Cancer breathalyzer: Researchers developing breath test for possible diagnosis of lung and breast cancers

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Emory University researcher Dana Allen blows into a device that traps specific compounds found in breath. The compounds are then examined to confirm the presence or absence of cancer. Credit: Gary Meek

(Medical Xpress) -- A breath test designed to detect established lung cancer in humans showed promising results in a study conducted by researchers at the Georgia Institute of Technology and the Winship Cancer Institute of Emory University. The researchers presented their

results June 2 at the annual American Society of Clinical Oncology (ASCO) meeting in Chicago.

The Georgia Tech team, led by Charlene W. Bayer, Ph.D., and the Winship researchers, led by Geetha D. Vallabhaneni, M.D., found 75 unique breath volatile organic compounds (BVOCs) that differed between patients with non-small cell lung cancer (NSCLC) and subjects without the disease. The study enrolled 25 newly diagnosed female patients with NSCLC and 25 females without the cancer.

The breath compounds of lung cancer patients were also compared with the BVOCs in patients with breast cancer, a second aim of the study. To do this, Bayer teamed with Winship researcher Sheryl G.A. Gabram, M.D. The researchers recently conducted a clinical study analyzing more than 300 BVOCs in breath samples of 20 healthy women over the age of 40 and 20 women recently diagnosed with stage II-IV breast cancer and who had not yet received treatment. The results showed that the breath analysis was able to determine whether the sample came from a cancer patient or healthy subject 78 percent of the time.

The breath sampler and analytical method used for both studies were developed by Bayer, a principal research scientist at the Georgia Tech Research Institute. The research was funded by a Jim and Sarah Kennedy pilot grant.

As a patient breathes into the device, chemical compounds are trapped and examined by a sensor. The researchers' sensing methodology combines gas chromatography – a technique for separating complex compounds – with mass spectrometry, which identifies the chemical makeup of a substance. Specific patterns in the compounds are then found and used to determine whether or not the disease is present.

Early diagnosis of lung cancer, the nation's leading cancer killer, has

long been a challenge. A simple and inexpensive breath test to detect NSCLC early would make a big impact on early diagnosis, said Vallabhaneni. When diagnosed at Stage I, the earliest stage, NSCLC is curable in more than 70 percent of cases. In contrast, when diagnosed at Stage 3, NSCLC has a cure rate of less than 25 percent.

Bayer and Vallabhaneni caution that these promising results should be tested in larger studies before the test can be used in routine settings. Next steps include an analysis of the genetic signatures of the 75 differing BVOCs to determine whether the signature varies based on the stage of the disease.

Because it can offer immediate results right in a physician's office, Bayer expects the device may also help improve early breast cancer detection among those who do not have the resources for a mammogram, more easily conduct interval testing for those with a genetically high risk for breast cancer, and facilitate recurrence testing after breast cancer treatment.

Provided by Georgia Institute of Technology

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