Season of hope

BABY BOY BROOKS HILL lived just two days shy of two months, but his life is taking on a larger meaning thanks to his parents, Caitlin and Rich Hill, and their enthusiastic support for the work of David Sweetser, MD, PhD, director of the Mass General Hospital for Children (MGHIC) Genetics and Metabolism Program and site director of the MGH Undiagnosed Disease Network. The medical detective work done by Sweetser — a specialist in rare and undiagnosed diseases — led to a surprising discovery about the family's genes.

Both natives of Milton, Massachusetts, Caitlin and Rich — a standout pitcher who was drafted by the Chicago Cubs in 2002 — have journeyed around the country as he pitched for a variety of major and minor league teams, including the Red Sox minor league team.

In 2011, their first son, Brice, was born. Two years later, on Dec. 26, 2013, Caitlin gave birth to Brooks at the MGH. Though thrilled to welcome their second son into the world, Caitlin noticed the baby had a weak cry and thought his thumbs seemed clenched, as if they could not extend properly.

Rich saw that Brooks' limbs were not fully straightening out. "Why are his arms like that?" he remembers asking a doctor.

Hours after Brooks was born, Caitlin and Rich met Sweetser, who, as the specialist on call, was examining Brooks carefully. Sweetser and the MGHIC team ordered ultrasounds to detect structural abnormalities in Brooks' heart or kidneys. They took urine and blood samples to help narrow down the list of possible genetic mutations and rule out certain conditions.

Sweetser also sent out Brooks' blood samples for a new, highly detailed genetic screening test known as "whole exome sequencing," which can reveal the genetic mutations underlying a disease — but getting results can take months.

The Hills felt they were in good hands. "We just knew that he knew what he was doing," Caitlin says.

Knowing that Brooks' unusual thumb shape can be a clue to brain (Continued on page 4)

Welcoming the Year of the Pig

NEARLY 300 PEOPLE gathered in the Richard B. Simches Research Center Feb. 22 to celebrate the Year of the Pig as part of the MGH Chinese Scientists and Staff Association's (CSSA) traditional Lunar New Year event. More than 50 performers from the MGH and greater Boston area showcased their talents in traditional Chinese music, dance, song and entertainment.

“It was a great event with lots of families and friends from MGH and local Chinese community members, gathering together to exchange their best wishes for the new year,” says Mengyu Wang, PhD, of the Mass Eye and Ear Department of Ophthalmology and MGH CSSA co-president. “It was also a good way to introduce our Chinese culture to the world.”

The evening’s entertainment included a Beijing opera performance — a principal tradition in Chinese culture — by the Harvard Alumni Peking Opera Group, a demonstration of Taiji — a Chinese martial art practiced for both its defense training and health benefits — and a few performers playing the Guzheng, a Chinese plucked string instrument with a more than 2,500-year history.
Study shows how a lack of sleep can contribute to cardiovascular disease

Getting enough sleep is key to good health, and studies have shown that insufficient sleep increases the risk of serious problems, including cardiovascular disease.

In a recent study, a team led by Filip Swirski, PhD, of the MGH Center for Systems Biology, identified how that process works on a molecular and biological level.

The team conducted a study using mice genetically programmed to develop arteriosclerosis. Animals that experienced repeated interruptions to their sleep, similar to someone who is frequently awakened due to noise or discomfort, developed larger arterial plaques than did mice allowed to sleep normally. They also had higher levels of two types of immune cells that contribute to arteriosclerosis in their blood vessels.

The sleep-deprived mice also had nearly double the production of stem cells in the bone marrow that give rise to white blood cells.

Dreams of relapse are common in individuals recovering from substance use disorder

Those in recovery from a substance abuse disorder and who have anxiety-provoking dreams about relapsing are not alone.

Dreams of those in recovery from every kind of substance use disorder – alcohol, heroin, cocaine, cannabis – can be characterized by a common pattern. The person takes a drink or their other primary substance. They then experience disbelief and are overcome with fear, guilt and remorse until they wake up, relieved to realize it was only a dream.

A research team led by John Kelly, PhD, associate director of the MGH Center for Addiction Medicine, recently found that individuals with more significant clinical histories of substance use disorder are more likely to have dreams of relapse and that these dreams will decrease over time as recovery continues.

“The association between the decreasing frequency of these dreams and the length of time in recovery suggests that, as the body and mind gradually adapt to abstinence and a new lifestyle, psychological angst about relapse diminishes,” Kelly says. “REM sleep and deep wave sleep undergo important changes, even long after people enter recovery; and these relapse dreams may be indicative of the healing process and brain-mind stabilization that occurs with time in recovery.”

Building a better understanding of the genetic links to insomnia

Insomnia affects around 10 to 20 percent of the population, and twin and family studies have suggested that about a third of the risk of insomnia is inherited. While evidence has suggested that insomnia increases the risk of anxiety disorders, alcohol use disorder, major depression and cardiometabolic disease, little has been known about the mechanisms involved.

An international research team led by investigators from the MGH and the University of Exeter Medical School in the U.K. has identified 57 gene regions associated with symptoms of insomnia.

“All of these identified regions help us understand why some people get insomnia, which pathways and systems are affected, and point to possible new therapeutic targets,” says lead author Jacqueline M. Lane, PhD, of the Center for Genomic Medicine and the MGH Department of Anesthesia, Critical Care and Pain Medicine.

The healing power of music


These were some of the places people were transported to during the Feb. 19 Conversations with Caregivers program, “The Healing Power of Music Therapy for People with Dementia and Their Caregivers.” Sponsored by the Dementia Caregiver Support Program, this education series was created by the Division of Palliative Care and Geriatric Medicine to offer support to those navigating the often difficult path of caring for an aging parent, spouse or loved one.

“Music is capable of bringing you back to those memories from so long ago,” said Suzanne Hanser, EdD, MT-BC, Music Therapy chair emerita at Berklee College of Music, who led the evening’s program. “It can take you back to times of wonder, of growth, of love. If music can take you there, isn’t that a wonderful gift?”

Music therapists can guide patients through their pain. The MGH music therapy program, funded through the MGH Cancer Center, includes learning and playing musical instruments, listening to music, creating customized playlists and writing songs to share. And best of all, Hanser says, musicking does not require training.

“People with Alzheimer’s disease have a remarkable ability to recall music,” said Hanser. “It enhances emotion and attention because people don’t need that executive function to allow music to soothe them, to comfort them and to bring joy.”

Music doesn’t help only patients; it also can calm and uplift caregivers as well. Throughout the program, Hanser invited attendees to close their eyes and let the music carry them away. She also invited audience members to participate in creating a song of their own, using chimes of the pentatonic scale that were handed out.

“Music can really help to create a connection with a loved one, especially a loved one with dementia,” Hanser said. “Just remember, there will never be a piece of music that is prescribed, everyone is different. It’s all up to you.”

The next program in the series – “Solving the Driving Dilemma: DriveWise Driver Evaluation Program” – will be March 19 from 5:30 - 7 pm. Call 617-724-0406 to register. All are welcome.

TIPS FOR BRINGING MORE MUSIC INTO YOUR LIFE:

• Find comfort with music: Listen to music that you love, remember good times and share these memories. Let the music take you to one of those places or memories.

• Energize with music: Find a favorite, energetic song that makes you want to move. Share your experience with family and friends.

• Cultivate your musical self: Sing or hum along with the radio, dance or move to the beat, or consider lessons on an instrument you’ve always wanted to play.

• Let music modify your mood: Play music when you are feeling sad, stressed or overwhelmed to lift your mood. Experiment with different types of music and see how they make you feel.

• Celebrate every day: Attend a concert, join an ensemble or simply celebrate everyday moments at home with music you love.
Speak up for safety 2019

NATIONAL PATIENT SAFETY Awareness Week will take place March 10 to 16. To celebrate, the MGH is hosting a variety of events, including a celebration recognizing the efforts of Patient Safety Stars across the hospital, presentations highlighting safety best practices and special grand rounds featuring guest speakers.

“While MGH caregivers focus on patient safety every day, the entire organization has rallied for this year’s Patient Safety Awareness Week with celebrations and special lectures,” says Elizabeth Mort, MD, senior vice president of Quality and Safety. “We hope staff take advantage of some of the week’s offerings.”

Along with a week of events throughout the hospital, information tables also will be set up in the White corridor to educate patients, visitors and staff about patient safety initiatives at the MGH. A full schedule of Patient Safety Awareness Week events can be found on Apollo, the MGH intranet.

Accepting the challenge

“WHAT I’VE LEARNED is that running a marathon isn’t about running a marathon. It’s about how determined you are to finish something you started. It’s about testing yourself and figuring out what you’re made of and how far you can push yourself. It’s about taking something that is said to be impossible and making it possible.”

These are some of the core lessons that Brian Soucy has learned from past runners, his own training and from family. Soucy will be running his first marathon this year as part of the Mass General Emergency Response Marathon Team. Money raised helps provide critical support for emergency care, disaster relief and disaster preparedness teaching and training at the MGH efforts – that benefit victims worldwide.

“One of the main reasons I want my first marathon to be the Boston Marathon is because I was at the finish line on the day of the bombing,” Soucy says. “My cousin’s husband was running, and we were there cheering him on. He was about two miles from the finish line when the bombs exploded. I will never forget the look on my nephew's face when it happened. It was and will always be a moment in our lives that none of us will ever forget.”

After ensuring his family was safe, Soucy – a firefighter EMT at the time – returned to the finish line to help in any way he could. The following year, his cousin’s husband again ran – and this time completed – the Boston Marathon. He then challenged Soucy to run the following year. It was a challenge Soucy happily accepted.

"Life got in the way and I was unable to run the marathon for the last few years. I am more than ready now and can’t wait to take on the challenge," says Soucy. “The reason I chose the MGH Emergency Response Team is because, out of all the patients the hospital received from the bombing, not a single life was lost at Mass General. The hospital had some of the worst patients that day, and the amazing teamwork that happened throughout the hospital that day is what saved all those lives.”

In addition to the Pediatric Hematology & Oncology, Emergency Response and Home Base teams – sponsored by John Hancock – runners also will support the Run for MGH team, which raises funds for hospital programs close to their hearts, including Caring for a Cure, cystic fibrosis, Down syndrome, the Lurie Center for Autism, and the Mootha Lab.

Marathon motivation:

“I chose to run with the Mass General Marathon Team for Pediatric Cancer because I have lost too many family members and loved ones to cancer. The single most important thing that I have learned from watching so many loved ones battle cancer is to live your life to the fullest every day. We are not promised a tomorrow, so it’s important to really enjoy your life no matter how hard things get. Training for the marathon has been a life-changing experience, and I can’t wait to run the Boston Marathon with Team MGH.”

SANDY CURKO, PEDIATRIC HEMATOLOGY & ONCOLOGY TEAM, FIRST MARATHON

“I am running with MGH to honor the memory of my daughter’s best friend Megan, who passed away in 2014 after living with osteosarcoma for a year. Megan and my daughter Niamh were best friends since their preschool years. She was a truly wonderful young woman who has had a forever kind of influence on my daughter, and running for her helps me to remember how much our family loves her.”

TIM SULLIVAN, PEDIATRIC HEMATOLOGY & ONCOLOGY TEAM, 11TH MARATHON (FIFTH BOSTON)

“This is a fantastic opportunity to support a cause I believe in, while challenging myself physically and mentally. In addition to being an MGH physician, I am also a patient, as well as the daughter, partner, cousin, friend and colleague of many current patients. This is my medical home and community. On race day I will be remembering my late father, Wally Leeds, who was a volunteer firefighter in Tunbridge, Vermont, and who believed in the value of responding to neighbors in need – a core value of MGH and the MGH Emergency Response Team.”

NAOMI LEEDS, EMERGENCY RESPONSE TEAM, FIRST MARATHON
Brooks had a genetic mutation of a gene known as OSGEP expressed in the kidney that was not previously known to cause human disease.

Hildebrandt had linked OSGEP along with other genes to Brooks’ kidney condition, congenital nephrotic syndrome. Even more stunning was new evidence that the OSGEP mutation appeared in families who had the same brain condition Brooks had. It was the double connection they had been hunting for — a gene associated with both the brain and kidney disorders that define GAMOS.

Rich, Caitlin and Brice were in Arizona for spring training with the Oakland Athletics when they received a text message from Sweetser. “I hope you are doing well, and the season is off to a good start,” Sweetser wrote. “It looks as if, after all this time, we discovered a genetic cause for Brooks’ nephrotic syndrome and other issues.”

Rich and Caitlin learned they each carried one copy of the extremely rare OSGEP mutation, which causes GAMOS. A child must inherit a copy from each parent to have the syndrome. With this knowledge, the Hills have options, such as in vitro fertilization and embryo selection, should they decide they want more children.

Caitlin and Rich are now focused on helping other families who are caught in the same swirl of confusion, pain and uncertainty that besets families with undiagnosed and extremely rare diseases. “We were extremely fortunate to have Dr. Sweetser and his team take on Brooks’ case,” Rich says.

Determined to give Brooks’ short life meaning for many years to come, the Hills have made a $575,000 donation to support Sweetser’s work. “Brooks made a lasting impact on Brooks’ case, “ Rich says.

The unusual combination of brain and kidney malfunction pointed to a condition called Galloway Mowat syndrome (GAMOS). Because of its extreme rarity, it was difficult to make a prognosis for Brooks.

After three weeks in the hospital — during which Brooks learned to eat and was sleeping well, he was discharged home. Two weeks later, Brooks was brought back to the Pediatric Intensive Care Unit after being diagnosed with RSV, despite having been vaccinated against the respiratory virus.

Despite all efforts and exhausting every possible option to treat his deteriorating condition, Brooks’ health was failing. Ultimately, his quality of life was most important. In collaboration with Sweetser and other specialists, Rich and Caitlin made the decision to bring Brooks home.

With the support of hospice care, Brooks died with his family around him on Feb. 24, 2014. “We learned and felt the true meaning of support and how important support is in everyday life,” Caitlin says.

Though one devastating chapter had closed, the story wasn’t over. Sweetser wanted more answers to bring the Hills a measure of peace and help future patients. “We don’t give up on cases like this,” he says.

A few months later, Brook’s whole exome test came back negative – no gene mutations were found to explain why Brooks had GAMOS.

Sweetser posted Brooks’ genetic information on scientific bulletin boards, and also connected with Friedhelm Hildebrandt, MD, of Boston Children’s Hospital. An expert in the kidney condition that Brooks had, Hildebrandt added the child’s DNA to his own studies.

In 2015, Sweetser reanalyzed Brooks’ genetic data hoping that, with the rapid advances in genetic knowledge, he might now find an answer. This time, there was an intriguing result: Brooks had a genetic