SANGAMO BIOSCIENCES INC
Form 10-K
February 23, 2012
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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

Form 10-K

þ **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**
For the fiscal year ended December 31, 2011

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: 0-30171

SANGAMO BIOSCIENCES, INC.

(Exact name of registrant as specified in its charter)

Delaware	**68-0359556**
(State or other jurisdiction of incorporation or organization)	***(I.R.S. Employer Identification No.)***
501 Canal Boulevard, Suite A	
Richmond, California	**94804**
(Address of principal executive offices)	***(Zip Code)***

(510) 970-6000

(Registrant s telephone number, including area code)

None

(Former name, former address and former fiscal year, if changed since last report)

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

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, $0.01 par value per share	Nasdaq Global Market

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

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

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

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

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K is not contained herein, and will not be contained, to the best of registrant s knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. þ

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

Large accelerated filer ¨ Accelerated filer þ Non-accelerated filer ¨ Smaller reporting company ¨

(Do not check if a smaller reporting company)

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

The aggregate market value of the voting stock held by non-affiliates of the registrant based upon the closing sale price of the common stock on June 30, 2011 (the last business day of the registrant s most recently completed second fiscal quarter), as reported on the Nasdaq Global Market was $294,045,039. For purposes of this calculation, directors and executive officers of the registrant have been deemed affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

Indicate the number of shares outstanding of each of the issuer s classes of common stock, as of the latest practicable date.

Class	Outstanding at February 1, 2012
Common Stock, $0.01 par value per share	52,554,795 shares

DOCUMENTS INCORPORATED BY REFERENCE

Document	Parts Into Which Incorporated
Proxy Statement for the 2012 Annual Meeting of Stockholders	Part III

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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;
- partnering;
- 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, 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 Results of Operations in this Form 10-K. Sangamo undertakes no obligation to publicly release any revisions to forward-looking statements to reflect events or circumstances arising after the date of this report. Readers are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date of this Annual Report on Form 10-K.

ZFP Therapeutic® is a registered trademark of Sangamo BioSciences, Inc. This report also contains trademarks and trade names that are the property of their respective owners.

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PART I

ITEM 1 BUSINESS

Overview

We are a clinical stage biopharmaceutical company focused on the research, development and commercialization of engineered DNA-binding proteins for the development of novel therapeutic strategies for unmet medical needs. Our current mission is to develop ZFP Therapeutics® through early stage clinical testing and strategically partner with biopharmaceutical companies at key value inflection points to execute late-stage clinical trials and commercial development. In the long term, our goal is to forward integrate to capture the value of late-stage and commercial ZFP Therapeutic products.

We, and our licensed partners, are the leaders in the research, development and commercialization of zinc finger DNA-binding proteins (ZFPs), a naturally occurring class of proteins. We have used our knowledge and expertise to develop a proprietary technology platform. ZFPs can be engineered (see Fig. 1) to make ZFP nucleases (ZFNs), proteins that can be used to modify DNA sequences in a variety of ways and ZFP transcription factors (ZFP TFs), proteins that can be used to turn genes on or off. As ZFPs act at the DNA level, they have broad potential applications in several areas including human therapeutics, plant agriculture, research reagents, as well as production of transgenic animals and cell-line engineering.

The main focus for our company is the development of novel human therapeutics and we are building a pipeline of ZFP Therapeutics. Our lead ZFP Therapeutic, SB-728-T, a ZFN-modified autologous T-cell product for the treatment of HIV/AIDS, is the first therapeutic application of our ZFN technology and is being evaluated in an ongoing Phase 2 and two Phase 1/2 clinical trials. We expect to present preliminary data from this program at appropriate scientific and medical meetings in 2012.

We have preclinical ZFP Therapeutic development programs in hemophilia and Parkinson s disease. In addition, we have research stage programs in other monogenic diseases; genetic conditions that result from a defect in a single gene, including hemoglobinopathies such as sickle cell anemia, lysosomal storage diseases and certain immunodeficiencies. On January 31, 2012, we entered into a collaboration and license agreement with Shire AG (Shire), pursuant to which we will collaborate with Shire to research, develop and commercialize human therapeutics for hemophilia and other monogenic diseases based on our ZFP technology.

We believe the potential commercial applications of ZFPs are broad-based and we have licensed our ZFP platform in fields outside human therapeutics as follows to facilitate the sale or license of ZFNs and ZFP TFs in those fields:

We have a license agreement with the research reagent company Sigma-Aldrich Corporation (Sigma). Sigma has the exclusive rights to develop and market high value laboratory research reagents based upon our ZFP technology as well as ZFP-modified cell lines for commercial production of protein pharmaceuticals and ZFP-engineered transgenic animals. Sigma is marketing ZFN-derived gene editing tools under the trademark CompoZr® and is selling transgenic animals through its SAGE™ Labs business unit.

We have a license agreement with Dow AgroSciences, LLC (DAS), a wholly owned subsidiary of Dow Chemical Corporation. Under the agreement, we have provided DAS with access to our ZFP technology and the exclusive rights to use it to modify the genomes or alter the nucleic acid or protein expression of plant cells, plants, or plant cell cultures. DAS markets our ZFN technology under the trademark EXZACT™ Precision Technology. We have retained rights to use plants or plant-derived products to deliver ZFP TFs or ZFNs into human or animals for diagnostic, therapeutic, or prophylactic purposes.

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We also have license agreements with pharmaceutical and life sciences companies including Genentech Inc. (Genentech), F. Hoffmann La Roche Ltd and Hoffmann-La Roche Inc. (Roche) and Open Monoclonal Technology, Inc. (OMT). Pursuant to these license agreements, we granted non-exclusive rights to use our ZFP technology for protein pharmaceutical production and transgenic animals.

We have a substantial intellectual property position in the design, selection, composition, and use of engineered ZFPs to support all of these commercial activities. As of February 1, 2012, we either own outright or have exclusively licensed the commercial rights to approximately 347 patents issued in the United States and foreign national jurisdictions, and we have 420 patent applications owned and licensed 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 ZFP technology across our chosen applications.

DNA, Genes, and Transcription Factors

DNA is present in all cells except mature red blood cells, and encodes the inherited characteristics of all living organisms. A cell s DNA is organized in chromosomes as thousands of individual units called genes. Genes encode proteins, which are assembled through the process of transcription whereby DNA is transcribed into ribonucleic acid (RNA) and, subsequently, translation whereby RNA is translated into protein. DNA, RNA, and proteins comprise many of the targets for pharmaceutical drug discovery and therapeutic intervention.

The human body is composed of specialized cells that perform different functions and are thus organized into tissues and organs. All somatic cells in an individual s body contain the same set of genes. However, only a fraction of these genes are turned on, or expressed, in an individual human cell at any given time. Genes are regulated (i.e. turned on or turned off) in response to a wide variety of stimuli and developmental signals. Distinct sets of genes are expressed in different cell types. It is this pattern of gene expression that determines the structure, biological function, and health of all cells, tissues, and organisms. The aberrant expression of certain genes can lead to disease.

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Transcription factors are proteins that bind to DNA and regulate gene expression. A transcription factor recognizes and binds to a specific DNA sequence within or near a particular gene and causes expression of that gene to be turned on (activated) or turned off (repressed). In higher organisms, naturally occurring transcription factors typically comprise two principal domains: the first is a DNA-binding domain, (designated in Figure 1 as the recognition domain) which recognizes a target DNA sequence and thereby directs the transcription factor to the proper chromosomal location; the second is a functional domain that causes the target gene to be activated or repressed (see Figure 1).

Figure 1

Schematic of the Two-Domain Structure of a ZFP Therapeutic

Engineered ZFP Nucleases (ZFNs) for Gene Modification and Engineered Zinc Finger Protein Transcription Factors (ZFP TFs) for Gene Regulation

Zinc finger DNA-binding proteins or ZFPs are the largest class of naturally occurring transcription factors in organisms from yeast to humans. Consistent with the two-domain structure of natural ZFP transcription factors, we take a modular approach to the design of the proteins that we engineer. The ZFP portion, the DNA-recognition domain, is typically composed of three or more zinc fingers. Each individual finger recognizes and binds to a three-four base pair sequence of DNA and multiple fingers can be linked together to recognize longer stretches of DNA, thereby improving specificity. By modifying the amino acids of a ZFP that directly interact with DNA, we can engineer novel ZFPs capable of recognizing pre-selected DNA sequences within, or near, virtually any gene. We use the engineered ZFP DNA-binding domain linked to a functional domain. The ZFP DNA-binding domain brings the functional domain into the proximity of the gene of interest.

Our engineered ZFPs can be attached to a cleavage domain of a restriction endonuclease, an enzyme that cuts DNA, creating a zinc finger nuclease or ZFN. The ZFN is able to recognize its intended gene target through its engineered ZFP DNA-binding domain. When a pair of such ZFNs is bound to the DNA in the correct orientation and spacing, the DNA sequence is cut between the ZFP binding sites. DNA binding by both ZFNs is necessary for cleavage, as both domains of the restriction endonuclease must be present, in the correct orientation, to mediate DNA cutting. This break in the DNA triggers a natural process of DNA repair in the cell. The repair process can be harnessed to achieve one of several outcomes that may be therapeutically useful. If cells are simply treated with ZFNs alone the repair process frequently results in joining together of the two ends of the broken DNA and the consequent loss of a small amount of genetic material that results in disruption of the original DNA sequence. This can result in the generation of a shortened or non-functional protein, i.e. gene

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disruption. We believe that ZFN-mediated gene modification may be used to disrupt a gene that is involved in disease pathology such as disruption of the CCR5 gene to treat HIV infection. In contrast, if cells are treated with ZFNs in the presence of an additional donor DNA sequence that encodes the correct gene sequence, the cell can use the donor as a template to correct the cell s gene as it repairs the break resulting in ZFN-mediated gene correction. ZFN-mediated gene correction enables a corrected gene to be expressed in its natural chromosomal context and may provide a novel approach for the precise repair of DNA sequence mutations responsible for monogenic diseases such as hemophilia, sickle cell anemia or X-linked severe combined immunodeficiency (X-linked SCID). In addition, by making the donor sequence a gene-sized segment of DNA, a new copy of a gene can also be added into the genome at a specific location. The ability to place a gene-sized segment of DNA specifically into a pre-determined location in the genome eliminates the insertional mutagenesis concerns associated with traditional gene replacement approaches, in which insertion of the altered gene typically occurs at random locations in the genome, and broadens the range of mutations of a gene that can be corrected in a single step.

We can also create a ZFP TF which is capable of controlling or regulating the expression of a target gene in the desired manner. For instance, attaching an activation domain to a ZFP will cause a target gene to be turned on. Alternatively, a repression domain causes the gene to be turned off. We have a preclinical ZFP Therapeutic program for Parkinson s disease in which we are evaluating a ZFP TF designed to upregulate the gene for glial cell line-derived neurotrophic factor (GDNF), thus increasing the expression of this potent neurotrophic factor that has shown promise in preclinical testing to slow or stop the progression of Parkinson s. Based on successful studies of a ZFP activator of GDNF in a rat model, the ZFP Therapeutic approach is being evaluated in a non-human primate model of the disease.

To date, we have designed, engineered, and assembled several thousand ZFPs and have tested many of these proteins for their affinity, or tightness of binding to their DNA target as well as their specificity, or preference for their intended DNA target. We have developed methods for the design, selection, and assembly of ZFPs capable of binding to a wide spectrum of DNA sequences and genes. We have linked ZFPs to numerous functional domains to create gene-specific ZFP TFs and have demonstrated the ability of these ZFP TFs to regulate hundreds of genes in dozens of different cell types and in whole organisms, including mice, rats, rabbits, pigs, fruit flies, worms, zebrafish and yeast, and in plant species including canola and maize. We and our collaborators have published data in peer-reviewed scientific journals on the transcriptional function of ZFP TFs, successful gene modification using ZFNs and the resulting changes in the behavior of the target cell, tissue, or organism. Sigma is currently using ZFNs to generate transgenic animals and cell lines that have specific genetic modifications that make them useful models of human disease. These high value biologic tools are being used by academics, and biotechnology and pharmaceutical companies for medical research and drug development. We are currently evaluating the safety and efficacy of ZFNs in human clinical trials.

ZFP Therapeutics Provide the Opportunity to Develop a New Class of Human Therapeutics

With our ability to generate and deliver gene-specific ZFNs for the correction, disruption or addition of target genes and DNA sequences and ZFP TFs for the activation or repression of genes, we are focused on developing a new class of highly differentiated human therapeutics. We believe that as more genes are linked to specific diseases, the clinical breadth and scope of our ZFP Therapeutic applications may be substantial.

We believe that ZFP Therapeutics provide a unique and proprietary approach to drug design and may have differential competitive advantages over small-molecule drugs, protein pharmaceuticals and RNA-based approaches enabling the development of therapies for a broad range of unmet medical needs.

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For example, ZFP Therapeutics can:

Potentially be used to treat a broad range of diseases. ZFP Therapeutics act at the DNA level to regulate gene expression or modify genes. We believe that we can generate ZFPs to recognize virtually any gene target allowing direct modulation of the gene and enabling a potentially broad applicability.

Target non-druggable targets. ZFNs and ZFP TFs act through a mechanism that is unique among biological drugs: direct regulation or modification of the disease-related or therapeutic gene as opposed to the RNA or protein target encoded by that gene. Following the genomics revolution of the 1990s, the sequencing and publication of the human genome, and the industrialization of genomics-based drug discovery, pharmaceutical and biotechnology companies have validated and characterized many new drug targets. Many of these targets have a clear role in disease processes but cannot be bound or modulated for therapeutic purposes by small molecules. Alternative therapeutic approaches may be required to modulate the biological activity of these so-called non-druggable targets. This may create a significant clinical and commercial opportunity for the therapeutic modification or regulation of disease-associated genes using engineered ZFNs or ZFP TFs. Thus, a target which may be intractable to treatment using a small molecule or monoclonal antibody can be modified, turned on or turned off at the DNA level using ZFP technology.

Provide novel activities such as gene modification and regulation of gene expression to address drug targets. Engineered ZFNs enable the disruption, correction or targeted addition of a gene sequence and ZFP TFs enable not just repression of the expression of a therapeutically relevant gene but also its activation in a cell. This gives our technology a degree of flexibility not seen in other drug platforms. Our ZFN gene-editing technology allows the correction of a mutation in a defective gene. This provides a novel therapeutic approach for monogenic diseases, diseases caused by a mutation in a single gene, such as hemophilia and sickle cell anemia. In contrast, direct modification of genes cannot be achieved using antisense RNA, or siRNA, which act by interfering with the expression of cellular RNA, or conventional small molecules, antibodies, or other protein pharmaceuticals that primarily act to block or antagonize the action of a protein.

Provide high specificity and selectivity for targets. ZFP Therapeutics can be designed to act with high specificity and we have published such data (*Proc. Natl. Acad. Sci* (2003) vol:100, 11997-12002; *J Neurosci. (2010) 30(49):16469-74; Nat Biotechnol. (2008) 26(7):808-16 and Nature (2011)478(7369):391-4*). In addition, there are generally only two targets per cell for a ZFP Therapeutic which means that ZFNs and ZFP TFs need to be available in the cell in very low concentrations. In contrast, drugs that act on protein and RNA targets that are naturally present in higher cellular concentrations need to be administered in higher concentrations. Many small molecule and RNA-based approaches either affect multiple targets demonstrating so-called off-target effects or are toxic in the concentrations required to be therapeutically effective.

Be used transiently to obtain a permanent therapeutic effect. Permanent gene disruption, correction or addition requires only brief cellular expression of ZFNs.

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THERAPEUTIC PRODUCT DEVELOPMENT

ZFP Therapeutic Product Development Programs

Product Candidate	Targeted Indication	Stage of Development	Protocol	Milestones
SB-728-T	HIV/AIDS	Phase 2	SB-728-902 Cohort 5	Trial initiated in January 2012
		Phase 1/2	SB-728-1101	Trial initiated in January 2012
		Phase 1/2	SB-728-1002	Trial initiated in October 2010 data in 2012
		Phase 1	SB-728-902	Enrollment completed
		Phase 1	SB-728-T*	Trial ongoing at University of Pennsylvania data in 1Q 2012
SB-313xTZ	Glioblastoma	Phase 1	GRm13Z40-2*	Trial ongoing at City of Hope

Table 1: Summary of ongoing clinical trials evaluating our ZFP Therapeutics.

* Investigator sponsored trial

Human Immunodeficiency Virus (HIV) and Acquired Immunodeficiency Syndrome (AIDS)

Market Opportunity

HIV infection results in the death of immune system cells, particularly $CD4^+$ T-cells, and thus leads to AIDS, a condition in which the body s immune system is depleted to such a degree that the patient is unable to fight off common infections. Ultimately, these patients succumb to opportunistic infections or cancers. According to UNAIDS/WHO, over 2.7 million people were newly infected with HIV in 2010. An estimated 1.8 million people died of AIDS in the same year. There are now over 34 million people living with HIV and AIDS worldwide. The CDC estimates that, in the United States alone, there are 1.2 million people living with HIV/AIDS, approximately 50,000 new infections each year and more than 16,000 people with AIDS were estimated to have died in 2008.

Current Treatments and Unmet Medical Need

Currently, there are approximately 30 antiretroviral drugs approved by the FDA to treat people infected with HIV. These drugs fall into four major classes: reverse transcriptase inhibitors, protease inhibitors, integrase inhibitors and entry and fusion inhibitors. This latter class also includes a small molecule antagonist of the CCR5 receptor, Selzentry® (maraviroc). This drug is being used in combination with other antiretroviral agents for treatment-experienced adult patients infected with CCR5-tropic HIV-1 strains that are resistant to multiple antiretroviral agents. The drug carries a black box warning of liver toxicity.

As HIV reproduces, variants of the virus emerge, including some that are resistant to antiretroviral drugs. Therefore, doctors recommend that people infected with HIV take a combination of antiretroviral drugs known as highly active antiretroviral therapy, or HAART. This strategy typically combines drugs from at least three different classes of antiretroviral drugs. Currently available drugs do not cure HIV infection or AIDS. They can suppress the virus, even to undetectable levels, but they cannot eliminate HIV from the body. Hence, people with HIV need to take antiretroviral drugs continuously which can have significant side effects over time. There is no therapeutic approach available which protects CD4+ T-cells, reduces viral load and does not require daily dosing.

Sangamo s Therapeutic Approach

Our therapeutic approach aims to use our ZFN-mediated gene editing technology to replicate a naturally occurring human mutation which renders individuals largely resistant to infection with the most common strain

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of HIV. CCR5 is a co-receptor for HIV entry into T-cells and, if CCR5 is not expressed on their surface, HIV infects them with lower efficiency. A population of individuals that is immune to HIV infection, despite multiple exposures to the virus, has been identified and extensively studied. The majority of these individuals have a natural mutation, CCR5 delta-32, resulting in the expression of a shortened, or truncated, and non-functional CCR5 protein. This mutation appears to have no observable deleterious effect. Individuals who carry the CCR5 delta-32 mutation on only one of their two CCR5 gene copies (heterozygotes), so-called long term non-progressors tend to take longer to develop AIDS. In addition, a study published in *Blood* in December 2010 reported an effective cure when an AIDS patient with leukemia received a bone marrow transplant from a matched donor with this CCR5 delta-32 mutation. This approach transferred the hematopoietic stem cells (HSCs) residing in the bone marrow from the delta-32 donor, and provided a self-renewable and potentially lifelong source of HIV-resistant immune cells. After transplantation, the AIDS patient was able to discontinue all anti-HIV drug treatments, CD4 counts increased, and viral load dropped to an undetectable level, demonstrating effective transplantation of protection from HIV infection.

We are using our ZFN-mediated gene disruption technology to disrupt the CCR5 gene in cells of a patient s immune system to make these cells permanently resistant to HIV infection. The aim is to provide a population of HIV-resistant cells that can fight HIV and opportunistic infections mimicking the situation in individuals that carry the natural mutation. In December 2008, in collaboration with scientists at the University of Pennsylvania, an IND application was filed for a Phase 1 trial of our CCR5 ZFP Therapeutic, SB-728-T. This single-dose investigator-sponsored trial began enrolling subjects in February 2009, at the University of Pennsylvania. In September 2009, we filed an IND application and initiated a dose-escalation Phase 1 clinical trial (SB-728-902) of SB-728-T. Both Phase 1 studies were in HIV-infected individuals who were on HAART. The studies were designed primarily to evaluate the safety and tolerability of this ZFP Therapeutic approach; however, subjects CD4 T-cell counts, levels of CCR5-modified T-cells and viral burden were also monitored. Preliminary data from both trials were presented in the first quarter of 2011 and demonstrated that the approach was well-tolerated in these subjects. In addition, we observed durable engraftment and persistence of SB-728-T, the ability of these cells to traffic to the gut mucosa and improvements the overall CD4 T-cell count and the CD4:CD8 ratio in multiple subjects.

In October 2010, we also initiated a new Phase 1/2 study (SB-728-1002) to evaluate SB-728-T in HIV-infected individuals who are not yet on HAART. We have completed accrual of this trial. In January 2012, we announced the initiation of two new studies (SB-728-1101 and SB-728-902, Cohort 5), based on data from our Phase 1 trials that demonstrated a strong correlation between the estimated numbers of engrafted cells in which both copies of the CCR5 gene were modified (biallelic modification) and the reduction in viral load in treated subjects that underwent a HAART treatment interruption (TI). Using different approaches, both studies aim to increase the numbers of biallelically modified engrafted cells in SB-728-T-treated subjects and to evaluate the effect of increasing the numbers of these cells on the immune system and on viral load during a TI.

We also have a preclinical stage program to investigate this approach to treating HIV in hematopoietic stem cells and, with our collaborators at City of Hope and the University of Southern California, have funding for this program from a $14.5 million Disease Team Research Award granted by the California Institute for Regenerative Medicine (CIRM) of which we expect to receive $5.2 million in aggregate during the term of our four year collaboration. In addition, we have an early research stage program to develop our ZFN approach as an *in-vivo* application for which we received a Grand Challenges Explorations grant of $0.1 million from the Bill and Melinda Gates Foundation in 2009.

Glioblastoma Multiforme (GBM)

Clinicians at City of Hope (COH) are evaluating a ZFP Therapeutic that uses our ZFN technology to disrupt the expression of the gene encoding the glucocorticoid receptor in T-cells. Scientists at COH have developed an engineered protein known as an IL-13 zetakine that, when expressed in cytotoxic or killer T-cells, enables them to seek out and destroy glioblastoma cells in the brain. In an investigator-sponsored IND, patients have

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been treated with zetakine-modified T-cells which have shown significant anti-tumor activity. In this clinical protocol, T-cells are modified to express the zetakine. These modified cells are infused into the brain following surgery for the targeted elimination of residual tumor cells. Frequently, however, a glucocorticoid such as Decadron® must be administered to patients post-surgery to control brain swelling. Glucocorticoids inactivate or kill the therapeutic T-cells through a protein known as the glucocorticoid receptor (GR). Cells without a functional GR are drug-resistant and are therefore available to destroy tumor cells. The goal is to generate zetakine positive, GR-negative T-cells, thus enabling the full treatment effect to occur even in the presence of Decadron.

In December 2006, we entered into an exclusive license agreement with COH for use of the zetakine with our technology. We retain commercialization rights and COH receives success-based milestone and downstream payments. In 2009, our collaborators at COH filed an investigator-sponsored IND application for a Phase 1 clinical trial of this therapeutic and have an ongoing Phase 1 trial in subjects with recurrent/refractory GBM. However, due to changes in the standard of care for glioblastoma patients namely the introduction of Avastin subjects with recurrent GBM are not presenting with the same pattern of recurrent tumor as when the trial protocol was conceived. Thus, subjects whose clinical profiles fit the original trial design have been difficult to recruit. We expect that our collaborators will report data if, and when, they have treated an appropriate number of subjects.

Diabetic Neuropathy and Amyotrophic Lateral Sclerosis (ALS)

In October 2011, we announced that our Phase 2b study (SB-509-901) did not meet its primary or secondary clinical endpoints in subjects with moderate severity diabetic neuropathy (DN) as compared to placebo, and thus we ceased all development activities for this drug. SB-509 was an injectable plasmid encoding a ZFP TF designed to upregulate the endogenous expression of the gene encoding vascular endothelial growth factor (VEGF-A) and had been in clinical studies to evaluate its use to treat diabetic neuropathy and Amyotrophic Lateral Sclerosis (ALS) and in preclinical studies in models of stroke, spinal cord injury and traumatic brain injury.

ZFP Therapeutic Pre-Clinical Stage Programs

Hemophilia B

Hemophilia, a rare bleeding disorder in which the blood does not clot normally, is an example of a monogenic disease (a disease that is caused by a genetic defect in a single gene). There are several types of hemophilia caused by mutations in genes that encode factors which help the blood clot and stop bleeding when blood vessels are injured. The most prevalent form of the disease, hemophilia A, is caused by a defect in clotting Factor VIII while defects in clotting Factor IX lead to hemophilia B. The most severe forms of hemophilia affect males. According to the National Hemophilia Foundation, hemophilia A occurs in about one in every 5,000 male births in the US, and hemophilia B in about 1 in every 25,000. The standard treatment for individuals with hemophilia is replacement of the defective clotting factor with regular infusion of concentrates or recombinant factors, which are expensive, carry the risk of transmission of blood-borne diseases such as hepatitis and other viral infections, and sometimes stimulate the body to produce antibodies against the factors that inhibit the benefits of treatment. In these situations, other clotting factors such as Factor VII and X may be used to treat patients.

Using our ZFN-gene editing technology, we have published data demonstrating functional correction of the human factor IX gene in the liver by direct intravenous delivery of ZFNs in a mouse model of the disease *(Nature (2011)475(7355):217-21)*. Further preclinical studies are ongoing to develop a treatment therapy for

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hemophilia B which will provide a permanent correction and reduce or eliminate the need for infusions of clotting factor products.

Parkinson s Disease (PD)

Parkinson s disease is a chronic, progressive disorder of the central nervous system and results from the loss of cells in a section of the brain called the substantia nigra. These cells produce dopamine, a chemical messenger responsible for transmitting signals within the brain. Loss of dopamine causes critical nerve cells, or neurons, in the brain, to fire out of control, leaving patients unable to direct or control their movement in a normal manner. The symptoms of Parkinson s may include tremors, difficulty maintaining balance and gait, rigidity or stiffness of the limbs and trunk and general slowness of movement (also called bradykinesia). Patients may also eventually have difficulty walking, talking, or completing other simple tasks. Symptoms often appear gradually yet with increasing severity and the progression of the disease may vary widely from patient to patient. There is no cure for Parkinson s disease. Drugs have been developed that can help patients manage many of the symptoms; however, they do not prevent disease progression. According to the Parkinson s disease Foundation, approximately 60,000 Americans are diagnosed with PD each year and approximately one million people in the US live with the disease.

Glial cell line-derived neurotrophic factor (GDNF) is a potent neurotrophic factor that has shown promise in preclinical testing to slow or stop the progression of PD. In January 2007, we were awarded a two-year grant of $950,000 by The Michael J. Fox Foundation for Parkinson s Research (MJFF) to support the development of a ZFP TF activator of GDNF to treat PD. We have published positive preclinical studies in a rat model of the disease in collaboration with scientists at the University of California, San Francisco (UCSF) (*J Neurosci. (2010) 30(49):16469-74)*. In July 2010, we were awarded a second round of funding by MJFF to support further studies of ZFP TF activators of GDNF in non-human primates. The $900,000 award will be paid over a period of two years.

ZFP Therapeutic Research Programs

We also have several research stage ZFP Therapeutic programs in progress that use our ZFN-gene editing technology to address monogenic diseases. These include hemophilia A, hemoglobinopathies such as sickle cell anemia, lysosomal storage diseases and immune system disorders such as X-linked severe combined immunodeficiency (X-linked SCID).

CORPORATE RELATIONSHIPS

We are applying our ZFP technology platform to several commercial applications in which our products provide us and our strategic partners and collaborators with potential technical, competitive and economic advantages. Where and when appropriate, we have established and will continue to pursue corporate partnerships in non-therapeutic areas and ZFP Therapeutic strategic partnerships with selected pharmaceutical, biotechnology and chemical companies to fund internal research and development activities and to assist in product development and commercialization.

Collaboration and License Agreement with Shire AG in Human Therapeutics and Diagnostics

On January 31, 2012, we entered into a collaboration and license agreement with Shire AG (Shire), pursuant to which we will collaborate to research, develop and commercialize human therapeutics and diagnostics for hemophilia and other monogenic diseases based on our ZFP technology. Under the agreement, the two companies may develop potential human therapeutic or diagnostic products for seven gene targets. The initial four gene targets are blood clotting Factors VII, VIII, IX and X, and products developed for such initial gene targets would be used for treating or diagnosing hemophilia. Shire has the right, subject to certain limitations, to designate three additional gene targets. Pursuant to the Agreement, we have granted Shire an exclusive, world-

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wide, royalty-bearing license, with the right to grant sublicenses, to use our ZFP technology for the purpose of developing and commercializing human therapeutic and diagnostic products for the gene targets.

The initial research term of the agreement is six years and is subject to extensions upon mutual agreement and under other specified circumstances. We are responsible for all research activities through the submission of an Investigative New Drug Application (IND) or European Clinical Trial Application (CTA), while Shire is responsible for clinical development and commercialization of products generated from the research program from and after the acceptance of an IND or CTA for the product. Shire will reimburse us for our internal and external research program-related costs.

Under the agreement, we received an upfront license fee of $13.0 million. In addition, for each gene target, we are eligible to receive milestone payments upon the achievement of specified research, regulatory, clinical development, commercialization and sales milestones. The total amount of potential milestone payments for each of the seven gene targets, assuming the achievement of all specified milestones in the Agreement, is $213.5 million. The milestone payments for each gene target through the acceptance of an IND or CTA submission total $8.5 million. We will also receive royalty payments that are a tiered double-digit percentage of net sales of products developed under the collaboration.

The agreement may be terminated by (i) us or Shire, in whole or in part, for the uncured material breach of the other party, (ii) us or Shire for the bankruptcy or other insolvency proceeding of the other party and (iii) Shire, in its entirety, beginning 24 months after the effective date of the agreement upon 90 days advance written notice. In addition, Shire may terminate the Agreement with respect to an individual gene target at any time, and under certain circumstances may designate a replacement gene target for a terminated gene target. As a result, actual future milestone payments could be lower than the amounts stated above

Agreement with Sigma-Aldrich Corporation in Laboratory Research Reagents, Transgenic Animal and Commercial Protein Production Cell-line Engineering

In July 2007, we entered into a license agreement with Sigma-Aldrich Corporation (Sigma). Under the license agreement, we agreed to provide Sigma with access to its proprietary ZFP technology and the exclusive right to use the technology to develop and commercialize research reagents products and services in the research field, excluding certain agricultural research uses that we previously licensed to Dow AgroSciences LLC. Under the agreement, we and Sigma agreed to conduct a three-year research program to develop laboratory research reagents using our ZFP technology during which time we assisted Sigma in connection with its efforts to market and sell services employing our technology in the research field. We transferred the ZFP manufacturing technology to Sigma.

In October 2009, we expanded the license agreement with Sigma. In addition to the original terms of the license agreement, Sigma received exclusive rights to develop and distribute ZFP-modified cell lines for commercial production of protein pharmaceuticals and certain ZFP-engineered transgenic animals for commercial applications. Under the terms of the agreement, Sigma made an upfront cash payment of $20.0 million, consisting of a $4.9 million purchase of 636,133 shares of our common stock, valued at $4.9 million, and a $15.1 million upfront license fee. The upfront license fee was recognized on a straight-line basis from the effective date of the expanded license through July 2010, which represents the period over which we were obligated to perform research services for Sigma. We are also eligible to receive commercial license fees of $5.0 million based on a percentage of net sales and sublicensing revenue and thereafter a reduced royalty rate of 10.5% of net sales and sublicensing revenue. During the term of the license agreement, Sigma is obligated to pay us minimum annual payments, a share of certain revenues received by Sigma from sublicensees, and royalty payments on the sale of licensed products and services. Sigma also has the right to sublicense the ZFP technology for research applications and we will receive 50% of any sublicensing revenues in the first two years and 25% of any sublicensing revenues thereafter. We retain the sole right to use and license our ZFP technology for GMP production purposes, for the production of materials used in or administered to humans, and for any other

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industrial commercial use. In addition, upon the achievement of certain cumulative commercial milestones Sigma will make milestone payments to us up to an aggregate of $25.0 million. The agreements may be terminated by Sigma at any time with a 90-day notice or by either party upon an uncured material breach of the other party. As a result, actual future milestone payments could be lower than the amounts stated above. In the event of any termination, all rights to use our ZFP technology will revert to us, and Sigma will no longer be permitted to practice our ZFP technology or to develop or, except in limited circumstances, commercialize any products derived from our ZFP technology. Through December 31, 2011, we have received approximately $43.6 million from Sigma under the collaboration agreement.

Agreement with Dow AgroSciences in Plant Agriculture

We and our collaborators have shown that ZFNs and ZFP TFs can be used to regulate and modify genes in plants. The ability to regulate gene expression with engineered ZFP TFs may lead to the creation of new plants that increase crop yields, lower production costs and are more resistant to herbicides, pesticides, and plant pathogens, which could permit the development of branded agricultural products with unique nutritional and processing characteristics. In addition, ZFNs may be used to facilitate the efficient and reproducible generation of transgenic plants.

In October 2005, we entered into an exclusive commercial license with DAS. Under this agreement, we provide DAS with access to our proprietary ZFP technology and the exclusive right to use the technology to modify the genomes or alter the nucleic acid or protein expression of plant cells, plants, or plant cell cultures. We have retained rights to use plants or plant-derived products to deliver ZFNs and ZFP TFs into humans or animals for diagnostic, therapeutic, or prophylactic purposes. Our agreement with DAS provided for an initial three-year research term. In June 2008, DAS exercised its option under the agreement to obtain a commercial license to sell products incorporating or derived from plant cells generated using our ZFP technology, including agricultural crops, industrial products and plant-derived biopharmaceuticals.

We agreed to supply DAS and its sublicensees with ZFNs and ZFP TFs for both research and commercial use over the initial three year period of the agreement and have amended and extended this provision. The agreement also provides for minimum sublicense fees each year due to us every October, provided the agreement is not terminated by DAS. Annual fees range from $250,000 to $3.0 million and total $25.3 million over 11 years. Furthermore, DAS has the right to sublicense our ZFP technology to third parties for use in plant cells, plants, or plant cell cultures, and we will be entitled to 25% of any cash consideration received by DAS under such sublicenses. We do not have any performance obligations with respect to the sublicensing activities to be conducted by DAS. DAS has the right to terminate the agreement at any time; accordingly, our actual sublicense fees over the term of the agreement could be lower than $25.3 million. In addition, each party may terminate the agreement upon an uncured material breach of the agreement by the other party. In the event of any termination of the agreement, all rights to use our ZFP technology will revert to us, and DAS will no longer be permitted to practice our ZFP technology or to develop or, except in limited circumstances, commercialize any products derived from our ZFP technology. We amended the agreement with DAS to extend the period of reagent manufacturing and research services through December 31, 2012. Through December 31, 2011, we have received approximately $39.8 million from DAS under the collaboration agreement.

Other Programs and Partners

Prior to our agreements with Sigma and DAS we marketed our ZFP TF and ZFN technology and intellectual property in products and areas outside ZFP Therapeutics directly to the pharmaceutical and biotechnology industry and established agreements in cell line engineering for pharmaceutical protein production and the development of transgenic animals.

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Pharmaceutical Protein Production

The production of pharmaceutical proteins, such as therapeutic antibodies, is an important area of commercial growth. We and our collaborators have demonstrated that ZFP-engineered mammalian cells may be used to increase the yield of systems used for pharmaceutical protein production.

We have established several research collaborations in this area, including a research collaboration agreement with Pfizer Inc. (Pfizer) in December 2004 to use our ZFP technology to develop enhanced cell lines for protein pharmaceutical production. Under the terms of the agreement, Pfizer funded research at Sangamo and we provided our proprietary ZFP technology for Pfizer to assess its feasibility for use in mammalian cell-based protein production, and we had received all funding under the agreement in 2009. We also granted Pfizer a worldwide, non-exclusive license for the use of certain ZFN reagents to permanently eliminate the Glutamine Synthetase gene in Chinese Hamster Ovary cell lines and for the use of these ZFN-modified cells for clinical and commercial production of therapeutic proteins. We received a onetime payment of $3.0 million from Pfizer pursuant to this agreement.

In April 2007, we entered into a research and license agreement with Genentech, Inc. pursuant to which we provide Genentech with access to our proprietary ZFN technology for use in mammalian cell-based protein pharmaceutical production. Under this agreement, we developed and delivered to Genentech ZFNs capable of making certain targeted modifications to the genome of an identified Genentech cell line to generate cell lines with novel characteristics for protein pharmaceuticals. We also granted Genentech a non-exclusive, worldwide, sublicensable right to use our ZFNs to generate cell lines with novel characteristics for protein pharmaceutical production purposes and to generate the same targeted modifications in the Genentech cell lines using our ZFN technology. Genentech has paid us a total of $1.3 million under the agreement, which consists of an upfront fee, technology access fees and milestone payments for the achievement of research-based milestones. Genentech has continuing obligations to pay us an annual technology access fee and, for each product developed by Genentech containing a protein expressed by the modified cell line created using our ZFN technology, aggregate milestone payments of up to $5.4 million upon achievement of specified milestones relating to the development and commercialization of such products. The research and license agreement continues until the later of ten years or expiration of specified patents relating to our ZFN technology covered under the agreement. In addition, Genentech may terminate the research and license agreement upon thirty days written notice. Either party may terminate the agreement upon a material breach by the other party.

In February 2008, we expanded the relationship with Genentech by increasing the number of potential targets in the genome of the identified Genentech cell line against which Genentech may use or apply our ZFN technology in mammalian cell-based protein pharmaceutical production. Under this expanded agreement, Genentech paid us an up-front fee, an annual on-going technology access fee, and milestone payments upon achievement of specified milestones relating to the construction and delivery of ZFNs. In addition, for each product developed by Genentech containing a protein expressed by a modified cell line using our ZFN technology, Genentech will make aggregate milestone payments of up to $5.4 million upon the achievement of specified milestones relating to the development and commercialization of such products. Under the second license and research agreement, to date Genentech has paid us $0.4 million for an up-front fee, annual technology access fees and the achievement of research-based milestones. The expanded agreement continues until the later of ten years or expiration of specified patents relating to our ZFN technology covered under the agreement. In addition, Genentech may terminate at any time any research plan or license relating to a designated target. Either party may terminate the agreement upon a material breach by the other party.

Transgenic Animals

In April 2008, we entered into a license agreement with Open Monoclonal Technology, Inc. (OMT), pursuant to which we granted a royalty-bearing, non-exclusive, sublicensable worldwide license to OMT for the commercial use of a transgenic animal generated using our ZFN technology. In consideration of the license and

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rights granted to OMT, OMT paid us an upfront license fee, and will pay us for each product created or developed through use of our ZFN technology aggregate milestone payments of up to $0.9 million upon the achievement of certain specified clinical development milestones, a small percentage royalty on sales of any product developed using our ZFN technology and a low single-digit percentage share of payments received by OMT from sublicensees. For any given OMT product, OMT has the right to buy out its future royalty payment obligations under the license agreement by paying a lump sum fee to us. To date, OMT has paid us $0.3 million under the license agreement. The license agreement shall continue in effect until neither OMT nor we have any further payment obligations. OMT may terminate the license agreement at any time. Either party may terminate the agreement upon a material breach by the other party.

In July 2008, we entered into a research and license agreement with F. Hoffmann-La Roche Ltd and Hoffmann-La Roche Inc. (collectively, Roche), pursuant to which we provided Roche with access to aspects of our proprietary ZFN technology to generate ZFN-modified cell lines and animals having targeted modifications in a specified gene in a specified species, solely for research purposes. In December 2009, pursuant to the research and license agreement, Roche exercised an option to receive an exclusive, worldwide license to use such animals in the production of therapeutic and diagnostic products. This exclusive commercial license shall continue, on a country-by-country and product-by-product basis, until the later of 10 years after the first commercial sale in such country or the expiration of the last valid patent claim covering such product. Under the research and license agreement, to date Roche has paid us $0.6 million for research milestone payments, quarterly maintenance research fees and an option license fee. Roche has agreed to pay us an additional research fee upon the delivery of the ZFN specified in the research and license agreement, a quarterly ongoing research maintenance fee during the research term and milestone payments upon the achievement of certain clinical development milestones relating to products produced under such commercial license, and low-single digit royalties on sales of such products. The aggregate milestone payments for therapeutic products will not exceed $5.75 million, but the diagnostics milestone payments are not similarly capped. Under the research and license agreement, on a product-by-product basis, Roche has the right to buy out its future royalty payment obligations by paying specified fixed amounts. Roche has the right to terminate this research and license agreement in its entirety or in part (on a country and product basis) upon thirty days advance written notice. Either party may terminate the agreement upon a material breach by the other party.

Funding from Research Foundations

California Institute for Regenerative Medicine

In October 2009, the California Institute for Regenerative Medicine (CIRM), a State of California entity, granted a $14.5 million Disease Team Research Award to develop an AIDS-related lymphoma therapy based on the application of ZFP nuclease (ZFN) gene-editing technology in stem cells. The four year grant supports an innovative research project conducted by a multidisciplinary team of investigators, including investigators from the University of Southern California, City of Hope National Medical Center and Sangamo BioSciences. We expect to receive funding up to $5.2 million from the total amount awarded based on expenses incurred for research and development efforts by us as prescribed in the agreement. The award is intended to substantially fund our research and development efforts related to the agreement. The State of California has the right to receive, subject to the terms and conditions of the agreement, payments from us resulting from sales of a commercial product resulting from research and development efforts supported by the grant, not to exceed two times the amount we receive in funding under the agreement with CIRM. Through December 31, 2011, we have received $2.4 million in funding from CIRM under this agreement.

The Juvenile Diabetes Research Foundation International

In October 2006, we announced a partnership with the Juvenile Diabetes Research Foundation International (JDRF) to provide financial support to one of our Phase 2 human clinical studies (SB-509-601) of SB-509, a ZFP Therapeutic that is in development for the treatment of diabetic neuropathy. Under the agreement with JDRF, and

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subject to its terms and conditions, including our achievement of certain milestones associated with the Phase 2 clinical trial (SB-509-601) of SB-509 for the treatment of mild to moderate diabetic neuropathy, JDRF was obligated to pay us an aggregate amount of up to $3.0 million which was received in full by the end of 2009.

In January 2010, we amended the agreement and subject to its terms and conditions, JDRF agreed to provide additional funding of up to $3.0 million for our Phase 2b trial in diabetic neuropathy (SB-509-901) which partially funded expenses related to the trial. Under the amended agreement, we were obligated to use commercially reasonable efforts to carry out the Phase 2b trial and, thereafter, to develop and commercialize a product containing SB-509 for the treatment of diabetes and complications of diabetes. We were also obligated to cover all costs of the Phase 2b trial that were not covered by JDRF s grant. In October 2011, we announced that the Phase 2b trial had failed to meet both its primary and secondary end-points and further development of SB-509 was discontinued. JDRF has the right, subject to certain limitations, to obtain an exclusive, sublicensable license to the intellectual property generated by us in the course of the Phase 2b trial, to make and commercialize products containing SB-509 for the treatment of diabetes and complications of diabetes. If JDRF obtains such a license, it is obligated to pay us a percentage of its revenues from product sales and sublicensing arrangements. If JDRF fails to satisfy its obligations to develop and commercialize a product containing SB-509 under the agreement, then their license rights will terminate and we will receive a non-exclusive, fully paid license, for any intellectual property developed during JDRF s use of the license, to research, develop and commercialize products containing SB-509 for the treatment of diabetes and complications of diabetes. Through December 31, 2011 we have received $2.0 million in funding under the amended agreement with JDRF.

The Michael J. Fox Foundation

In January 2007, we entered into a partnership with the Michael J. Fox Foundation for Parkinson s Research (MJFF) to provide financial support of our program to develop ZFP TFs to activate the expression of glial cell line-derived neurotrophic factor (GDNF) which has shown promise in preclinical testing to slow or stop the progression of Parkinson s disease. Under the agreement with MJFF and subject to its terms and conditions, MJFF paid us $1.0 million, the total funds due under the agreement, over a period of two years. In June 2010, we received a commitment for renewed funding from MJFF to support further studies of ZFP TF activators of GDNF. Subject to the terms and conditions of the agreement, the $0.9 million award is being paid over a period of two years and is intended to substantially fund our research efforts related to the agreement. Revenue will be recognized based on expenses incurred by us pursuant to the research conducted as set forth in the agreement. Through December 31, 2011 we have received the entire $1.9 million in funding available under the agreements with MJFF.

The Bill and Melinda Gates Foundation

In May 2009, we announced that we were awarded a Grand Challenges Explorations Grant of $0.1 million by the Bill and Melinda Gates Foundation (Gates Foundation) to support research into the use of our ZFNs to develop an *in vivo* treatment of HIV/AIDS. We received the entire grant in 2009.

INTELLECTUAL PROPERTY AND TECHNOLOGY LICENSES

Patents and licenses are important to our business. Our strategy is to file or license patent applications to protect technology, inventions and improvements to inventions that we consider important for the development of our technology. We seek patent protection and licenses that relate to our technology and candidates in our pipeline and/or may be important to our future. We have filed numerous patents and patent applications with the United States Patent and Trademark Office (USPTO) and foreign jurisdictions. This proprietary intellectual property includes methods relating to the design of zinc finger proteins, therapeutic applications and enabling technologies. We rely on a combination of patent, copyright, trademark, proprietary know how, continuing technological innovations, trade secret laws, as well as confidentiality agreements, materials transfer agreements and licensing agreements, to establish and protect our proprietary rights.

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Technology Licenses

We have licensed intellectual property directed to the design, selection, and use of ZFPs, ZFNs and ZFP TFs for gene modification and regulation from the Massachusetts Institute of Technology, Johnson & Johnson, The Scripps Research Institute, The Johns Hopkins University, Harvard University, the Medical Research Council, the California Institute of Technology, City of Hope, and the University of Utah. These licenses grant us rights to make, use, and sell ZFPs, ZFNs, and ZFP TFs under 15 families of patent filings. As of February 1, 2012 these patent filings have resulted in 23 issued U.S. patents and 39 granted foreign patents, with 5 currently pending U.S. patent applications and 30 pending applications in foreign patent offices.

We believe that these in-licensed patents and patent applications include several of the early and important patent filings directed at the design, selection, composition and use of ZFPs, ZFNs and ZFP TFs, particularly the agreements with Johns Hopkins University, the Massachusetts Institute of Technology, Johnson & Johnson and The Scripps Research Institute.

Johns Hopkins University

We entered into a license agreement with the Johns Hopkins University on June 29