Indian Institute of Science
Centre for BioSystems Science and Engineering
BSSE Seminar

26th August 2019, 10:00 AM, Monday, MRDG Seminar Hall, 1st floor, Biological Sciences Building

Bioengineering Human Tissues and Organs: The Way Forward

Dr. Biman B. Mandal

Biosciences and Bioengineering, IIT Guwahati

ABOUT THE SPEAKER

Dr. Biman B. Mandal is an Associate Professor at the Department of Biosciences and Bioengineering, Indian Institute of Technology Guwahati (IITG). Dr. Mandal received his Ph.D from IIT Kharagpur and Post Doc from Tufts University, Boston, USA. His research area is Tissue Engineering and Regenerative Medicine. Dr. Mandal has published 117+ International journal articles with a cumulative impact factor of 596+, 3900+ citations and H-index of 33. He is the lead inventor in 4 US and 11 Indian patents, has contributed to 9 book chapters, delivered 55+ Plenary/Popular/Invited talks, and is an Editorial board member of 11 International Journals and the visiting faculty of 5 International Universities. Dr. Mandal is a recipient of APA-Young Scientist Award 2019; NASI-SCOPUS Young Scientist Award 2016; INSA- Medal 2015; NASI- Medal 2013; DST-INSPIRE Faculty 2013; Gandhian Young Technological Innovation Award 2014; DAE-Young Scientist Award 2011, SYIS- TERMIS Asia-Pacific Young Investigator Award 2011; MAHE Young Scientist Award 2012; DBT-Young Scientist Award 2012; DST- Young Scientist Award 2012. His lab is recognized as a "Unit of Excellence" by DBT and has received major funding support from DBT/DST/ICMR/DAE/DRDO.

ABSTRACT

Every year, millions of patients suffer loss or failure of an organ or tissue as a result of accidents or disease. Tissue or organ transplantation is a commonly accepted norm under these circumstances. However, constant shortage of donor tissue and organ transplants coupled with high morbidity and mortality has spurred great interest for lab grown tissues/organs as promising substitute. Recent scientific advancement in biomaterials science, stem cells in combination with biomimetic environments have made this possible through tissue engineering approaches. In such an approach, conventionally fabricated or 3D bioprinted polymeric scaffold imitates the native tissue/organ it is replacing, while also providing a temporary functional support for the residing cells. In comparison to synthetic, biologically derived polymeric scaffolds being natural, biodegradable and biocompatible offer resident cells a wide variety of biofunctional motifs that help to regulate cell adhesion, proliferation, phenotype, matrix production and physiological activity. In our laboratory at IIT Guwahati, we utilize silk as a natural model biopolymer to fabricate various tissue forms to study and understand the mechanisms related to cell-surface interactions and stem cell differentiation towards regeneration of tissue/organs with an aim to achieve total physiological functionality. In my presentation, I will share our recent *in vitro* and *in vivo* findings to reconstruct native tissues/organ including human skin, engineered bone & cartilage, bioengineered blood vessels, bioartificial pancreas for type-1 diabetes. Findings from these studies have immense implications in relation to development of artificial tissues and grafts towards future *in vivo* human transplantation.