

Breath Tests May Reveal Illnesses

New Research Discovers Even Cancer Can Be Found By Studying a Single Puff

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Some day a visit to the doctor's office may seem more like a traffic stop for drunken driving.

Researchers recently discovered that tiny molecules found in a single puff of your breath may help screen for a range of conditions, including asthma, cancer and even schizophrenia. A study published this year, for instance, found that a breath test for breast cancer rivaled the effectiveness of a standard mammogram screening.

A handful of breath tests are already available and more than a half-dozen new tests could reach doctors' offices over the next few years.

"People used to look at me like I was deranged when I said I was doing research into breath," said Michael Phillips, professor of medicine at the New York Medical College, Valhalla, N.Y. Dr. Phillips has received several grants from the National Institutes of Health to investigate breath's ability to predict a range of conditions.

"We're now on the verge of breath testing being a standard at the doctor's office—we're not asking anyone to believe the unbelievable anymore," says Dr. Phillips, who hopes to someday commercialize his ideas through a company he has set up, **Menssana Research Inc.** in Fort Lee, N.J.

Dr. Phillips says he has used breath tests to detect lung and breast cancer with some accuracy. The two tests look for patterns of molecules associated with

oxidative stress, a condition caused by the body's inefficient use of oxygen within cells. Many diseases, including cancer, trigger increased levels of oxidative stress.

Researchers have associated similar markers with conditions such as schizophrenia and organ rejection.

Dating back to Hippocrates, physicians have long sniffed breath as a simple way to check a patient's health. Stinky breath can be a sign of gum disease, ammonia-like breath can be an indicator of kidney problems and sweet- or fruity-smelling breath is sometimes linked to diabetes.

The modern era of breath testing began in the early 1970s when the late Nobel Laureate Linus Pauling froze exhaled breath and exposed it to certain chemi-

Breath testing is on the verge of being a standard, according to one researcher.

cals through a process known as gas chromatography. What he found—a breath "fingerprint" of tiny, unique organic compounds—inflated hopes that breath testing could drastically change the way physicians interacted with their patients.

It didn't happen quickly. Researchers soon discovered that breath was difficult to collect in a uniform way and even harder to analyze. Only in recent years have researchers been able to standardize breath-collection techniques and uti-

lize the power of faster, more advanced computer technology to interpret their findings. It's now known that breath contains some 400 different molecules, though the majority of them haven't been studied in any detail.

The breath test for asthma, approved by the Food and Drug Administration this summer and made by **Aerocrine Inc.** of Sweden, measures levels of nitric oxide—a marker associated with airway inflammation. The molecule, often linked to smog and automobile exhaust, is always present in the lungs in very small amounts, but heightened levels could point to trouble. Similarly, a drop in the levels can indicate that treatment is working.

The company's machine, which costs about \$43,000, looks like a standard desktop computer, but with a long breath-collection tube dangling from it. The machine mixes a patient's exhaled breath with ozone and then reads the light that's emitted by the reaction of the two. The results are displayed on a monitor.

A single test costs about \$165, though that price could fall to below \$50 if sales are strong, said Aerocrine President Trevor Bourke.

While breath-test technology is still unproved, researchers are gathering data to back it up. In a study of 201 women published this year by the *Breast Journal*, a breath test identified 88% of breast cancers, about equal to the mammogram. A similar but unrelated study of lung cancer published in the journal *Chest* in June found that a breath test detected the disease accurately 85% of the time.

"If a person has a negative breath test, then it is almost 100% certain that they are free of lung cancer or breast cancer, and no more tests are needed," said New York Medical College's Dr. Phillips, who conducted both studies.

The American Cancer Society has kept an eye on the research progress of the breath test, a "novel technology that may offer ways to improve standard screening methods," said Robert Smith, director of cancer screening for the American Cancer Society.

In order to improve upon what is currently available, breath-test researchers will have to prove that their screenings can find disease in its very early stages. So far, most testing has focused only on identifying disease, regardless of progression, he said.

Lingering skepticism is still a big obstacle to the technology's acceptance, though those perceptions appear to be fading, said Patrick McCann, chief executive of **Ekips Technologies**, a Norman, Okla., company that produces an asthma-detecting breath test that uses lasers.

"There's a lot of good science behind these tests," he said. "When we start to see even more, this whole thing is going to snowball."