

A Wireless, Passive Sensor for Monitoring the Pressure of an Abdominal Aortic Aneurysm Sac

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Abdominal aortic aneurysms (AAA), which claim the lives of 15,000 Americans annually, occur when the aortic walls are weakened to the point of bulging or rupture. Besides aorta replacements, AAA is commonly treated with an endovascular aortic repair procedure that reinforces the aorta by inserting a stent via a leg artery. While this procedure is effective, failure of the stent may increase the pressure of the AAA sac and cause the aorta wall to rupture. Therefore, monitoring of the pressure in the AAA sac is critical for post surgery assessment. We present the design and fabrication of a wireless passive pressure sensor for measuring the

pressure of an AAA sac after stent placement. The sensor is made of a hermetically sealed chamber with two opposite membranes. A magnetically soft film is attached on one of the membranes, and a permanent magnetic film is placed on the other. As the membranes deflect due to changes in sac pressure, the separation distance between the magnetic elements changes. This in turn varies the magnetic harmonic fields of the magnetically soft film, allowing remote pressure monitoring with the use of a magnetic coil. Compared to Endosure, a wireless passive sensor developed by CardioMems that operates by remotely measuring the resonant frequency change of a capacitive-inductive circuit, the proposed device is thinner and can be miniaturized to a long and thin strip. Its signal is also not reduced by the electrically dense body since it is interrogated through magnetic fields.