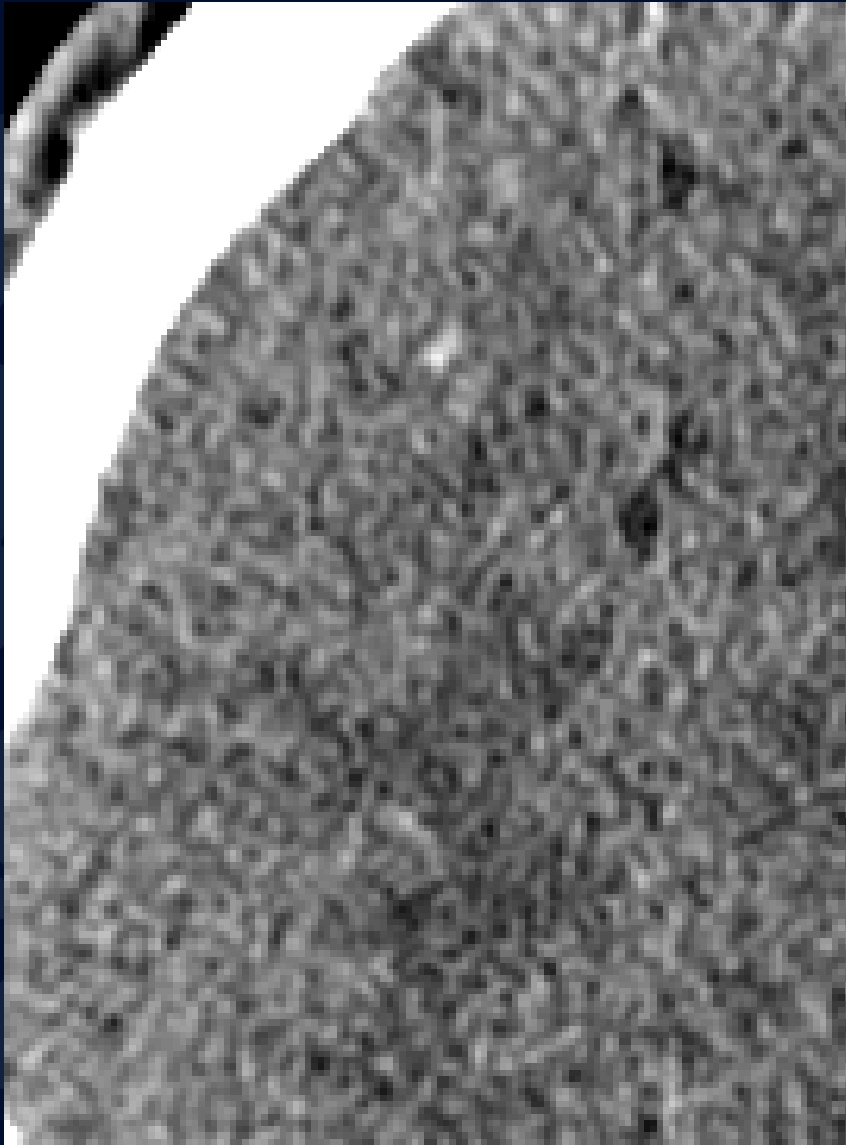
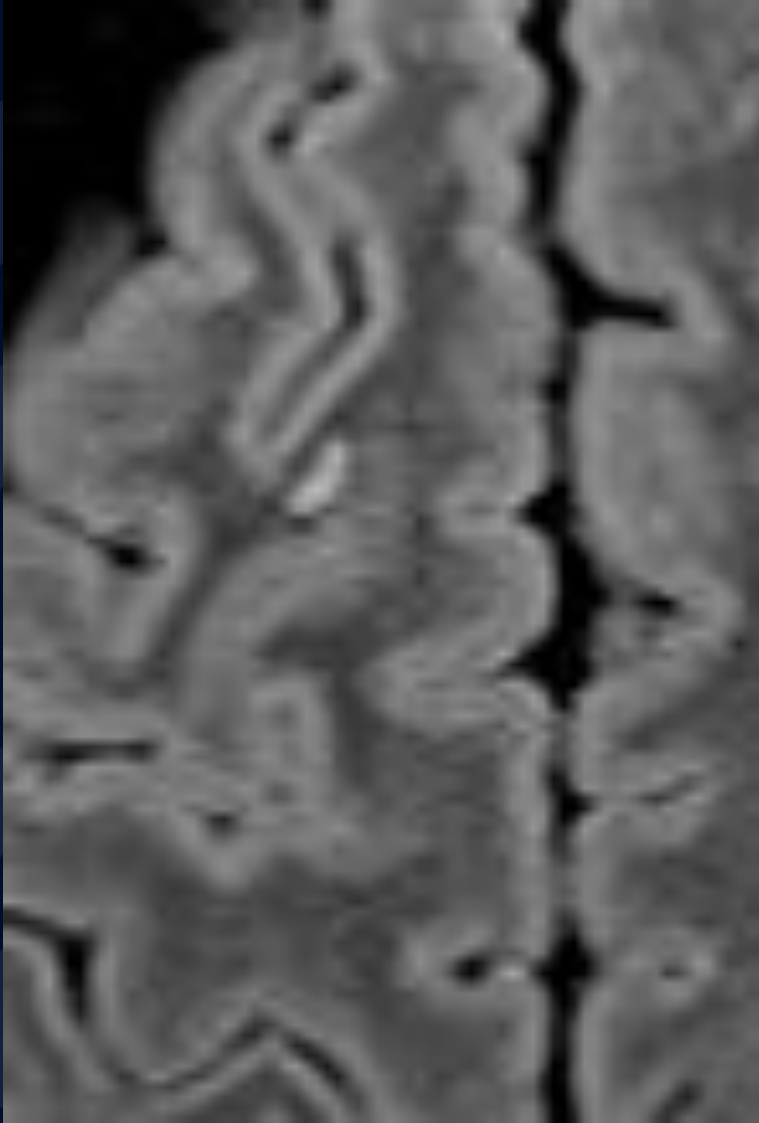


# 20 y/o football player with traumatic head injury

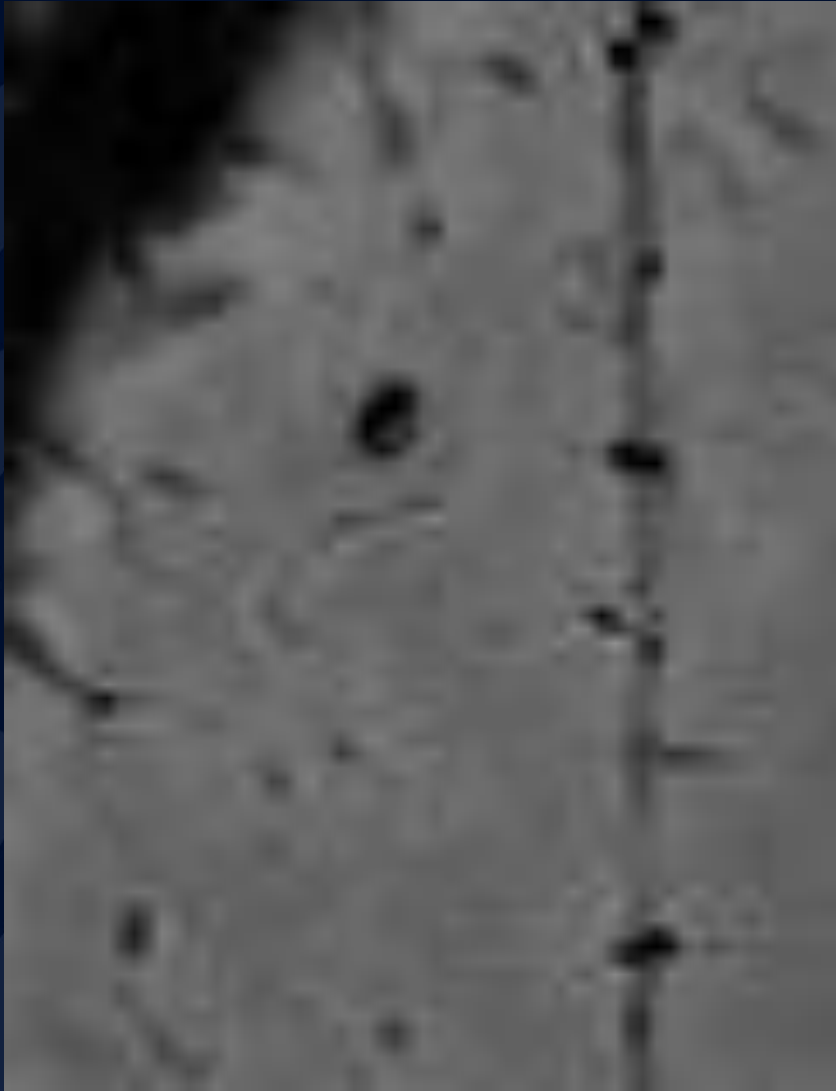
Pireh Ansari, MD  
Leo Wolansky, MD



**CT without  
contrast**



# T2 FLAIR



# Susceptibility Weighted Imaging (SWI)

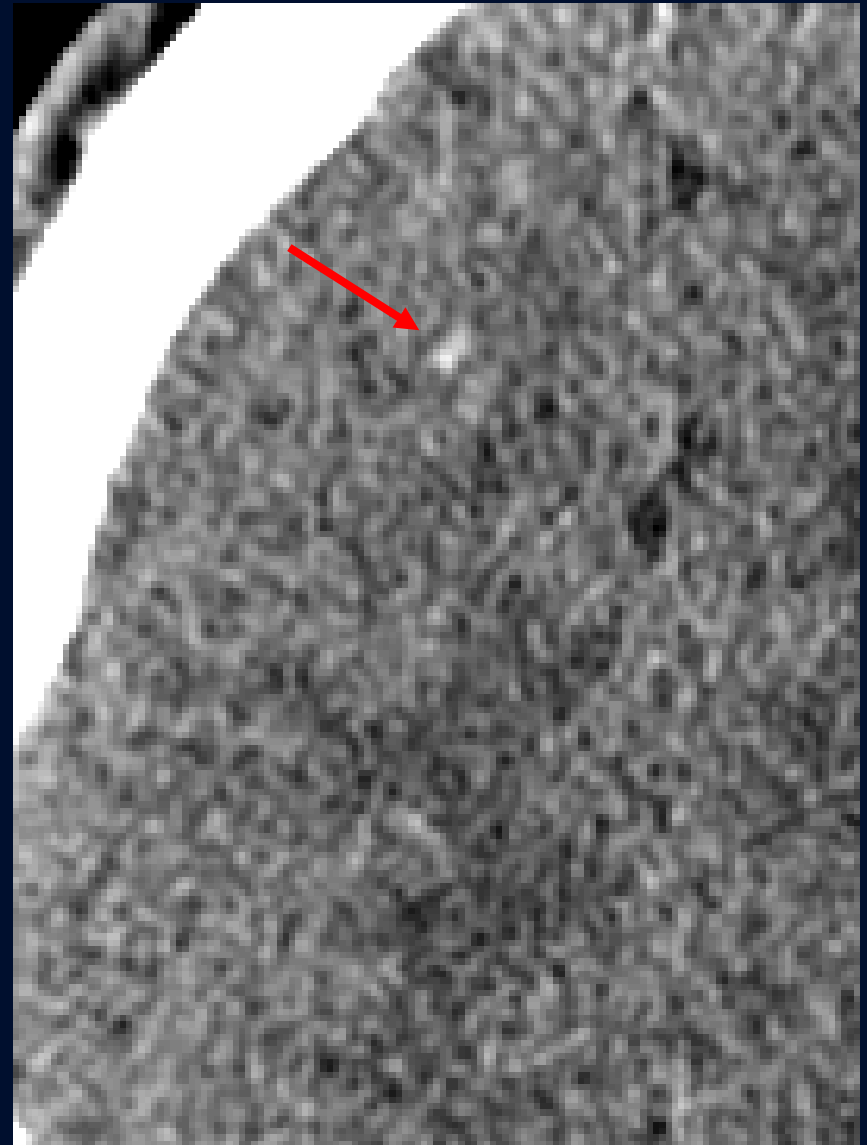


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# **Cerebral Hemorrhage (Diffuse Axonal Injury)**

# CT without contrast

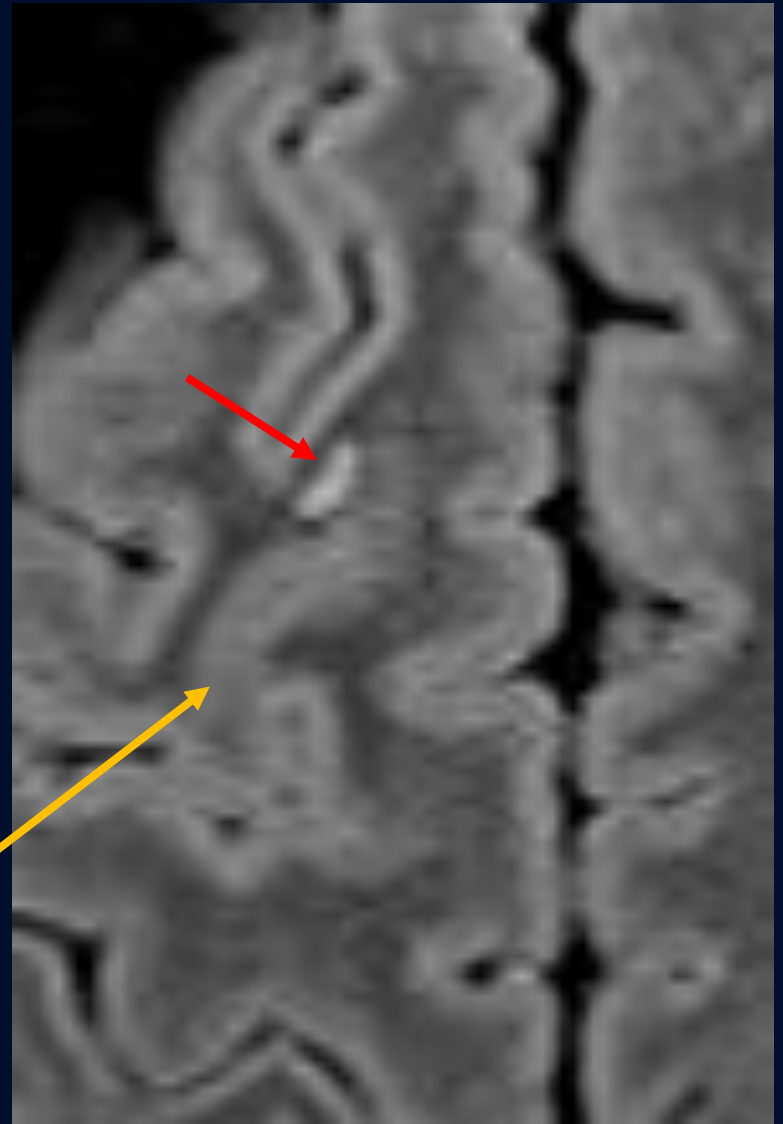
- Small focal hyperdensity seen in right frontal lobe
- Hemorrhagic shearing injury



# 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           |
|--|------------|--------------------|--------------|
| <b>Hyperacute</b><br>(<12h)                | Hyperdense | Isointense         | Hyperintense |
| <b>Acute</b><br>(12h – 2 days)             | Hyperdense | Isointense         | Hypointense  |
| <b>Early subacute</b><br>(3 – 7 days)      | Hyperdense | Hyperintense       | Hypointense  |
| <b>Late subacute</b><br>(8 days – 1 month) | Isodense   | Hyperintense       | Hyperintense |
| <b>Chronic</b><br>(> 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.

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