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Welcome to Neonatology News
Welcome to Neonatology News, an annual publication of Connecticut Children’s Medical Center Foundation, prepared especially for friends of the hospital’s Division of Neonatology and Neonatal Intensive Care Units (NICUs). Read on to learn more about the programs, services and research that benefit Connecticut Children’s tiniest patient population.

Spotlight on Research...
FROM THE DIRECTOR’S DESK

I would like to welcome you to the latest edition of Neonatology News and introduce myself to the Connecticut Children’s family. My name is Jim Moore and I am the new Division Chief for Neonatal-Perinatal Medicine. It was exciting coming home to the Northeast from my most recent position as medical director of Dallas Children’s Level IV Neonatal Intensive Care Unit (NICU) and as a faculty member at UT Southwestern Medical School.

A WONDERFUL TRANSITION

I was born in Syracuse, New York, and spent a number of years growing up near my grandparents in Naugatuck, Connecticut. On my return to Connecticut, I was very fortunate to take over a thriving Neonatal Program from my predecessor, Vic Herson, MD, who has led this Division through remarkable growth and change. Vic not only expanded the clinical services during his tenure but was critical in the development of many programmatic, research and quality initiatives.

We are fortunate that Vic has remained in two important capacities as both the Chief of Pediatrics at Hartford Hospital and as Director of Outreach for our service line. It has been a wonderful transition; Vic and the entire faculty and Connecticut Children’s community have been welcoming and supportive during my first year here.

CARE AND CONTRIBUTIONS

In this issue of Neonatology News, I would like to highlight both the care we provide to our patients within our NICUs, and the contributions we make to advancing therapies – not just here in the United States but in our Global Health outreach efforts as well.

Our focus on neonatal care starts with new discovery. In this issue, we feature a conversation with David Sink, MD, and his colleague, James Hagadorn, MD, about improving quality outcomes and developing best practices in NICU clinical care in response to “Alarm Fatigue.” We also focus on some of the work of Adam Matson, MD, and his collaborators performing bench research, leading the way to understanding the GI tract physiology and reducing GI infections, such as Necrotizing Enterocolitis (NEC). This is but a small sample of the Division of Neonatology’s 15 research project presentations presented at this year’s Society for Pediatric Research National Meeting in Baltimore, Maryland.

Be sure to review the enclosed insert, which highlights some of our ongoing research as well as research published over the past year.

Our Global Health initiatives continue as well. Naveed Hussain, MD, and Lenny Eisenfeld, MD, led a team from Connecticut Children’s Medical Center and the University of Connecticut to the NICE Institute for the Newborn in Hyderabad, India, in October 2015. The team, including the physicians, two NICU nurses, one clinical nurse specialist, and one social worker, led multiple training sessions with the staff and medical providers to help set up the region’s first Infant Cooling Program for the treatment of Hypoxic Ischemic Encephalopathy (HIE) – babies born asphyxiated at birth and at risk for brain injury. The “Infant Cooling Program in Hyderabad, India,” was successfully subsidized by funds raised through our Foundation, and a Blanketrol III (an infant Cooling Device used to improve neurologic outcomes) was installed at a regional center in Hyderabad, along with a commitment for remote expert procedural support from Connecticut Children’s. Learn more on page 5.

Also, be sure to read about our new “Alex’s Library” at Connecticut Children’s NICU at UConn Health in Farmington and how our donors made it possible.

A BRIGHT FUTURE

I am very excited about the future here at Connecticut Children’s – from the development of new programs of treatment, advances in research, and improvements in quality clinical care to the physical changes that are coming to our NICUs. It is going to be an exciting time to be a part of the Connecticut Children’s family. Rest assured our focus will always be, first and foremost, on patient and family-centered care. It will be the new discoveries, innovation in quality patient care and education that will continue to differentiate us.

I look forward to taking our journey together.

New Division Chief Reflects on First Year at Connecticut Children’s Medical Center, continued from page 1.

PROGRAM STRENGTHS

Reflecting on his first year at Connecticut Children’s Dr. Moore cited the caring staff and sense of community across Connecticut Children’s and its Neonatal Intensive Care Units in Hartford and Farmington as definitive strengths of the program.

“The caring, friendly staff and our team-centered approach allow not only for the great care of our babies and families, but our involvement in education, outreach and research improves outcomes across our region,” Dr. Moore said. “The strong sense of dedication is reflected in the large number of people who have been here since the beginning, with one goal in mind – making children better,” he said.

EYE ON THE FUTURE

For all of the Division’s successes, one success is also a challenge, Dr. Moore noted. “We have been very busy and will need to expand our NICUs, in time, to meet the demand,” he said.

Another goal is to help Connecticut Children’s launch a new Telemedicine Program to provide consultative support for physicians and patients throughout the region.

“I was part of the development of the Telemedicine Program at Dallas Children’s, and we are currently working on developing our own capabilities in Telemedicine at Connecticut Children’s as well,” Dr. Moore said. “I plan to continue working with our team here to utilize technology that will expand our ability to care for patients beyond the four walls of our hospitals and clinics.”

From the Bench to the Bedside

By James Moore, MD, PhD, Division Chief, Neonatal-Perinatal Medicine
Steven’s Incredible Journey Begins with 140-Day NICU Stay

Megan Lefevre’s first pregnancy was a difficult one. She threw up about three times a day and lost 12 pounds in the process.

But the difficulties she endured during her pregnancy did not prepare her or her husband, Paul, for the challenges that lay ahead when their son, Steven, was born prematurely at 27 weeks on Oct. 24, 2012 – three months early.

“I woke up with terrible back pain and my stomach was as hard as a rock,” the Woodbury resident recalled.

Following a 12-hour stay in a local hospital, Megan was transferred to UConn Health at John Dempsey Hospital for the next four days. While there, she gave birth to Steven, who weighed 2 pounds, 15 ounces, and measured 15½ inches long.

But after 28 hours in Connecticut Children's Neonatal Intensive Care Unit (NICU) in Farmington, Steven was rushed to Connecticut Children’s Medical Center NICU in Hartford, where he underwent emergency surgery to fix a perforation in his small intestine.

It was the first of several surgeries, dozens of procedures and “countless scares” for Steven’s parents. Steven remained in Connecticut Children’s Level 4 NICU for the next 140 days and returned several times to the Medical Center for follow-up treatment and hospitalization.

BIG SCARES
“Our first big scare was driving from Farmington to Hartford,” said Megan, who teaches first grade in Oakville. “We worried whether our baby would live.”

“At one week old, Steven had a grade 2 brain bleed and increased fluid,” Megan said. “The following week, he had a grade 3 brain bleed with increased fluid. The blood vessels in premature babies’ brains are very fragile and can burst easily,” she explained.

Their second big scare came when Steven needed surgery for hydrocephalus, a condition in which fluid accumulates in the brain after brain bleeds. Initially, a reservoir was placed from which the neurosurgeons could draw off the extra fluid as needed.

“His heart rate would drop and his blood oxygen level would drop,” Paul said. “Sometimes he would turn gray, other times he would turn blue and need oxygen resuscitation.”

After undergoing shunt surgery to permanently drain the extra fluid, Steven was remarkably better, his father said.

OVERCOMING THE OBSTACLES
From pneumonia and chronic lung disease to an enlarged liver and urinary tract infections, Steven fought many battles in his first few days, weeks and years of life. From weekly eye exams for grade 3 retinopathy of prematurity that can lead to blindness – to surgery for a tethered spinal cord – he also underwent numerous procedures and has been followed by many specialists along the way, including Marilyn Sanders, MD, a Connecticut Children’s neonatologist, who cared for Steven during his NICU hospitalizations.

“Steven came home from the hospital in March of 2013,” his mother said. “He began rolling around at 10 months, sitting at 12 months, crawling at 18 months and walking at 2 years of age.”

In October 2015, at age 3, he started preschool. “He can walk, he can talk. He’s an easygoing child, who is very likeable and very social,” Megan said.

GRATEFUL FOR CARE
Steven’s family – which includes step-brother Matthew, 17, and sister Shayla, who turned 1 in March – is happy about his progress. “We are so grateful for how well he is doing because of the amazing help he received,” said Megan, who keeps in touch with many of Steven’s caregivers at Connecticut Children’s. “He had the best care possible.”

Steven, who will be 4 years old in October, is a happy, easygoing child who will be returning to preschool in the fall. He is pictured here with his dad and mom, Paul and Megan Lefevre, and his sister Shayla, age 1.
A former patient of Connecticut Children’s Neonatal Intensive Care Unit returned to the Medical Center’s Farmington NICU in February to celebrate the opening of a library named in his honor.

Eight-year-old Alex Skulte, who was born prematurely at 26 weeks, weighing only 1 pound, 15 ounces, returned with his family Feb. 19th to take part in a ribbon-cutting ceremony to open Alex's Library at Connecticut Children’s NICU at UConn Health Center.

“Seeing Alex’s Library for the first time brought tears to my eyes,” said Nicky Schmidt, Alex's mother, who is Co-Founder and President of The Baby Alex Foundation, which was established in 2008 to support pediatric brain injury research. “I was amazed at what a beautiful space had arisen from the ashes of the storage closet. The colors are perfect, the chairs, comfortable and the space warm and cozy.”

**A PEACEFUL RETREAT**

The library, which was completed last fall, will serve as a peaceful retreat and as a valuable resource for patient families. The Baby Alex Foundation donated $10,000 to help support the cost of furniture, books and other materials as well as ongoing maintenance to the room; it partnered with the nonprofit Team Making a Difference in this donation.

The library’s physical transformation was made possible thanks to a generous donation of time and services by KBE Building Corp. of Farmington, its subcontractors, and Tecton Architects of Hartford.

“We are so thankful to all who helped bring this new library to life. From KBE Building Corp. to the Baby Alex Foundation, so much love, hard work and dedication went into this project in support of our patient families” said James Moore, MD, Division Chief of Connecticut Children’s Neonatal Intensive Care Units. “It is a valuable resource that will continue to bring comfort to so many throughout their care journey at Connecticut Children’s NICU in Farmington.”

**AN INSPIRATION**

Facing tremendous odds from birth, Alex had suffered brain hemorrhaging, meningitis and other complications before he was six months of age. Although he still suffers from epilepsy and a physical disability, he is a determined little boy who has extraordinary abilities in math and languages and hopes to inspire others to face life with courage.

“Alex could not have been prouder,” Nicky said of her son’s reaction to the new library, the first of its kind to be opened by the Baby Alex Foundation. “We hope this library, filled with inspirational books, will provide comfort, peace and hope to families whose children are in the NICU. We also hope that Alex’s autobiography, available in the library, will help all families believe.”

Alex and his family – mom, Nicky Schmidt; dad, Erik Skulte; and his sister, Isabella – relax inside Connecticut Children’s new NICU library at UConn Health Center in Farmington.

Among those participating with the Skulte family in the ribbon-cutting ceremony for Alex’s Library were (l-r) Ted Cutler, CEO of Tecton Architects; Kathryn Mease, Interior Designer, Tecton Architects; Michael Kolakowski, Jr., Project Manager of KBE Building Corp.; and Michael Kolakowski, President and CEO of KBE Building Corp.
Successful Infant Cooling Program Launched in India

It’s all about “Cooling the Kids.”

Last year, Connecticut Children’s Medical Center neonatologists Naveed Hussain, MD, and Leonard Eisenfeld, MD, made it their mission to help launch an Infant Cooling Program in Hyderabad, India, for infants with moderate hypoxic brain injury.

Dr. Hussain and Dr. Eisenfeld, along with several colleagues from UConn Health Center, traveled halfway around the world in October 2015 to implement the program at the non-profit Neonatal Intensive Care & Emergencies (NICE) Institute for the Newborn in Hyderabad, a city of 8.7 million people.

According to Dr. Hussain, lack of oxygen to the brain in newborns – or birth asphyxia – is a leading cause of infant mortality in India, where death within the first month of birth accounts for 65 percent of infant deaths. In babies who survive resuscitation at birth, brain injury manifests as Hypoxic Ischemic Encephalopathy or HIE.

“Infants with mild HIE recover without much medical intervention, and those with severe HIE have a high mortality and morbidity despite medical treatment,” said Dr. Hussain, who has been part of Connecticut Children’s global health presence in India since 2008. “However, those with moderate – or Stage II – HIE can best be treated by total body cooling, the only effective therapy for HIE.”

NEONATAL THERAPEUTIC HYPOTHERMIA

Neonatal therapeutic hypothermia – or cooling – is a relatively new treatment option in which an infant’s total body temperature is decreased shortly after birth to slow the progression of injury from oxygen deprivation at birth and reduce the chance of severe brain damage.

Apoptosis – or programmed cell death – can begin with a lack of oxygen to the brain. “Immediately, the baby’s brain cells begin to die,” Dr. Eisenfeld explained. “You can prevent some of that from happening by lowering the baby’s core body temperature, about four degrees lower than normal. To be most effective, this therapy has to be started within the first six hours after birth.”

PROJECT ROLLOUT

The goals of the Infant Cooling Program for Hyderabad, India, were to train local staff and area professionals on the uses, protocols and procedures of Infant Cooling and provide them with the specialized equipment needed to perform the procedure.

Organized under the auspices of Connecticut Children’s Medical Center – Global Health Initiative, the mission began in July 2015 with an appeal to raise money for the necessary equipment and supplies. Donors to Connecticut Children’s Medical Center Foundation quickly responded and helped raise the $11,000 needed for the cooling equipment and an additional $4000 to run the program for two years.

With meticulous preparation of protocols and procedures by NICU professionals from UConn Health – Terry Donovan and Kathy Miller – and outfitted with blue “Cool the Kids” team t-shirts, the two Connecticut Children’s neonatologists and other members of the UConn Health Center staff met up with Dr. Padmanabh Reddy and the rest of the Hyderabadi team to conduct the Hypothermia Workshop Oct. 16-19.

“In six months’ time, we showed excellent outcomes in 12 infants,” Dr. Hussain said. “We are now preparing to expand the program both in its capacity and in the area covered in the villages surrounding the city of Hyderabad,” he said.

2016 GOALS

As part of a Phase II initiative, Dr. Hussain said they are seeking additional funds to purchase a second Blanketrol® III cooling system to serve as a backup to the first and to increase the capacity to treat more infants at a time. They also plan to develop training materials and purchase supplies for implementation of the Indian Version of the Helping Babies Breathe® Program in local villages currently served by the Community Health & Intervention Program (CHIP) of the NICE Institute. The Team hopes to raise $30,000 by Dec. 31, 2016.

To donate to the Global Health Initiative – Infant Cooling Program for India, please contact the Foundation at 860.837.5700, or visit www.connecticutchildrensfoundation.org/infant_cooling.
The advantages of feeding human milk to newborns are many. Studies have shown that human milk helps to prevent childhood obesity, lower infection rates and improve cognitive function in children, among other benefits. For mothers, breastfeeding protects against later breast cancer.

The Connecticut Perinatal Quality Collaborative (CPQC), of which Connecticut Children’s Medical Center Neonatal Intensive Care Unit (NICU) is a founding member, promotes the exclusive use of mother’s own milk (MOM) throughout the infants’ hospitalization, including babies cared for in the NICU.

“At Connecticut Children’s NICU, we continue to prioritize an exclusive human milk diet for all newborns. In addition to the general benefits for all babies, a breast milk diet also protects against a serious complication of prematurity, necrotizing enterocolitis (NEC),” said Marilyn Sanders, MD, a neonatologist at Connecticut Children’s, who has played a leading role in the CPQC.

NEC is a devastating disease affecting the intestines of premature infants. It can produce serious complications, such as disruption of the gut lining and tissue death, and can be life-threatening. Although research is underway, there are still many unknowns about the disease and its prevention.

**HI-MOM INITIATIVE**
The mission of the CPQC – a partnership of Connecticut Children’s and Yale-New Haven Children’s Hospital, with sponsorship by the March of Dimes and the Connecticut Hospital Association – is to promote high quality maternal and newborn care across the continuum of acuity – from community hospital care to specialized care provided by tertiary referral hospitals. The CPQC, now in its ninth year, launched the HI-MOM initiative in 2015.

“We did a formal launch last spring, inviting all 24 birthing hospitals in Connecticut to participate. To date, 21 hospitals have participated in HI-MOM,” Dr. Sanders said.

The goals of HI-MOM, which stands for Human Infants with Mother’s Own Milk, are to increase the percentage of healthy newborns receiving exclusive breast milk feeding during the entire birth hospitalization, and to increase the use of exclusive mother’s own milk for infants in the NICU prior to discharge.

Workgroups were formed to focus on three areas: 1) Antenatal (before birth; during or relating to pregnancy; prenatal); 2) Well Baby; and 3) the Neonatal Intensive Care Unit.

“All three workgroups have developed work plans and quality improvement projects using PDSA methodology—Plan, Do, Study, Act,” Dr. Sanders said. Results will be shared at the next HI-MOM meeting in September.

**IMPROVING OUTCOMES**
“The HI-MOM Initiative of the Connecticut Perinatal Quality Collaborative is an extraordinary show of teamwork and interprofessional effort to improve the utilization of breast milk in newborns and subsequently improve neonatal outcomes,” said Mary Cooper, MD, Vice-President of Quality at the Connecticut Hospital Association.

“Multiple birthing hospitals across the state have identified techniques for improving the use of breast milk, and they have shared those techniques with one another,” she said.

In addition to collaborating on the HI-MOM Initiative, the CPQC has been awarded a contract to work with the Department of Public Health to create a website of resources for mothers who are breastfeeding.

“We also have the opportunity to obtain grants to support our collaborative activities,” Dr. Sanders said. “Perinatal collaboratives are powerful vehicles to assure quality assurance.”

The Hi-MOM initiative is an example of the power of multidisciplinary groups to promote evidence-based care. Several years ago, March of Dimes sponsored several large state collaboratives to implement projects designed to decrease the number of non-medically indicated deliveries at less than 39 weeks of pregnancy. As a result of this project, admissions to NICUs in those hospitals decreased.

“‘Delivery on demand’ is gone,” said Dr. Sanders. “You can’t schedule a repeat C-section at less than 39 weeks unless there is a medical indication for either the mother or the fetus. These are the kinds of initiatives that improve the quality of care.”

For more information about the Connecticut Perinatal Quality Collaborative (CPQC), please visit www.ctpqc.org.
Imagine dozens of alarms continuously beeping and vying for your attention. Now, imagine that some of the alarms require immediate attention while others require none at all. An overload in the Neonatal Intensive Care Unit (NICU) can be exhausting for caregivers and can lead to a condition called “Alarm Fatigue.”

At Connecticut Children’s Medical Center, neonatologists David Sink, MD, and James Hagadorn, MD, began investigating the issue of Alarm Fatigue in late 2014 as a Quality Improvement initiative to find ways to reduce the noise from “nuisance alarms” that require no action on the part of the caregiver.

“The alarms would pull the nurses away from their current task, which we thought could be a safety issue,” Dr. Sink said. “We needed a situation where all the alarms mean something.”

“Alarm fatigue has been a gradually increasing problem due to the proliferation of machines used for patient care that use noise or lights or both to attract the attention of care providers,” Dr. Hagadorn explained. “In an intensive care setting this can result in many hundreds of alarms per day. It has become widespread to the point that it’s receiving attention from national organizations interested in patient safety.

“The worst case scenario is that excessive alarms may result in staff becoming desensitized and not responding promptly to an important clinical event where a patient needs help,” Dr. Hagadorn said.

**NOISES IN THE NICU**

In the NICU, many machines emit sounds – from ventilators and cardiorespiratory monitors to IV pumps and breast milk warmers. With Quality Improvement team input, Drs. Sink and Hagadorn pinpointed a common source of nuisance or non-actionable alarms in the NICU: pulse oximeters – devices used to continuously measure the degree of oxygen saturation of the blood circulating in premature babies.

“Clearly, the pulse oximeters created the most alarms,” said Dr. Sink, who serves as Medical Director at Connecticut Children’s NICU at UConn Health Center. Alarms will sound when a baby’s saturation level is too low or too high, even though the saturation levels typically fall back within the normal range on their own.

“We analyzed data from our oximeters and found that babies were not spending any more time in oxygen saturation that were too low or too high,” he said.

**OXYGEN SATURATION TARGETS**

At Connecticut Children’s, the target range for oxygen saturation is 90-94 percent for the tiniest babies. The alarms will sound if a baby’s oxygen saturation level dips to 85 percent or rises to 96 percent.

“Premature babies will have lower oxygen saturation targets than our more mature babies, as they are at highest risk for retinopathy of prematurity; too little can increase mortality and long-term development outcomes.

In studying the issue, Dr. Sink and Dr. Hagadorn found that by making a few changes to the monitor settings, implementing policy changes for oxygen saturation targets and using visual reminders at the bedside, they were able to reduce 80 percent of nuisance alarms from the pulse oximeters.

“Our senior fellow, Kendall Johnson, MD, supervised a quality improvement project that documented a substantial reduction in alarms for premature infants,” Dr. Hagadorn noted.

“It was very successful,” Dr. Sink said. “We eliminated 1,500 nuisance alarms per day in each NICU. We are now down to about 350 nuisance alarms per day.”

**SHARING SUCCESSES**

As members of the Vermont Oxford Network (VON), a collaboration of more than 1,000 neonatal ICUs worldwide that work together to improve outcomes for premature infants, Drs. Sink and Hagadorn were invited to present their findings at the 2015 iNICQ series in October. For 2015, iNICQ focused on alarm safety and safe oxygen therapy for premature infants. Multidisciplinary teams from 118 NICUs participated.

“Our key message was teams should work together to try to identify and reduce alarms that don’t actually require a care provider to intervene for the baby,” Dr. Hagadorn said. “The idea is to preserve the ability to identify all events where intervention is needed, but reduce what are called “non-actionable” alarms that add to alarm burden without improving care.”

Further study will allow them to examine other types of nuisance alarms. “This has been a good start, but we still have more work to do in neonatal ICUs and in other areas of hospitals as well,” Dr. Hagadorn said.

David Sink, MD, Medical Director of Connecticut Children’s NICU at UConn Health Center in Farmington (pictured), and colleague James Hagadorn, MD, led a Quality Improvement initiative that has significantly reduced the number of nuisance alarms in each of Connecticut Children’s NICUs, thereby reducing “Alarm Fatigue.”
Every year, Connecticut Children’s Medical Center cares for hundreds of premature or high-risk newborns in our Level 4 Neonatal Intensive Care Unit (NICU) in Hartford and at our Level 3 NICU in Farmington at UConn Health Center. Our Hartford NICU houses 32 beds, while our Farmington NICU is equipped with 40.

On many days, those beds are filled to capacity.

This fall, donations towards Connecticut Children’s 20th Anniversary Gala Bid4Kidz fundraiser will help equip both of our NICUs with specialized beds called Giraffe Omnibeds. Omnibeds serve as a site for housing our most critically ill babies, providing needed humidity, protection against infections and a quiet setting to assist and improve their development.

Often, up to 50 percent or more of babies cared for in our units are critically ill and would benefit from this technology, which research has shown is the best type of bed for these babies. Currently, our NICU in Hartford is equipped with eight Giraffe Omnibeds, but is in need of eight more. Our Farmington site is not equipped with this technology and is seeking six Omnibeds for our most critically ill babies. The cost of each bed is $34,000.

Connecticut Children’s Anniversary Gala, which features a magical “Emerald Cirque Wizard of Oz” production, will be held Saturday, Nov. 12, at the Connecticut Convention Center. Donations towards the Giraffe Omnibeds are welcome at any time.

To help equip our NICUs with new Giraffe Omnibeds, please call Connecticut Children’s Medical Center Foundation at 860.837.5700. For Gala ticket information, please visit bit.ly/CTChildrensGala.
Necrotizing enterocolitis (NEC) is a devastating disease affecting the intestines of premature infants and can be life-threatening. It is the most common intestinal emergency among premature babies and occurs when tissue in the small or large intestine is injured or inflamed and begins to die off.

Although the exact cause is unknown – and prevention is unclear – researchers at Connecticut Children's Medical Center, including Neonatologist Adam Matson, MD, and colleagues are studying the disease and looking for answers that may lie within a baby’s intestinal microbiome.

NEC AND THE INTESTINAL MICROBIOME
NEC is thought to be associated with the community of microbes living within the intestine called the intestinal microbiome. One study, now in its third year, is a collaborative effort with physician-researchers at Connecticut Children’s and colleagues at the University of Connecticut (Storrs) School of Nursing, looking at the intestinal microbiome and the role of human milk.

“There are live microbes in human milk,” Dr. Matson said. “We are looking at how breast milk influences the intestinal microbiome.”

In premature infants, a breast milk diet is associated with a decrease in NEC, while prolonged exposure to unnecessary antibiotics increases the risk of the disease.

MICROBIOME RESEARCH
To study the microbes, the researchers collect stool samples in Connecticut Children’s Neonatal Intensive Care Units (NICUs) in Hartford and Farmington, isolate microbial DNA, and then use the DNA sequences to define the community of microbes. This microbial sequencing step occurs in collaboration with researchers at the University of Connecticut (Storrs). “We have to collect thousands of stool samples, as many as 3,000 a year,” Dr. Matson said. “We also take stool samples from babies that have gotten sick and transfer them into mice so we can better understand how the microbes cause inflammation.”

According to Dr. Matson, all babies less than 32 weeks of age and less than 1500 grams (about 3 pounds) in birth weight are being studied. “We know these premature babies are at risk for a lot of different diseases – asthma, autism, neurological impairments, allergies and NEC. NEC affects about 5 to 10 percent of babies less than 1500 grams,” he said. “About half need to have surgery. It’s a significant problem.”

Colleagues are also conducting microbiome research looking at the relationship between the gut and the brain and the impact of the microbiome on liver function.

“The infrastructure for collecting, storing, processing and analyzing microbes is now in place,” Dr. Matson said. “Our long-term goal is to create a shared repository that will benefit multiple researchers at Connecticut Children’s and improve the care and outcomes of premature babies.”

If you would like to support research in Connecticut Children’s Division of Neonatology, please call the Foundation at 860.837.5700.
The Division of Neonatology engages in basic, clinical and translational areas of investigation, including human milk, breastfeeding medicine/lactation, fetal/neonatal allergy and immunology, and oxygen targeting and associated toxicity. Below is a sampling of research published within the past year from our Division of Neonatology at participating sites, including Connecticut Children's Medical Center, University of Connecticut Health Sciences Center, and University of Connecticut (Storrs):


Evidence that FcRn mediates the transplacental passage of maternal IgE in the form of IgG anti-IgE/IgE immune complexes. A. Bundhoo • S. Pawegio • E. Rafi • A. Dhongade • R. S. Blumberg • A.P. Matson. Clinical & Experimental Allergy • Feb 2015.


Long-term exposure to house dust mite leads to the suppression of allergic airway disease despite persistent lung inflammation. S. J. Bracken • A. J. Adami • S. M. Szczepanek • M. Ehsan • P. Natarajan • L. A. Guemsa • N. Shahriari • E. Rafi • A. P. Matson • C. M. Schramm • R. S. Thrall. International Archives of Allergy and Immunology • Apr 2015.


Figure. Receiver operating characteristic curves representing optimal thresholds of exclusive breastfeeding required to maintain any breastfeeding corresponding to the Healthy People 2020 breastfeeding objectives time points: at 3 months, 6 months and 1 year. A. E. Brownell • J.J. Hagadorn • M. M. Lussier • G. Goh • K. N. Thevenet-Morrison • T. J. Lerer • V.C. Herson • C. R. Howard. Dataset • Apr 2016.