Human vaginal epithelium model (HVE) to support the development of new natural, lipid-based treatments against bacterial and fungal gynecological infections

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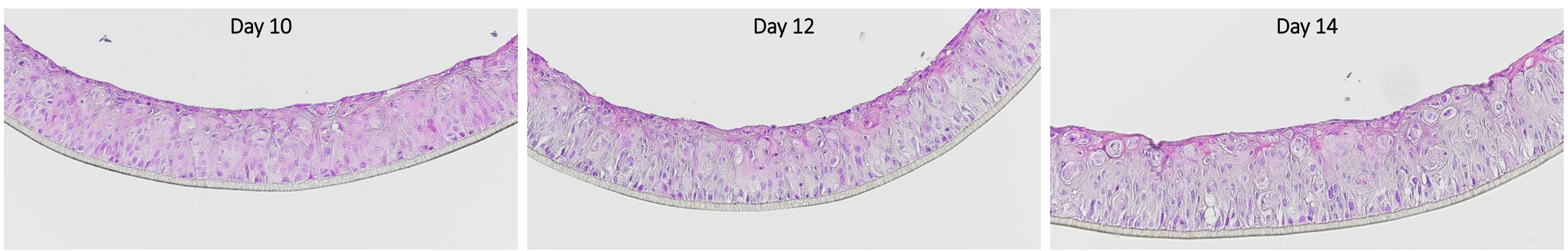
Introduction

Each year, about one in four women is affected by a gynecological infection. Like other infections they cause pain and local inflammation but they can also exacerbate the susceptibility to pelvis inflammations or urinary tract infection (UTI), lead to psychological complications or result in infertility. Currently available treatments are not quite satisfactory as they present major drawbacks. Most of them are only able to target a small fraction of unwanted bacteria while severely affecting women's natural flora and promoting the emergence of antimicrobial resistance. As such, there is a need for new therapeutics options that would target a larger spectrum of harmful bacteria with heightened specificity. The Halt-Infect consortium (Capretto, Karolinska Institute and StratiCELL) aims to develop new natural, lipid-based treatments against bacterial and fungal gynecological infections. In order to support the development of these new treatments and assess their antimicrobial potency, StratiCELL developed a three-dimensional human vaginal epithelium model (HVE).

Reconstructed HVE

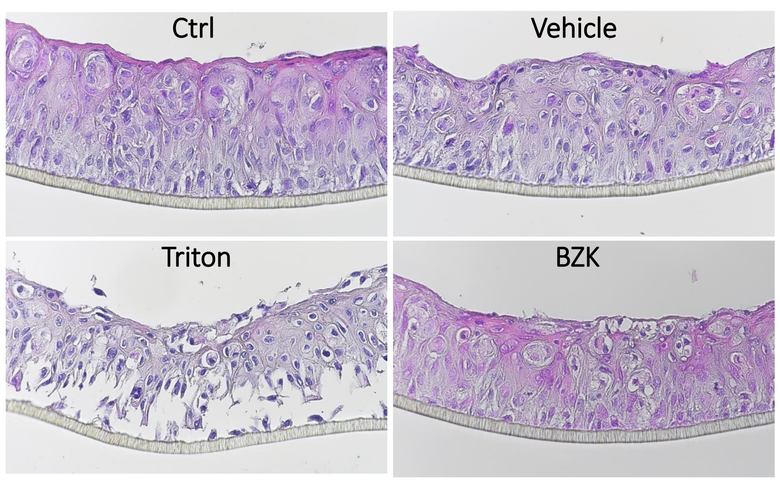
StratiCELL's three-dimensional human vaginal epithelium model is developed from A431 cells. This cell's line is derived from an epidermal carcinoma of the vulva. This HVE model replicates histological features of the human vaginal epithelium.



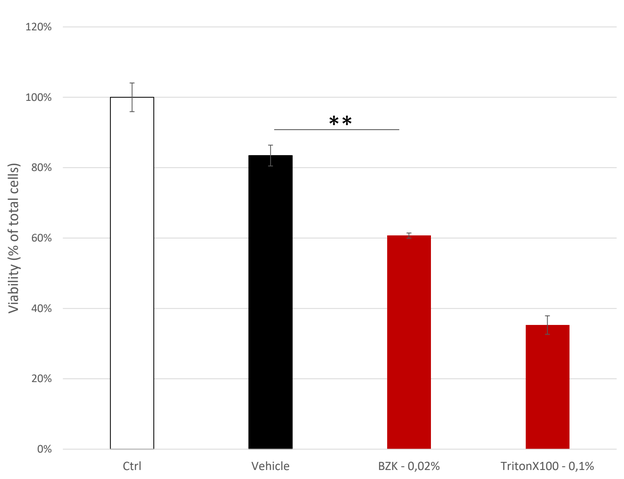
Hematoxylin Eosine (HE) coloration, x200.

HVE irritation & inflammation

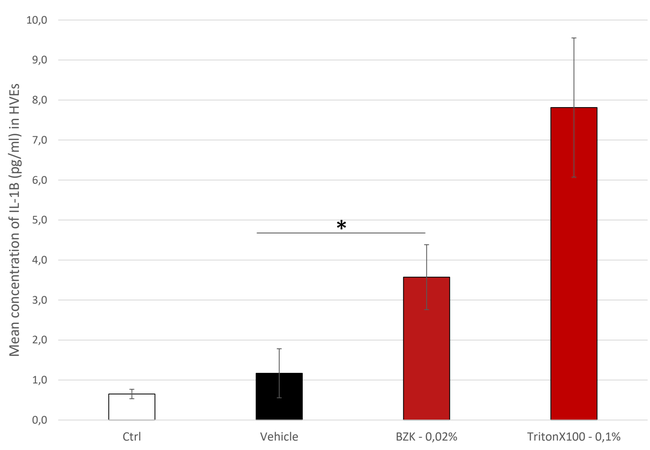
The HVE model responds to exposition of known irritants both in term of histology and inflammatory profile. HVEs were topically exposed to Benzalkonium Chloride (BZK) for 24 hours at a concentration of 0,02%. At this concentration, BZK was able to induce tissular damage and elicit a liberation of IL-1β without destroying or disorganizing the tissue (cf. Triton X100 at 0,1%)



HE coloration x400.



HVE viability at 24h, assayed via MTS



IL-1β released in HVE supernatant, assayed via ELISA

Conclusion and perspectives

We have managed to develop a 3D reconstructed vaginal epithelium. This model, exposed to BZK as an irritant, mimics the behavior of *in-vivo* human vaginal epithelium and is suitable to be used for safety tests.

Our next steps will focus on further functionalizing this model by exploring its genomic and proteomic response to various stresses (irritation, dryness, *etc*). Experiments are already in progress to evaluate the HVE's ability to sustain bacterial growth and survive in anaerobic conditions and results are promising. In the meantime, we are also working on upgrading the model with the addition of artificial mucus that would mimic the rheological properties of natural mucus.

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