

- **Title**

Personalized medicine: development of theranostic nano-platforms based peptides against cancer

- **Project description**

Design and characterization of self-assembling peptide systems for the innovative development of a theranostic nano-platform for applications in the field of personalized medicine with particular attention to severe tumor pathologies (triple negative breast cancer and / or glioblastoma). Personalized therapy is the most advanced and innovative weapon for the treatment of very severe pathologies, resistant to conventional therapies. It also contributes to improving the quality of life of patients and family members.

The use of supramolecular nano-platforms (such as peptide nanofibers) composed of biocompatible and non-toxic materials such as peptides, where one or more drugs (chemotherapeutic, siRNA etc.) can be encapsulated or bound on the surface with an on-demand release system represents an extremely innovative challenge. Selective drug release has significant advantages over current drug delivery strategies available for cancer treatment, which in most cases provide high toxicity even to healthy cells.

The nano-platforms will be highly versatile and modular and can be exploited for personalized medicine and used for the treatment of different types of cancer simply by modifying the molecules exposed on the surface of the fiber. In fact, the modularity of the platform allows the functionalization of its surface with molecules that perform different actions: i) targeting of receptors over-expressed by tumor cells; ii) increased internalization, thanks to cell-penetrating peptides; iii) passage through the blood-brain barrier for tumors affecting the central nervous system; iv) transport of classical chemotherapy drugs to decrease their systemic toxicity; v) siRNA transport for gene therapy; vi) diagnostics through the use of magnetic nanoparticles that can be loaded in the fiber.