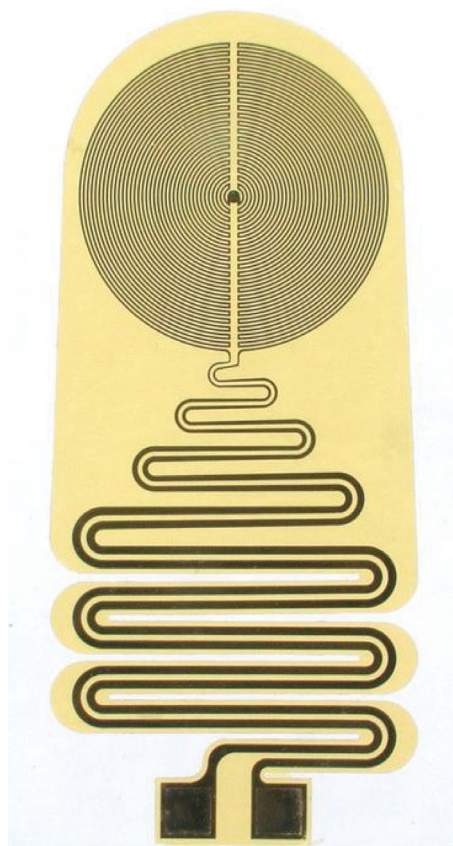


## Implantable devices for kidney monitoring



Rejection is a leading cause of organ transplant failure but it is difficult to detect. Biopsies are often used to detect early-stage rejection of kidneys, but this is intrusive and can have potentially dangerous

complications. Nevertheless, early detection of rejection can improve outcomes or even allow some kidney function to be saved. Zheng Zhang, Lorenzo Gallon, John Rogers and colleagues now report a wireless, fully implantable system that can continuously monitor the health of grafted kidneys in rat models.

The researchers – who are based at Northwestern University, Tsinghua University, University of Illinois at Chicago and the University of Chicago – used a thin (100 nm) patterned gold disk encapsulated in polyimide as a soft thermal sensor for interfacing with the kidney surface. The biosensor monitors the local temperature and thermal conductivity of the kidney, which are used as a proxy for inflammation. The biosensor is connected to an electronics module containing readout circuitry, a coin-cell battery and Bluetooth chip for data transmission. In rat models, the system was able to detect warning signs of acute kidney transplant rejection several days or weeks before other indicators (such as increases of biomarkers in blood) were detected when immunosuppressive therapy was stopped or absent. In cases where therapy was continued, the system was shown to collect data for up to 2.5 months.

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*Nature Electronics*

Original reference: *Science* **381**, 1105–1112 (2023)