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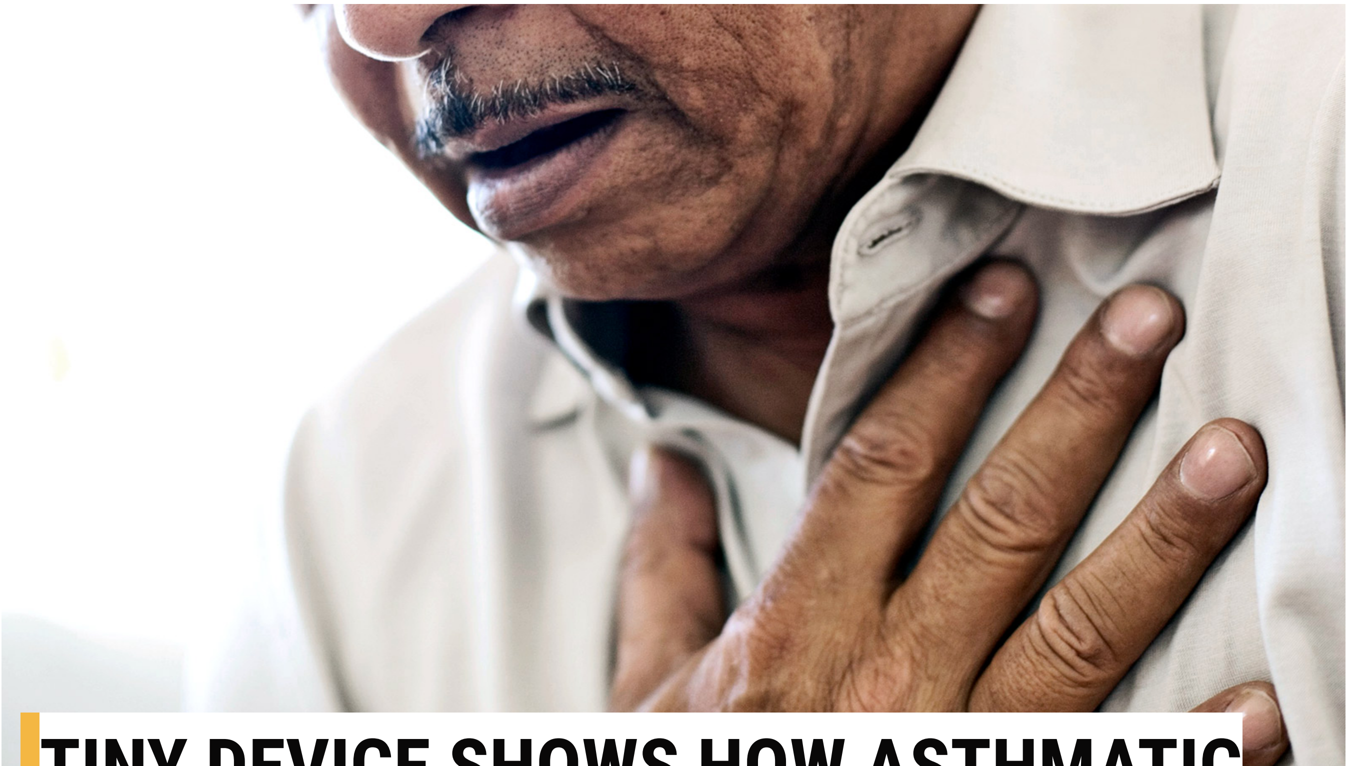

TINY DEVICE SHOWS HOW ASTHMATIC SPASMS HAPPEN

BY PATTI VERBANAS

A microdevice that mimics the behavior of the human airways has revealed how muscle contractions, or bronchospasm, in the airway occur, researchers report.

The study could lead to new treatment strategies for respiratory diseases, says coauthor Reynold Panettieri, director of the Rutgers University Institute for Translational Medicine and Science.

Bronchospasm can occur in both healthy people and those who suffer from serious respiratory diseases such as asthma or chronic obstructive pulmonary disease (COPD). Studying why the smooth muscle surrounding bronchial airways can suddenly contract and lead to difficulties in breathing is difficult due to the complexities of bronchospasm and the fact that the human respiratory system cannot be modeled in animal studies.

> **"BEING ABLE TO STUDY THE MECHANICS ON THE SINGLE-CELL LEVEL AND VIEW THOUSANDS OF CELLS SIMULTANEOUSLY CAN BE AN IMPORTANT SCREENING TOOL FOR THE DEVELOPMENT OF NEW DRUGS..."**

To analyze the biochemical and mechanical signals that occur between cells during spasms, the researchers created a microdevice—a "bronchi on a chip" one-thousandth the size of a human hair—containing cells from healthy and asthmatic lungs that mimics the function of a lung on single-cell levels.

When they triggered a simulated bronchospasm on the device, the researchers discovered that the initial contraction prompts the secretion of hormone-like compounds that either can induce an additional constriction or relax the spasm. In people with asthma, the smooth muscle surrounding the airways is more reactive and contracts more easily in response to stimuli such as allergens, leading to extended bronchial spasms, wheezing, and shortness of breath.

They also found that inducing a second asthmatic trigger during a bronchial spasm at a precise time will actually cause the smooth muscle to relax and stop the spasm.

The treatments for bronchospam have not changed in the past 50 years, Panettieri says, since they work for most—but not all—people.

“The microdevice allowed us to drill down into how single cells interact with each other in relation to smooth muscle contraction in a variety of lung diseases,” says Panettieri.

“Being able to study the mechanics on the single-cell level and view thousands of cells simultaneously can be an important screening tool for the development of new drugs for people with asthma who don’t respond to **current treatment**.”

The study appears in the journal ***Nature Biomedical Engineering***. Additional researchers from Rutgers, the Yale University’s Yale Systems Biology Institute, and Johns Hopkins University contributed to the work.