DEPARTMENT OF
BIOMEDICAL ENGINEERING

WPI

SOTAK LECTURE IN BIOMEDICAL ENGINEERING

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CELLS AS BIOFACTORIES: EXPLOITING CELL THERAPIES FOR TISSUE ENGINEERING AND WOUND HEALING

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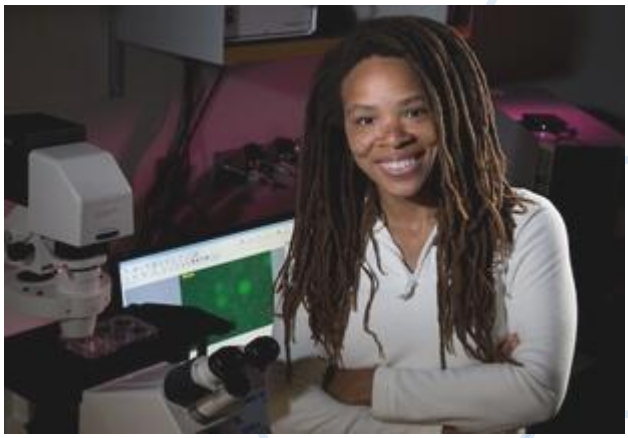

Although mesenchymal (adult) stem cell therapy for a variety of applications have shown promise, it was reported as early as 2003 but to date no stem cell therapy has gained the status of clinical standard. Challenges to widespread use of mesenchymal stem cell therapies include their tendency to migrate from the target site and their poor survival following transplantation. By incorporating them into synthetic hydrogels with insulin secreting cells, we were able to restrict mesenchymal stem cell migration and prolong their survival. Mesenchymal stem cells and topically applied insulin have each shown promise in healing otherwise intractable wounds. Separately, both insulin and mesenchymal stem cells have shown therapeutic efficacy in treating patients with chronic wounds, diabetic ulcers, and deep thermal burns. Understanding how best to exploit their wound healing potential will improve our ability to accelerate wound healing. Results from our lab showed that when treated with the combination of mesenchymal stem cells and insulin secreting cells diabetic excise wounds healed without intermediate scab or scar formation, healed at faster rates than normoglycemic wounds, and healed 3x faster than controls and 2x faster than wounds healed by either cell type alone. Identifying the mechanisms by which the combination of ISCs and MSCs heal wounds faster than normal and without scar is essential to improve cell-based strategies to accelerate wound healing and cell therapies in general, for a variety of applications

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