Capture, Detection and Analysis of Circulating Tumor Cells

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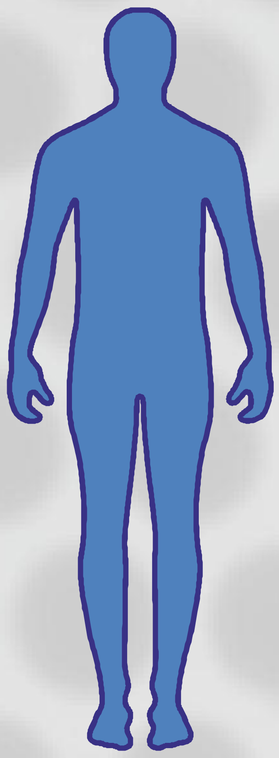
Abstract

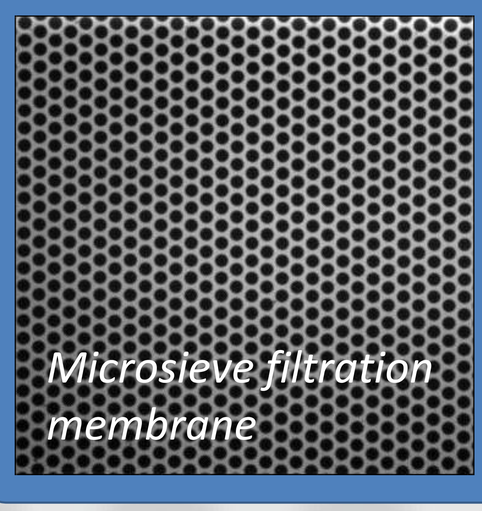
Circulating tumor cells (CTCs) are cells from tumors shed into the blood stream. CTCs are a strong prognostic and predictive factor for recurrence & survival of cancer patients. They also can be used as a tool to monitor therapy and represent a “liquid biopsy” to tailor therapy. A single cell sorting and capture chip is developed for the capture and sorting of individual CTCs, which enables single cell analysis. The capture efficiency can be improved further by adding an affinity-based capture layer. An electrical readout will be added to the capture plate to easily identify the location of cells on the plate.

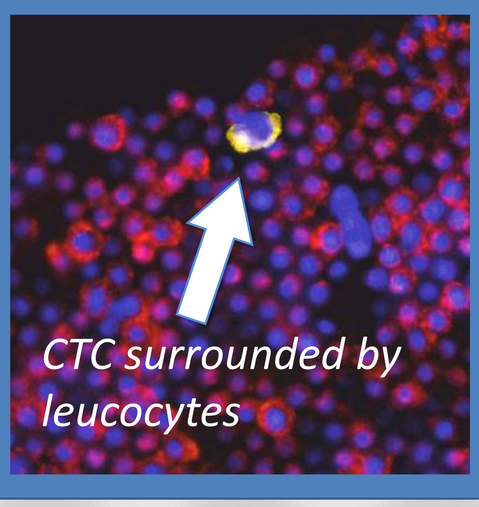


Liquid biopsy

CTC isolation technologies

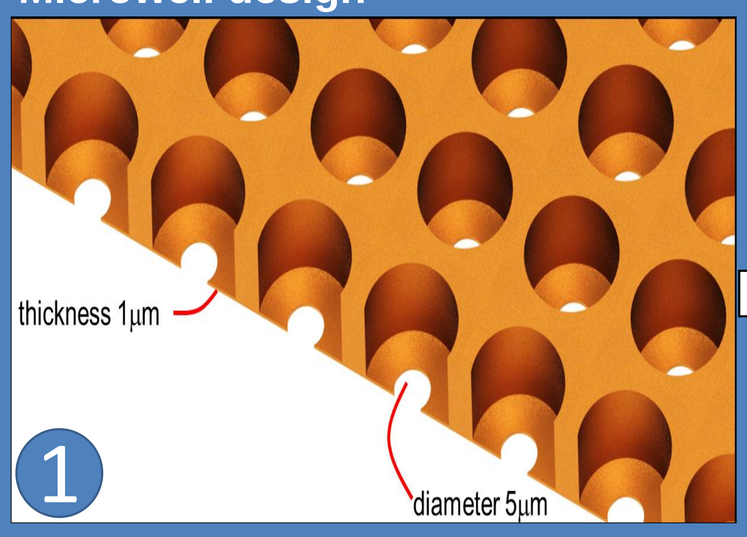
Filtration using Silicon Microsieves Followed by Fluorescence Detection and Analysis



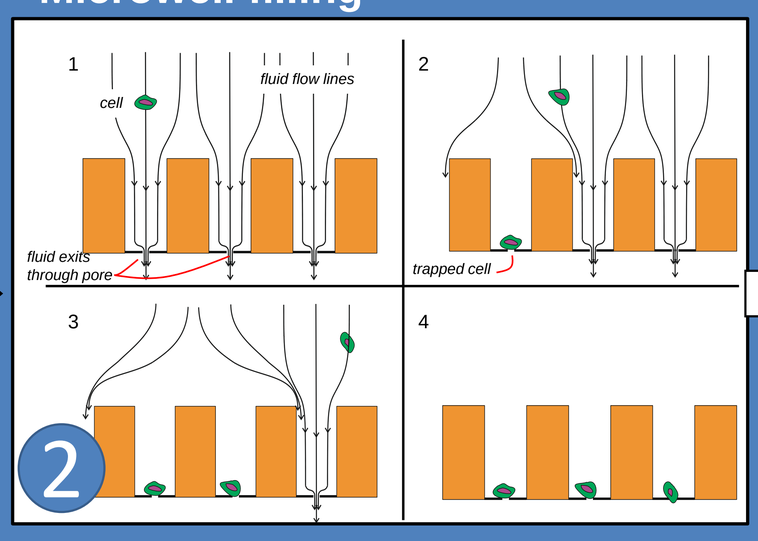


Single Cell Isolation and Analysis Using Microwells

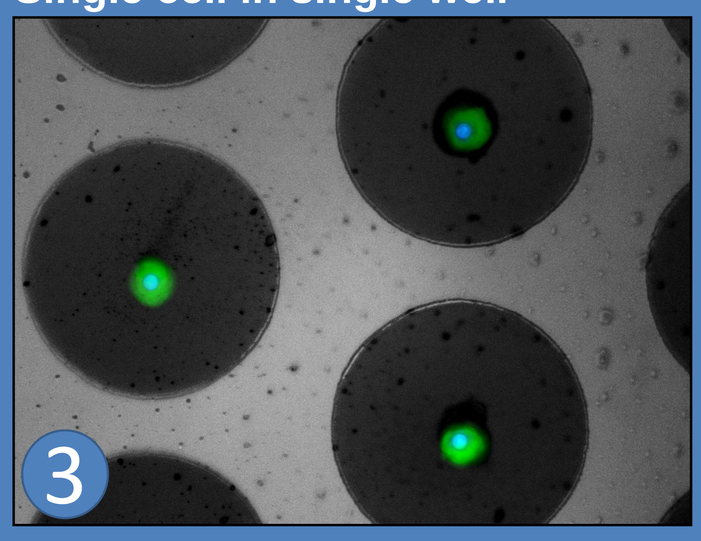
Microwell design



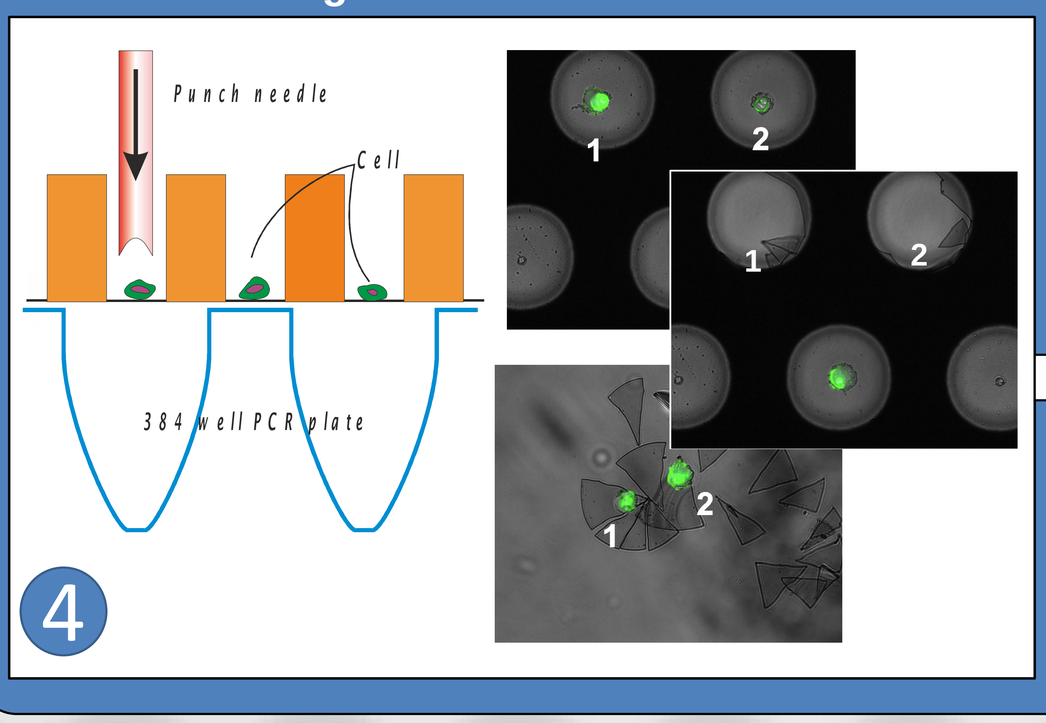
Microwell filling



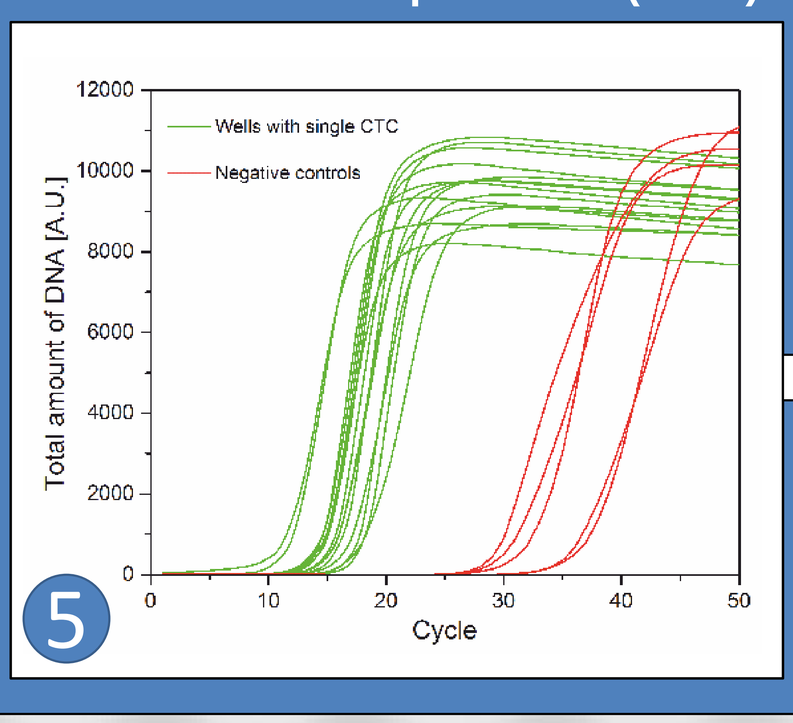
Single cell in single well



Isolation of single cells



Whole Genome Amplification (WGA)



Sequencing

Conclusions

We have developed a set of technologies to detect and isolate single CTC for the purpose of DNA analysis. Next step is to increase the capture and detection efficiency by supplying the Microwells with antibodies against CTC and use for example electrodes inside the Microwells to determine the presence of a cell.

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