



	Experiment title: High resolution imaging of normal and tumoral micro-vascular networks: impact of MRT at the capillary scale	Experiment number: MD-288
Beamline: 19	Date of experiment: from: 5/11/2001 to: 9/11/2001	Date of report: 01/2007
Shifts: 6	Local contact(s): P. Cloetens, Tim Weitkamp	<i>Received at ESRF:</i>
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Report:

The purpose of this proposal was to assess the impact of Micro-Beam Radiotherapy (MRT) treatment on the micro-vascular networks of implanted brain tumors. This project was first proposed in the form of a Long Term Project (LTP) in January 2007 and later on as a short term proposal in March 2007 after rejection of the LTP. Despite feeling a very high scientific interest for our LTP, the scientific committee raised the argument that there was a need for preliminary data to go to the further stage. Hence this short term proposal was an encouragement to make further progress in reliability procedures for sample preparation and post-treatment.

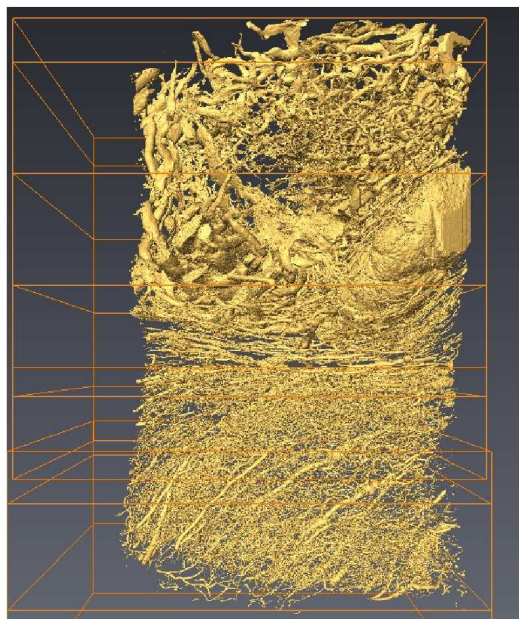


Fig1: Volume rendering of absorption images of a Baryum injected tumorous vessels.

The experimental session carried out in the beginning of November has given the full proof that our new sample preparation could handle ID19 beam source without damage or heating. In fact, rather than using hard Epoxy resin for the sample conditioning we now use a soft Poly-Ethylene-Glycol (PEG) polymer for the sample conservation. The question was then to assess whether or not this new conditioning could affect the imaging process and the quality of the resulting images. We neither experience bubble creation nor sample movement during the experiments. Furthermore, we have also changed the optical components of the system, now using the multilayer optic rather than single crystal monochromator. The consequence is a gain of a factor three in the total time for a sample image.

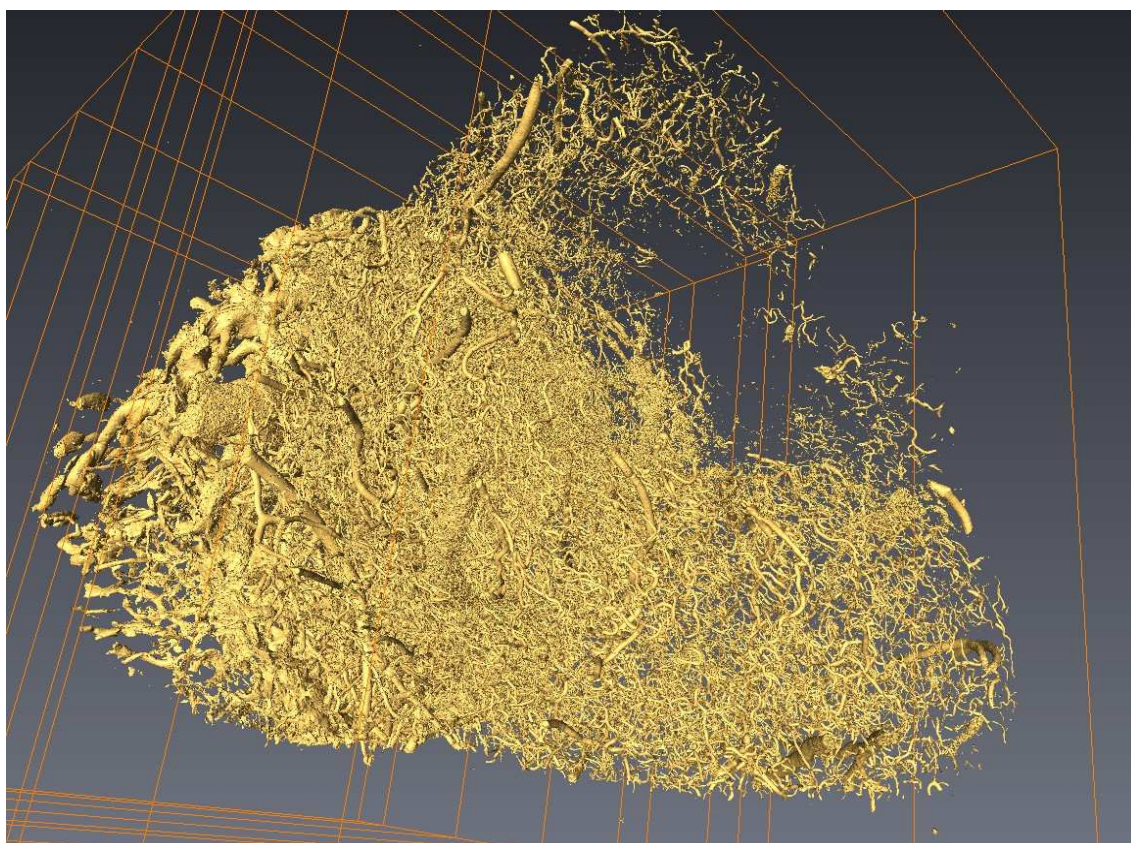


Fig. 2 : Zoom on the upper part of Fig. 1.

Hence we now have the proof that the imaging protocol is now fully compatible with our new sample preparation with furthermore faster imaging procedure. During the three days of the experiment we have been able to make 170 different scans. This renders possible a systematic investigation of micro-vascularization of almost one centimeter along the z direction, which is interesting in the context of implanted tumors whose size can be as large as 8 millimeter long. We now proceed to the analysis on the resulting images which now give promising evidence of a systematic 3D quantification of the MRT impact at the capillary scale. The advantage of our imaging protocol is an investigation of functional tumoral vessels as illustrated on Fig. 1 where the lower part corresponds to healthy vascular networks, whereas the upper part are tumorous vessels. We clearly distinguish in this upper zone important leakage zone which can be attributable to MRT treatment. The quantitative analysis of these images and their comparison with histological analysis is now under process.