國立臺灣大學

生物產業機電工程學系
Department of Bio-Industrial Mechatronics Engineering

化學工程學系
Department of Chemical Engineering

演講公告

Biomimetic Materials for Cardiac Tissue Engineering and Cardiovascular Repair

主講：Dr. Elizabeth Lipke

Associate Professor, Department of Chemical Engineering, Auburn University, U.S.A.

Dr. Lipke's research group employs biomimetic materials, which act to emulate properties from a natural biological environment, to created engineered tissues for drug testing and for understanding development and disease. We are particularly interested in the role of microenvironmental cues in directing pluripotent stem cell differentiation into cardiomyocytes.

Biomimetic materials offer a novel approach for directing cardiac regeneration, drawing upon the characteristics of developing myocardium to influence the mechanical, structural, and electrical properties of stem cell-derived cardiomyocytes. Lipke Lab research has demonstrated for the first time that human induced pluripotent stem cells (hiPSCs) can successfully be differentiated into contracting cardiomyocytes within a controlled biomimetic hydrogel microenvironment, achieving developmentally-appropriate temporal changes in gene expression, high cardiomyocyte yield, and calcium handling properties similar to agematched CMs produced using high-efficiency 2D monolayer cardiac differentiation. Furthermore, CMs within our 3D developing human engineered cardiac tissues (3D-dhECTs) became progressively anisotropic without external electromechanical stimuli and developed ultrastructural features of mature CMs. Our results demonstrate that providing a 3D architecture throughout hiPSC differentiation is advantageous for creating an ontogeny-mimicking (i.e., ontomimetic) model of native human myocardium, emulating key stages of cardiac embryologic development, growth, and maturation in an model of human heart muscle.

Our research substantiates the importance of biomimetic materials in the quest to form engineered cardiac tissue that replicate the native human heart and in facilitating cardiovascular repair.

日期：2015年05月29日（五）

時間：10:30~12:00

地點：生機系 知武館 四樓演講廳