Transfusion Medicine Trials Are Increasingly Addressing Pediatric-Specific Outcomes

Treatment of Pediatric Traumatic Bleeding Has Advanced, But Still Has a Long Way to Go

The 2021 AABB Annual Meeting’s Most Anticipated Sessions
#AABB21 Will Feature Expert-Led Sessions on Critical Topics in the Field, Including:

- Pediatric Cellular Therapy: An Overview from Collections to Alpha/Beta Depletions
- Overcoming Inventory Management Hurdles in a Rural Versus Urban Transfusion Service
- Challenges and Triumphs from the Implementation of Major Donor Eligibility Changes during a Global Pandemic
- Creating the Blood Center Infrastructure for Biotherapies: From Contracts to Collections and Distribution
- New Developments in Optimizing Transfusion Management for Major Bleeding: “One Size Does Not Fit All Causes”
- And much more!

Register Today at aabb.org/annualmeeting
6 **Pediatric Transfusion Matures**

After years of lagging behind, transfusion medicine trials are increasingly addressing pediatric-specific outcomes.

12 **You've Come a Long Way Baby, But Treatment of Pediatric Traumatic Bleeding Still Has a Long Way to Go**
Pediatric Patients Are Much More Than Small Adults

Although there is still much to learn, we know more today about pediatric transfusion medicine than we did just a few years ago. For a long time, many of our transfusion management strategies for children and infants were extrapolated from adult therapies. But in recent years, more research has been devoted to exploring optimal transfusion medicine treatment strategies for pediatric patients. This aspect of our field is advancing rapidly as we continue to strive for the best treatments for our youngest patients.

This month’s issue of AABB News examines what we now know about transfusing pediatric and neonatal patients — and what we have yet to learn. The first feature article, which begins on page 6, discusses some of the differences between adult and pediatric patients — such as in their hemostatic systems — where the data on pediatric and neonatal patients is lacking and the work that is starting to be done. The second feature, starting on page 12, examines treatments for pediatric and neonatal trauma patients and describes how, while the adult literature has been useful in developing emergency care for pediatric trauma patients, the differences between pediatric patients requires a different approach. For example, despite having a smaller blood volume, children are often better than adults at maintaining normal blood pressure after significant blood loss.

2021 AABB Virtual Annual Meeting

AABB is gearing up for our 2021 Virtual Annual Meeting, which will take place Oct. 17-19.

As you can see from the agenda at aabb.org/annual-meeting, our Association’s signature event will, once again, present the best education sessions in the field led by world-renowned experts in blood and biotherapies. Although the meeting will be virtual, participants will still have plenty of opportunities to network with their colleagues through our new, upgraded platform and to meet in-person at pop-up events throughout the world.

This year’s meeting will emphasize accessibility and connections, with the majority of sessions available with Spanish translation, and a new track for early-career professionals focused on the fundamentals of transfusion medicine. The meeting will also emphasize content, featuring hundreds of oral and poster presentations covering the latest cutting-edge research and a virtual exhibit hall showcasing new products and services from our industry partners. Finally, this year’s meeting will emphasize convenience, with the meeting taking place on a Sunday, Monday and Tuesday based on feedback from previous attendees.

Wherever you are in the world, I can’t wait to see you in October!
5k Run / 1-mile Walk
Sunday, October 17 – Tuesday, October 19

The Run for Research is a virtual 5K run or 1-mile walk; you can complete your run or walk on any day of the AABB Annual Meeting, to be held Oct. 17-19.

$55 registration includes an event t-shirt. Register as an individual or as part of a 5- or 10-member team. Teams will receive discounted registration.

Add the Run for Research to your meeting registration or pay separately through RunSignup.

runsignup.com/nbf2021
Kim Vanuytsel
Kim Vanuytsel, PhD, is a research assistant professor in the Boston University Department of Medicine, Section of Hematology and Oncology and Center for Regenerative Medicine. She received a National Blood Foundation (NBF) early-career Scientific Research Grant in 2020 for her project, Validation of a potential curative gene editing approach across the diverse sickle cell disease (SCD) patient population using induced pluripotent stem cells (iPSC). AABB News spoke with Vanuytsel to ask about her research and her career.

AABB News: How has receiving an NBF early-career Scientific Research Grant helped move your career forward?

Vanuytsel: As an early-career investigator, establishing my research program during a pandemic and in a year where I became a first-time mom was a daunting task. Receiving recognition in the form of an NBF early-career Scientific Research Grant has made me feel supported as I navigate some of these new challenges, and the grant has been instrumental in getting my research kickstarted.

AABB News: How did you become interested in gene editing?

Vanuytsel: I started working with the first generation of gene editing tools (zinc finger nucleases) during my PhD, when I edited pluripotent stem cells to create a disease model for Fanconi anemia. Since then, I have followed the evolution of the gene editing field closely, witnessing a massive expansion of the gene editing toolbox available to researchers and clinicians. It is truly remarkable how far the field has come in the past decade with gene editing technologies, including the novel base editing approach being actively pursued as a curative treatment for SCD in clinical and preclinical trials. I am beyond excited to help validate some of these emerging editing strategies across the diverse sickle cell disease patient population using our iPSC platform to ensure we can offer the best and safest possible solutions to every patient.

AABB News: What gave you the idea of treating sickle cell disease using iPSCs?

Vanuytsel: iPSCs make an excellent preclinical validation tool, as they capture the exact genetic background of the patient they are derived from. They also present an unlimited supply of cells that can become any cell type in the body when given the right instructions, allowing us to generate red blood cells specific to a given SCD patient over and over in the lab. This way we can study aspects of the disease, test novel compounds and validate emerging gene editing approaches in a robust way, without the need for patients to repeatedly undergo costly and invasive manipulations.

AABB News: When do you expect to get preliminary results of your NBF-funded research?

Vanuytsel: We are currently working to expand our gene editing efforts to cover a sufficiently large representation of genetic backgrounds contained within our SCD iPSC library.

AABB News: In what ways might your findings influence how patients with sickle cell disease are treated?

Vanuytsel: Using our SCD-specific iPSC platform, we hope to aid in the validation of some of these exciting and newly emerging gene editing therapies across the SCD patient population so that we can determine whether a given treatment is equally safe and effective for all patients or if there are cases in which alternative
treatments might offer a better solution. The latter scenario can then be immediately addressed using our platform to test alternative therapeutic strategies in the lab without having to subject patients to additional experimentation and sample collections.

**AABB News: What directions do you think your research might take next?**

Vanuytsel: The gene editing approaches currently being explored as a curative treatment for SCD in clinical and pre-clinical trials look very promising, and we would like to contribute to the validation of these therapies across the diverse SCD patient population to take a variety of genetic backgrounds into account. In the future, a global aim would be to use our SCD iPSC platform to identify and validate accessible therapeutics for those suffering from SCD in low resource settings.

In addition, we hope to assist in improving other aspects related to cell therapy for SCD and other hematological disorders. The ex vivo culture and manipulation of hematopoietic stem and progenitor cells (HSPCs) required for these therapies poses challenges with respect to retention of engraftment potential, as well as expansion of hematopoietic stem cells (HSCs). To learn how to better retain or even enhance engraftment capacity of HSCs, we have profiled fetal liver HSCs — as these cells display superior engraftment potential compared to postnatal HSCs — while at the same time representing a stage of active HSC expansion. I am looking forward to presenting this work during this year’s AABB Annual Meeting in Oral Abstract Session AM21-46, Transfusion Medicine and Cellular Therapy Innovation.

**Yan Zheng**

Yan Zheng is an assistant member of the pathology department at St. Jude Children’s Research Hospital in Memphis. Zheng received an NBF early-career Scientific Research Grant in 2019 for her study, Comprehensive Characterization of RH Loci by Whole Genome Sequencing and Long-read Genome Sequencing. She recently spoke with *AABB News* about her research and her career.

**AABB News: How did you become interested in genome sequencing and how has receiving an NBF early-career Scientific Research Grant helped move your career forward?**

Zheng: During my transfusion medicine fellowship training, I had a few patients with sickle cell disease (SCD) who were positive for e antigen but formed anti-e antibodies after blood transfusion. This is interesting and unique to Rh antigens. Blood antigen typing revealed that those patients have variant e antigens. Since most variant Rh antigens can only be distinguished by genotyping, those with variant antigens are still at risk for Rh alloimmunization despite serologic Rh antigen-matching. I realized that the Rh blood system is complex and fascinating. Receiving an NBF grant allowed me to continue and further expand my research on RH genotyping.

**AABB News: What do you hope to learn as a result of your research?**

Zheng: As the cost of next generation sequencing continues to decrease, affordable genome sequencing for patients with chronic diseases will soon be possible. We hope to develop computational tools to predict the genotypes of RH and other blood groups using genome sequencing data.

**AABB News: When do you expect to have preliminary results?**

Zheng: Our group developed a computation algorithm named RHtyper for RH genotyping using whole genome sequencing data. This data has been presented at the American Society for Hematology (ASH) annual meeting and published in *Blood Advances*. We have implemented RHtyper as a cloud-based public access application in DNAnexus.

**AABB News: Where do you see your research going next?**

Zheng: We will extend the application of RHtyper to using whole exon sequencing data. We will also explore the possibility of using long-read genome sequencing methods to study RH structural variations. We hope our research can help to determine immunogenicity of specific RH variant alleles to further refine red cell matching by genotype for patients with SCD.