

Preeclampsia may boost heart disease risk by altering blood vessels

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Preeclampsia may permanently change the blood vessels of women who experience the condition during pregnancy, boosting their lifelong risk for cardiovascular disease, according to Penn State researchers.

In a study, researchers compared [women](#) who had healthy pregnancies with those that experienced [preeclampsia](#), a condition in which blood vessels around the uterus constrict during [pregnancy](#) and can result in symptoms that include high blood pressure, kidney damage, swelling and headaches.

The researchers found that after a pregnancy, the blood vessels of women who experienced preeclampsia function differently than women who had healthy pregnancies, which could help explain why women who have had preeclampsia go on to have a higher risk of [cardiovascular disease](#).

"We were able to show that even though the symptoms of preeclampsia go away once the woman gives birth, there's still an underlying dysfunction in the blood vessels," said Anna Stanhewicz, a post-doctoral fellow in the College of Health and Human Development. "This suggests that something happens during a preeclamptic pregnancy that permanently changes the way blood vessels function."

Stanhewicz said the findings—published in the current issue of *Hypertension*—could help lead to better prevention and treatment of cardiovascular disease, which is the leading cause of death for women in the United States. According to Stanhewicz, preeclampsia—which affects approximately 7 percent of pregnant women in the U.S.—increases a woman's risk for developing heart disease to that of a lifelong smoker's.

While previous research has examined the effects of preeclampsia on the blood vessels of mice and rats, Stanhewicz and the other researchers wanted to look at the effects of the condition on human blood vessels.

"We wanted to see if vessel dysfunction does in fact still occur after pregnancy. If we compare how well the blood vessels are functioning in

women that had preeclampsia to women who had a healthy pregnancy, do we see a difference?" Stanhewicz said. "And also, if we can see a difference, what is contributing to that?"

The researchers recruited 24 participants, 12 of which had experienced a healthy pregnancy and 12 who had preeclampsia. In a lab, the researchers placed a special fiber through the top layer of skin on the participants' arms, which allowed them to apply substances locally and test the function of blood vessels just under the skin.

When the researchers applied acetylcholine—a substance that causes blood vessels to dilate, or become bigger—they found that the vessels of women who had preeclampsia opened about 50 percent less than those of women who had healthy pregnancies.

"This answered one of our major questions, which was whether the blood vessels of women who experience preeclampsia work differently after their pregnancy. We found that yes, they do," Stanhewicz said. "But we also wanted to know more about why this was happening."

Taking clues from previous animal studies, the researchers applied angiotensin II—a naturally occurring substance in blood that helps blood vessels constrict, or become smaller—and found that the blood vessels of women who had preeclampsia constricted about 20 percent more than women who had normal pregnancies. Stanhewicz said this suggests that women who have had preeclampsia are more sensitive to angiotensin II.

In a final test, the [researchers](#) applied losartan, a commercially available drug used to treat people with [high blood pressure](#), to the [blood vessels](#) and measured its effects.

"We found that when we inhibited the action of angiotensin II with the losartan, it didn't affect the women who had healthy pregnancies, but it

improved blood vessel function in the women who had a preeclamptic pregnancy," Stanhewicz said. "By blocking that excessive constriction, we were able to functionally restore the dilation response."

In the future, Stanhewicz said she would like to further study using losartan in women who have had preeclampsia to explore if it could be a possible treatment strategy.

"Even though these women who have had preeclampsia appear healthy after they deliver and their blood pressure returns to normal, we would like to give them an oral intervention with losartan and see if that improves their microvascular function," Stanhewicz said. "Hopefully, that would then prevent the accelerated progression of cardiovascular disease."

Provided by Pennsylvania State University

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