

# Commercial insight: cell and gene therapy

Providing a critical overview of the sector's commercial developments – M&As, licensing agreements & collaborations, financial results, IPOs and clinical/regulatory updates, with commentary from our Expert Contributors.



Interest in pluripotent stem cell (PSC)-derived products remains strong and we continue to make ground on the creation of off-the-shelf designer cells. Fate Therapeutics, through its partnership with Sloan Kettering, has made some particularly interesting advancements. Recently, at the American Society for Hematology Annual Meeting in December, the company announced that it has successfully created T cells with multiple modifications executed through a single CRISPR/Cas9-mediated engineering event. The cells Fate created were derived from a clonal iPSC line that was modified to introduce a chimeric antigen receptor (CAR) and remove T-cell receptor (TCR) expression, giving them the ability to target cancer while effectively making them 'invisible' to the immune system. Fate also reported on the generation of iPSC-derived NK cells, which will be used for IND enabling work.



## GENE THERAPY

**Richard Philipson**

Chief Medical Officer,  
Trizell Ltd, UK



## CELL THERAPY

**Mark Curtis**

Financial Portfolio Manager,  
Emerging Technologies

Lonza AG

Switzerland



This month sees the outstanding achievement of Spark Therapeutics in the landmark approval by FDA of LUXTER-NA™ for the treatment of RPE65 mutation-associated retinal dystrophy – the first FDA-approved gene therapy for a genetic disease. December always sees a rash of news from the American Society of Hematology annual meeting, and this year is no different. News from BioMarin on progress with its treatment for hemophilia A will certainly keep Spark on its toes, as it looks like BioMarin is ahead of its competitor in the race to be the first to market for this serious hereditary bleeding condition. A third key player in the hematology field, bluebird bio, also keeps up the positive news flow with updates suggesting favorable clinical

outcomes in patients with sickle cell disease or beta-thalassemia receiving treatment with its lentivirus-based therapy. All in all, a great way to end the year!



## FATE THERAPEUTICS PRODUCES VIABLE CAR T CELLS FROM ENGINEERED IPSC LINE

Fate Therapeutics have announced the generation of engineered CAR-targeted CD8 $\alpha$  $\beta$ <sup>+</sup> T cells from a master pluripotent stem cell line (MPCL). This development is a significant move for the future of allogeneic CAR T cell-based therapies.

To create the T cells, CRISPR/Cas9 was used to insert a CAR into an induced pluripotent stem cell (iPSC) and to eliminate TCR expression. Fate Therapeutics are currently developing the T cells for immunotherapeutic use, as well as establishing Good Manufacturing Practice (GMP) protocols in collaboration with the Memorial Sloan Kettering Cancer Centre under a partnership established in 2016. Previous research has shown that the engineered CAR T cells demonstrate better antigen specific anti-tumor potency in the form of cytokine release and targeted cellular cytotoxicity than conventional

CAR T cells, making the novel product optimal for oncologic uses.

*"The use of a clonal engineered master pluripotent cell line enables cost-effective manufacture, timely availability and reliable off-the-shelf delivery of targeted T-cell cancer immunotherapy without patient restriction. Additionally, unlike conventional allogeneic CAR T-cell approaches that involve billions of heterogeneous engineering events to modify the genomic function of primary T cells, an engineered iPSC clone is defined by a single uniform engineering event. As a result, a T-cell product generated from a clonal engineered master pluripotent cell line is homogeneous with respect to genomic modification and cell product composition. This revolutionary approach has the potential to mediate safer, more effective pharmacologic activity, including in combination with cycles of other cancer treatments,"*

commented Scott Wolchko, Fate's CEO.



## NEW DATA SUPPORTS VBL'S GLIOBLASTOMA GENE THERAPY MECHANISM OF ACTION

VBL Therapeutics has released data from its ongoing Phase 2 trial of VB-111 in recurrent glioblastoma multiforme (rGBM), which supports a link between the therapy's mechanism of action and the clinical outcomes being observed in the trial.

VB-111 employs a dual mechanism whereby angiogenic gene therapy is able to reduce the blood supply to a tumor site, whilst the immune system is also leveraged to help fight the tumor. It is administered once every few months via

intravenous. Patients in the trial have been assessed for overall survival and progression free survival. The latest trial data shows a significant improvement in both parameters, along with vascular imaging data, and increases in immune activation that correlate with the therapy's mechanism. The findings were presented at the 22nd Annual Meeting of the Society for Neuro-Oncology (SNO).

*"Our latest analysis has further strengthened our understanding of the highly novel dual mechanism of action of VB-111. We have shown that the survival benefits observed in our rGBM Phase 2 trial are tied to reduced tumor vascularity, which is consistent with what we know about the*

*anti-angiogenic properties of VB-111. In addition, we have demonstrated that VB-111 is associated with fever and immune-mediated responses, including secretion of immune-stimulatory cytokines that correlate with OS as well. The dual mechanism of action is further supported by preclinical data identifying the cell populations and molecular signaling driving this immune anti-tumor response. The data also provide new potential biomarkers that may be useful for clinical analyses. Building upon this, we look forward to additional insights on VB-111 from our pivotal Phase 3 GLOBE trial in rGBM, from which we expect top-line data in the first quarter of 2018,"*

commented Dror Harats, CEO of VBL.



## IND ENABLING FT500 PRODUCTION BEGINS AT UNIVERSITY OF MINNESOTA FOR FATE THERAPEUTICS

Fate Therapeutics have begun production of their Natural Killer (NK) cell cancer immunotherapy FT500. Successful manufacturing of the early stage product will enable the filing of an IND application planned for later this year. The company hopes to gain approval for the trialing of FT500 in solid tumor outpatients.

FT500 is generated from a clonal MPCL that was in turn created using the company's proprietary iPSC platform. Pre-clinical studies have showed that the product enhances the secretion of cytokines and chemokines; activating T cells that infiltrate tumor spheroids.

Production will take place at the GMP facility at the University of Minnesota, Molecular and Cellular Therapeutics, which is registered

with the FDA and state of the art. It has been estimated that a single manufacturing cycle will yield hundreds of doses at a concentration of up to  $1 \times 10^9$  NK cells per dose.

*"Preclinical studies demonstrate that FT500 has direct anti-tumor activity and the capacity to secrete inflammatory cytokines and chemokines upon activation. This enables the cell product to potentially exploit both innate and adaptive immunity and elicit a broad, multi-targeted immune response against tumor cells by engaging a diverse set of stress ligands, recruiting a polyclonal T-cell population to the tumor site and augmenting T-cell activation in the tumor microenvironment. While checkpoint inhibitors have transformed the cancer therapy landscape by inducing long-term remissions in multiple solid tumor*

indications, many tumor subtypes are resistant to checkpoint blockade therapy and non-responsiveness remains a significant concern. We thank the FDA for considering the unique therapeutic value of FT500 in combination with checkpoint inhibitors and its supportive feedback on our ongoing clinical translation and planned 1Q18 IND submission,"

commented CEO Scott Wolchko.



LANDMARK APPROVAL FOR  
LUXTURNA, SPARK'S INHERITED  
RETINAL DISEASE GENE THERAPY

Orphan designated LUXTURNA™ – voretigene neparvovec-rzyl – has been approved for market by the FDA. Developed by Spark Therapeutics in Philadelphia, the landmark AAV gene therapy targets inherited retinal disease (IRD) in patients who have a biallelic mutation of the *RPE65* gene.

LUXTURNA is the first gene therapy for a genetic condition approved in the USA, and the first AAV-mediated therapy to reach the market. As suggested by the orphan designation status, it is also the only treatment approved for IRD.

The therapy will be manufactured in Philadelphia and administered in centres across the USA to patients who have undergone genetic testing to confirm their biallelic status. Surgeons will administer the subretinal injection to each eye

on separate days. The EMA is currently reviewing LUXTURNA for the European market.

*"Today's landmark approval of LUXTURNA is a moment decade in the making for the field of gene therapy, the inherited retinal disease (IRD) community, and most importantly, patients with biallelic RPE65 mutation associated retinal dystrophy who now have the option to seek treatment. This one-time gene therapy for an inherited disease represents a first-of-its-kind breakthrough that may lay the groundwork for the development of gene therapies for other conditions that are not adequately addressed today. We offer our sincere gratitude to the patients and their families as well as the expert investigators who continue to participate in LUXTURNA's clinical development program,"*

commented Jeffrey D Marrazzo, CEO at Spark Therapeutics.



RMAT DESIGNATION FOR  
MESOBLAST'S HEART FAILURE CELL  
THERAPY

The FDA has granted Regenerative Medicine Advanced Therapy (RMAT) designation to Mesoblast's cell therapy candidate for patients who have heart failure with left ventricular systolic dysfunction, and left ventricular assist devices

(LVADs). The product, MPC-150-IM, is comprised of a 150 million cell dose of mesenchymal precursor cells (MPCs). These are thought to secrete powerful biomolecules and induce the growth of a mature blood vessel network; reducing damaging

inflammation and strengthening the native heart.

The FDA's decision was based upon a 30-patient trial which demonstrated improved native heart function, as well as improved early survival rates in LVAD patients, and a lengthening of the time to first hospitalization for a bleeding event. The candidate is currently undergoing a Phase 2b trial in 159 patients that is expected to yield results in the first quarter of this year.

The designation facilitates interactions with the FDA, including a multidisciplinary comprehensive discussion to which Mesoblast has been invited. Further benefits

include an expedited approval process by means of priority review, allowing the movement of therapies targeting life-threatening conditions to market at a faster rate.

Silviu Itescu, Mesoblast's CEO stated,

*"The RMAT designation speaks to the strength of the clinical data generated to date using our cell-based therapy in these heart failure patients with LVADs who are at risk of high mortality and have extremely limited treatment options. We are looking forward to working closely with the FDA in advancing this program with the aim of providing a new therapeutic option for these patients with exceptionally high unmet clinical need."*



## EXPERT PICK

### MESOBLAST RMAT DESIGNATION

*Mesoblast was successful in securing a RMAT Designation, which will no doubt*

*help the company advance its mesenchymal precursor cell product in the USA. The designation was granted based on data generated through a Phase 1 study of 30 patients, evaluating the company's cell therapy in heart failure patients with left ventricular assist devices. The RMAT is a relatively new designation, designed to expedite the review and approval of regenerative medicine products, analogous to conditional approval in Japan. Mesoblast is expecting a readout on primary outcome from a Phase 2b study of 159 patients in Q1 of 2018. – Mark Curtis*



### ADVERUM DOSES FIRST PATIENT IN AAV-MEDIATED A1AT DEFICIENCY THERAPY


The first patient in Adverum's Phase 1/2 trial of gene therapy ADV-043 for alpha-1 antitrypsin (A1AT)

deficiency. The patient is part of the low dose first cohort who are receiving the adeno-associated virus

(AAV) mediated treatment, with the primary endpoints of safety and tolerability assessment. Efficacy will be monitored via the concentrations of A1AT in plasma. The ADVANCE trial will enrol up to 20 patients and escalate the dosage for later cohorts.

Adverum CEO Amber Salzman commented,

*"We are excited to dose the first patient in the ADVANCE trial, which is an important achievement for Adverum as we are now in the clinic developing a potential new treatment option for individuals with A1AT deficiency. We are working diligently to develop ADVM-043 as a single-administration gene therapy for individuals living with this disease."*



### ONES TO WATCH

Interesting news from Adverum Biotechnologies, with the announcement of the first patient dosed in its Phase 1/2 clinical trial of ADVM-043 for alpha-1 antitrypsin deficiency (AATD). Patients with AATD are predisposed to chronic obstructive pulmonary disease (COPD) and liver disease, and about 1–5% of patients with diagnosed COPD are estimated to have AATD. Slowly progressive shortness of breath is the primary symptom, and treatment includes smoking cessation, bronchodilators and physical rehabilitation. Intravenous augmentation therapy with alpha1-antitrypsin enzyme replacement therapy benefits some patients, although this latter treatment is not widely available outside the US and may not ameliorate the liver disease. Adverum's AAV-10 based treatment offers a novel alternative, but showing that changes in enzyme levels translate to long-term clinical benefits in patients with COPD will be a long haul! –Richard Philipson



### FDA APPROVAL INITIATES TRIALING OF DIABETES TARGETING CELL POUCH SYSTEM BY SERNOVA

The FDA has approved an Investigative New Drug (IND) application from clinical stage company Sernova Corp. The decision opens the door for the company to initiate in human trialing of its Cell Pouch System (CPS) for diabetes.

The CPS is a microencapsulation device for the subcutaneous

storage of therapeutic cells, which in turn release proteins and hormones, such as insulin, required by patients. The initial trialing of the CPS will be targeted towards patients with hypoglycemia – a dangerous drop in blood sugar levels – unawareness; alleviating the need for manual monitoring and insulin



control. Patients in the study will be implanted with the CPS, which will then have a dose of islet cells transplanted within it, which are expected to last for 6 months before determining the necessity of a second dose.

The trial will be backed by the diabetes organization JDRF International, who have committed to providing \$2.45 million of funding. The organization highlighted the seriousness of hypoglycemia unawareness in Type 1 diabetes

patients as a justification of their backing.

Sernova CEO Phillip Taylor commented,

*"We're extremely enthusiastic about the promise of Sernova's regenerative medicine platform to provide a new therapeutic option for diabetes patients with hypoglycemia unawareness. We believe Sernova's multiple advancing cell-based therapies have the potential to deliver significant improvement in the quality of life of patients suffering from diabetes and other debilitating diseases."*



## IND ACTIVE FOR REGENXBIO'S MPS II PEDIATRIC GENE THERAPY

Trial enrolment is set to begin shortly for the Phase 1/2 clinical study of gene therapy RGX-121, due to its recently active IND. Based on the developer, REGENXBIO's proprietary NAV Technology Platform, the orphan and rare pediatric disease designated therapy targets Mucopolysaccharidosis Type II (MPS II).

MPS II is a recessive genetic disease that causes adverse symptoms including spinal compression, a build up of fluid in the brain, and storage lesions. It is caused by a deficiency in the enzyme I2S but current treatment approaches are not able to target the symptoms, which manifest in the central nervous system. It is hoped that RGX-121 will be able to secure a permanent supply of I2S for patients that is able

to cross the blood-brain barrier as a result of expression via AAV vectors. The treatment has been developed to be delivered via a one-time injection accompanied by a year of immunosuppression.

REGENXBIO CMO Stephen Yoo stated:

*"The goal of the RGX-121 program is to develop a single-dose treatment for MPS II that can prevent the progression of neurocognitive decline experienced by children with the disease, which addresses one of the shortcomings of the current standard of care, enzyme replacement therapy. We expect to commence trial enrollment in the first half of 2018, and we look forward to working with leading gene therapy researchers and the broader MPS II community on this novel clinical program."*



## BIOMARIN'S 1.5 YEARS' CLINICAL DATA SHOWS PROMISE FOR HEMOPHILIA PATIENTS

BioMarin Pharmaceutical has announced an update to its previously

reported results of an open-label Phase 1/2 study of valoctocogene



EXPERT  
PICK

*The presentation at the American Society of Hematology of long-term efficacy data for BioMarin's valoctocogene roxaparvovec places the company ahead of its rival Spark Therapeutics in developing the first gene therapy treatment for hemophilia A. BioMarin's AAV-5 based treatment encodes for a B-domain-deleted human FVIII, thus addressing the challenge of gene size which has made hemophilia A, up to now, a hard nut to crack. The presentation from BioMarin showed normal or near normal FVIII levels in 11 of 13 patients treated, with associated marked reductions in annualized bleeding rate and FVIII use in both dose cohorts. These data compare very favorably to Spark's product, a similar AAV-5 based, B-domain-deleted treatment, which has recently reported disappointing and unexpectedly inconsistent levels of FVIII. Spark is doing much better in FIX deficient hemophilia B, where it is ahead of its rival UniQure, but in hemophilia A BioMarin looks like it's winning the race. –Richard Philipson*

roxaparvovec, an investigational gene therapy for severe hemophilia A.

The updated results were presented at the 59th American Society of Hematology Annual Meeting and Exposition in December by primary investigator of the Phase 1/2 study, Dr John Pasi of Barts and the London School of Medicine and Dentistry. Data showed sustained normal or near-normal Factor VIII levels in severe hemophilia A for most patients with a maximum

follow up of 19 months. The data presented at ASH is the most current data and includes 78 weeks of data for the 613 vg/kg dose and 48 weeks of data for the 413vg/kg dose.

Results from the ongoing Phase 1/2 study were also published recently in the New England Journal of Medicine, which showed the safety and efficacy of valoctocogene roxaparvovec, at the 613 dose in men with severe hemophilia A at 52 weeks.

## SERVIER'S UCART19 TRIALS REPORT 83% REMISSION RATE IN PHASE 1

Preliminary results from the Phase 1 study of UCART19, a CAR T cell therapy for patients with CD19-positive B-cell acute lymphoblastic leukemia (B-ALL), have reported a positive safety and tolerability profile along with an 83% remission rate.

Originally developed by Cellectis, the candidate was licensed by Servier in 2015 and is now being developed in collaboration with Pfizer who hold the US rights to commercialization. These latest results were presented at the 59th American Society of Hematology (ASH) Annual Meeting and Exposition regarding the CALM (UCART19 in Advanced Lymphoid Malignancies) and PALL (Pediatric Acute Lymphoblastic Leukemia) trials taking place in the UK and US, respectively.

Results from the CALM study showed that 5 of the 7 enrolled patients achieved molecular remission – measured by the number of residual leukemic cells remaining post-treatment – in 28 days. There was one instance of Grade 4

Cytokine Release Syndrome (CRS), which developed into neutropenic sepsis resulting in death. The pediatric patients all achieved remission, with mild but manageable CRS and Grade 1 graft-versus-host disease (GvHD) occurring.

UCART19 is an off-the-shelf, allogeneic product that targets the CD19 receptor expressed in cases of relapsed and refractory B-ALL. The candidate has been gene edited with TALEN® to target this receptor and proposes a faster route to treatment than the current autologous approach.

Principal investigator of the CALM study, Reuben Benjamin, commented,

*"These early results for UCART19 are very encouraging both in terms of manageable safety and the impressive complete molecular remission rate in these hard-to-treat adult patients with R/R B-ALL. This first cohort explored a lower dose of UCART19 that is approximately one tenth of that used in most autologous CAR-T trials. These results support additional evaluation of UCART19 at varying doses."*





## POSITIVE RESULTS FROM BLUEBIRD'S ONGOING LENTIGLOBIN™ TRIAL

bluebird bio has released data from its ongoing trial of LentiGlobin™, a gene therapy targeting the underlying cause of Severe Sickle Cell Disease (SCD) and Transfusion-Dependent -Thalassemia (TDT). The latest results from a study of seven patients show clinical improvements post-treatment in the majority of cases. Of particular note is a sustained 3.8-year transfusion independence in a TDT patient, with three of the four patients having normal or near normal hemoglobin levels to date.

In the SCD patients enrolled in the study, post-treatment results have shown up to 52% of a patient's haemoglobin consists of HbAT87Q, which is expressed as a result of the treatment. These outcomes were presented at the 59th Annual Meeting of the American Society of Hematology by the study's primary investigator, Marina Cavazzana.

Bluebird's CMO Dave Davidson commented on the latest findings:

*"People with SCD and TDT experience serious complications and organ damage as a result of their disease and complications from chronic blood transfusions. Addressing the underlying genetic causes of these diseases has the potential to dramatically improve patient outcomes. All three patients with severe SCD in the HGB-205 study showed a steady increase in HbAT87Q production in the first six months following LentiGlobin therapy, with the longest-treated patient showing stable hemoglobin levels over two and a half years. All four patients with TDT are transfusion-free following therapy, up to almost 4 years in the first patient treated. The durable treatment effects observed to date in this study are encouraging, particularly given the manufacturing process improvements that we implemented across our subsequent clinical studies of LentiGlobin, and additional changes to the HGB-206 study protocol that we hope will further improve outcomes for patients with SCD."*



## CLINICALLY SIGNIFICANT RESULTS FROM STUDY OF GENSIGHT'S GS010 FOR LHON

French company Gensight Biologics has reported clinically significant data from its study of gene therapy for Leber Hereditary Optic Neuropathy (LHON), GS010. The study is a Phase 1/2 trial that enrolled 15 subjects in 2015.

The follow-up data thus far has shown gains in visual acuity over the time since initial treatment. Subjects had the eye most affected by the condition treated with the

gene therapy whilst the other remained untreated, as has been used for comparison purposes.

The most encouraging results came from patients who were less than 2 years into vision loss at the time of treatment. In this group, there was a mean gain of 28 ETDR letters in the treated eye, compared to a mean gain of 13 in the untreated. Since a clinically significant gain is set at 15



letters, the results support the efficacy of the approach. Additionally, there was a positive safety and

tolerability profile of GS010 with the only adverse events being mild and manageable.



## TIGENIX CLOSES LICENSING DEAL WITH MESOBLAST, AND GAINS CHMP RECOMMENDATION FOR UCART19

Mesoblast and TiGenix have reached an exclusive licensing agreement whereby TiGenix will gain access to the use of Mesoblast's patented adipose-derived mesenchymal stem cells (MSCs). This will support the development and commercialization of the company's cell therapy product for the treatment of fistulae, Cx601.

The deal comes at a cost of €20 million, with Mesoblast being paid €5 million upfront, and then again in 12 months, followed by an additional €10 million on the achievement of regulatory milestones.

*"We are delighted to have concluded this exclusive license agreement with Mesoblast, which will broaden our IP protection for Cx601 as we move closer to commercialization in Europe. We continue advancing our global pivotal Phase 3 clinical trial to support a future Biologics License Application (BLA) to the US FDA and*

*are also pursuing the development of new indications for Cx601 to expand its potential market. With this newly added IP protection, TiGenix now has a stronger intellectual property position that supports the use of Cx601 for treatment of all fistulae,"*

said TiGenix CEO, Eduardo Bravo.

In a further milestone for Cx601, the EMA has been recommended to authorize the commercialization of the product by its Committee for Medicinal Products for Human Use (CHMP). The decision was based on statistically significant data regarding the remission rate, and subsequent sustained remission of Crohn's patients in the Phase 3 trial ADMIRE-CD. Approval of the Marketing Authorization application in Europe seems likely, and once passed TiGenix will receive €15 million from Takeda, to whom they have granted ex-USA commercialization rights.



TiGenix's allogeneic MSC product for fistulas in Crohn's, Cx601, is the first allogeneic cell therapy to receive a positive opinion

recommending a marketing approval from the EMA. Takeda gained ex-US rights to the cell therapy in 2016 as it moved deeper into the clinic. Now, as the therapy approaches commercialization, Takeda will capitalize on its partnership with TiGenix, announcing its intention to buy the company outright. The deal is valued at north of €500M and is supported unanimously by TiGenix's Board of Directors. –Mark Curtis



## JUNO TO LEVERAGE THERMO FISHER'S CELL THERAPY SYSTEM FOR CAR T MANUFACTURE

Juno therapeutics have entered into a partnership with Thermo Fisher Scientific, granting them use of the latter's Cell Therapy System (CTS) Dynabeads CD3/CD28 magnetic beads, which will be integrated into the manufacturing process for their CAR T therapies.

The CTS reagent platform activates and expands genetically modified T cells that are being developed for cancer immunotherapies. Thermo's proprietary platform has already been leveraged in the development of other CAR T therapies due to its capacity for high reproducibility and streamlining of the production process.

Thermo Fisher COO Mark Stevenson commented, "As Juno progresses its pipeline from clinical research to commercializing drug product, it requires the highest-quality manufacturing capabilities that the industry can offer. Cell Therapy Systems' products help minimize the risk of contamination and variability in clinical research and drug commercialization. These products are supported by rigorous regulatory review, making them a proven choice as more companies invest in moving from bench to bedside."



## VERTEX AND CRISPR TO COLLABORATE ON DEVELOPMENT OF HEMOGLOBIN GENE THERAPY

Vertex Pharmaceuticals has licensed the investigational gene therapy CTX001 from CRISPR Therapeutics as part of a collaboration deal between the two companies. The candidate, which is comprised of autologous hematopoietic stem cells gene edited by CRISPR to produce fetal hemoglobin (HbF) for the treatment of  $\alpha$ -thalassemia and sickle cell disease, will be co-developed as part of the collaboration. As per the terms of the deal, costs and profits from the development and potential commercialization will be shared between the companies.

An application to initiate clinical trials for the therapy in Europe was

filed in December 2017, with a US IND to follow shortly. The Europe study is expected to ascertain the safety and efficacy of the therapy in patients with  $\alpha$ -thalassemia, with the US trial testing sickle cell disease subjects.

Vertex CSO David Altshuler commented, "Over the past 2 years, we've made significant progress with CRISPR Therapeutics on the discovery and preclinical development of multiple CRISPR/Cas9-based treatments, and we're pleased to select CTX001 as the first of these treatments to move into clinical development as part of our collaboration. The addition of CTX001 to our clinical development pipeline

provides us with a near-term opportunity to generate the first proof-of-concept clinical data for a CRISPR/Cas9-based medicine in two genetic diseases that are highly aligned with our research strategy.”



## GILEAD BUYS KITE-BACKED CELL DESIGN LABS FOR \$567 MILLION

Gilead has bought the company Cell Design Labs, who had shares held by the recently acquired Kite Pharma, in a \$567 million deal. This boosts Gilead’s CAR-T portfolio as the company focuses on the development of products that require two antigens to activate CAR T cells, and throttle technologies, which operate a switch for CAR-T cells using a small molecule. Cell Design is currently developing therapies targeting prostate and liver cancer, and multiple myeloma.

The CAR-T cells produced by Cell Design engineer the internal and external portions of the naturally

occurring Notch receptor via the proprietary platform SynNotch scaffold. This instructs the T cells to detect specific molecular targets and to turn on new genes. This system can be programmed to deliver several immunotherapeutic actions once bound to the intended target cells.

Cell Design CEO Brian Atwood commented,

*“Bringing our robust technology platforms under the Gilead umbrella, with its outstanding research and development capabilities and commitment to innovation, provides an exciting path forward for the development of the next generation of living therapies for patients with cancer.”*



## LGMD GENE THERAPY COMPANY MYONEXUS RAISES \$2.5 MILLION SEED FUNDING

Ohio-based biotech company Myonexus Therapeutics has secured \$2.5 million in seed funding, allowing the company to advance five gene therapies currently being developed for the treatment of limb-girdle muscular dystrophies (LGMDs). New investors from the funding round include Cincy-Tech, LLC, Rev1 Ventures, The Jain Foundation, and GFB ONLUS.

LGMD is currently untreatable, emphasizing the value of the potentially corrective treatments that Myonexus is working on. The seed funding will be put towards

initiation of a Phase 1/2a clinical trial of the gene therapy MYO-101 in the LGMD subtype 2E. This is expected to begin early this year. Other candidates are already undergoing Phase 1 trialing for various subsets of the condition.

The company’s CEO Michael Triplett commented,

*“MYO-101’s compelling preclinical data strongly supported the case for clinical translation, validated by our own subsequent clinical trial results as well as general advances in the neuromuscular disease gene therapy field. We are committed to rapidly advancing*

our pioneering pipeline of gene therapy candidates, with the ultimate goal of providing first-ever corrective LGMD treatments."



## CELLECTIS APPOINTS NEW CMO, STÉPHANE DEPIL

Cellectis has announced the appointment of Professor Stéphane Depil as its new Senior Vice President of R&D and Chief Medical Officer. Professor Depil will be responsible for bringing Cellectis' product candidates to clinical-stage development, strategic and operational management

of all therapeutic activities, and supervising research and development projects within the company. Along with this, he will keep the academic and research activities as adjunct Professor at Léon Bérard Cancer Center & University Claude Bernard Lyon, France.

Professor Depil has over 15 years of experience in oncology

clinical development, both in various universities and pharmaceutical companies. Prior to joining the Léon Bérard Cancer Center & Cancer Research Center of Lyon as Medical Director of the Cancer Immunotherapy Program, he served as CEO at Netris Pharma and Director of Oncology Research and Development at Servier.