

Glioblastoma Cancer Stem-like Cells discrimination by UHF-Dielectrophoresis Crossover Frequency

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Abstract:

SUMCASTEC* explores new approach for cancer stem cells (CSCs) real time and neutralization, by developing a micro- optofluidic lab-on-chip (LOC) platform.

Cancer Stem Cells or CSCs appear as major biological and therapeutic targets, in particular for Glioblastoma (GBM). Heterogeneity of tumor cell populations, leads to optimize characterization and sorting methods. Actually, analysis are based on efficiently targeting of a set of biological markers, which are used to validate the cell stemness properties.

Besides the biological properties, biophysical properties of CSCs are expected to be a potential way to discriminate, sort and finally neutralize CSC populations. Our data summarize first's results glioblastoma cell lines' and GBM primary cultures characterization; measuring their crossover frequencies by di-electrophoresis (DEP) technics using Ultra High frequency (UHF) range (above 50 MHz).

In order to establish the proof of concept, GBM cell lines are cultured following different conditions, in order to achieve an enrichment of CSCs. In other hand, CD133 marker-based sorting is assessed to discriminate CSC of GBM primary cultures subpopulations and characterize their crossover frequencies.

Using microfluidic lab-on-chip systems implemented on Bipolar-Complementary Oxide Semiconductor (BiCMOS) technology (allowing single cell handling and analysis), and following DEP electrokinetic method, these CSCs were discriminated from the differentiated cells. Based on measurements of their own intracellular specificities, the enriched CSCs subpopulations have shown clear differences of DEP crossover frequency signatures of CSC enriched populations compared to differentiated cells.

That demonstrates the concept and validates the technique efficiency for CSCs discrimination. Confirming a high potential of the LOC platform in the diagnosis and development of new glioblastoma therapeutics.