Biomaterial Strategies for Developing Biomimetic Engineered Skin

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Monday, February 25
11:00-12:00pm, Brauer Hall, Rm 12

Prompt closure of wounds is critical to prevention of infection and sepsis in patients suffering massive burn injuries. The most common challenge associated with treating these patients is the lack of available donor skin. Within the past two decades, a number of tissue engineering/cell-based therapies have been developed for treating these injuries including engineered skin and cultured epithelial autografts (CEAs). While these therapies have been life-saving, challenges associated with their mechanical properties and anatomy compared to normal skin remain. Both engineered skin and CEAs are orders of magnitude weaker than normal skin and prone to delamination at the epidermal-dermal junction, making their manufacture and surgical application difficult and causing them to be prone to damage in the early phases of engraftment. In addition, normal human skin contains rete ridges (interdigitations of the epidermis and dermis) which play multiple roles in skin homeostasis. These interdigitations of the epidermis and dermis also increase the contact area between these layers, enhancing adhesion. However, these structures have not been widely incorporated into engineered skin. Recent advances in biomaterials synthesis and modification to improve engineered skin and CEA properties and anatomy will be discussed along with new techniques to produce rete ridges in these tissue substitutes.

Dr. Heather Powell is currently an Associate Professor of Materials Science and Engineering and Biomedical Engineering at The Ohio State University. She joined OSU in 2008 after earning a B.S. in Paleobiology and a Ph.D. in Materials Science and Engineering followed by a post-doctoral fellowship at the Shriners Burns Hospital where she began her work in the developing materials for cutaneous injuries and disorders. Her current research interests include hierarchical scaffolding for tissue engineering, engineered skin mechanics, mechanobiology of fibrosis, anti-scar therapy development, and materials for large segmental bone defects. She was the recipient of the Ralph E. Powe Junior Faculty Enhancement Award from Oak Ridge Associated Universities, The Distinguished Undergraduate Research Mentor Award (OSU) and the Herman Weed Award for Excellence in Teaching (OSU). Her research has been funded by NSF, NIH, Veterans Affairs, the Musculoskeletal Transplant Foundation, Zimmer Inc., Milliken Healthcare Products LLC, and the Shriners Hospitals Research Foundation.

Faculty, students, and the general public are invited. Hosted by: Katharine Flores