

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

Yuxiang Zhang, MD
Leo Wolansky, MD



UConn
HEALTH

RADIOLOGY



UCONN
HEALTH

RADIOLOGY

A large, stylized oak leaf graphic in a dark blue color, positioned on the left side of the slide. The leaf has a prominent central vein and several smaller veins branching off it. The leaf's edge is serrated.

?

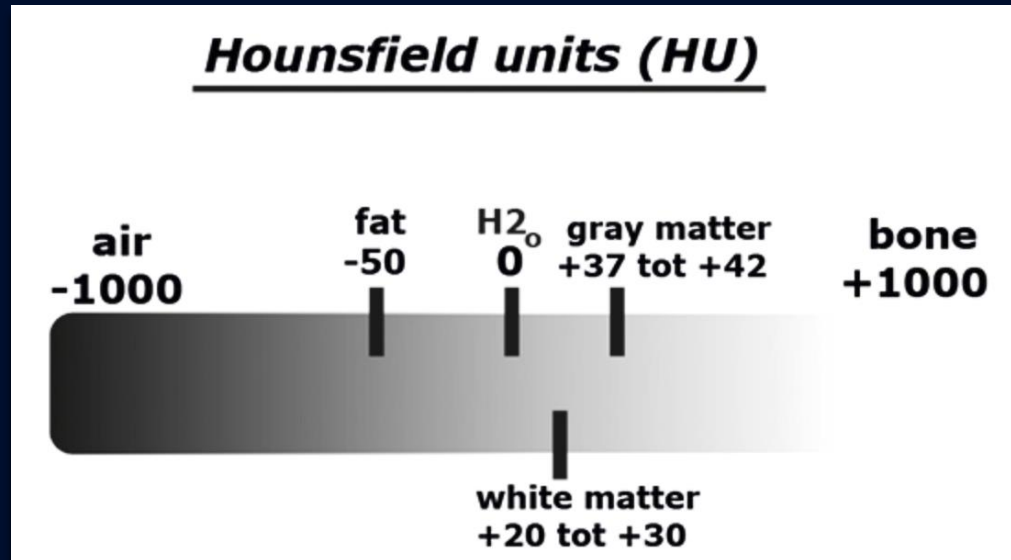
Pseudolesion with
“Cortical Rim Sign”
i.e. Cerebral Atrophy with
Partial Volume Averaging

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

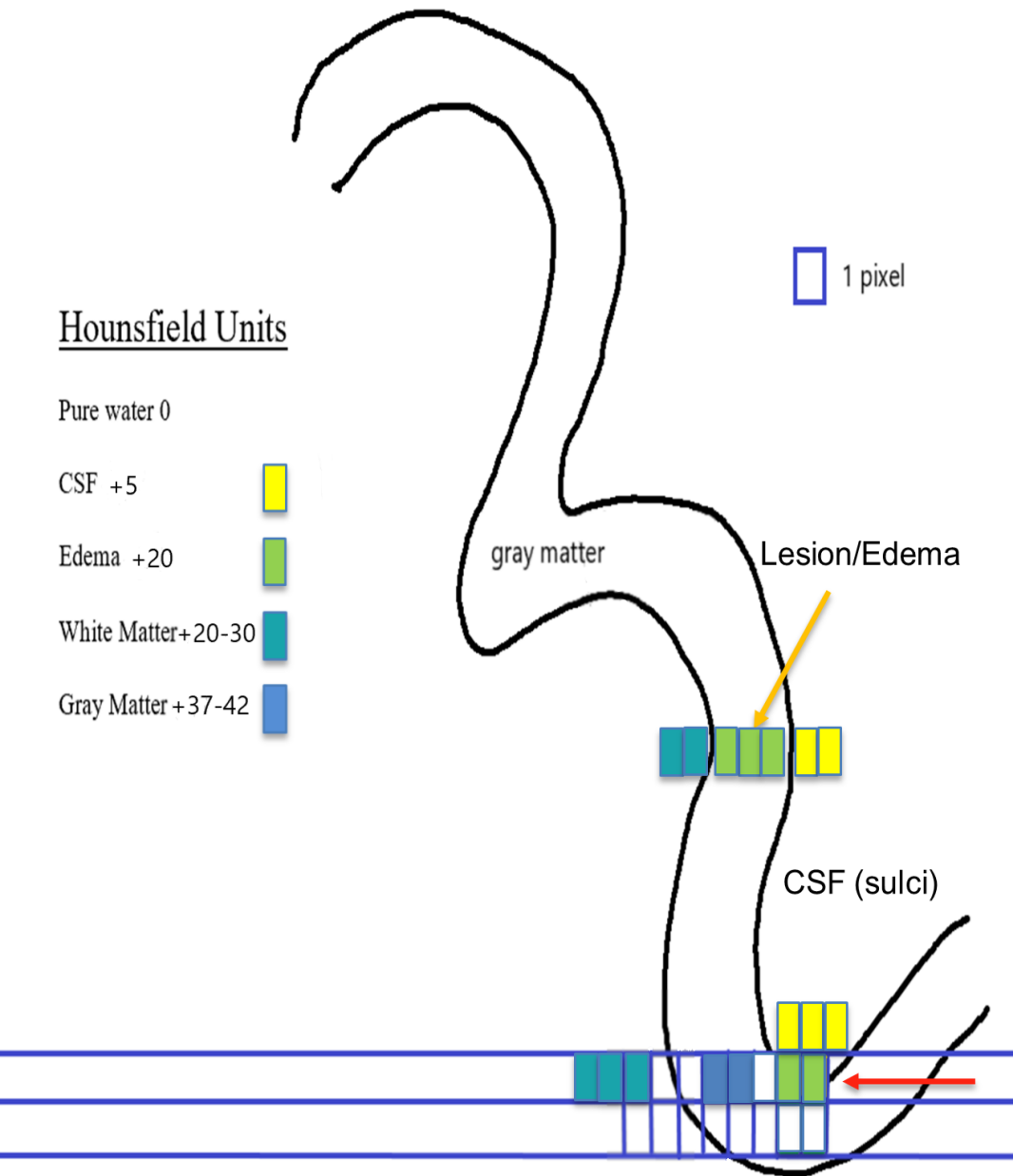
Edema +20

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."

UConn
HEALTH

RADIOLOGY

Hounsfield Units

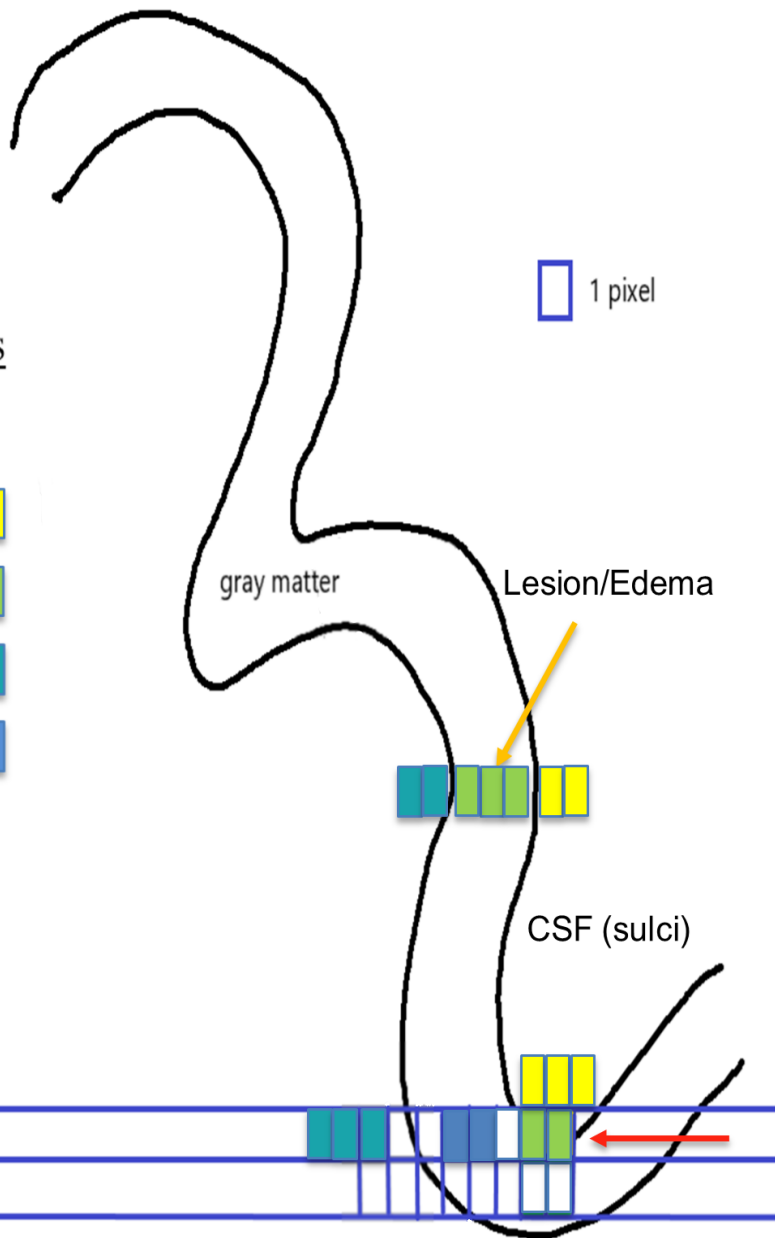
Pure water 0

CSF +5

Edema +20

White Matter +20-30

Gray Matter +37-42



-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

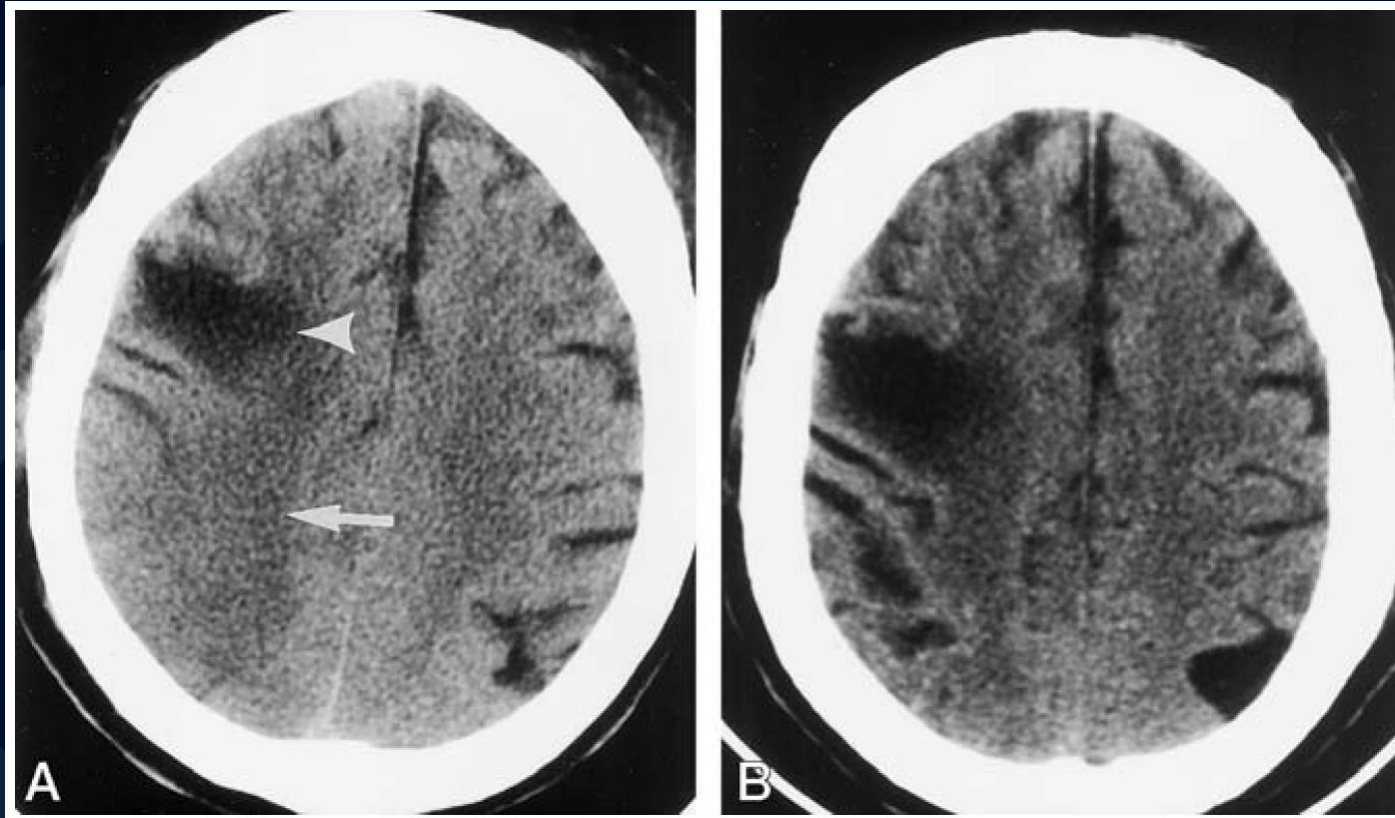
② In cases of hypodense

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.

UConn
HEALTH

RADIOLOGY

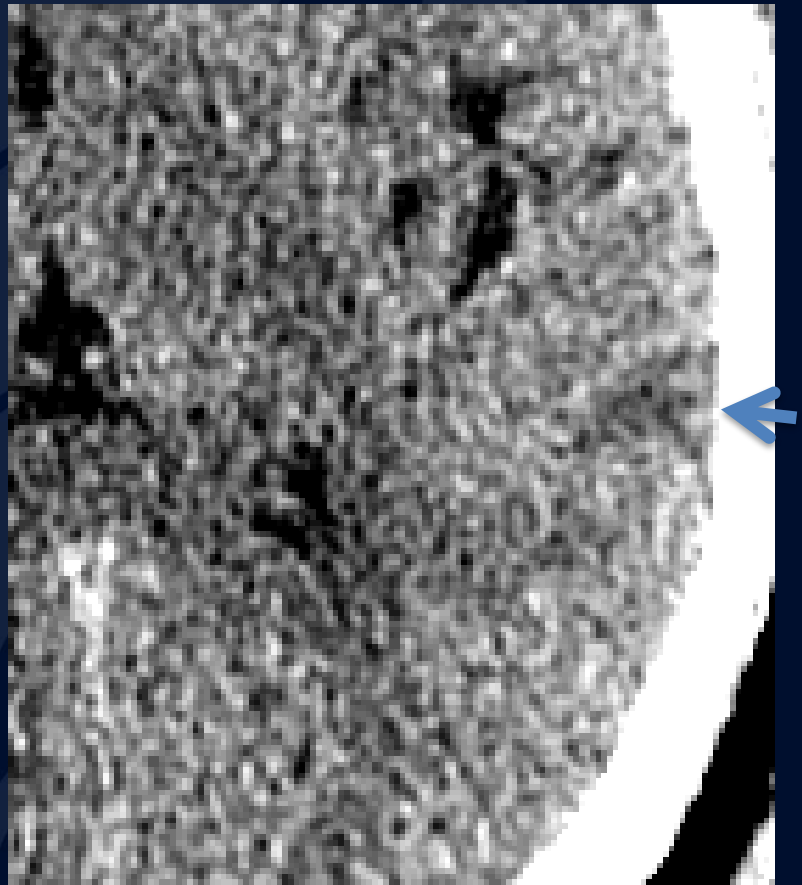
DDx: Acute postictal Cortical Edema



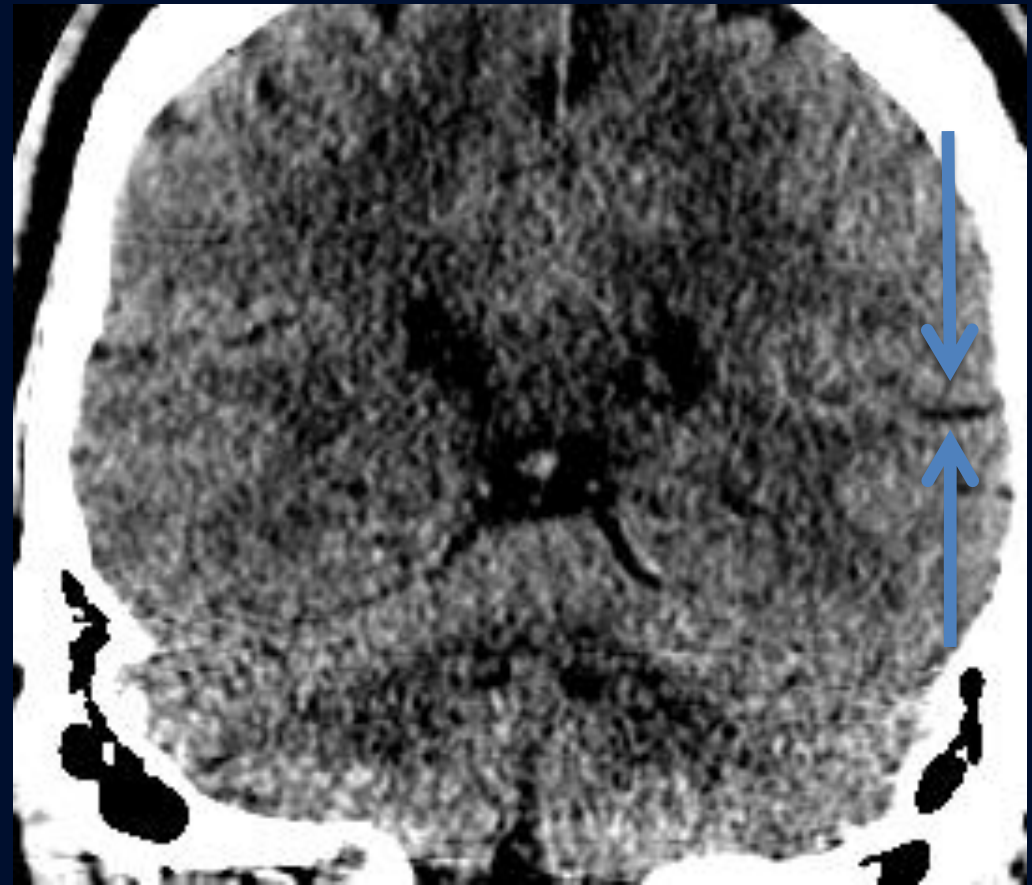
77 y/o M with acute postictal left hemiparesis and decreased level of consciousness.

- 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