

Higher blood sugar in early pregnancy raises baby's heart-defect risk

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Higher blood sugar early in pregnancy raises the baby's risk of a congenital heart defect, even among mothers who do not have diabetes, according to a study led by researchers at the Stanford University School of Medicine.

The study will be published online Dec. 15 in *The Journal of Pediatrics*.

For many years, physicians have known that women with diabetes face an increased risk of giving birth to babies with heart defects. Some studies have also suggested a link between nondiabetic mothers' blood sugar levels and babies' heart defect risk. However, the new study is the first to examine this question in the earliest part of pregnancy, when the [fetal heart](#) is forming.

"Most women who have a child with congenital heart disease are not diabetic," said the study's senior author, James Priest, MD, assistant professor of pediatric cardiology. "We found that in women who don't already have diabetes or develop diabetes during pregnancy, we can still measure risk for having a child with congenital

heart disease by looking at their [glucose](#) values during the first trimester of pregnancy."

The study's lead author is Emmi Helle, MD, PhD, an affiliate in pediatric cardiology and former postdoctoral scholar.

A research challenge

One challenge associated with conducting the research was the fact that maternal [blood glucose](#) is not routinely measured in nondiabetic pregnant women. Instead, women typically receive an oral glucose tolerance test halfway through pregnancy to determine whether they have gestational diabetes, but this test is performed well after the fetal heart has formed.

The research team studied medical records from 19,107 pairs of mothers and their babies born between 2009 and 2015. The records included details of the mothers' prenatal care, including blood test results and any cardiac diagnoses made for the babies during pregnancy or after birth. Infants with certain genetic diseases, those born from multiple pregnancies and those whose mothers had extremely low or high body-mass-index measures were not included in the study. Of the infants in the study, 811 were diagnosed with [congenital heart disease](#), and the remaining 18,296 were not.

The scientists analyzed [blood glucose levels](#) from any blood sample collected from the mothers between four weeks prior to the estimated date of conception and the end of the 14th gestational week, just after the completion of the first trimester of pregnancy. These early blood glucose measurements were available for 2,292, or 13 percent, of women in the study. The researchers also looked at the results of [oral glucose tolerance](#) tests performed around 20 weeks of gestation, which were available for 9,511, or just under half, of the women in the study.

When risk is elevated

After excluding women who had diabetes before pregnancy or who developed it during pregnancy, the results showed that the risk of giving birth to a child with a [congenital heart defect](#) was elevated by 8 percent for every increase of 10 milligrams per deciliter in blood glucose levels in the early stages of pregnancy.

The next step in the research is to conduct a prospective study that follows a large group of women through pregnancy to see if the results are confirmed, Priest said. If researchers see the same relationship, it may be helpful to measure blood glucose early in [pregnancy](#) in all pregnant women to help determine which individuals are at greater risk for having a baby with a heart [defect](#), he said.

"We could use [blood](#) glucose information to select [women](#) for whom a screening of the fetal heart could be helpful," Priest said, adding that modern prenatal imaging allows for detailed diagnoses of many congenital [heart](#) defects before birth. "Knowing about defects prenatally improves outcomes because mothers can receive specialized care that increases their babies' chances of being healthier after birth."

The work is an example of Stanford Medicine's focus on precision health, the goal of which is to anticipate and prevent disease in the healthy and precisely diagnose and treat disease in the ill.

Provided by Stanford University Medical Center

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