Rob M.I. Kapsa et al., J Tissue Sci Eng 2014, 5:3
http://dx.doi.org/10.4172/2157-7552.S1.014

OMICS Group Conferences
Accelerating Scientific Discovery

3rd International Conference on
Tissue Science & Regenerative Medicine
September 24-26, 2014 Valencia Convention Centre, Spain

Bionic materials for neuromuscular restoration and maintenance

Rob M.I. Kapsa[1,2], Quigley AF[1,2], Moulton S[1], Cornock R[1], Zhang B[2], Choong PFM[2] and Wallace GG[1]
[1]University of Wollongong, Australia
[2]St. Vincent's Hospital, Australia

Effective engineering of skeletal muscle requires platforms that facilitate proliferation and maintenance of primary muscle stem/precursor cells (eg myoblasts) and muscle fibre maturation in a manner that reflects native muscle structure. In addition, the supporting scaffold needs to accommodate the correct innervation of the re-engineered muscle tissue by promoting axonal connection and neuromuscular junction formation. We have been investigating the use of micro and nano-structured conducting polymer surfaces and soft gel systems for *ex vivo* muscle and nerve growth, differentiation and trophic electrical stimulation. Micro-structured platforms were created by localization of wet-spun PLA:PLGA fibers onto polypyrrole substrate, whilst nano-structured platforms were created by orientation of carbon nanotube fibres on a conducting gold mylar surface, over which a layers of polypyrrole were deposited. Human and murine myoblasts, rat dorsal root ganglion explants (sensory nerve) and PC12 neuronal cell lines were grown and/or differentiated on these platforms. A significant effect on myotube orientation was seen on both micro and nano-structured surfaces whilst surface topography similarly influenced the direction in which elements of the neuronal components grew. Growth of muscle cells as well as neuronal components (Scwhann cells and axons) on both nano and micro-structured polypyrrole was increased by electrical stimulation, providing a novel model system by which the effective innervation of regenerating muscle can be explored.

Biography

Robert Kapsa completed his PhD in 1996 at the University of Melbourne Dept. Medicine, St. Vincent's Hospital (Melbourne). He is Program Director for the Bionics Platform of the ARC Centre for Electromaterials Science (ACES) and concurrent Principal Scientist and Head of Research Neurosciences at St Vincent's Hospital in Melbourne. He has published 85 peer-reviewed manuscripts including 2 book chapters and one book in the areas of muscle biochemistry, genetics, gene therapy and muscle and nerve engineering. His work is focused on the development of autologous cell-based regenerative therapies for hereditary nerve and muscle disease.

r.kapsa@unimelb.edu.au