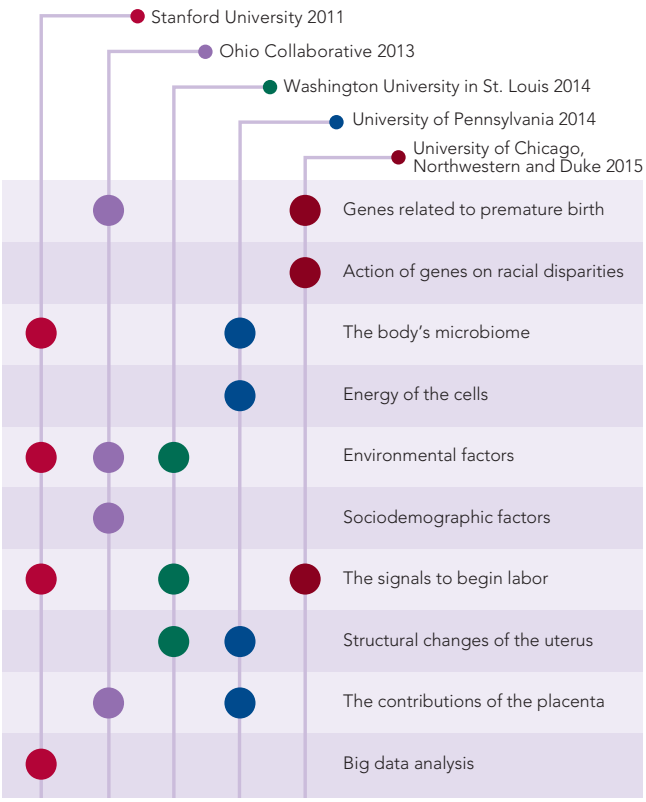
march of dimes®
A FIGHTING CHANCE FOR EVERY BABY℠

Prematurity Research Centers Overview



Surprisingly, we do not know what causes a woman to go into labor at the end of a full-term pregnancy. Despite decades of work and many associated risk factors, the actual biological basis of labor is not known. In more than half of all premature births, no explanation exists as well. There are some accepted causes, and many risk factors have been identified — but not all women with such risk factors deliver before 37 completed weeks.

Our network of five March of Dimes Prematurity Research Centers brings together some of the best minds in science, medicine, engineering and technology. These different disciplines not only connect and collaborate with each other to investigate the multiple causes of prematurity, but also share new methods of discovery. Different specialists working together are able to absorb how the other disciplines approach the same problem, and use different tools and methods to look at and eventually solve the problems in their own field in a different way. It's this kind of cross-fertilization that makes the transdisciplinary approach so valuable, and particularly so with a problem with the size and complexity of premature birth. We chose the Prematurity Research Centers because each center's expertise fit into a matrix of potential causes of premature birth, and as such, they have the best people in those particular fields needed to solve the problem.

Because we want each center to pursue the Research Themes we've laid out for them, their findings will inform and amplify the Themes the other centers are pursuing.

Our most promising research to date.

The more than 200 researchers working in a transdisciplinary model represent multiple specialties from the medical, scientific, engineering, technology and academic communities. The sheer number of publications, speaking engagements and abstracts that have been presented to the medical community at large reflects not only the magnitude of the challenge prematurity presents, but also the international attention it's receiving.

Could the bacteria that lives in the reproductive track be the key to preterm birth?

David Relman, M.D., Professor of Medicine and of Microbiology and Immunology at **Stanford University** has spent decades studying the microbiome. His focus has been in studying the healthy bacteria, or microbiome, that normally live in harmony inside our bodies.

Until recently, a pregnant mother's womb was thought to be a clean, sterile environment that protects the baby from bacteria found elsewhere in the body. Relman thinks that there may more microbe invasion of the tissues of the mother and baby inside the womb than previously thought. His work has found evidence that a disturbance of the delicate balance of these bacteria may contribute to preterm birth.

And this research has a personal resonance for Relman who spent four frantic and exhausting months in the NICU when his daughter was born three months early. He says "the stakes are huge for a person's life and the family around them when they experience preterm birth. We were one of the lucky ones."

Prematurity Research Centers Overview

Why does one group of women with similar racial and ethnic backgrounds have dramatically lower rates of preterm birth than another similar group?

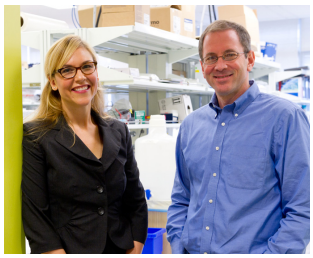
Dr. Irina Buhimschi, Director of the Center for Perinatal Research at The Research Institute at Nationwide Children's Hospital, one of eight institutions that make up the **Ohio Collaborative** believes that a variety of genetic, environmental and social factors are involved in preterm birth.

African American women are twice as likely as women from any other racial or ethnic background to deliver a preterm baby. This racial disparity is well documented, but not well understood, as it remains an issue even when access to health care, behavior, education, or socioeconomic status are taken out of the equation. There is, however, a minority population of African descent with a notably lower rate of preterm birth in Ohio. Ohio has the second largest Somali population in the country.

The Ohio Collaborative has launched a comprehensive study to understand why Somali-American women have lower rates of preterm birth. In addition, the March of Dimes has multiple initiatives in this area at its Prematurity Research Centers.

Dr. Buhimschi, herself an immigrant, came from Romania for her post doctorial fellowship and feels deeply about this inherently misunderstood phenomenon. "We can put rockets on the moon, but we don't understand why or how nine months in utero makes a new person."

Circadian rhythms have a profound effect on metabolism, the immune system, and maybe even preterm birth.



Our biological processes, or circadian rhythms, reoccur naturally on a 24-hour cycle, even in the absence of fluctuations in light. Why then do women on shift work have higher rates of perterm birth? Why do 80% of women go into spontaneous labor between late night and early morning?

That's exactly what a team of researchers led by **Eric Herzog, Ph.D.** Professor in the Department of Biology at **Washington University in St. Louis** and **Emily Jungheim, M.D.** Assistant Profession of Obstetrics and Gynecology are studying. They believe there is a causal relationship between the disruption of a women's sleep patterns and preterm birth. Either genetic or environmental disruptions in a woman's daily schedule may increase the risk of preterm birth.

This chronodisruption, as it's called, can be brought on by a number of factors, including shift work, exposure to artificial light, even irregular meals and sleep times. Long term, the goal in the 1,000 women is to test how these disruptions influence preterm birth.

And for Dr. Jungheim it's personal. Her sister-in-law and brother had a baby at 35 weeks, followed by a preterm birth at 30 weeks with twins. Today as a reproductive medicine specialist, she says, "a lot of my patients are at risk for preterm birth and I'm all about helping women, couples and families build their dreams of having children and it really all starts with birth."

For Dr. Herzog, it began as a kid. as the son of a gynecologist watching the trials and tribulations of his dad worrying about preterm babies. And the rest is research.

Could the microbiome that lives in the cervix or vagina be the cause of preterm birth?

Our bodies are home to a class of exponentially diverse and symbiotic species—the microbiome. They live in different parts of our bodies, on our skin, in our gut, even in the reproductive organs, and they all differ from person to person.

The microbial communities in the cervix and vagina, called the cervicovaginal space, have been shown to play a role in vaginal health and disease, but their role in pregnancy has remained largely unknown until now. And that's where **Dr. Michal Elovitz,** Professor of Obstetrics and Gynecology at the **University of Pennsylvania** comes in.

Her study of just over 2,000 women has shown that specific bacterial species in the cervix and the vagina are associated with an increased rate of spontaneous preterm birth—as well as different bacterial strains that actually help protect against it. These specific bacteria may serve as new and promising new therapies to reduce the incidence of preterm birth.

www.prematurityresearch.org