

OU researchers developing new tool to detect cancer

August 26 2008

Early cancer detection can significantly improve survival rates. Current diagnostic tests often fail to detect cancer in the earliest stages and at the same time expose a patient to the harmful effects of radiation. Led by Dr. Patrick McCann, a small group of internationally known researchers at the University of Oklahoma with expertise in the development of mid-infrared lasers is working to create a sensor to detect biomarker gases exhaled in the breath of a person with cancer.

Proof-of-concept detection of a suspected lung cancer biomarker in exhaled breath has already been established as reported by the Oklahoma group in the July 2007 issue of *Applied Optics*. The research was inspired by studies showing that dogs can detect cancer by sniffing the exhaled breath of cancer patients. For example, by smelling breath samples, dogs identified breast and lung cancer patients with accuracies of 88 and 97 percent, respectively, as reported in the March 2006 issue of *Integrative Cancer Therapies*. The evidence is clear—gas phase molecules are uniquely associated with cancer.

Intrigued by the concept of using breath analysis to detect cancer, McCann saw an opportunity to use mid-infrared laser technology to help elucidate the relationship between specific gas phase biomarker molecules and cancer. He believes it is possible to develop easy-to-use detection devices for cancer, particularly for hard-to-detect cancers like lung cancer. McCann says we need sensors that detect these gas phase cancer biomarkers. "A device that measures cancer specific gases in exhaled breath would change medical research, as we know it."

McCann says the science and technology exist to support the development of a new tool to detect cancer, but the research will take from five to 10 years to get low-cost devices into the clinic. OU may have the strongest contingent of researchers dedicated to providing a solution to the problem using this approach. Even though studies confirm that dogs can detect cancer by smelling the gases, they can't tell us what gases they smell. It's up to the medical research community using the best measurement tools to figure that out.

According to McCann, "Improved methods to detect molecules have been demonstrated, and more people need to be using these methods to detect molecules given off from cancer. We have developed laser-based methods to detect molecules. Mid-infrared lasers can measure suspected cancer biomarkers—ethane, formaldehyde and acetaldehyde." McCann will use nanotechnology to improve laser performance and shrink laser systems, which would allow battery-powered operation of a handheld sensor device.

"You often have to go outside your discipline to pioneer new areas of research and Oklahoma has an advantage with so many experts in other fields. But getting funding for interdisciplinary research is challenging. However, more capital and research infrastructure are needed for this device to become a reality. As we build upon our existing capabilities Oklahoma can become more widely known as a center of excellence in this important area."

Even though McCann is not a cancer researcher, he wants his research on developing innovative laser technology to benefit the millions of people who would otherwise suffer from a late-stage cancer diagnosis. McCann knows it can be done. He says, "The science supports it, and the dogs tell us there is something there."

Source: University of Oklahoma

Citation: OU researchers developing new tool to detect cancer (2008, August 26) retrieved 27 April 2024 from <https://medicalxpress.com/news/2008-08-ou-tool-cancer.html>

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