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Biomedical Engineering

Wallace H. Coulter Foundation
Biomedical Engineering Seminar Series

TEJA GUDA, PH.D. is the Jacobson Distinguished Professor of Innovation and Entrepreneurship and Associate Professor of Biomedical Engineering at UTSA. He currently also serves as Associate Dean at the Graduate School at UTSA to promote graduate student success. He received his undergraduate degree from the Indian Institute of Technology Bombay, his PhD in Biomedical Engineering from the University of Texas San Antonio and completed his postdoctoral training at Wake Forest University.

Dr. Guda's primary research is biomaterials translation for regenerative medicine applications. He is specifically interested in mechanics of matrices, 3D architectures of porous materials, and biophysical stimulation using bioreactors. His research has been supported by the NSF, the NIH, the DoD, and various private foundations and industry.

10/29/21

DR. TEJA GUDA

Jacobson Distinguished Professor of Innovation and Entrepreneurship

University of Texas at San Antonio

FRIDAY, OCTOBER 29 / 9:00 AM

LEVERAGING MATRIX MECHANICS AND BIOMIMETIC MATERIALS TO REGENERATE VASCULARIZED TISSUES

ABSTRACT: Large volumetric defects in the vascularized tissues of the body do not heal of their own accord. Regeneration and functional restoration of tissues can only be induced using a combination of suitable cells, biocompatible/bioactive material substrates and appropriate biophysical and biochemical microenvironments. Scaffolds designed for tissue engineering can meet these criteria by mimicking the mechanics and architecture of the native tissue matrix and by incorporating appropriate signaling cues to induce tissue-specific growth and maturation in responsive cells. We developed highly porous hydroxyapatite scaffolds coated with collagen films to impart better mechanical strength and promote cell attachment. These scaffolds showed successful integration in various preclinical models at multiple anatomical sites. The scaffolds can also be used to deliver growth factors or antimicrobials to promote regeneration and prevent infection. The challenge remains to promote rapid vascularization to the interior of large defects to allow functional bone growth and stabilization fast enough to be clinically relevant. To achieve this, our recent work with fat-derived microvascular fragments and blood clot mimetic materials within the porous scaffolds demonstrates the influence of pore size and microenvironment on promoting multi-tissue development simultaneously. Since large traumatic injuries affect multiple tissues in a region of the body, we have developed platforms to restore functional skeletal muscle using hydrogel carriers of the same composition as natural muscle extracellular matrix: collagen and fibrin. Similarly, hydroxyapatite coated open-porous silk and collagen-silk textured fibers in a single cohesive scaffold have been developed to restore function at the bone-ligament enthesis and encourage regeneration.

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Through the generous support of the Wallace H. Coulter Foundation, the Department of Biomedical Engineering facilitates weekly lectures each year during academic terms. Experts in all areas of Biomedical Engineering are invited to provide a research seminar and to meet with faculty and students to discuss the latest developments and research in Biomedical Engineering.

Friday, October 29, 2021

9:00AM-10:00AM | https://bme.fiu.edu/seminars