PROJECT PRESENTATION:

Cardiac Progenitor Cells for Treatment of Heart Disease

Ischemic heart disease is responsible for 50 percent of the mortality of the population of the western world. One serious condition is myocardial infarction. Even in cases where the patient is successfully treated, it leads, to a varying extent, to the formation of scar tissue in the heart. The result is coronary insufficiency with a prognosis no better than for severe forms of cancer. We are now collaborating to find new treatments using heart stem cells.

It was recently found that the heart has ability to regenerate. There is clinical evidence that there is a small population of cells in the adult heart that have stem cell properties which are responsible for this. In the event of an injury, these heart progenitor cells migrate towards the damaged area and start dividing. However, neither is their capacity to divide sufficient, nor is it quite clear whether they differentiate into heart muscle cells exclusively.

Overall Goal

In other species, the heart's ability to regenerate is far more extensive. In Zebra fish, for example, as much as 20 percent of the ventricle can be removed and the heart will still regenerate completely. Similarly, injuries in humans seem to awaken evolutionary conserved signalling pathway genes in order to repair the damage. Unfortunately with insufficient results.

The overall goal of this project is to characterise the signalling pathways in order to find chemical substances with ability to stimulate propagation, differentiation, and migration of cells, and with the potential for being developed into pharmaceuticals.

Beneficial Expertise

The project benefits from the Sahlgrenska Academy at Göteborg university, which contributes with extensive knowledge of regenerative processes, Cellartis brings in stem cell expertise, while AstraZeneca has vast experience of drug screening.

Preliminary Results

Using the extracellular progenitor cell marker C-kit, heart progenitor cells have been found in cells from the human atrium. The cells used originate from a piece of the atrium that is removed during heart surgery when connecting patients to a heart-lung machine. Cells from neonates undergoing heart surgery have been

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found to be positive also for the intracellular marker Islet-1. This is a transcription factor active at an earlier stage during heart muscle cell differentiation.

Next Stage

The project is planned to continue to 2009 and several milestones have to be reached before considering any compounds for further drug development. Goals to be achieved are to characterise and isolate human heart progenitor cells and develop methods for successful maintainance in culture, to purify and propagate heart progenitor cells from human heart biopsies and further validate the screening assays in 96-well plates, and to screen compound libraries using cultured heart progenitor cells.

Project Leader
Caroline Améen
Cellartis

We have recently received funding for post docs, which I am certain will speed up the project, making it possible for us to deliver results according to schedule.

PROJECT PARTICIPANTS:

- **AstraZeneca –** One of the world's leading pharmaceutical companies. Provides medicines designed to fight disease in six medical areas: cancer, cardiovascular, gastrointestinal, infection, neuroscience and respiratory.

- **Cellartis** – A biotech company focused on applications of human stem cell technologies and derivation of stem cell lines.

- **Department of Clinical Chemistry and Transfusion Medicine, Sahlgrenska Academy at Göteborg University** – Several research groups are working within the following research areas; hormone research, glycobiology, inborn errors of metabolism, cartilage and heart regeneration, DNA repair and cancer.

Per-Ove Sjöquist
Head of Cardiology
AstraZeneca

It is great to be able to work in an unconventional way in a project like this together with world-class experts outside AstraZeneca.

Would you like to know more about this project? Please contact:

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This stem cell project is unique in the way it takes the best parts from each organisation, making them create knowledge together, which each party can protect and use for future success.

The Cardiovascular and Metabolic Network, CVM, is a competence network and co-operation project between health care, academia and industry. Its task is to increase the number of commercialisations in the cardiovascular and metabolic area, which in the long term will lead to better applications in health and medical care and more employment opportunities. The CVM Network validates suitable development projects and provides cutting-edge competence and capital. CVM is part of GöteborgBIO.