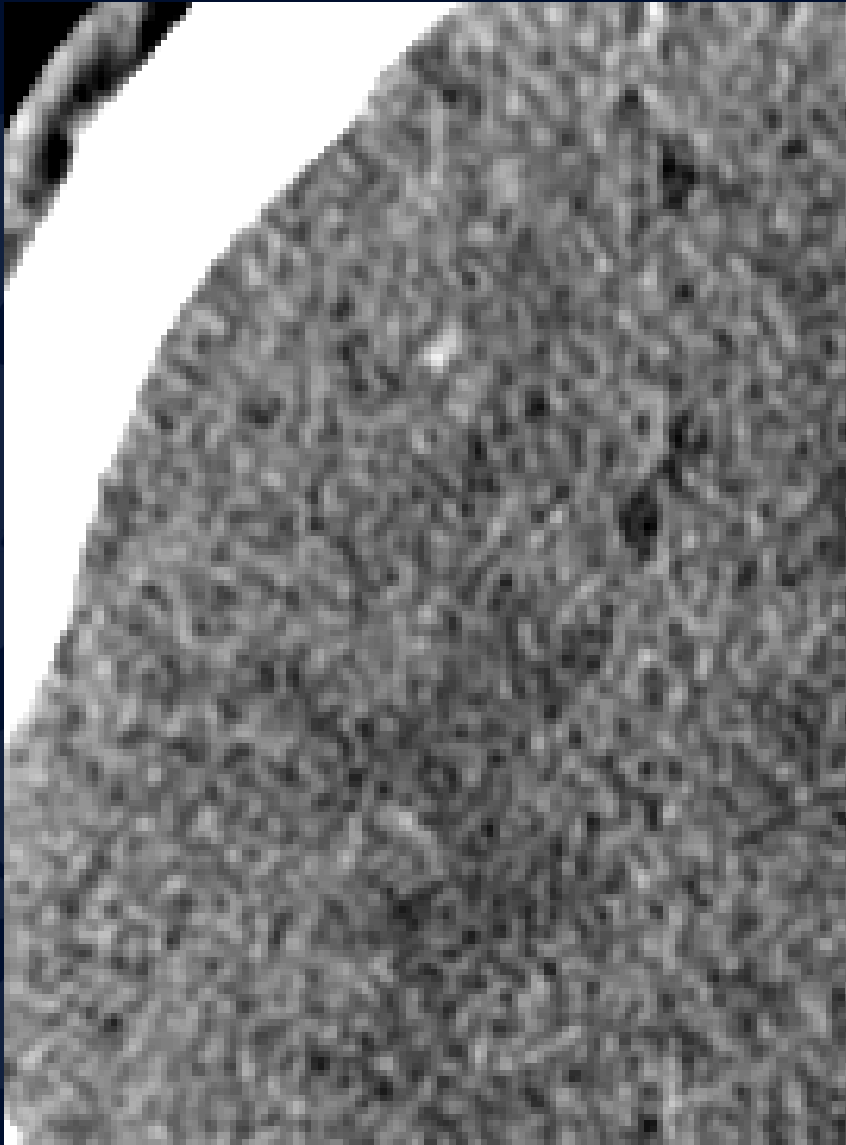
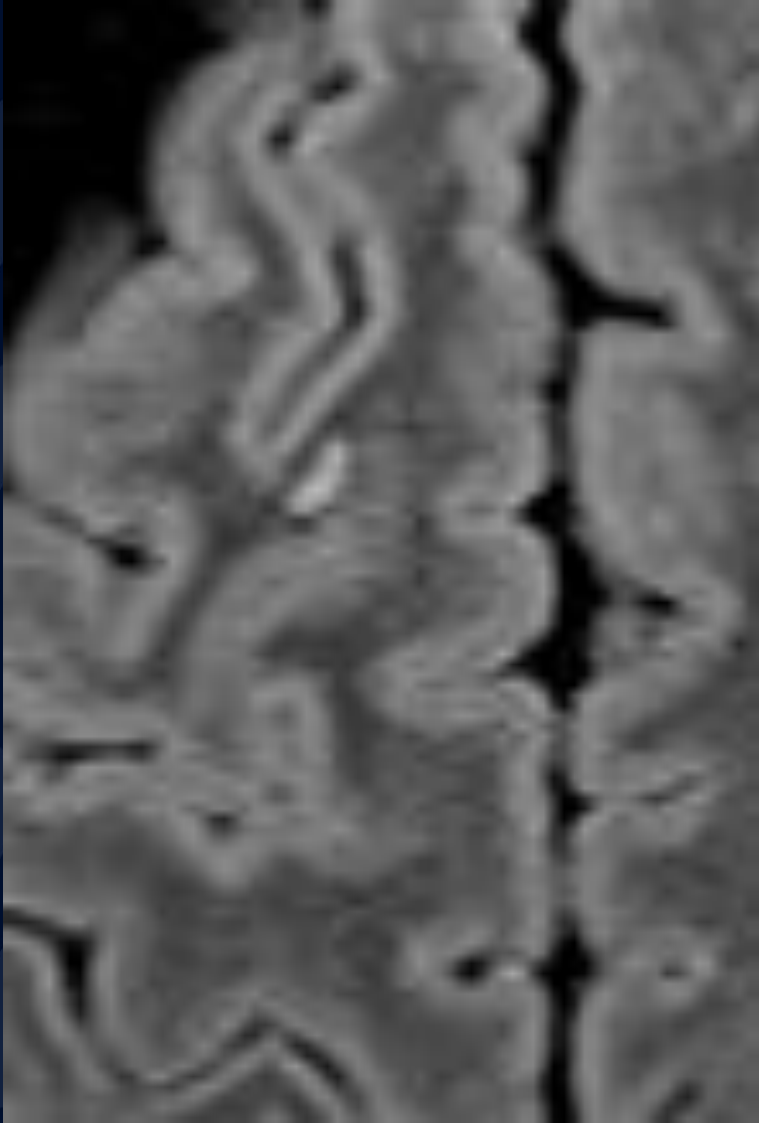


20 y/o football player with traumatic head injury

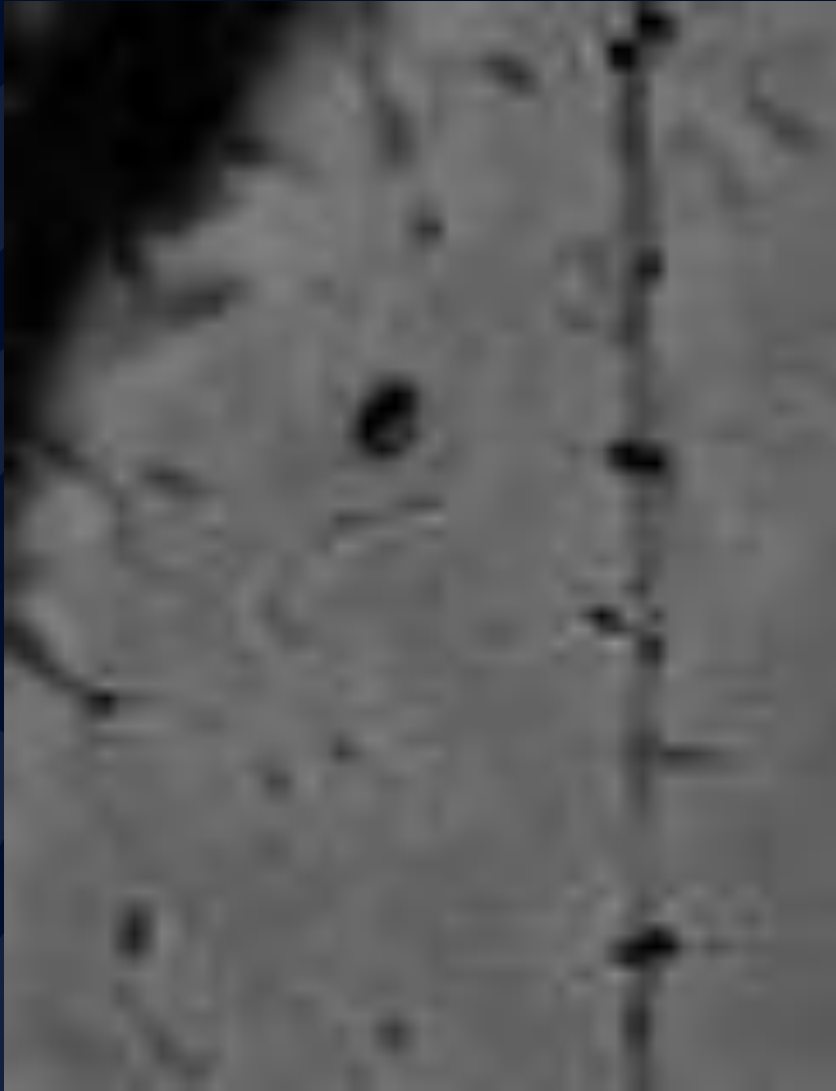
Pireh Ansari, MD
Leo Wolansky, MD



**CT without
contrast**



T2 FLAIR



Susceptibility Weighted Imaging (SWI)

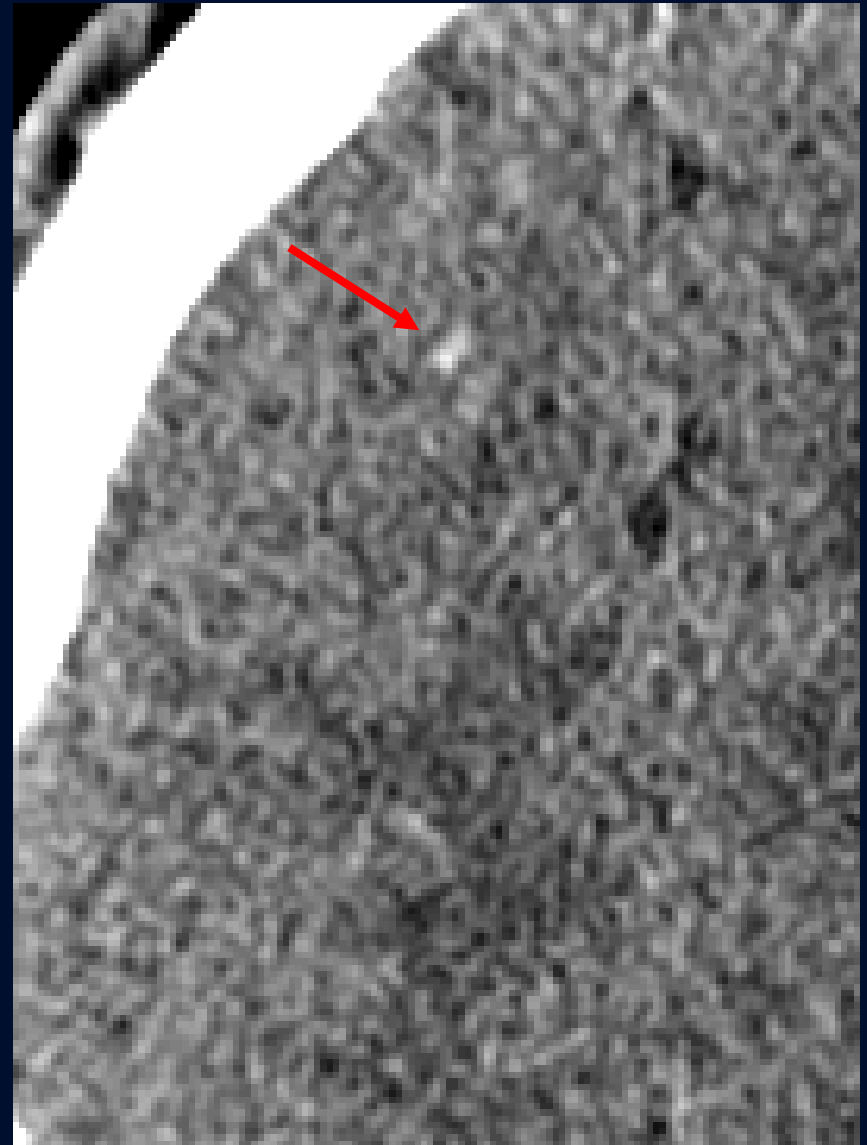


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Cerebral Hemorrhage (Diffuse Axonal Injury)

CT without contrast

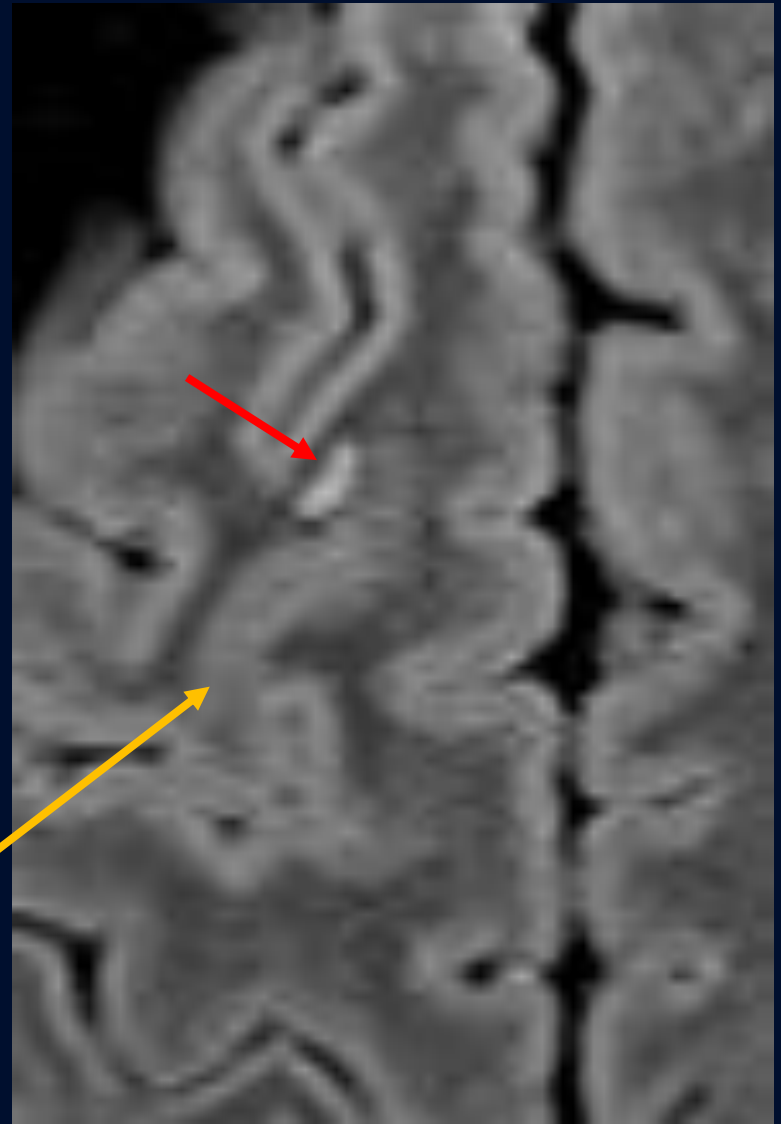
- Small focal hyperdensity seen in right frontal lobe
- Hemorrhagic shearing injury



T2 FLAIR

- Small focal hyperintensity seen in right frontal lobe due to edema
- Indicative of acute injury

Note: localized subarachnoid hemorrhage seen adjacent to cerebral hemorrhage obscuring the sulcus



SWI

- Hypointensity representing deoxyHb seen in right frontal lobe

Note: subarachnoid hemorrhage also visible on SWI



Cerebral Hemorrhage

Causes: Trauma, hypertension, amyloid angiopathy, ischemic stroke conversion, cocaine, neoplasm, coagulopathies, venous infarct, aneurysm (e.g. mycotic)

Common locations: Basal ganglia, thalamus, pons, cerebellum, subcortical white matter

Clinical Presentation: Sudden focal deficit that progressively worsens, headache, vomiting

Imaging: *Clinical presentation is nonspecific, imaging is mandatory*

- **CT:** non-contrast CT is study of choice, CTA for underlying vascular lesion
 - Blood appears hyperdense initially, becomes more hypodense with time
 - Can be surrounded by hypodense area representing edema
- **MRI:** evaluate for underlying mass, cerebral amyloid angiopathy
 - Appearance of blood on T1/T2 depends on stage (see next slide)
 - Acute blood and hemosiderin appear dark on SWI

Imaging of Intracerebral Hemorrhage

	CT	T1	T2
Hyperacute (<12h)	Hyperdense	Isointense	Hyperintense
Acute (12h – 2 days)	Hyperdense	Isointense	Hypointense
Early subacute (3 – 7 days)	Hyperdense	Hyperintense	Hypointense
Late subacute (8 days – 1 month)	Isodense	Hyperintense	Hyperintense
Chronic (> 1 month)	Hypodense	Iso or Hypointense	Hypointense

References

Kidwell, Chelsea S., and Max Wintermark. "Imaging of intracranial haemorrhage." *The Lancet Neurology* 7.3 (2008): 256-267.

Macellari, Federica, et al. "Neuroimaging in intracerebral hemorrhage." *Stroke* 45.3 (2014): 903-908.

Ansari, Wolansky. Cerebral Hemorrhage. Radiology Online (2021)