

Orthopaedic smart device provides personalized medicine

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Imagine a smart sensor customized to provide vital, real-time information about a patient's recent orthopaedic surgery. Instead of relying on X-rays or invasive procedures, surgeons will be able to collect diagnostic data from an implantable sensor. A study presented at the Orthopaedic Research Society 2012 Annual Meeting in San Francisco outlined this remarkable technology that promises to make post-surgical diagnosis and follow up more precise, efficient, and cost-effective.

"The sensor provides opportunities to make specific and detailed diagnostics for a particular patient and to tailor care based on very objective and quantitative measures," said Eric H. Ledet, PhD, Assistant Professor, Rensselaer Polytechnic Institute.

"This highly unique sensor is very small (4 mm diameter and 500 microns thick), is wireless, batteryless, and requires no telemetry within the body. Its simplicity makes it less prone to failure and very inexpensive to produce," Dr. Ledet explained.

The orthopaedic implant acts as a carrier for the sensor. The [wireless sensor](#) can monitor load, strain, motion, temperature, and pressure in the challenging in vivo environment. It can be placed into a spinal or fracture fixation implant, for example, to determine the patient's progress.

"For the patient that is progressing well, the information from the sensor enables the physician to determine that the patient can return to work

without risk of injury," said Dr. Ledet. "The number of lost days at work is reduced."

It can also alert the physician to potential problems, indicating that additional interventions may be needed. "By maintaining a simple platform, we're able to customize the sensor and make it very, very small so it can be incorporated into a lot of different implants," said Rebecca A. Wachs, MS, Rensselaer Polytechnic Institute. "By changing one small parameter, we can change the sensitivity of the sensor itself."

Dr. Ledet reports a number of major breakthroughs with the [sensor technology](#) in the last eighteen months. Although the researchers are manually producing the sensor, they anticipate it will eventually be mass produced—driving the price down further.

Provided by Orthopaedic Research Society

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