

Special gel could help in surgery after pelvic organ prolapse

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Credit: Ivan Samkoz/Pexels

Of women who have had surgery for pelvic organ prolapse, 20% require surgery again. This is usually due to suboptimal wound healing after surgery. The synthetic PIC gel (discovered at Radboud University) might

help improve this recovery process. Melissa van Velthoven will receive her Ph.D. at Radboud University on 27 February for research on this topic (in collaboration with Amsterdam UMC).

Pelvic organ prolapse occurs in almost half of women aged 50 and older. It involves the bladder, uterus or bowels dropping into the vagina, which can lead to problems with urination, defecation, and sexual function, among others.

"The connective tissue of the pelvic floor becomes weaker as a result of childbirth or for other reasons, and the support function of the pelvic floor is reduced," explains researcher Van Velthoven. She carried out her research in collaboration with the group of Jan-Paul Roovers, urogynaecologist at Amsterdam UMC.

In response to a prolapse, a small proportion of women undergo [surgery](#) to strengthen the [pelvic floor](#). In this kind of operation, the body's own tissue is generally used to strengthen the connective tissue and remedy the prolapse. Van Velthoven states, "Unfortunately, the prolapse may recur after surgery, requiring about 20% of women to undergo another round of surgery. We believe that this high recurrence risk is due to the wound healing process being disturbed."

For her research, Van Velthoven looked at how the synthetic PIC gel, discovered and developed at Radboud University, can be used to stimulate cells, residing in the connective tissue, to improve wound healing. "Collagen (for strength) and elastin (for elasticity) are the main components that can help to restore the connective tissue."

Van Velthoven's research involved tissue engineering: by using growth factors (proteins that can stimulate wound healing) or hormones combined with a scaffold, tissues can be repaired. A suitable scaffold is the PIC gel.

Van Velthoven tested a combination of PIC gel and [growth factors](#), and PIC gel and hormones on cells. "We saw that a specific growth factor did stimulate cell growth, but we did not see a clear effect on collagen or elastin production. When we conjugated a hormone to the PIC gel, we saw that it did increase collagen and elastin production."

Van Velthoven then tested the gel on wound healing in laboratory animals. Under anesthesia, an incision was made in the abdomen of rabbits, and the gel was then injected into the connective tissue of the abdomen. "The gel caused only a mild immune response. This is good news, because when you introduce something foreign to a body, there is always an immune response. This [immune response](#) could be reduced further by hormones conjugated to the gel.

"We also saw that the [connective tissue](#) healed over time, characterized by an increase in the amount of collagen. We unfortunately saw no increase in elastin production." The gel is therefore safe to use on laboratory animals.

In sheep, the researchers mimicked [pelvic organ prolapse](#) surgery and examined whether using PIC gel improved wound healing. This research study is yet to be published.

In her research, Van Velthoven also looked for alternatives for animal studies. "Animals are currently used for research for investigating diseases and testing of new therapies. Our research group is trying to prevent this by developing models based on cells in PIC gel. The models I have created seem to mimic the human body much better than what has been available so far. So that looks promising."

Provided by Radboud University

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