Tissue Science-2013

OMICS Group Conferences
Accelerating Scientific Discovery

2nd International Conference on
Tissue Science & Regenerative Medicine

August 26-28, 2013 Raleigh-NC, USA

Nanofibrous self-assembling peptide hydrogels for tissue engineering applications

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Abstract

In nature, molecules spontaneously self-assemble to form stable assemblies, creating for example, proteins and lipid structures in cells. In recent years, this process has been exploited to produce hydrogels based on amino acids, the building blocks of proteins. These supramolecular hydrogels can be based on β-sheets, α-helices and random coils. With 20 natural amino acids to use as the building blocks, and an infinite number of synthetic analogues, with various properties, a wide range of gels with varying physical and chemical properties can be produced. The high water content, porosity, potential for cellular remodeling and the nanofibrous architecture has resulted in peptide hydrogels being labelled as extracellular matrix (ECM) mimics, with the potential for numerous biological applications.

We have produced nanofibrous peptide hydrogels based on tripeptide and octapeptide systems for skin, cartilage and intervertebral disc cell culture and tissue engineering. Cell viability, proliferation and matrix production suggest these gels can maintain viable environments for use as 3D cell culture systems and tissue engineering applications.

Biography

Julie Gough completed her Ph.D. at The University of Nottingham, UK and postdoctoral studies at The University of Nottingham and at Imperial College London. Julie is currently Reader in Biomaterials and Tissue Engineering at the University of Manchester, UK and has published more than 60 papers in reputed journals.