New device measures heart health with drop of blood

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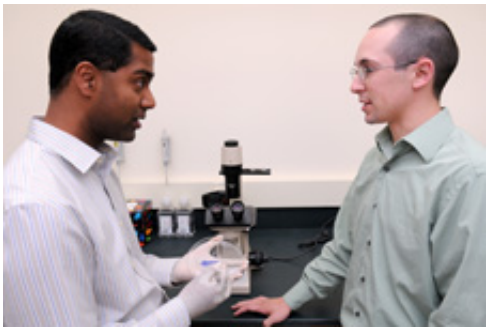

Chemical engineering professor Shashi Murthy, left, speaks with research assistant and student Brian Plouffe in their lab.

(PhysOrg.com) -- Is your heart sound? To answer that question, all assistant professor Shashi Murthy needs is a single drop of your blood.

Murthy, a member of Northeastern's chemical engineering department, and his team of researchers have developed a device that can monitor cardiovascular health by using just 200 microliters of blood.

The device, which is smaller than a slim cell phone, makes use of antibodies that naturally bind to endothelial progenitor cells present in a blood sample. The greater the number of these cells, which studies show can repair damaged blood vessels, the greater your cardiovascular health.

Murthy, the project's lead researcher, recently published a paper on his

novel method of disease detection in a publication called the Federation of American Societies for Experimental Biology Journal. Co-writers are Brian Plouffe, a chemical engineering doctoral student at Northeastern and Virna Sales, a Harvard Medical School instructor and a cardiovascular surgeon at Children's Hospital Boston.

Earlier this month, the team's research was featured in a local-news broadcast on Boston's WBZ-TV.

Heart disease is currently the leading cause of death in the United States. According to the Centers for Disease Control and Prevention, more than 650,000 Americans die from heart disease each year, accounting for roughly 27 percent of all U.S. deaths.

"Just knowing the number of [endothelial progenitor] cells present in a sample is a meaningful bit of information," Murthy explains. "We will be able to essentially assess relative cardiovascular health."

It will take at least two years, Murthy says, before the diagnostic tool reaches patients in hospitals across the country. Over the next several months, he and his team will begin to test the device's reliability by studying blood samples from patients known to be at risk or known not to be at risk for heart disease.

"Even slightly less than 100 percent reliability is not acceptable," says Murthy.

Eventually, Murthy hopes to move beyond using the device solely as a diagnostic application. It's quite possible, he explains, that it might someday help scientists repair damaged blood-vessel walls, lessening the need for bypass surgery and treating such conditions as heart arrhythmia. This is because endothelial progenitor cells can be transformed into endothelial cells, the building blocks of blood vessels.

Such a feat would require that endothelial progenitor cells be carefully removed from a blood sample, enriched and perhaps even multiplied, then injected back into damaged tissue through a surgical procedure. Murthy likens the as-yet theoretical procedure to a stem-cell or bone-marrow transplant.

“It’s a different starting material and a different end point,” he says. “But the idea is the same.”

Although Murthy is proud of his team’s medical breakthrough, he won’t be content until at-risk patients—heavy smokers, for example, or those with a family history of heart disease—begin benefiting from the device.

“Until the technology is known to be very helpful to patients and society at large, I consider it an unfinished project,” he says.

Provided by Northeastern University (news : web)