

# #352—Utilising the Pressure Profile to Assess Repeatability of an Intra-Vaginal Pressure Sensor Array (The FemFit®)

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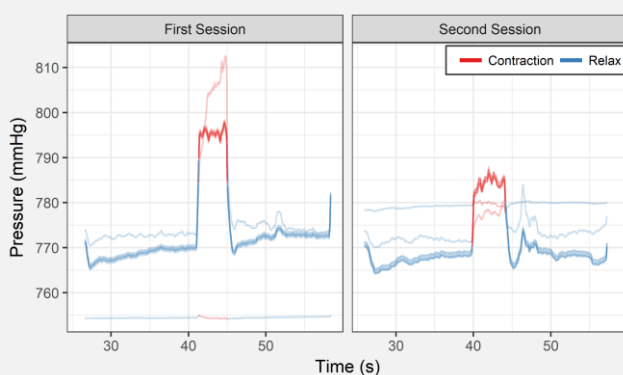
## Introduction

A new intra-vaginal pressure sensing device (FemFit®) has been developed to measure the vaginal pressure profile [1]. It is designed to help women manage their pelvic floor health. Pelvic floor activation is identifiable within the pressure profile. Hence, the pressure profile has the ability to determine pelvic floor muscle integrity and abdominal pressure simultaneously.

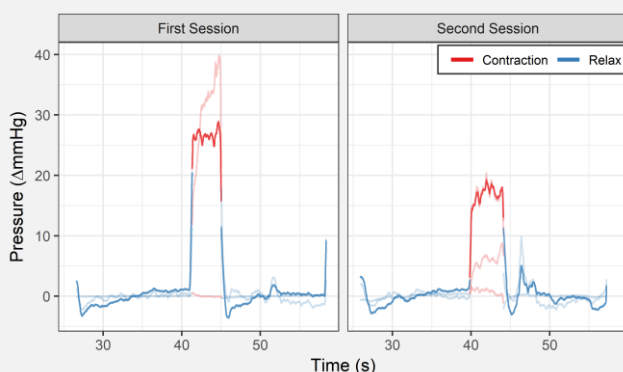
## Objective

Devise an appropriate methodology to investigate and quantify the repeatability of the pressure profile measured by the FemFit®.

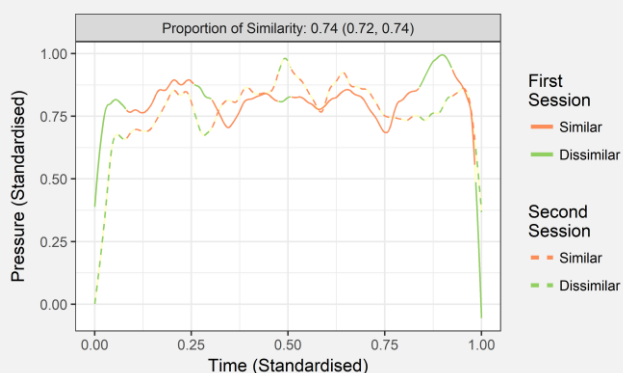
## Methodology



**1. Identify** when a change in the pressure profile can be attributed to a muscle activation, such as a pelvic floor muscle contraction.



**2. Explain** the measurements in terms of a change in pressure from the baseline pressure profile before an activation.



**3. Estimate** the similarity as a proportion between sessions by sensor with the aid of a Hidden Markov Model [2].



The FemFit® utilises a linear array of eight pressure sensors to distinguish between intra-abdominal pressure and pelvic floor pressure within the vaginal pressure profile.

## Results

A proportion of similarity was calculated for 24 participants' PFM contractions and Valsalvas. The variability of the median proportion of similarity, across all exercises, suggests that the differences in the shape of the two profiles could be attributed to the participant.

### Proportion of Similarity – Summary Table

PFMC (Sensor 4)	First: 0.60 (0.53, 0.67)
	Second: 0.66 (0.60, 0.73)
	Third: 0.57 (0.51, 0.64)
Valsalva (Sensor 7)	First: 0.62 (0.56, 0.72)
	Second: 0.62 (0.53, 0.67)
	Third: 0.64 (0.56, 0.69)

Median with a 95 % bootstrap confidence interval.

### Hidden Markov Models

A statistical technique which classifies observations into a fixed number of groups with a stochastic assumption. It can facilitate the quantification of the similarities between the shape of the two profiles, and express this as a proportion [2].

## Concluding Message

The output produced by this novel method to investigate and quantify the FemFit®'s repeatability facilitated the interpretation of the whole pressure trace, rather than one summary number such as a mean or median which may obscure the nature of the pressure trace generated by the pelvic floor muscles. The next steps will be to further refine the current methodology, and to develop a statistical estimator which conveys all eight sensors' proportions of similarity.

## References

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