NHF News Briefs

August 3 – 9, 2018

This report includes selected news items from the past week on issues of concern to the bleeding disorders community. It is designed to help keep NHF national and local leadership and staff informed of the latest information from the news media. It will be distributed by email on Thursday of each week, covering important news items from the previous seven days. Subjects covered will include hemophilia, other bleeding disorders, gene therapy, hepatitis, HIV/AIDS, and others.

North Bay Business Journal
August 1, 2018

Hemophilia, The Musical?

By Steven E.F. Brown

As a longtime maker of orphan drugs for rare disorders and diseases that affect small populations, San Rafael's BioMarin Pharmaceutical Inc. has tried out some unusual marketing methods since it was founded 21 years ago.

The company, led by CEO Jean-Jacques Bienaimé, commissioned an "unscripted" documentary film about its history and also published a book that Debra Charlesworth, its vice president of corporate communications, calls an honest "warts and all" look at its birth and growth.

Even so, BioMarin's quotidian publicity efforts are typically tightly focused on patients and physicians who use its products.

But BioMarin's latest creative venture – a musical theater production about hemophilia and other bleeding disorders starring high school students – is truly treading new ground.

Hemophilia the musical

BioMarin is paying for a three-day musical-theater training program in New York in November in which 25 high school students from around the country with hemophilia or other bleeding disorders will rehearse six songs and then put on a "Broadway-style performance" Nov. 12.

The idea for the show came about, said Charlesworth, as BioMarin moved into late-stage clinical testing of a one-time gene therapy for hemophilia A and increased its outreach to the wider community of people with bleeding disorders.

People with severe hemophilia are often limited in the physical activity they can do, and this has a big effect on teenagers in high school, said Charlesworth.

"There are certain sports they really can't play. Sports are a big part of a high school experience, but so are the arts," she said.

Though BioMarin had been considering putting together some sort of creative performance around bleeding disorders on its own, when the company learned through its contacts in the community that a Los Angeles boutique agency, Believe Limited, was working on a similar project, it joined that effort.

"The alignment was amazing," said Charlesworth of BioMarin's meetings with Patrick James Lynch, the CEO of Believe, who suffers from severe hemophilia A himself.

Believe Limited was created around the idea of making "engaging and entertaining content aimed at people with chronic and rare diseases," Lynch said. His company had already produced a comedic "mockumentary" web series similar to "The Office" or "Parks and Recreation" called "Stop the Bleeding!" and was working on a film called "My Beautiful Stutter."

Lynch also spent several years filming a documentary about Chris Bombardier, the first person with severe hemophilia A to climb Mount Everest.

Trained as an actor himself, Lynch wanted to do something live on stage for the bleeding disorders community, particularly after seeing the raunchy musical "The Book of Mormon" with his mother.

"There's such permission in musical theater as an art form," said Lynch, pointing out that "Hemophilia the musical" isn't all that far from actual shows like "Menopause the musical."

Reflecting on his own experience with hemophilia, and the death from a brain bleed in college of his brother, who also had severe hemophilia A, Lynch wanted to create not just a show to teach people about bleeding disorders, but one that used theater to help kids who suffer from them.

"My brother never identified as having a bleeding disorder," Lynch said. "He pulled back and he disconnected. That cost him his life."

Lynch himself missed plenty of social opportunities and friendships, and had a difficult high school experience because of bleeding in his joints and other problems from his hemophilia. His later work as a professional actor in New York helped him reflect on his situation, and he hopes to help other people do the same kind of serious thinking, but earlier in their lives.

"I came to appreciate how the lessons learned and skills developed as a participant in theater served me as a person and more specifically as a person with hemophilia," Lynch said.

Crowdsourced chorus

After a nationwide application process, promoted mainly by Believe Limited via social media and contacts in the bleeding disorders community, said Charlesworth, the 25 participants will be chosen and flown to New York for a weekend of training under Paul Russell, the director of the UK Haemophilia Society choir.

"Our first goal will be to create a sense of community for the 25 teens so that they feel supported, comfortable and valued, thus able to create," said Russell, who started a company called Standing Ovation Choir four years ago to bring singing and performance into the corporate "team building" arena. He's done choral sessions already with corporate giants like AIG and Google.

"When you sing the body releases two hormones, oxytocin and endorphin, two key components for a happy and healthy state of being," said Russell.

Just as singing can be beneficial for employee engagement, it's even more helpful for teenagers, he said.

“Vocal or musical training is hugely beneficial for kids. It develops the frontal lobe, encourages working with peers as an ensemble and boosts morale and confidence. Kids with bleeding disorders can feel isolated; the arts unite and bring people together,” he said.

Judges, being chosen now from the ranks of executive directors of bleeding disorder organizations around the country, will evaluate potential participants based on an audition video and an essay. Though it’s a competitive process to get one of the 25 slots, said Lynch, the idea isn’t to create a competition. Nevertheless, “there will be some hard choices,” he said.

Five slots in the show will be reserved for people who don’t have bleeding disorders, but who are siblings or children of people with hemophilia or similar conditions.

“Bleeding disorders affect a whole family,” said Lynch.

Unlike professional actors arriving on Broadway to sing in already-written musicals, the high school students at this workshop will face another challenge – they won’t just have to learn the songs, but first they’ll have to help make them up.

One question on the application for the workshop asks “What would you like to see in a six-song musical about hemophilia?” and Lynch said those answers will be used to create the content for the show.

That “crowdsourcing,” as Charlesworth called it, is a vital part of the workshop, which is technically named “Breaking Through!” although she and others sometimes refer to it as “Hemophilia the musical.” The idea is to push the participants to reflect on their lives and put forward ideas they think should be heard about bleeding disorders.

And although the idea of a musical theater production about bleeding disorders might seem like an out-of-the-box marketing idea for BioMarin, she doesn’t see it as that different from the other types of outreach the company has made.

“Because we’re in rare disease, we don’t do advertising. The common thread in all of this is the involvement and partnership with the community,” she said. “It’s all focused on the community.”

Hemophilianewstoday.com
August 2, 2018

"Life Can Change in An Instant"

By Joe MacDonald

In an instant, things can change and redefine who we are. One minute life appears to take us down one road, and then we encounter something that brings us toward an entirely different destination. Whatever happens, we know that life will never be the same again, and our entire perspective changes. We are left to pick up the pieces and trust that something deep within ourselves will help us to find our footing.

For those of us who care for a child with a chronic illness, we know that circumstances can collide to guide us to the instant in life that redirects our course. These circumstances can be a sudden incident or a continuous injury that irritates a joint or an internal organ. When we realize that what we have encountered is beyond our control and that sometimes there is no medicine to help curtail the ravages of the storm, our world changes. We are left to figure out how to pick up the pieces and move forward.

My youngest son had the mother of all complications regarding a bleeding disorder.
While hemophilia affects roughly one in 5,000 male births, one-third of these have something that acts like an allergy called an inhibitor. He also had something so rare that only a handful of people in the world have it: an allergy to the product he needed to clot. In an instant, life changed for us with unique diagnosis, upon diagnosis, upon diagnosis. Would the struggles ever stop?
In a moment, bleeds became the norm, and we called the hospital home. We started dreaming of the days that my son could participate in school for at least a week without visiting a doctor. The ravages of my boy's bleeding disorder sought to claim the very heart of our family. The kid who yearned to play baseball and soccer now found himself in a wheelchair. He did not walk without assistance for well over a year. My split-level home had a walker on each floor so that "MacDonald the Younger" could experience some element of freedom.

While we continued to live in and out of the hospital, we encountered another "instant." While in the hospital an on-call hematologist visited my son's room and encouraged us to help the medical team develop a health map for my son. The doctor started by writing about health issues and ways to manage bleeds and other hemophilia-related complications. We followed up by chronicling educational and psycho-social developments. Between us, we put a tangible plan in place to treat my son. This guide eventually led to a kind of healing that we couldn't have previously imagined.
In an instant, new circumstances arise, and we must accept a new reality whether we want to or not. Our journey is not beautifully laid out, scripted, or planned. We must take it step-by-step, trusting that we have what we need within us to stay on the path. Life happens when you are busy making other plans. It is up to us to embrace our reality while the blueprints we envisioned fade away, at least for a season.

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Note: Hemophilia News Today is strictly a news and information website about the disease. It does not provide medical advice, diagnosis, or treatment. This content is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Always seek the advice of your physician or another qualified health provider with any questions you may have regarding a medical condition. Never disregard professional medical advice or delay in seeking it because of something you have read on this website. The opinions expressed in this column are not those of Hemophilia News Today or its parent company, BioNews Services, and are intended to spark discussion about issues pertaining to hemophilia.

RFID Journal
August 6, 2018

Health-Care, Pharmaceutical Providers Testing RFID to Track Hemophilia Medication

US Bioservices and MedImpact are piloting myCubixx technology for use with hemophilia patients to track how drugs are being stored in their homes, as well as when they are used and when they may expire.

By Claire Swedberg

Specialty pharmacy US Bioservices is piloting an in-home inventory-management program using RFID technology, with MedImpact Healthcare Systems, for monitoring the at-home use of medications by patients with hemophilia, a genetic disorder impairing the body's ability to form blood clots. The system, consisting ofpassive UHF RFID-enabled coolers that track, in real time, which medications are being stored and which are being used, is intended to prevent the overstocking or expiration of medications, while helping health-care providers understand and manage each patient's condition. The technology is provided by US Bioservices' parent company,AmerisourceBergen.

US Bioservices provides patient support, including specialty medication and clinical care. Among its customers are patients with hemophilia who require drugs to manage their condition. Hemophiliacs typically live normal, healthy lives, but they require medication either as a prophylactic or when an injury occurs that could lead to bleeding. Typically, they keep these medicines on hand, since the drugs may need to be used on an emergency basis.

Like other medications, hemophilia drugs can be high-priced and have a specific shelf-life. They also require refrigeration to be effective, says Kevin James, US Bioservices' payer strategy VP, so tracking them is critical—though this can be difficult to accomplish when the drugs are dispersed to the homes of patients who may or may not need to use them regularly. Patients typically store the medicines in their home refrigerators, making it easy to lose track of them or enable them to expire.

MedImpact Healthcare Systems is a pharmacy benefit manager (PBM) that provides home delivery of drugs for patients' health insurance companies. The system being piloted is part of the firm's MedImpact Direct Specialty Program pharmacy delivery service. For the pilot, patients are using an AmerisourceBergen myCubixx refrigerator and cloud-based software to collect and manage RFID-based data from the cooler, which can then be made accessible to US Bioservices and MedImpact, as well as to the patient and health-care providers.

Each of about a dozen participating patients will have the refrigerator installed in his or her home. The unit measures 1.8 cubic feet and can hold a month's worth of medicine, depending on the size of the product being used. It comes with a built-in computer, a ThingMagic M6e RFID reader module and antennas, and can be plugged into a standard wall unit. Each medication provided to a patient comes with a UHF RFID tag attached to its container, with a unique ID

number encoded to that tag. Passive UHF RFID tags are attached at one of US Bioservices' specialty pharmacies. That unique ID, stored in the US Bioservices software, is linked to details about the medication, including its quantity and expiration date, as well as any temperature storage requirements. When a drug is placed inside the cooler, the reader captures the ID number encoded to its tag, then forwards that data to software hosted on a cloud-based server, via a cellular connection. The software links the medication with the cooler, along with the individual using that device. In that way, the patient, the health-care provider and the pharmacist can each view what medication is being stored there, as well as whether it is nearing expiration. Each time an individual removes a drug from the cooler, he or she must first provide information to the system. The unit has a touch screen, known as a clinical interface, on its front.

The door to the cooler is locked and will not open until the patient uses the interface. The user must first enter a four-digit code that serves as a password to launch the system. Next, he or she must respond to prompts to indicate why the cooler is being accessed. The touch screen prompts the user to select the part of the body that may have been injured, as well as where bleeding may be occurring and the pain scale. The door then unlocks and the patient can remove the medication. The system identifies which item was removed, based on the unique ID that it no longer reads inside the unit. If the user takes medication as a prophylactic, there are prompts to indicate that as well. Every access to the cooler is captured by the software, as well as which medication's tag is no longer being read inside the unit. Once the drug is returned to the cooler, data is updated to indicate this status.

The system then knows how long the medicine remained out of the cooler, and thus how long it was exposed to room temperatures. The solution further knows that the individual had an injury and, generally, what that consisted of. The system is intended to enable US Bioservices and MedImpact to determine when a patient may require a medication refill. Analytics from the data will also make it possible to identify whether a patient has more medicine on hand than he or she needs—for instance, if that person uses medication at a lower rate than anticipated.

The pilot, which began in July of this year, will continue for at least six months before being assessed, James says. The participants will assess the return on investment (ROI) the system provides, based on the reduced risk of medication expirations or over-stocking. In the long term, James reports, "We could provide this solution with all of our pharmacies," and to other PBMs and insurance companies. "Our role as a specialty pharmacy is to maximize positive clinical outcomes while minimizing cost." The participants hope to learn about patient satisfaction, he says, based on the solution and the financial ROI.

Hemophilianewstoday.com
August 6, 2018

Employment Status, Pain, Low Physical Activity Linked to Anxiety, Depression in Hemophilia Patients

By Iqra Mumal

A study that examined the role of emotional distress in the lives of hemophilia patients found that a patient's employment status, pain interference levels, perception of the detrimental consequences of hemophilia, and physical activity levels were all independently associated with symptoms of anxiety and depression.

The study, "Emotional distress in haemophilia: Factors associated with the presence of anxiety and depression symptoms among adults," was published in the journal *Haemophilia*. Hemophilia is a rare genetic disorder characterized by spontaneous bleeding. The current standard of treatment for patients includes factor replacement therapy.

Despite significant improvements in treatment over the last few decades, people with hemophilia still face many clinical challenges, including demanding treatment regimens, severe pain related to hemarthrosis (bleeding into the joints), hemophilic arthropathy (permanent joint disease), and the development of therapy inhibitors.

However, the effects of hemophilia extend beyond clinical issues and can include psychosocial problems such as uncertainty about health, social restrictions, and unemployment. Consequently, current guidelines for the optimal care of hemophilia include the promotion of psychosocial health.

It is important to identify modifiable factors that contribute to anxiety and depression in patients with hemophilia. This can allow physicians and researchers to develop tailored treatments to help patients improve overall outcomes. Therefore, researchers set out to investigate the potentially modifiable factors associated with the presence of anxiety and depressive symptoms among adults with hemophilia.

Researchers conducted a cross-sectional observational study that examined sociodemographic, clinical, and psychosocial variables among 102 Portuguese patients with hemophilia A or B. The results showed a significant impact of clinical characteristics on anxiety and depression.

Particularly, patients who had greater anxiety and depressive symptoms were more likely to have experienced urgent hospital visits due to hemophilia, more bleeding episodes, more affected joints and pain, and worse levels of perceived functionality and quality of life in the previous year.

Researchers also conducted a statistical analysis, controlling for demographics such as age and education, and clinical characteristics such as severity and joint deterioration. They sought to determine which factors were independently associated with anxiety and depression.

They found that patients who were unemployed, retired, or on medical leave were four times more likely to report anxiety and about three times more likely to report symptoms of depression.

Additionally, patients who experienced increased levels of pain interference were more likely to report anxiety and depression. Pain interference refers to the consequences of pain on various aspects of a person's life. This can include social, cognitive, emotional, physical, and recreational activities.

Furthermore, an increased perception of the detrimental consequences of hemophilia was associated with an almost two-fold increase of the likelihood of having depressive symptoms.

Conversely, patients who are physically active are almost 70 percent less likely to have depressive symptoms compared to patients who live sedentary lifestyles.

Professional status, pain interference, the perception of detrimental consequences, and exercise are four modifiable risk factors that can contribute to or reduce depression and anxiety in patients with hemophilia.

"These highlight potential intervention targets, which are amenable to change through evidence-based tailored interventions aiming to decrease emotional distress, promote well-being and improving haemophilia-related health outcomes among these patients," researchers noted.

Fierce Biotech
August 7, 2018

Spark Slides on Hemophilia A Data, Aims for Phase 3

By Amirah Al Idrus |

Spark Therapeutics' hemophilia A gene therapy reduced bleeding by 97% in a phase 1/2 trial, building on data reported in December that suggested it may not be as potent as a rival in development at BioMarin.

The study tested three different doses of the treatment, SPK-8011, which is designed to remedy hemophilia A patients' deficiency of clotting factor VIII. Two patients received a dose of 5 x 10^{11} vector genomes (vg)/kg body weight, three received 1 x 10^{12} vg/kg and seven received 2 x 10^{12} vg/kg. Four weeks after treatment, all three groups had twin 97% decreases in annualized bleeding rate and in annualized infusion rate.

Five of the seven patients on the highest dose had 100% reductions in bleeding rate and infusion rate. The treatment also boosted their factor VIII levels, on average, to 30% of normal. The Philadelphia-based biotech will move this dose into phase 3, starting with a run-in study slated to begin in the fourth quarter, Spark said in a statement.

But the data aren't perfect; the treatment triggered an immune response in the remaining two patients that dropped their factor VIII levels to less than 5% of normal. One of the patients didn't respond to oral steroids and had to be hospitalized. Spark was down about 30% before the market opened Tuesday.

To avoid this kind of immune response in the future, Spark will add prophylactic oral steroids to its treatment, said Spark President and R&D chief Katherine High, M.D.

"These early data further support the dramatic impact on patient outcomes that can result from factor activity levels above 12% and bring us closer to our goal of one day eliminating spontaneous bleeding altogether, while potentially freeing patients with hemophilia A from the need for regular infusions," High said.

People with hemophilia A need lifelong treatment, which includes regular infusions of factor VIII or a clotting promoter that raises their factor VIII levels. Treatments can be expensive and time-consuming, and because they require an injection, patient adherence can become an issue. A gene therapy would be a game changer in the space.

Spark is playing catch-up to BioMarin, whose own hemophilia A gene therapy is in phase 3.

At two years after infusion with BioMarin's Valoctocogene Roxaparvovec, patients' average factor VIII levels were at 59%, outperforming Spark's SPK-8011. However, the average factor VIII levels at one year post-infusion were close to double that, at 104% of normal, suggesting that the treatment's efficacy wanes over time.

Biospace.com
August 7, 2018

Health Canada Approves HEMLIBRA for Hemophilia A Patients with Inhibitors

(MISSISSAUGA, ON, CNW) - F. Hoffmann-La Roche Ltd.(Roche Canada) announced today that Health Canada has approved HEMLIBRA® (emicizumab injection) for hemophilia A (congenital factor VIII deficiency) patients with factor VIII inhibitors as routine prophylaxis to prevent bleeding or reduce the frequency of bleeding episodes.[2] (Please see HEMLIBRA Product Monograph for full prescribing information.)

In two of the largest clinical studies for people with hemophilia A with inhibitors (HAVEN 1 and HAVEN 2), HEMLIBRA was shown to substantially reduce bleeds in adults and children compared to prior episodic (on demand) treatment with bypassing agents.[3,4]

"Preventing bleeds in patients with hemophilia A can be extremely challenging, usually requiring patients to self-infuse medications multiple times a week, or even daily," says Dr. Jayson Stoffman, Associate Professor, Department of Pediatrics and Child Health, University of Manitoba, and Medical Director of the Manitoba Bleeding Disorders Program. "The development of inhibitors adds a significant challenge, with more demanding treatments that are often less effective. Hemlibra offers these patients the chance to effectively reduce the frequency of their bleeds with a once weekly injection at home. This could significantly improve the quality of life for inhibitor patients, and particularly children and their families."

Hemophilia A is a rare bleeding disorder affecting approximately 3,000 Canadian males.[5]People with hemophilia A have significantly lower than normal levels of factor VIII (FVIII) in their blood, which lowers the ability of their blood to clot.[6] Nearly one-in-three people with severe hemophilia A can develop inhibitors to factor VIII replacement therapies, putting them at greater risk of life-threatening bleeds or repeated bleeding episodes that can cause long-term joint damage.[7]

"Many people with severe hemophilia A face an ongoing struggle to control their bleeds, live with pain caused by joint damage and their lives revolve around treatment infusions. Until now, treatment options have been limited for those with inhibitors to factor VIII and there hasn't been a new medicine in the past 20 years," says Paul Wilton, President, Canadian Hemophilia Society. "Hemlibra is a significant innovation for people with inhibitors and we are pleased that it is now approved for Canadian patients."

About the Health Canada Approval

The Health Canada approval of HEMLIBRA is based on data from two pivotal clinical studies for people with hemophilia A with inhibitors, the phase III HAVEN 1 and HAVEN 2 studies. HEMLIBRA prophylaxis was evaluated in a randomized, multicenter, open-label clinical study in 109 adolescent and adult males (aged 12 to 75 years old) with hemophilia A with FVIII inhibitors who had previously received either episodic (on-demand) or prophylactic treatment with bypassing agents. In the study, patients received weekly HEMLIBRA prophylaxis (Arms A

and C) -- 3 mg/kg once weekly for 4 weeks followed by 1.5 mg/kg once weekly thereafter -- or no prophylaxis (Arm B).[8]
Below is a summary of key data from the HAVEN 1 study:[9]

- The primary endpoint showed a statistically significant reduction in treated bleeds of 87% (risk rate [RR]=0.13, p<0.0001) with HEMLIBRA prophylaxis compared to no prophylaxis.
    - In addition, 62.9% (95% CI: 44.9; 78.5) of patients who received HEMLIBRA prophylaxis experienced zero treated bleeds compared to 5.6% (95% CI: 0.1; 27.3) of patients who received no prophylaxis.
- In a first-of-its-kind intra-patient analysis, HEMLIBRA prophylaxis resulted in a statistically significant reduction in treated bleeds of 79% (RR=0.21, p=0.0003) compared to previous treatment with BPA prophylaxis collected in the NIS prior to enrolment.
    - Additionally, 70.8% (95% CI: 48.9; 87.4) of patients experienced zero treated bleeds with HEMLIBRA prophylaxis compared to 12.5% (95% CI: 2.7; 32.4) with previous treatment with BPA prophylaxis during the NIS.
- Improvements in bleed rate with HEMLIBRA prophylaxis compared to no prophylaxis included:
    - 80% (RR=0.20, p<0.0001) reduction in all bleeds
    - 92% (RR=0.08, p<0.0001) reduction in treated spontaneous bleeds
    - 89% (RR=0.11, p=0.0050) reduction in treated joint bleeds
    - 95% (RR=0.05, p=0.0002) reduction in treated target joint bleeds.
- HEMLIBRA prophylaxis showed a statistically significant and clinically meaningful improvement in the Haemophilia-specific Quality of Life (Haem-A-QoL) Total Score and Physical Health scale compared to no prophylaxis. This was measured at week 25 after the start of treatment in adults 18 years of age and older and evaluated hemophilia-related symptoms and physical function.

HAVEN 2 was a single-arm, multicenter, open-label clinical study in pediatric patients (age < 12 years old, or 12 to 17 years old weighing < 40 kg) with hemophilia A with factor VIII inhibitors. Patients received HEMLIBRA prophylaxis at 3 mg/kg once weekly for the first four weeks followed by 1.5 mg/kg once weekly thereafter.

The study evaluated the pharmacokinetics, safety, and efficacy of weekly HEMLIBRA prophylaxis, including the efficacy of weekly HEMLIBRA prophylaxis compared with previous episodic (on-demand) and prophylactic bypassing agent treatment in patients who had participated in the non-interventional study (NIS) BH29768 prior to enrollment (intra-patient comparison).

At the time of the interim analysis, the clinical study had enrolled 60 male patients. Thirty-eight patients aged 6 to < 12 years, 17 patients aged 2 to < 6 years, two patients aged < 2 years and three patients aged ≥ 12 years.[10]
Below is a summary of the interim results of HAVEN 2:[4]

- After a median observation time of 38.1 weeks, the interim analysis showed that 87% (95% CI: 66.4; 97.2) of children who received HEMLIBRA prophylaxis experienced zero treated bleeds. Interim data also showed:
    - 34.8% (95% CI: 16.4; 57.3) of children experienced zero bleeds overall, which includes all treated and non-treated bleeds.

    - 95.7% (95% CI: 78.1; 99.9) of children experienced zero treated spontaneous bleeds.
    - 95.7% (95% CI: 78.1; 99.9) of children experienced zero treated joint bleeds.
    - 100% (95% CI: 85.2; 100) of children experienced zero treated target joint bleeds.
- In an intra-patient analysis, 13 children who had participated in the NIS had an annualised bleeding rate (ABR) for treated bleeds of 17.2 (95% CI: 12.4; 23.8) on previous treatment with a BPA either as prophylaxis (n=12) or on-demand (n=1) compared to 0.2 (95% CI: 0.1; 0.8) on HEMLIBRA prophylaxis, corresponding to a 99% (RR=0.01, 95% CI: 0.004; 0.044) reduction in bleed rate. On HEMLIBRA prophylaxis, 11 children (84.6%) experienced zero treated bleeds.[4]

The most common adverse drug reactions (ADRs) from pooled clinical studies of people treated with HEMLIBRA were injection site reactions, headache, arthralgia, pyrexia, diarrhea, myalgia and thrombotic microangiopathy. The most serious adverse drug reactions reported from the clinical trials with HEMLIBRA were TMA and thrombotic events, including cavernous sinus thrombosis and superficial vein thrombosis contemporaneous with skin necrosis.[11]
In the HAVEN 1 study, three people experienced thrombotic microangiopathy (TMA) events and two people experienced serious thrombotic events when on average, a cumulative amount of more than 100 U/kg/24 hours of activated prothrombin complex concentrate (aPCC) (FEIBA®) was administered for 24 hours or more while receiving HEMLIBRA prophylaxis.[12]

About Hemophilia A
Hemophilia A is an inherited, serious disorder in which a person's blood does not clot properly, leading to uncontrolled and often spontaneous bleeding. Hemophilia A affects around 3,000 Canadian males,[5] approximately 40 per cent of whom have a severe form of the disorder.[13]
People with hemophilia A either lack or do not have enough of a clotting protein called factor VIII. Depending on the severity of their disorder, people with haemophilia A can bleed frequently, especially into their joints or muscles.[14] These bleeds can present a significant health concern as they often cause pain and can lead to chronic swelling, deformity, reduced mobility, and long-term joint damage.[15] A serious complication of treatment is the development of inhibitors to factor VIII replacement therapies.[16] Inhibitors are antibodies developed by the body's immune system that bind to and block the efficacy of replacement factor VIII,[17] making it difficult, if not impossible to obtain a level of factor VIII sufficient to control bleeding.

About HEMLIBRA® (emicizumab injection)
HEMLIBRA is an engineered humanized monoclonal modified immunoglobulin G4 (IgG4) antibody that bridges activated factor IX and factor X to restore the natural function of missing activated factor VIII that is needed for effective blood clotting. It has no structural relationship to FVIII and, as such, does not induce or enhance the development of direct inhibitors to FVIII.[18,19]
HEMLIBRA is a prophylactic (preventative) treatment that can be administered by an injection of a ready-to-use solution under the skin (subcutaneously) once weekly.[20]
HEMLIBRA was created by Chugai Pharmaceutical Co., Ltd. and is being co-developed by Chugai, Roche and Genentech. It is currently approved in the United States and Europe for people with hemophilia A with factor VIII inhibitors.

About Roche in Hematology
For more than 20 years, Roche has been developing medicines that redefine treatment in

hematology. Today, we are investing more than ever in our effort to bring innovative treatment options to people with diseases of the blood. In addition to approved medicines MabThera®/Rituxan® (rituximab), Gazyva®/Gazyvaro® (obinutuzumab), and Venclexta™/Venclyxto™ (venetoclax) in collaboration with AbbVie, Roche's pipeline of investigational hematology medicines includes Tecentriq® (atezolizumab), an anti-CD79b antibody drug conjugate (polatuzumab vedotin/RG7596) and a small molecule antagonist of MDM2 (idasanutlin/RG7388). Roche's dedication to developing novel molecules in hematology expands beyond malignancy, with the development of Hemlibra (emicizumab injection), a bispecific monoclonal antibody for the treatment of hemophilia A.

About Roche

Headquartered in Basel, Switzerland, Roche is a global pioneer in pharmaceuticals and diagnostics focused on advancing science to improve people's lives. The combined strengths of pharmaceuticals and diagnostics under one roof have made Roche the leader in personalised healthcare - a strategy that aims to fit the right treatment to each patient in the best way possible. Roche is the world's largest biotech company, with truly differentiated medicines in oncology, immunology, infectious diseases, ophthalmology and diseases of the central nervous system. Roche is also the world leader in in vitro diagnostics and tissue-based cancer diagnostics, and a frontrunner in diabetes management.

Roche Canada was founded in 1931. The company employs over 1,000 people across the country, with its pharmaceuticals head office located in Mississauga, Ontario, and diagnostics division based in Laval, Quebec. Roche Canada is actively involved in local communities, investing in charitable organizations and partnering with healthcare institutions across the country. For more information, visit www.rochecanada.com.

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SOURCE Roche Canada

EurekAlert.org (AAAS)
August 9, 2018

RCSI and Bayer enter research collaboration to improve hemophilia treatment

Study to develop new treatments that can be tailored to individual's needs

RCSI and Bayer have today announced a research collaboration that aims to improve treatments for people with severe haemophilia. The project will explore new treatments that can be tailored to the severity of each individual's condition in order to safely and effectively promote blood clotting in people with haemophilia.

Haemophilia is an inherited bleeding disorder caused by the lack of a key blood clotting protein, known as factor VIII (FVIII). This results in prolonged bleeding that is difficult to stop unless the condition is recognised and treated. Haemophilia predominantly affects men, with approximately 1 in 4000 males in Ireland affected.

The research study is led by Dr Roger Preston, Lecturer in Vascular Biology at the Irish Centre for Vascular Biology and Department of Molecular and Cellular Therapeutics, RCSI and is funded by a Special Project Award of €200,000 from Bayer. The award was made under the Bayer Haemophilia Awards Program, a prestigious international award programme that supports basic and clinical research in haemophilia. The programme seeks to support the development of the next generation of care and treatment options for people with haemophilia worldwide.

Individuals with severe haemophilia A are at an increased risk of bleeding as they possess factor VIII levels of <1% of that observed in individuals without haemophilia. This is normally treated by regular administration of 'replacement' factor VIII.

Dr Roger Preston said: "The aim of our study is to engineer new therapeutics with clotting properties that can be 'tuned' to match the needs of each person being treated. We hope to develop treatments that can promote blood clotting with increased precision in order to improve the quality of life for people with haemophilia and other individuals at increased risk of bleeding".

RCSI CEO, Professor Cathal Kelly said: "RCSI is delighted to announce this collaboration between Dr Preston and Bayer. This partnership exemplifies how collaboration between academia and industry can help improve the health of people with haemophilia through the high quality, impactful scientific research taking place at the Irish Centre for Vascular Biology here at RCSI."

"Since its establishment 15 years ago, the ultimate goal of Bayer Haemophilia Awards Program (BHAP) has been to support research that has the potential to have a significant impact on our understanding of haemophilia and bleeding disorders," said Dr Tristan Cooper, Bayer Ltd. Medical Director. "BHAP continues to be a tangible reflection of Bayer's ongoing commitment to research and advancing scientific knowledge that improves patient care. We are proud to recognise and award Dr Preston for his expertise and commitment in his field."

Dr. Preston was previously awarded an Early Career Investigator Award from Bayer in 2014 and this new project will build on his initial research in this field.

About RCSI

RCSI is ranked among the top 250 (top 2%) of universities worldwide in the Times Higher Education World University Rankings (2018) and its research is ranked first in Ireland for citations. It is an international not-for-profit health sciences institution, with its headquarters in Dublin, focused on education and research to drive improvements in human health worldwide. RCSI is a signatory of the Athena SWAN Charter.

About Bayer

Bayer is a global enterprise with core competencies in the Life Science fields of health care and agriculture. Its products and services are designed to benefit people and improve their quality of life. At the same time, the Group aims to create value through innovation, growth and high earning power. Bayer is committed to the principles of sustainable development and to its social and ethical responsibilities as a corporate citizen. In fiscal 2017, the Group employed around 99,800 people and had sales of EUR 35.0 billion. Capital expenditures amounted to EUR 2.4 billion, R&D expenses to EUR 4.5 billion. For more information, go to http://www.bayer.com.

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