Small Liquid Sensor Could Detect Cancer Instantly From Home

Thursday, February 18, 2010

FOX NEWS

COLUMBIA, Mo. —

An at home cancer detection kit could be in the same aisle as a pregnancy test in a future trip to the drugstore. A sensor, smaller than a human hair, is in development at the University of Missouri and would be able to test body fluids for cancers, including breast cancer and prostate cancer.

"By using highly sensitive, low-signal-loss acoustic resonant sensors in a liquid, these substances can be effectively and quickly detected — a brand-new concept that will result in a noninvasive approach for breast cancer detection," said Jae Kwon, assistant professor of electrical and computer engineering at MU.

The sensor would not require large amounts of data or equipment. It would also produce instant results, which would decrease anxiety for patients who would normally spend time waiting to hear about blood tests or biopsies that could take days or even weeks.

Last year, Kwon was awarded $400,000, for a National Science Foundation CAREER Award to continue his effort on this sensor research for an additional five years.

Click here to read more about this project.
THE TIMES OF INDIA

Home cancer detection kit soon a reality

Jae Kwon, assistant professor of electrical and computer engineering, University of Missouri, is working on developing an acoustic resonant sensor that is smaller than a human hair and could test bodily fluids for a variety of diseases, including breast and prostate cancers.

Kwon explained: "Many disease-related substances in liquids are not easily tracked. In a liquid environment, most sensors experience a significant loss of signal quality, but by using highly sensitive, low-signal-loss acoustic resonant sensors in a liquid, these substances can be effectively and quickly detected - a brand-new concept that will result in a noninvasive approach for breast cancer detection."

Kwon’s sensor makes use of micro/nanoelectromechanical systems (M/NEMS), tiny devices that are smaller than the diameter of a human hair, to directly detect diseases in body fluids.

Kwon said: "Our ultimate goal is to produce a device that will simply and quickly diagnose multiple specific diseases, and eventually be used to create 'point of care' systems, which are services provided to patients at their bedside.

"The sensor has strong commercial potential to be manifested as simple home kits for easy, rapid and accurate diagnosis of various diseases, such as breast cancer and prostate cancer."

Kwon's sensor research has been published in the IEEE International Conference on Solid-state, Sensors, Actuators and Microsystems and the IEEE Conference on Sensors.
MU researcher develops cancer-detecting sensor

The sensor could potentially be developed as a home testing kit.

By Krystin Arneson
Published Feb. 19, 2010

A non-invasive approach to detecting cancer is under development by MU researcher Jae Kwon.

It takes the form of an "acoustic resonant sensor" that looks at biomarkers in bodily fluids, such as blood or urine.

"Research has found that there are biomarkers that indicate when cancer is present," MU News Bureau spokeswoman Kelsey Jackson said. "So the sensor is detecting those biomarkers in the blood or urine."

Before Kwon, looking at fluids to find disease was more of a challenge, Jackson said. Like cell phones, most sensors lose signal quality when they are in adverse environments, or in this case, liquid environments. Kwon's detector improves on previous sensors because of its low signal loss and high sensitivity, which enables the sensor to get a good reading of the biomarkers.

He said because of that, disease-related substances can be "effectively and quickly detected."

By "quickly," Kwon means in real-time. As complicated as it is, the detector is smaller than a human hair. Its small size and high sensitivity allows patients to get results almost immediately, instead of waiting days or weeks for biopsy or test results.

"Our ultimate goal is to produce a device that will simply and quickly diagnose multiple specific diseases, and eventually be used to create 'point of care' systems, which are services provided to patients at their bedsides," Kwon said.

The size of the sensor again plays a key role in this because it allows typically bulky accompanying machinery, such as data readers and scanning equipment, to be smaller too.

Much like home drug tests or pregnancy kits, Kwon hopes the sensor might be available commercially one day. People can then be diagnosed at home instead of going to the hospital for a potentially costly barrage of tests.

"The sensor has strong commercial potential to be manifested as simple home kits for easy, rapid and accurate diagnosis," Kwon said.

Kwon received a five-year, $400,000 National Science Foundation CAREER award to continue his work. The award, meant to support junior teacher-scholars, is one of the foundation's most prestigious. The Institute of Electrical and Electronics Engineers has also published his sensor research at two conferences.
MU works in anticipation of future cuts

Budget officials draw scenarios.

By Janese Heavin

Thursday, February 18, 2010

The University of Missouri’s budget office will begin meeting with department administrators starting tomorrow as the campus braces for cuts in state funding.

Provost Brian Foster said MU’s schools and colleges will be asked to consider several scenarios and offer feedback. The worst-case scenario — being used for planning purposes only — will look at the effects of a 13 percent cut in budgets over the next three years.

MU expects to lose $10 million in state funding next fiscal year under a deal with Gov. Jay Nixon that freezes tuition in exchange for no more than a 5 percent cut to higher education.

Adding utility, benefits and other inflationary costs to that deficit and considering revenue increases from another expected enrollment spike, the university is looking at a $17 million shortfall next year, Budget Director Tim Rooney said. Over the past few years, administrators have tucked back about $9 million from enrollment increases to soften the expected blow, leaving administrators to deal with an $8 million budget hole next year. The shortfall equals about a 2 percent cut across the campus.

Although the general operating fund makes up 26 percent of the university’s $1.8 billion budget, it’s the trunk that supports all other MU operations, Rooney said this morning at a community forum. State funding and tuition, he said, make up the root system of the university’s money tree.

The lion’s share of MU’s budget is the more than $953 million enterprise fund — self-supporting entities such as the hospital, health clinics and the bookstore. Athletics also is included, even though the university provides about 4 percent of its budget.

Other funds are made up of money allocated for specific purposes, such as fees that pay for the student health center or gifts and grants given to support specific programs. Those funding sources make up the branches and leaves that would die without a healthy trunk, Rooney said, sticking with the tree analysis. For instance, the university wouldn’t be able to secure grants if general funds weren’t there to pay salaries for quality faculty, he said.

The community presentation, held at the MU Life Science Business Incubator in the research park, aimed to clear up misconceptions about the university’s budget. Rooney explained. For
example, the $1 billion For All We Call Mizzou campaign doesn’t solve operating fund woes because it was composed of donations given for specific buildings or projects. Donors, not the university, controlled where the bulk of those funds went.

Getting everyday people to understand how the university spends its money is tough, said retired resident Don Johnson, an alumnus who recently returned to the area. He said he hears grumblings at coffee shops about new athletics buildings — expenses that, in actuality, were designated by private donors spending private money. “There are a lot of misperceptions,” he told Rooney. “You don’t do a good job of public relations, getting that message to the public.”

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Making a bit of me

A machine that prints organs is coming to market

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Illustration by David Simonds

The great hope of transplant surgeons is that they will, one day, be able to order replacement body parts on demand. At the moment, a patient may wait months, sometimes years, for an organ from a suitable donor. During that time his condition may worsen. He may even die. The ability to make organs as they are needed would not only relieve suffering but also save lives. And that possibility may be closer with the arrival of the first commercial 3D bio-printer for manufacturing human tissue and organs.

The new machine, which costs around $200,000, has been developed by Organovo, a company in San Diego that specialises in regenerative medicine, and Invetech, an engineering and automation firm in Melbourne, Australia. One of Organovo’s founders, *Gabor Forgacs of the University of Missouri*, developed the prototype on which the new 3D bio-printer is based. *The first production models will soon be delivered to research groups which, like Dr Forgacs’s, are studying ways to produce tissue and organs for repair and replacement. At present much of this work is done by hand or by adapting existing instruments and devices.*

To start with, only simple tissues, such as skin, muscle and short stretches of blood vessels, will be made, says Keith Murphy, Organovo’s chief executive, and these will be for research purposes. Mr Murphy says, however, that the company expects that within five years, once clinical trials are complete, the printers will produce blood vessels for use as grafts in bypass surgery. With more research it should be possible to produce bigger, more complex body parts. Because the machines have the ability to make branched tubes, the technology could, for example, be used to create the networks of blood vessels needed to sustain larger printed organs, like kidneys, livers and hearts.

Printing history

Organovo’s 3D bio-printer works in a similar way to some rapid-prototyping machines used in industry to make parts and mechanically functioning models. These work like inkjet printers, but with a third dimension. Such printers deposit droplets of polymer which fuse together to form a structure. With each pass of the printing heads, the base on which the object is being made...
moves down a notch. In this way, little by little, the object takes shape. Voids in the structure and complex shapes are supported by printing a “scaffold” of water-soluble material. Once the object is complete, the scaffold is washed away.

Researchers have found that something similar can be done with biological materials. When small clusters of cells are placed next to each other they flow together, fuse and organise themselves. Various techniques are being explored to condition the cells to mature into functioning body parts—for example, “exercising” incipient muscles using small machines.

Though printing organs is new, growing them from scratch on scaffolds has already been done successfully. In 2006 Anthony Atala and his colleagues at the Wake Forest Institute for Regenerative Medicine in North Carolina made new bladders for seven patients. These are still working.

Dr Atala’s process starts by taking a tiny sample of tissue from the patient’s own bladder (so that the organ that is grown from it will not be rejected by his immune system). From this he extracts precursor cells that can go on to form the muscle on the outside of the bladder and the specialised cells within it. When more of these cells have been cultured in the laboratory, they are painted onto a biodegradable bladder-shaped scaffold which is warmed to body temperature. The cells then mature and multiply. Six to eight weeks later, the bladder is ready to be put into the patient.

The advantage of using a bioprinter is that it eliminates the need for a scaffold, so Dr Atala, too, is experimenting with inkjet technology. The Organovo machine uses stem cells extracted from adult bone marrow and fat as the precursors. These cells can be coaxied into differentiating into many other types of cells by the application of appropriate growth factors. The cells are formed into droplets 100-500 microns in diameter and containing 10,000-30,000 cells each. The droplets retain their shape well and pass easily through the inkjet printing process.

A second printing head is used to deposit scaffolding—a sugar-based hydrogel. This does not interfere with the cells or stick to them. Once the printing is complete, the structure is left for a day or two, to allow the droplets to fuse together. For tubular structures, such as blood vessels, the hydrogel is printed in the centre and around the outside of the ring of each cross-section before the cells are added. When the part has matured, the hydrogel is peeled away from the outside and pulled from the centre like a piece of string.

The bio-printers are also capable of using other types of cells and support materials. They could be employed, Mr Murphy suggests, to place liver cells on a pre-built, liver-shaped scaffold or to form layers of lining and connective tissue that would grow into a tooth. The printer fits inside a standard laboratory biosafety cabinet, for sterile operation. Invetech has developed a laser-based calibration system to ensure that both print heads deposit their materials accurately, and a computer-graphics system allows cross-sections of body parts to be designed.

Some researchers think machines like this may one day be capable of printing tissues and organs directly into the body. Indeed, Dr Atala is working on one that would scan the contours of the part of a body where a skin graft was needed and then print skin onto it. As for bigger body parts, Dr Forgacs thinks they may take many different forms, at least initially. A man-made biological
substitute for a kidney, for instance, need not look like a real one or contain all its features in order to clean waste products from the bloodstream. Those waiting for transplants are unlikely to worry too much about what replacement body parts look like, so long as they work and make them better.
The Pew Center on the States study says Missouri needs to improve how it manages its long-term liabilities for pensions and retiree health care benefits. The survey says:

- Missouri’s pension systems were 83 percent funded in 2008, above the 80 percent benchmark that the U.S. Government Accountability Office says is preferred by experts.

- Although Missouri consistently meets its annual required contribution for its state employees’ plan, its payment for the public school retirement system has repeatedly been underfunded.

- Missouri is one of 29 states that have put aside some money to cover its bill coming due for retiree health care and other benefits. However, less than 1 percent of the total $2.9 billion liability has been funded.
Faculty Council approves military course credit transfer

The council also discussed domestic partner benefits for faculty members.

By Kaylen Ralph
Published Feb. 19, 2010

Faculty Council approved a proposal awarding credit for military coursework and introduced several issues regarding diversity at MU at Thursday's meeting.

The proposal states military veterans with at least two years of honorable service are allowed to transfer military course credit accredited by the American Council of Education to MU. The change in this proposal from the transfer credit policy is that military veterans are allowed a maximum of nine credit hours as general electives. Currently, veterans can count up to 20 percent of their credit hours for MU credit.

"We want to limit the number of credits that we're just handing out," Academic Affairs Committee Chairman Joe Parcell said.

One issue raised at the meeting that had not come up in previous discussion was giving credit for veterans who had been honorably or dishonorably discharged. Parcell said he assumed discharged veterans would be excluded from this policy, but the issue had not come up in meetings with any of the military branches on campus.

The new policy will apply to veterans enrolled for the fall 2010 semester.

All items being introduced for discussion came from the Diversity Enhancement Committee. DEC Chairwoman Leah Cohn brought up the possibility of expanding insurance benefits for MU employees in same-sex partnerships, creating a family friendly initiative task force and looking into the policy for reporting sexual harassment.

According to the proposed Resolution on Domestic Partnership, more than 300 institutions of higher education in the United States have same-sex domestic partner benefits included as part of their employees' benefits package. This includes all members of the Big 10 and most members of the Big 12. The UM system is one of the few that does not offer these benefits.

"It's not fair, it's not fair to say to one (employee) we're going to cover your partner but not your partner (to another)," Cohn said.

Vice Chairman Bill Wiebold brought up the possibility of introducing the employee-plus-one system as another option.

"We're looking at this issue and employee plus one as two different issues. They're related but they're different," Cohn said.
Cohn said according to Associate Vice President of Benefits Mike Paden, implementing insurance benefits for partners in same-sex relationships would cost approximately $2.2 million for the whole UM system.

Concerning the creation of a family-friendly task force, Cohn cited issues, such as the absence of places for students who are nursing to pump breast milk and the difficulty for students who miss class in order to care for a sick family member to make up class work. Cohn said improvements in these areas would apply to and benefit faculty members as well.

Regarding the process for reporting sexual harassment, the council discussed possible venues for consolidating reports of inappropriate behavior. The discussion branched off into several different areas and the council decided to table the discussion for a later date.

"It sounds like this might evolve into more than just the data-gathering process," Faculty Council Chairwoman Leona Rubin said.
'Live tiger' story takes on life of its own

By Janese Heavin

Posted February 11, 2010 at 11:42 a.m.

Tim Noce's idea of having a live tiger on the MU campus has taken on a life of its own, forcing Noce to try to clarify himself more than once.

Last week, Noce, president of the Missouri Students Association, told me he never intended to cage a wild tiger and parade it around the football field during home games at the University of Missouri. Rather, Noce said his idea was for Mizzou to build an appropriate habitat for a neglected or abused tiger, allow animal science faculty and students to care for it and make the animal a sort of school mascot, not to replace the costumed Truman the Tiger.

The AP eventually picked up on the clarified story, but not before talk of live tigers roaming Farout Field spread.

ESPN's "Page 2" column called it a "terrible idea."

"The problem with adding a real tiger isn't that it's both unsafe and expensive; it's that it isn't unsafe and expensive enough," quipped writer Patrick Hruby. "Not if Missouri truly wants to attract attention in our fractured, distracted, overstimulated media age. The first student who gets mauled by the mascot? Big news. But Tiger bite victims No. 2-20? Yawn."

Hruby goes on to make some suggestions, such as getting a white tiger mascot, trained by Siegfried and Roy and an "Old School"-style mascot fire ring during pregame warmups.

Check out the column here.

Today, The Pitch in KC dubbed the live tiger story a case of bad journalism.

Writer Nadia Pflaum took ESPN reporters and producers to task for talking about it on a televised show without reading beyond an outdated Maneater story from Jan. 26 or trying to contact Noce himself.

In fact -- even though the AP picked up on the story earlier this week -- Noce told the Pitch he's only actually been contacted by three news outlets: The Trib, The Maneater and The Pitch.

The whole "movement" to get a live tiger at Mizzou started when a buddy jumped the gun on Twitter, Noce told The Pitch. You can read that story here.
Olympic notebook: Meet the Games' youngest reporter

MU mention on Page 2

VANCOUVER—Working in the unofficial press center at Robson Square, Brennan LaBrie stands out a bit.

It's not just that he's blogging, doing podcasts, and posting to Twitter. It's that he's 10 years old. LaBrie was one of a dozen winners of a Time magazine "kid reporter" contest. But LaBrie was already an experienced reporter before landing the Time gig. He runs a handwritten neighborhood weekly that has roughly 250 subscribers paying 25 cents an issue.

Brennan LaBrie: a veteran journalist at age 10

(Credit: Ina Fried/CNET)

Because his hometown, Port Townsend, Wash., is so close, the folks at Time suggested he come to the Games for a day.

That wasn't enough for LaBrie though, who said one day just wasn't sufficient to do the kind of reporting he wanted to do.

"I'm all about people," LaBrie told me. "I believe everyone has a great story."
So LaBrie sought additional funds from neighbors and family, raising more than $1,400 so he can spend a week covering the games.

Thus far, LaBrie hasn't made it inside to see any events firsthand, but that hasn't seemed to slow him down.

"We just go to the big screens and get real close," said Brennan's mom, Colleen LaBrie.

**iPhone as reporting tool**

Speaking of younger journalists, I've also been sharing the press room with a team of student journalists testing out a tool that turns the iPhone into a multimedia reporting machine.

Vericorder, based in Kelowna, British Columbia, has a $5.99 iPhone app for audio recording, is just about ready with a $7.99 multimedia version (photos and sound), and hopes to have a video version ready in time for a broadcasting trade show in April.

Vericorder's software works with a standard iPhone, though it is seen here with a third-party attachment that adds an external lens and microphone.

To both test and promote the technology, Vericorder has brought in student journalists from the U.S. and Canada to cover the Olympics using the technology.

"We think they adopt technology a little more quickly," said Vericorder senior VP David Barkwell. "We thought it would be a tremendous experience for them. It was also a way for us to really put our technology to the test."

**University of Missouri journalism professor Karen Mitchell** said that using the iPhone has a side benefit for the younger reporters. Its wide-angle lens doesn't let them work from too far away from their subjects.

"It forces them to get close to people," Mitchell said. "Once they get close they find better stories. They get intimate. They ask different questions."

Mitchell, who has been editing the students' work, is an Olympics veteran, having previously covered the Atlanta and Sydney games as a photo editor for Gannett and the Associated Press.
Vonn went to MU High School

By Janese Heavin

Posted February 18, 2010 at 2:17 p.m.

Twitter has been abuzz today with news that Olympic skier Lindsey Vonn has an MU connection.

Vonn recently won a gold medal for the best time in the downhill competition at the 2010 Olympic Games in Vancouver.

"Did you know that gold medalist Lindsey Vonn went to the University of Missouri?" one tweeter asked. Another exclaimed: "Holy Cow Lindsey Vonn went to Mizzou!"

Well, not exactly. Vonn apparently took some online courses through MU High School, an online program through the university's Center for Distance and Independent Study, in the early 2000s. The spokeswoman there tells me she's not sure whether Vonn has ever been to Columbia.

That said, Vonn lists the University of Missouri as her education on her official Olympics profile. Not a bad plug for Mizzou.