

Principles of diagnostic imaging methods

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Checked version of the article can be found here (https://www.wikilectures.eu/index.php?title=Principles_of_diagnostic_imaging_methods&oldid=338949).

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Basic principles

- **The transmission principle:** a source of radiation from one side of the patient, on the other side a detector that detects the weakening of the radiation. Uses X-ray, CT.
- **Emission principle:** the radiation source is inside the patient, the detector is outside the patient. Used by nuclear medicine, thermography.
- **The reflective principle:** source outside the patient, reflected waves are detected. Uses UZ.
- **Principle of resonant absorption and emission.** Uses MRI.

For more information see *Principle of Magnetic Resonance Tomography*.

Static and dynamic methods

- **Static methods:** emphasis on morphology, contrast and spatial resolution.
- **Dynamic methods:** emphasis on function, time resolution.

Physical modalities

Diagnostic imaging methods use several different physical modalities to image organs and tissues. The basic methods used in diagnosis include:

- ionizing radiation, especially X-rays: fluoroscopy, CT,
- behavior of substances in a magnetic field (relaxation time T1, T2 and proton density – PD): MRI,
- acoustic properties of tissues (acoustic impedance): ultrasonography,
- radioactive decay of radionuclides with the emission of ionizing radiation (γ radiation): nuclear medicine methods - SPECT, PET,

Other physical modalities are also used at the experimental level. These include, for example:

- tissue elasticity (Young's modulus of elasticity): elastography,
- visible light (<https://cs.wikipedia.org/wiki/Sv%C4%9Btlo>): e.g. laser-CT – breast vascularisation examination, OCT (*Optical Coherence Tomography*) – eye examination,
- infrared radiation: thermography, NIRS (*Near InfraRed Spectroscopy*) tomography,
- microwaves: microwave tomography - breast examination,
- electrical impedance: EIT (*Electrical Impedance Tomography*).

General principles

- ALARA principle: As Low As Reasonably Achievable – the dose of ionizing radiation should be as low as reasonably achievable.

Links

External links

- Images at atlas.mudr.org (<http://atlas.mudr.org/Modality>) sorted by modality
- Lukáš Mikšík: Radiology (<http://www.stefajir.cz/files/RadioOt.doc>)

References

- Jaromír Šrámek: Unconventional alternatives to mammography (presentation, 2010) (<https://www.med.muni.cz/biofyz/doc/NMgr/nekonvenčni.pdf>)



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