

Introduction to Radiology

The imaging modalities

X-Rays or Plain Films

Fluoroscopy

Angiography

Computed Tomography (CT)

Magnetic Resonance (MR)

Ultrasound (US)

Nuclear Medicine

(PET or Bone Scan)

Ionizing Radiation

Magnetic Field and
Radiofrequency Pulses

Sound waves (Echos)

Ionizing Radiation

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Best Spatial Resolution
Good for High-contrast Structures

Best Soft Tissue
Contrast Resolution

Best used with soft tissue and fluid

Best for physiologic imaging

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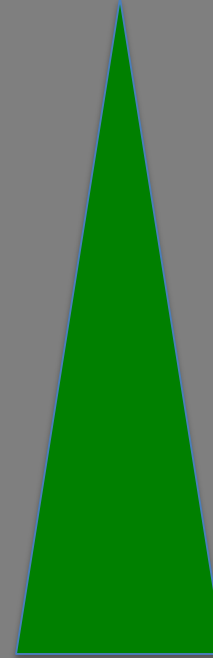
Magnetic Resonance (MR)

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Best Spatial Resolution



Worst Spatial Resolution

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Transmission technique: Source of energy is outside the patient, passes through the patient, and is then captured to make the image

Emission technique: Energy source is a radiotracer injected into the patient; energy emitted from the patient is captured to make the image

Rad Modalities: a summary

Modality	Good for	Not good for
X-ray	Heart, lungs, bowel w/ air	Soft tissues
Fluoro	GI investigations	Anything outside the investigated tract
Angiography	Vessels + interventions	Anything outside the investigated vessel
CT	Most body parts	Soft tissues with little change in density
MR	Soft tissues, young/pregnant	Lungs; anything with metal; BEWARE OF MAGNET
US	Fluid-filled structures, superficial parts, young/pregnant	Lungs, air, lots of fat, bones
Nuclear Medicine	Functional imaging; whatever the specific target of the study is	Small objects; anything other than the specific target of the study

Rad Modalities: a summary

Which is the best modality?

“It depends on what you mean by ‘best’.”

Modality	Spatial resolution	Soft tissue contrast	Radiation	Speed	Cost
X-ray	Excellent	Poor	Low	Fast	Low
Fluoro	Good	Poor	High	Fast	Medium
Angiography	Good	Poor	High	Fast	High
CT	Good	Good	High	Fast	High
MR	Fair	Excellent	None	Slow	Very high
US	Fair	Good	None	Medium	Low to medium
Nuclear Medicine	Poor	Variable	High	Slow	Variable (medium to very high)