



# Introduction to Medical Imaging

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## Medical imaging

... is the technique and process of creating visual representations of the interior of a body for clinical analysis and medical intervention, as well as visual representation of the function of some organs or tissues.

... seeks

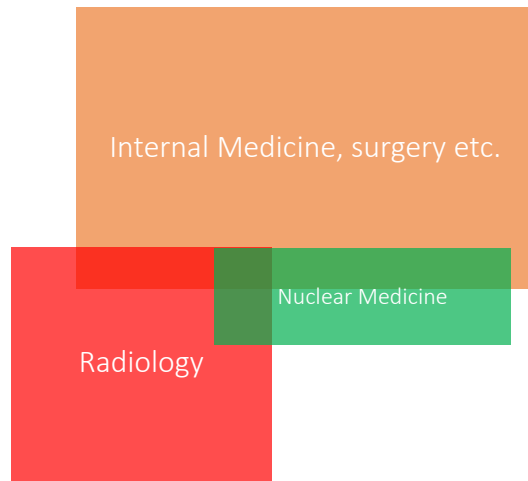
- to reveal internal structures hidden by the skin and bones, as well as to diagnose and treat disease.
- establishes a database of normal anatomy and physiology to make it possible to identify abnormalities.

[https://en.wikipedia.org/wiki/Medical\\_imaging](https://en.wikipedia.org/wiki/Medical_imaging)

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## Medical imaging – Major Modalities

- Endoscopy
- Ultrasound
- X-ray
- Angiography
- CT
- MRI
- Gamma camera
- SPECT und PET
- Hybrid imaging



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## Endoscopy - Indications

- Colonoscopy
  - Colorectal polyps
- Bronchoskopy
  - Biopsy
  - Foreign objects
- Cystoscopy
  - Stenosis
  - Biopsy
- Laryngoscopy
- Minimal invasive surgery

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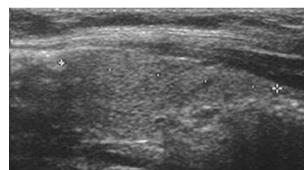
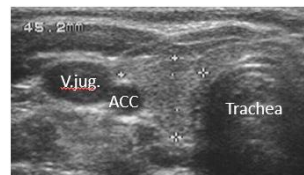
## Ultrasound

- Production of soundwaves using Piezo-electric crystals
- Reception of the resulting echos in the same detector
- Uses soundwaves and no ionising radiation

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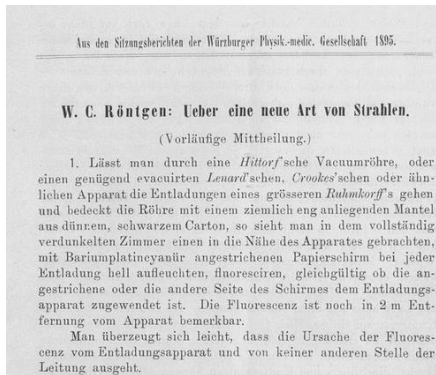
## Ultrasound - Indications

- Gynaecology
  - Prenatal screening
  - Transvaginal US
- Abdomen
  - Assessment of liver, gallbladder, kidney, pancreas, spleen etc.
- Thyroid
  - Detection of nodules
- Angiology
  - Deep vein thrombosis



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## 1895 – looking inside the body



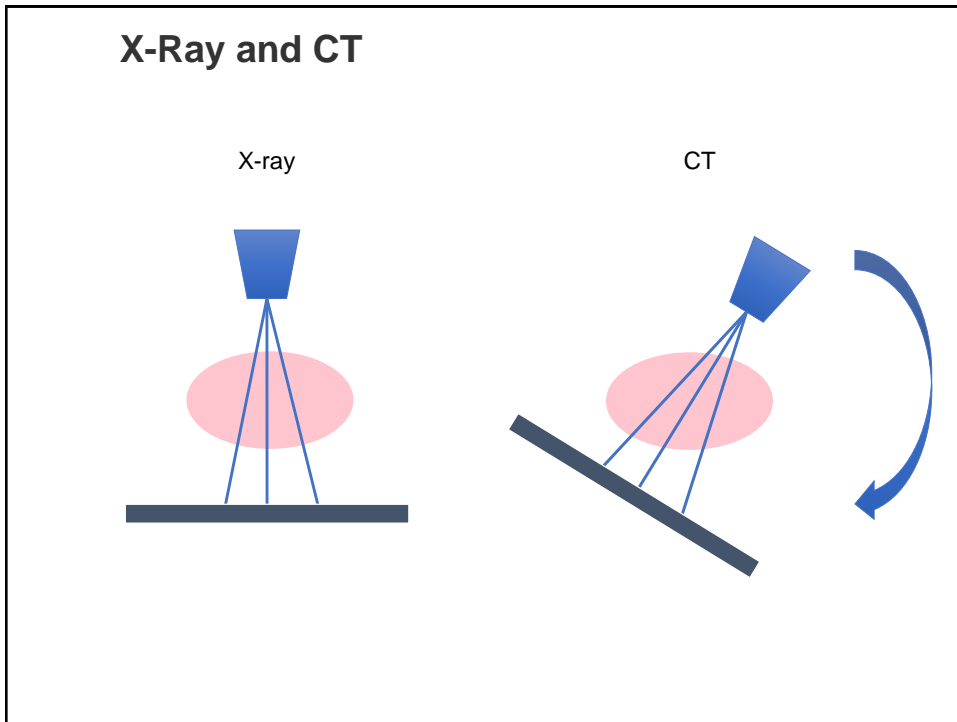
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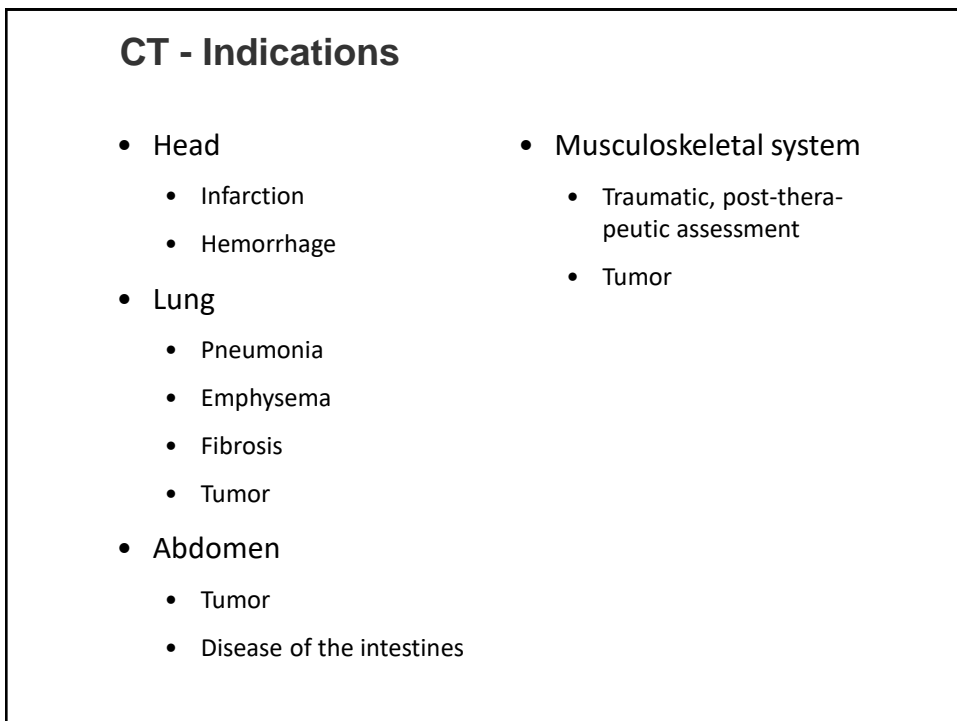
## X-ray - Indications

- Chest
  - Pneumonia
  - Pleural effusion
  - Pneumothorax
  - Rough assessment of heart and vessels
  - Foreign body
- Abdomen
  - Ileus
  - Free gas
  - Kidney stone
- Bone (fracture)

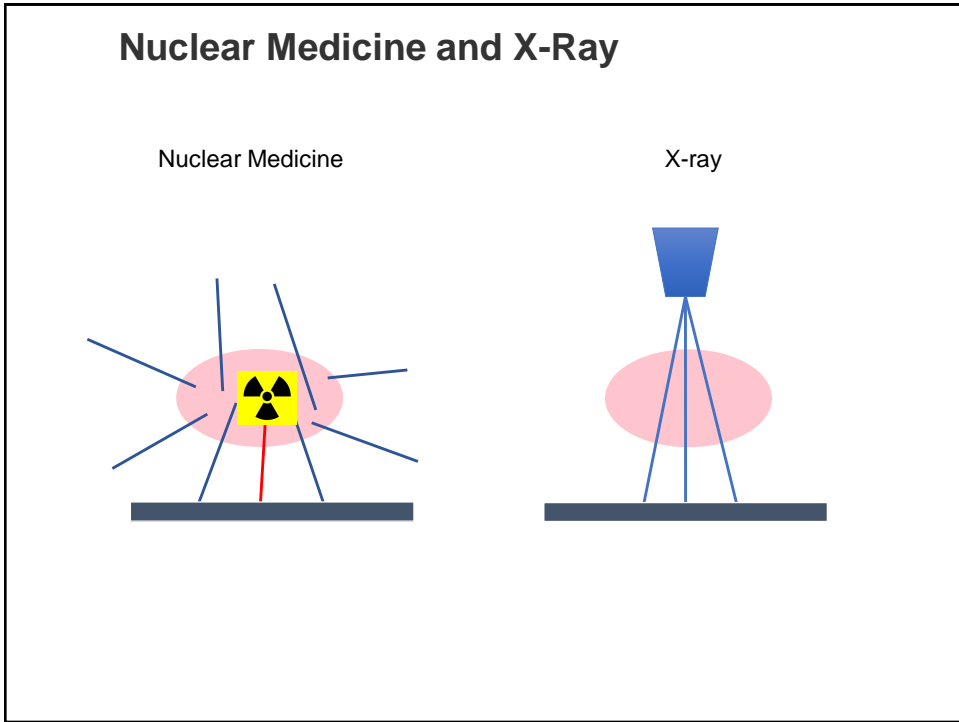
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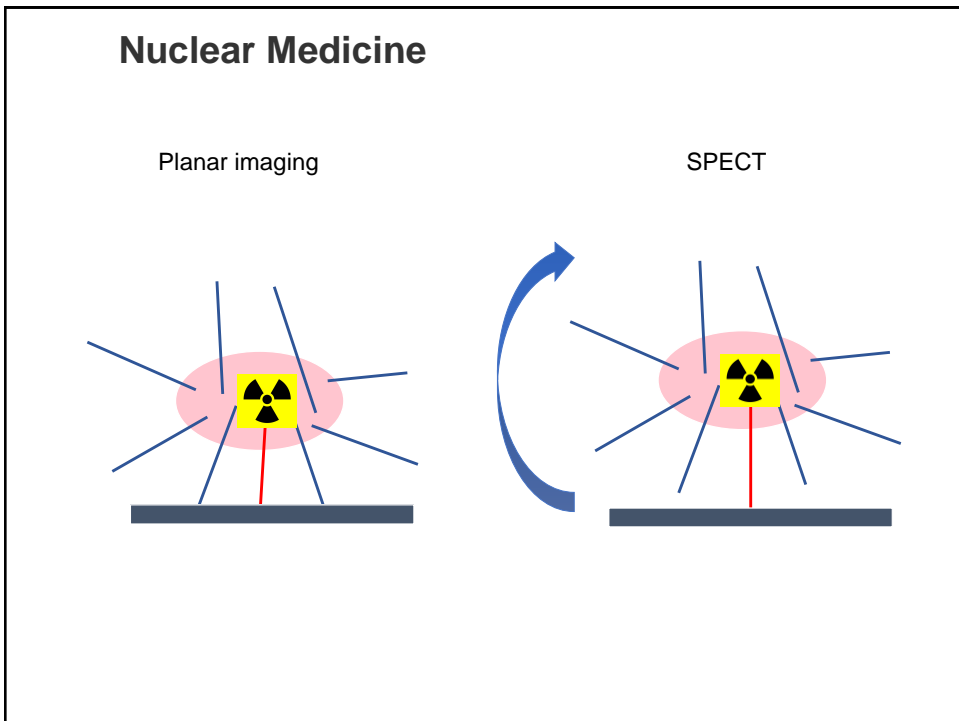
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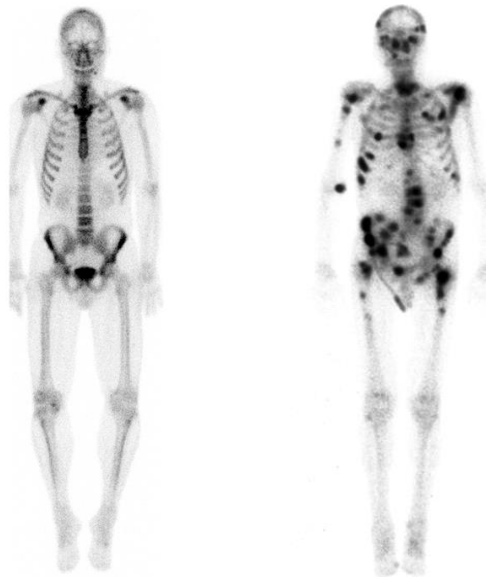
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## Scintigraphy (and SPECT) - Indications

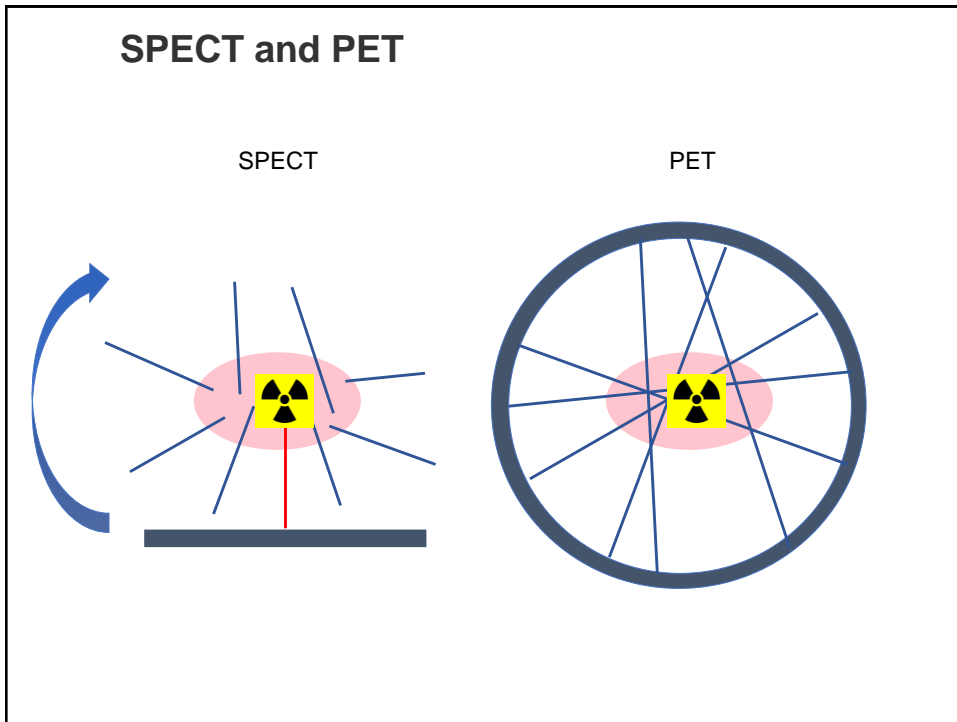
- Thyroid
  - Nodules
  - Autonomy
- Heart
  - Ischemia
- Lung
  - Perfusion, pulmonary embolism
- Kidney
  - Obstruction
- Musculoskeletal system
  - Arthritis
  - Bone metastases

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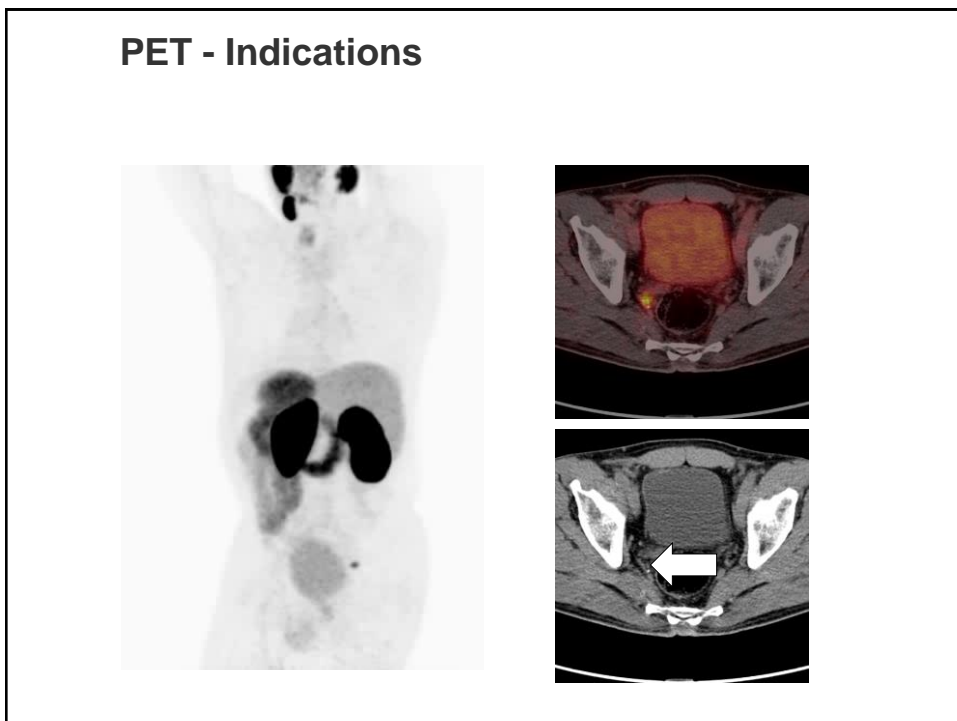
## Scintigraphy (and SPECT) - Indications



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## **MRI**

- Alteration of spin using strong magnetic fields
- Detection of return to normal spin
- Very good tissue contrast
- No ionising radiation

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## **MRI - Indications**

- Head / Neuroimaging
  - Tumor
  - Demyelinating diseases
  - Epilepsy
- Abdomen
  - Liver, pancreas, MRCP
- Pelvis
  - Tumor
  - Treatment planning
- Musculoskeletal system
  - Multiple....

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## Summary

Internal Medicine, surgery etc.

Radiology

Nuclear Medicine

You are here!

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