NUTRITION & YOUR CHILD

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Children's Nutrition Research Center
1100 Bates Street
Houston, Texas 77030-3411

JOIN A CNRC NUTRITION STUDY!

Houston-area residents are invited to participate in the following nutrition research projects designed to help CNRC scientists learn more about the nutritional needs of children. Free parking is provided. For most studies, financial compensation is provided. For questions on becoming a CNRC research volunteer call Noemi Islam at 713-798-0506 or e-mail BIBStudy@bcm.edu.

Adult Volunteers with Diabetes Needed H-34291

The study will investigate whether type 2 diabetic patients make an important compound called arginine in different amounts. Eligible participants must be African American or Hispanic men, between the ages of 20 and 60 years, diagnosed with type 2 diabetes within the last 10 years, overweight and with no other chronic medical conditions. For more information, contact Adriana Cardenas at 713-798-7003 or adriana.cardenas@bcm.edu.

Teen Talk Study H-46202

Baylor College of Medicine is recruiting 14- to 17-year-olds living in rural communities and their parents to help researchers understand what affects their food and physical activity choices and body weight. For more information, contact Chishima Collender at 713-798-0517 or Noemi Islam at 713-798-0702.

Teen Heart Health H-30665

12- to 17-year-olds and young adults (normal weight or overweight) with and without type 2 diabetes are needed for a research study investigating risk for heart disease in youth. Study involves body composition, skin fold, and blood tests. For more information, contact Jocelyn Chang at 713-798-0517 or e-mail BIBStudy@bcm.edu.

A Pediatric Gastroesophageal Reflux Registry H-41641

Researchers at Baylor College of Medicine and Texas Children’s Hospital are conducting a research study to learn how slow stomach emptying (called gastroesophageal reflux) affects children and how to treat it. Children ages 5 to 17 years who have been diagnosed with gastroesophageal reflux or have a combination of pain, nausea, vomiting, early satiety or postprandial fullness may be eligible. The study requires visits to the CNRC. For more information about this study, please contact study coordinator Heather Charron at 713-798-0381 or charron@bcm.edu.

Healthy Pediatric Volunteers Needed H-43759

Healthy boys and girls between ages 3 to 18 years are needed for a research study investigating risk for heart disease in youth. Study involves body composition, skin fold, and blood tests. For more information, contact Heather Charron at 713-798-0381 or charron@bcm.edu.

Lauren Smith and Leigh Shinal
Office of Communications & Community Outreach
Baylor College of Medicine

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Baylor College of Medicine
Community Outreach
Office of Communications & Community Outreach
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WILLIAM A. HAYES, M.D.
Director

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A collaborative study in mice by researchers from USDA/ARS Children’s Nutrition Research Center at Baylor College of Medicine emphasizes why good nutrition of the pregnant mother and good postnatal nutrition are critical for a healthy life.

The study builds on previous studies that showed that mice that do not get enough to eat during a critical but relatively short period immediately after birth grow more slowly, including slower muscle growth. In the current study, researchers confirmed that this limits their capacity for physical activity or exercise as adults. The study was published in the Journal of Physiology.

“Exercise capacity depends not only on the muscles, but also on the heart’s ability to pump blood to the body in response to exercise. So if there is an effect on exercise capacity, it is essential to determine if this is due to the muscles, the heart, or something else,” explained Dr. Marta Fiol, associate professor of pediatrics-nutrition at the CNRC.

In the study, healthy newborn mice (pups) were nursed by mouse moms that consumed a diet containing insufficient protein. This reduces the amount of milk the moms produce, and as a result their pups grow more slowly than pups nursed by moms fed a normal diet. Once the pups could eat solid food, they were all fed a good diet that supports rapid growth.

When the mice were adults, researchers performed a number of tests similar to those done in humans to assess their heart function, including a treadmill stress test, echocardiogram and ultrasound measurements of their heart size and function, followed by studies of how their heart cells functioned.

“We found that the mice that had been poorly nourished during this critical postnatal time had a smaller lean muscle mass than their well-fed counterparts, and that their heart was of normal size, but was not able to pump blood to the body as efficiently as the hearts of the well-fed pups,” Fiol explained.

Researchers confirmed that this limits their cardiac output. The results of the exercise test showed that the females’ exercise capacity was compromised by poor nutrition.

From the echocardiogram and ultrasound measurements, researchers confirmed that the left ventricle (the engine of the heart) was smaller in the pups whose moms had been poorly nourished as infants. Once not exercising, the females could maintain normal function by increasing their heart rate. But they were limited in how much they could increase their heart’s ability to pump when they needed to work harder, particularly when exercising. In addition to the smaller heart, there were other functional problems with the females’ hearts. These findings would help explain why the exercise capacity of the female mice was less than normal.

“These results emphasize how, beginning in utero and through infancy, how nutrition can have life-long effects on the health of an individual,” Fiol said.

“In addition, we now need to determine what is preventing the compromised growth of the heart in comparison to the rest of the body, and why female mice are especially at risk,” she said. “With this information we can determine if there are interventions that can be used to reduce the problem and its lifelong consequences.”

Others who contributed to this study include David Ferguson at Michigan State University and a postdoctoral fellow at the CNRC when the study was conducted, Tanner Monroe (now at Duquesne University), Celia Pena Hereida, Ryan Fleshmann, George Rodney and George Taffet, all of Baylor College of Medicine.

“It is likely that future research will show that different children need different approaches, at least in part because their specific needs depend on their unique genetic makeup,” Fiol said. Conversely, if you focus on the child’s behavior directly, such as through the use of punishment, threats or even rewards, then you have included a treadmill stress test, like the one the children were given in this study.

The tendency to eat in response to the environment, not hunger, is a strong predictor of weight status.

While the statement provides an up-to-date summary of findings, there may be other things that can cause birth defects that we don’t know about,” Hanchard said. “Maybe this could be used for a ‘biomarker.’ We’re hoping that we can use this test to improve the diagnosis of diabetic embryopathy. We can’t yet say that if we were to change methylation, we would change whether birth defects occurred.”

The next step in this research is to conduct DNA methylation analysis on a larger sample size to test for potential clinical uses. While this technique could help with clinical diagnosis, Schulze said their work does not pin down the underlying cause of diabetic embryopathy. They found the calculations could provide a fairly accurate classification of whether the child had diabetic embryopathy on the basis of only their genetic analysis (no clinical information). Furthermore, the methylation modifications found in this study were unique to diabetic embryopathy, as opposed to other causes of birth defects, according to Hanchard.

“One of the things known about diabetes is that it affects how nutrients are processed down to a cellular level. It can disrupt how genes are expressed, and this can impact development,” said Schulze, a current research associate in molecular and human genetics at Baylor. “We don’t necessarily know if the changes we see are directly causing the defects, but we think this discovery as a ‘biomarker.’ We’re hoping that we can use this technique to improve the diagnosis of diabetic embryopathy. We can’t just say that if we were able to make this technique available to those with diabetes, we would be able to use this test to improve the diagnosis of diabetic embryopathy. We can’t just say that if we were to change methylation at those specific locations in the DNA that it would change whether birth defects occurred.”

“Our hypothesis is that maybe diabetes also impacts DNA methylation, and that DNA methylation fine-tunes how genes act in response to genetic influences or environmental stress,” said Hanchard. “We don’t necessarily know if the changes we see are directly causing the defects, but we think this discovery as a ‘biomarker.’ We’re hoping that we can use this technique to improve the diagnosis of diabetic embryopathy. We can’t just say that if we were able to make this technique available to those with diabetes, we would be able to use this test to improve the diagnosis of diabetic embryopathy. We can’t just say that if we were to change methylation at those specific locations in the DNA that it would change whether birth defects occurred.”

“We’re hopeful this is sort of an entry into this bigger idea that we can have more accurate diagnoses for this condition,” Hanchard said. “We’re hopeful this is sort of an entry into this bigger idea that we can have more accurate diagnoses for this condition.”

“Caused by Maternal Diabetes

Diabetic embryopathy is usually diagnosed through a process of elimination. A baby born with birth defects could have been tested for other genetic syndromes. If all of those possibilities were ruled out, and the mother had diabetes during her pregnancy, doctors may diagnose the child with diabetic embryopathy. Dr. Neil Hanchard, assistant professor of molecular and human genetics at Baylor and a researcher at the CNRC, worked alongside Dr. John Belmont, adjunct professor of molecular and human genetics at Baylor, to find a more definitive way to diagnose this condition.

“We don’t necessarily know if the changes we see are actually causing the defects,” said Schulze, a current research associate in molecular and human genetics at Baylor. “That’s why at this stage we are referring to this discovery as a ‘biomarker.’ We’re hoping that we can use this test to improve the diagnosis of diabetic embryopathy. We can’t just say that if we were to change methylation at those specific locations in the DNA that it would change whether birth defects occurred.”

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