Ceramics instead of chromium

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TEXT: Letizia Krummenacher / PICTURES: Empa
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Bernhard Weisse using a traction device to check how firmly the prosthesis can be anchored in artificial bone material.

The design of the grooves and barbs is crucial.

Left picture: Drawing of a hip resurfacing prothesis.
Center: Resurfacing prothesis (above) compared to a shaft prothesis.
Right: Anchoring a prototype in artificial bone material.

are produced in a single piece, which makes the prosthesis much easier to insert. But the design also needs to guarantee the best possible fixation. “To do so, several rims with a profile of a fluke are cut and turned into the surface of the cup, which dig into the surrounding pelvic bone after being inserted,” explains Weisse. This guarantees good basic stability from the very beginning. On the opposite side, the surface of the femoral head is milled so that the cap merely needs to be placed on top and immediately holds in place.

**Testing with bone precursor cells**

For the prosthesis to remain stable in the long term, however, bone cells need to be able to adhere and proliferate on the surface. In order to find a suitable surface structure Katharina Maniura and her team at Empa are conducting cell assays on a rough, porous surface where bone precursor cells can multiply. The surface is based on structures, with which dental implants already grew into the jaw bone. Nevertheless, bone cells from different regions of the body differ greatly. The next step will, therefore, be to adapt the implant surface to the special requirements of hip bones. //