

New Nano-Sensor Can Detect Asthma Symptoms

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A sensor developed at the University of Pittsburgh could strip the element of surprise from some asthma attacks by detecting one before its onset. Fitted in a hand-held device, the tiny sensor provides people who have asthma with a simple and affordable means of keeping tabs on their condition by measuring their breath for high levels of a specific gas associated with asthma inflammation.

Researchers led by Alexander Star, a chemistry professor in Pitt's School of Arts and Sciences, created a sensor reactive to even minute amounts of nitric oxide, a gas prevalent in the breath of asthmatics, as they describe in the Aug. 22 online edition of the journal *Nanotechnology*.

Star also will present his research at the American Chemical Society's 234th National Meeting slated for Aug. 19-23 in Boston.

The sensor consists of a carbon nanotube—a rolled, one-atom thick sheet of graphite 100,000 times smaller than a human hair—coated with a polyethylene imine polymer.

Star cased the sensor in a hand-held device that people blow into to determine the nitric oxide content of their breath. The nitric oxide level in the breath of a person with asthma spikes as the airways grow more inflamed. High levels—perhaps two-thirds over normal—may precede an attack by one to three weeks, but possibly earlier depending on the asthma's severity, said Jigme Sethi, a Pitt assistant professor in the School of Medicine's Division of Pulmonary, Allergy, and Critical Care

Medicine and a clinician at UPMC Montefiore, who plans to clinically test Star's sensor.

Besides detecting attacks early on, Star's device also provides an easy, portable method for patients and their doctors to regularly monitor their symptoms and tailor treatment accordingly, Sethi said. Physicians use nitric oxide readings to help diagnose and gauge the severity of asthma, but the current method of measuring it requires expensive machines available only in outpatient clinics, Sethi said. Star's invention could allow people with asthma to watch their nitric oxide levels as easily as people with diabetes check their blood sugar with hand-held glucose monitors, Sethi said.

Star specializes in using carbon nanotubes-which were widely introduced to science in the early 1990s-as chemical sensors and in hydrogen fuel cells. In the case of sensors, a nanotube's extreme thinness renders it extremely sensitive to small changes in their chemical environment, which makes for an excellent detector, Star said.

Source: University of Pittsburgh

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