

Exercise before and during early pregnancy increases two beneficial proteins for mothers-to-be

October 14 2011

Although exercise is generally considered to be a good thing for people with high blood pressure, it has traditionally been considered too risky for women who are also pregnant. Some studies suggest that exercise has benefits such as decreasing the risk of women developing preeclampsia, a condition that raises blood pressure to dangerously high levels but how this might happen has remained unknown. New research using an animal model falls into the "pro-exercise" camp: It suggests that exercise before conception and in the early stages of pregnancy may protect a mother-to-be by stimulating the expression of two proteins thought to play a role in blood vessel health.

The study was led by Jeffrey Gilbert of the University of Oregon's Department of Human Physiology, while he was with the University of Minnesota Medical School. Dr. Gilbert will present the research at the Physiology of Cardiovascular Disease: [Gender Disparities](#) conference, October 12 at the University of Mississippi in Jackson. The conference is sponsored by the [American Physiological Society](#) with additional support from the [American Heart Association](#). His presentation is entitled, "[Exercise Training](#) Before and During Pregnancy Improves [Endothelial Function](#) and Stimulates Cytoprotective and Antioxidant Pathways in the Pregnant Rat."

In the study, [female rats](#) were separated into two groups, the exercise group and the control group, and later impregnated. The exercise group

ran voluntarily on an activity wheel for six weeks prior to and during pregnancy, with running times and distances monitored weekly. The control group did not exercise. The team analyzed tissue samples taken from both groups late in their pregnancies.

The researchers found that the rats in the exercise group had higher levels of a circulating protein called [vascular endothelial growth factor](#) (VEGF) than those in the control group. VEGF and a pregnancy specific version of the protein called placental growth factor (PlGF) are important because not only do they stimulate the development of new blood vessels, they also maintain normal vessel function which in turn promotes good cardiovascular health.

According to Dr. Gilbert, finding increased VEGF in the exercise group has important implications for understanding, and perhaps preventing, preeclampsia. He noted that clinical and experimental studies have found that high levels of a protein called sFlt-1 can bind up the mothers' circulating levels of PlGF and VEGF and can lead to preeclampsia.

The researchers also saw that when VEGF increased, endothelial function increased. The endothelium is a thin layer of cells that line the inside of blood vessels. It reduces turbulence in blood flow, which allows blood to be pumped further with each heartbeat, thus taking stress off the heart.

The team also found that the rats in the [exercise group](#) had increased amounts of heat shock proteins (HSPs) compared to those that did not exercise. One HSP in particular, HSP 90, is thought to play a vital role in maintaining the blood vessels of the heart. It works in sync with VEGF and nitric oxide to dilate blood vessels so that blood flows more freely, which lowers blood pressure. Increased expression of HSPs as a result of exercise could provide a preconditioning effect that may help protect against cellular damage in the placenta during pregnancies complicated

by [high blood pressure](#).

"There have been many studies about exercise and pregnancy, but not at the molecular level," said Dr. Gilbert. "We hope to learn whether stimulating these proteins with exercise before pregnancy or early during pregnancy can lower a woman's risk for preeclampsia."

Provided by American Physiological Society

Citation: Exercise before and during early pregnancy increases two beneficial proteins for mothers-to-be (2011, October 14) retrieved 26 April 2024 from <https://medicalxpress.com/news/2011-10-early-pregnancy-beneficial-proteins-mothers-to-be.html>

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