Highly endowed research project for developing an artificial sphincter

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The national research initiative Nano-tera.ch will provide CHF 2.2 million for the development of a sphincter implant.

The lack of control over one's own bowel movements can severely affect an individual's quality of life. Researchers at the University of Basel want to develop an adaptive implant that would be able to contract and relax like a natural muscle. The national research initiative Nano-Tera.ch will provide CHF 2.2 million to support the interdisciplinary research and development of the implant.

Incontinence is a double burden for those afflicted: the psychological strain is high, and many are reticent to speak about it. Although mild cases can be treated with medication, in severe cases doctors must attempt to repair the sphincter or implant an artificial one.

The hydraulic sphincter implants that are currently available have major disadvantages. They exert significant and above all permanent pressure

on the tissue, which can lead to damage of the anus. Further, they are often complicated to use, especially for older patients.

Given these problems, researchers led by Professor Bert Müller of the University of Basel's Biomaterials Science Center, in cooperation with associated partners, would like to develop an implant that would contract and relax like a natural muscle. Müller explains, "An intelligent sphincter would automatically increase the pressure when the patient coughs."

The researchers rely on ten thousand nanometer-thin plastic films that become warped when exposed to a voltage. The technology already exists in principle, but miniaturization is needed to apply them in battery operated implants that can last for several years.

Broad consortium of research and industry

The components of the implant that convert electric signals into mechanical motion are to be designed and built based on electroactive polymers at the University of Basel. The necessary performance electronics will be developed by the Swiss Federal Laboratories for Materials Science and Technology (EMPA, Eidgenössische Materialprüfungs- und Forschungsanstalt). Clinicians from Bern and Schaffhausen will specify the required standards for the implant, and the University of Bern will conduct the testing.

The project will be led by Professor Müller, who is the Thomas Straumann Professor of Materials Science in Medicine at the University of Basel. Other partners include the Medical Faculty of the University of Bern, Inselspital Bern, EMPA, and the hospitals of Schaffhausen. Together with their own funding of CHF 4.1 million the budget includes CHF 6.3 million for four years. Myopowers SA, which already has experience with artificial sphincters for the treatment of urinary incontinence, has provided support in-kind.