

Iron oxidation state as a potential indicator of ovarian cancer tumour.

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Introduction

The ovarian surface epithelial tumours are a heterogenic group of neoplasms in which a wide spectrum of clinical behaviour can be observed. The histopathological scope of these tumours range from benign cystic tumours up to malignant high grade carcinomas. The aim of this study was to check if iron oxidation state in tissue and cyst fluid can be treated as an indicator of the malignancy of the ovarian tumours.

Methods

The ovarian tumors and fluids from a corresponding cysts were taken intraoperatively from patients with requiring surgical intervention. The specimens intended for the histological examination were cryo-sectioned and stained with the hematoxylin-eosin. Fe XANES spectra were collected at selected points of few different region of the samples. For each specimen an average of this points were probed. As the standards for XANES analysis: transferrin, hemoglobin, myoglobin, ferritin, $\text{Fe}_2(\text{SO}_4)_3 \cdot n\text{H}_2\text{O}$, $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$ and Fe_2O_3 were used. The X-ray Absorption Spectroscopy (XANES) measurements were performed at the beamline P65 at Petra III Extension, DESY – Deutsches Elektronen - Synchrotron. The monochromatic beam was achieved by use of the Si(111) monochromator. The final beam spot size was $1 \times 0,5 \text{ mm}^2$. The fluorescence radiation was detected with a 7 section HPGGe detector. The samples were measured with the use liquid helium open flow cryostat at the temperature about 19 K. The time of the measurement was 2 s per step.

Results and discussion

Analysis using the program Athena (IFEFIT package) revealed that the iron oxidation state in the studied samples was between 2+ and 3+. For tissue and corresponding cyst fluids, for this same sample, the shift of the absorption edge can be observed. The results will be presented and discussed on a poster.

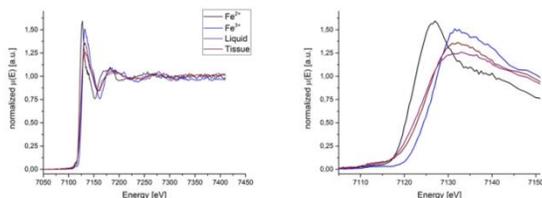


Figure 1 Comparison of the Fe K-edge XANES spectra obtained for tissue and fluid from cyst (borderline serous tumour) and for the reference materials.

Conclusion

The position of Fe K-edge suggests that cystic fluids and cancer tissue contain both chemical forms of Iron (Fe^{2+} and Fe^{3+}). However a substantial is fraction of iron on the third oxidation state. The shape of first derivative of Fe XANES spectra for fluids and transferrin are similar - transferrin seems to play a role in accumulation of the iron in cysts fluid.

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