

New device to monitor pelvic floor

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A world-first innovative device that can measure pelvic floor muscle changes in women is being developed at the University of Auckland.

The device, called the FemFit, is the focus of research into pelvic floor muscle function and dysfunction in women and how this relates to childbirth, urinary incontinence and pelvic organ prolapse.

These studies are led by Research Fellow, Dr Jenny Kruger from the Pelvic Floor Research Group at the University's Auckland Bioengineering Institute.

"There is unequivocal evidence that damage to the muscles of the pelvic floor (for example, during childbirth) doubles the risk of women developing pelvic floor dysfunction later in life," says Dr Kruger.

"Those disorders typically manifest as urinary incontinence (leakage) or [pelvic organ prolapse](#)," she says. "Although we don't yet know how to fix the muscle damage there are some things that women can do to perhaps help prevent or treat the symptoms.

"For instance leakage affects one in four women during their lifetime," says Dr Kruger. "Research has shown that pelvic floor muscle training is an effective first line treatment for leakage and mild prolapse.

"The problem is that women often don't know how to perform pelvic floor muscle exercises correctly, (unless they go to a pelvic floor physio), and even then they often don't stick to doing them."

Dr Kruger says they developed a prototype instrument (the FemFit) which is a slim, compliant silicone-based pressure sensor array for pelvic floor research.

"The FemFit is an intra-vaginal device that can essentially be 'worn' during everyday activities – or during activities or exercise that provoke leakage," she says.

"Imagine you have just had your first baby and you used to be able to go the gym or run prior to birth, but now every time you run or exercise (or even just pick baby up, sneeze, cough or laugh) you leak urine," says Dr Kruger.

"The aim of the FemFit is to look at what is happening to both abdominal pressure and pelvic floor muscle activation pressures during times leakage occurs, and by knowing that we could develop, a custom exercise programme for each woman, to fix their particular problem."

It will also have the potential to help with adherence, (similar to the Fit Bit community) – so it can generate reminders and also be part of an online community.

Recently the group collaborated with Professor Chantale Dumoulin from the University of Montreal in Canada to run a clinical study to validate the FemFit. The study will look at the vaginal pressure profiles in continent and incontinent women, and determine if these change after three months of pelvic floor muscle training.

"We are also exploring the usefulness of the FemFit for clinicians who are performing prolapse surgery, and whether this is useful pre and post-surgery (as a measure of surgical success)," says Dr Kruger.

The group is also researching the use of novel techniques (such as

instrumentation development) and computer modelling with the aim of developing risk prediction models to help identify women who are more likely to suffer pelvic floor muscle damage during vaginal delivery.

"We know there are statistical associations between certain things like age, size of baby, ethnicity, how long you are pushing for during labour, and if you needed an instrumental delivery," says Dr Kruger. "But these are only one part of the picture.

"What we don't know is how the damage occurs (or the mechanisms of second stage), so by using bioengineering principals we are building up a better picture of the 'how'," she says.

"We suspect that how the [pelvic floor muscles](#) change during pregnancy - how stretchy they become - is likely to influence the outcomes."

Researchers in the group have developed a prototype bio-instrument that is able to quantify the muscle stiffness and this metric might be useful in developing these risk prediction models.

"We have also developed some highly sophisticated computational models of childbirth, which although are not ready yet for the clinic – have the potential to help inform caregivers of potential risk by simulating the delivery and seeing what happens," says Dr Kruger. "Of course this will never negate clinical judgement, but our aim is to provide another valid tool in the tool box to help prevent [pelvic floor](#) muscle damage."

Provided by University of Auckland

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