

Third parties on which we rely and we may be adversely affected by natural disasters and our business continuity and disaster recovery plans may not adequately protect us from a serious disaster.

Natural disasters could severely disrupt our operations and have a material adverse effect on our business, financial condition, results of operations and prospects. If a natural disaster, power outage or other event occurred that prevented us from using all or a significant portion of our headquarters, that damaged critical infrastructure or that otherwise disrupted operations, it may be difficult or, in certain cases, impossible for us to continue our business 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 a material adverse effect on our business, financial condition, results of operations and prospects.

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.

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;
- 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;
- our ability to complete the TxCell Acquisition on the anticipated terms, or at all;
- 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;
- regulatory developments;
- changes, by one or more of our security analysts, in recommendations, ratings or coverage of our stock;
- additions or departures of key personnel;
- future 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.

Actual or potential sales of our common stock by our employees, including our executive officers, pursuant to pre-arranged stock trading plans could cause our stock price to fall or prevent it from increasing for numerous reasons, and actual or potential sales by such persons could be viewed negatively by other investors.

In accordance with the guidelines specified under Rule 10b5-1 of the Securities Exchange Act of 1934, as amended, and our policies regarding stock transactions, a number of our employees, including executive officers and members of our board of 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. Actual or potential sales of our common stock by such persons could cause the price of our common stock to fall or prevent it from increasing for numerous reasons.

Future sales and issuances of our common stock or rights to purchase common stock, including pursuant to our equity incentive plans, could result in additional dilution of the percentage ownership of our stockholders and could cause our stock price to fall.

Additional capital will be needed in the future to continue our planned operations. 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 stock price is also influenced by public perception of gene therapy and government regulation of potential products.

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. Stock prices of these companies declined whether or not the specific company was involved with retroviral gene transfer for the treatment of infants with X-linked SCID, or whether the specific company's clinical trials were placed on hold in connection with these events. Other potential adverse events in the field of gene therapy may occur in the future that could result in greater governmental regulation of our potential products and potential regulatory delays relating to the testing or approval of our potential products. These external events may have a negative impact on public perception of our business, which could cause our stock price to decline.

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 and Delaware law 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, as amended:

- 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 Delaware General Corporation Law, 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 the Court of Chancery of 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, as amended, provide that the Court of Chancery of 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 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; 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.

This provision may 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 2. UNREGISTERED SALES OF EQUITY SECURITIES AND USE OF PROCEEDS

None.

ITEM 3. DEFAULTS UPON SENIOR SECURITIES

Not applicable.

ITEM 4. MINE SAFEY DISCLOSURES

Not applicable.

ITEM 5. OTHER INFORMATION

None.

ITEM 6. EXHIBITS

(a) Exhibits:

2.1(A)	Share Purchase Agreement dated July 20, 2018 among Sangamo Therapeutics, Inc. and the Selling TxCell Shareholders named on the signature pages thereto.
2.2(B)	Tender Offer Agreement dated July 20, 2018 between Sangamo Therapeutics, Inc. and TxCell S.A.
3.1(C)	Composite copy of Seventh Amended and Restated Certificate of Incorporation of Sangamo Therapeutics, Inc., as amended.
3.2(D)	Third Amended and Restated Bylaws of Sangamo Therapeutics, Inc.
10.1(E)(+)	Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan.
10.2(F)(+)	Form of Stock Option Grant Notice and Form of Option Agreement (U.S. employees) under the Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan.
10.3(G)(+)	Form of Stock Option Grant Notice and Form of Option Agreement (non-employee directors) under the Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan.
10.4(H)(+)	Form of Stock Option Grant Notice and Form of Option Agreement (U.K. employees) under the Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan.
10.5(I)(+)	Form of Restricted Stock Unit Grant Notice and Form of Restricted Stock Unit Award Agreement (U.S. employees) under the Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan.
10.6(J)(+)	Form of Restricted Stock Unit Grant Notice and Form of Restricted Stock Unit Award Agreement (non-employee directors) under the Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan.
10.7(K)(+)	Form of Restricted Stock Unit Grant Notice and Form of Restricted Stock Unit Award Agreement (U.K. employees) under the Sangamo Therapeutics, Inc. 2018 Equity Incentive Plan.
10.8(L)(+)	Sangamo Therapeutics, Inc. 2010 Employee Stock Purchase Plan, as amended effective June 11, 2018.
10.9	Sixth Amendment to the Triple Net Laboratory Lease Agreement, dated May 23, 2018, between the Registrant and Point Richmond R&D Associates II, LLC.
14.1(M)	Sangamo Therapeutics, Inc. Code of Business Conduct and Ethics
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.
101.INS	XBRL Instance 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

* The certifications attached as Exhibit 32.1 accompany this Quarterly Report on Form 10-Q 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 Registrant for purposes of Section 18 of the Securities Exchange Act of 1934, as amended.

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

(A) Incorporated by reference to Exhibit 2.1 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on July 23, 2018.

(B) Incorporated by reference to Exhibit 2.2 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on July 23, 2018.

(C) Incorporated by reference to Exhibit 3.1 to the Registrant's Quarterly Report on Form 10-Q (File No. 000-30171), filed with the SEC on August 9, 2017.

(D) Incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(E) Incorporated by reference to Exhibit 99.1 to the Registrant's Registration Statement on Form S-8 (File No. 333-225552), filed with the SEC on June 11, 2018.

(F) Incorporated by reference to Exhibit 99.2 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(G) Incorporated by reference to Exhibit 99.3 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(H) Incorporated by reference to Exhibit 99.4 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(I) Incorporated by reference to Exhibit 99.5 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(J) Incorporated by reference to Exhibit 99.6 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(K) Incorporated by reference to Exhibit 99.7 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(L) Incorporated by reference to Exhibit 99.8 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

(M) Incorporated by reference to Exhibit 14.1 to the Registrant's Current Report on Form 8-K (File No. 000-30171), filed with the SEC on June 15, 2018.

SIGNATURES

Pursuant to the requirements of the Securities and Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned thereunto duly authorized.

Dated: August 8, 2018

SANGAMO THERAPEUTICS, INC.

/s/ KATHY Y. YI

Kathy Y. Yi
Senior Vice President and Chief Financial Officer
(Principal Financial and Accounting Officer)

EXHIBIT 10.9

SIXTH AMENDMENT TO LEASE

THIS SIXTH AMENDMENT TO LEASE (this "Sixth Amendment") is entered into as of May 11, 2018 (the "Effective Date"), by and between POINT RICHMOND R&D ASSOCIATES II, LLC, a California limited liability company ("Landlord"), and SANGAMO THERAPEUTICS, INC., a Delaware corporation (formerly known as Sangamo Biosciences, Inc., a Delaware corporation) ("Tenant"), with reference to the following facts:

A. Landlord and Tenant entered into that certain Triple Net Laboratory Lease dated as of May 23, 1997, together with an Addendum thereto dated May 28, 1997 (collectively, the "Original Lease"), as amended by those certain letter agreements dated June 15, 1999, April 21, 2000 and November 3, 2000, that certain First Amendment to Lease dated March 12, 2004 (the "First Amendment"), that certain Lease Addendum dated December 12, 2006 ("Lease Addendum II"), that certain Second Amendment to Lease dated March 15, 2007, that certain Lease Addendum III dated April 2, 2012 ("Lease Addendum III"), that certain Third Amendment to Lease dated August 1, 2013 (the "Third Amendment"), that certain Lease Addendum dated December 1, 2013 ("Lease Addendum IV", and collectively with Lease Addendum II and Lease Addendum III, the "Storage Space Lease Addenda"), that certain Fourth Amendment to Lease dated June 10, 2016, and that certain Fifth Amendment to Lease dated July 10, 2017 (the "Fifth Amendment"), pursuant to which Tenant leases certain premises consisting of approximately 26,629 rentable square feet known as Suites A, B and C-1 ("Suites A, B and C-1"), approximately 5,165 rentable square feet known as Suite C-2 ("Suite C-2"), and approximately 6,153 rentable square feet known as Suite F ("Suite F", and collectively with Suites A, B and C-1, and Suite C-2, the "Premises"), in the building located at 501 Canal Boulevard, Point Richmond, California (the "Building"). The Original Lease, as so amended, is collectively referred to herein as the "Existing Lease"; provided, however, the Storage Space Lease Addenda are no longer in effect pursuant to the terms of the Fifth Amendment.

B. The Lease as to Suites A, B and C-1 shall expire on August 31, 2019 (the "Suites A, B and C-1 Prior Expiration Date"), as to Suite C-2 shall expire on November 31, 2019 (the "Suite C-2 Prior Expiration Date"), and as to Suite F shall expire on July 31, 2021 (the "Suite F Prior Expiration Date"). Tenant has requested that the Lease be amended to make the expiration date of the Term one date for all of the Premises, and Landlord is willing to do the same on the following terms and conditions.

NOW, THEREFORE, in consideration of the foregoing, and for other good and valuable consideration, the receipt and adequacy of which are hereby acknowledged, Landlord and Tenant hereby agree as follows:

1. Incorporation of Recitals and Defined Terms . The Recitals above are hereby incorporated herein. As of the Effective Date, unless context clearly indicates otherwise, all references to "the Lease" or "this Lease" in the Existing Lease or in this Sixth Amendment shall be deemed to refer to the Existing Lease, as amended by this Sixth Amendment. Capitalized terms which are not otherwise defined in this Sixth Amendment shall have the meanings set forth in the Existing Lease.

2. Extension of Term of Lease as to Original Premises . The Term of the Lease as to the all of the Premises is hereby extended to August 31, 2026 (the "**Second Extended Expiration Date**"), unless sooner terminated in accordance with the terms of the Lease. That portion of the Term as to Suites A, B and C-1 only commencing the day immediately following the Prior Suites A, B and C-1 Expiration Date (the "**Suites A, B and C-1 Second Extension Date**") and ending on the Second Extended Expiration Date shall be referred to herein as the "**Suites A, B and C-1 Second Extended Term** ". That portion of the Term as to Suite C-2 only commencing the day immediately following the Prior Suite C-2 Expiration Date (the "**Suite C-2 Second Extension Date**") and ending on the Second Extended Expiration Date shall be referred to herein as the "**Suite C-2 Second Extended Term**". That portion of the Term as to Suite F only commencing the day immediately following the Prior Suite F Expiration Date (the "**Suite F Second Extension Date** ", and collectively with the Suites A, B and C-1 Second Extension Date and the Suite F Second Extension Date, the "**Second Extension Dates**"), and ending on the Second Extended Expiration Date shall be referred to herein as the "**Suite F Second Extended Term**".

3. Base Monthly Rent.

(a) *Premises Through Day Before Second Extension Dates* . The Base Monthly Rent, Additional Rent and all other charges under the Lease shall be payable as provided therein with respect to the each portion of the Premises through and including the day before each of the respective Second Extension Dates.

(b) *Suites A, B and C-1 From Suites A, B and C-1 Second Extension Date Through Second Extended Expiration Date*. As of the Suites A, B and C-1 Second Extension Date, the schedule of Base Monthly Rent payable with respect to Suites A, B and C-1 from the Suites A, B and C-1 Second Extension Date through the Suites A, B and C-1 Second Extended Term is the following:

Period	Base Monthly Rent
09/01/19 – 08/31/20	$63,910.00
09/01/20 – 08/31/21	$65,508.00
09/01/21 – 08/31/22	$67,145.00
09/01/22 – 08/31/23	$68,824.00
09/01/23 – 08/31/24	$70,545.00
09/01/24 – 08/31/25	$72,308.00
09/01/25 – 08/31/26	$74,116.00

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(c) *Suite C-2 From Suite C-2 Second Extension Date Through Second Extended Expiration Date*. As of the Suite C-2 Second Extension Date, the schedule of Base Monthly Rent payable with respect to Suite C-2 from the Suite C-2 Second Extension Date through the Suite C-2 Second Extended Term is the following:

Period	Base Monthly Rent
12/01/19 – 11/30/20	$10,072.00
12/01/20 – 11/30/21	$10,324.00
12/01/21 – 11/30/22	$10,582.00
12/01/22 – 11/30/23	$10,846.00
12/01/23 – 11/30/24	$11,117.00
12/01/24 – 11/30/25	$11,395.00
12/01/25 – 08/31/26	$11,680.00

(d) *Suite F From Suite F Second Extension Date Through Second Extended Expiration Date*. As of the Suite F Second Extension Date, the schedule of Base Monthly Rent payable with respect to Suite F from the Suite F Second Extension Date through the Suite F Second Extended Term is the following:

Period	Base Monthly Rent
08/01/21 – 07/31/22	$13,106.00
08/01/22 – 07/31/23	$13,434.00
08/01/23 – 07/31/24	$13,769.00
08/01/24 – 07/31/25	$14,114.00
08/01/25 – 07/31/26	$14,466.00
08/01/26 – 08/31/26	$14,828.00

All such Base Rent shall be payable by Tenant in accordance with the terms of the Lease.

4. Operating Expenses. Any caps on increases in Operating Expenses respecting the Premises shall continue to apply prior to each respective Second Extension Date. As of (a) the Suites A, B and C-1 Second Extension Date as to Suites A, B and C-1, (b) the Suite C-2 Second

Extension Date as to Suite C-2 and (c) the Suite F Second Extension Date as to Suite F, and ending as of the Second Extended Expiration Date as to all portions of the Premises, Tenant's Pro Rata Share of Operating Expenses (exclusive of Taxes) shall not increase by more than 5% per calendar year on a compounding and cumulative basis (e.g. Tenant's Pro Rata Share of Operating Expenses (other than Taxes) for calendar year 2019 shall not exceed 105% of Tenant's Pro Rata Share of Operating Expenses (other than Taxes) for calendar year 2018; Tenant's Pro Rata Share of Operating Expenses (other than Taxes) for calendar year 2020 shall not exceed 105% of the maximum allowable amount of Tenant's Pro Rata Share of Operating Expenses (other than Taxes) permitted for calendar year 2019, etc.). By way of illustration, if Tenant's Pro Rata Share of Operating Expenses (other than Taxes) were to be $1.00 per rentable square foot per month, then Tenant's Pro Rata Share of Operating Expenses (other than Taxes) for calendar year 2019 would not exceed $1.05 per rentable square foot per month, and Tenant's Pro Rata Share of Operating Expenses (other than Taxes) for calendar year 2020 would not exceed $1.1025 per rentable square foot per month. For the avoidance of doubt, nothing contained herein shall limit in any way Tenant's liability for Taxes.

5. Condition of Premises; Suites A, B and C-1 Alterations .

(a) Tenant acknowledges that it has been, and continues to be, in possession of the Premises, is familiar with the condition of the Premises and continues to occupy the Premises in its "as is, where is" condition, with all faults, without any representation, warranty or improvement by Landlord of any kind whatsoever, except as may otherwise be expressly provided in this Sixth Amendment or the Existing Lease.

(b) Tenant shall perform Alterations in Suites A, B and C-1 (the "Suites A, B and C-1 Alterations") at Tenant's sole cost and expense, and otherwise in conformance with Exhibit A to this Sixth Amendment (the "Work Agreement"). In the event of any conflict between the Work Agreement and Section 7.3, Alterations, of the Original Lease, the terms of the Work Agreement shall control. In the event of any conflict between the Work Agreement and the provisions of this Sixth Amendment, the terms of the Work Agreement shall control.

6. Extension Options.

(a) The first and second sentences of Section 8(a) of the First Amendment (as amended by Section 2 of the Third Amendment and Section 14(a) of the Fifth Amendment) are hereby amended and restated in their entireties as follows:

> Landlord hereby grants Tenant the option to extend the Term of the Lease as to all of the Premises (the "Second Extension Option"), for one (1) additional period of five (5) years (the "Second Option Term"), commencing immediately after the Second Extended Expiration Date. The Second Extension Option shall be upon all the terms and conditions contained in the Lease (as amended hereby), except that (1) the initial Base Monthly Rent for the Premises during the Second Option Term shall be equal to 95% of the "fair market rent" for the Premises as of the commencement of the Second Option Term (i.e., the rate that a willing, comparable, new (i.e., non-renewal), non-equity tenant would pay, and that a willing landlord of comparable research and development laboratory space in Richmond, California would accept at arms' length), determined in the manner set forth in subparagraph

(b) below, and (2) Tenant shall not be entitled to the Suites A, B and C-1 Allowances (as defined in the Work Letter to the Sixth Amendment) during the Second Option Term.

(b) All references to "the Extension Options" and "an Extension Option" in Section 8 of the First Amendment are hereby changed to "the Second Extension Option", and all references to the "applicable Option Term" are hereby changed to the "Second Option Term".

(c) Except as set forth above, Tenant shall have no further options to extend the Term of the Lease as to any portion of the Premises.

7. Right of First Offer.

(a) Tenant shall have a one-time right of first offer (the "Right of First Offer") with respect to Suite D in the Building, containing approximately 8,000 rentable square feet (the "Offering Space").

(b) Landlord and Tenant acknowledge that the Offering Space is currently leased to an existing tenant. On or after October 31, 2018, and prior to the date Landlord leases the Offering Space to a third-party tenant or other occupant, Landlord shall advise Tenant (the "Advice") of the material economic terms and conditions under which Landlord is prepared to lease such Offering Space to Tenant, including, without limitation, the proposed term of lease and the proposed rent payable for the Offering Space. Tenant may lease such Offering Space in its entirety only, under such terms, by delivering written notice of exercise to Landlord (the "Notice of Exercise") within 15 business days after the date of the Advice, except that Tenant shall have no such Right of First Offer, and Tenant may not exercise its right under this Section 7, if: (i) at the time that Landlord would otherwise deliver the Advice, a default or breach on the part of Tenant beyond applicable notice and cure periods exists under the Lease; (ii) the Premises, or any portion thereof, is sublet at the time Landlord would otherwise deliver the Advice; (iii) Tenant is not occupying the entire Premises at the time Landlord would otherwise deliver the Advice; or (iv) the Offering Space is not intended for the exclusive use of Tenant. Tenant shall deliver evidence of Tenant's creditworthiness concurrently with delivery of the Notice of Exercise.

(c) The term with respect to the Offering Space (the "Offering Space Term") shall commence as of November 1, 2019 (the "Offering Space Commencement Date"), and shall be for the length stated in the Advice. As of the Offering Space Commencement Date, the Offering Space shall be considered a part of the Premises, provided that all of the terms stated in the Advice shall govern Tenant's leasing of the Offering Space and only to the extent that they do not conflict with the Advice, the terms and conditions of the Lease shall apply to the Offering Space. The foregoing notwithstanding, if Landlord is unable to deliver possession of the Offering Space to Tenant on the Offering Space Commencement Date, Landlord shall not be liable for any claims, damages or liabilities by reason thereof, but the Offering Space Term shall commence upon the date possession of the Offering Space is delivered by Landlord to Tenant, provided that Tenant shall not be obligated to pay any Rent for the Offering Space until the possession of the Offering Space is delivered to Tenant. The Offering Space shall be accepted by Tenant in "AS IS" condition, and Landlord's only obligation with respect to the condition of the Offering Space as of the Offering Space Commencement Date shall be to deliver such Offering Space in such condition.

(d) Tenant shall pay Base Rent for the Offering Space at the rate or rates set forth in the Advice, which rate or rates shall reflect the Fair Market Rent for the Offering Space as determined by Landlord in Landlord's reasonable judgment. For purposes of this Right of First Offer provision, "Fair Market Rent" shall mean the annual rental rate per square foot for space comparable to the Offering Space in the Building and office buildings comparable to the Building in Richmond, California under leases and renewal and expansion amendments being entered into at or about the time that the Fair Market Rent is being determined, giving appropriate consideration to tenant concessions, brokerage commissions, tenant improvement allowances, and the method of allocating operating expenses and taxes. Notwithstanding the foregoing, space leased under any of the following circumstances shall not be considered to be comparable for purposes hereof: (i) the lease term is for less than the lease term of the Offering Space, (ii) the space is encumbered by the option rights of another tenant, or (iii) the space has a lack of windows and/or an awkward or unusual shape or configuration. The foregoing is not intended to be an exclusive list of space that will not be considered to be comparable. The determination of Fair Market Rent shall also take into consideration any reasonably anticipated changes in the Fair Market Rent from the time such Fair Market Rent is being determined and the time such Fair Market Rent will become effective under the Lease.

(e) The Right of First Offer shall terminate upon Tenant's failure to exercise its Right of First Offer within the 15-business-day period provided in Section 7(b) above as to the Offering Space.

(f) If Tenant exercises its Right of First Offer, Landlord shall prepare an amendment (the "Offering Amendment") adding the Offering Space to the Premises on the terms set forth in the Advice and reflecting the changes in the Base Rent, rentable square footage of the Premises, Tenant's Pro Rata Share and other appropriate terms. A copy of the Offering Amendment shall be sent to Tenant within a reasonable time after Landlord's receipt of the Notice of Exercise executed by Tenant, and Tenant shall execute and return the Offering Amendment to Landlord within 15 days thereafter, but an otherwise valid exercise of the Right of First Offer shall be fully effective whether or not the Offering Amendment is prepared and/or executed.

(g) Notwithstanding anything to the contrary contained herein, Tenant's Right of First Offer is subject and subordinate to the expansion rights (whether such rights are designated as a right of first offer, right of first refusal, expansion option or otherwise) of any tenant or other occupant of the Building existing as of the Effective Date of this Amendment. As of the Effective Date, no tenant or other occupant of the Building has any such rights.

(h) Notwithstanding anything to the contrary contained herein, Tenant's rights under this Section 7 are personal to the original Tenant executing the Lease ("Named Tenant") and shall not be assigned or assignable, in whole or in part, to any third-party. Any assignment or other transfer of such rights by Named Tenant shall be void and of no force or effect. Without limiting the generality of the foregoing, no sublessee of the Premises shall be permitted to exercise the rights granted to Tenant under this Section 7.

8. Brokers. Tenant shall be solely responsible for any commission, fees or costs payable to any real estate broker, sales person or finder claiming to have represented Tenant in connection with this Sixth Amendment, any future amendment to the Lease and/or Tenant's exercise of any extension option or right of first refusal contained in the Lease. Tenant shall

indemnify, defend and hold Landlord harmless from and against any and all claims by any real estate broker, salesperson or finder claiming to have represented Tenant for a commission, finder's fee or other compensation in connection with this Sixth Amendment. Landlord shall indemnify, defend and hold Tenant harmless from and against any and all claims by any real estate broker, salesperson or finder claiming to have represented Landlord for a commission, finder's fee or other compensation in connection with this Sixth Amendment. Landlord and Tenant each acknowledge and agree that neither Landlord nor Tenant are represented by any broker in connection with this Sixth Amendment.

9. Inspection by a CASp in Accordance with Civil Code Section 1938 . To Landlord's actual knowledge, the property being leased or rented pursuant to the Lease (as amended by this Sixth Amendment) has not undergone inspection by a Certified Access Specialist (CASp). A Certified Access Specialist (CASp) can inspect the subject premises and determine whether the subject premises comply with all of the applicable construction-related accessibility standards under state law. Although state law does not require a CASp inspection of the subject premises, the commercial property owner or lessor may not prohibit the lessee or tenant from obtaining a CASp inspection of the subject premises for the occupancy or potential occupancy of the lessee or tenant, if requested by the lessee or tenant. The parties shall mutually agree on the arrangements for the time and manner of the CASp inspection, the payment of the fee for the CASp inspection, and the cost of making any repairs necessary to correct violations of construction-related accessibility standards within the premises. The foregoing verification is included in this Sixth Amendment solely for the purpose of complying with California Civil Code Section 1938 and, except as otherwise expressly stated above, shall not in any manner affect Landlord's and Tenant's respective responsibilities for compliance with construction-related accessibility standards as provided under the Lease.

10. OFAC. Tenant represents and warrants to Landlord that Tenant is currently in compliance with and shall at all times during the Term of the Lease remain in compliance with the regulations of the Office of Foreign Asset Control ("OFAC") of the Department of the Treasury and any statute, executive order (including the September 24, 2001, Executive Order Blocking Property and Prohibiting Transactions with Persons Who Commit, Threaten to Commit, or Support Terrorism), or other governmental action relating thereto.

11. Counterparts; PDF. This Sixth Amendment may be executed in multiple counterparts each of which is deemed an original but together constitute one and the same instrument. This Sixth Amendment may be executed in so-called "pdf" format and each party has the right to rely upon a pdf counterpart of this Sixth Amendment signed by the other party to the same extent as if such party had received an original counterpart.

12. Authority. This Sixth Amendment shall be binding upon and inure to the benefit of the parties, their respective heirs, legal representatives, successors and assigns. Each party hereto and the persons signing below warrant that the person signing below on such party's behalf is authorized to do so and to bind such party to the terms of this Sixth Amendment.

13. Status of Existing Lease . Except as amended hereby, the Existing Lease is unchanged, and, as amended hereby, the Existing Lease remains in full force and effect.

[remainder of page intentionally left blank; signatures appear on following page]

IN WITNESS WHEREOF, Landlord and Tenant have entered into this Sixth Amendment as of the date first set forth above.

Landlord: POINT RICHMOND R&D ASSOCIATES II, LLC,
a California limited liability company

By: Wareham-NZL, LLC, its Manager

By: /s/ Richard K. Robbins
Richard K. Robbins
Its Manager

Tenant: SANGAMO THERAPEUTICS, INC.,
a Delaware corporation

By: /s/ Sandy Macrae
Sandy Macrae
President and CEO

EXHIBIT A

WORK AGREEMENT

1. Allowance.

1.1 Cost of Suites A, B and C-1 Alterations . Tenant shall perform the Suites A, B and C-1 Alterations at Tenant's sole cost and expense, subject to the Suites A, B and C-1 Allowances (as hereinafter defined).

1.2 Allowance. Tenant shall be entitled: (i) to an allowance in an amount not to exceed $1,500,00.00 (the "Suites A, B and C-1 New Allowance"), (ii) to use the Extended Term Allowance in the amount of $46,600.75 (the "First Option Term Allowance") as set forth in Section 8 of the Third Amendment, and (iii) to apply the remaining unapplied and unexpired allowances set forth elsewhere in the Existing Lease (the "Remaining Existing Allowances", and collectively with the Suites A, B and C-1 New Allowance and the First Option Term Allowance, the "Suites A, B and C-1 Allowances"), for the costs relating to the design and installation of the Suites A, B and C-1 Alterations in the Premises. In no event will Landlord be obligated to make disbursements pursuant to this Work Agreement in a total amount which exceeds the Suites A, B and C-1 Allowances. Tenant must complete all of the Suites A, B and C-1 Alterations and have submitted Payment Request Supporting Documentation (defined below) for such work no later than August 31, 2021 in order to be entitled to receive the Suites A, B and C-1 Allowances for such work. If Tenant does not submit a request for application or disbursement of the entirety of the Suites A, B and C-1 Allowances in accordance with the provisions of this Work Letter such date, any undisbursed portion shall be forfeited and shall accrue for the sole benefit of Landlord.

1.3 Disbursement of the Suites A, B and C-1 Allowances .

(a) Suites A, B and C-1 Allowance Items . Except as otherwise set forth in this Work Agreement, the Suites A, B and C-1 Allowances shall be disbursed by Landlord only for the following items and costs (collectively the "Suites A, B and C-1 Allowance Items"):

(i) Payment of the fees of the Architect and the Building Consultants (as those terms are defined below) and payment of fees and costs reasonably incurred by Landlord for the review of the Construction Drawings (defined below) by Landlord or by Landlord's third party consultants;

(ii) The payment of plan check, permit and license fees relating to the Suites A, B and C-1 Alterations;

(iii) The cost of construction of the Suites A, B and C-1 Alterations, including, without limitation, costs of labor and materials, costs of any equipment and fixtures that would become Landlord's property under the terms of the Existing Lease as of the expiration or earlier termination of the Term, costs of any services provided by third parties unaffiliated with Tenant in connection with the design and construction, after hours charges, testing and inspection costs, freight elevator usage, trash removal costs, and contractors' fees and general conditions;

(iv) The cost of any changes to the Building when such changes are required by the Construction Drawings, such cost to include all direct architectural and/or engineering fees and expenses incurred in connection therewith; and

(v) The cost of any changes to the Construction Drawings (defined below) or Suites A, B and C-1 Alterations required by applicable building codes (collectively, "Code").

(b) Disbursement of Suites A, B and C-1 Allowances . During the design and construction of the Suites A, B and C-1 Alterations, Landlord shall make monthly disbursements of the Suites A, B and C-1 Allowances to reimburse Tenant for Suites A, B and C-1 Allowance Items and shall authorize the release of funds as follows, and otherwise in accordance with Landlord's standard disbursement process.

(i) On or before the fifth (5th) day of each calendar month (or such other date as Landlord may designate), Tenant shall deliver to Landlord: (A) a request for payment from Contractor (defined below) approved by Tenant, in a commercially reasonable form to be provided or approved in advance by Landlord, including a schedule of values and showing the percentage of completion, by trade, of the Suites A, B and C-1 Alterations, which details the portion of the work completed and the portion not completed; (B) invoices from all of Tenant's Agents (defined below) for labor rendered and materials delivered to the Premises; (C) executed conditional mechanic's lien releases from all of Tenant's Agents who have lien rights with respect to the subject request for payment (along with unconditional mechanics' lien releases with respect to payments made pursuant to Tenant's prior submission hereunder) in compliance with all applicable laws; and (D) all other information reasonably requested by Landlord (collectively, the "Payment Request Supporting Documentation").

(ii) Within thirty (30) days after Tenant's delivery to Landlord of all Payment Request Supporting Documentation, Landlord shall deliver to Tenant payment in an amount equal to the lesser of: (x) the amount so requested by Tenant, as set forth above, less (i) the applicable Over-Allowance Amount (defined in Section 3.2(a) below) and (ii) a ten percent (10%) retention (the aggregate amount of such retentions to be known as the "Final Retention"), and (y) the balance of any remaining available portion of the Suites A, B and C-1 Allowances (not including the Final Retention), provided that if Landlord, in good faith, disputes any item in a request for payment based on non-compliance of any work with the Approved Working Drawings (defined below) or due to any substandard work and delivers a written objection to such item setting forth with reasonable particularity Landlord's reasons for its dispute (a "Draw Dispute Notice") within ten (10) business days following Tenant's submission of its Payment Request Supporting Documentation, Landlord may deduct the amount of such disputed item from the payment. Landlord and Tenant shall, in good faith, endeavor to diligently resolve any such dispute. Landlord's payment of such amounts shall not be deemed Landlord's approval or acceptance of the work furnished or materials supplied as set forth in Tenant's payment request.

(iii) Subject to the provisions of this Work Agreement, following the final completion of construction of the Suites A, B and C-1 Alterations, Landlord shall deliver to Tenant a check made payable to Tenant, or a check or checks made payable to another party or parties as reasonably requested by Tenant, in the amount of the Final Retention, provided that

(A) Tenant delivers to Landlord properly executed unconditional mechanics' lien releases from all of Tenant's Agents in compliance with all applicable laws; (B) Landlord has determined in good faith that no substandard work exists which adversely affects the mechanical, electrical, plumbing, heating, ventilating and air conditioning, life-safety or other systems of the Building, the curtain wall of the Building, the structure or exterior appearance of the Building; (C) Architect (hereafter defined) delivers to Landlord a certificate, in a form reasonably acceptable to Landlord, certifying that the construction of the Suites A, B and C-1 Alterations has been finally completed; and (D) Tenant has fulfilled its Completion Obligations (defined below) and has otherwise complied with Landlord's standard "close-out" requirements regarding city approvals, closeout tasks, closeout documentation regarding the general contractor, financial close-out matters, and Tenant's vendors.

2. Construction Drawings.

2.1 Selection of Architect; Construction Drawings .

(a) Tenant shall retain an architect approved in writing, in advance by Landlord, such approval not to be unreasonably withheld, conditioned or delayed, and shall be granted or denied within three (3) business days upon request (the "Architect") to prepare the Construction Drawings. Tenant shall retain engineering consultants approved in writing, in advance by Landlord, such approval not to be unreasonably withheld, conditioned or delayed, and shall be granted or denied within three (3) business days upon request (the "Building Consultants") to prepare all plans and engineering working drawings and perform all work relating to mechanical, electrical and plumbing ("MEP"), HVAC/Air Balancing, life-safety, structural, sprinkler and riser work. Landlord's failure to respond within such three (3) business day period shall be deemed approval by Landlord.

(b) The plans and drawings to be prepared by Architect and the Building Consultants hereunder (i.e., both the Space Plan and the Working Drawings, as each term is defined below) shall be known collectively as the "Construction Drawings." All Construction Drawings shall comply with the drawing format and specifications reasonably determined or approved by Landlord and shall be subject to Landlord's prior written approval as specified in Sections 2.2, 2.3 and 2.4 below. All MEP drawings must be fully engineered or prepared on a "design-build-assist" basis with a Landlord-approved MEP basis of design ("BOD"), as prepared by an approved MEP engineer consultant. The MEP drawings cannot be prepared on a strictly "design-build" basis. Landlord's review of the Construction Drawings shall be for its sole purpose and shall not obligate Landlord to review the same, for quality, design, Code compliance or other like matters. Accordingly, notwithstanding that any Construction Drawings are reviewed by Landlord or its space planner, architect, engineers and consultants, and notwithstanding any advice or assistance which may be rendered to Tenant by Landlord or Landlord's space planner, architect, engineers, and consultants, Landlord shall have no liability whatsoever in connection therewith and shall not be responsible for any omissions or errors contained in the Construction Drawings.

2.2 Space Plan. Tenant shall supply Landlord for Landlord's review and approval with four (4) copies signed by Tenant of its space plan for the Premises ("Space Plan") before any architectural working drawings or engineering drawings have been commenced. The Space Plan shall include a layout and designation of all laboratory facilities, offices, rooms and other

partitioning, their intended use, and equipment to be contained therein. Landlord may request clarification or more specific drawings for special use items not included in the Space Plan. Landlord shall advise Tenant within five (5) business days after Landlord's receipt of the Space Plan (or, if applicable, such additional information requested by Landlord pursuant to the provisions of the immediately preceding sentence) if the same is approved or is unsatisfactory or incomplete in any respect. Upon any disapproval by Landlord, Tenant shall promptly cause the Space Plan to be revised to correct any deficiencies or other matters Landlord may reasonably require. In the event Landlord fails to respond within such five (5) business day period, such Space Plan shall be deemed approved by Landlord.

2.3 Working Drawings. After the Space Plan has been approved by Landlord, Tenant shall supply the Architect and the Building Consultants with a complete listing of standard and non-standard equipment and specifications, including, without limitation, B.T.U. calculations, electrical requirements and special electrical receptacle requirements, to enable the Architect and the Building Consultants to complete the Working Drawings and shall cause the Architect and the Engineers to promptly complete the architectural and engineering drawings, and Architect shall compile a fully coordinated set of drawings, including but not limited to architectural, structural, mechanical, electrical, plumbing, fire sprinkler and life safety in a form which is complete to allow subcontractors to bid on the work and to obtain all applicable permits (collectively, the "Working Drawings") and shall submit the same to Landlord for Landlord's review and approval. Tenant shall supply Landlord with four (4) copies signed by Tenant of the Working Drawings. Landlord shall advise Tenant within seven (7) business days after Landlord's receipt of the Working Drawings if Landlord, in good faith, determines that the same are approved (the "Approved Working Drawings") or are unsatisfactory or incomplete. If Tenant is so advised, Tenant shall promptly revise the Working Drawings to correct any deficiencies or other matters Landlord may reasonably require. In the event Landlord fails to respond within such seven (7) business day period, Tenant shall send a reminder notice to Landlord, and if Landlord fails to respond to the reminder notice within three (3) business days after receipt thereof, such Working Drawings shall be deemed approved by Landlord.

2.4 Landlord's Approval. Tenant acknowledges that it shall be deemed reasonable for Landlord to disapprove the Space Plan and any subsequent Working Drawings if (among other reasons): (a) the Suites A, B and C-1 Alterations as specified and designed do not comply with the requirements of the Project's sustainability practices (if any) or any applicable "green" building standards, or (b) the sprinkler system design does not comply with the specifications provided by FM Global. Additionally, Landlord's approval of any matter under this Work Agreement may be withheld if Landlord reasonably determines that the same would violate any provision of the Lease or this Work Agreement or would adversely affect the mechanical, electrical, plumbing, heating, ventilating and air conditioning, life-safety or other systems of the Building, the curtain wall of the Building, the structure or exterior appearance of the Building.

2.5 Changes to Approved Working Drawings. Any changes to the Approved Working Drawings approved by Landlord (each, a "Change") shall be requested and instituted in accordance with the provisions of this Section 2.5 and shall be subject to the written approval of the non-requesting party in accordance with this Work Agreement.

(a) Change Request. Either Landlord or Tenant may request Changes after Landlord approves the Working Drawings by notifying the other party thereof in writing in substantially the same form as the AIA standard change order form (a "Change Request"), which Change Request shall detail the nature and extent of any requested Changes and any modification of the Approved Working Drawings, as applicable, necessitated by the Change. If the nature of a Change requires revisions to the Approved Working Drawings, then the requesting party shall be solely responsible for the cost and expense of such revisions and any increases in the cost as a result of such Change. Change Requests shall be signed by the requesting party's representative as set forth in this Work Agreement. Landlord shall only request a Change if it reasonably believes that such Change is necessary to comply with applicable laws or to prevent a material adverse impact on the Building's Systems, including any fire/life safety systems.

(b) Approval of Changes. All Change Requests shall be subject to the other party's prior written approval, which approval shall not be unreasonably withheld, conditioned or delayed. The non-requesting party shall have three (3) business days after receipt of a Change Request to notify the requesting party in writing of the non-requesting party's decision either to approve or object to the Change Request. If the non-requesting party fails to respond within such three (3) business day period, the requesting party shall send a reminder notice and the non-requesting party's failure to respond to the reminder notice within two (2) business days after receipt thereof shall be deemed approval by the nonrequesting party.

3. Construction Of The Suites A, B and C-1 Alterations .

3.1 Tenant's Selection of Contractors .

(a) The Contractor. Tenant shall retain a general contractor approved in writing, in advance by Landlord, such approval not to be unreasonably withheld and be granted or denied within three (3) business days upon request, to construct the Suites A, B and C-1 Alterations ("Contractor"). Landlord's failure to respond within such three (3) business day period shall be deemed approval by Landlord.

(b) Tenant's Agents. All subcontractors, laborers, materialmen, and suppliers used by Tenant (such subcontractors, laborers, materialmen, and suppliers, and the Contractor to be known collectively as "Tenant's Agents") must be approved in writing by Landlord, in Landlord's reasonable discretion within three (3) business days upon request, provided that Landlord will require Tenant to retain the Building Consultants. All of Tenant's Agents shall be licensed in the State of California and capable of being bonded. Landlord's failure to respond within such three (3) business day period shall be deemed approval by Landlord.

3.2 Construction of Tenant Improvements by Tenant's Agents .

(a) Construction Contract. Prior to Tenant's execution of the construction contract and general conditions with Contractor (the "Contract"), Tenant shall submit the Contract to Landlord for its approval, which approval shall not be unreasonably withheld or delayed and shall be granted or denied within three (3) business days upon request. Landlord's failure to respond within such three (3) business day period shall be deemed approval by Landlord. Prior to the commencement of the construction of the Suites A, B and C-1 Alterations, Tenant shall provide

Landlord with a schedule of values consisting of a detailed breakdown, by trade, of the final costs to be incurred or which have been incurred, for all Suites A, B and C-1 Allowance Items in connection with the design and construction of the Suites A, B and C-1 Alterations, which costs form the basis for the amount of the Contract ("Final Costs"). Prior to the commencement of construction of the Suites A, B and C-1 Alterations, Landlord and Tenant shall identify the amount (the "Over-Allowance Amount") equal to the difference between the amount of the Final Costs and the amount of the Suites A, B and C-1 Allowances (less any portion thereof already disbursed by Landlord, or in the process of being disbursed by Landlord, on or before the commencement of construction of the Suites A, B and C-1 Alterations), and Landlord will reimburse Tenant on a monthly basis, as described in Section 1.2(b)(ii) above, for a percentage of each amount requested by the Contractor or otherwise to be disbursed under this Work Agreement, which percentage shall be equal to the Suites A, B and C-1 Allowances divided by the amount of the Final Costs (after deducting from the Final Costs any amounts expended in connection with the preparation of the Construction Drawings, and the cost of all other Suites A, B and C-1 Allowance Items incurred prior to the commencement of construction of the Suites A, B and C-1 Alterations), and Tenant shall be solely responsible for any Over-Allowance Amount. If, after the Final Costs have been initially determined, the costs relating to the design and construction of the Suites A, B and C-1 Alterations shall change, any additional costs for such design and construction in excess of the Final Costs shall be added to the Over-Allowance Amount and the Final Costs, and Landlord's reimbursement percentage, shall be recalculated in accordance with the terms of the immediately preceding sentence. Notwithstanding anything set forth herein to the contrary, construction of the Suites A, B and C-1 Alterations shall not commence until Tenant has procured and delivered to Landlord a copy of all Permits for the applicable Suites A, B and C-1 Alterations.

(b) Construction Requirements.

(i) Landlord's General Conditions for Tenant's Agents and Tenant Improvement Work. Construction of the Suites A, B and C-1 Alterations shall comply with the following: (A) the Suites A, B and C-1 Alterations shall be constructed in strict accordance with the Approved Working Drawings; (B) Tenant's Agents shall submit schedules of all work relating to the Suites A, B and C-1 Alterations to Landlord, and Landlord shall, within five (5) business days of receipt thereof, inform Tenant's Agents of any changes which are necessary thereto, and Tenant's Agents shall use commercially reasonable efforts to adhere to such corrected schedule; and (C) Tenant shall abide by all reasonable rules made and provided to Tenant in writing by Landlord's Building Manager with respect to the use of contractor parking, materials delivery, freight, loading dock and service elevators, any required shutdown of utilities (including life-safety systems), storage of materials, coordination of work with the contractors of Landlord, and any other matter in connection with this Work Agreement, including, without limitation, the construction of the Suites A, B and C-1 Alterations.

(ii) Indemnity. Tenant's indemnity of Landlord as set forth in the Lease shall also apply with respect to any and all costs, losses, damages, injuries and liabilities related in any way to any act or omission of Tenant or Tenant's Agents, or anyone directly or indirectly employed by any of them, or in connection with Tenant's non-payment of any amount arising out of the Suites A, B and C-1 Alterations and/or Tenant's disapproval of all or any portion of any request for payment. Such indemnity by Tenant, as set forth in the Lease, shall also apply with respect to any and all costs, losses, damages, injuries and liabilities related in any way to

Landlord's performance of any ministerial acts reasonably necessary (A) to permit Tenant to complete the Suites A, B and C-1 Alterations, and (B) to enable Tenant to obtain any related building permit or certificate of occupancy for the Premises; provided, however, nothing contained in this Work Agreement shall be deemed to modify the indemnity provisions of the Existing Lease.

(iii) Requirements of Tenant's Agents. Each of Tenant's Agents shall guarantee to Tenant and for the benefit of Landlord that the portion of the Suites A, B and C-1 Alterations for which it is responsible shall be free from any defects in workmanship and materials for a period of not less than one (1) year from the date of completion thereof. Each of Tenant's Agents shall be responsible for the replacement or repair, without additional charge, of all work done or furnished in accordance with its contract that shall become defective within one (1) year after the completion of the work performed by such contractor or subcontractor. The correction of such work shall include, without additional charge, all additional expenses and damages incurred in connection with the removal or replacement of all or any part of the Suites A, B and C-1 Alterations, and/or the Building and/or common areas that are damaged or disturbed thereby. All such warranties or guarantees as to materials or workmanship of or with respect to the Suites A, B and C-1 Alterations shall be contained in the Contract or subcontract and shall be written such that such guarantees or warranties shall inure to the benefit of both Landlord and Tenant, as their respective interests may appear, and can be directly enforced by either. Tenant covenants to give to Landlord any assignment or other assurances as may be necessary to effect such right of direct enforcement.

(c) Insurance Requirements.

(i) General Coverages. All of Tenant's Agents shall carry employer's liability and worker's compensation insurance covering all of their respective employees, and shall also carry commercial general liability insurance, including personal and bodily injury, property damage and completed operations liability, all with limits, in form and with companies as are required to be carried by Tenant as set forth in the Lease.

(ii) Special Coverages. Tenant or Contractor shall carry "Builder's All Risk" insurance in an amount approved by Landlord covering the construction of the Suites A, B and C-1 Alterations, and such other insurance as Landlord may require, it being understood and agreed that the Suites A, B and C-1 Alterations shall be insured by Tenant pursuant to the Lease immediately upon completion thereof. Such insurance shall be in amounts and shall include such extended coverage endorsements as may be reasonably required by Landlord, and shall be in form and with companies as are required to be carried by Tenant as set forth in the Lease.

(iii) General Terms. Certificates for all of the foregoing insurance coverage shall be delivered to Landlord before the commencement of construction of the Suites A, B and C-1 Alterations and before the Contractor's equipment is moved onto the site. All such policies of insurance must contain a provision that the company writing said policy will endeavor to give Landlord thirty (30) days' prior written notice of any cancellation of such insurance. In the event that the Suites A, B and C-1 Alterations are damaged by any cause during the course of the construction thereof, Tenant shall immediately repair the same at Tenant's sole cost and expense. Tenant's Agents shall maintain all of the foregoing insurance coverage in force until the Suites A, B and C-1 Alterations are fully completed and accepted by Landlord, except for any

Products and Completed Operations Coverage insurance required by Landlord, which is to be maintained for one (1) year following completion of the work and acceptance by Landlord and Tenant. All policies carried hereunder shall insure Landlord, Wareham Property Group as Landlord's manager, and Tenant, as their interests may appear, as well as Tenant's Agents. All insurance, except Workers' Compensation, maintained by Tenant's Agents shall preclude subrogation claims by the insurer against anyone insured thereunder. Such insurance shall provide that it is primary insurance as respects Landlord and Tenant and that any other insurance maintained by Landlord or Tenant is excess and noncontributing with the insurance required hereunder. The requirements for the foregoing insurance shall not derogate from the provisions for indemnification of Landlord by Tenant under the Lease and/or this Work Agreement.

(d) Governmental Compliance. The Suites A, B and C-1 Alterations shall comply in all respects with the following: (i) the Code and other federal, state, city and/or quasi-governmental laws, codes, ordinances and regulations, as each may apply according to the rulings of the controlling public official, agent or other person or entity; (ii) applicable standards of the American Insurance Association (formerly, the National Board of Fire Underwriters) and the National Electrical Code; (iii) building material manufacturer's specifications, and (iv) the Project's Sustainability Practices (if any).

(e) Inspection by Landlord. Prior to the completion of the Suites A, B and C-1 Alterations, Landlord shall have the right to inspect the same during normal business hours upon reasonable advance notice, provided however, that Landlord's failure to inspect the Suites A, B and C-1 Alterations shall in no event constitute a waiver of any of Landlord's rights hereunder nor shall Landlord's inspection of the Suites A, B and C-1 Alterations constitute Landlord's approval of the same. Should Landlord disapprove any portion of the Suites A, B and C-1 Alterations, Landlord shall notify Tenant in writing of such disapproval and shall specify the items disapproved. Any defects or deviations in, and/or disapproval by Landlord of, the Suites A, B and C-1 Alterations shall be rectified by Tenant at no expense to Landlord, provided however, that in the event Landlord determines that a defect or deviation exists or disapproves of any matter in connection with any portion of the Suites A, B and C-1 Alterations and such defect, deviation or matter might adversely affect the mechanical, electrical, plumbing, heating, ventilating and air conditioning or life-safety systems of the Building, the structure or exterior appearance of the Building or any other tenant's use of such other tenant's leased premises, and Tenant fails to immediately cease the problematic aspect(s) of the Suites A, B and C-1 Alterations work and promptly commence to remedy the same after Landlord's written notice thereof or fails to diligently execute to completion, then Landlord may take such action as Landlord deems necessary, at Tenant's expense and without incurring any liability on Landlord's part, to correct any such defect, deviation and/or matter, including, without limitation, causing the cessation of performance of the construction of the Suites A, B and C-1 Alterations until such time as the defect, deviation and/or matter is corrected to Landlord's reasonable satisfaction.

(f) Meetings. Tenant shall hold periodic meetings at a reasonable time with the Architect and the Contractor regarding the progress of the preparation of the Construction Drawings and the construction of the Suites A, B and C-1 Alterations, which meetings shall be held at the Premises, and Landlord and/or its agents shall receive prior written notice of, and shall have the right to attend, all such meetings. Upon Landlord's reasonable request, certain of Tenant's Agents shall attend such meetings. In addition, minutes shall be taken at all such

meetings, and Landlord will be included in the distribution list for such minutes. One such meeting each month shall include the review of Contractor's current request for payment.

3.3 Notice of Completion; Copy of Record Set of Plans . Following completion of construction of the Suites A, B and C-1 Alterations, Landlord shall cause a Notice of Completion to be recorded in the office of the Recorder of Contra Costa County and shall furnish a copy thereof to Tenant. Within thirty (30) days following the completion of construction, (i) Tenant shall cause the Architect and Contractor (A) to update the Approved Working Drawings as necessary to reflect all changes made to the Approved Working Drawings during the course of construction, (B) to certify to the best of their knowledge that the updated drawings are true and correct, which certification shall survive the expiration or termination of the Lease, and (C) to deliver to Landlord such updated drawings in accordance with Landlord's then-current CAD requirements, and (ii) Tenant shall deliver to Landlord a copy of all warranties, guaranties, and operating manuals and information relating to the improvements, equipment, and systems in the Premises. Tenant's obligations set forth in this Section are collectively referred to as the "Completion Obligations."

4. Miscellaneous.

4.1 Tenant's Representative . Tenant has designated Chris Holman as its sole representative with respect to the matters set forth in this Work Agreement, until further notice to Landlord, who shall have full authority and responsibility to act on behalf of Tenant as required in this Work Agreement.

4.2 Landlord's Representative. Landlord has designated Chris Barlow as its sole representative with respect to the matters set forth in this Work Agreement, who, until further notice to Tenant, shall have full authority and responsibility to act on behalf of Landlord as required in this Work Agreement.

4.3 Tenant's Default. Notwithstanding any provision to the contrary contained in the Lease, if a default or breach by Tenant beyond applicable notice and cure periods under the Lease (including, without limitation, this Work Agreement) has occurred at any time on or before the Substantial Completion of the Suites A, B and C-1 Alterations, then (i) in addition to all other rights and remedies granted to Landlord pursuant to the Lease, Landlord shall have the right to withhold payment of all or any portion of the Suites A, B and C-1 Allowances, and (ii) all other obligations of Landlord under the terms of this Work Agreement shall be forgiven until such time as such default is cured pursuant to the terms of the Lease. For purposes of this Section 4.3, "Substantial Completion" shall mean completion of construction of the Suites A, B and C-1 Alterations in the Premises pursuant to the Approved Working Drawings, with the exception of any punch list items.

Exhibit 31.1

CERTIFICATION

I, Alexander D. Macrae, certify that:

1. I have reviewed this quarterly report on Form 10-Q 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: August 8, 2018

/s/ Alexander D. Macrae
Alexander D. Macrae
President and Chief Executive Officer

Exhibit 31.2

CERTIFICATION

I, Kathy Y. Yi, certify that:

1. I have reviewed this quarterly report on Form 10-Q 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: August 8, 2018

/s/ Kathy Y. Yi
Kathy Y. Yi
Senior Vice President and Chief Financial Officer
(Principal Financial and Accounting Officer)

Exhibit 32.1

Certification 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") and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350), each of the undersigned hereby certifies in his or her capacity as an officer of Sangamo Therapeutics, Inc. (the "Company"), that, to the best of his or her knowledge:

(1) the Company's Quarterly Report on Form 10-Q for the period ended June 30, 2018, 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: August 8, 2018

/s/ Kathy Y. Yi
Kathy Y. Yi
Senior Vice President and Chief Financial Officer
(Principal Financial and Accounting Officer)

Date: August 8, 2018

This certification accompanies the Quarterly Report on Form 10-Q 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-Q), 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.