Research line 1.

Apoferritin and other biological carrier for the delivery of imaging and therapeutic agents

**L-Ferritin targets breast cancer** stem cells A growing body of evidence suggests that cancer stem cells (CSC) have the unique biological properties necessary for tumor maintenance and spreading, and function as a reservoir for the relapse and metastatic evolution of the disease by virtue of their resistance to radio- and chemo-therapies. Thus, the efficacy of a therapeutic approach relies on its ability to effectively target and deplete CSC. In this study, we show that CSC-enriched tumorspheres from breast cancer cell lines display an increased L-Ferritin uptake capability compared to their monolayer counterparts as a consequence of the upregulation of the L-Ferritin receptor SCARA5. L-Ferritin internalization was exploited for the simultaneous delivery of Curcumin, a natural therapeutic molecule endowed with antineoplastic action, and the MRI contrast agent Gd-HPDO3A, both entrapped in the L-Ferritin cavity. This theranostic system was able to impair viability and self-renewal of tumorspheres *in vitro* and to induce the regression of established tumors in mice. In conclusion, here we show that Curcumin-loaded L-Ferritin has a strong therapeutic potential due to the specific targeting of CSC and the improved Curcumin bioavailability, opening up the possibility of its use in a clinical setting**.**