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EPITHELIAL COATING FLOW BIOPHYSICS FOR MICROBICIDE DELIVERY

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Fluid flow is of importance for the drug delivery of anti-HIV topical microbicides. These molecules can act within the fluids of the vaginal lumen and/or within the vaginal epithelium. First generation prototype microbicides are delivered via gel vehicles, which spread after insertion and coat luminal surfaces. We are developing a mechanistic computer model of completeness and durability of coating. This depends upon properties of the gel and the vagina. We focus here on understanding the effect of a yield stress of the microbicide vehicle. This property characterizes a condition in which the material stops flowing below a threshold shear stress. Microbicides that possess this property definitely show greater durability of coating, but a yield stress can constrain the extent and speed of the initial coating process. We present an analysis here over a realistic range of small yield stresses measured for vaginal gels. Results are interpreted with respect to trade-offs between durability and extent of coating. These provide initial insights regarding the fluid property of yield stress for formulators of gel delivery vehicles for microbicidal formulations.

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