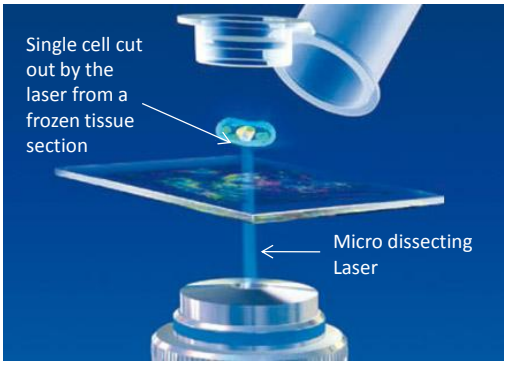
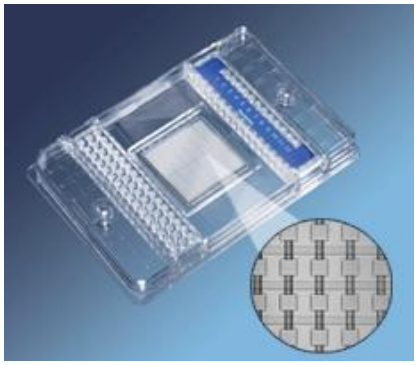
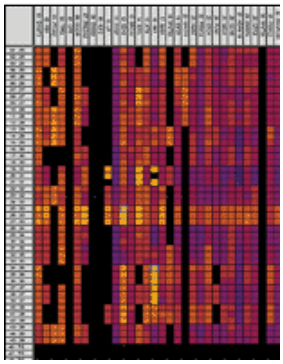
STUDENT RESEARCH PROJECT



Laser Capture Microdissection: Cells are cut out from thin sections of frozen tissue.



Fluidigm® System: A ble to quantify gene expression in singel cells.



Gene expression array: Output of the Fluidigm® system showing which genes are expressed.

Design of a microfluidics 'World-to-Chip' device for single cell gene expression analysis

Master Thesis / Semester Project / Bachelor Project

Gene expression studies are key to understanding many of today's diseases i.e. cancer. However the technologies which are currently used have significant limitations: i) The cells which are analyzed are cultured in the laboratory and therefore do not behave exactly how they would in organ tissues. ii) Cell harvesting techniques from organ tissues report average gene expression patterns from thousands of cells.

Considering these limitations it is therefore likely that important genes are being missed. With recent advances in technology we are now able to cut out individual cells from organ tissue (using laser capture microdissection) and analyze their gene expression patterns (using the Fluidigm® system). However, handling of the individual cells and transferring them to the Fluidigm® system remains difficult and time consuming. This can lead to the degradation of a cell's contents and therefore lead to erroneous results. Hence there is a need for a microfluidics device which connects Laser Capture Microdissection and the Fluidigm system into one, complete automated system.

We therefore propose a project to design a microfluidic device which will capture, process and transfer a continuous stream of laser microdissected cells to the fluidigm® system. This project is part of an ambitious project which if successful could revolutionize the way biological systems are analysed, ultimately enabling the development of new treatments, not only for bone disease, but also for other diseases such as cancer.

Furthermore, this project will allow a student to gain valuable experience in the new emerging field of microfluidics.

Previous knowledge in the following areas is an advantage but not necessary: micro-manufacturing, Fluid Dynamics, CFD, CAD.

Mechanical/Electrical/Chemical/Process Engineers are encouraged to apply.

50% Theoretical work, 50% Practical and experimental work.

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