

## Department of Physical Methods [1]

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The Department of Physical Methods of the Holy Cross Cancer Centre performs routine tests:

- in cooperation with the Department of Laboratory Diagnostics of the Holy Cross Cancer Centre: measurements of trace elements in human biological material (serum, urine, hair, cancer tissue) in patients with various medical conditions,

- in cooperation with the Department of Nuclear Medicine with the PET Unit: measurements of the concentration of trace elements in samples of effluent from the Tc / Mo and Ge / Ga generators.

The determination of the concentration of trace elements in human biological material may be helpful:

- as a subsidiary examination in the diagnosis of cancer
- in cases of suspected poisoning (toxicology),
- in the monitoring of persons occupationally exposed to a given element,
- in the monitoring of environmental diseases.

We also conduct research using X-ray tomography (XCT), a test method which allows for visualization of the internal structure of a variety of three-dimensional objects (bones, tissues, animal organisms) without the need for additional preparation. The measurements are performed with the use of the ultramodern X-ray scanner which allows for the reconstruction and analysis of the internal structures of objects and bodies with spatial resolution of 5?m which corresponds to a volume of approx. 10-7mm<sup>3</sup>.

We also analyze materials using X-ray diffraction (XRD). The method is mostly applied for analyzing metals and their alloys (e.g. for the construction of prostheses) and pharmaceuticals (drugs patents, the identification of counterfeit drugs and generics).

### **Equipment:**

Measurements are made by X-ray fluorescence analysis of total reflection of the incident beam (TXRF) and by means of modern spectrometer using the method of X-ray fluorescence analysis of the wavelength dispersion (WDXRF). Both of these methods (TXRF and WDXRF) allow simultaneous measurement of the concentration of many elements (from aluminum to uranium for TXRF and oxygen to uranium for WDXRF).

### **Research and scientific publications**

The Department of Physical Methods conducts research on the use of methods of atomic physics and nuclear medical diagnostics. The main objective of the research is to examine correlations between the content of elements in human tissues and medical condition of the patient (especially the type and severity of cancer). More information - see Section Science.

Centrum

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