



STEM CELL SOCIETY
SINGAPORE

STEM CELL SOCIETY SEMINAR

Friday 24 June 2011 • Discovery Theatre, Matrix Building Level 4,
30 Biopolis Street, Singapore 138671



PROGRAMME

4.30 - 5.30pm

Prof. Dietmar W. Hutmacher

Professor and Chair of Regenerative Medicine, Queensland University of Technology, Australia

“Can Mesenchymal Stem Cells Regenerate a Large Segmental Bone Defect of the Tibia?”

5.30pm onwards

Network Social

Provided by Stem Cell Society Singapore

Only for members of Stem Cell Society Singapore; Non-members who wish to attend Network Social are welcome to sign up for membership at www.stemcell.org.sg/scss_membership.php.

Hosted by

Dr Steve Oh

Principal Scientist, Bioprocessing Technology Institute

SPEAKER

Prof. Dietmar W. Hutmacher



Can Mesenchymal Stem Cells Regenerate a Large Segmental Bone Defect of the Tibia?

Abstract

Introduction: The reconstruction of large bone defects caused by trauma, revision surgery, inflammation, tumour surgery, and developmental deformity remains a major challenge for the orthopaedic surgeon. To stimulate bone regeneration, the application of autologous bone grafts has advanced as the "gold standard" treatment but significant drawbacks are associated with this approach. Tissue engineering unites aspects of cellular biology, biomechanical engineering, biomaterial science, and trauma and orthopaedic surgery. Its general principle involves the association of cells with a natural or synthetic supporting scaffold to produce a three-dimensional implantable construct. Mesenchymal progenitor cells (MPCs) represent an attractive cell source for the concept of bone tissue engineering. In the past MPC's have been implicated in the enhancement of bone repair. Their special immunological characteristics suggest that MPCs could be used in an allogenic application. In our study, we assessed the regenerative potential

of autologous vs. allogenic MPCs in an ovine critical sized segmental defect model.

Methods: Ovine MPCs were isolated from bone marrow aspirates, expanded and cultured with osteogenic media for two weeks before implantation. Cells were seeded onto medical grade polycaprolactone-tricalcium phosphate (mPCL-TCP) scaffolds and fixed with platelet riched plasma (PRP). Autologous and allogenic transplantation was performed by using the cell seeded scaffolds (n=8). Cell-free scaffolds served as a control. Bone healing was assessed twelve weeks post surgery by radiology, micro computed tomography, biomechanical testing and histology.

Results: Scaffold based allogenic cell transplantation did not lead to a local or systemic rejection. Radiology and histology showed no significant difference in the bone formation of the autologous vs. allogenic group. Both

cell-groups showed a higher bone formation than the cell-free scaffold. **Conclusion:** Scaffold based bone engineering using allogenic cells offers the potential for an off the shelf product, which would be desired from a health economic point of view.

SPEAKER

Prof. Dietmar W. Hutmacher

Can Mesenchymal Stem Cells Regenerate a Large Segmental Bone Defect of the Tibia?

Biography

Prof Hutmacher's excellent track record is evidence of his internationally-recognized world-leadership in the fields of biomaterials, tissue engineering and regenerative medicine. In these fields, this track record illustrates successful mastery of a major challenge in the interdisciplinary field of biomedical engineering: the ability to transcend traditional disciplinary boundaries, initiate and nurture research and educational programs across different disciplines. He is Professor and Chair of Regenerative Medicine at the Institute of Health and Biomedical Innovation of QUT, where he leads the Regenerative Medicine Group, a multidisciplinary team of researchers including engineers, cell biologists, polymer chemists, clinicians, and veterinary surgeons. He also holds Adjunct Professorships at prestigious universities e.g. in the USA (Georgia Institute of Technology).

Prof Hutmacher's pre-eminent international standing and impact on the field are illustrated by his publication record

(more than 180 journal articles, edited 3 books, 35 book chapters and some 300 conference papers) and citation record (more than 5600 citations, h-index of 39). Three of his papers in Materials Science have received citations in the top 1% for the field, and he is also ranked by Thomas Reuters 45th world-wide in citations per paper (54 per paper) in Materials Science over the past decade.

Over the past 10 years in academia he has been Lead-CI, Co-CI or collaborator in grants totalling more than AUD\$ 35 million. During the most recent 4 years in Australia, he has been an investigator on external grants totalling in excess of AUD\$ 8 million. These grants have included ARC Discovery, ARC Linkage, ARC LIEF NHMRC Projects, NIH, and Prostate Cancer Foundation of Australia awards.

