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Dr Richard Shelton BDS, PhD

Senior Lecturer and Head of Biomaterials Unit

School of Dentistry (/schools/dentistry/index.aspx)

Contact details

Telephone +44 (0) 121 466 5535 (tel:+44 121 466 5535)

Fax 0121 466 5501

Email r.m.shelton@bham.ac.uk (mailto:r.m.shelton@bham.ac.uk)

The School of Dentistry
College of Medical and Dental Sciences
University of Birmingham
St Chad's Queensway
Birmingham
B4 6NN
United Kingdom

About

Dick Shelton is Senior Lecturer in Biomaterials and Head of the Biomaterials Unit. He has published over 50 research papers in scientific journals as well as reviews and a book chapter in the areas of bone biomaterials, tissue engineering and application of hydrogels. He has received grants from EPSRC, BBSRC and the Wellcome Trust and the Dr Hadwen Trust for Humane Research.

Qualifications

- PhD 1989.
- BDS 1983.

Biography

Dick obtained a BDS degree in 1983 and having completed House Officer and Senior House Officer posts in Birmingham and Liverpool undertook a PhD in the Anatomy Department at the University of Birmingham examining the influence of surface functional groups on the behaviour of primary rat osteoblasts. After obtaining his PhD (1989) he went to Kagoshima University Dental School for one year working as a clinical and research assistant. On returning to England he worked as a research fellow in Biological Sciences, investigating the influence of microstrain on the behaviour of bone derived cells, before taking up a lecturer's position at the University of Bristol in Conservative Dentistry. He returned to Birmingham to work as a research fellow in the Biomaterials Unit at the School of Dentistry in 1991, and has had interest and publications in a variety of areas related primarily to bone replacement, and in vitro modelling of the development of implant host interfaces. More recently his research has moved towards the development of tissue engineering scaffolds, for replacement of bone and the development of potential transfer membranes, for delivery of oral keratinocytes. This work has been funded by both individual and joint projects with groups from Oxford, examining synthesis of bone using alginate scaffolds, and Aston developing a novel method for light activated crosslinking of alginate scaffolds, containing cells located both within and on the scaffolds.

Teaching

- BMedSc.
- BDS.

Postgraduate supervision

Dick is interested in supervising doctoral research students in the following areas:

- Osteoblast interactions with defined surfaces and tissue engineering of bone utilising stem cells from different sources.
- Investigating the influence of three dimensional arrangements/geometries on the behaviour of cells.
- Development of tissue engineered oral mucosa and modelling of oral mucosa in vitro.
- Development of hydrogels for use in tissue engineering.

Research

Research Themes:

Scaffolds for tissue engineering of bone – a variety of scaffolds have been developed and examined for the potential replacement of bone including octacalcium phosphate crystals of different morphologies as well as hydrogels that could be crosslinked in novel ways. Particular crystal morphologies were identified that promoted the development of the osteoblast phenotype in vitro from bone marrow cells.

Tissue engineering of skin and oral mucosa – different techniques have been developed for potentially expanding and delivering keratinocytes to wound sites.

Biocompatibility of dental materials – different dental materials have been tested both biologically using a variety of cell types and mechanically to assess methods for improving biocompatibility.

Surface development of Bioglass – the process of surface development and modification in the presence or absence of proteins was examined using a variety of techniques and identified that proteins profoundly altered the widely accepted surface development pathways previously described.

Osteoblast substrate interactions – different substrates have been examined for their influence on the behaviour of primary osteoblasts and has identified the importance of

functional groups in determining both osteoblast colonisation, adhesion morphology and synthetic activity, which were thought to be modulated through the different protein populations that adsorbed onto these substrates.

Other activities

- One of the founding members involved with establishing the UK Society for Biomaterials and subsequently a committee member for some years.
- Former committee member at BSI for CH194.

Publications

Hunt NC, Shelton RM, Henderson DJ, Grover LM. (2013), Calcium-alginate hydrogel-encapsulated fibroblasts provide sustained release of vascular endothelial growth factor, **Tissue Engineering Part A**, 19: 905-914.

Smith AM, Hunt NC, Shelton RM, Grover LM. (2012), Alginate hydrogel has a negative impact on in vitro collagen 1 deposition by fibroblasts, **Biomacromolecules**, 13: 4032-4038.

Khan E, Shelton RM, Cooper PR, Hamburger J, Landini G. (2012), Architectural characterization of organotypic cultures of H400 and primary rat keratinocytes, **Journal of Biomedical Materials Research Part A**, 100A: 3227-3238

Wynn-Jones G, Shelton RM, Hofmann MP. (2012), Development of Portland cement for orthopedic applications, establishing injectability and decreasing setting times, **Journal of Biomedical Materials Research Part B**, 100B: 2213-2221

Smith JG, Smith AJ, Shelton RM, Cooper PR. (2012), Recruitment of dental pulp cells by dentine and pulp extracellular matrix components, **Experimental Cell Research**, 318: 2397-2406.

Man J, Shelton RM, Cooper PR, Landini G, Scheven BA. (2012), Low intensity ultrasound stimulates osteoblast migration at different frequencies, **Journal of Bone and Mineral Metabolism**, 30: 602-607.

Smith JG, Smith AJ, Shelton RM, Cooper PR. (2012), Antibacterial activity of dentine and pulp extracellular matrix extracts, **International Endodontic Journal**, 45: 749-755

Man J, Shelton RM, Cooper PR, Scheven BA. (2012), Low-intensity low-frequency ultrasound promotes proliferation and differentiation of odontoblast-like cells, **Journal of Endodontics,** 38: 608-613.

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