Wireless Neurovascular Monitoring System (#7908)

A flexible and minimally invasive electronic system to wirelessly monitor treatment of cerebral aneurysms

Inventors at Georgia Tech have developed a wireless implantable biosensor system to monitor blood flow during a cerebral aneurysm treatment. The system is comprised of a miniaturized capacitive sensor and inductive coil, and can be used for integration into a circuit-less and battery-less functional device. The optimized wireless system demonstrates the longest detection range, based on the ratio of the readout distance and sensor cross-sectional area among the reported inductive coupling methods to date. Quantitative analysis of transient sensor signals allows accurate identification of a resonance frequency, which will offer real-time monitoring of hemodynamics of blood flow in cerebral aneurysm with an abnormal focal dilation.

Benefits/Advantages

- **Minimally invasive**: minimal impact on hemodynamics (dynamics of blood flow)
- **Flexible and stretchable**: able to conform to complex vessel geometry
- **Longer range**: improved wireless detection range

Potential Commercial Applications

- Monitoring of treatment process of cerebral aneurysms
- Monitoring abdominal aortic aneurysm treatment and parameters in other blood vessels

Background/Context for This Invention

Un-ruptured cerebral aneurysms exist in as many as 6% of the population in the world, introducing risk of serious damage if not properly treated. Cerebral aneurysms result from weakened sections of blood vessels, allowing abnormal blood flow into a sac. Current standard of care involves invasive treatment via clipping or embolization in the targeted aneurysm sacs. Although post-treatment monitoring of blood flow is recommended, the existing practice using angiography is costly and invasive. Even though some devices show a possible method of a sensor integration for active monitoring of hemodynamics, they still require cumbersome tethering with an external data acquisition system.

Dr. Woon-Hong Yeo
Assistant Professor – Georgia Tech School of Mechanical Engineering

Robert Herbert
Graduate Student – Georgia Tech School of Mechanical Engineering

Publications

Fully Printed, Wireless, Stretchable Implantable Biosystem toward Batteryless, Real?Time Monitoring of Cerebral Aneurysm Hemodynamics, Advanced Science, August, 7 2019

Integrated sensor could monitor brain aneurysm treatment, Phys Org, August 2, 2018

For more information about this technology, please visit:
https://licensing.research.gatech.edu/technology/wireless-neurovascular-monitoring-system