Type of presentation: Poster

**ID-1-P-1979 Correlative microscopy characterization of the interaction of magnetic nanoparticles with breast cancer cells by Soft X-ray tomography, epi-fluorescent optical and transmission electron microscopy.**

Chiappi M.1, Chichón F. J.1, Conesa J. J.1, Pereiro E.2, Rodríguez M. J.1, Carrascosa J. L.1,3


Email of the presenting author: jlcarras@cnb.csic.es

We have analyzed the internalization and accumulation of dimercaptosuccinic acid-coated superparamagnetic iron oxide nanoparticles (DMSA-SPIONs), with average diameter of 15 nm and negative surface charge, in MCF-7 breast cancer cells. Cells were incubated with 0.25 mg Fe ml-1 DMSA-SPIONs for different time intervals ranging from 0 to 24 h. Time-dependent uptake studies showed maximum accumulation of SPIONs after 24 h of incubation. Internalized SPIONs were localized in endosomes by acidotropic probe LysoTracker and classical TEM studies. After these preliminary studies, Soft X-ray (SX) cryo-tomography was used to characterize the distribution and topological arrangement of magnetic nanoparticles (DMSA-SPIONs) in MCF-7 cells, and to define the eventual reorganization of the intracellular environment caused by the incorporation of nanoparticles. X-ray cryo-tomographic reconstructions allowed us to visualize, at nanometric 3D resolution, the whole cell without chemical fixation or staining agents. Correlative microscopy was used to facilitate the localization of those cells containing nanoparticles accumulated in endosomes labeled by LysoTracker. Vitrified cells were prepared by plunge freezing and introduced in the Transmission Soft X-ray microscope for tilted series acquisition. Reconstructed volumes show the SPION-containing endosomal as very dense bodies which accumulate in the cell cytoplasm near the Golgi area close to the nucleus. This accumulation excludes from this area other organelles like mitochondria, which are displaced to the cellular periphery.

Acknowledgement: These experiments were performed at the Mistral beamline at ALBA Synchrotron Light Facility with the collaboration of ALBA staff. We acknowledge Dr. María del Puerto Morales for providing the SPIONS. This work was partly funded by Grant BFU2011-29038.
Fig. 1: SPIONS accumulation by correlative fluorescent optical and Soft-Xray microscopy. A and B) MCF7 cells without SPIONS. C and D) MCF7 cells incubated with SPIONS for 24 hours. Yellow arrows point to the LysoTracker accumulation correlating both optical and X-ray image respectively. N Mark the position of the nucleus.