MSE SEMINAR

October 20, 2017
113 McBryde Hall
3:30 – 4:30 PM
Refreshments at 3:00 PM

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"Cell-Substrate Interactions on Keratin Biomimetic Coatings for Percutaneous Prosthetic Applications"

ABSTRACT

Percutaneous osseointegrated prosthetics (POP) consist of a bone anchored titanium post that extends through the skin and attaches to an external prosthetic. Compared to the traditional socket interface, POPs offer better stability, limb functionality, and osseoperception. Although the POP surgery technique is well established, the main disadvantage to this technology remains the titanium (Ti) - skin interface. Some complications that can arise include, epithelial downgrowth, mechanical tearing, and infection. Various types of coatings, surface structure, and antibiotic release mechanisms have been used on Ti in an effort to mitigate POP's associated obstacles, but these methods have failed to translate into published clinical studies.

One solution may be to mimic a junction similar to the fingernail-skin interface, which is infection-free and mechanically stable, as a template for the Ti-skin surface. Using keratin, a protein found in skin, hair, and nails, to coat the Ti implant can help create this proposed interaction. Keratin has been used in other studies for its cell adhesion and biocompatible properties. It has been suggested that the Leu-Asp-Val (LDV) cellular motif is the primary component responsible for cellular attachment, but that has yet to be confirmed. In our study, we investigated whether keratin on silanized Ti provides a suitable coating to translate into the Ti-skin interface application. Overall, we developed a uniform keratin coating that allowed skin cells to adhere and aided in a signaling cascade that did not produce myofibroblast and supported keratinization. Also, we optically identified cellular binding motifs in our keratin substrates.

BIOSKETCH

Alexis Trent is a Ph.D. candidate pursuing her doctoral degree in Material Science and Engineering. She graduated from North Carolina Agricultural and Technical University in May 2013 with her Bachelors in Mechanical Engineering. Ms. Trent's research interests include materials for biomedical applications and medical devices, as well as medical product commercialization.