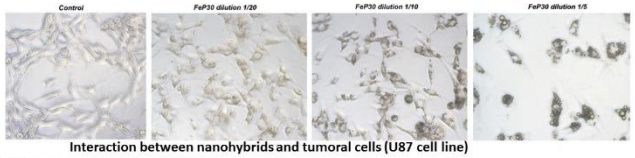
PROGRAMUL DE COOPERARE ELVEȚIANO-ROMÂN
SWISS-ROMANIAN COOPERATION PROGRAMME

PPI/PEI dendrimers immobilized iron oxide nanoparticles as contrast agents for cancer detection (Acronym: NANOCAGE)

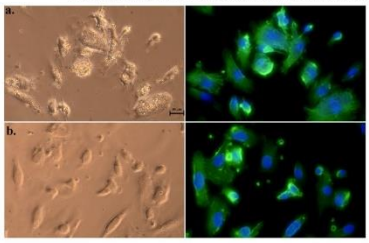
Starting Date 01.11.2012

Duration 36 Months

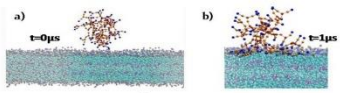
Discipline Physical Chemistry
(Research field: medicine)



Interaction between nanohybrids and tumoral cells (U87 cell line)



Interaction of EPC with nanohybrids



Dendrimer/cell membrane interactions

Main Goals

1. Development of new and highly biocompatible nanomaterials based on PPI/PEI and iron oxide with higher relaxivity in comparison with those based on PAMAM dendrimers.
2. In vitro assessment of toxicity and biocompatibility of new hybrid nanomaterials following the cytotoxicity and changes in cellular morphology, of the representative cells of brain tissue.
3. In vivo assessment of the functionality of the new hybrid nanomaterials injected in rats by following immediate and long term effects.

Activities

1. *Simulation*: Molecular Dynamics simulation and thermodynamic predictive studies of the hybrid nanomaterials based on PPI / PEI dendrimers and iron oxide manufacturing under high pressure conditions
2. *Simulation:* Modelling the interactions between the hybrid nanocomposite and the cell membranes
3. *Experimental*: Hydrothermal synthesis at high pressures and low temperatures of hybrid nanomaterials based on PPI / PEI dendrimers and iron oxide
4. *Investigations*: Characterisation of physical-chemical and magnetic properties of hybrid nanomaterials
5. *Investigations*: In vitro toxicity and biocompatibility tests using different cell lines and In vivo assessment of the hybrid nanomaterials behaviour

Expected results

1. High added-value products meaning nanomaterials based contrast agents for brain cancer.
2. Prooving the functionality of the proposed nanomaterials by in vivo studies on small animals
3. A possible mechanism by which proposed nanomaterials are accumulated in cells.
4. MD simulation methodologies and computational power allowing accurate predictions of the interactions with inorganic NPs using synthesis parameters with modest computational effort.
5. Published papers, participation at conferences, training stages for the young researchers

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