

Researchers find early predictor for preeclampsia

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University of Iowa researchers have discovered a biomarker that could give expecting mothers and their doctors the first simple blood test to reliably predict that a pregnant woman may develop preeclampsia, at least as early as 6 weeks into the pregnancy.

Preeclampsia is a cardiovascular disorder generally occurring late in pregnancy and often resulting in an early delivery, creating immediate and potentially lifelong risks to both mother and baby. It causes [high blood pressure](#) and protein in the urine, and is typically diagnosed in the late second or third trimester of pregnancy. Between 5 and 7 percent of all pregnancies in the United States are affected with [preeclampsia](#), equating to roughly 4,000 pregnancies in Iowa or around 500,000 in the United States per year. More than 100,000 women worldwide die from the disease each year.

In their paper, "Vasopressin in Preeclampsia: A Novel Very-Early Human Pregnancy Biomarker and Clinically-Relevant Mouse Model," study authors Mark Santillan, M.D., assistant professor of Obstetrics and Gynecology and a Maternal Fetal Medicine specialist, Justin Grobe, Ph.D., assistant professor of Pharmacology and a Fellow of the American Heart Association (FAHA), and Donna Santillan, Ph.D., research assistant professor of Obstetrics and Gynecology, demonstrate that elevated secretion of arginine vasopressin (AVP) can be a very early biomarker of a preeclamptic pregnancy.

The paper was published online Monday in the American Heart

Association's journal, *Hypertension*. It will be published in print in October.

"Preeclampsia is a horrible hypertensive disorder of pregnancy that can be very dangerous to both the mother and the baby," Mark Santillan says. "Preeclampsia can cause liver failure, kidney failure, seizures, and death. Preeclamptic mothers and babies born to these preeclamptic moms are also at increased lifetime risk for heart attacks, stroke, and diabetes. Unfortunately, we have no reliable way to predict and prevent preeclampsia. The only thing you can do to protect a baby and a mother from some of the negative effects of preeclampsia is to deliver the baby, and most of the time that results in a preterm birth."

The researchers believe this discovery will majorly impact obstetric care in rural and underserved communities. Determining very early that a pregnancy is going to be preeclamptic is significant, the researchers say, so doctors can help expecting mothers by heightening their awareness of significant symptoms of preeclampsia or if need be, transfer them to hospitals able to provide the appropriate, higher level of medical care.

"Sometimes symptoms of normal pregnancy such as headaches, occasional blurry vision, abdominal pain, and swelling are really symptoms of preeclampsia and not something that should just be dismissed without testing by healthcare providers." Donna Santillan says. "Being able to determine that a pregnancy is affected by preeclampsia early will help women pay careful attention to their symptoms and to get medical care before the effects of preeclampsia becoming severe for both the mother and baby. The women who have participated in this study by donating their blood samples have made a great contribution to advancing the health of women."

What the researchers found was that maternal plasma copeptin – an inert, stable biomarker of vasopressin secretion with a substantially

longer half-life in the blood than vasopressin – is a clinically useful biomarker that predicts preeclampsia. Using samples from the Maternal Fetal Tissue bank, a major part of the University of Iowa Women's Health Tissue Repository, copeptin levels were measured throughout pregnancy in maternal plasma from preeclamptic and control women. Copeptin levels were significantly higher throughout the preeclamptic pregnancies than in the control pregnancies.

The group is currently working to determine if the copeptin biomarker is also elevated in urine, and could therefore be used in a simple home test kit.

While there are currently no treatments for preeclampsia other than premature delivery of the baby, the researchers are also investigating new drug targets. The group has demonstrated that infusion of vasopressin into pregnant mice causes all of the major symptoms of preeclampsia. Until this discovery, there was no effective animal model of the early-[pregnancy](#) events that precipitate preeclampsia.

"We've broken the circle of 'no test, no model, no cure' which has plagued the preeclampsia field for centuries," notes Grobe. "Suddenly we have identified a hormone that is elevated well ahead of the disorder, and have demonstrated that this hormone can cause the symptoms. It is only a matter of time before we can therapeutically target this system as a preventative or curative intervention."

Provided by University of Iowa

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