MRI Sequences

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Sequences T1

T1 is for anatomy

Gray matter is gray

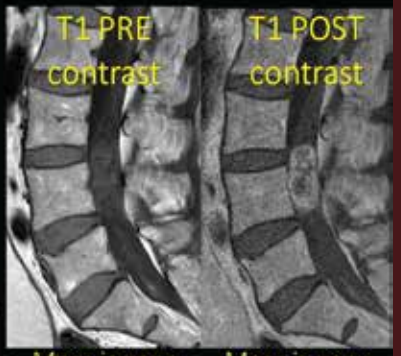
White matter is white

Because it's anatomic—
White is White and Gray is Gray

Sequences T1

T1 is also for contrast

Contrast is to look for mass lesions



Mass is very hard to see

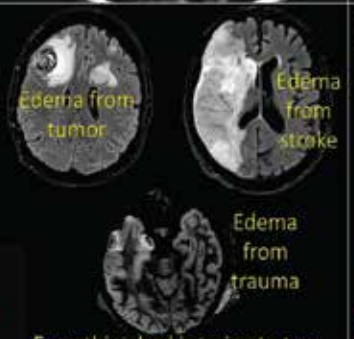
Mass is very hard NOT to see

Sequences T2

T2 is for water

What is pathologic water in the brain?

EDEMA

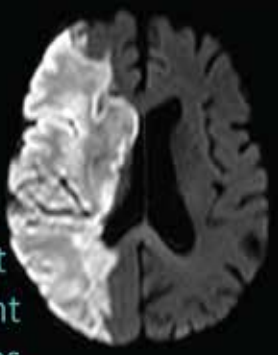


Everything bad is trying to turn your brain back into what it came from--WATER

Sequences DWI

DWI is for stroke

Acute strokes are bright on DWI--but not all bright things on DWI are strokes



Sequences Gradient

Gradient imaging is for metal

What is the most important metal in the body?

IRON = BLOOD

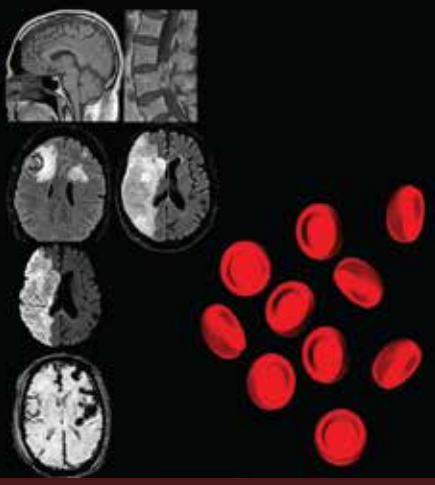
Review

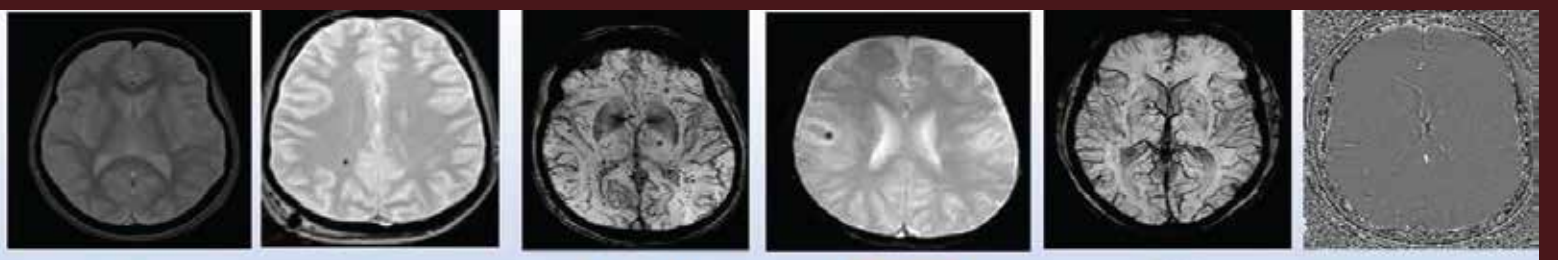
T1 is for ANATOMY and CONTRAST

T2 is for WATER and EDEMA

DWI is for STROKE

GRADIENT is for BLOOD





T2*	GRE	FFE	SWAN	SWI	Phase imaging
T2* Basis for SWI, SWAN & GRE sequences. Represents the effective transverse relaxation time, incorporating both T2 decay and susceptibility effects. Emphasizes inhomogeneities in the magnetic field, enhancing sensitivity to deoxygenated blood, iron, or air. The basis of GRE sequences, particularly in detecting susceptibility-related changes.	GRE (Gradient Recalled Echo): General-purpose sequence for creating T2* effects Good for detecting hemorrhages, calcifications, and air interfaces T2* effects dominate, creating signal loss in areas with field inhomogeneities (e.g., blood or air interfaces) Moderate sensitivity compared to SWI or SWAN	FFE (Fast Field Echo): Proprietary Philips' version of GRE sequences. Similar to GRE, emphasizes speed and uses T2* weighting. Useful in high-speed imaging with sensitivity to flow and susceptibility differences. Often interchangeable with GRE. Focused on speed; not optimized for susceptibility contrast like SWI	SWAN (Susceptibility Weighted ANgiography): Proprietary GE multi-gradient Echo sequence Similar to SWI but optimized for faster imaging with less artifact sensitivity High-resolution imaging to detect microbleeds, iron deposition, and venous structures Less sensitive to small susceptibility differences than SWI Combines phase and magnitude data for superior contrast	Susceptibility-Weighted Imaging: Best resolution But at the cost of longer acquisition times Combines **magnitude** and **phase data** to enhance contrast. High sensitivity to iron and calcium. Best for microbleeds, venography, and brain trauma. **Limitations:** Requires longer acquisition time and phase processing	Phase Imaging: Focuses on the phase component of MR signals, & provides information about magnetic susceptibility differences. Directly visualizes susceptibility changes. Complements SWI by differentiating substances like iron (paramagnetic) and calcium (diamagnetic

Neurophilia