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Motivazione e campo di applicazione

Conventional glioblastoma (GBM) therapies have not resulted in major improvements in the survival, due to high recurrence and tumor spreading. Therefore, there is an urgent need to develop new effective therapies. The establishment of an immunosuppressive tumor microenvironment in GBM is known to limit the cytotoxic effects of conventional therapies and, in this context, myeloid-derived suppressor cells play a critical role by promoting immune tolerance, tumor growth and spreading.

Obiettivi generali e principali attività

The goal of this thesis project is to develop a stimuli-responsive Iron oxide nanocube (IONC)-loaded delivery system in order to combine local fever-range Magnetic Hyperthermia (MHT) with MDSC depletion-targeted immunotherapy for intratumoral treatment of GBM. The specific objectives are: 1) To exploit the superior heating efficiency of the IONC-loaded platforms to induce tumor damage. 2) To turn the immunosuppressive TME into an immunosupportive one, by local delivery of immunomodulators. 3) To release the loaded immunomodulators specifically at the tumor site, upon the appropriate stimulus (pH or temperature), thus enhancing their tumor retention and therapeutic effect. All these actions will result in the reduction of the immunosuppressive activity of MDSCs and the enhancement of the antitumour immune responses, ultimately leading to tumor regression.

Obiettivi di apprendimento (strumenti tecnici e analitici, metodologie sperimentali)

The student will be involved in studies aimed to optimize nanoformulations for magnetic hyperthermia and drug delivery, and to characterize in vitro its therapeutic impact on glioblastoma cells and MDSCs. The student will get experience in hands on nanofabrication, as well as a deep knowledge on nanomaterials characterization. Furthermore, the student will acquire basic immunological techniques.

Luogo/i in cui si svolgerà il lavoro: Italian Istitute of Tecnology

Informazioni aggiuntive

Numero massimo di studenti: 1