



	Experiment title: Charcterization of osteosarcoma resected human tissue by using high resolution X ray microdiffraction	Experiment number: LS 2996
Beamline: ID 13	Date of experiment: from: 17/02/22 to:21/02/22	Date of report: 10/09/22 <i>Received at ESRF:</i>
Shifts: 12	Local contact(s): Jiliang Liu	
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Report:

The aim of this proposal was to assess the bone quality of osteosarcoma resected human tissue, by using x-ray scanning micro-diffraction at a spatial resolution down to 1 um. This allowed to visualise and evaluate the bone microarchitecture, bone mineral platelets and collagen fibrils of osteosarcoma (OS) tissue. The bone microarchitectures and bone quality of OS will be compared with the healthy control bone and with histological data of the same subject. Due to its rarity, osteosarcoma is still lacking a reliable and precise characterization of the bone quality morphology as well as microarchitecture information at the micron scale. The results of this proposal will help to tackle this gap and will get a better understanding of bone quality, microarchitecture changes in OS tissue and to translate this knowledge into: i) pre-clinical research, ii) therapeutic strategy and iii) eventually clinical practice.

Three subjects affected by OS were be enrolled at Istituto Ortopedico Rizzoli (Bologna, Italy) after Ethical Committee approval and signed consent by the patient. Tissues affected by OS and healthy tissues were identified by a pathologist with certified experience in OS. The tumor after resection was sent to the pathologists at Istituto Ortopedico Rizzoli for diagnostic purposes. In this study, approximately 1 cm³ of sclerotic bone has been harvested from the area affected by the tumor as well as from healthy tissue from the same patient. The sample has been sectioned in different thin slices (50 micron). One of these sections was colored with Haematoxylin and Eosin for histology (Figure 1, left panel) and another section has been analyzed by x-ray micro-diffraction.

Scattering maps have highlighted the variety of bone tissue morphology according to the kind of Osteosarcoma and SAXS-WAXS spectra acquired from different bone regions have pointed out bone quality (Figure 1, central

and right panes). Interestingly, both control and osteosarcoma tissues show peaks corresponding to Hydroxyapatite whereas collagen peaks can be easily distinguished only in controls. These preliminary data suggest a different composition of bone tissue being the OS bone tissue more crystalline with respect to controls that appear to be more dynamic because of collagen presence. The data acquired still need to be further process, but these initial observation give an interesting overview of OS lesions.

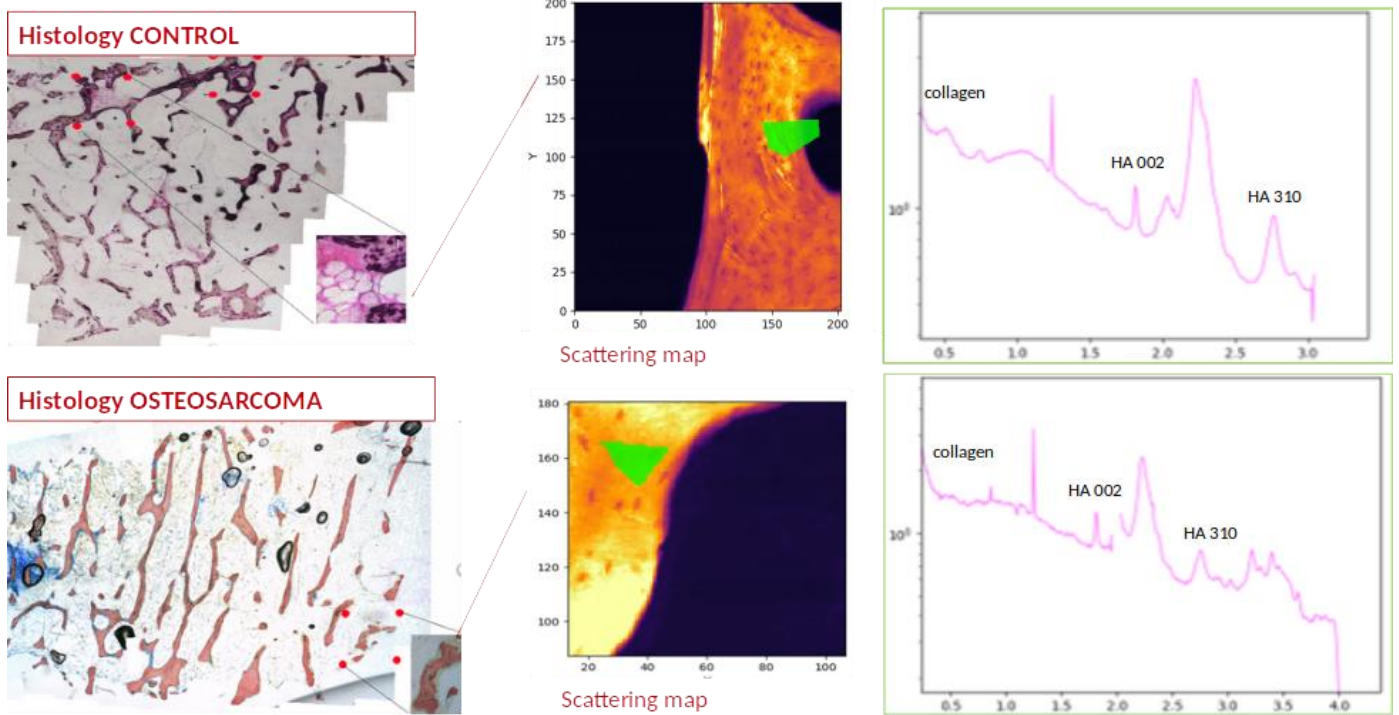


Figure 1: From left to right: histologies of control and osteosarcoma bone samples. Center: scattering map of healthy and control bone. Right: SAXS and WAXS spectra from the green regio in the scattering map.

