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Sangamo Announces 16 Week Clinical Results Including Reductions In Glycosaminoglycans In Phase 1/2 Trial Evaluating SB-913, A Zinc Finger Nuclease Genome Editing Treatment For MPS II (Hunter Syndrome)

September 5, 2018

SSIEM presentation included early data from Cohorts 1 (low dose) and 2 (mid dose); enrollment of Cohort 3 (high dose, 5x the mid dose) was recently completed

Total urinary GAGs declined by 51%, dermatan sulfate by 32%, and heparan sulfate by 61% in Cohort 2 at 16 weeks

SB-913 has been generally well-tolerated with no treatment related serious adverse events in patients up to 32 weeks

- Conference Call and Webcast Scheduled for 9:00 a.m. Eastern Time Today

RICHMOND, Calif., Sept. 5, 2018 /PRNewswire/ -- Sangamo Therapeutics, Inc. (NASDAQ: SGMO) today reported 16 week reductions in urinary glycosaminoglycans (GAGs), a key biomarker of Mucopolysaccharidosis Type II (MPS II) disease pathophysiology, in Cohort 2 of the Phase 1/2 CHAMPIONS Study evaluating SB-913. SB-913 is a zinc finger nuclease (ZFN) *in vivo* genome editing product candidate being evaluated for the treatment of MPS II, also known as Hunter syndrome. In Cohort 2 at 16 weeks post-dosing, mean reductions were observed in total urinary GAGs, dermatan sulfate, and heparan sulfate of 51%, 32%, and 61%, respectively. The data were presented today at the 2018 Annual Symposium of the Society for the Study of Inborn Errors of Metabolism (SSIEM) being held in Athens, Greece.

The CHAMPIONS Study is the first evaluation of an *in vivo* genome editing treatment in humans. The clinical trial is evaluating three separate doses of SB-913 over a planned 36 month study period. Today's presentation included early safety and efficacy results for Cohort 1 (low dose) and Cohort 2 (mid dose), with two patients enrolled in each. Enrollment and dosing of Cohort 3 (high dose, 5x the mid dose) was recently completed.

MPS II is a genetic lysosomal storage disease caused by deficiency of the iduronate-2-sulfatase (IDS) enzyme which is needed to break down or recycle glycosaminoglycans (GAGs) dermatan sulfate and heparan sulfate. Without IDS enzyme, the GAGs accumulate in nearly all organs and body tissues. Chronic accumulation of GAGs inside cellular lysosomes results in cellular engorgement, organomegaly, tissue destruction, and organ system dysfunction.

"In MPS II patients, we know that when the IDS enzyme is infused intravenously, it is rapidly taken up by cells and breaks down the stored GAGs. We have previously hypothesized that even very low amounts of IDS secreted continuously into the circulation could be adequate to reduce GAGs and potentially provide the first indication of efficacy for SB-913," said Dr. Joseph Muenzer, a professor of pediatrics and genetics at the University of North Carolina (UNC) School of Medicine in Chapel Hill and principal investigator on the study.

Dr. Muenzer continued: "In the CHAMPIONS Study, the observed reduction across total GAGs, dermatan sulfate and heparan sulfate in Cohort 2 is encouraging. We hope to understand the clinical relevance of these changes by conducting a controlled withdrawal of enzyme replacement therapy (ERT) in patients enrolled in the study soon. Withdrawal from weekly ERT infusions would be a very meaningful outcome for patients with MPS II."

SB-913 is designed to treat MPS II by using Sangamo's ZFN genome editing technology to insert a new copy of the IDS gene into a precise location in the DNA of liver cells to enable a patient's liver to produce a continuous and stable supply of the missing human IDS enzyme. SB-913 is a single intravenous infusion of AAV6 vectors packaging ZFNs and a copy of the IDS gene. The ZFNs are designed to enter the cells as inactive DNA instructions in a format designed only for liver cells to unlock. Once "unlocked," the ZFNs then identify, bind to and cut the DNA in a specific location within the albumin gene. Using the cells' natural DNA repair processes, Sangamo believes liver cells can then insert the IDS gene at that precise location. Driven by the strong albumin promoter, the IDS gene would then express IDS enzyme and would be taken up by tissues and cells where the enzyme breaks down dermatan sulfate and heparan sulfate GAGs into individual sugars.

"We are encouraged by the safety and tolerability profile observed to date and by the GAG reductions at week 16 in Cohort 2. We have recently infused the two Cohort 3 patients at a dose that is five times higher than the mid-dose of Cohort 2, and we look forward to seeing those results," said Dr. Edward Conner, MD, Chief Medical Officer of Sangamo. "If longer-term data from this study continue to be positive, therapeutic genome editing has the potential to bring tremendous medical progress for MPS II and other monogenic diseases."

About the Results Presented at SSIEM

In the CHAMPIONS Study, two patients are enrolled into each of three dose cohorts:

- Cohort 1 (low dose) — 5e12 vector genomes per kilogram body weight (vg/kg) of SB-913 (a starting dose level Sangamo determined through discussions with the United States Food and Drug Administration as appropriate for the first-ever infusions of an *in vivo* genome editing treatment)
- Cohort 2 (mid dose) —1e13 vg/kg of SB-913 (2x the starting dose)
- Cohort 3 (high dose) — 5e13 vg/kg of SB-913 (5x the mid dose)

All subjects receive ERT weekly. Biochemical measurements of urinary GAGs and plasma IDS are obtained at screening and baseline visits and every

four weeks during the initial phase of the trial.

Safety
Safety data presented today were collected and analyzed as of July 10, 2018 and included information on the first five subjects. In all subjects, administration of SB-913 was generally well-tolerated. There were no serious adverse events (SAEs) reported as related to SB-913. The majority of adverse events (AEs) reported were mild (Grade 1) and resolved without treatment. All AEs reported as related to SB-913 were mild (Grade 1), resolved without treatment, and did not show evidence of dose dependence. Two SAEs were reported and both were determined by the site investigator to be due to primary MPS II disease and unrelated to SB-913 treatment. No persistent transaminitis was observed in any subject.

Efficacy

Glycosaminoglycans (GAGs)

	Total GAG % Change at 16 weeks Mean (SD)	**Dermatan Sulfate % Change at 16 weeks Mean (SD)**	**Heparan Sulfate % Change at 16 weeks Mean (SD)**
Cohort 1 (Subject 1)	+13.0	-14.5	-15.6
Cohort 1 (Subject 2)	+4.8	+22.6	-31.4
Cohort 1 Mean (SD)	**+8.9 (5.8)**	**+ 4.1 (26.2)**	**-23.5 (11.2)**
Cohort 2 (Subject 3)	-62.5	-47.4	-69.9
Cohort 2 (Subject 4)	-39.1	-16.3	-53.0
Cohort 2 Mean (SD)	**-50.8 (16.5)**	**-31.8 (22.0)**	**-61.5 (12.0)**

For Cohort 2 subjects, total GAGs, dermatan sulfate and heparan sulfate observations were below baseline throughout the sixteen weeks with the exception of one excursion when a sample was obtained four days after one subject was hospitalized for an SAE of atrial fibrillation, unrelated to study drug, and was hypotensive for several hours. At the next measurement, this patient's GAGs returned to the previous low range observed since week 4.

Plasma IDS
At baseline and for the first 16 weeks post-dosing of SB-913, plasma IDS activity (measurements obtained at trough of weekly ERT dosing) was below the level of quantification of the current assay.

In addition to UNC, clinical sites around the United States have been actively participating in the CHAMPIONS Study including UCSF Benioff Children's Hospital Oakland, Cincinnati Children's Hospital, The Children's Hospital of Philadelphia, Lurie Children's Hospital of Chicago, University of Minnesota, and New York University.

Next Steps
Two subjects in Cohort 3 (high dose, 5x the mid dose) have recently been infused, and the study's safety monitoring committee will review cumulative data from all three dose cohorts later this year. Sangamo will work with site investigators to determine when withdrawal of ERT is appropriate for individual patients. Sangamo plans to present longer-term safety and efficacy results from the CHAMPIONS Study in February at the 2019 WORLD*Symposium* meeting in Orlando, Florida.

About MPS II (Hunter syndrome)
Mucopolysaccharidosis Type II (MPS II, Hunter syndrome) is an X-linked recessive lysosomal storage disorder that occurs almost exclusively in males. MPS II is caused by mutations in the gene encoding iduronate 2-sulfatase (IDS), resulting in a deficiency of IDS, a lysosomal enzyme required for the degradation of the glycosaminoglycans (GAGs) heparan and dermatan sulfate. The absence of IDS enzyme results in lysosomal GAG accumulation, leading to skeletal abnormalities, cardiac and respiratory obstructions, organomegaly, and in severe form of the disease, cognitive impairment and typically death in adolescence. The estimated incidence of MPS II is 0.6 to 1.3 per 100,000 live male births[1]. Current standard of care treatment for MPS II consists of chronic IV enzyme replacement therapy (ERT). However, IV ERT requires life-long, weekly infusions because the hIDS is cleared from circulation in the body within hours of treatment due to its short half-life and has not been shown to address the neurological symptoms of the disease.

Conference Call
Sangamo will host a conference call today, September 5, 2018, at 9:00 a.m. ET, which will be open to the public. The call will also be webcast live and can be accessed via a link on the Sangamo Therapeutics website in the Investors and Media section under Events and Presentations.

The conference call dial-in numbers are (877) 377-7553 for domestic callers and (678) 894-3968 for international callers. The conference ID number for the call is 8798741. For those unable to listen in at the designated time, a conference call replay will be available for one week following the conference call, from approximately 11:00 a.m. ET on September 5, 2018 to 11:59 p.m. ET on September 12, 2018. The conference call replay numbers for domestic and international callers are (855) 859-2056 and (404) 537-3406, respectively. The conference ID number for the replay is 8798741.

About Sangamo
Sangamo Therapeutics is focused on translating ground-breaking science into genomic therapies that transform patients' lives using the Company's platform technologies in genome editing, gene therapy, gene regulation and cell therapy. For more information about Sangamo, visit www.sangamo.com.

Forward-Looking Statements

This press release contains forward-looking statements regarding Sangamo's current expectations. These forward-looking statements include, without limitation, statements related to the potential for SB-913 to treat MPS II, including the potential for ZFNs to be effectively designed to consistently produce IDS through genome editing, the potential for significant medical progress for MPS II and other monogenic diseases given the therapeutic potential of genome editing, if the data from this trial continue to be positive, plans to conduct a controlled withdrawal of weekly ERT infusions in MPS

II patients in the CHAMPIONS Study and anticipated next steps for the CHAMPIONS Study, including safety monitoring committee review, Sangamo's expectation that it will present longer-term safety and efficacy results from the CHAMPIONS Study in February at the 2019 WORLDSymposium meeting, and other statements that are not historical fact. These statements are not guarantees of future performance and are subject to certain risks, uncertainties and assumptions that are difficult to predict. Factors that could cause actual results to differ include, but are not limited to, risks and uncertainties related to early data, including the risk that the early data from the CHAMPIONS Study may not be representative of final results after all patients are treated in the study and all data are collected and analyzed; Sangamo's ability to complete the CHAMPIONS Study; whether the final results from the CHAMPIONS Study will validate and support the safety and efficacy of SB-913, including the risk that the early efficacy data from the second cohort in the CHAMPIONS Study to date may not be maintained or replicated; Sangamo's reliance on partners and other third-parties to meet their clinical and manufacturing obligations, and its ability to maintain strategic partnerships. Further, there can be no assurance that the necessary regulatory approvals for SB-913 will be obtained or that Sangamo and its partners will be able to develop commercially viable product candidates for the treatment of MPS II and other diseases. Actual results may differ from those projected in forward-looking statements due to these and other risks and uncertainties that exist in Sangamo's operations and business environments. These risks and uncertainties are described more fully in Sangamo's Quarterly Report on Form 10-Q for the quarter ended June 30, 2018, as filed with the Securities and Exchange Commission. Forward-looking statements contained in this announcement are made as of this date, and Sangamo undertakes no duty to update such information except as required under applicable law.

[1]Burton, B.K., Jego, V., Mikl, J. et al. J Inherit Metab Dis (2017) 40: 867-74

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