



Sandia handheld instrument assesses dental disease in minutes

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March 29, 2007, ALBUQUERQUE, N.M. — Who would have guessed that when the Star Trek medical diagnostic tool known as the tricorder makes its appearance in real life, the first user might be . . . your dentist.

According to a paper in the March 27 issue of PNAS (the Proceedings of the National Academy of Sciences), a recently completed pilot study conducted with the University of Michigan shows that a Sandia National Laboratories handheld device determined in minutes — from a tiny sample of saliva alone — not only if a patient has gum disease but quantitatively how advanced the disease is.

“The gold standard for any medical test is when instruments are used to examine human patients,” says Sandia researcher Amy Herr. “The pilot study allowed us to compare our results to accepted clinical measurements. Then we could statistically validate both the periodontal disease biomarker and the new microfluidic instrument.

“We achieved faster and more reproducible results because we combined steps that ordinarily require time-consuming manual handling by many people, into a single automated device.”

Sandia is a National Nuclear Security Administration (NNSA) laboratory.

Because the amount of sample fluid needed for testing is so small, Herr sees further applications in other disease areas — including potentially improved diagnosis of prostate and breast cancer — as well as rapid measurements of serum in animal models employed in vaccine development research.

Says Sandia researcher Anup Singh, “This technology also has great promise for Sandia’s efforts in homeland defense. We have ongoing efforts to use the diagnostic platform to detect biotoxins and other markers in bodily fluids to be able to diagnose exposure to a biological agent.

“We’ve filed patents and technical advances to protect the work,” Herr says. “The study has sparked commercial and university interest in our inventions. Our team — an interdisciplinary group of internal and external collaborators — believes Sandia’s contributions in this area could advance personalized medicine. So we’re motivated to extend the limits of Sandia’s lab-on-a-chip tools.

A “lab on a chip” refers to an entire laboratory on an area the size of a computer chip, requiring only minute amounts of material to perform automated chemical analysis.

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