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MAGNETIC NANOCRYSTALS AND MAGNETIC HYPERTHERMIA TO TACKLE CANCER STEM CELLS

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The use of heat to reduce tumor mass is very ancient. Nowadays, there are several techniques that allow to precisely focalize the heat in very specific body regions resulting in treatments that are more efficient and minimize side effects. Magnetic nanoparticles can act as heat mediators under external magnetic activation in the so-called magnetic hyperthermia. The field of magnetic hyperthermia has received a renewed interest since the colloidal syntheses by non-hydrolytic methods have revealed several merits over conventional wet chemical hydrolytic processes in terms of controlled size, size distribution and crystallinity. All these parameters together with nanoparticles solubility and state of aggregation can affect structural and magnetic properties of nanomaterials and thus their heat performance. I will first focus on our recent progress on iron-based nanoparticles as heat mediators. Then, I will show our ongoing studies aiming at correlate heat effects on cancer stem cells. I will also report about *in vitro* hyperthermia experiments on primary tumor cells to relate nanoparticle geometry to changes of magnetic hyperthermia performances in tumor cell. Finally, I will show our preliminary *in vivo* studies performed with the aim to combine magnetic hyperthermia and heat-mediated drug release.

BIOGRAPHY

Teresa Pellegrino has received her PhD at the age of 30 years in Chemical synthesis and Nanoscience in 2005 from the University of Bari, Italy. Since 2014 she is tenured team leader of the group of "Nanomaterials for Biomedical Applications" at the Italian Institute of Technology, Genoa, Italy. Her current research interests focus on the development of inorganic nanostructures for drug delivery, magnetic hyperthermia, photo-thermal treatment and radiotherapy applications. She is coauthor of 112 publications in the field of nanoscience, nanomedicine and drug delivery systems that have been cited more than 10000 times, and her H-index is 44.

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