MedTech for Women: Lactide-releasing and, as a result, pH-regulating textiles for a healthy vaginal environment

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Abstract

Introduction
Worldwide, almost one-third of the women of childbearing age suffer from bacterial vaginosis. This condition causes the sensitive vaginal microbiome to become unbalanced, leading to a decrease in lactic acid bacteria and a significant rise in the vaginal pH level. Such a disturbance of the vaginal flora can lead to urogenital infections, abscesses, or premature births. Guideline-based treatment with antibiotics results in a relapse rate of around 50 %. Therefore, fibers have been developed for use in panty liners that regulate the pH level in the vagina by re-leasing L-lactide. The lactide is released into the physiological environment within a few minutes in a moisture-controlled manner. This helps maintain a healthy pH level.

Methods
Three different fiber materials were investigated. Two fiber materials were spun from a compound of polymer and lactide. The third were viscose fibers coated with lactide.
(Di)lactide, as a cyclic diester of lactic acid, dissociates upon contact with water into a hydrogen cation (H+) and the lactate salt of lactic acid.The samples were placed in simulated vaginal fluid. Since physiological secretion of vaginal fluid per day is relatively low with 1 – 5 ml, a detection method that requires only a small amount of fluid had to be developed. For this reason, in addition to measuring the pH, lactate content was also analyzed and compared.

Results
The tests with simulated vaginal fluid showed that lactide-loaded and coated fibers can reduce the pH value from an value of over 4.6 to a value of 3.4 within 15 minutes. Lactate concentration does not correlate with the pH value and therefore cannot be used as an in vitro measurement method.

Conclusion
The fibers developed showed an almost immediate reduction of the pH value to a relevant range.
Further research projects will continue to pursue this promising approach toward a preventively effective panty liner. A realistic vaginal test model should be developed to optimize the textile materials.

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