

Role of azurin-associated precision nanomedicines on cancer immune modulation

Proposers

Helena Florindo (FFULisboa/iMed.Ulisboa), Arsénio Fialho (IST/iBB)

Introduction

Tumor immune evasion impairs antigen presentation by antigen presenting cells (APC), mostly dendritic cells (DCs), and promotes signaling pathways-related immune suppressive mechanisms. Current cancer vaccines induce a poor to moderate immune response mainly due to immunosuppressive tumor microenvironment (TME). But, it was shown that targeting antigens via vaccination leads to the modulation of tumor biology, making cancer cells more susceptible to standard treatment modalities. The combination of chemotherapy, vaccination and cancer-immune network modulation may be the key to overcome pro-tumorigenic behavior and metastatisation.

Partner 1 Speciality

The Intracell_ADD group at FFULisboa/iMed.Ulisboa has been focused on the design, synthesis and characterization of nanotechnology-based strategies as platforms for cancer vaccination. These nanoparticles (NPs) yield prolonged release of antigens and immune-modulators within or in the vicinity of APCs. In addition to DC-targeted NP, FFULisboa group is developing nanocarriers to deliver gene regulators to tumor stromal cells.

Partner 2 Specialty

The group at iBB has an extended expertise in the recombinant production and purification of the bacterial protein azurin. The iBB group has been deeply involved in the characterization of the molecular and cellular effects underlying the anti-cancer effect of azurin and related peptides. This group will also bring in-depth expertise in cancer and molecular biology to the project.

Project outline/goal

Development of a ligand-modified nanoplatform depending on target cells: NP1) DC-target NP coated with mannose to deliver melanoma associated antigens and cancer adjuvants, leading to APC activation and maturation; NP2) azurin-coated NPs to deliver siRNA/mRNA molecules to modulate tumor immune-suppressive pathways. It will address the characterization of the effect of the protein azurin once delivered onto the surface of NPs. Azurin has a tumor-targeted effect and the iBB group has demonstrated that azurin may have a synergistic effect with cytotoxic drugs. But limited information regarding azurin's adjuvant effect on DCs or in the combination of cancer vaccines.

Student profile

Profile sought: preference, but not limited, to students with a background in Pharmaceutical Sciences, Biotechnology, Biology and Biochemistry with an interest in cancer research and nanomedicines.