

Biobone Symposium

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Bridging the gap - harnessing skeletal stem cells and environmental niches for bone repair

Abstract: Medical advances have led to a welcome increase in world population demographics. However, increased aging populations pose new challenges and emphasize the need for innovative approaches to augment and repair tissue lost through trauma or disease. Regenerative medicine strategies have sought to repair skeletal defects resulting from trauma and disease with the application of cells, typically isolated from the patients themselves, in combination with porous biomaterials or scaffolds [1]. Skeletal stem cells, commonly referred to as Mesenchymal stem cells or human bone marrow stromal stem cells, are defined as multipotent progenitor cells with the ability to generate cartilage, bone, muscle, tendon, ligament and fat. We have developed protocols for the isolation, expansion and translational application of skeletal stem cell populations with cues from developmental biology, nanotopography and nanoscale architecture as well as biomimetic niche development informing our skeletal tissue engineering approaches. We have developed ex vivo approaches to bone formation evaluation and analysis and central are large animal in vivo translational studies to examine the efficacy of skeletal stem and cell populations in innovative scaffold compositions for orthopaedics. The talk will also highlight current clinical translational studies to examine the efficacy of skeletal populations for orthopaedic application. Advances in our understanding of skeletal stem cells and their role in bone development and repair, offer the potential to open new frontiers in bone regeneration and offer exciting opportunities to improve the quality of life of many.

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[1] Dawson JI, Kanczler J, Tare R, Kassem M, Oreffo ROC (2014). Bridging the gap: Bone regeneration using skeletal stem cell-based strategies - Where are we now? *Stem Cells*. 2014; 32(1):35-44. doi: 10.1002/stem.1559. Review

Bio: Prof. Oreffo holds the chair of Musculoskeletal Science and is co-founder and current Director of the Centre for Human Development, Stem Cells and Regeneration at Southampton. He has held positions at AstraZeneca, and University of Oxford before being appointed to a lectureship in 1999 at the University of Southampton. Richard is internationally recognised for his work on skeletal biology and the mechanisms involved in skeletal stem cell differentiation and bone regeneration. Richard leads a multidisciplinary research group focused on developing strategies to repair bone & cartilage and understanding bone development; including the role of epigenetics in musculoskeletal diseases. Richard manages a significant research grant portfolio, has published over 225 peer-reviewed full papers, holds a number of visiting professorships, is on the editorial boards of five journals and is a Fellow of the Royal Society of Biology.