The overall purpose of the AFA Insurance five-year research programme was to increase knowledge about regenerative medicine with a special focus on those diseases and injuries that cause most deaths such as cardiovascular diseases, cancer and neurological diseases. The research focuses on regenerative medicine in a broad sense in both basic research and clinical application. There is therefore a wide span of the projects that received funding – from new research on brain diseases, cancer therapies, the occurrence of diabetes in children, symptom relief in Parkinson’s disease and shorten healing time of fractures.
Programme Schedule

Chair: Michael Adams and Peter Friberg

09:00
Registration and coffee

09:30
Opening of the symposium
Carola Lemne, CEO The Confederation of Swedish Enterprise
Sten Gellerstedt, The Swedish Trade Union Confederation
Peter Friberg, Professor Gothenburg University
Susanna Stymne Airey, PhD, head of R&D AFA Insurance

10:10
Key note:
Where is regenerative medicine research today?
Challenges ahead and clinical implications
Molly Stevens, London Imperial College and Karolinska Institute

Short break

11:00
Identification and functional characterization of oocyte stem cells in the mammalian ovary
Kui Liu, Gothenburg University and Outti Horvatta, Karolinska Institute

The Functional and Molecular Properties of Induced Pluripotency; Implications of Donor Age
David Bryder and Niels-Bjarne Woods, Lunds University

11:30
Advancing the use of regenerative medicine in orthopedics
Per Aspenberg and Mikael Sigvardsson, Linköping University

Novel strategies for brain repair
Jonas Frisen, Karolinska Institute

12:00
Networking Lunch

13:00
Engineered T-cells for regenerative cancer therapy
Angelica Loskog, Uppsala University

Cell-based therapies to intervene with the development of type 1 diabetes
Per-Ola Carlsson, Uppsala University

13:30
Regenerative therapy for brain and heart infarction
Zaal Kokaia, Lunds University

Functional Integration of Grafted Human Induced Pluripotent Stem (iPS) Cells to Regenerate the Brain in Parkinsons Disease and Epilepsy
My Andersson, Lunds University

14:00
Refreshment break with networking

14:30
Biomaterials - Enhanced Strategies for Cardiovascular Repair (BEST CARE)
Karl-Henrik Grinnemo, Karolinska Institute

Novel strategies for brain regeneration after stroke ? from lab to patient to population
Milos Pekny, Gothenburg University

15:00
Ethics in Regenerative medicine
Bengt Gerdin, Uppsala University

15:45
What we know, what we think we know, and what we have learned!
Concluding remarks
Michael Adams, Molly Stevens and Peter Friberg
Identification and functional characterization of oocyte stem cells in the mammalian ovary

They have performed extensive experiments to (a) explore the existence of oogonia stem cells (OSCs) in the mammalian ovaries; and (b) study the possible functions of the OSCs.

The research has great significance in deciding if we can use oogonia stem cells for providing new treatment for female infertility.

The Functional and Molecular Properties of Induced Pluripotency; Implications of Donor Age

During the duration of the project, we have developed, optimized and adapted techniques that allow for investigations into the molecular and functional nature of induced pluripotent stem cells (iPSCs) derived from young and aged somatic donor cells. Such techniques have involved IPS derivation techniques, gene expression and telomere length estimations from very limited samples, epigenetic analyses and the use of in vitro and in vivo assays to probe IPS function.

Advancing the use of regenerative medicine in orthopedics

This project aimed at developing an observation within cell biology into a possible treatment method in orthopedics. It turned out that the cells didn’t play the role we had expected in our orthopedic animal models, so in this respect the project failed. On the other hand, the development of these animal models, and the contact between traditional experimental orthopedics and advanced cell biology led to spin-off effects that have opened a new avenue in research about bone fractures. The healing mechanisms in most fractures in humans are quite different from the textbook descriptions.

Novel strategies for brain repair

We undertook cross-species comparisons aimed at revealing novel principles of neurogenesis in the central nervous system. Our comparative analyses involved highly regenerative aquatic salamanders and mammals. In contrast to mammals, salamanders respond to loss of neurons by complete regeneration.

In this project we aimed to start bridging the gap between the brain regeneration capacities of salamanders and mammals. Upon injury, glial cells in the adult salamander brain give rise to new neurons, involving processes that lead to complete regeneration.

Our central hypothesis was that by appropriate targeting of such processes, we should be able to impose regenerative traits in mammals in terms of gene expression profile, cell behavior, and ultimately improved functional recovery. During the course of the project we have identified a key mechanism that controls cell genesis in the central nervous system of both salamanders and mammals. We also revealed critical inter-mammalian variations and revealed human specific traits.

Engineered T-cells for regenerative cancer therapy

The goal of the program was to establish T cell therapy for cancer in Sweden. To meet this challenge we started a T cell program at Uppsala University. The focus was set on the development and execution of a clinical trial using 3rd generation chimeric antigen receptor (CAR) T cells for B cell leukemia and lymphoma, with focus on lymphoma.

Cell-based therapies to intervene with the development of type 1 diabetes

This project combines experimental and clinical studies of cell-based therapies commonly aimed at preventing the development of type 1 diabetes and curing illness. In a clinical study, adult patients with newly diagnosed type 1 diabetes were autologously transplanted with mesenchymal stromal cells in order to stop progression of the disease with destruction of insulin-producing cells.
Zaal Kokaia
Lunds University

Regenerative therapy for brain and heart infarction
The main goal of this multidisciplinary project was linking together basic and clinical research to determine mechanisms of regeneration following ischemic damage to the brain and heart. A substantial amount of data was generated revealing the role of transplanted and endogenous stem cells in molecular, cellular and plastic changes involved in recovery of impaired functions after brain and heart infarction. Our data will promote development of new therapeutic approaches to improve patients’ quality of life in post-infarction phase.

My Andersson
Lunds University

Functional Integration of Grafted Human Induced Pluripotent Stem (iPS) Cells to Regenerate the Brain in Parkinsons Disease and Epilepsy
Our studies demonstrate that human iPSCs differentiate into neurons when transplanted in vitro and in vivo. More mature functional properties are acquired by iPSCs in vivo after 6 months of transplantation, also demonstrating late afferent synaptogenesis revealed by optogenetics. We have also shown that human induced neurons (hiNs) survive and differentiate for long time, up to 6 months after transplantation, although their migration and synaptic integration is less pronounced compared to transplanted iPSCs. Taken together, our data suggest that both cell types are competent for neuronal cell replacement therapeutic strategies, and need to be explored further, particularly in various disease models.

Karl-Henrik Grinnemo
Karolinska Institute

Biomaterials - Enhanced Strategies for Cardiovascular Repair (BEST CARE)
This project is a translational research proposal that seeks to develop next generation cell therapy strategies for cardiovascular repair and regeneration leading to near-term clinical studies for cardiovascular diseases.

Milos Pekny
Gothenburg University

Novel strategies for brain regeneration after stroke? from lab to patient to population
Trygghet på jobbet för fyra miljoner människor