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).

See also comparation of actual and checked version (https://www.wikilectures.eu/index.php?title=Principles_of_diagnostic_imaging_methods&diff=-&oldid=338949).

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, 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/nekonvencni.pdf)

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