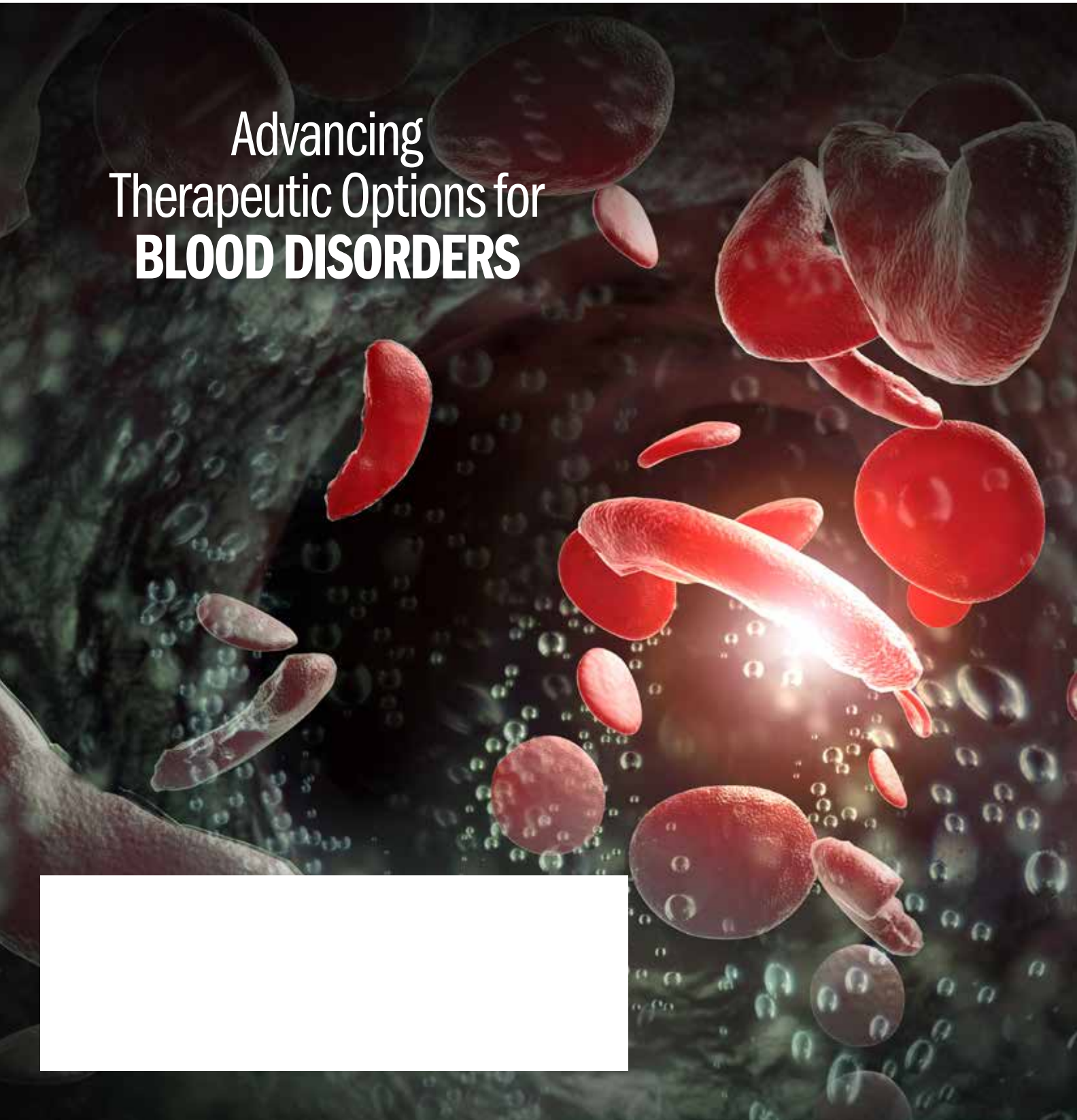
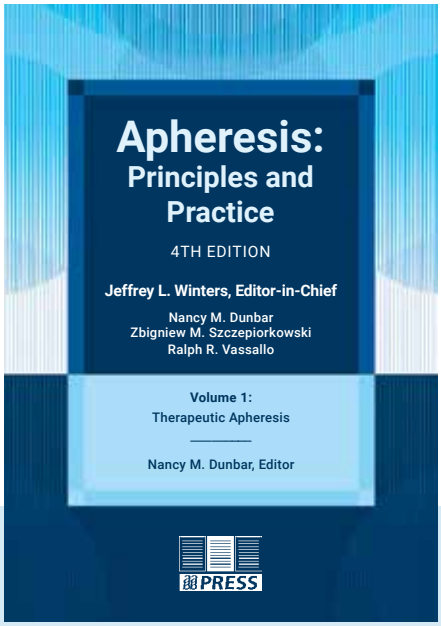
FEBRUARY 2021
Vol. 23 No.2

AABB News



Advancing Therapeutic Options for **BLOOD DISORDERS**



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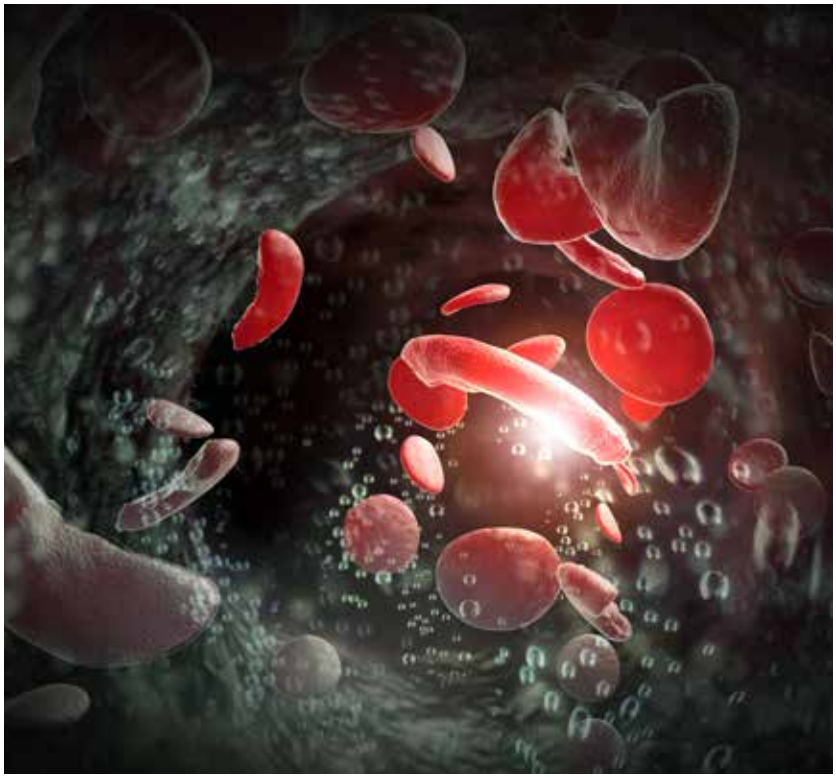
(AABB Press, 2020, 234 pages, ISBN: 978-1-56395-408-5)



Contents

14
Cellular Therapies Fueling New Treatment Options for Hemoglobinopathies

Researchers are increasingly looking to cellular therapies to advance therapeutic options for patients.

President's Message

Advancing Therapeutic Options for Patients with Blood Disorders

Patients with blood disorders often require frequent transfusions as part of their treatment. Because of this, those of us working in the transfusion medicine and biotherapies field sometimes get to know some of these patients personally. We might see them on a regular basis and develop a rapport with them. In doing so, we may gain insight into the challenges of their condition.

We also may come to understand how reliant such patients are on a strong and diverse blood supply. While a stable and sufficient blood supply is a key public health issue for everyone, it is of particularly critical importance for patients who require frequent transfusions to maintain optimal health. Their need for appropriately matched blood is ever-present and its availability can make a significant difference in their overall quality of life.

This month's issue of *AABB News* focuses on blood disorders, the most common of which is, of course, sickle cell disease. It is perhaps fitting that we highlight blood disorders in the month following National Blood Donor month, since patients with blood disorders depend on the continuous replenishment of the blood supply. As part of our celebration of National Blood Donor Month in January, one of the issues we highlighted was the critical need for a diverse blood supply. This is of the utmost importance because, as we all know, a diverse blood supply can help providers find appropriately matched blood for patients in need.

New Treatments on the Horizon

As our two features in this issue highlight, various advancements in the treatment of sickle cell disease and other blood disorders have been made in recent years. In fact, this area of research is flourishing and new therapeutic options may be not far off.

David Green, MSA

The first feature article in this issue, beginning on page 8, examines the state of treatment for patients with sickle cell disease and explores new therapies currently under investigation. The second feature, beginning on page 14, looks at experimental biotherapeutic options that may one day change the way we treat blood disorders.

This is a fascinating area of our field with much potential. We can hope that as research continues, therapeutic options for blood disorders will proliferate, potentially helping us ease the burden for these patients. ■

David Green, MSA
AABB President

AABB News
FEBRUARY 2021 | Vol. 23 No. 2

Postmaster:
Send address changes to AABB News; c/o Member Services; 4550 Montgomery Avenue; Suite 700 North Tower; Bethesda, MD 20814.

AABB News
(ISSN 1523939X) is published monthly, except for the combined November/December issue for the members of AABB; 4550 Montgomery Avenue; Suite 700 North Tower; Bethesda, MD 20814.

AABB is an international, not-for-profit association representing individuals and institutions involved in transfusion medicine, cellular therapies and patient blood management. The association is committed to improving health by developing and delivering standards, accreditation and educational programs that focus on optimizing patient and donor care and safety.

+1.301.907.6977
Email: news@aabb.org
Website: www.aabb.org

Periodicals postage paid at Bethesda, MD, and at additional mailing offices.

Publications Mail Agreement No. 41248513.

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AABB and the National Blood Foundation (NBF) are proud to present the names of those who made a donation to the NBF and its Research and Education Trust Fund in 2020. Their generosity helped give eight deserving early-career researchers funding to conduct studies that may advance the field and help further their career in transfusion medicine or biotherapies.

AABB and the NBF laud the giving spirit behind these donations with a special thanks to recurring donors who remain committed to our mission, those who donated to the NBF for the first time and those who made anonymous donations.

Many previous grant recipients have leveraged their grant-funded research into a successful career, becoming industry experts and leaders whose scientific contributions continue to advance the field and improve patient treatment and safety.

Thank you for supporting the NBF's mission to fuel innovative research for the benefit of donors and patients.

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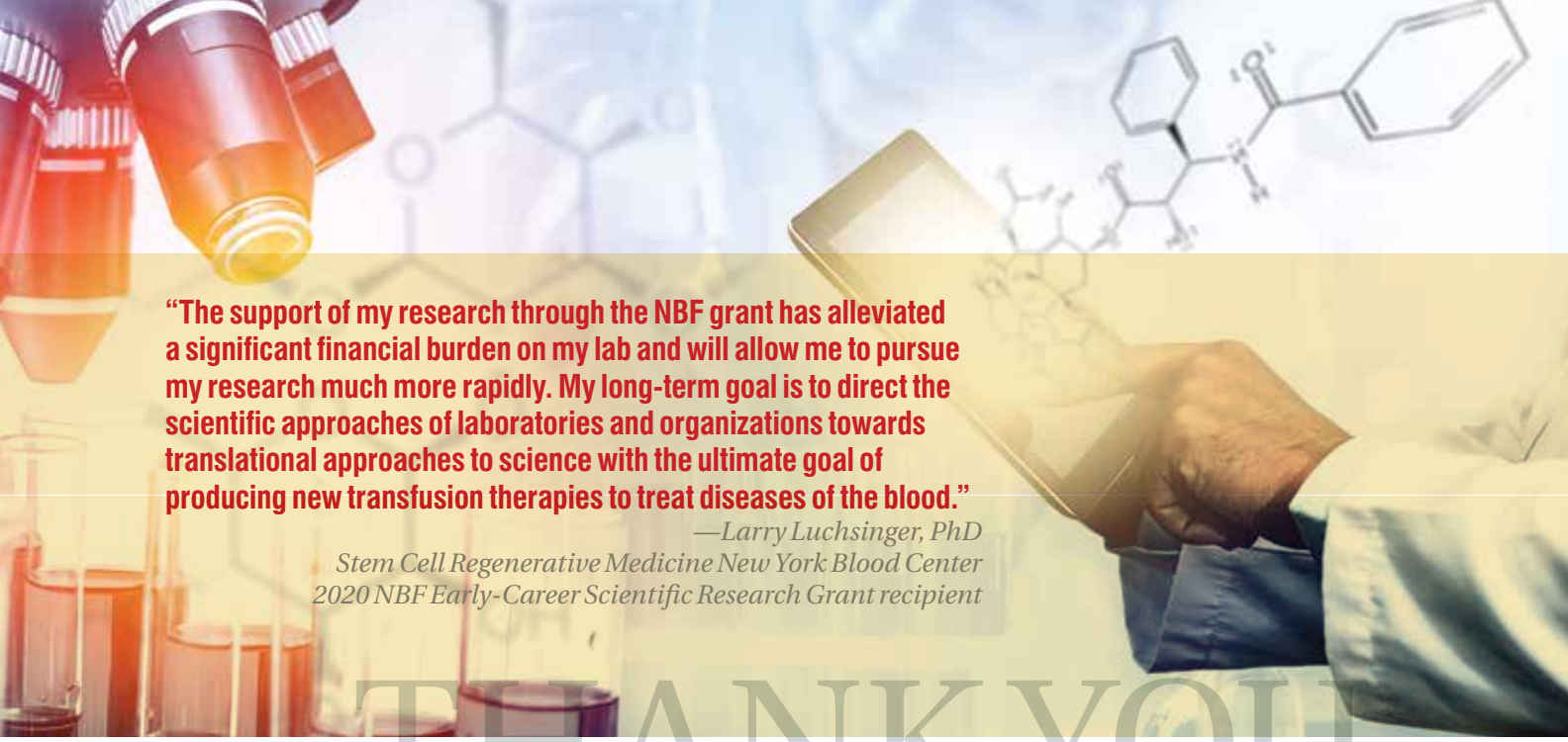

"The support of my research through the NBF grant has alleviated a significant financial burden on my lab and will allow me to pursue my research much more rapidly. My long-term goal is to direct the scientific approaches of laboratories and organizations towards translational approaches to science with the ultimate goal of producing new transfusion therapies to treat diseases of the blood."

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"This grant benefits me in several important ways: it allows me additional time in my position to further establish my own research program, it connects me with fellow transfusion medicine researchers and clinicians, and helps me to develop a respected reputation as a strong independent scientist."

—Robert H. Lee, PhD
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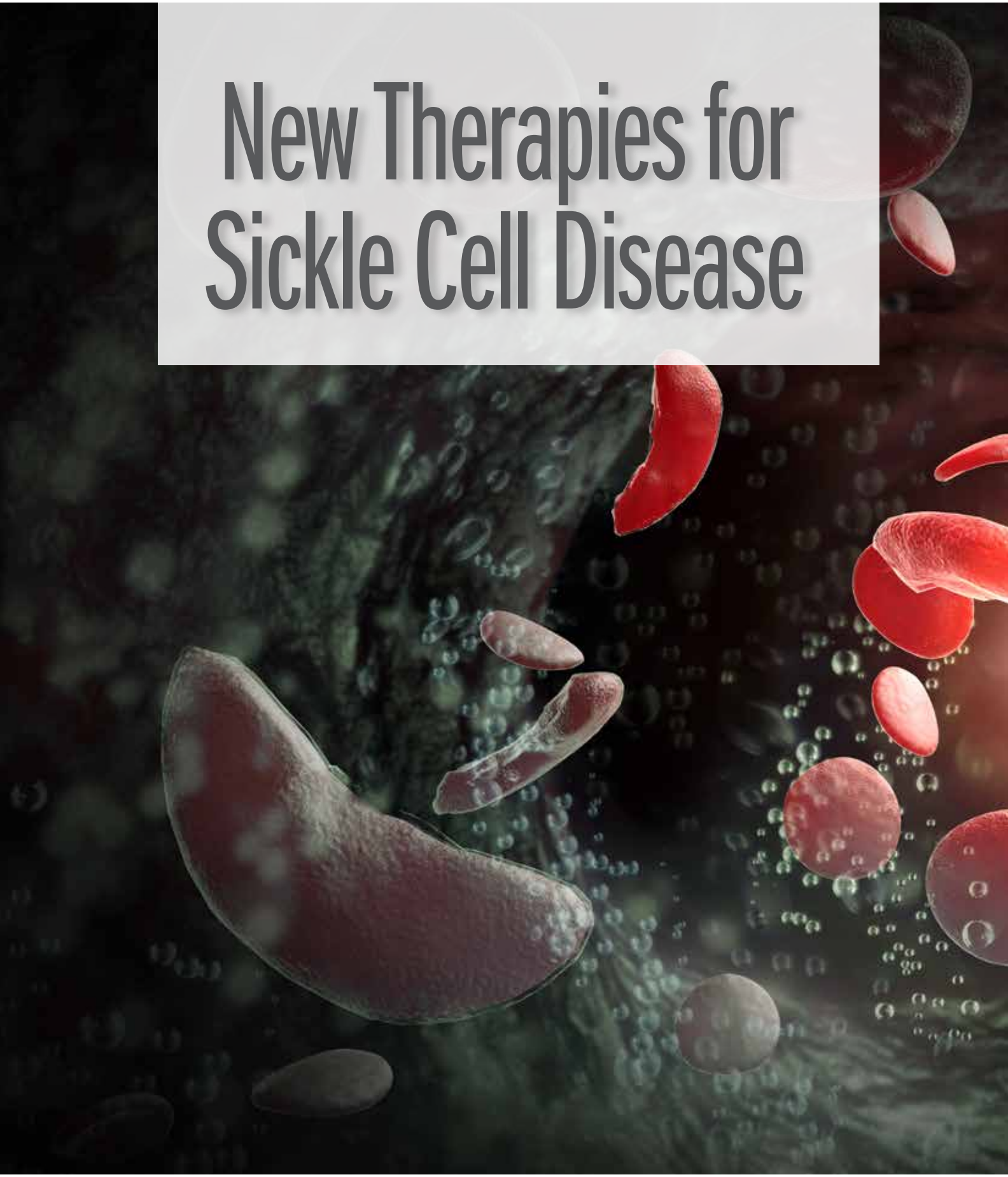
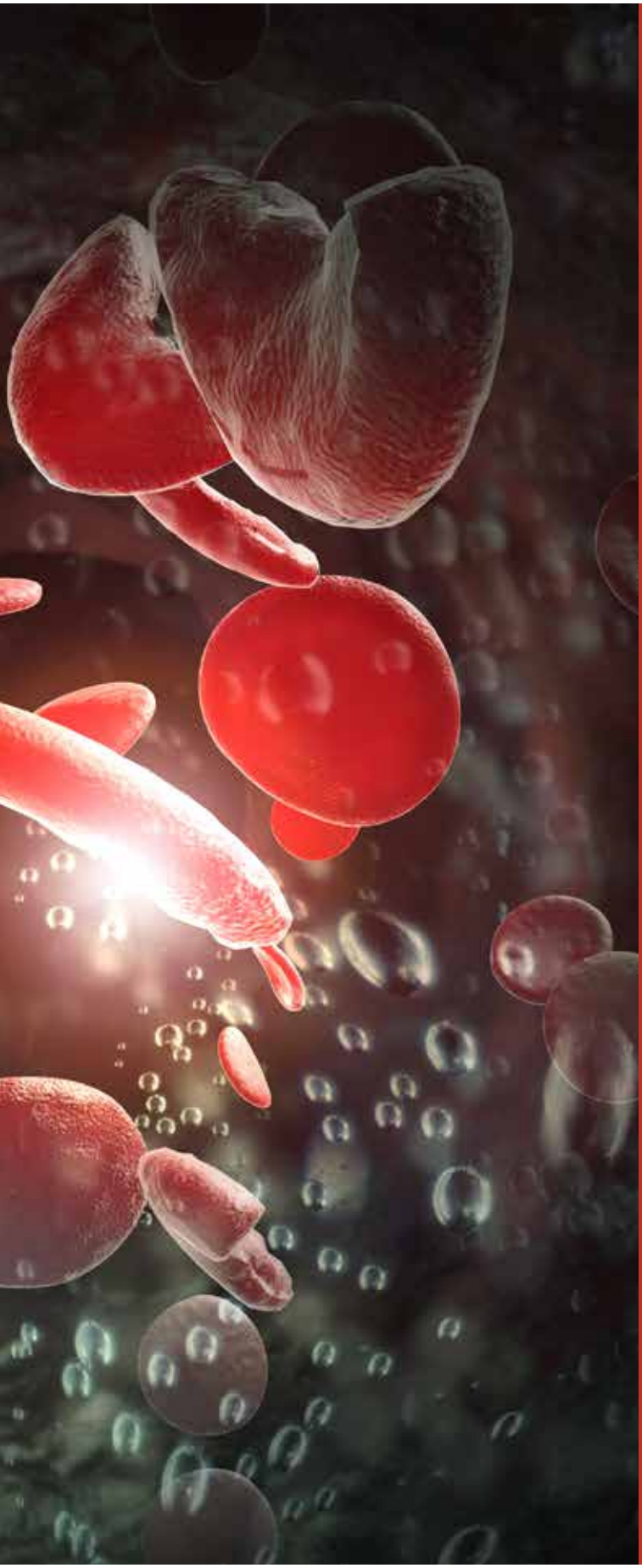
New Therapies for Sickle Cell Disease





By Marian Mostovy
Contributing Writer

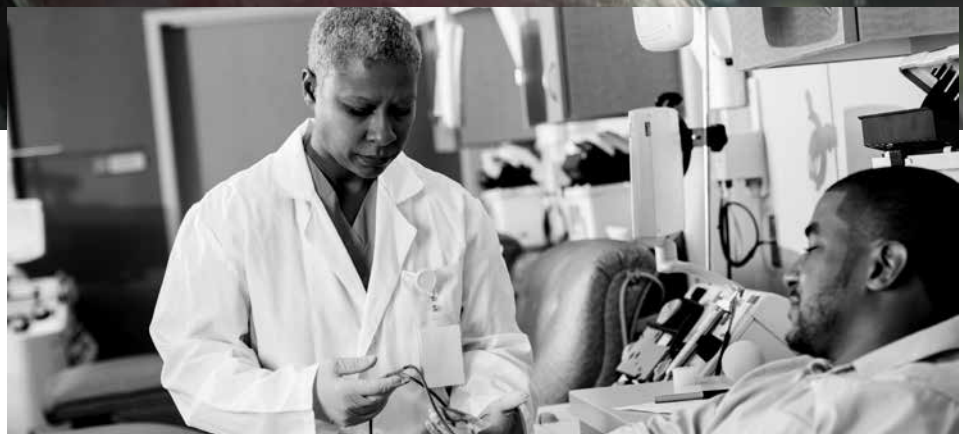
Sickle cell disease (SCD) is a painful, life-threatening disease that affects millions of people throughout the world. Incidence is highest in sub-Saharan Africa; in the U.S., it is estimated that 100,000 people, primarily African-Americans, have SCD. In the past few years, a better understanding of SCD, the evolution of gene editing techniques and increased awareness of social biases that have thwarted treatment advancements, are fueling development of promising new therapies.

SCD results from a single genetic mutation that causes hemoglobin molecules in the red cells to stick together, to form rigid rod-shaped structures, which stretches the red cells into a "c" shape (similar to a sickle) and makes them rigid. As a result, the cells have difficulty navigating through small blood vessels and break apart early, causing anemia. They also limit oxygen to the body's tissues, which can lead to a host of complications including progressive organ damage, vaso-occlusive events (pain crises), infections and reduced life expectancy.

Current Therapies

The current therapies used for support and the prevention of SCD-related events include pain medication, hydroxyurea and chronic blood transfusion.

Hydroxyurea, approved in 1998, reactivates production of fetal hemoglobin to help reduce SDC-related events. Individuals make fetal hemoglobin in utero and are born with small amounts of it that gradually transform to adult hemoglobin. "Fetal hemoglobin is healthy and blocks the sickling that occurs in the abnormal adult hemoglobin if a person has the sickle cell mutation," said Deepa Manwani, MD, director of hematology, Department of Pediatrics at Montefiore Medical Center, N.Y. The medication helps prevent pain crisis and acute chest syndrome. It is also associated with other benefits for patients, including decreasing white cell count, and organ damage which



can help reduce the burden of disease.

But treatment with hydroxyurea also has some limitations. "Hydroxyurea's a wonderful drug, but you don't get a perfect response—for example, patients who have multiple pain crises have a reduction in their pain crises, but it doesn't eliminate pain crises. And about one third of adults do not respond. So there's a huge room for improvement," said Manwani.

Chronic blood transfusions signal to the body that there is sufficient blood, so patients do not produce sickle hemoglobin, thus reducing the levels of sickle hemoglobin, which helps to keep the patient healthier. But even with careful matching, chronic transfusions come with a risk of alloimmunization. "The formation of antibodies can destroy the red blood cells you're transfusing and create severe reactions for the patient," said Manwani. "That is a significant complication, because the next time, you might not be able to transfuse the patient when they really need it."

Also, chronic transfusion therapy may lead to increased iron levels, which increases the risk of organ damage. While daily medicine can prevent this from occurring, taking medication indefinitely can be challenging for many individuals. Transfusions also carry the risk of acute reactions and, although the risk is low, transfusion-associated infections.

The only potential cure for SCD is stem cell transplantation. Transplants are most effective in individuals with who have good donor matches, so the number of patients who can currently benefit are limited.

Newly Approved Drugs

The initial understanding of sickle cell disease dates back to 1949. "For quite a while after that, people just thought of it as a red cell problem. It's been gradual, but in the last decade the downstream effects of SCD have become increasingly clear," said Manwani.

Scientists now know SCD involves not just defective hemoglobin inside the red cell, but makes the outside of the red blood cell sticky as well as the endothelium lining the blood vessels. "We know the white blood cells are activated and they stick to the endothelium and then trap the red cells, mediating blockage that was thought to be purely from the red cells. Chronic inflammation and increased coagulation are also occurring," according to Manwani.

The growing advances in the understanding of the disease have revealed opportunities for new drug therapies. A plethora of agents have been tested and are now undergoing in pre-clinical and clinical trials. The Food and Drug Administration (FDA) approved three over the past three years. Each is designed to prevent complications of SCD, but targets a different aspect of the pathophysiology and has different clinical benefits, some of which could lessen the burden on transfusion services that support patients with SCD:

- **Voxelotor (Oxbryta, Global Blood Therapeutics)**. This drug received approval in November 2019 for adults and pediatric patients 12 years of age and older with SCD. It is an oral medication that increases hemoglobin and decreases breakdown of red cells. Voxelotor binds to the hemoglobin and increases oxygen affinity, which prevents formation of rod-like polymers in sickle cells and causes damage and hemolysis (breakdown of red cells) as they circulate. Reducing hemolysis could reduce the need for chronic transfusions over time.

- **Crizanlizumab (Adakveo, Novartis)**. This medicine was also approved by FDA in November 2019. It is delivered intravenously monthly, and is indicated to reduce the frequency of vaso-occlusive crises in adults and pediatric patients aged 16 years and older with SCD. Crizanlizumab prevents the white cells and red cells from sticking to endothelium, as well as reducing platelet-white cell aggregates, decreasing the rate of blockages that lead to pain crises. By decreasing admissions for acute chest syndrome and pain events, it could reduce the need for transfusions in those settings.

- **L-glutamine**. Approved in July 2017, L-glutamine was the first agent approved since hydroxyurea almost 20 years prior. The oral powder is indicated

"The formation of antibodies can destroy the red blood cells you're transfusing and create severe reactions for the patient."
— Deepa Manwani, MD

for patients age 5 years and older with SCD to reduce complications associated with the blood disorder. It works by neutralizing the oxidative stress in sickle red cells, which depletes the mechanisms that protect against such stress.

Physicians are prescribing these pharmacotherapies based on their specific benefits and the patient's needs. It is not known if they can work with each other, but all can be given with hydroxyurea. "All three new drugs have been tested in patients on hydroxyurea and those who are not, and the drugs do just as well in patients on hydroxyurea, which means there is added benefit," said Manwani. "We recommend to our patients to take them in addition to hydroxyurea whenever possible." She added that clinical experience and data over time will inform providers on their optimal use.

Adding a new therapy is sometimes hard to sell to patients and families. "It's our job as providers to explain to them that multiple therapies will help them get the maximum benefit," said Manwani. She explains to patients that SCD is such a complex disease that proper treatment may require combination therapies, just like people with high blood pressure may take several medicines daily throughout their lives.

Other challenges posed by the novel drugs are their high cost and insurance approval. And as with all medications, they have potential side effects.

Despite these issues, Manwani welcomes the increase in choices. "It's been exciting to be able to offer the medicines and for the patients to have other options. It's only been a year since voxelotor and crizanlizumab were approved. With time, both provider and patient comfort will increase. We really have to see what happens in the real world."

An estimated 40 more drugs are in the pipeline in all three clinical phases of research.

Meanwhile, a new use of an older drug, hydroxyurea, was established in a 2016 study published by Russell Ware and his group in *Lancet*. "Many pediatric patients are treated with blood transfusions for primary stroke prevention, and now we know a subset of them—those that don't have severe vasculopathy by brain imaging—can be transitioned back to hydroxyurea instead of monthly transfusion," Manwani related. Not all patients transitioned to hydroxyurea will have an optimal response, but at least it's an option for many of these patients."

Gene Editing Therapies

American and European researchers are in the early stages of using genomic editing tools to add, remove or alter genetic material in stem cells to develop a cure for SCD. All current research involves removing stems cells from the patient, manipulating these cells in a laboratory and transplanting them back into the patient. The lengthy process requires chemotherapy and blood transfusions to prepare patients for the genetically edited cells.

"What is being done now is either replacing that abnormal hemoglobin with a normal one or inducing stem cells to make blood cells that have more fetal hemoglobin, which stabilizes the red blood cells," explained John Manis, MD, investigator in the Joint Program in Transfusion Medicine at Boston Children's Hospital. "With both of those genetic manipulations, the end product would be a longer-lived red cell, that doesn't sickle and induce vaso-occlusive crises and that would prevent patients from needing transfusion."

A gene therapy approach developed by several groups including Bluebird Bio, Inc., Cambridge, Mass., began early clinical trials more than two years ago. As part of this therapy, researchers first create copies of a modified form of the B-globin gene—which is defective in people with sickle cell disease. Next, the non-infectious part of a virus, in this case HIV, is used to deliver the modified genes into stem cells collected from the patient. Following the procedure, patients begin producing blood cells with anti-sickling hemoglobin. The goal: reduce sickled red blood cells, hemolysis and other complications.

In December 2020, Bluebird Bio reported 32 patients in one arm of its safety and efficacy trial received benefit from the therapy. At two years follow-up, there were no reported vaso-occlusive events in patients who had experienced at least four severe vaso-occlusive events, and at up to 30 months follow-up, patients continued to produce anti-sickling hemoglobin. Also, a one-year assessment of the patients' self-reported quality of life outcomes demonstrated reduced pain intensity.

Two other recent investigational studies focused on promoting fetal hemoglobin production. One was conducted by Boston Children's Hospital researchers led by David Williams, MD , a past recipient of AABB's Karl Landsteiner Memorial Award; and Erica Estrick, MD, using a viral vector. "Through the virus, we introduce machinery that inhibits production

"It's been exciting to be able to offer the medicines and for the patients to have other options."
—Deepa Manwani, MD

of *BCL11A*, a protein that normally shuts off fetal hemoglobin ," explained Manis, who was a co-author of the study." The red cells now have higher amounts of fetal hemoglobin—specifically in the erythroid lineage— that's found to be very protective for patients with sickle cell."

The other study, conducted by a group of researchers led by Selim Corbacioglu, MD, University of Resensburg in Germany, employed CRISPR gene editing to turn off *BCL11A*. "CRISPR technology introduces ribonucleoprotein into the cell, where it alters the DNA of the chromosome," Manis explained. "They are deleting where the *BCL11A* protein fits and making the protein inactive in red blood cells; they don't have any virus in them. They have just been modified in the test tube, then they're given back to the patient."

Both studies showed promising results. In the Boston Children's Hospital study, sickle cell disease was reduced or absent at follow-up for six patients after a minimum of 6 months. In the CRISPR study, two patients had high levels of fetal hemoglobin, elimination of transfusion and no pain episodes more than one year later.

The next challenge in gene editing is to fix the single point mutation that causes sickle cell disease. That challenge is being addressed by Beam Therapeutics using a technique called base editing, which has been called CRISPR 2.0. The Cambridge, Mass. company is the first to seek to fix a "typo" in the human genome, which is made up of combinations of the bases A, T, G, and C. People with sickle cell disease have a T-A base pair which should be an A-T. So far, Beam scientists are able to switch the T to a C and A to a G, which although also a typo, results in functional red blood cells. That work is still in the pre-clinical testing phase.

Although the prospect of gene editing providing a life-long cure for SCD engenders hope, the field remains experimental, cautioned Manis. "I'm incredibly positive about gene editing. But we need to take a pause and balance the excitement generated by thinking we can simply change your genes and you're back to normal. We need expanded trials to answer who the best candidates are— adolescents or children who have proven complications? Or adults who have many complications, but which may not be reversible? We're learning so much now, we're just not quite there yet."

Brighter Horizon

Researchers are looking at many other potential treatments for SCD, including:

- Making allogenic stem cell transplant procedures less debilitating by developing a drug that minimizes the amount of chemotherapy patients undergo to prepare for them.
- Broadening the pool of stem cell donors by improving the success of transplants using half-matches through genetic editing so more individuals can experience the curative benefits of the procedure.
- Investigating new agents that could improve on hydroxyurea's ability to increase fetal hemoglobin above the current 30% to 50% or even more.
- Researching more potential drugs in the pipeline that are sickling inhibitors, anti-adhesion agents and others that ameliorate other downstream effects of SCD.
- Leveraging the four existing pathophysiological strategies for delaying sickling beside fetal hemoglobin induction to search large libraries of drugs that have been tested in humans and could quickly move to clinical testing if they match a strategy.

With a high percentage of patients with SCD living in low-income countries, some believe an inexpensive, easy-to-deliver drug to treat them is the most urgent need. And with COVID-19 impacting blood collections, drug treatments for SCD would lessen the ongoing demand for transfusions.

Much work lies ahead to expand and improve treatment for SCD, but the good news is it *is* happening. Manis noted that for many years, insufficient focus was aimed at advancing treatments for SCD. "Now, we are paying mroe attention to this deadly disease," Manis said. ■

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Cellular Therapies Fueling New Treatment Options for Hemoglobinopathies

By Leah Lawrence
Contribuiting Writer

The sickle, for which sickle cell disease (SCD) is named, is considered one of the most ancient of farming tools, dating back hundreds if not thousands of years. Today, though, the scientists and clinicians studying groundbreaking treatments for SCD and other hemoglobinopathies are speaking in terms not of ancient history, but of science fiction turned reality.

One of the most promising up-and-coming cellular therapies for hemoglobinopathies is gene therapy. Another involves harnessing the power of induced pluripotent stem cells (iPSCs) to manufacture red blood cells (RBCs) and platelets to produce a high-quality and cost-effective off-the-shelf blood supply.

"As a scientist I view these therapies as being amazing and transformative, showing that the era of molecular medicine is finally here," said George J. Murphy, PhD, director of research, section of hematology and oncology and co-director of the Center for Regenerative Medicine at Boston University School of Medicine. "From a basic biology viewpoint though, many of these first-in-human trials are giving us ultimate insight into globin biology, which may cause us to redefine the way we think about these diseases in the future."'

Need for New Treatment Options

Hemoglobinopathies are a group of inherited disorders in which there is abnormal production or structure of the hemoglobin molecule. The two most common hemoglobinopathies are SCD and beta thalassemia. Each of these is monogenic — caused by variation in a single gene.

"For many decades there has been a single drug used to treat sickle cell disease and beta thalassemia: hydroxyurea," Murphy said. "This is a repurposed chemotherapeutic drug, that when given, elevates fetal hemoglobin and helps prevent the formation of sickle-shaped cells that is the hallmark of the disease."

Although an effective drug, hydroxyurea often does not alleviate all symptoms and is not effective for all patients with hemoglobinopathies, leaving many patients to rely on blood transfusions or simply pain management for their disease.

"The idea behind transfusions is simple, replace the blood cells that

are not functional with normal cells," explained Eric E. Bouhassira, PhD, director of the Center for Human Embryonic Stem Cell Research at Albert Einstein College of Medicine. "The issue is that these new cells don't last forever and when patients require a lot of transfusions it can create iron overload and cause organ damage."

Outside of these palliative treatments, the only curative option for patients is hematopoietic stem cell transplantation. "Instead of replacing the blood components, hematopoietic stem cell transplant replacing the blood producing unit in the bone marrow, so the defective cells are continually replaced, potentially for life," said Larry Luchsinger, PhD, director of the New York Blood Center iPSC Bank. However, many issues around transplant exist, including difficulty in finding appropriately matched donors and the long-term efficacy of the transplanted stem cells.

"The ultimate goal is to be able to take the person's own stem cells, edit them, and restore them to the patient," Luchsinger said.

Gene Therapy

Enter gene therapy. Once scientists were able to map the genome and identify the mutation that caused SCD and beta thalassemia, researchers started examining methods to alter the defective genes. The first method that was researched involved using a virus to deliver a therapeutic gene. "Viruses are convenient because they are evolutionary mechanisms for transferring DNA between species," Luchsinger said.

The National Institutes of Health, in collaboration with Bluebird Bio, has an ongoing clinical trial investigating the use of LentiGlobin to add functional copies of a modified form of the beta-globin gene to a patient's stem cells. Put simply, the patient's hematopoietic stem cells are harvested, the modified virus is added to the stem cells, and the stem cells are returned to the patient.

Data on this technology presented at the 2020 American Society of Hematology Annual Meeting and Exposition on a small group of patients with SCD showed continued production of gene therapy-derived anti-sickling hemoglobin, near normal levels of key markers of hemolysis, and reported no severe vaso-occlusive events through 24 months.[1]

"It is easier to think about this approach as gene additive therapy," Murphy said. "They are not trying to correct the mutation but to put in an additional gene that produces a more stable form of hemoglobin to try to outweigh the effect of the mutated copy of the gene."

Bluebird Bio has also done extensive research into optimizing the conditioning regimen used in patients with SCD to prepare their body for the transplant of cells, Murphy said.

Another approach to gene-additive therapy is targeting *BCL11A*, a repressor of gamma-globin expression and fetal hemoglobin production.

A small study published in late 2020 in *The New England Journal of Medicine* detailed six patients with SCD treated with a lentiviral vector directed against *BCL11A*. With at least 6 months follow-up, all patients had robust

and stable fetal hemoglobin production, with fetal hemoglobin accounting for between 20% and 40% of total hemoglobin at the most recent follow-up.[2]

Although convenient and revolutionary, Luchsinger acknowledged that using viruses to delivery therapy is likely not the most ideal solution. "The virus will never be gone from the body. It has to integrate its own genome into the DNA," Luchsinger said. "The human cell has evolved to recognize foreign materials. It often knows something was done to it and we do not always know how it will react. It is hubris to think we have all the answers."

Possibly even more promising than the use of gene-additive therapy is the use of gene editing. Gene editing using CRISPR-Cas9 is also in early clinical trials for the treatment of hemoglobinopathies. CRISPR-Cas9 was adapted from a naturally occurring genome editing system in bacteria.

"One approach using CRISPR-Cas9 in hemoglobinopathies, is instead of directly correcting the gene, you can change the DNA to reduce expression of the protein *BCL11A*, and increase production of fetal hemoglobin," Bouhassira explained.

In results presented at the 62nd ASH Annual Meeting and Exposition in late 2020 and published in *NEJM*, a study of one patient with beta thalassemia and one with SCD showed that a year after undergoing gene therapy both patients had high levels of allelic editing in bone marrow and blood, increases in fetal hemoglobin, and transfusion dependence. The patient with SCD also had elimination of vaso-occlusive episodes.[3] "These early results show that the vast majority switch over to making fetal hemoglobin, which is therapeutic and potentially curative," Murphy said.

Bouhassira agreed, "Even as little as 10 years ago, the idea of gene therapy was still a dream, but now with all these approaches, it seems more and more likely that something is going to work."

Harnessing iPSCs

In the absence of safe and efficacious stem cell transplants or eligibility for gene therapy, patients are going to continue rely on transfusion, Luchsinger said.

When patients with hemoglobinopathies undergo chronic transfusion, their systems start to react to minor antigens in the donor blood. "The only way to avoid this is to find people who do not express the antigens that the patient is reacting to, but those donors are very rare," Bouhassira said.

Instead, researchers are harnessing iPSCs to create a more reliable source of blood transfusion for patients with hemoglobinopathies. iPSCs are derived from adult cells and have the potential to form any cell type in the human body.

"We collaborated with the New York Blood Bank and got a bit of blood from donors that have these very rare red blood cells that could be used to transfuse every SCD patient, whether or not they are alloimmunized," Bouhassira said. "We took that blood and reprogrammed the cells into iPSCs and then turned these iPSCs into red blood cells."

In theory, using only this limited number of donors the iPSCs could produce an unlimited amount of blood for patients. However, in reality some issues still need to be optimized, according to Luchsinger. First, he said, research needs to be done to make sure that the final cells are functional. "We have to make sure that the red blood cells are carrying the right amount of oxygen and that platelets still coagulate but are not perpetually activated," Luchsinger said.

A second issue is scalability. "Right now, iPSCs are grown in a 2-D tissue culture and we can develop millions and millions of cells, but when we are talking about transfusion, we are talking about billions and trillions of RBCs," Luchsinger said.

The process will need to be duplicated on an industrial scale, Murphy said. "It is a real engineering and physics problem."

Future Work

Not all patients with hemoglobinopathies will be eligible for gene therapy and transfusions are not a long-term solution. That is why Luchsinger continues to research hematopoietic stem cell physiology in an attempt to improve their maintenance in vitro and make hematopoietic stem cell transplant a safe option for more patients. For example, one of Luchsinger's studies showed that the culture of hematopoietic stem cells in low calcium increased their functional maintenance.[4]

"We have to keep looking at these mechanisms and gain an understanding that leads down unexplored avenues for improving the safety and, ultimately, the efficacy of transplantation," he said.

In the short-term, Murphy said scientists should continue to prove that the science is viable, but should not turn a blind eye to the growing issue of access. None of the gene therapies that have come to market

are available at a price that could be considered easily accessible, Murphy said.

For example, another gene therapy, the chimeric antigen receptor (CAR)-T cell therapy tisagenlecleucel (Kymriah, Novartis) used for cancer, is priced at $475,000.[5] A Biogen gene therapy product for spinomuscular atrophy was priced at $750,000 for the first year and $375,000 every year after.[6]

"I strongly feel that academia can play a role in addressing many of these concerns," Murphy said during a 2020 TED Talk.[7]

Among the immediate calls to action that can be taken to combat disparity of access to needed therapies are the use of open-source science and medicine and possibly radically changing the way that science is funded, Murphy suggested.

"Science is a business … but what is not often known is that many highly successful companies were started from foundational academic grants at academic institutions," he said during his TED Talk. "What if companies that were started or inspired in academia using NIH-funded dollars had to give equity in their companies back to the NIH or maybe even pay back those foundational grants at a prorated rate."

He also called on scientists to act as politicians and key-decision makers. "We have to do a better job in disseminating information to each other and to our patients about these therapeutics that, at some point, will be standard of care," Murphy said. "Those who don't understand will ultimately do their patients a disservice." ■

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AABB Welcomes Linda S. Barnes as Vice President of Biotherapies

By Magda Yang
Social Media and Public Relations Manager

Advancing cellular therapies and other biotherapies is a fundamental component of AABB's vision and mission. These growing areas of medicine are transforming patient care and unveiling new opportunities for facilities and companies throughout the world. With eyes set on the future, AABB recently appointed Linda S. Barnes, DrPHc, MHA, RAC (RAPS), as its vice president, Biotherapies. A longtime AABB member, Barnes has served in the role of biotherapies strategy lead throughout the past six months, helping to advance the Association's biotherapies-related offerings and spearheading a strategic analysis of opportunities in biotherapies.

Barnes will play an important role in helping to guide AABB as the Association continues to develop more biotherapies-related products and services. In the words of AABB CEO Debra BenAvram, "Biotherapies presents new opportunities every day, and I am excited to see where we go from here to deliver new value to the AABB community. Linda's knowledge and experience make her an ideal match to lead our efforts as the Association continues to expand its offerings in the biotherapies realm."

Barnes has supported AABB as an independent consultant to the Global Services Division throughout the past several years, as an assessor and as the biotherapies strategy lead. She serves as co-chair of the Policy and Practice Improvement sub-committee for the Global Transfusion Medicine Forum of the AABB. She brings extensive clinical trial management experience in domestic and international settings. As a seasoned executive leader, Barnes employs a systems-thinking approach to complex adaptive problems.

"As a devoted AABB member, I am honored to officially be joining AABB as Vice President of Biotherapies," said Barnes. "It is exciting that AABB is expanding products and services for the emerging biotherapies sector. I think of blood transfusion as the foundational cellular therapy. For this reason, AABB's legacy can naturally facilitate the fast-growing field of advanced 'living' therapies, by helping patients, partners and health systems adopt these new treatments."


Linda S. Barnes, DrPHc, MHA, RAC (RAPS)

Her extensive experience in cellular therapies and other biotherapies ranges from advancing first-in-class immunotherapies to delivering blood services in low-resource settings. During her 25-year career, Barnes has provided technical consultation on quality management in blood transfusion services for several countries, including the People's Republic of China, Liberia, Uganda, Ukraine, Kazakhstan, and the Caribbean Region, including Guyana, and Turks and Caicos Islands. "My passion is improving health equity through access to safe blood transfusion and advanced therapies throughout the world," Barnes told *AABB News*.

As a public health expert and technical advisor to blood systems and cellular therapy services, Barnes is also a member of the Standards Coordinating Body for Regenerative Medicines. She is a board member for Performance Excellence Northwest, the Malcolm Baldrige Regional Quality organization, and is a credentialed Baldrige Examiner. She obtained her master's degree in health services from the University of Washington, is board-certified in Regulatory Affairs by the Regulatory Affairs Professionals Society and is currently a public health doctoral candidate at University of Illinois-Chicago.

AABB congratulates Linda Barnes on her new role as vice president, Biotherapies, as the Association strives to strengthen the safety and quality of biotherapies by leveraging the expertise of the transfusion medicine and cellular therapies community. ■

Early Treatment With High-Titer CCP May Lower COVID-19 Risk in Seniors

By Drew Case
Communications Manager

Early treatment with high-titer convalescent plasma may reduce the risk of progression to severe disease in seniors with mild cases of COVID-19, according to findings published Jan. 6 in the *New England Journal of Medicine*.

Investigators in Argentina randomly assigned 160 older adults to receive either 250 ml of high-titer COVID-19 convalescent plasma (CCP) (defined as an immunoglobulin G [IgG] titer greater than 1:1,000 against the SARS-CoV-2 spike protein) or 250 ml of placebo within 72 hours of symptom onset.

The research team monitored patients' clinical status until day 15 to assess for the primary endpoint: the development of severe respiratory disease (defined as a respiratory rate of 30 breaths per minute or more), an oxygen saturation of less than 93% while the patient was breathing, or both. The trial included 160 patients, of whom 80 received CCP and 80 received placebo. The trial ended at 76% of target enrollment because COVID-19 cases in Buenos Aires declined significantly.

Data indicated that treatment with CCP within 72 hours of symptom onset reduced the risk of progression to severe respiratory disease by 48%. In the intention-to-treat population, severe respiratory disease developed in 13 of 80 patients (16%) who received CCP, compared to 25 of 80 patients (31%) who received placebo. In addition, the median time to the development of severe respiratory disease in the treatment group was longer than that in the placebo group.

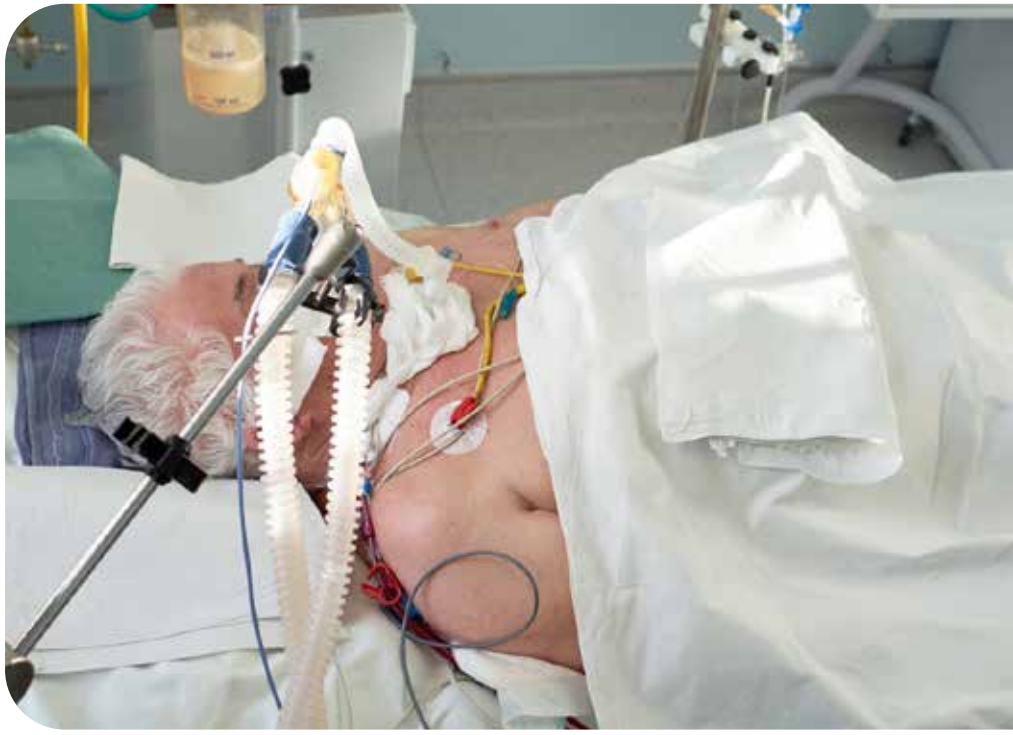
A modified intention-to-treat population that excluded six patients who developed severe disease prior to CCP or placebo administration showed a larger intervention effect size. Severe respiratory disease developed in 9 of 76 patients (12%) in the CCP group compared to 23 of 78 patients (29%) in the placebo group. Four patients (5%) who received CCP and 10 patients (12%) who received placebo had life-threatening respiratory disease. Two patients in the CCP group and four patients in the placebo group died.

The distribution of anti–SARS-CoV-2 serum IgG titers 24 hours after infusion differed significantly in the two groups, with higher concentrations in patients in the convalescent plasma group. A comparison between severe and mild cases of illness showed no IgG correlate of protection for antibodies against SARS-CoV-2 in the serum samples of convalescent plasma recipients.

According to the authors, the findings support previous research that suggests antibody interventions against COVID-19 may work better when administered early in the course of the illness. Furthermore, they noted that CCP can be easily accessible and, therefore, could be an inexpensive alternative to monoclonal antibodies.

"This simple and inexpensive intervention can reduce demands on the health care system and may save lives," the researchers wrote. "Early infusions of convalescent plasma can provide a bridge to recovery for at-risk patients until vaccines become widely available."

High-Titer CCP May Decrease Risk of Death in Non-Ventilated Patients With COVID-19



Transfusion with high-titer CCP was associated with a lower mortality risk compared with transfusion with low-titer plasma in patients with COVID-19 who were not receiving mechanical ventilation, according to results of a study published in the *New England Journal of Medicine*. However, the data indicated that there was no such benefit in patients with COVID-19 who were receiving mechanical ventilation.

In the retrospective study, based on data from the Mayo Clinic-led COVID-19 Convalescent Plasma Expanded-Access Program, investigators determined the effect of the anti–SARS-CoV-2 IgG antibody levels in CCP used to treat hospitalized adults with COVID-19 at 680 acute care facilities across the United States. The primary outcome was mortality within 30 days of CCP transfusion. The analysis included 3,082 patients who were enrolled through July 4, 2020, and for whom data on anti–SARS-CoV-2 antibody levels in plasma transfusions and on 30-day mortality were available.

Among all patients, 830 died within 30 days of plasma transfusion. This figure included 115 of 515 patients (22.3%) in the high-titer group, 549 of 2,006 patients (27.4%) in the medium-titer group, and 166 of 561 patients (29.6%) in the low-titer group. Among 2,014 patients who did not require mechanical ventilation, 81 of 365 (22.2%) in the low-titer group died within 30 days; 251 of 1,297 (19.4%) patients in the medium-titer group died; and 50 of 352 in the high-titer group died. Patients in the high-titer group had a lower relative risk of death within 30 days after transfusion than patients in the low-titer group (relative risk, 0.75).

The findings indicated that there was no effect on the risk of death among patients who received mechanical ventilation (relative risk, 1.02). Of these 1,068 patients, 80 of 183 (43.7%) in the low-titer group died within 30 days of transfusion. Of the medium-titer and high-titer groups, 277 of 666 (41.6%) and 64 of 158 patients (40.5%) died within 30 days of plasma transfusion, respectively.

Notably, data suggested that the timing of CCP transfusion may be associated with mortality risk. The unadjusted mortality within 30 days of transfusion was lower among patients who received a transfusion within 3 days of receiving a COVID-19 diagnosis (point estimate, 22.2%) than among those who received a transfusion 4 or more days after receiving a COVID-19 diagnosis (point estimate, 29.5%). According to investigators, the benefit of CCP was most apparent in patients who received plasma transfusions containing higher levels of anti–SARS-CoV-2 IgG antibodies early in the disease course.

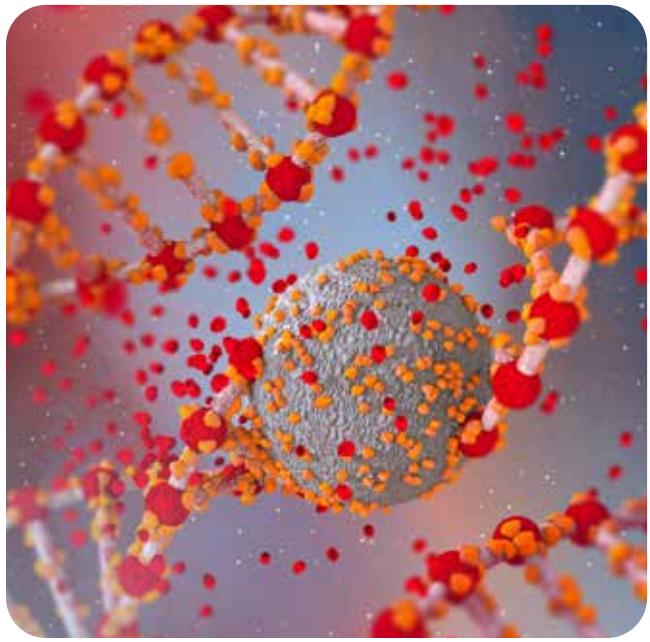
Investigators Compare RHD Genotyping, Transfusion Practice in the U.S., Denmark

Forty-eight percent of American patients with weak or discrepant D typing included in a genotyping study could be safety treated as D-positive, according to findings published in the January edition of *Transfusion*. Results indicated that 34% could potentially benefit from being treated as D-negative and that 18% of patients may require consideration if pregnancy is possible.

Reduced D antigen on red blood cells may be due to "partial" D phenotypes, which are associated with loss of epitope(s) and risk for alloimmunization, or "weak" D phenotypes that do not lack major epitopes with the absence of clinical complications. In this study, investigators compared the genotyping of 353 American and 57 Dutch blood samples with weak and discrepant D typing.

Among the Dutch blood samples, 51 (90%) had weak D types 1, 2, or 3; two had other weak D; and two partial D, as well as two new alleles. Among American blood samples, Black and multiracial ethnicities were overrepresented relative to population. Of these blood samples, 155 (44%) had weak D types 1, 2, or 3, while 198 (56%) had other alleles. Thirteen had uncommon weak D, 62 had weak D type 4.0, 107 had partial D, 9 had no RHD, and 7 had new alleles.

Investigational Gene Therapy May Induce Fetal Hemoglobin Production, Eliminate Clinical Manifestations of SCD



An investigational gene therapy reduced or eliminated clinical manifestations of sickle cell disease (SCD) and led to robust and stable fetal hemoglobin induction in six patients after at least 6 months of follow-up, according to findings published recently in the *New England Journal of Medicine.*

The investigational gene therapy targets the *BCL11A* gene, which is a repressor of gamma-globin expression and fetal hemoglobin production in adult erythrocytes. All six patients in the trial received an infusion of autologous CD34+ cells transduced with the BCH-BB694 lentiviral vector, which encodes a short hairpin RNA (shRNA) targeting *BCL11A* mRNA embedded in a microRNA (shmiR) and allows for erythroid lineage–specific knockdown. Investigators assessed patients for primary endpoints of engraftment and safety and for hematologic and clinical responses to treatment.

After at least 6 months of follow-up, all six patients had engraftment and achieved "robust and stable" fetal hemoglobin induction. In addition, all patients who could be fully evaluated showed fetal hemoglobin broadly distributed in red cells. Adverse events were consistent with effects of the preparative chemotherapy. Patients experienced the reduction or elimination of clinical SCD manifestations during the follow-up period.

According to investigators, the initial results of this trial provide validation that *BCL11A* can be targeted to lead to successful fetal hemoglobin induction. Furthermore, they predict that the patients in this study will have protection from sickling to prevent or significantly ameliorate both acute and chronic SCD complications, although additional follow-up will clarify the long-term effects.

The authors also noted that use of a short hairpin RNA embedded within an endogenous microRNA scaffold (termed a shmiR vector) to alter genetic expression (rather than reliance on the addition of a protein coding sequence) may have potential implications for other diseases. ■

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On the Front Lines in Advancing Treatments for Blood Disorders

Stella Chou, MD

In the past decade, we have seen an explosion in scientific knowledge and technology that may allow us to cure sickle cell disease, thalassemia, hemophilia, and bone marrow failure syndromes.

Stella Chou, MD, is an associate professor of pediatrics at the Perelman School of Medicine at the University of Pennsylvania. She practices pediatric hematology and transfusion medicine at The Children's Hospital of Philadelphia. Throughout her career, her research has focused extensively on gaining a better understanding of sickle cell disease and advancing treatments for the condition. The goal of her research is to identify new approaches to minimize red blood cell alloimmunization, reduce complications and improve therapy.

AABB NEWS: **MUCH OF YOUR WORK HAS FOCUSED ON IMPROVING TRANSFUSION THERAPY FOR PATIENTS WITH SICKLE CELL DISEASE. WHAT HAVE BEEN SOME OF THE MOST IMPORTANT ADVANCEMENTS IN THIS AREA OF THE FIELD IN RECENT YEARS?**

Chou: Recognition of RH variants in both patients with sickle cell disease and in donors of African descent, who are often the best donors for the SCD population, will allow us to improve transfusion strategies. First, RH genotypes give us important information when evaluating new antibodies, and in some cases, changes our red cell matching strategy. For example, we recommend prophylactic C negative red cells for patients who type C positive serologically, but carry the hybrid RHD*DIIIa-CE(4-7)-D allele and lack conventional RHCE alleles expressing C. Our work demonstrating the impact of RH variants in both patients and donors on alloimmunization in SCD has led us to initiate pilot clinical trials of RH genotype matched blood. In collaboration with Dr.

"A major impact of the pandemic on our work was the associated blood shortages, that have particularly impacted the African-American donor inventory. We had to limit enrollment to our study for providing RH genotype matched red cells to chronically transfused patients with SCD."

Connie Westhoff and Sunitha Vege at the New York Blood Center, we have initiated a study to provide prophylactic RH matched red cells for chronically transfused patients with SCD. It's incredibly satisfying to have our prior observations translate into tangible interventions to improve the safety and efficacy of red cell transfusions for this patient population.

AABB NEWS: **OBTAINING APPROPRIATE MATCHING BLOOD IS A CRITICAL ISSUE IN THE TREATMENT OF PATIENTS WITH SICKLE CELL DISEASE. WHAT ADVICE DO YOU GIVE TO PROVIDERS WHO LOOKING TO FIND APPROPRIATELY MATCHED BLOOD FOR PATIENTS?**

Chou: This issue is most challenging for patients who have formed multiple alloantibodies, or lack a high prevalence antigen. My advice is to have close communication with your blood supplier. Speaking by phone or corresponding by email helps us on both sides have more information on the patient's medical status, whether the need for blood is urgent, and what the blood center has in fresh inventory for a complex patient.

AABB NEWS: **YOU RECEIVED A NATIONAL BLOOD FOUNDATION EARLY-CAREER SCIENTIFIC RESEARCH GRANT IN 2013 FOR YOUR RESEARCH ON GENERATING RED BLOOD CELLS FROM IPSCS. HOW HAS THIS RESEARCH ADVANCED SINCE 2013?**

Chou: The NBF grant provided early funding to allow me to start the project, and subsequently obtain federal funding for a project of larger scope. In the meantime, science had major advancements in the field of gene editing to expand the types of red blood cells we could generate from iPSCs. We have successfully generated Rh null cells, D— cells, as well as cells lacking high prevalence Rh antigens such as hrS. We have been actively pursuing ways to grow the cells such that they are compatible with gel cards so that they can be readily used by immunohematology laboratories, and we continue to make progress.

AABB NEWS: **MUCH OF YOUR RESEARCH HAS FOCUSED ON BLOOD DISORDERS. WHAT FIRST DREW YOU TO THIS AREA OF RESEARCH?**

Chou: My primary clinical training was in Pediatric Hematology Oncology, and I subsequently pursued a fellowship in Transfusion Medicine because I saw a need for the combined expertise, in clinical and research arenas. I cared for many patients with sickle cell disease and was most intrigued by the complexities of alloimmunization in this patient population. Over the years, we and others have put together pieces of the puzzle, and while I feel there's still much to be done, I also think solutions are around the corner.

AABB NEWS: **WHAT ADVANCEMENTS IN BLOOD DISORDER TREATMENTS DO YOU THINK MIGHT BE MOST IMPORTANT IN THE COMING YEARS?**

Chou: For many blood disorders, stem cell transplant, and more recently, gene therapy can offer a curative option. Just in the past decade, we have seen an explosion in scientific knowledge and technology that may allow us to cure sickle cell disease, thalassemia, hemophilia, and bone marrow failure syndromes. Stem cell transplant and gene therapy will not be an option for everyone, particularly world-wide, but it is very exciting to see these advances actually happening.

AABB NEWS: **YOU WERE INDUCTED INTO THE NBF HALL OF FAME IN 2018. HOW DID THIS RECOGNITION IMPACT YOUR CAREER?**

Chou: Induction into the NBF Hall of Fame was such an honor, yet humbling as well. I only hope I can be productive enough and earn my keep to be recognized alongside other inductees who have had such considerable achievements.

AABB NEWS: **HOW HAS THE ONGOING COVID-19 PANDEMIC AFFECTED YOUR WORK?**

Chou: Shutting down my laboratory for several months in the spring and then slowly ramping up once we were allowed to reopen was incredibly hard. My laboratory is now mostly back to a routine, but I do miss our in-person lab meetings and informal meetings that foster exchange of ideas and new ideas.

A major impact of the pandemic on our work was the associated blood shortages, that have particularly impacted the African-American donor inventory. We had to limit enrollment to our study for providing RH genotype matched red cells to chronically transfused patients with SCD. We are still struggling with national blood shortages and the current African American donor inventory can not support the numbers of donors we would need to be genotyping for more patients on the study.

We are all looking forward to more vaccines and getting back to normalcy sometime in 2021. ■

CALENDAR

February

10 Immunohematology Boot Camp: Case Studies Involving MNS Genotyping (21EL-606)
AABB eCast

11 CCP Assays and Outcomes: Global Perspectives (21EL-607)
AABB Hot Topic Discussion
(Free for AABB Individual Members)

24 Process Validation 101 (21EL-608)
AABB eCast

March

10 To Ignore or Not to Ignore? Transfusing Patients with Multiple Alloantibodies (21EL-612)
AABB eCast

24 Inventory Management: Pandemic Panic Coming Full Circle (21EL-616)
AABB eCast

April

7 Nonconventional Products & Drugs in MTPs: Blood Banker vs Clinician (21EL-622)
AABB eCast

21 Disaster Proofing Your Disaster Preparedness Plan (21EL-626)
AABB eCast

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*For further information about AABB eCasts, contact the Educational & Professional Development and Meetings department:

Tel: +1.301.215.6482

Email: professionaldevelopment@aabb.org

eCasts: www.aabb.org/education/elearning/ecasts

Session titles are subject to change.

Index of Advertisers

PEP Volunteer Spotlight

Kathleen Hopping
Senior Quality Director
BioCareSD

How long have you been an AABB member?

I have been an AABB member since 2005.

In which volunteer activities within AABB have you participated?

Since 2017, I have served as a committee member of the Circular of Information Task Force, where we revise Circular content to include updating for consistency with ISBT-128 and uniform blood labeling requirements. I am also a current member of the Regulatory Affairs Committee, where one of our charges is to review FDA/CMS documents and notices and provide input on the operational and technical implications.

What motivates you to volunteer?

I believe that as a volunteer I can make a difference. My investment of time and effort provides a valuable service to a community and the people in it. It feels good to volunteer, to give my time and experience. I believe volunteering is socially responsible; if we are able to give back in some way, we should.

How has your volunteer work impacted your professional work?

My volunteer work has allowed me to meet new people, learn new things and establish lasting connections. Additionally, my involvement with AABB has led me to other volunteer opportunities, like with the ICCBBA Americas Technical Advisory Group (ATAG), and the chance to Chair the U.S. Platelet Labeling Subcommittee in 2019-2020. I am always impressed by the caliber of the other volunteers I work with, all of whom give selflessly to help support and promote advancements in donor and patient care.

What have you learned from volunteering with AABB? And what advice would you give to someone interested in volunteering?

Volunteering has helped me to gain new perspective and to learn from the amazing people I work with. This has led to personal as well as professional growth.

My advice to anyone interested in volunteering is to never underestimate your potential. All volunteers are extremely valuable, your help is always needed and no effort is too small. As a volunteer, you have the power to make things happen, improve upon the work of others, and you will gain new skills, knowledge and experience along the way.

What do you like to do in your free time?

In my free time I enjoy hiking, camping and yoga. ■

AABB Committees have Openings for 2021-22 Association Year

Committees are vital to the success of AABB. The Association's committees and volunteers help ensure that the information it shares with the membership, public and media is timely and accurate.

All members who are interested in serving on a committee during the 2021-22 association year may apply by completing the committee volunteer form on the AABB website. To help broaden and diversify our committee talent, AABB especially encourages members who have not previously served on an AABB committee to apply. AABB will keep application information on file for three years.

Additionally, all AABB committees seek qualified junior committee members to fill standing positions. To be eligible, an applicant must be a current AABB early-career member or an individual member with less than two years of membership who has not yet served on an AABB committee, task force or working group. AABB encourages interested members to complete the Committee Volunteer Form, selecting "Junior Committee Member" in the contact information. The application deadline is Feb. 15.

AABB Congratulates the 2020 BB and SBB Certificate Recipients

TECHNOLOGIST IN BLOOD BANKING

The Technologist in Blood Banking [BB(ASCP)] certification is awarded to individuals who demonstrate an understanding of the underlying scientific principles of laboratory testing, and have mastered related technical, procedural and problem-solving skills. Recipients of this certification understand the factors affecting health and disease, and recognize the importance of proper test selection, reasons for discrepant test results, and deviations of test results and ethics. The following individuals were awarded the Technologist in Blood Banking certification in 2020:

Khelil Abawajy
Yawovi Adzomada
Kelechi Agwu
Fawziya Ahmed
Joseph Anim-Kwapong
Kelsey Armstrong
Matthew Arruza
Almaz Asgedom
Adrienne Krizty-Batino
Urvi Bhula
Angelica Bissonnette
Taylor Brown
Alicia Browning
Laura Buehler
Matthew Burroughs
Samantha Bush
Natalie Cook
Karissa Dowlan
Samireh Ali Esmaeili
Anaisa Figueroa
Jacinda Garcia
Karmi Gettemy
Naghena Ghulam
Alexandria Godissart
Raymone Gonzalez
Alberto-Gonzalez De Los Santos
Chelsea Greschak
Justin Hunter
Levi Jones
Paul Kopin
Brittany Krafft
Christina Lampp
Anna Leitschuh
Yong Keng Liu
Terra Livingston
Sasha Lombardo
Lindsey Lowery
Antonio Loza
Jessica Machado
Ziyad Mahammed
Doel Mathews
Michelle Matseur
Mario Mayers
Tonni Melendez
Brandon Mus
Fatema Owens
Jamie Phan
Mariem Prieto
Marie Richards
Brett Ridley
Jasmine Rogers
Mark Sheridan
Namrata Shrestha
Rishi Singh
Susan Suchara-Kaman
Berenice Tarango
Godson Tebid
Filmon Tesfai
Phuoc Thai
Fan Tong
Danielle Volk
Stephanie Whiteneck
Amie Wong
Nicholas Yu
Chase Zuber

SPECIALIST IN BLOOD BANKING

The Specialist in Blood Banking [SBB(ASCP)] certification is awarded to individuals who demonstrate an understanding of advanced scientific principles, including technical and procedural components of laboratory testing, as well as factors that influence disease processes and laboratory tests. Recipients of this certification have demonstrated an understanding of the structure and function of the organization, principles of management and education, and the roles of other health care team members. The following individuals were awarded the Specialist in Blood Banking certification in 2020:

Eden Alcoseba
Nicole Aldurien
Kelly Anderson
Katie Arocena
Hiwot Ayalew
Ashley Bellmyer
Alex Bladecki
Jill Brantner
Lorraine Browning
Kristen Buban
Sarah Burnett-Greenup
Richard Carpenay
Margaret Chamberlain
Danielle Chasse
Renee Cravens
Katya Dayot
Carissa De Los Reyes
Pooja Desai
Erin Doyle
Julia Dugger
Robyn Dunn
Christine Dutka
Vickie Evans
Anna Evans
Erica Formiller
Tara Francis
Phoebe Gordon
Velvet Goss
Malgorzata Harris
David Heinemann
Jennifer Herring
Benjamin Hetherwick

Daria Heyenbruch
David Anh Ho
Ada Ho
Jerry Hughes
Jordan Ippolito
Kristopher Karn
Ankitaben Khatri
Silvana Khoshaba
Lucila Kilpatrick
Kristina Larsen
Min Lee
Karaleigh Leonard
Xinrong Liang
Cassandra Lokken
Krystal Talbert Matusevich
Meta Morrison
Christy Mudd
Naw Myint
Laura Nguyen
Kimthu Nguyen
Andrew Norris
Michael Orr
Andrea Pahomi
Amy Partin
Ankurika Patel
Isis Persad Meadows
Hai Pham
Sarah Rader
Trisin Ramon
Eduardo Reyes
Stephanie Reynolds
Olivia Robinson
Eddy Ruano
Jessica Sabelhaus
Christi Ann Samella
Darlene Sanders
Yukiko Sarker
Angela Schreiter
Michael Shelley
Charles Shimek
Whitney Snipes
Heather Spiker
Toufik Tahiri
Parulben Talati
Kelly Tucker
Jennifer Watt
Randy Welch
Nicholas Yu

Examinations for both the Technologist in Blood Banking certification and the Specialist in Blood Banking certification are offered by the American Society for Clinical Pathology (ASCP) Board of Certification, in collaboration with AABB. AABB congratulates all individuals who received these certifications in 2020.

Dana Devine Appointed Director of UBC's Centre for Blood Research

Dana Devine, PhD, chief scientist at Canadian Blood Services (CBS) and president-elect of AABB, has been appointed director of the Centre for Blood Research (CBR) at the University of British Columbia (UBC). As director, Devine will focus on faculty renewal – bringing on younger investigators who will maintain the vibrancy of the center – as well as building and improving partnerships that help harness the discoveries made at the center and translate them into better patient care.

"As one of the founders of the Centre for Blood Research, I've watched it grow over the years. In some ways, it feels like I'm coming full circle," Devine said. "It's one of the largest academic blood centers in the world, and one of the most multidisciplinary. I'm really interested in ensuring it stays vibrant and keeps growing."

Devine will continue as CBS's chief scientist during her four-year term as director, which deepens the organizations' existing collaboration. CBS provided 10% of the start-up funding for the CBR and continues to collaborate in numerous ways, such as providing funding to support the center's infrastructure and its training and education programs. Devine succeeds Ed Conway, MD, PhD, who served as director from 2009-20.

ICCBBA Announces Upcoming Retirement of Paul Ashford

ICCBBA recently announced that Paul Ashford, MSc, intends to retire as the organization's executive director on Dec. 31, 2021. Ashford has served as the executive director ICCBBA since 2005, where he has led efforts to promote the global adoption of ISBT 128, the global standard for the terminology, identification, coding and labeling of medical products of human origin.

An AABB member since 1999, Ashford has served as a member of AABB's Blood Banking and Transfusion Services Standards Committee. He also served as board member of the Worldwide Network for Blood and Marrow Transplantation, a chartered scientist assessor for the Science Council and a chartered engineering assessor for the Engineering Council.

"Mr. Ashford has made a tremendous contribution to the growth and success of ISBT 128 for Medical Products of Human Origin," said Diane Wilson, chairman of ICCBBA Board of Directors. "During his 16-year tenure, Mr. Ashford has built ICCBBA into a strong and resilient organization, and we are looking forward to continued growth under new direction in the future."

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