Electronics and Sensors: The Era of Smart Orthopaedics

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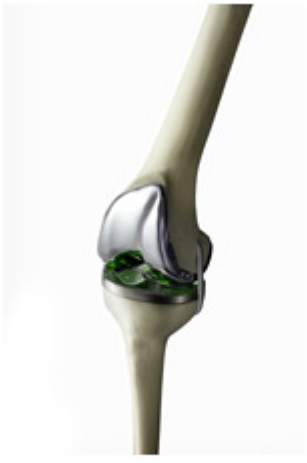
OrthoSensor is moving orthopaedics surgery from an art to a science.

Evidence-based medicine is becoming more important than ever, and OrthoSensor is taking the next logical step forward by embarking on new territory—intelligent orthopaedic devices. The technology is designed for evidence-based orthopaedic surgery and remote implant monitoring."Our belief is that the future of orthopaedics is moving from mechanics (materials sciences, geometry, etc.) to more electronics—the use of microelectronics sensor to drive sensor-assisted surgery and remote monitoring," says Jay Pierce, CEO of OrthoSensor (Sunrise, FL). He believes that the company's technologies will be a disruptive force in orthopaedics. OrthoSensor was founded in 2007 by an orthopaedic surgeon who envisioned using electronics and sensors to treat musculoskeletal diseases.

Front view of the OrthoSensor trial knee product.



OrthoSensor product implanted in the knee.

So far, its technology integrates electronics such as sensors and wireless capabilities to create systems that give surgeons real-time information while they're performing procedures. "We're harnessing the convergence of orthopaedic devices, technology, and the Internet to form this category of intelligent devices," says Pierce. The route to these devices involves low-power, miniaturized components.

The company built an application specific integrated circuit (ASIC), identified multiple sensing technology that measures the clinical parameters that are important to orthopaedic surgeons, and has included RFID in the technology platform. Eventually this technology will be applied to the spine, hip arthroplasty, total joint reconstruction, osteoporosis treatments—basically every segment in musculoskeletal disease, says Pierce.

OrthoSensor has three product platforms—surgical, implantables, and analytics. The surgical segment consists of low cost, disposable, and intelligent devices that help a surgeon more effectively place an implant during surgery. “Today’s orthopaedic surgery is very much an art,” says Pierce. “We’re trying to move it to more of a science through evidence—[such as] quantifiable data that says the knee is balanced.” The implantables platform uses intelligent implants that will pull data such as early warning signs of infection, monitoring bone density, and material wear. This capability will enable doctors to remotely monitor the implant. The analytics platform involves a Web-hosted environment that will capture implant data and be used to improve clinical outcomes; it will go beyond the device registry concept to create a patient outcomes registry.

RF device and the OrthoSensor graphical user interface.

OrthoSensor is working closely with orthopaedic companies to create custom products that are compatible with a specific company’s implants. The company plans to release its intraoperative knee insert as a collaboration with two large orthopaedic implant companies this May. The single-use device addresses the challenge of mechanical knee alignment and provides effective joint kinematics. A smart implant (OrthoSensor’s second technology platform) could be launched sometime next year, says Pierce.

The company has raised $28 million thus far, and Pierce says the company is comfortable that it’s now well capitalized to meet its objectives.

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