Degradation Testing of 3D Printed, Anti-HIV Drug Delivery Devices

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Abstract (in 12 Pt Arial Font)

The creation of drug delivery devices through 3D printing offers benefits that include personalized dosage, device size, and controllable degradation. While 3D printing in drug delivery has largely focused on uses in tissue scaffolding, little work has been done in intravaginal devices for reproductive health. This project focuses on the creation of intravaginal drug delivery devices using polymer blends of polylactic acid (PLA) with polyethylene glycol (PEG) mixed with tenofovir disoproxil fumarate (TDF), an anti-HIV medication. This work explores controllable degradation in drug delivery devices using two different properties: materials and surface area. For testing, three different devices were designed, each with increasing surface area, and printed using two different polymer blends with different degradation profiles. Each device was tested for degradation rate using two different methods, depending on whether it was loaded with TDF or not. Devices containing TDF were tested for drug efficacy and loading, and the devices without TDF were tested for degradation rate using UV-Vis spectroscopy and PBS. Based on the different device designs and material, we predict that the devices containing less PLA and the most surface area will degrade the fastest. By changing these two factors, degradation rate can be controlled. If successful, this research will continue in testing different degradation rates using different blends and surface areas in addition to scaling up the devices for potential human uses.

Biography of Presenter (in 12 Pt Ariel Font)

Corinne Warlick is an undergraduate student attending Western Kentucky University studying chemistry with certification through the American Chemical Society. She is very active in the Honors College at WKU and several organizations on campus, serving as an ambassador for the university and mentor to incoming freshman. This fall Corinne will begin her senior year and plans to attend graduate school for chemical engineering, with plans to get a job in industry post-graduation.