Off to a great start

University physicians and researchers find that it’s never too early to begin optimizing kids’ brain development

The right timing can make all the difference. And where children’s brain development is concerned, University of Minnesota researchers are finding that particularly important.

“The earlier you intervene, the bigger impact you can have,” says Michael Georgieff, M.D., director of the University’s Center for Neurobehavioral Development and a neonatologist at University of Minnesota Amplatz Children’s Hospital. “You’re laying the foundation for a healthy adult mental life.”

That’s one reason so many public health initiatives focus on the first thousand days—or about the first three years—of life, he adds.

So as a neonatologist, working with premature and critically ill babies who are especially vulnerable, Georgieff digs in on day one. With colleagues in the Department of Pediatrics and throughout the University, Georgieff is determining key factors that influence infants’ brain health and discovering which early medical and nutritional treatments can improve long-term brain function the most.

The University is the perfect place to conduct this work, Georgieff says. “We have an impressive ‘deep bench,’” he explains, which includes colleagues at the University’s Institute of Child Development (the top-ranked child development center in the nation) and throughout the University of Minnesota Amplatz Children’s Hospital.

That’s why so many University researchers and physicians have joined with others to create the Minnesota Early Childhood Network—a collaboration that brings together scientists, medical providers, policy makers, and community leaders to help improve the lives of young children.

The Minnesota Early Childhood Network is one example of how the University of Minnesota is working to improve the health of young children. And it’s part of a larger effort to address the complex issues facing children and families today.

“Children’s health is a top priority for the University of Minnesota,” says E. Mack Allread, M.D., senior vice president for medical affairs and dean of the University of Minnesota Medical School. “We are committed to improving the health of children and families in our community.”

Michael Georgieff, M.D., examines a graphical representation of a child’s brain waves. University experts pioneered the use of specialized tools that help them evaluate development and learning in very young children, even in infants.
development/child psychology program in the country, according to U.S. News & World Report), at its world-renowned Center for Magnetic Resonance Research, and in its strong neuroscience graduate program. The team also has access to the specialized tools that can help evaluate development and cognition in very young children, even in infants.

“We are uniquely positioned to identify those who have fallen off their developmental trajectory and help with early therapy, when the brain is more plastic,” Georgieff says.

**Boosting the world’s I.Q.**

Georgieff’s research was the first to demonstrate that iron deficiency itself, not anemia (a condition, most commonly caused by iron deficiency, in which a person’s blood doesn’t carry enough oxygen to the rest of the body), is responsible for cognitive deficits.

“There are many factors that determine preemies’ outcomes, but nutrition is one thing we can do something about right away,” Georgieff says.

About 2 billion people are iron deficient worldwide, according to the World Health Organization. The most common cause is maternal anemia during pregnancy, and after birth, kids in developing countries are often at risk because of iron-poor diets and parasitic infections that cause blood loss. In the United States, the most likely culprit of iron deficiency after birth is too-early introduction of cow’s milk, Georgieff says, which is low in iron the body can use.

“It’s been estimated that if you could cure the three most common micronutrient deficiencies—iron, zinc, and iodine—the world’s collective I.Q. would go up by 10 points,” Georgieff says.

**Learnings from the lab**

Assistant professor of pediatrics Phu Tran, Ph.D., is examining just how these deficiencies affect the developing brain. He conducts lab research on how early adversity, caused by factors such as stress or nutritional deficiency, can limit a child’s ability to learn and remember throughout life. Particularly, he’s studying a molecule called brain-derived neurotrophic factor, which plays a crucial role in helping the brain grow and adapt, and how it can explain the cognitive deficit that occurs during and after a period of iron deficiency.

In an animal model of early-life iron deficiency, Tran’s team found persistent changes in the brain networks that are involved with efficient information processing.

“With these insights, we can devise potential treatment strategies to optimize brain function

*Curing the three most common micronutrient deficiencies—iron, zinc, and iodine—could raise the world’s collective I.Q. by 10 points.*
in conjunction with iron treatment,” he says. For example, he and his colleagues are currently testing whether supplementing choline, a nutrient in the B-vitamin family that is accessible worldwide, can help reverse damage caused by iron deficiency early in life.

**Surviving and thriving**

Now that preemies are surviving at higher rates than ever, this work is becoming more and more important. As University of Minnesota Amplatz Children’s Hospital neonatologist Sara Ramel, M.D., says, “We’re helping those tiny babies in the NICU not just to survive, but thrive.”

Ramel is exploring the importance of protein as a building block for infant brain health. She’s also refined the way that babies’ growth and brain development is measured.

“We’ve learned through our research that while weight gain in infants is important, there are other factors that also need to be monitored, including how long infants are, and the fat-to-muscle ratio in their bodies,” she says. “Understanding all these key measures may lead to improved neurodevelopmental and cardiovascular outcomes.”

Ramel’s research has shown that preemies who were longer in their first year of life scored higher on cognitive and speech tests at age 2.

It also has shown that children who gained more muscle mass during their time in the hospital and in the four months after going home were able to process information faster.

Premature babies have higher fat mass, and less muscle mass, when compared with babies born at full term. Ramel’s group hypothesizes that infants who experience early fast growth, specifically in fat mass, could face an increased risk for cardiovascular disease, insulin resistance, and hypertension as adults.

The first group of preemies that Ramel studied is just now reaching preschool age. Those kids are being measured for body composition, blood pressure, and cognitive abilities again because measurements at preschool age can better predict long-term metabolic risk and long-term school success than those obtained during early infancy.

Ramel hopes that this work will lead to earlier and better ways to enhance children’s brain development and growth. And she’s optimistic about the future for the preemies she sees in the hospital every day.

“We want them to be successful in school and live long, healthy, productive lives,” she says. “I can’t imagine a better job—to take care of babies and learn ways to make their lives better.”

*Photos courtesy of Michael Schmidt*
Leaving a legacy
The Zach Sobiech Osteosarcoma Fund lifts University of Minnesota bone cancer research program ‘up, up, up’

Through music, Zach Sobiech said goodbye to his loved ones. And in the process, the terminally ill Stillwater teenager’s YouTube music video for his song “Clouds” touched people around the world.

Though Sobiech died of osteosarcoma, an aggressive type of bone cancer, on May 20 at age 18, his legacy extends far past millions of YouTube views. The Zach Sobiech Osteosarcoma Fund, created by Zach and his family through Children’s Cancer Research Fund, exclusively benefits research at the Masonic Cancer Center, University of Minnesota focused on understanding the causes of osteosarcoma as well as developing new therapies for it.

Proceeds from the sales of Sobiech’s music, prints of his lyrics, and specially designed necklaces and key chains all benefit the Zach Sobiech Osteosarcoma Fund.

To date, more than $568,000 has been raised—from 195,000 people around the world.

Osteosarcoma affects approximately 500 children in the United States per year, but doctors know very little about the cancer, says Brenda Weigel, M.D., codirector of the Masonic Cancer Center’s Sarcoma Program and director of the Department of Pediatrics’s Division of Hematology/Oncology. She also was Sobiech’s doctor at University of Minnesota Amplatz Children’s Hospital.

“We know [almost] nothing about the causes or why certain people get it,” Weigel says. “If we did, we could come up with better treatments.”

University investigators from a variety of different areas, including veterinary science, chemistry, surgery, medicine, and pediatrics, are working together to understand this complex disease.

Currently, University researchers are examining the human genome to identify genetic changes that may indicate a greater likelihood of developing osteosarcoma. They’ve also found that, at a molecular level, naturally occurring canine osteosarcomas are remarkably similar to those that occur in children, meaning that progress toward developing treatments for dogs that have osteosarcoma can speed the development of treatments for people with the same disease.

And they’ll build on their successes with support from the Zach Sobiech Osteosarcoma Fund.

“Zach’s legacy will live on in many, many ways,” says Weigel, “through his songs and his efforts to raise advocacy and awareness of osteosarcoma.”

To make a gift to the Zach Sobiech Osteosarcoma Fund or hear his music, visit www.childrenscancer.org/zach.
Though the problem of youth violence reigns large in the United States, Iris Borowsky, M.D., Ph.D., is not one to dwell on the negative. Instead, she has spent the past 19 years at the University of Minnesota researching ways to prevent the problem.

“When you look at our country, we’re way in the lead in things like rates of firearm injuries,” says Borowsky, a nationally recognized expert on youth violence and director of the Department of Pediatrics’ recently merged divisions of General Pediatrics and Adolescent Health. “The health consequences of youth violence are severe. I focus on what we can do to prevent children from falling into cycles of violence, and how to alert professionals who work with children to be aware of the signs.”

When she’s not in the clinic, Borowsky researches issues such as bullying, healthy parenting, and teen fatalism. 

Findings from her recent bullying study, published in the Journal of Adolescent Health, have been widely reported. It revealed that more than half of Minnesota students in grades 6, 9, and 12 were victims or perpetrators of bullying—a concerning statistic because suicide risk is strongly associated with bullying.

“We found that children who were affected by bullying but had strong connections with parents, liked school, and had solid relationships with other adults or friends were much less likely to think about suicide,” Borowsky reports, “and that the converse is true for higher risk of suicide. Our hope is that these findings will enable people who work with children to identify suicide risk and intervene early.”

Borowsky developed an intervention program several years ago designed to help doctors identify and treat mental illness in adolescents and improve parent/child connectedness through a phone-based parent-training program. After running a controlled study at eight pediatric practices, Borowsky found that the program was working; nine months after the intervention, both fight-related injuries for which medical care was required and violent behavior were significantly reduced in youths ages 7 to 15.

“Dr. Borowsky is renowned for her leadership in addressing child and adolescent health disparities,” says colleague Tina Cheng, M.D., M.P.H., division chief of General Pediatrics and Adolescent Medicine at Johns Hopkins Children’s Center. “She has a deep commitment to improving health for vulnerable children and is a wonderful role model.”

The Academic Pediatric Association agrees; this year, the group singled out Borowsky for the prestigious Miller-Sarkin Mentoring Award, acknowledging her outstanding work.

“I love working with students at all levels,” says Borowsky, “even with high school students, getting them excited about careers in health care, and in violence prevention. Youth violence is something we all need to care about because it’s a national epidemic, and it’s preventable.”
Joyce Wallin secured her place in medical history on June 7, 1963, when she received a special gift from her identical twin sister, Jeanet Diment—a new kidney and a new lease on life.

It was the first solid organ transplant ever performed by University of Minnesota physicians and, as it turns out, the first of many pioneering transplant procedures to be performed at the University.

The University secured its standing as a world-class center for organ transplant innovation by performing transplants for two groups that had been considered impossible candidates: children and people with diabetes. It became the site of the country’s first formal training program for up-and-coming transplant experts; today it’s one of the largest.

And in April, University physicians performed their 8,000th kidney transplant—almost exactly 50 years after the transplant on Wallin, who lived in good health with her sister’s kidney for 37 years.

The opportunity to build on this distinguished history and learn from the best drew transplant nephrologist Priya Verghese, M.D., to the University four years ago. The opportunity to improve lives drew her to pediatric nephrology.

When children ill with kidney failure receive a kidney transplant, they “bounce back so quickly,” Verghese says. “It’s amazing to see what they can accomplish.”

Besides her clinical duties at University of Minnesota Amplatz Children’s Hospital, Verghese leads first-of-its-kind research that aims to make transplants safer and more successful.

Preventing viral infections after transplantation is a major focus of her work. Because they lack previous exposure and immunity to certain viruses, children are particularly vulnerable to infections. The devastation of these infections can include transplant failure, cancer, and even death, Verghese says. So the trick is to strike a balance between suppressing the immune system so that the organ isn’t rejected, while also keeping infections at bay.

No one knows the importance of this work better than John Bly, who lost a daughter to kidney failure in 1998. At age 7, Ann Bly was among the first children in the country to receive a kidney transplant. Her second transplant took place at age 14. Her father says she had many medical “ups and downs” in the 14 years she lived with the second transplanted kidney, which he donated to her.

In his daughter’s honor, Bly made a gift of $100,000 to support Verghese’s pediatric kidney transplant research.

“I wanted to contribute to research that would help prevent the difficulties my daughter went through,” he says.

And as funding available from public sources continues to decline, experts like Verghese are relying on private support more than ever.

“We have great ideas and amazing things that we want to do—we just need the funds to do them,” Verghese says. “I am grateful to donors like Mr. Bly. He and others like him are critical for the execution of pilot studies that help generate the preliminary results required to apply for larger funding from federal sources like the National Institutes of Health.

“For those of us doing cutting-edge research, philanthropic support is pivotal.”

To find out how your support can make a difference in pediatric transplant research at the University, contact Elizabeth Patty at 612-625-6136 or patty@umn.edu.
Join us for a fabulous first-ever event:
Wine Women & Shoes

6 p.m. Friday, November 22
McNamara Alumni Center
University of Minnesota

A walk-around wine and food tasting, marketplace, live auction, and fashion show come together for four fabulous hours of fundraising, camaraderie, and shopping. Guests will:

• Sample a wide array of wines from signature collections
• Taste gourmet goodies prepared by D’Amico & Sons
• Chat with charming Shoe Guys, who wander the room carrying stylish shoes on silver platters
• Meander through the Marketplace, trying on designer shoes, boutique attire, artisan jewelry, and accessories
• Bid on irresistible items and one-of-a-kind trips in the live auction
• Sit back and enjoy the fashion show.

Wine Women & Shoes supports crucial, life-changing pediatric patient services, programs, and activities at University of Minnesota Amplatz Children’s Hospital—transforming the care experience for patients and their families. Reserve your tickets today at uofmhope.org.

Well on our way

The Children's Health Campaign is inspiring hope and improving the lives of seriously ill children and their families. The campaign has raised $151 million for University of Minnesota Amplatz Children’s Hospital so far—86 percent of the $175 million goal—through private gifts and fundraising events, supporting vital advances in research and care.

Help us illuminate brighter days for children. Make your gift today at uofmhope.org.

And save the date for WineFest No. 19—A Toast to Children’s Health on May 9 and 10!

Also benefiting University of Minnesota Amplatz Children’s Hospital, WineFest has raised $10.5 million in support of children’s health research, education, and care at the University of Minnesota since 1995.
The young cancer patients at University of Minnesota Amplatz Children’s Hospital who lose their hair after chemotherapy now have a stylish way to keep their heads warm. Thanks to the organization Love Your Melon, more than 800 cozy winter hats and baseball caps have been given to children at Amplatz.

Love Your Melon makes and sells hats and caps under a “buy one, give one” setup. You buy one; they give one to a child being treated for cancer. The organization also created a fund to provide special experiences like helicopter rides to patients and their families. And it’s all in the spirit of doing good.

Love Your Melon grew out of a University of St. Thomas classroom in 2011 when Zachary Quinn’s assignment to “start a business” turned into an undoubtedly fulfilling opportunity.

“My group decided that we needed to do something that made a difference,” Quinn says. Amplatz Children’s Hospital was the first to open its doors to Love Your Melon and its hats. “We didn’t know exactly why we were doing it until the first time we went in Amplatz,” says Quinn. “It was remarkable to see the families and make them smile.”

Through the tireless efforts of Quinn and business partner Brian Keller, Love Your Melon has hand-delivered 1,700 hats to children’s hospitals around the country.

“It’s not just fun,” Quinn explains. “It’s necessary for these kids. It’s centered around the fun aspect, but it’s therapeutic and means so much to them.”

Buy a hat or learn more about the organization at loveyourmelon.com.