

92 y/o male, hx of CVA with left-sided  
hemiparesis, multiple new-onset  
generalized tonic-clonic seizures

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A large, stylized oak leaf graphic in a dark blue color, positioned on the left side of the slide. It features detailed vein patterns and a lobed edge.

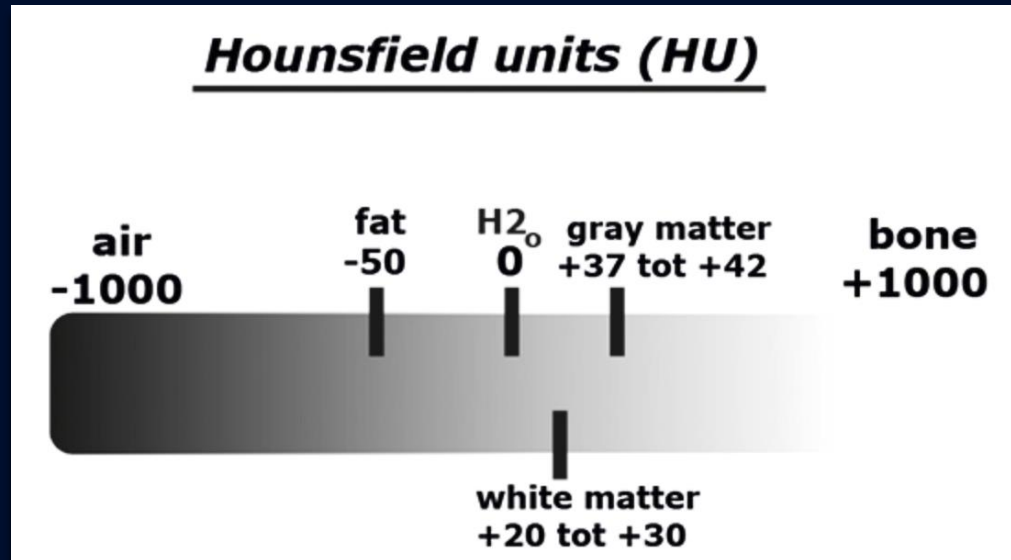
?

Pseudolesion with  
“Cortical Rim Sign”  
i.e. Cerebral Atrophy with  
Partial Volume Averaging

# Cortical Rim Sign

-A pixel in the axial plane is a 2D rendering of a 3D voxel with displayed dimensions in-plane and a third dimension out of plane corresponding with the slice thickness.

-Each pixel in the CT scan image has an associated gray-scale value i.e. Hounsfield Unit, which is a function of the average density of the tissue in all three planes.



## Hounsfield Units

Pure water 0

CSF +5

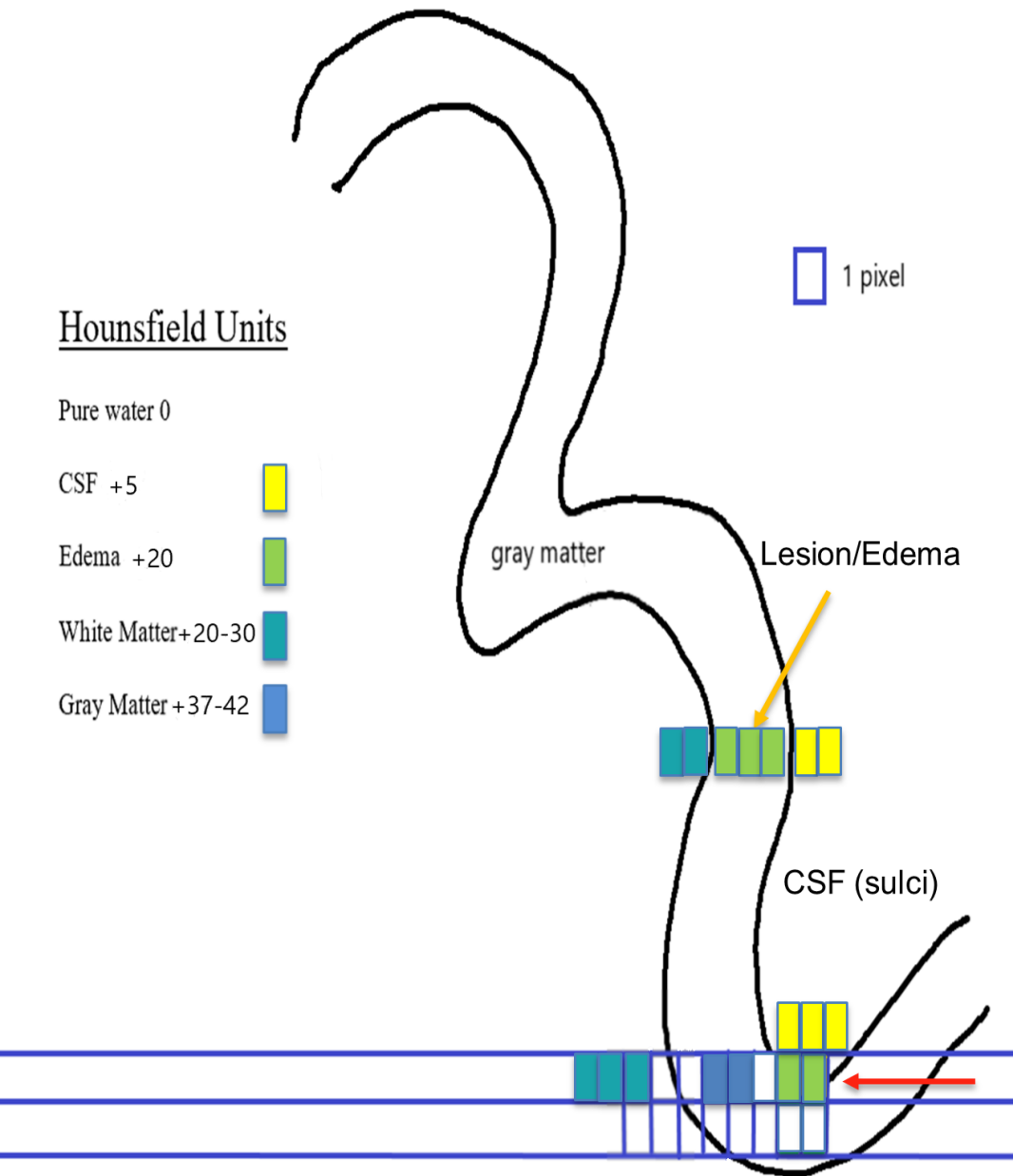
Edema +20

White Matter +20-30

Gray Matter +37-42



1 pixel



-Olive pixels represent pixels registering ~20-25 c/w edema or hypodense lesion. Similar pixel value pseudolesion can be obtained from partial volume averaging of cortex ~42-HU (blue) and CSF 5-HU (yellow). In this setting pixel HU is calculated as  $(42+5)/2=23.5$  similar to Hounsfield Unit of edema/lesion.

Difference will be:

① In brain edema, coursing from the lesion (olive voxels, orange arrow) to the normal white matter (turquoise) occurs directly without an obligatory "cortical rim."

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## Hounsfield Units

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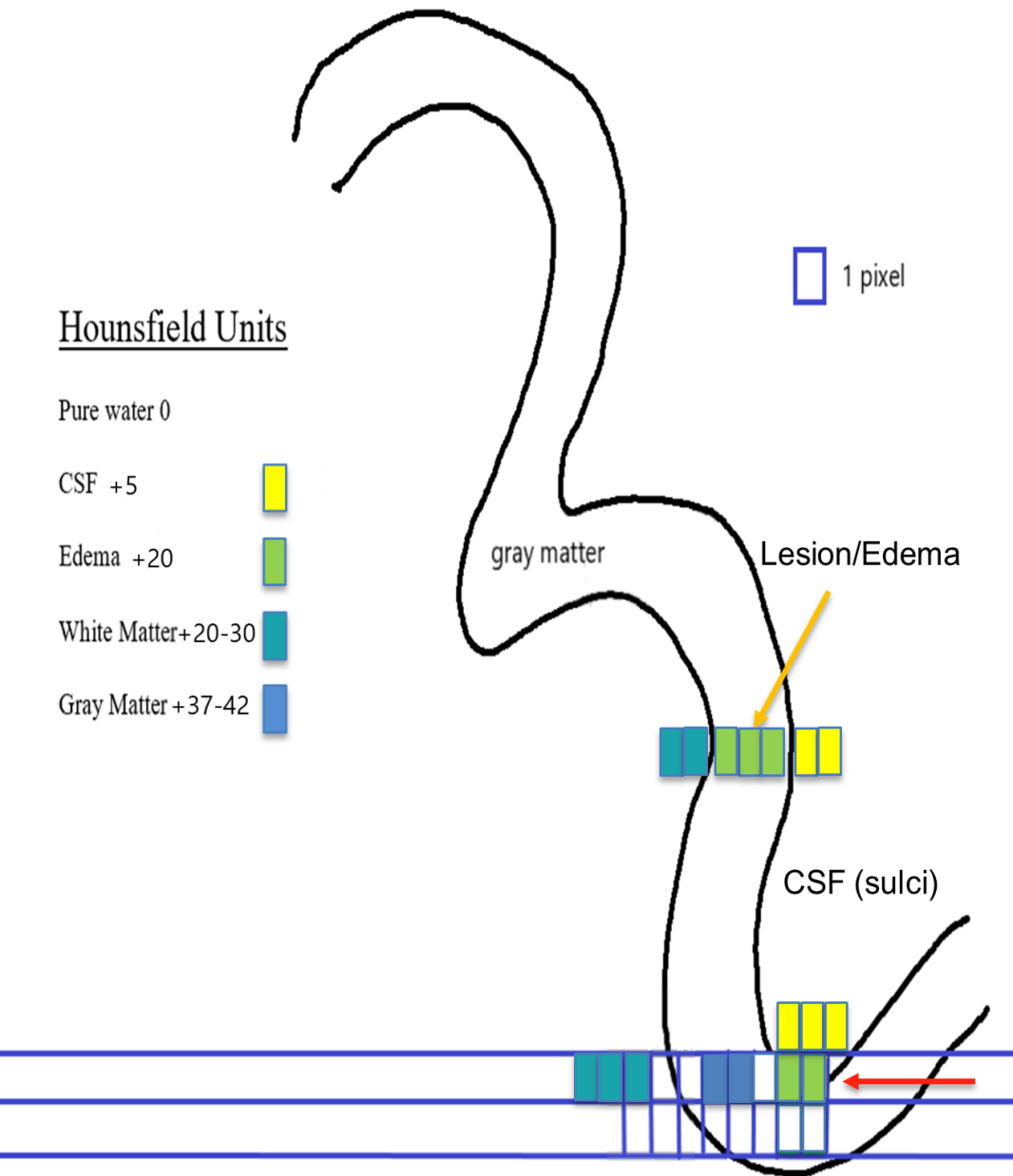
Edema +20

White Matter +20-30

Gray Matter +37-42



1 pixel



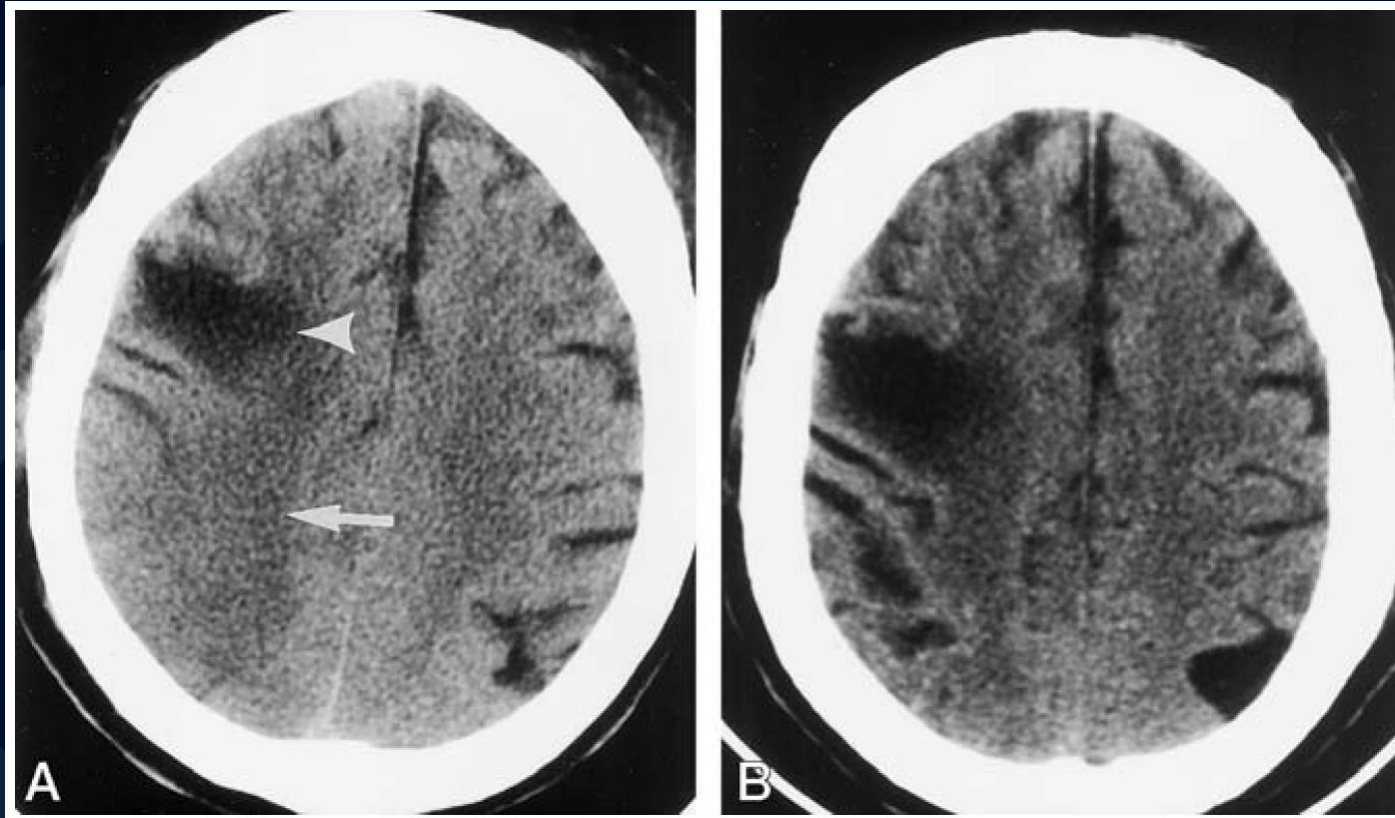
-Olive pixels represent pixels registering ~20-25 c/w edema or hypodense lesion. Similar pixel value pseudolesion can be obtained from partial volume averaging of cortex ~42-HU (blue) and CSF 5-HU (yellow). In this setting pixel HU is calculated as  $(42+5)/2=23.5$  similar to Hounsfield Unit of edema/lesion.

Difference will be:

- ① In brain edema
- ② In cases of hypodense pseudolesion due to partial volume averaging of cortex & CSF (olive voxels, red arrow), there is always a rim of normal cerebral cortex (blue) separating the pseudolesion from the normal white matter (turquoise) deep to the cortex.



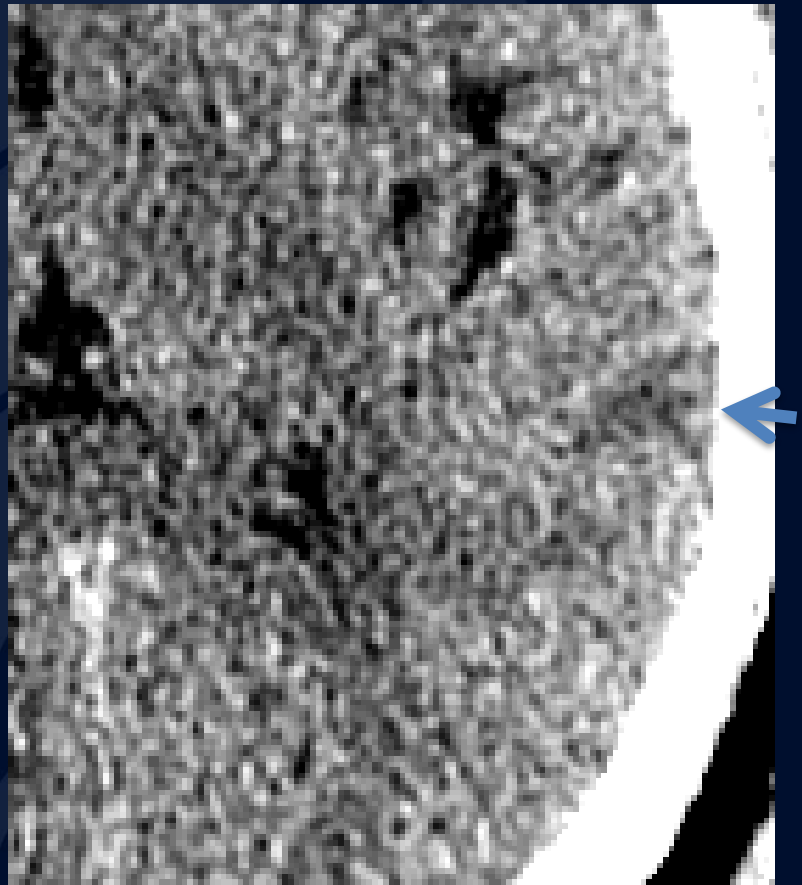
# DDx: Acute postictal Cortical Edema



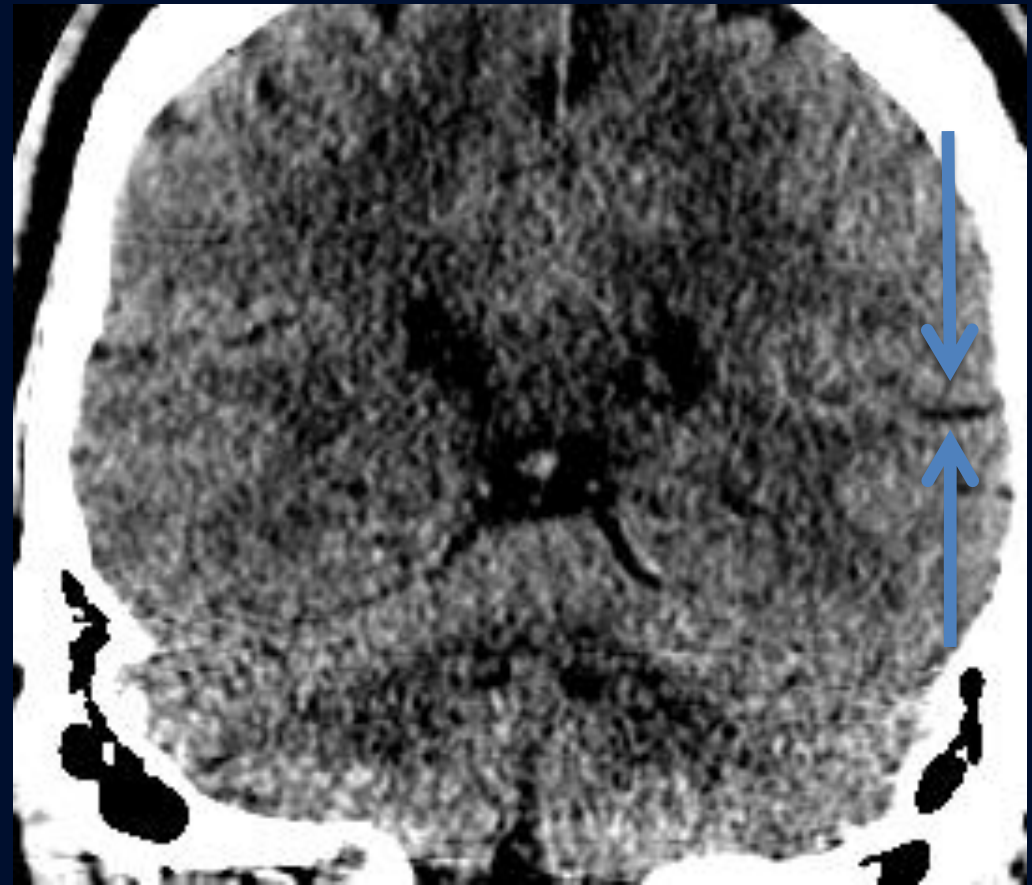
77 y/o M with acute postictal left hemiparesis and decreased level of consciousness.

- A. Initial axial noncontrast CT scan shows right frontoparietal swelling with decreased attenuation (arrow) with old infarct in R frontal lobe (arrowhead)
- B. Axial noncontrast CT obtained 8 days later showed resolution of cerebral swelling.

Pseudolesion with cortical rim sign on left sided image (arrow)



Corresponds with sulcus on right sided image (arrow)



# References

- Andrew M Silverstein. “Acute Postictal Cerebral Imaging.” American Journal of Neuroradiology, September 1998
- <http://www.ctlab.geo.utexas.edu/about-ct/artifacts-and-partial-volume-effects/>
- Goodenough, Weaver, Davis, LaFalce. Volume Averaging Limitations of Computed Tomography *AJNR* 2:585-588, Nov/Dec 1981