PROGRAMUL DE COOPERARE ELVEȚIANO-ROMÂN
SWISS-ROMANIAN COOPERATION PROGRAMME

Response of in vitro hypoxic tumor models to potentially therapeutic compounds as revealed by an advanced analytical platform – TUMORANALYZER –

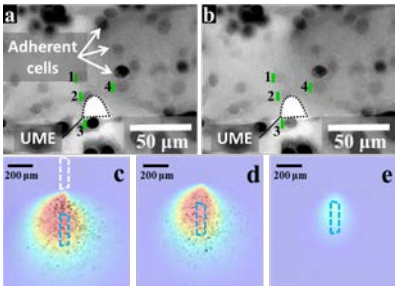
Starting Date 01.02.2013

Duration 36 Months

Discipline Cancer Research

Main Goals

Our aim is to study the antitumor effect of carbonic anhydrase inhibitors at cellular level with a novel, advanced analytical platform. Such platform is developed: ***i)*** by combining Surface Plasmon Resonance imaging (SPRi) with Electrochemical Impedance Spectroscopy (EIS) to assess continuously changes in cell adherence, mobility and morphology, and ***ii)*** by using a microfluidic push-pull device (MPPD) coupled with a Scanning ElectroChemical Microscope for the localized delivery and detection of different species in the extracellular space of the cells exposed to drug candidates.



Localized impact of the MPPD, operated in electrochemical mode (a, b) or microfluidic mode (c-e), on a layer of adherently growing cancer cells

Activities

The following activities have been already addressed within the project:

- Development of an integrated optical stand for SPRi gathering EIS and MPPD facilities.
- Precise electrochemical pH perturbation of only few living cells (see figures a and b above, before and after perturbation, respectively).
- Simulations (figures c-e) and experimental verification of the MPPD as a tool for electrochemical and microfluidic control of the chemical composition at the extracellular space of living cells.
- Establish the cell model to test the carbonic anhydrase inhibitors. HT 29 tumor cells have been investigated in hypoxic conditions.
- Advanced ROS detection (preliminary). MPPD probes are functional in ICB and also investigated in terms of the effect of the ac voltage perturbation of the Electrochemical SPRi on electrochemical detection.
- The electrochemical SPRi experiments on HT29 cells having their liquid environment controlled by the MPPD (initiated).

Expected results

The novel analytical platform promises to reveal details on the effect of carbonic anhydrase inhibitors on cells, which are not easily acquirable with current cell biology approaches.

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