UCLA Engineering
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BIOENGINEERING

PRESENTS

Engineered microenvironments to guide stem cell-based therapies in tissue repair

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1:00 – 2:00 PM
2101 ENGINEERING V

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ABSTRACT:

Mesenchymal stem cells (MSCs) have tremendous potential in cell-based therapies for tissue loss due to their multilineage potential, proangiogenic capabilities, and immune regulatory and anti-inflammatory capacities. Despite the promise of MSC-based therapies, the efficacy of this approach is limited by the high death rate and poor engraftment of cells in ischemic conditions. Compared to individual cells, the formation of MSCs into spheroids enhances their survival, proangiogenic and anti-inflammatory potential. However, the fabrication and delivery of MSC spheroids to promote tissue repair is not a "one size fits all" approach, and effective strategies to optimize spheroid function for these applications are lacking. We design strategies to optimize MSC function, whether through preconditioning in specific microenvironments or transplanting with engineered materials to dictate cell function in situ. The characteristics of the material are key in guiding cell participation in tissue repair. In this talk, I will highlight ongoing efforts by our laboratory to develop MSC spheroids for use in treating large bone defects and accelerating wound closure. I will also provide examples of engineered biomaterials to enhance cell survival and instruct cell function.

BIOGRAPHY:

Kent Leach is Professor of Biomedical Engineering and Orthopaedic Surgery at UC Davis. He received the Ph.D. in Chemical Engineering from the University of Oklahoma. He then completed postdoctoral research at the University of Michigan and Harvard University, where he focused on the controlled delivery of growth factors and nucleic acids from engineered materials for tissue regeneration. He is the PI of the UC Davis T32 Biotechnology Training Program, and he is a standing member of the Biomaterials and Biointerfaces (BMBI) study section for NIH. Since 2010, he is an Associate Editor for the Annals of Biomedical Engineering, the flagship publication for the Biomedical Engineering Society (BMES), and he serves on the America's Council for the Tissue Engineering and Regenerative Medicine International Society (TERMIS). He has published more than 80 full-sized research papers and reviews, and he is an elected fellow of the American Institute for Medical and Biological Engineering (AIMBE). His present research interests are focused on engineering cell-instructive biomaterials for tissue engineering and translation from the bench to the clinic.