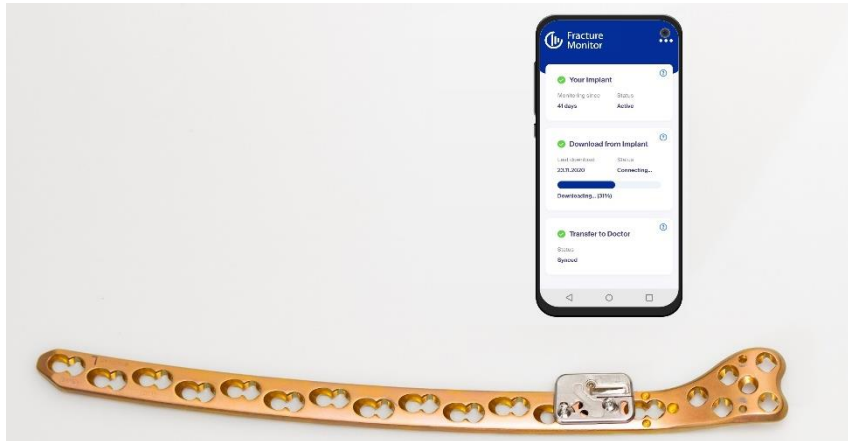


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Science City Davos

## Monitoring of fracture healing

Use of smart implants in postoperative care



The sensor unit provides daily measurements of the healing progress via Bluetooth. Image: AO Research Institute

Since its beginnings 65 years ago, the AO Foundation has been dedicated to the treatment of bone fractures and during this time has been instrumental in the development of better implants, instruments and surgical techniques. While the surgical treatment of bone fractures has been revolutionized in recent years and the success of treatment has increased accordingly, comparatively

little has been done in the area of follow-up treatment. This is because the X-rays used to assess the healing progress only allow a subjective assessment and correlate only to a limited extent with the actual stability of the healing bone. In the absence of more objective assessment methods, the rehabilitation protocol is still hardly personalized as a rule; instead, initial immobilization followed by partial weight-bearing over several weeks is prescribed as standard. The individual healing process is insufficiently taken into account.

The Fracture Monitor, a new smart implant developed at the AO Research Institute Davos, aims to shed light on this issue and enable individualized follow-up treatment by objectively recording the healing process. The implant can be mounted on various commercially available bone plates and continuously measures the load on the plate by means of a built-in sensor. As healing progresses, the fractured bone gradually regains its original stability, while at the same time the load on the bone plate steadily decreases. The data recorded by the Fracture Monitor is read out daily via Bluetooth and thus helps the doctor to assess the current status of bone healing at any time. Knowing the individual healing process would presumably mean that patients with an uncomplicated healing process would need fewer follow-up examinations, would be exposed to less X-rays and could return to normal daily life more quickly. Any complications such as infections, impending delays or even failure to heal, on the other hand, could be detected at an early stage by the data provided by the implant and appropriate countermeasures could be taken in good time.

The newly developed implant system will soon be tested in a clinical study involving thirty patients who have suffered fractures of the femur. This study is primarily intended to demonstrate the safety of the medical product and is thus expected to be the last major step in the development cycle on the way to market approval. There are numerous other potential applications for the technology; for example, initial studies are currently underway to transfer the concept to the spine to measure vertebral body fusion.

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**AO Research Institute Davos**

The goal of the AO Research Institute Davos (ARI) is to advance patient care through innovative orthopedic research and development. Other goals include contributing to high quality applied preclinical research and development with a focus on clinical applications and solutions, investigating and improving the performance of surgical procedures, devices, and compounds, and building a strong relationship with the AO medical community, academic societies, and universities. [www.aofoundation.org/ari](http://www.aofoundation.org/ari)