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Cohesive Device to monitor brain Aneurysm treatment

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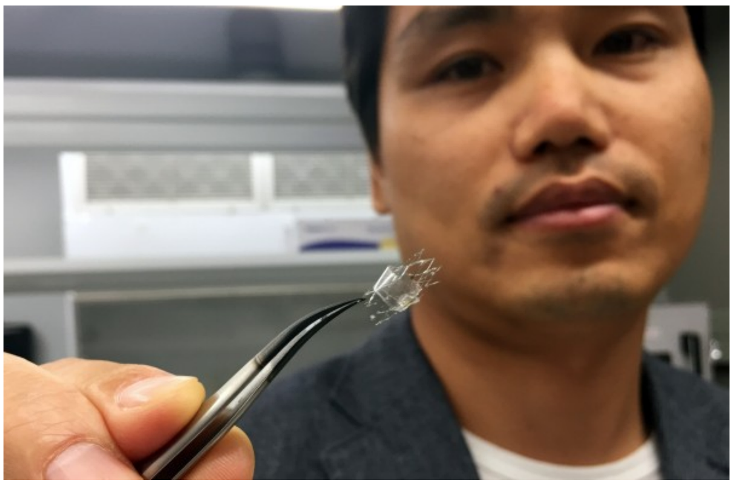

A multi-university research team has demonstrated proof-of-concept for a highly flexible and stretchable sensor that could be integrated with the flow diverter to monitor hemodynamics in a blood vessel without costly diagnostic procedures.

The sensor, which uses capacitance changes to measure blood flow, could reduce the need for testing to monitor the flow through the diverter.

Researchers, led by Georgia Tech, have shown that the sensor accurately measures fluid flow in animal blood vessels in vitro, and are working on the next challenge: wireless operation that could allow in vivo testing.

Endovascular therapy using platinum coils to fill the aneurysm sac has become the standard of care for most aneurysms, but recently a new endovascular approach – a flow diverter – has been developed to treat cerebral aneurysms.

Flow diversion involves placing a porous stent across the neck of an aneurysm to redirect flow away from the sac, generating local blood clots within the sac.

Yeo and his colleagues hope their sensor could provide simpler monitoring in a doctor’s office using a wireless inductive coil to send electromagnetic energy through the sensor.

By measuring how the energy’s resonant frequency changes as it passes through the sensor, the system could measure blood flow changes into the sac.

The sensor uses a micro-membrane made of two metal layers surrounding a dielectric material, and wraps around the flow diverter.

The device is just a few hundred nanometers thick, and is produced using nanofabrication and material transfer printing techniques, encapsulated in a soft elastomeric material.

Because the brain’s blood vessels are so small, the flow diverters can be no more than five to ten millimeters long and a few millimeters in diameter. That rules out the use of conventional sensors with rigid and bulky electronic circuits.

The researchers tested three materials for their sensors: gold, magnesium and the nickel-titanium alloy known as nitinol. All can be safely used in the body, but magnesium offers the potential to be dissolved into the bloodstream after it is no longer needed.

The proof-of-principle sensor was connected to a guide wire in the in vitro testing, but Yeo and his colleagues are now working on a wireless version that could be implanted in a living animal model.