Experimental Report

Exp. n. MD-403

"High resolution x-ray micro CT for 3D imaging of metastatic colon cancer"

Beamline ID19 – 3-4/5/2009 – Local Contact: P. Tafforeau

Experimental Team: F.Fiori, E.Girardin, B.Lonzi, A.Manescu, H.Nirvathi

An absorption X-ray micro-CT experiment was performed on several biopsies taken form variuos organs of mice in which metastatic human colon cancer cells (SW480), previuosly labeled by iron oxide nanoparticles (Endorem), were injected. Different times after injection (up to 14 days) were considered. The beam energy was seto to 20 KeV and 1500 projections were taken with an acquisition time of 0.2 s per projection. The resolution (pixel sixe) was set to 1.4 μm .

Altough the spreading of the matastasis in the different organs was previously observed by optical tecnhiques (bioluminescence imaging - BLI), X-ray micro-CT was not able to unambiguously identify the labeled tumor cells in the investigated samples. As an example, fig.1 shows the grey level histograms obtained from the kidney images, for 0 h (top) and 48 h (bottom) after tumor cell injection. No additional peak that can be linked to the presence of iron oxide nanoparticles is visible in the latter, and the same is observed for all of the investigated samples. The conclusions is that the number of originally injected labeled cells that reach the various organs is not sufficient to give a a sufficient iron oxide concentration and, as a consequence, a detectable absorption signal . Therefore, the next step in this research is to propose the use of X-ray microfluorescence, for example at the ID22 beamline, which in principle should be able to detected iron traces in the organs and to give a 2D or 3D visualization of its distribution.

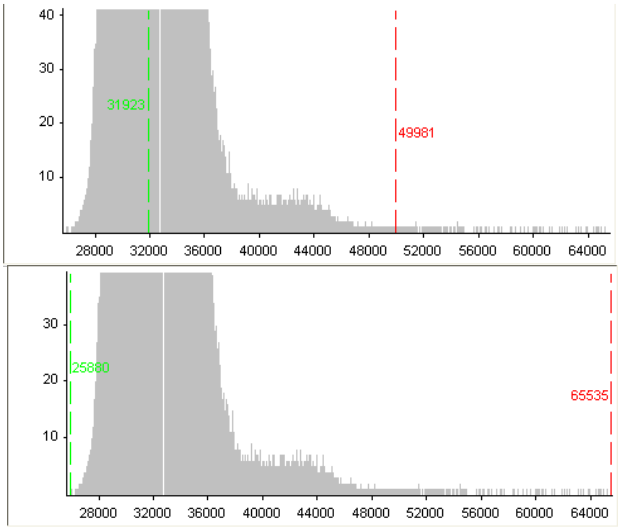

Fig.1 - grey level histograms obtained from the kidney images, for 0 h (top) and 48 h (bottom) after tumor cell injection.