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TESTING THE RESILIENCE OF CANCER STEM CELLS TO MAGNETIC HYPERTHERMIA AND HEAT-MEDIATED DRUG DELIVERY

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Cancer stem cells (CSCs) are well known for being responsible for tumor regression and metastasis. In particular, quiescent CSCs, kept at a non-proliferating state, have been identified in many human malignancies as the subcellular tumor type that causes resistance to current chemotherapy. Available chemotherapeutics attack the cells by blocking their division and replication, resulting ineffective for the eradication of those cells that rarely divide. Therefore, an efficient cancer therapy must act also on quiescent CSC in order to avoid tumor relapse. In this study, we have investigated the potential of magnetic hyperthermia in combination with a chemotherapeutic agent (Doxorubicin) to eliminate colorectal CSCs (CR-CSCs), expressing high levels of CD44v6 markers, withdrawn from patient. Preliminary results from our research suggest that these cells are sensitive to heat under certain magnetic hyperthermia conditions. Therefore, we have been exploiting the use of magnetic iron oxide nanocubes (IONCs) developed in our group, loaded or not with doxorubicin, to study their effect on CR-CSCs. We hypothesize that under the severe effect caused by the heat generated by the IONCs, which kills most of the cell population, quiescent CSCs will struggle to survive, thus starting to divide and being more susceptible to the action of the doxorubicin released from the nanocubes. The obtained results using this cell model revealed that the combined effect of doxorubicin and heat might lead to more efficient CSCs elimination, encouraging the use of such smart nanoplatforms for further studies.

BIOGRAPHY

Soraia Fernandes has received her PhD degree, in Natural Sciences from the University of Regensburg (Germany) and in Chemistry and Materials Science and Technologies from the University of Genoa (Italy), in 2016. She is currently a Postdoctoral associate in the research group of Dr. Teresa Pellegrino at the Italian Institute of Technology (Italy). Her research focus is the biological assessment of magnetic nanoparticles as heat mediators and/or drug delivery systems for the development of an effective treatment against cancer.

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