ESRF	**Experiment title:** The determination of iron, cooper and zinc oxidation state in tissues and fluids from ovarian cancers in relation to different type od ovarian tumour using XAS	**Experiment number**: MD 1119
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Names and affiliations of applicants (* indicates experimentalists):

M. Lankosz[1]*, P. Wrobel[1]*, M. Grzelak [1]*, L. Furman[1]*, D. Adamek[2], L. Chmura[2], R. Jach[3]

[1] AGH-University of Science and Technology, Faculty of Physics and Applied Computer Science, al. Mickiewicza 30, 30-059 Krakow, Poland

[2] Department of Pathomorphology, Collegium Medicum, Jagiellonian University, Krakow, Poland

[3] Department of Gynecology and Obstetrics, Collegium Medicum, Jagiellonian University, Krakow, Poland

Report:

Experimental report

The ovarian tumors were obtained intraoperatively from patients with requiring surgical intervention. The tumor tissues were harvested in pairs with the aspirated fluids from a corresponding cysts. The specimens intended for the histological examination were cryosectioned and stained with the hematoxylin-eosin. This enabled to determine the type of the tumors that were analyzed. The remaining ovarian tissues were used to prepare the samples of about 100 mg that were cut and placed in the specially prepared PEEK measurement containers and encapsulated with the X-ray-transparent Ultralene foil. Also about 10 µl of the cystic fluids were disposed in the same type of containers. The samples were then immediately frozen at -180˚C to minimize the biological and the chemical processes, e.g., oxidation. The tissues and cystic fluids came from mucinous cystadenoma, teratoma, fibrotecoma, atypical proliferative mucinous tumour, metastatic signetring cell carcinoma of stomach and three controls samples. For the XANES analysis: hemoglobin, myoglobin, $Fe_2(SO_4)_3 \cdot nH_2O$, $FeSO_4 \cdot 7H_2O$ and Fe_2O_3were used as references. The beam was monochromated with a Si(111) monochromator. The beam spot size was 3x3 mm^2. The fluorescence radiation was detected with a 12 section Si(Li) detector. The samples were measured in a vacuum with the use LHe open flow cryostat at the temperature 70 K. In order to collect the Fe-K edge XANES spectra the photon energy was changed in range from 6,900 keV to 7,450 keV. The time of the measurement was 15 s or 20 s per step. In our investigations 9 samples of tissues were measured. The background was subtracted from the spectra, and then the spectra were normalized by use of the Athena program from the IFEFFIT package.

The Fe-K XANES spectra obtained for the references, malignant tissue, benign tissue and for the control tissues are shown in Figure 1. The position of the Fe K-edge for presented samples, suggests that they contain both chemical form of iron, however substantial is fraction of iron on the third oxidation state. The shape of the Fe K-edge for malignant and benign specimens is similar with the Fe K-edge for the hemoglobin, instead the shape of the Fe K-edge for control tissues is similar with reference material containing iron on third oxidation state. The measurements indicated, that BM25 end station is suitable for

Fe-K cryoXANES analysis of ovarian tumor tissues. The aim of the experiment has been achieved. The data are sufficient for publication, however additional information about oxidation states of Cu and Zn are necessary in order to evaluate the mechanism that drives the enlargement of cyst by accumulation only of liquid or semiliquid substance inside. We are expecting that ESRF staff will be included as co-author of our future publication.

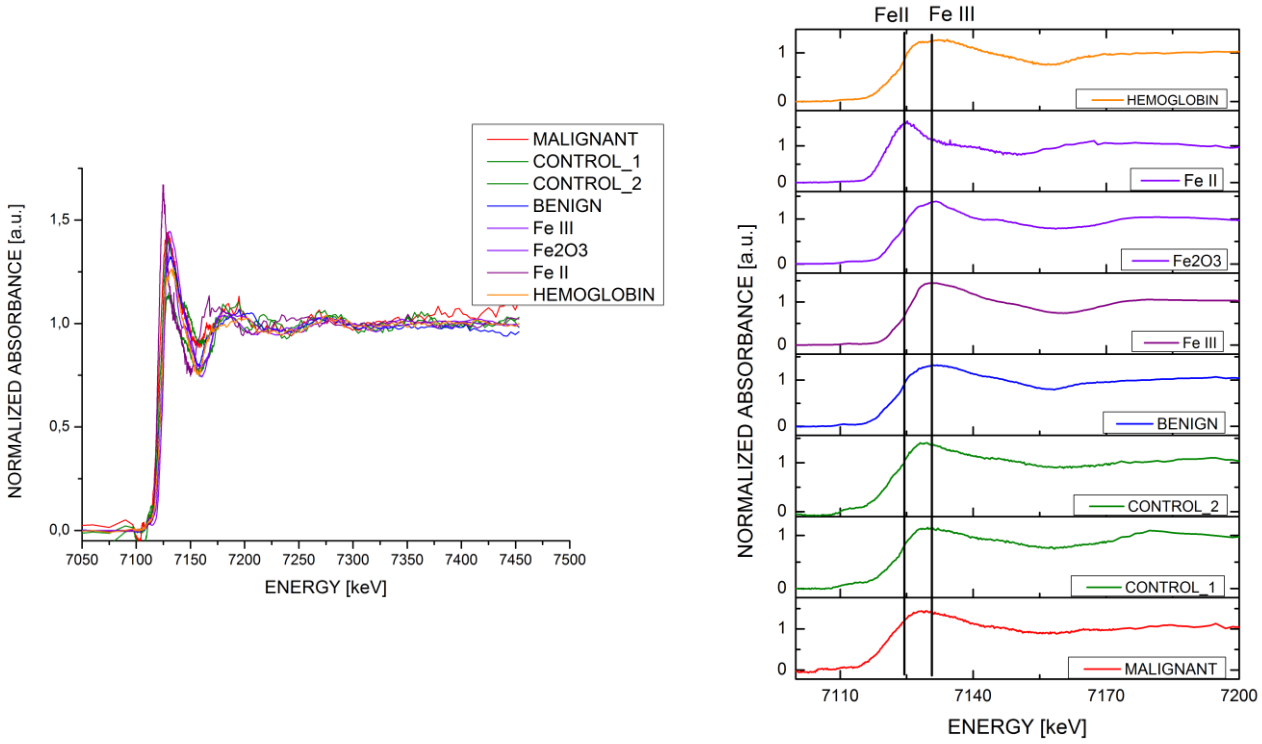

Figure 1. Comparison of the Fe K-edge XANES spectra obtained for tissues and (malignant, benign, control) and for the reference materials.

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