Sci TM Editor's Choice Summary Master Template

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Overline: BIOSENSORS

Title: Disappearing pressure cuffs

One-sentence summary: Wireless, biodegradable pressure sensors provide continuous short-term monitoring of arterial pulse in rats.

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Text of summary

Blood vessel anastomosis (connecting two open ends of vessels) is an important part of complex reconstructive surgeries including coronary artery bypass grafts (CABG), critical limb ischemia, and traumatic vascular repair. Ensuring sufficient blood flow at vessel anastomoses post-procedure is crucial, yet blood flow monitoring can be inconsistent. Insufficient blood flow or anastomotic failure can require repeat intervention. Boutry and colleagues have developed a biodegradable, flexible, wireless sensor for the continuous monitoring of blood flow that may offer a solution.

In their recent publication, Boutry *et al.* report their flexible sensor design which uses a fringe-field capacitive sensor to measure capacitance changes associated with changes in vessel diameter during arterial pulsation. Their design, which can be wrapped as a cuff around an artery, uses inductive coupling with an external reader coil to wirelessly monitor the blood vessel. After in vitro testing, the device was implanted around a rat femoral artery (which has a similar diameter to a pediatric facial artery) and the output pulse wave was compared with results detected using an external Doppler ultrasound system. The pulse rate output by the device was similar to the analyzed ultrasound waveform result, and the wireless monitoring capability persisted with similar results obtained one week after implantation. The device also performed favorably in an occlusion test in which blood flow through the femoral artery was transiently blocked and then restored.

This new device offers short-term continuous monitoring of vessel patency that could improve outcomes after surgical procedures requiring vessel anastomosis. The authors contend that the flexible sensor readings could be optimized by improving the sampling rate of the network analyzer associated with the device. The biodegradable materials used in the device avoid the need for a subsequent procedure to remove the implant. Although further evaluation is needed in additional vessels to investigate sensor behavior to pressure loads, the results of the study have translational potential.

Highlighted Article
C. M. Boutry, L. Beker, Y. Kaizawa, C. Vassos, H. Tran, A. C. Hinckley, R. Pfattner, S. Niu, J. Li, J. Claverie, Z. Wang, J. Chang, P. M. Fox, Z. Ba, Biodegradable and flexible arterial-pulse sensor for the wireless monitoring of blood flow. *Nat. Biomed. Eng.* 3, 47-57 (2019).

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