



**March of Dimes  
Research Newsletter**

MAY 2023



**Dr. Emre Seli**  
Chief Scientific Officer  
March of Dimes

## From the desk of our Chief Scientific Officer

If there's one word that speaks to me this Spring, it's the word 'poised.' To be poised, to be ready, to be starting on a foundational path. And this is truly where we at March of Dimes research find ourselves. Poised for everything that is to come.

Getting to this position has taken time, energy, and some good fortune. Time, because we have been evolving and improving the research department—grant schedules, procedures, and commitments—for over 18 months. Energy because we've done a lot of work carefully, wisely, and efficiently. And fortune because there's just no other way to explain how lucky we are to have a tight knit, synergized research team internally and the very best and brightest researchers working for our cause in the world.

First, we've set vital and relevant research themes that defined the problems plaguing moms and babies in the U.S. today—stress; structural and systemic racism; maternal, cardiovascular, and metabolic disorders; birth inequity; and spontaneous, late preterm birth. Of course, our themes are ever-evolving (we've just identified an exploratory focus on Recurrent Pregnancy Loss in the context of environmental factors), but the above topics are glaring red flags in our fight for the health of all moms and babies.

We're digging to find answers to many questions: What causes an otherwise low-risk woman to go into labor at 34 weeks? How can women prevent heart issues in pregnancy? Can chronic stress lead to preterm birth? Can racism's impact on a woman's health be reversed or mitigated? What are the factors that account for birth disparities? While finding answers is hard, it's simply impossible if you're not asking the right questions.

Second, we've confidently embarked on a research strategy to make a difference for women and children in our lifetime—translational science. March of Dimes is squarely focused on science that can be brought to clinical trial, tested, tried, and proven true before being made available to patients in the form of a test or treatment. We've never been more sure of a research philosophy, and are constant witness to its tangible rewards in our laboratories.

Third, we're on steady footing in regards to resources, and continue to strengthen mutually beneficial relationships with donors, partners, and like-minded organizations.

Fourth, there's our people. Our internal research team is as good as it gets. From operations, to grant administration, to research communication, to vision and strategy, we're inching our way toward aspirational goals every hour.

And last but certainly not least is the heart of our research program: our remarkable grantees and award winners, researchers, professors, and scientists (some of whom have found themselves as patients, too). From scholars that study molecular pathways to those who build complex artificial intelligence programs that can rapidly comb through tens of thousands of pages of data, these people will be changing outcomes for our most vulnerable families.

It's because of them, and the reasons above, that today, March of Dimes is poised for tomorrow.

In this issue of the newsletter, you'll hear from Jon about our Pediatric Scientist Development Program and the (very deserving) recipient of our biggest career award; an exciting machine learning model from our Stanford Prematurity Research Center; a new Innovation Fund investment; and the powerful story of one family that has lost a lot—and still manages to give back.

Keep searching,

**Emre**



# Research dispatches from Jonathan Cherry

## *March of Dimes supports pediatrician scientists in Florida*

Recently, our research group was invited to speak to prospective researchers in various venues. Showing up to scientific gatherings in person and sharing our work is one of the many ways we provide access and information to folks who also believe the work we do is critical to saving the lives of moms and babies.

In early March, I traveled to Florida for a meeting of the Association of Medical School Pediatric Department Chairs (AMSPDC). The purpose was to support our pediatrician scientists in the Pediatric Scientist Development Program (PSDP).

This program, in which March of Dimes is one of many funders, is available to early career pediatricians interested in lifelong research careers in, and translational solutions for, prematurity; neonatal morbidity and mortality; and fetal and neonatal health equity.

Instead of being a spectator at the AMSPDC conference, I presented to a group of curious and incredibly engaged early-stage researchers. My presentation focused on how to work with donor funded foundations like March of Dimes. It outlined how our grant programs differ from government funded programs and endowed foundations, and how that difference allows researchers to directly see the impact of their research.

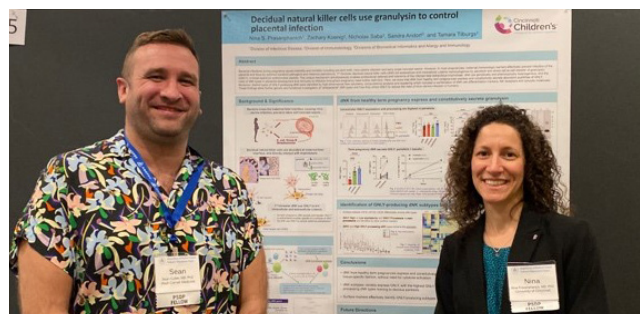


From the podium during the March of Dimes presentation at the Association of Medical School Pediatric Department Chairs (AMSPDC) meeting in March 2023.

What is that difference? Simply put, we know our funding comes from people like you who've chosen to share their time, gifts, and talents, and we know where it goes—to moms and babies in NICUs, hospitals, medical care centers, and homes across the country. Governments and not-for-profits manage money and investments whose origin, and sometimes destination, can be hard to pinpoint. We've always worked directly with those affected, and are just a few degrees separated from those impacted by our work. Honestly, it's one of the reasons I'm so proud to work here and passionate about what we do.

And judging by many of the scholars I spoke with, they value that type of impact too. In the case of the PSDP, the scholars are folks who have dedicated a large portion of their lives to improving the health and well-being of children. Now they want to improve that quality and implementation of care in a direct and meaningful way. These pediatrician scientists are paving the way for future generations, and we're proud to help them.

At this conference, I met up with several of our current and former March of Dimes funded scholars and shared findings, ideas, plans, and encouragement. I happened to catch up with Drs. Sean Cullen and Nina Prasanphanich. Both presented their research in Florida and did a great job. Their research exemplifies what we hope for—improvements in our understanding, mitigation, and prevention of poor birth outcomes.



Dr. Sean Cullen, Neonatology Fellow, Weill Cornell Medicine, 2021 March of Dimes Scholar for the Pediatric Scientist Development Program (PSDP), and Dr. Nina Prasanphanich, Clinical Fellow, Division of Infectious Diseases, Cincinnati Children's Hospital Medical Center, 2020 March of Dimes Scholar for the Pediatric Scientist Development Program (PSDP), pictured at the Association of Medical School Pediatric Department Chairs (AMSPDC) meeting.

## *March of Dimes at SRI in Australia*

Fast forward a couple weeks, a couple thousand miles away, and this time with a partner, I was at it again. At the Society for Reproductive Investigation (SRI) in Australia, I was a panelist for the new investigator and early career gathering, participated in an open-forum mentoring session with early and mid-career researchers, and was joined on stage by Dr. Seli, our fearless Chief Scientific Officer (CSO), to present Dr. Patricia Hunt with the Richard B. Johnston, Jr., MD Prize in Developmental Biology.

## *Panel on collaborative science and mentorship*

The panel discussion I participated on involved research heads, institute chairs, and representatives from around the globe. Each brought their own perspective on mentoring, collaborative science, and developmental programs for early-stage researchers. The discussion was lively, and we fielded questions, shared stories and perspectives, and met with attendees in almost every stage of their careers.

I was incredibly encouraged by the participants' questions and thoughtful replies of the fellow panelists. They tackled tough problems of mentor-mentee relations; how to set-up a productive research collaboration; how to maintain clear communications; and critically, when to recognize the natural end and gracefully exit a collaboration with good relations intact.



Questions from the audience at the 2023 Annual Meeting of the Society for Reproductive Investigation (SRI) in Brisbane, Australia.

## *Dr. Patricia Hunt awarded March of Dimes Richard B. Johnston, Jr., MD Prize in Developmental Biology*

The prize is presented to those who've made and continue to make an impact on the field of developmental biology. You may not know Dr. Hunt by name, but you certainly know her work. She's a big part of why we know so much about how age impacts pregnancy outcomes, and is a large part of why you know to avoid Bisphenol A (BPA) and polycarbonate plastics near your food (or your baby's bottle!).

A Regents Professor at Washington State University, Dr. Hunt has made instrumental discoveries in how maternal eggs, and in turn, resulting embryos, are impacted by aging, mistakes in cell division, and environmental exposures.

As one of the original scientific voices to suggest that the health of embryos may be affected by parental age, Dr. Hunt has significantly advanced the field of developmental biology. She was the first to show the effects of age on the oocyte; specifically, that the loss of cohesion in the cell-cycle apparatus renders the oocyte prone to developmental errors.

Dr. Hunt then famously made the unexpected discovery that exposure to Bisphenol A (BPA), a common substance in plastics, can increase the risk of prenatal abnormalities by altering egg quality. As a result, she received national recognition for her discoveries on endocrine disrupting plastics and influenced consumers to demand BPA-free products.

When she took the podium in Australia to receive her award, she shared her truly fascinating journey from bench to advocacy.

Her talk, "Evolution of a Reproductive Geneticist," covered her career from research on the impact of aging on oocyte quality, to the discovery and characterization of environmental contaminants on reproductive health.

What had my jaw on the floor was that they continue to discover, characterize, and bring awareness to new chemicals that we all encounter in our daily life. It had me reconsidering everything, from the receipts I touch from buying my morning coffee, to the plastic cups our coffee comes in, to things like “that new car smell.”

This talk was jarring, but by no means alarmist or sensational. Dr. Hunt clearly and plainly presented what she learned, how she came to the conclusions, and importantly, what we can all do about it. Dr. Hunt is not finished with her work, and we were incredibly proud to present her with this award and honor.

Last, and a sign of things to come, The MotherToBaby podcast episode I spoke on was released. This included an interview that covered a conversation with Chris Stallman about how the March of Dimes research group is building on our 85 year history of success. In this 30 minute conversation, you can learn about our research into preterm birth, how we view the research landscape, and what’s coming next. Keep in mind this podcast episode was purposefully high level in content. Our own podcast will be airing soon. This is where we’ll be doing deeper dives into the science, outcomes, and path forward. We have started recording episodes with our researchers, and hope you enjoy learning from them as much as we enjoy working on them. [Listen here.](#)

So, what’s next? In June, we’ve been invited to present at the Birth Defects Research & Prevention (BDRP) annual meeting in Charleston, South Carolina. I’ll share details about our research, grantmaking process, and, similar to our presentation at PSDP, communicating your science in a meaningful way to a non-technical audience. I’ll have an update in the next newsletter.

**Stay tuned and thank YOU for your support!**



**Jonathan Cherry**  
Senior Director Research Operations



Dr. Patricia Hunt, Regents Professor at Washington State University, Recipient of the 2022-2023 Richard B. Johnston, Jr., MD Prize in Developmental Biology, delivering her talk “Evolution of a Reproductive Geneticist” at SRI in Brisbane, Australia.



Dr. Emre Seli, Chief Scientific Officer, March of Dimes, Dr. Patricia Hunt, Washington State University, and Jonathan Cherry, Senior Director Research Operations, March of Dimes, at SRI.



# Stanford medicine researchers predict diseases of prematurity before birth

In an exciting first, researchers at Stanford Medical School and the March of Dimes Prematurity Research Center (PRC) at Stanford have created a Machine Learning (ML) model that predicts prematurity-related newborn diseases weeks before they occur, including before a baby is even born.

Using Electronic Medical Records (EMR) of pregnant Californian women and their babies (including information on the mom's health and lifestyle before pregnancy, her pregnancy medical data, fetal ultrasound data, and the baby's blood work, weight, and APGAR score at birth), the model was able to accurately predict a variety of adverse outcomes, including death.

In addition, the machine learning algorithm, which works by 'reading' an immense amount of verbal and numerical medical data, was accurate in predicting outcomes for babies before birth, paving the way for a fundamental leap forward in early diagnosis and treatment of prematurity-related diseases.

"What surprised us is that we could make some of these predictions even before birth," said senior study author Dr. Nima Aghaepour, an associate professor of anesthesiology, perioperative and pain medicine and of pediatrics at Stanford Medicine. "This tool has given us something that currently does not exist—the ability to see into the future and act today so we can improve the trajectories of preterm babies, and in some cases, save their lives."

The study results, published in February in *Science Translational Medicine*, must be validated in larger, more diverse patient populations before the model can be commercialized and made available to clinicians in hospitals around the country, a milestone that remains several years away.

Still, the initial results show promise for two reasons. First, the model showed a high degree of accuracy in predicting a number of adverse

outcomes, a characteristic that instills confidence in the reliability of the model. Second, the model was validated with a second set of patient data and performed with a high degree of accuracy in predicting future health outcomes for those babies.

"This type of predictive capability has the potential to dramatically alter care for the most at-risk babies," said Dr. David Stevenson, a neonatologist, study co-author, and lead investigator of the Stanford PRC. "It also shifts the clinical emphasis away from making sweeping inferences about the prognosis of preterm babies based on what week they were born and onto individual babies with their own distinct health profiles and maternal histories, which we've shown have a significant effect on their offspring."

The research highlighted the role maternal experiences, not just health histories and pregnancy profiles, have on babies. Specifically, the new algorithm was able to link specific types of Social Determinants of Health (SDOH) in moms with certain prematurity complications. "If a mother was homeless, we found that the impact on the baby would be different than the impact of incarceration, whereas under traditional paradigms both of these socioeconomic factors might have similar effects on prematurity," Aghaepour said.

Currently, doctors primarily rely on APGAR scores (which measure a baby's pulse, muscle tone, skin color, and more), gestational age, and birthweight to gauge a baby's health, neither of which are particularly insightful in making predictions about future health outcomes for individual babies.

"This model represents a scientific crystal ball for doctors, allowing them to see which infants may need immediate intervention," said March of Dimes Chief Scientific Officer Dr. Emre Seli. "Usually, scientists find ways to improve on something that we can already do, but in this case, Stanford Medicine researchers have made

enormous headway toward finding an answer to a problem that no one had ever solved before.”

“We are encouraged by this breakthrough and hopeful about the impact it can make for at-risk moms and babies in our lifetime.”

To arrive at the ML predictions, researchers grouped EMR of moms presenting at Stanford Health Care with the EMR of their babies born at Stanford Medicine Children’s Health, covering 22,104 live births between 2014 and 2018. (The validation that occurred in the second set of patients brought the total number of mom and baby pairs to 32,354).

The predictive model uses an algorithm called a long short-term memory neural network to make predictions about 24 health outcomes for babies up to eight weeks old. This neural network operates similarly to how you would read a book—you don’t necessarily recall every word; instead, you recall concepts, themes, and key details, adding to the story as you continue reading.

Using data from moms and babies just born, the model accurately identified babies who would later develop certain conditions, including bronchopulmonary dysplasia, a type of lung disease, retinopathy of prematurity, which can result in blindness and necrotizing enterocolitis, a serious gastrointestinal condition.

The model could also predict some outcomes before birth, including for morbidity. It had moderately strong predictions for a dozen other outcomes, and weaker predictions for conditions such as yeast infections or meconium aspiration syndrome, which is when a baby inhales meconium during birth.





# March of Dimes Innovation Fund makes second investment into fetal distress detection technology

March of Dimes' Innovation Fund has made its second investment into a technology that promises to detect in utero fetal distress more accurately than existing fetal monitoring tools in an effort to avoid unnecessary Cesarean deliveries.

The Innovation Fund, which invests in early-stage ventures aimed at dramatically altering outcomes for moms and babies, has invested in Series B Financing for Raydiant Oximetry, based in San Ramon, CA.

Directly prior to the financing round, Raydiant had just completed a clinical study demonstrating a 95% sensitivity and 84% specificity for detecting fetal distress. These results could significantly improve outcomes for moms and babies during childbirth over current fetal monitoring technology, which only provides 85 to 90% sensitivity and 29 to 40% specificity for detecting fetal distress.

"As the leading organization fighting to end preventable maternal and infant death and illness, our investment in Raydiant Oximetry furthers our commitment to address the most pressing challenges facing moms and babies," said Dr. Elizabeth Cherot, Senior Vice President & Chief Medical and Health Officer of March of Dimes.

"As our second Innovation Fund investment, it is our hope that this partnership will help obstetric care providers make better-informed decisions for maternal-fetal clinical management during labor and delivery."

Raydiant Oximetry was founded by Dr. Neil P. Ray, a pediatric anesthesiologist, to find a solution to the pervasive problem of identifying fetal distress and potentially avoiding medically unnecessary Cesarean births, which can have short- and long-term implications for the mom and child.

The company's technology, a low-cost, non-invasive sensor that continuously monitors fetal oxygenation during labor, aims to better identify fetal distress. Because of its life-improving potential, the FDA has granted the technology, called LUMERAH™, Breakthrough Device status for expedited market approval.

Raydiant Oximetry aims to raise \$25 million as part of its Series B funding round. These funds will be used to complete the commercial product development effort and launch a pivotal trial to support FDA clearance.



# From heartbreak to hope: One couple's search for answers with March of Dimes

The Martins know about loss. And hope.

While they were falling in love, Dana and Shannon Martin talked often of the family they'd always dreamed of. But unfortunately, the couple experienced unexplained pregnancy loss after loss, suffering seven prenatal losses in a short period of time, including two while they were living in a home that had been critically poisoning them with carbon monoxide.

The Martins refused to give up. During their recovery from the carbon monoxide, they researched fertility, genetics, and environmental factors that could disrupt a healthy pregnancy. Though they were inundated with search results, they discerned quickly that no organizations—public or private—had the answers.

And yet, they said, it was obvious March of Dimes was committed to finding them—they were asking the right questions, investing money into promising ventures and translational research, and operating from a rich legacy in fighting for maternal and infant health.

Shannon and Dana had questions: Why were they experiencing these recurring pregnancy losses? Could Shannon carry a baby to term? How would the carbon monoxide poisoning affect their pregnancy journey going forward?

And most importantly, could Shannon and Dana volunteer their time and resources to help solve these puzzling reproductive and prenatal questions?

So in 2021, they sent March of Dimes an email. And they heard right back.

"Once we found out that March of Dimes was doing a lot of work in this field, it was pretty clear we had to be involved," Shannon said. "And after we sent an email expressing a desire to support some of these efforts, we realized we could be of service in the March of Dimes Innovation Fund and with the Prematurity Research Centers (PRCs)."



Shannon and Dana Martin

"So we just dove right in."

Since then, the Martins, who are entrepreneurs focusing on technology and real estate, have made two significant donations to March of Dimes.

One gift has started a new PRC exploratory research theme into Recurrent Pregnancy Loss (RPL), which is characterized as having two or more pregnancy losses in a row, with a focus on environmental factors like carbon monoxide poisoning.

Another gift is supporting the March of Dimes Innovation Fund, a new organizational initiative that invests in early stage ventures focused on finding diagnostic and therapeutic solutions to the maternal and infant health crisis.

The couple sits on the Innovation Fund's Investment Committee, where they work with other volunteers with medical, scientific, and financial expertise to review potential startup companies in which March of Dimes can invest. They also provide guidance on strategy, process, venture market insights, and more.

"From the Innovation Fund to the Recurrent Pregnancy Loss research March of Dimes scientists are working on, we are incredibly hopeful we can move the needle on maternal health and infant care," the Martins said. "Every day, we feel optimistic March of Dimes can provide not just answers, but solutions to families like ours."