



Institute for Human Centered Engineering

HuCE – BME Lab

Project Description

Development of Intra-Vaginal Sensors to Measure Pelvic Floor Muscle Activity

Numerous women suffer from pelvic floor disorder, which can generate, amongst other, stress urinary incontinence (SUI) [Morin, 2004]. SUI, defined as the complaint of involuntary urine leakage on effort or exertion, or on sneezing or coughing, is particularly prevalent [Hampel, 2004]. Several theories have attempted to explain female urinary continence mechanisms emphasizing the importance of the pelvic floor muscles (PFM) in urethral closure for maintaining continence [Morin, 2004]. Nevertheless, several studies mentioned the lack of suitable instrumentation to assess PFM activity. This project aims at providing a better understanding of the mechanisms of PFM contraction by developing two vaginal sensors measuring the active and passive PFM tone.

The sensor measuring the active PFM tone will assess several parameters such as static and dynamic PFM strength in the transverse plane, an electromyogram, and the position and orientation changes of the probe. The sensor measuring the passive PFM tone will assess static and dynamic PFM strength in the transverse plane, an electromyogram, and distance.

A first prototype measuring the active PFM tone based on force sensing resistors (FSR) has been developed. After performing different tests, it turned out that FSR were only appropriate for qualitative measurements and not for quantitative measurements. A second prototype based on strain gauges is currently under development. Also a prototype measuring the passive PFM tone is under development.

Our efforts have been concentrated on force measurements since it turned out to be the most difficult task. Strain gauge technology seems to be an appropriate approach to measure PFM strength and will be used for both probes. The two intra-vaginal sensor prototypes that are under development for measuring active and passive PFM tone have shown good potential to assess PFM activity.

References

- M. Morin et al, Neurology and Urodynamics, 23:668-674, 2004.
C. Hampel et al, European Urology, 46:15-25, 2004.

Project Partner

Bern University of Applied Sciences, Health Section
University Hospital Bern

Project Team at HuCE

Damien Maurer, Prof. Dr. Volker Koch

Contact

Prof. Dr. Volker Koch
Deputy Director, MSc Biomedical Engineering
+41 32 321 63 84
volker.koch@bfh.ch

Bern University for Applied Sciences
Engineering and Information Technology
Institute for Human Centered Engineering
Quellgasse 21
CH-2501 Biel/Bienne, Switzerland