STEM CELL SOCIETY
SINGAPORE

STEM CELL SOCIETY SEMINAR

Monday 11 June 2012 • Creation Theatrette, Matrix Building Level 4,
30 Biopolis Street, Singapore 138671

Programme

5.00 - 5.30pm	David Fiorentini Biological Industries, Israel "Xeno-free medium and culture system for human mesenchymal stem cells"
5.30 - 6.00pm	Dr Michal Amit Technion-Israel Institute of Technology "Culture methods for human pluripotent stem cells"
6.00pm onwards	Network Social Provided by Biological Industries, Israel
Hosted by	Dr Andre Choo Principal Investigator, Bioprocessing Technology Institute, A*STAR

SPEAKER

David Fiorentini

Xeno-free medium and culture system for human mesenchymal stem cells

Abstract

Human Mesenchymal Stem Cells (hMSC) are multipotent cells with the ability to give rise to multiple tissue types, including bone, fat and cartilage. hMSC have advantages over other stem cells types, due to the broad variety of their tissue sources and for being immuno-privileged. These traits have led hMSC to become desirable tools in regenerative medicine and cell therapy. Application of hMSC in cell therapy needs the elaboration of appropriate culture medium and defined culture conditions in order to minimize the health risk of using non-human derived proteins and to avoid immunogenicity and rejection in recipients.

To date, the most common culture media for growth and expansion of hMSC include serum. In addition, the common auxiliary medium supplements and solutions (for attachment, freezing and dissociation) required for long term growth and maintenance of hMSC are mostly animal-derived.

This presentation addressed the ability of a developed culture medium and auxiliary solutions which are xeno-free, to support long term expansion of hMSC under xeno-free culture conditions, suitable for medical applications. The xeno-free culture system includes specially developed culture medium as well as solutions for attachment, dissociation and cryopreservation that enable long-term growth of hMSC while maintaining the ability for self-renewal and multi-lineage differentiation.

Biography

Dr David Fiorentini is head of R&D at Biological Industries Ltd. He obtained his degrees in Biotechnology in the Hebrew university of Jerusalem and completed his studies working on production of viral vaccines in microcarriers culture system. Subsequently, David worked as a research scientist and R&D manager in several biotech companies where he developed cell culture technologies for the production of biologicals.

David Fiorentini has served as VP for Scientific Affairs in Biological Industries Ltd. for more than 20 years. Among other duties, he is head of R&D department and responsible for the development of unique products in the areas of culture media for animal cells, serum-free media, xeno-free medium products for human embryonic and adult stem cells as well as medium products for clinical genetic analysis.

SPEAKER

Dr Michal Amit

Culture methods for human pluripotent stem cells

Abstract

Human embryonic stem cells (hESCs) are pluripotent cells isolated from blastocysts. Traditionally, pluripotent stem cells have been cultured with a supporting layer in two-dimensional culture, which allows their continuous growth as undifferentiated cells. However, any future use of hESCs for cell-based therapy and industrial purposes will require a scalable, reproducible and controlled culture system.

Our group at the Technion, together with scientists from Biological Industries, developed the optimal culture technology for undifferentiated hESCs suitable for clinical and industrial applications. for highest applicability, , the developed culture medium meets two criteria: (1) culturing hESCs without using feeder layers, and (2) without using non-defined or animal components. The developed defined medium, "Nutristem™", was designed for 2D culture of undifferentiated hESCs. When cultured using this system hESCs maintained all their features for over a year in culture, including pluripotency and stable karyotypes.

Recently, a new source for pluripotent cells was presented by Yamanaka et al, who demonstrated the ability to reprogram mouse somatic cells, and later human somatic cells, into ESC-like cells. Our results demonstrate that Nutritem™ could be used for iPSCs as well as for hESCs.

Employing the 'whole embryo' approach, we used NutriStem™ medium and inactivated human foreskin fibroblasts (HFF) as feeder layer to derive a hESC line in a clean room (Ella GMP facility, Sheaba Hospital, Israel). The cell line was passaged mechanically until removed from the GMP-facility, at which point passaging was carried out by collagenase splitting. All materials and disposables were GMP-grade. The HFF feeders were also derived in the same conditions. The resultant cell line, CL1, demonstrated hESC features, including typical colony morphology, stable karyotype, expression of ESC markers and embryoid body and teratoma formation after 25 passages of continuous culture.

In addition to our progress in developing 2D culture technique, we have recently published a suspension culture for PSCs, where scaled up cells were cultured as undifferentiated cells using spinner flasks and xeno-free medium. The cell line, CL1, was transferred successfully to a dynamic suspension culture, where it was cultured as undifferentiated and upscaled (up to 26 fold increase in cell number during 10 days of culture) using spinner flasks and xeno-free medium.

SPEAKER

Dr Michal Amit

Culture methods for human pluripotent stem cells

Biography

Michal Amit, Ph.D. is a senior scientist at the Sohnis and Forman Families Stem Cell Center, Faculty of Medicine, Technion - Israel Institute of Technology, Haifa. She obtained her Ph.D. degree in Medical Sciences from the Technion. In 1998 she trained at the laboratory of James Thomson at the University of Wisconsin, Madison, in embryonic stem cell (ESC) culture and derivation methods, at the time of the derivation of the first human ESC lines. At the Faculty of Medicine of the Technion she derived the first human embryonic stem cell lines in Israel, as part of her Ph.D. degree. Under grants funded by the National Institute of Health, Michal Amit was responsible for the Technion's ESC bank, which distributed hESCs to laboratories worldwide, and for establishing and running international courses on culturing ESCs.

In recent years she directed the Stem Cell Infrastructure Center of the Technion and has developed culture techniques for ESCs using defined and animal-free conditions. She currently devotes her research efforts toward developing methods for the mass production of pluripotent stem cells, to promote research, clinical and industrial applications.