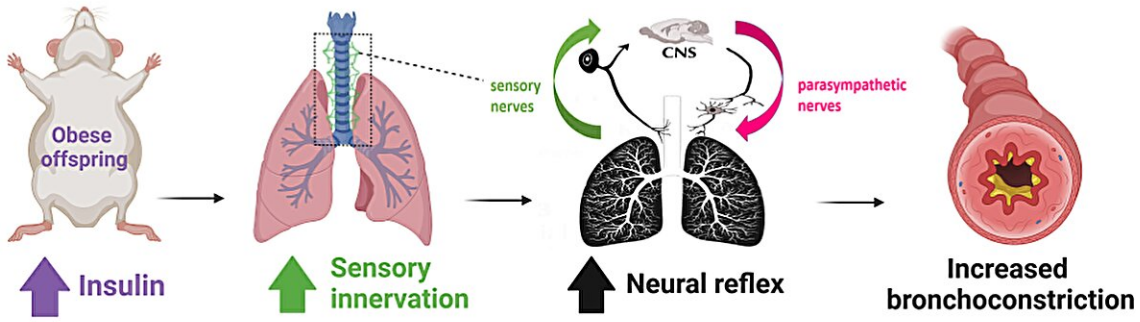
High-fat diet during pregnancy found to change respiratory nerve development, increase asthma risk in adult offspring

August 30 2023



Characteristics of offspring from a dam fed a high-fat diet. Credit: *American Journal of Physiology-Lung Cellular and Molecular Physiology* (2023). DOI: 10.1152/ajplung.00115.2023

New research points to a novel potential connection between eating a high-fat diet during pregnancy and the development of asthma in the offspring. This correlation has been previously documented, but the cause was unclear. The study is published ahead of print in the *American Journal of Physiology-Lung Cellular and Molecular Physiology*.

Researchers from Oregon Health & Science University fed female mice either a high-fat diet (HFD) or a regular diet (RD). After eight weeks on their assigned diets, females in both groups were bred with males raised

on a regular diet. Females continued their assigned diet until their pups were weaned. Once weaned, pups from both groups were fed a regular diet.

At different points in the offspring's development, researchers measured various metabolic factors, nerve development in their respiratory system, airway resistance and the presence of a molecule associated with asthma called substance P. Researchers also measured the offspring's responses to exposure to a chemical that triggered bronchoconstriction—a narrowing of the airways.

Compared to offspring of RD mothers, both male and female offspring of HFD dams had greater body weight, despite eating a regular diet. They also had increased insulin resistance and more insulin in their blood than is healthy. In addition, male offspring of HFD mothers had an increased percentage of body fat and decreased lean mass.

At 16 weeks old, HFD offspring had longer nerves, more nerve branching and an increase in substance P associated with their nerves than the RD offspring. During the bronchoconstriction trials, HFD offspring also showed greater constriction of their airways and greater airway resistance, which are hallmark characteristics of asthma.

The researchers further demonstrated that the HFD offsprings' response to the bronchoconstriction trials was influenced by blocking the influence of the airway nerves. In these trials, the differences between groups went away. "These findings have important clinical implications and provide new insights into the pathophysiology of asthma," researchers concluded.

More information: Gina N. Calco et al, Maternal high-fat diet increases airway sensory innervation and reflex bronchoconstriction in adult offspring, *American Journal of Physiology-Lung Cellular and*

Molecular Physiology (2023). DOI: 10.1152/ajplung.00115.2023