STEM CELL SOCIETY
SINGAPORE

Singapore
Stem Cell Consortium

STEM CELL CLUB

Monday 31 May 2010 • Aspiration Theatrette, Matrix Building Level 2M,
30 Biopolis Street, Singapore 138671

PROGRAMME

5.00 - 5.30pm	Dr Anthony Vugler Institute of Ophthalmology, University College London "New perspectives on degeneration and repair in the visual system"
5.30 - 6.00pm	Dr Frank Barry Director, University's National Centre for Biomedical Engineering Science (NCBES) "Therapeutic Delivery of Mesenchymal Stem Cells: The Host Response"
6.00pm	Network Social Provided by Stem Cell Society Singapore Only for members of Stem Cell Society Singapore ; Non-members who wish to attend Network Social could sign up for membership at the seminar
Hosted by	Dr Steve Oh Principal Scientist, Bioprocessing Technology Institute

SPEAKER

Dr Anthony Vugler

New perspectives on degeneration and repair in the visual system

Abstract

Retinal diseases such as age-related macular degeneration (AMD) and retinitis pigmentosa (RP) remain major causes of severe visual impairment. Work in animal models has shown that, following loss of functional rod/cone photoreceptors, a stereotyped sequence of events ensues in post-synaptic retinal circuitry. This plasticity involves interneurons (bipolar cells) and output neurons (retinal ganglion cells), including the recently discovered melanopsin system. Importantly, in both humans with AMD/RP and associated animal models, advanced stages of the disease can also involve a significant loss of retinal ganglion cells.

Cellular transplantation is one strategy being developed to halt degeneration and maintain visual circuitry. In particular, replacement of the retinal pigment epithelium (RPE) is a major therapeutic goal for the treatment of AMD and other dystrophies with primary pathology in these cells. In recent years, it has been established that this important cell type can be generated from both embryonic stem (ES) cells and induced pluripotent stem (IPS) cells. Sub-retinal transplantation of these stem cell-derived RPE into dystrophic rodents produces a localised rescue of retinal structure/function that is sufficient to maintain vision. In addition to RPE, considerable efforts are also being directed to the production cells that may replace lost / damaged photoreceptors.

Regardless of the therapeutic approach taken, it is important to intervene at the earliest stages of disease in order to minimise plasticity in post-synaptic visual circuitry. Where degeneration is already advanced, molecular prosthesis can be used to reactivate retinal output neurons and re-establish visual responsiveness in otherwise blind rodents.

Biography

After completing my undergraduate degree in Neuroscience at the University of Sheffield I did my PhD with Peter Coffey. From this, I published one of the first papers detailing how degeneration of rods/cones in the retina can cause pathology/plasticity in visual-recipient structures of the brain. Later, as a neuroscience lecturer at Sheffield I focused on how retinal circuitry changes in response to the loss of rods and cones. I have continued this line of investigation at the institute of ophthalmology, being amongst the first to report the involvement of the newly described melanopsin system in the process of retinal degeneration. In terms of translational research, I am excited by the potential of RPE transplantation to halt retinal degeneration in conditions such as age-related macular degeneration. As such, I have performed characterisation work on the formation of this important cell type from human ES / IPS cells. My ongoing research examines how the structure and function of the visual system is altered by loss of visual input and how degenerating retinal circuitry can be preserved / repaired using various therapeutic strategies.

SPEAKER

Dr Frank Barry

Therapeutic Delivery of Mesenchymal Stem Cells: The Host Response

Abstract

The objective of this work is the evaluate the therapeutic utility of mesenchymal stem cells from bone marrow in tissue repair applications and in particular the nature of the transplanted stem cell-host interaction that underlies the therapeutic mechanism of action. These approaches are based upon the foundation that neither extensive engraftment nor differentiation of the transplanted cells are prerequisites for a useful therapeutic response.

Several models of tissue repair have been assessed, including myocardial repair, joint repair in arthritis, neuronal repair and, importantly, an assessment of the stem cell-tumor interaction. In addition, the role of mesenchymal stem cells and endothelial progenitors in promoting a revascularization response has been considered. This is especially important in diabetic therapy. In general there is a chemotactic response of transplanted stem cells in the injured host and this directs the cells to the site of tissue damage where they engraft in an apparently transient and inefficient way. It is likely that the transplanted cells contribute significantly to a repair response but the exact nature of that contribution is uncertain.

Several elements of the stem cell host interaction are likely to be critical in evoking a stem cell-mediated repair response that is useful and clinically meaningful. These are likely to include trophic effects, suppression of the host immune response and mobilization of host cells, among others.

Biography

Frank Barry is Professor of Cellular Therapy at the National University of Ireland, Galway, Director of the University's National Centre for Biomedical Engineering Science (NCBES) and a principle investigator at the Regenerative Medicine Institute (REMEDI) Here he directs a large group of researchers who focus on the development of new repair strategies in stem cell therapy and gene therapy in orthopaedics and spinal cord injury. REMEDI includes a GMP stem cell manufacturing facility for the preparation of stem cells for use in human clinical studies.

Frank Barry has contributed to the fields of tissue engineering and regenerative medicine by developing an innovative and successful cellular therapy for the treatment of acute joint injury and arthritic disease. This has included the generation of a large body of new data in groundbreaking preclinical studies, and has lead to a phase of clinical testing of mesenchymal stem cells in human trials. In addition he has developed new techniques for the isolation, characterization and commitment of bone marrow stem cells. He currently leads the FP7-funded PurStem project, focusing on the advanced characterization and preparation of human MSCs, and is a partner in the ADIPOA and GAMBA initiatives.