

Study: Maternal, paternal exercise affects metabolic health in offspring

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A mouse study by Kristin Stanford, a physiology and cell biology researcher with The Ohio State University College of Medicine at the Wexner Medical Center, provides new ways to determine how maternal and paternal exercise improve metabolic health of offspring.

Laurie Goodyear of the Joslin Diabetes Center and Harvard Medical School co-led the study, published online in the journal *Diabetes*.

This study used mice to evaluate how their lifestyles—eating fatty foods vs. healthy and exercising vs. not—affected the metabolites of their offspring.

Metabolites are substances made or used when the body breaks down food, drugs or chemicals, or its own fat or [muscle tissue](#). This process, called [metabolism](#), makes energy and the materials needed for growth, reproduction and maintaining health. Metabolites can serve as disease markers, particularly for type 2 diabetes and cardiovascular disease.

"Tissue metabolites contribute to overall metabolism, including glucose or [fatty acid metabolism](#), and thus systemic metabolism. We have previously shown that maternal and paternal exercise improve health of offspring. Tissue and serum metabolites play a fundamental role in the health of an organism, but how parental exercise affects offspring tissue and serum metabolites has not yet been investigated. This new data contributes to how maternal or paternal exercise could improve metabolism in offspring," Stanford said.

Other studies have linked development of type 2 diabetes and impaired metabolic health to the parents' poor diet. In this study, researchers investigated the beneficial effects of parental exercise training in the presence of high-fat feeding on offspring metabolic health.

They used targeted metabolomics—the study of metabolites—to determine the impact of maternal exercise, paternal exercise, and the combination of maternal and paternal exercise on the [metabolite](#) profile in offspring liver, [skeletal muscle](#) and blood serum levels.

"We have long been interested in the role of parental exercise to improve offspring metabolic health. These data are a next step in learning mechanisms for how this works," said Stanford, who is a member of Ohio State's Dorothy M. Davis Heart and Lung Research Institute and the Diabetes and Metabolism Research Center.

This study found that all forms of parental exercise improved whole-body glucose metabolism in offspring as adults, and metabolomics profiling of offspring serum, muscle, and liver reveal that parental exercise results in extensive effects across all classes of metabolites in all of these offspring tissues.

"Any insight into how these tissue metabolites could

be regulated could help us understand how tissue metabolism works and offer some ideas to benefit or improve tissue glucose or fatty acid metabolism. This could eventually lead to developing new therapeutic tool or targets to improve metabolism," Goodyear said.

Future studies will elucidate the specific role of [exercise](#) to mediate these [metabolites](#) and determine their role to improve health of [offspring](#), specifically in muscle and the liver.

More information: Diego Hernández-Saavedra et al, Maternal Exercise and Paternal Exercise Induce Distinct Metabolite Signatures in Offspring Tissues, *Diabetes* (2022). [DOI: 10.2337/db22-0341](https://doi.org/10.2337/db22-0341)

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