NOVEL MICROSCOPY METHODS OF MEDICAL IMAGING

W.M. Kwiatek [1*], **M. Podgórczyk** [1], **C. Paluszkiewicz** [2], **M. Gajda** [3], **Z. Stachura** [1], **M. Lekka** [1], **J. Lekki** [1], **M. Piccinini** [4], **and D. Grolimund** [5]

[1] *Institute of Nuclear Physics PAN, ul.Radzikowskiego 152, 31-342 Kraków, Poland*
[2] *AGH University of Science and Technology, Al. Mickiewicza 30, 30-059 Kraków, Poland*
[3] *Chair of Histology Collegium Medicum, Jagiellonian University, ul. Kopernika 7, 30-059 Kraków, Poland*
[4] *INFN - Laboratori Nazionali di Frascati, Via E. Fermi 40, I-00044 Frascati, Italy*
[5] *Swiss Light Source, Paul Scherrer Institut, 5232 Villingen PSI, Switzerland*

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*) e-mail: Wojciech.Kwiatek@ifj.edu.pl

Nowdays, the proper diagnosis requires medical imaging at scales ranging from single molecules through cells, tissues, organs, and up to whole body. Traditionally used optical microscopy and some other commonly used techniques quite often become insufficient for accurate diagnostics. Combining different imaging techniques may deliver complementary information from a sample, providing a combination of analytical performance that could enhance the accuracy of diagnosis and thus the quality of prognosis and possibly the speed of it.

Imaging technologies in different scientific areas have been rapidly developing in last decades, requiring higher and higher level of skills and knowledge. This puts medical specialists in a situation of continuous challenge to stay at the cutting edge of the technology already available to help patients timely and efficiently. Such a situation is obviously connected with synchrotron radiation based techniques.

SR-XRF (Synchrotron Radiation-X-ray Fluorescence), XANES (Xray Absorption Near Edge Structure), SR-FTIR (Synchrotron Radiation – Fourier Transform InfraRed), micro-spectroscopy techniques as well as phase contrast microscopy, computer tomography, or a family of scanning probe microscopes (STM, NSOM, AFM…), give new opportunities of medical imaging.

Figure 1 presents the application of SR-XRF Zn distribution within tissue section [1] while Figure 2 shows an example of SR-FTIR image of the prostate cancerous tissue. A closer look at the results permitted to distinguish between the healthy, cancerous and hyperplastic parts of the tissue.

The examples of some other applications will be presented and discussed in terms of complementarities and opportunities.

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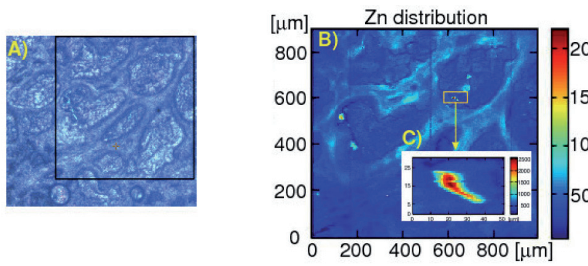

(A) (B)

Figure 1. (A) Histological view of prostate tissue section, (B) Zn Distribution over the marked section, (C) High resolution 2D scan of Zn distribution over the "hot spot" [1].

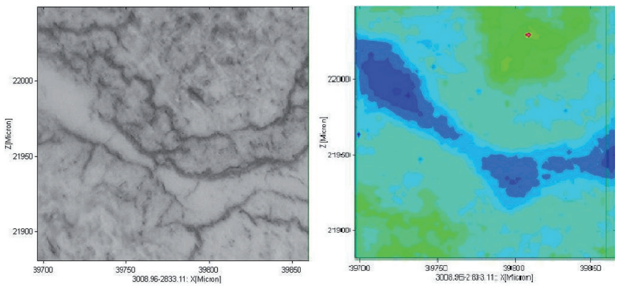

Figure 2. Histological view of prostate cancerous tissue (left), 2D distribution of CH_2/CH_3 intensity ratio (right).

References

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