Serena Best

Serena Best is a Professor of Materials Science at the University of Cambridge and Fellow of St. John's College, Cambridge. She co-directs the Cambridge Centre for Medical Materials (along with Professor Ruth Cameron). She has published around 400 journal papers, books, book chapters and patents in the fields of biomaterials and skeletal repair. Her main research interests focus on the development of functionalised collagen scaffolds for tissue regeneration and bioactive ceramics for bone repair. She was President of the UK Institute of Materials, Minerals and Mining (IOM3) from Jan 2019 – Dec 2020 and Chair of the Executive Board (Jan 2021- Dec 2022). She is a Fellow of the Royal Academy of Engineering (FREng). She is also a Fellow of Federation of Institutions for Biomaterials Science and Engineering (FBSE), the American Institute for Medical and Biological Engineering (FAIMBE) and the European Academy of Sciences (FEURASC). She has been invited to give a number of Plenary lectures at conferences across the World and has held positions on scientific advisory panels, assessment panels and visiting chairs in Europe and Asia. She was awarded a CBE in the Queen's Birthday Honours List in 2017 for services to Biomaterials Engineering.

Tissue Engineering Scaffolds: A Complex Question?

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For many years, there has been interest in the use of biomaterials to replace human tissues damaged by injury or disease. Over time, the materials of choice have gradually changed from those that simply offer mechanical support to those that interact directly with the biological environment. The concept of "tissue engineering" emerged in the 1980s and was proposed as a potential health panacea. Intensive research directed towards hard and soft tissue regeneration led to a huge growth in the field, based on improved underpinning knowledge of cell-, material- and biomolecular interactions. Focus is now on the recruitment and delivery of biological cells to assist in the repair process. With this move from tissue replacement to cell-mediated tissue reconstruction and regeneration, there is increasing need for the design of appropriate biomaterial "scaffolds" and membranes. The ultimate target is to enable clinical translation of new treatments, drugs and therapies and this can be achieved through the development of both model systems and implantable scaffolds and devices. Model systems present the challenge of recapitulating accurately conditions *in-vivo* which, ideally, would consider simultaneously the mechanical, physical, biochemical and cellular environments. It might be argued then, that model systems are necessarily complex and advancing understanding about relevant biological systems and optimal biomaterials scaffolds is key. However, the question arises whether similarly complex goals should be set when developing implantable scaffolds and constructs. Are "smart but simple" systems the most likely to result in translatable products and successful outcomes for the patient? This talk will consider two materials, a bone graft substitute (hydroxyapatite) and collagen, a highly versatile and bioactive natural macromolecule and will discuss methods that have been applied to optimise their structure and function.