

Vascular network investigation by X-ray microtomography

Thursday, 12 September 2019 14:45 (20 minutes)

Carcinogenesis is a process providing cell DNA changes. As a consequence, cells begin to divide rapidly. The cancerous tissue growth requires an increased supply of nutrients and oxygen therefore the tumor needs to produce its own irregular blood vessels network. Combating pathological angiogenesis is one of the basic strategies of anticancer therapy.

There are a few methods capable of visualizing and analyzing vascular network. Some of the methods, such as histology, are destructive, others, like magnetic resonance imaging (MRI), does not produce images with sufficient resolution. X-ray microtomography (microCT) is a well-established nondestructive method for 3D imaging and analysis of small samples. As a result, micro-CT obtains spatial distribution of X-ray linear attenuation coefficient within the sample.

Unfortunately, the difference in linear attenuation coefficient between blood in the vessels and surrounding soft tissues is nondetectable with „raw micro-CT”. There are several ways to improve vessels visibility in micro-CT image, for example staining or perfusion.

This presentation will provide an overview of vessels visualization and analysis methods with examples, performed in Micro-CT Lab of Medical Physics department at Jagiellonian University [1,2].

References

- [1] Leszczyński, B., Sojka-Leszczynska, P., Wojtysiak, D., Wróbel, A. and Pędrys, R. (2018). Visualization of porcine eye anatomy by X-ray microtomography. *Experimental Eye Research*, 167, pp.51-55.
- [2] Leszczyński, B., Śniegocka, M., Wróbel, A., Pędrys, R., Szczygieł, M., Romanowska-Dixon, B., Urbańska, K. and Elas, M. (2018). Visualization and Quantitative 3D Analysis of Intraocular Melanoma and Its Vascularization in a Hamster Eye. *International Journal of Molecular Sciences*, 19(2), p.332.

Collaboration

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Session Classification: Boron Neutron Capture Therapy