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Tucson, Arizona | Published: 12.16.2003

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Breath test could be disease detector

By David Wichner ARIZONA DAILY STAR

Someday in the not-too-distant future, doctors may be able to diagnose illnesses such as cancer and heart disease by means of a simple breath test, a California scientist said in a presentation to a Tucson optics group Monday.



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Adapting cutting-edge optical technology to do that is the next step, Barbara

Paldus, executive vice president of Sunnyvale, Calif.-based Picarro Inc., told those who attended a luncheon meeting of the Arizona Optics Industry Association at the Arizona Inn.

"Hopefully, one day you'll be able to go to your doctor, breathe into a tube and 10 minutes later find out what's going on," Paldus said of the optical test equipment her company is developing.

Widely used for detecting blood-alcohol levels, breath analysis has already been used for years to detect gases in breath that indicate gastric disorders, Paldus said.

Picarro uses a patented technique, called "cavity ring-down spectroscopy," or CRDS, that can detect a variety of gases at the molecular level, said Paldus, who holds a doctorate in electrical engineering from Stanford University.

The devices work by introducing breath gases into a chamber shot through with laser light. Presence of certain gases is detected by measuring the rate at which the photons, or quantum-level light units, decay in the chamber.

"Every gas has a fingerprint, and it's literally like a human fingerprint, it's a unique spectral signature," she said.

The technology allows detection of gases at the levels of one part per billion or less, Paldus said.

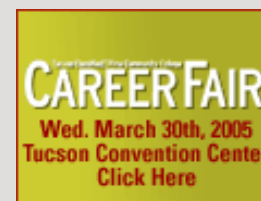
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While existing technologies are used to detect bodily gases for diagnoses, Picarro's technology holds the promise of achieving results with smaller and cheaper test equipment, Paldus said.

Sensing technologies such as mass spectroscopy - in which a substance is bombarded with an electron beam, creating fragments for chemical analysis - have been used for several years to diagnose Helicobacter pylori, a bacterium linked to peptic ulcers, she noted.

Now there is a worldwide scientific effort to study ways to diagnose illnesses by measuring some 400 volatile organic compounds - including methane, pentane and benzene - in breath as markers for a variety of ailments.

"Their presence or absence and concentrations can be indicators - and there's some good, very good, starting evidence for that - of cancer, or being able to predict heart attacks," Paldus said.

Kathleen Perkins, CEO of Tucson-based Breault Research Organization and an optics association organizer, said Picarro's technology is a good example of how the optical sciences are converging with biomedical science to create new diagnostic tools.

She plans to arrange meetings with Paldus and scientists from the University of Arizona's Arizona Cancer Center and the Optical Sciences Center to see whether they can combine efforts on research.

"One of the reasons I'm here is we're starting to put together consortia to bridge the gap between the optical technologies and the medical technologies, so that we can come upon the solution," Paldus said,

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adding that she was visiting Tucson for the first time.

Picarro has already developed CRDS systems for use by the semiconductor industry to measure air purity in manufacturing.

But the company has to develop a better laser source to get the kind of sensitivity needed for medical diagnostic devices - a breakthrough that is likely five to 10 years away, she said.

Dr. John Hughes, a semiretired surgeon and local technology-development booster, said after Paldus' presentation that the CRDS technology has great potential, citing the longtime use of breath analysis for Helicobacter pylori.

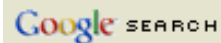
"If you make it much more cost-effective and much more reliable, reducing a lot of the complexities of the moisture and other factors, is where you could create a new generation" of diagnostic tools, said Hughes, who has been involved in developing a local nanotechnology industry cluster.

Contact reporter David Wichner at 573-4181 or wichner@azstarnet.com.

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