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Publication: Austin American-Statesman

Publish date: December 29, 2013

UT research lab lands nearly \$1 million for blood test to diagnose cancer

By Mary Ann Roser

John Zhang at the University of Texas is using his expertise in miniaturization to help diagnose cancer where it is easy to reach but hard to detect: in the blood.

Zhang, in collaboration with researchers at UT Southwestern Medical Center at Dallas, has developed a disposable microchip the size of two thumbnails that costs about \$5 and is capable of capturing as few as five cancer cells among millions of cells circulating in a person's blood. A hand-held microscope he also invented can then read the cells and determine the type of cancer.

The entire system would cost in the range of \$50,000, an amount Zhang said was about nine to 10 times less than a similar product on the market.

"I want to bring this into the global health (arena) to lower the cost of health care," said Zhang, an assistant professor of biomedical engineering.

He does not see the technology replacing current ones but rather being complementary, and researchers say the test doesn't replace more traditional detection methods like mammograms.

The microchip Zhang developed is designed to capture cells. The patient's blood is mixed with a chemical cocktail of antibodies laced with tiny metal particles. The cancer cells bind with the metal and are attracted to a microchip that's attached to a magnet and engineered to capture the cells.

The cells are then stained by a dye that colors them according to the type of cancer tumor present. The cells can then be examined with a hand-held microscope equipped with computer scanning software that is able to detect variations in color to reveal the type of cancer.

Because of the invention's potential, Zhang and his team recently received a three-year, \$950,000 grant from the National Cancer Institute, which is part of the National Institutes of Health. Zhang is the chief science officer with NanoLite Systems, an Austin company seeking to commercialize the blood testing device along with another Zhang invention. NanoLite became part of the Austin Technology Incubator last month.

A trend in medical devices is making instruments smaller and cheaper, and doing that can involve a creative marriage between engineers, like Zhang and his team at UT, and physician-researchers like Drs. Eugene Frenkel and Jonathan Uhr at UT Southwestern. Their invention is among several in development, all vying to compete with Johnson & Johnson's Veridex CellSearch test, on the market since 2004.

Since the groundbreaking CellSearch Circulating Tumor Cell Test has been out, some oncologists have used it to test the blood of patients known or suspected of having prostate, breast or colon cancer.

Zhang's device captures cancer cells in the same way as the CellSearch instrument. CellSearch uses a fluorescent or color-coded imaging process to read the cells. Zhang said his microscope is more precise.

That's the reason the National Cancer Institute awarded nearly \$1 million to Zhang and his team, said Avi Rasooly, program director at the institute.

Zhang's device has the capability to read 10 different colors, or cancers, Rasooly said, and "nobody was able to do this. \u2026 He is ahead of the game."

Zhang's device is testing the same three cancers CellSearch analyzes, but Zhang said his device has the potential to test 10 to 17 cancers.

The grant was highly competitive, and of thousands of applications submitted, just 10 percent received varying amounts of funding, Rasooly said. Zhang's team, which includes adjunct associate professor Kostia Sokolov, graduate student Yu-yen Huang and research associate Kaz Hoshino, is working on a "very hot technology" and combines a trend of oncologists, engineers and molecular biologists working together, Rasooly said.

A spokeswoman for CellSearch did not return a call seeking comment.

Its website says the CellSearch system is used to monitor patients with cancer that has spread. The test can help doctors determine how to treat patients and how to gauge their survival. Zhang said such testing also can detect cancer at a very early stage.

Doctors are always looking for new tools in the fight against cancer, said Dr. Beth Hellerstedt, head of research at Texas Oncology in Austin.

She has used the Veridex CellSearch test in conjunction with traditional CT scans, mammograms and other screening tests for cancer. It likely would be some years before a blood test alone could be used to diagnose and monitor cancer patients, she said.

A concern is using the test to detect cancers that are not lethal and better left alone.

"The burden of over-detection is almost as bad as under-detection," Hellerstedt said. "There may be a circulating tumor cell, and your body may have taken care of it in some other way. That is not something that can be overlooked."

Zhang said he has heard those concerns, but "it's our responsibility to offer this option."

If all goes well, it would take about three to four years to bring the device to market, said Ting Shen, president and CEO of NanoLite Systems, the company developing the device.