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Maternal stress during pregnancy linked to asthma risk in offspring

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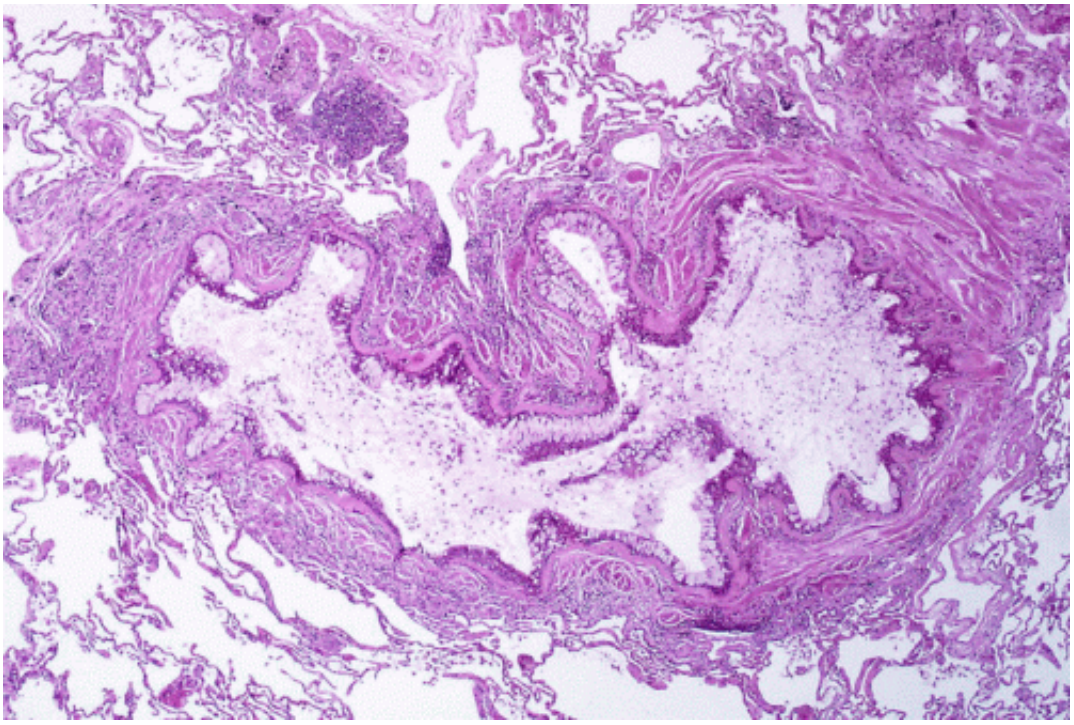

Obstruction of the lumen of a bronchiole by mucoid exudate, goblet cell metaplasia, and epithelial basement membrane thickening in a person with asthma. Credit: Yale Rosen/Wikipedia/CC BY-SA 2.0

During pregnancy, many women make a concerted effort to keep stress levels low—and for good reason. Maternal stress has been linked to a number of negative outcomes for women and their infants, including developmental and behavioral problems. Now, it has been linked to the

development of asthma. Researchers at the Harvard School of Public Health found that stress among pregnant mice—even a single bout—led to an increased risk of allergy-induced asthma in their offspring.

Glucocorticoids (GC) are naturally occurring stress hormones that help keep inflammation down. Synthetic versions of these hormones, such as prednisone, dexamethasone and hydrocortisone, are often used as a treatment for allergic reactions. Ironically, the same GCs can lead to inflammation and ramp up allergic responses to irritants, such as air pollution or pollen, instead of fighting them when released in the body in response to chronic stress. Because GCs are already elevated during a normal pregnancy, the stage is set for a harmful allergic response if levels spike due to stress.

In this study, Robert Lim, Alexey V. Fedulov and Lester Kobzik looked at whether the uptick of GC caused by maternal stress during pregnancy could lead to the development of asthma in the offspring. They exposed one group of pregnant mice to a single bout of stress, while a second group was given dexamethasone to mimic the effects of a stressful occurrence. A third group was given enough metyrapone—a steroid-inhibitor that blocks stress hormone release—to counteract the surge in stress hormones after stress exposure, and a fourth control group had no intervention.

They found that high concentrations of stress hormones (corticosterone or CORT) in the mother can cross the placenta and increase fetal CORT levels, potentially leading to a higher vulnerability to asthma and allergies. The offspring of all the mice were exposed to allergens after birth. According to the researchers, "Only the offspring of stressed mothers demonstrated increased asthma susceptibility compared with nonstressed mothers. We also demonstrated that a single episode of stress significantly elevated maternal stress hormone levels. These results indicate that maternal stress can play a role in the initiation of asthma by

increasing asthma susceptibility in offspring."

More information: The complete study is available online: ajplung.physiology.org/content/307/2/L141

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