

Regenerative musculoskeletal medicine- Skeletal stem cell based strategies for bone regeneration

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The application of selected skeletal or mesenchymal progenitor cells and appropriate scaffolds/ growth factors in regenerative strategies is currently one of the most exciting and promising areas for disease treatment and reparative medicine.

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. The development of technologies to facilitate the identification and isolation of specific skeletal stem cells and development of scaffolds that address issues of growth factor delivery and angiogenic support to aid de novo tissue formation remains a significant clinical need

We have developed protocols for the isolation, expansion and translational application of skeletal populations, including enriched skeletal stem cell populations for skeletal repair with cues from developmental biology. A number of areas of work will be presented including:

- i) innovative isolation strategies for fetal and adult skeletal populations,
- ii) derivation of niche environments through combination of progenitor cells with tailored biomimetic scaffolds in an attempt to modulate the osteogenic and angiogenic repair process and,
- iii) translational studies to examine the efficacy of skeletal populations for orthopaedic application.

The development of protocols, tools and above all multidisciplinary approaches that integrate stem cells, materials, angiogenic and clinical techniques for skeletal tissue regeneration for de novo tissue formation offers exciting opportunities, with significant therapeutic implications, to improve the quality of life of many in an ageing population.

Biography

Richard Oreffo holds the chair of Musculoskeletal Science, is co-founder of the Centre for Human Development, Stem Cells & Regeneration and Associate Dean (International and Enterprise) within the Faculty of Medicine. He has held and holds positions on UK Research Council / Government bodies and serves on the editorial boards of seven journals. He leads a multidisciplinary group focused on understanding bone development and developing strategies to regenerate bone and cartilage. He led the group that won the 2010 Technology and Innovation Award and Grand Prix award for a stem cell concentrator. He is a Fellow of the Institute of Biology, has published over 160 peer-reviewed papers, holds 5 patents and is co-editor of "Epigenetic aspects of Chronic Diseases" published in June 2011.

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