

Elemental imaging at micro and nanoscale in toxicology research: from occupational diseases to reproductive medicine

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X-ray microscopy and microanalyses are excellent probes for the detection of biologically relevant metals as well as exogenous elements in single cells and tissues. When operated at third generation synchrotron facilities, the techniques allow a detection sensitivity adequate to perform clinical analyses, while the high spatial resolution of microprobes enables exploring subcellular interactions.

This presentation will describe some medical researches that are taking great advantage from micro and nano X-ray probes, correlating analyses at different incidental energies or under different experimental set-ups, combining complementary spatial resolutions.

Important achievements have been reached in the field of occupational diseases, such as the asbestos related ones, when analyzing human lung tissues of exposed subjects from an endemic area (obtained from the archives of the hospital of Trieste University). The analyses performed at four beamlines, involving three synchrotron facilities, revealed important details of the tissue and cell response to asbestos fibers.

A new application, that will be presented, is for the evaluation of the cryo-damage in cryo-conserved human ovarian tissues, when attempting to preserve female fertility in cancer patients and setting the best protocols.

Our testimony indicates that X-Ray microscopy and microanalyses are becoming powerful biomedical techniques with increasing applicability in clinical tasks.

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