

Collagen stiffness plays role in asthma, could lead to targeted treatment

June 9 2021



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A new study finds that manipulating the stiffness of the collagen-based support structure of airway cells could lead to a new treatment for asthma. The study is published ahead of print in the *Journal of Applied*

Physiology.

Asthma is a respiratory condition that affects more than 300 million people across the globe. People with asthma experience tightening (constricting) of airway [smooth muscle cells](#) in response to a variety of triggers, including breathing in substances—such as smoke or pollen—that irritate the airways or cause inflammation. Current asthma treatments focus on reducing inflammation and opening up constricted airways to facilitate easier breathing. Even when inflammation is controlled, however, the same trigger (called an agonist) may cause an asthma attack. Airway stiffness, including the [extracellular matrix](#)—a network of collagen, enzymes and proteins that surrounds the cells—also plays a role in asthma. However, less is known about how airway stiffness contributes to an [asthma attack](#) independently of inflammation.

A research team from Northeastern University in Boston explored how changing the stiffness of the extracellular matrix affects airway constriction. The researchers treated the extracellular matrix of healthy bovine airways with vitamin B2 and ultraviolet A radiation to stiffen the structure. The procedure, called collagen crosslinking, is often performed to stiffen the collagen in the cornea during eye surgery. "The goal here was not to recreate the pathophysiological process that occurs in asthma, but to perturb the [mechanical properties](#) of the [extracellular matrix] without introducing any inflammatory signals," the researchers wrote.

When treated with the same agonist, the airways with the stiffer extracellular matrix constricted more quickly and to a greater degree than before, even without inflammation present. These results highlight the potential for developing an [asthma](#) treatment that targets the stiffness of the extracellular matrix, the research team explained.

"Stiffening of the extracellular matrix is a sufficient condition for [airway](#)

hyperreactivity" is published ahead of print in the *Journal of Applied Physiology*.

More information: Ryan R. Jamieson et al, Stiffening of the extracellular matrix is a sufficient condition for airway hyperreactivity, *Journal of Applied Physiology* (2021). [DOI: 10.1152/jappphysiol.00554.2020](https://doi.org/10.1152/jappphysiol.00554.2020)

Provided by American Physiological Society

Citation: Collagen stiffness plays role in asthma, could lead to targeted treatment (2021, June 9) retrieved 6 May 2024 from

<https://medicalxpress.com/news/2021-06-collagen-stiffness-role-asthma-treatment.html>

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