Major Imaging Modalities Every Medical Student Should Know

	How does it work? (the basics)	What am I looking at?	What is it useful for?	What are its risks/limitations?
X-Ray	Electromagnetic rays that pass through the body to a stationary x-ray detector	**Whiter** (absorbed rays): fat, water, bones **Darker** (rays pass freely): air/gas	Bone visualization, tube/catheter placement, accumulation of air	**Limitations**: soft tissue details **Risks**: radiation exposure (~0.1mSv)
Computed tomography (CT) scan	Series of x-ray images from different angles to make a 3D picture	**HypoDENSE (whiter):** minerals-think bone, blood, fat **HyperDENSE (darker)**: gas/air	trauma "pan-scans", stroke, soft tissue pathology (think: appendicitis, kidney stones, PE, etc.)	**Risks**: radiation exposure (~7mSv), contrast exposure (iodine)
Magnetic resonance imaging (MRI)	Images generated from magnetic field and computer generated radio waves (think big rotating magnets moving H+)	**HyperINTENSE (whiter)-T1** fat, white brain matter **HypoINTENSE (darker)- T1** bone, ligaments, air, *WATER* **HyperINTENSE (whiter)-T2** fat, white brain matter, *WATER* **HypoINTENSE (darker)- T2** bone, ligaments, air	Soft tissue infections or tumor, bone infections, spine pathology, breast	**Limitations**: contraindicated for people with metal hardware **Risks**: contrast exposure (gadolinium)
Positron Emission Tomography (PET)	Radioactive tracer (fluorodeoxyglucose) lights up areas of high metabolic activity	Increased metabolic activity shows up brighter **What is physiologically bright?** brain, GU system, lactating breasts, salivary glands	Identification of tumors, monitor of spread and treatment response, and identifying unhealthy tissue (heart disease, dementia, etc.)	**Limitations**: identifying cancers in areas of physiologic high metabolic activity
Ultrasound	Stay tuned for a special episode all about ultrasound in season 2!			

Information sourced from radiopedia and UpToDate