

OHIO PERINATAL RESEARCH NETWORK (OPRN)



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A Research Collaboration between:
Nationwide Children's Hospital,
The Research Institute at Nationwide Children's Hospital
The Ohio State University and
The Ohio State University Medical Center





Mission Statement

The mission of the **Ohio Perinatal Research Network** is to improve the lives of children and families in Ohio and beyond by discovering and implementing actions that measurably reduce prematurity associated morbidity and mortality.

Executive Summary

The researchers of the OPRN share a belief that events in the preconceptional and prenatal periods underlie much of neonatal, infant and childhood morbidity and mortality. Intrauterine inflammation is a common pathway leading to adverse pediatric health outcomes. The gestational age at onset, duration, intensity, location, and the primary cause of inflammation are important variables that affect the short and long term health outcomes. Consequences of intrauterine inflammation include premature onset of parturition with or without preterm birth, and neonatal events that may affect ultimate childhood health.

However, the morbidities associated with preterm birth, such as chronic lung disease, necrotizing enterocolitis, and periventricular leukomalacia do not affect every preterm infant. This variation in the incidence and severity of morbidities among preterm infants born at the same gestational age is also incompletely understood.

Although the immune response of the maternal-fetal dyad to intrauterine inflammation is a promising avenue of investigation, research in this area has been hampered by inter- and intra-disciplinary differences in conceptional models; definitions, data collection, and organizational competition. The OPRN is poised to overcome these barriers by developing an integrated centralized data and specimen repository accessible to collaborating OPRN researchers and institutions. The repository will include information about pregnancy outcome, neonatal morbidity and mortality, and ultimately childhood outcomes. This clinical data will be linked to appropriately stored and catalogued biological fluids and tissues, and will serve as a unique resource to speed the pace of discovery of the causes of preterm birth and infant/childhood morbidity and mortality.

OPRN Collaborating Institutions, Centers, and Departments

Nationwide Children's Hospital (NCH)

- Department of Pediatrics

The Research Institute at Nationwide Children's Hospital

- Center for Perinatal Research
- Center for Innovation Pediatric Practice
- Center for Biobehavioral Health
- Biopathology Core
- Bioinformatics Core

The Ohio State University Medical Center (OSUMC)

- Division of Maternal and Fetal Medicine

The Ohio State University

- College of Medicine
 - Center for Clinical and Translational Science
 - Department of Pediatrics
 - Department of Obstetrics and Gynecology
- College of Public Health
- Department of Epidemiology
- College of Nursing

Potential Collaborators

NCH Centers and Departments

- Center for Microbial Pathogenesis
- Center for Molecular and Human Genetics
- Pathology

The Ohio State University Medical Center (OSUMC)

- Genetics
- Pathology
- Institute for Behavioral Medicine Research
- Oral Biology
- Center for Microbial Interface Biology

The Ohio State University

- Psychology
- Kirwan Institute
- Social Work
- Initiative in Population Research

Ohio Perinatal Quality Collaborative (OPQC)

NCH Affiliates

OhioHealth

Mount Carmel Health System

The Facts

What is Happening in the United States?



The incidence of preterm birth rose by 17.2% between 1990 and 2006 (from 10.6% to 12.8%, March of Dimes Statistics) and the rate in Ohio rose by 21% between 1996 and 2006. More than half million infants were born preterm in 2006. Three factors explain the rise:

- More accurate pregnancy dating with ultrasound has revealed more preterm births than were previously recognized.
- Increased use of fertility treatment has led to more preterm births mainly in twins and triplets (more than 60% are born preterm) and the preterm birth rate is also higher after fertility treatment in single pregnancies.
- Later preterm births (34 to 36 weeks) have increased as obstetricians have chosen preterm delivery as a safer choice for pregnancies complicated by maternal high blood pressure, diabetes, poor fetal growth and other problems. The rate of still birth has declined but the rate of preterm birth has climbed substantially.

The U.S. infant mortality rate is higher than rates in most other developed countries. The relative position of the United States in comparison to countries with the lowest infant mortality rates appears to be worsening. In 2005, the United States ranked 30th in the world in infant mortality. Previously, the United States international ranking in infant mortality was 12th in 1960 and 23rd in 1990.

- The leading causes of infant mortality in the United States and in Ohio are preterm birth and birth defects. The majority of infant deaths occur due to preterm births, especially for babies born before 32 weeks of gestation. In 2005 the infant mortality rate in Ohio was 8.2 per 1,000 live births (U.S. Rate = 6.9 per 1,000 live births).
- In 2005, the preterm birth rate in Ohio was 13.3%, (U.S. rate = 12.8%).
- Nationally, the rate of non-Hispanic black infants who die before 1 is almost double the rate for non-Hispanic white infants.
- Deaths due to preterm birth for non-Hispanic black infants in 2005 were high relative to their proportion within the general population: only 28 percent of live births were non-Hispanic black infants, but non-Hispanic black infants accounted for 56 percent of all death due to preterm birth.
- Preterm births generated more than \$26.2 billion in medical and educational costs and lost productivity in 2005

Citation: MacDorman MF, Mathews TJ. Recent Trends in Infant Mortality in the United States. NCHS data brief, no 9. Hyattsville, MD: National Center for Health Statistics. 2008.

What is Happening in Franklin County?



- Each year 145 infants in Franklin County die before their first birthday
- For the last 20 years in Franklin County, the infant death rate for non-Hispanic black infants has been more than double that for non-Hispanic white infants
- Prematurity accounted for 92 (or 62.6 percent) of 148 infant deaths in Franklin County in 2005



Infant Mortality Rates

INFANT MORTALITY RATE 2005

Franklin County	<input type="text" value="8.4"/>	8.4
State of Ohio	<input type="text" value="8.3"/>	8.3
United States	<input type="text" value="6.9"/>	6.9

Rate of deaths to infants under one year of age per 1,000 live births.

(Sources: Franklin County and Ohio: Ohio Vital Statistics System; U.S.: National Vital Statistics Reports)

FRANKLIN COUNTY INFANT MORTALITY RATE BY RACE 2005

Non-Hispanic Black	<input type="text" value="15.7"/>	15.7
Non-Hispanic White	<input type="text" value="6.7"/>	6.7
Hispanic	<input type="text" value="3.9"/>	3.9

Rate of deaths to infants under one year of age per 1,000 live births.

(Sources: Franklin County and Ohio: Ohio Vital Statistics System; U.S.: National Vital Statistics Reports)

Delivering a Healthy Daughter Fades Trauma of Preterm Birth Losses

The dread of more heartache stopped Jeanie and William Sieck from trying again after losing two sons, each born too early two years apart. Jeanie first became pregnant in 1997. She lost their son after going into preterm labor at 24 weeks of pregnancy.

“I believed this was a fluke,” exclaims Jeanie. “We decided to try for another baby right away.” Sadly, a second son was lost after delivery at 22 weeks.

“The thought that this could happen again made us give up, it was too traumatic. But then my dad passed away in 2005.” Jeanie’s father had never stopped hoping for grandchildren, he even had researched surrogacy. Losing him reminded Jeanie and William how much family meant to them and inspired the couple to find resources to help Jeanie carry a child full-term.

After becoming pregnant a third time, Jeanie was referred to the Prematurity Prevention Program at The Ohio State University Medical Center. “I knew having two preterm births greatly increased my risk of having another,” explains Jeanie. “But I learned that progesterone shots might help me reduce my risk of having another preterm baby.”

During her pregnancy, Jeanie received 21 weekly shots of a progesterone formulation called 17P and her cervix was checked frequently with ultrasound. She was put on bed rest starting the fourth month and also had to manage gestational diabetes. “It was all worth it! Our daughter Charlotte was born healthy at 38 weeks.”

“We’re excited and hopeful to have a second child. We plan to do this all again.”

Caring for Infants Born Preterm at Home

Kim and Charlie Ellis know the sadness and challenges of premature birth. Their first child died after being born too soon. So when daughter Paris was born early and weighed less than two pounds, they were afraid they would lose her too.

Paris was hospitalized during the first six months of her life. It was frightening to know that a ventilator was keeping their newborn alive. Kim says any time there seemed to be hope, something would go wrong. “One time she would be breathing on her own and then she wouldn’t.”

Once Paris left the hospital, her well-being was in her family’s hands. Both parents needed to learn how to take care of a “preemie” without having doctors, nurses, and therapists standing right next to them. While it was tough, Kim adapted to the 24-hour care and monitoring that Paris required, which included being on a feeding tube and oxygen.

Today Paris is eating and breathing on her own. Her parents have turned their attention to their daughter’s developmental progress because the risks of having disabilities and behavioral problems are greater for children who are born prematurely.



“You don’t understand what it’s like until you have a premature baby.”



Born Preterm

Becky’s first pregnancy was normal, so she knew something wasn’t right when complications developed early in her second pregnancy. She was right. Little Amy was born at just 26 weeks gestation time, and she weighed only 1.75 pounds. She was rushed to Nationwide Children’s Hospital shortly after her birth, where she spent the first 99 days of her life in the Memorial Tournament Neonatal Intensive Care Unit (NICU).

The Memorial Tournament NICU at Children’s is one of the largest and most sophisticated in the county. Children’s staff is dedicated to not only treating, but also to preventing all complications from premature births. Babies born too early can face a host of challenges: Important organs, such as the heart, lungs, stomach and skin may not be mature enough to function without special help.

The NICU team—more than 35 physicians and 130 nurses—has worked hard to find solutions for the tiniest babies, and they have developed Small Baby Guidelines that create a uniform approach to the family centered care of extremely premature babies like Amy.

Amy, now age 4, was born at 26 weeks and just 1.75 pounds. She was one of the first to be treated at the Memorial Tournament NICU using the Small Baby Guidelines.

Through research, the OPRN seeks to better understand the causes of preterm birth in hopes of measurably reducing prematurity-associated morbidity and mortality.

Research Insights

How can the number of premature births be reduced?



Jay Iams, MD, Division of Maternal and Fetal Medicine at The Ohio State University Medical Center

Most people think that preterm birth is a problem that's been solved by the modern technology of neonatal intensive care, but that's a misperception. Despite wonderful advances in care for tiny preterm newborns, preterm birth is still the leading cause of perinatal and infant deaths in Ohio and America. Preterm birth affects 20,000 families in Ohio, including 2500 in Franklin County every year, many of whom had no apparent risk factors. We have learned how to prevent recurrent preterm birth in some women, and we're always exploring new methods in clinical research projects. Our current projects are aimed at understanding the higher rates of preterm birth in African-American women, and at links between depression, stress, and preterm birth in women pregnant for the first time. We're lucky in Columbus to have developed a team of experts devoted to solving the riddles of preterm birth so that every baby can be born healthy after a full term pregnancy.



Leif Nelin, MD, Division of Neonatology and Center for Perinatal Research at Nationwide Children's Hospital; Associate Professor of Pediatrics at The Ohio State University College of Medicine

The causes of spontaneous preterm deliveries are quite complex, and involve environmental and/or genetic factors. There have been advances in our understanding of the cascade of events that cause uterine activation and labor, but the exact causes and interactions that result in a preterm delivery remain a mystery. This gap in knowledge must be addressed through innovative research programs.

Through a large-scale prospective, population-based cohort and specimen data collection process, the OPRN will provide the foundation for a collaborative research program to elucidate the genetic and clinical factors that underlie preterm deliveries. Additionally, this network will allow researchers to gain knowledge in the early identification of adverse outcomes that preterm infants are at such high-risk of developing. The OPRN is uniquely poised to provide scientific answers to the current national epidemic of preterm birth, which will result in decreased preterm delivery and infant mortality for Ohio and beyond.

Our Children's Future



**Steven Allen, MD, Chief Executive Officer
Nationwide Children's Hospital, Columbus Ohio**

Nationwide Children's Hospital and The Ohio State University and its Medical Center are embarking upon a joint collaboration to establish the Ohio Perinatal Research Network "OPRN." This collaboration seeks to improve the lives of children and families in Ohio and beyond by discovering and implementing actions that measurably reduce prematurity associated morbidity and mortality.

Preterm birth rate statistics locally and nationally are sobering. In the United States preterm births rose 17% and more than a half million infants were born preterm in 2006. In 2005, the preterm birth delivery rate in Ohio was 13.3%, higher than the U.S. rate of 12.8%. In this day and age the failure of the U.S. to perform in this area is inexcusable.

The OPRN researchers will scientifically examine an array of factors that contribute to the increased risk of preterm birth. One very obvious factor to be examined is the pronounced health disparities associated with African-American infant deaths related to preterm birth. African-American preterm births are strikingly high within the general population. African-Americans comprised 28% of all live births, but counted for 56% of all infant deaths due to preterm births. These statistics make the infant death rate twice that of white infants. The intent of the OPRN is to help all concerned communities answer the questions: Why is this happening? What can we do to ensure our babies are born healthy? What can we do to minimize the risk of preterm birth in all mothers?



**Steven Gabbe MD, Senior Vice President for
Health Sciences, The Ohio State University**

One of the most remarkable strengths of the Ohio Perinatal Research Network (OPRN) is the continuum of patient care that connects mothers who give birth to preterm infants at OSUMC and the preterm infants cared for and treated at NCH. Both institutions play a critical role in helping sustain this fragile family unit. The families with preterm infants are faced with sometimes insurmountable obstacles. Our physicians have worked collaboratively for years to administer top notch care for mothers, infants, and families with preterm infants.

With preterm births on the rise in the United States and in Ohio, our physicians inevitably understood that this joint research collaboration was needed to help families and communities answer and better understand the factors contributing to the impacts of preterm birth. The Ohio Perinatal Research Network is well poised to explore the array of factors associated with the increase of preterm births. It is our hope that this research collaboration will serve as a foundation to bring prematurity to the forefront of national health policy conversations on the health and well being of families.

A Joint Collaboration



Wiley W. "Chip" Souba Jr., MD, Chief Executive Officer, The Ohio State University Medical Center and Dean, The Ohio State University College of Medicine

The joint research collaboration between Nationwide Children's Hospital and The Ohio State University to fight prematurity through innovation in research represents each institution's unfettered commitment to research and its ability to shape the future of medicine by creating, disseminating, and applying new knowledge, and by personalizing health care to meet the needs of each individual. The OPRN clinical and data specimen research repository will serve as a valuable resource to assist in implementing research programs that will ultimately shape the future of medicine through personalized health care. The myriad of factors leading to and resulting from preterm birth are different for each individual. It is our hope that the OPRN will pave the way to translating research on prematurity from the bench to bedside.



Stanley Lemeshow, Dean, The Ohio State University College of Public Health

The vision of the College of Public Health at The Ohio State University is to be a leader in public health research and education with local impact and global significance. The Ohio Perinatal Research Network (OPRN) supports this mission by seeking to improve the health of the people of Ohio and beyond. The potential of the OPRN to foster future interdisciplinary research on prematurity is exponential. This collaboration will speed the pace for discovery for the next generation of public health practitioners, health care managers and scholars.

Not only will the OPRN serve as a foundation for future research on prematurity, it will also grow population-based research to examine the long-term impact of preterm birth on children, families, and communities. Success in these research areas will enable health care providers, communities, and local governments and the federal government to implement programs to better train the public health workforce, and advance knowledge on health disparities of ethnic, racial and cultural minorities. The OPRN can also help bridge the gap between community partnerships through educational engagement and community-based research. The penultimate goal is to translate research into practice to prepare and equip our families to prevent preterm births.



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