A target to optimize organ repair processes

Anqi Xiong

In optimal settings, tissues when damaged can repair themselves and the organ in question can resume its normal function. However, tissue repair is far from optimal and often leads to permanent scar formation and subsequent decay in organ function leading to clinical symptoms.

The main focus of the group's research is to understand the underlying mechanisms by which tissues can repair themselves with minimal fibrosis. A cell type in blood vessels called pericytes is believed to play a central role in this process. The project has allowed us to identify a cell type, mesenchymal stem cells in blood vessels in human placenta, that can upon culturing give rise to pericytes and also fibroblasts, a cell that maintains a central role in scar formation.

The purpose of this thesis work was to isolate these cells and study the differentiation process, the mechanism by which these mesenchymal stem cells lead to the generation of pericytes and fibroblasts, under what culture conditions these different cells can be stable cultured and what effects certain growth factors have on this process.

The group were able to culture these cells in incubators and characterize them on the basis of there expression of different molecules expressed on the cell surface and separate the different cell-types. I was partially successful in identifying environments were these cells could be stably propagated outside of the body. Preliminary results show that while two growth factors that are known to be involved in scar formation effected the cells under study. However, no clear differences between these two factors could be observed.

Based on these results, cells that have not been in culture as long will be used in the future, in order to further optimize our experimental system. To date there are no methods that allow the study of stable pericyte cultures outside the body. This work lays the foundation for understanding how these cells might be influenced therapeutically to contribute to optimal tissue repair without deleterious scarring.

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Biology Education Centre and Department of Medical Biochemistry and Microbiology, Uppsala University
Supervisor: Christian Sundberg