

*Red Tech official for radiographer*

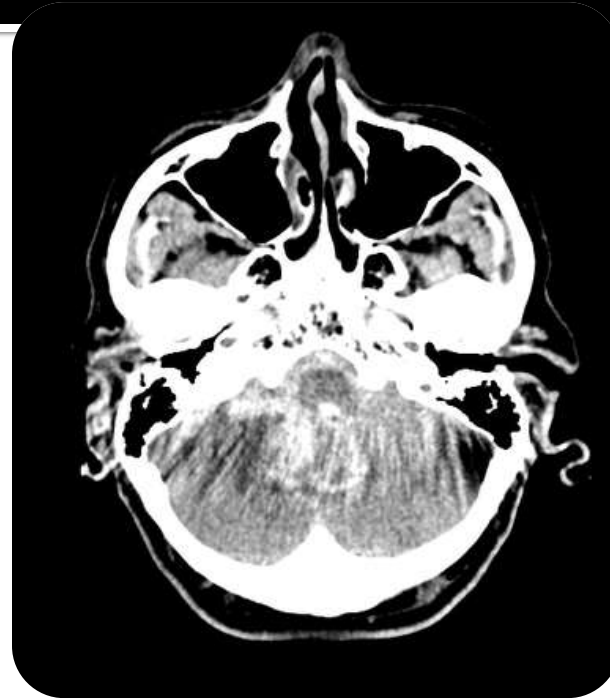
**Ct artifacts**

# Beam hardening Artifact

It is assumed that energy of x-ray beam is monochromatic or homogenous in nature but in practice it is observed that energy of x-ray beam is polychromatic that means x-ray beam contains soft, semi soft, hard and ultra hard rays therefore the nature of x-ray beam is heterogeneous. When x-ray beam passes through different thickness of the body, there is difference in attenuation of the beam. This is known as beam hardening.

# Beam hardening

Ex. In brain imaging you can see that more thicker area showing more attenuation means less penetrating of rays. And in center of brain rays are more hardened than peripheral, resulting more penetration reaching more rays to the detector. This artifact in brain also called cupping artifact .



# Partial volume Artifact

Sometimes in one voxel, there are two different types of slices embedded in it with different CT numbers. Due to this, when a CT scanner cannot reconstruct the image properly because of the difference in CT number in a voxel.

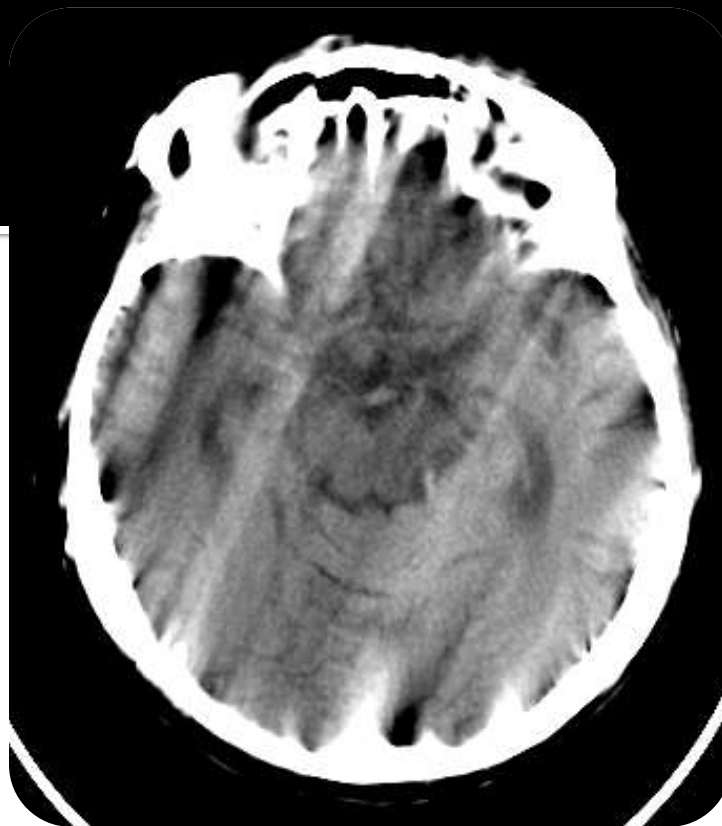
Ex. Suppose a slice having CT numbers 100 and 200, so when reconstructed by a scanner, the resulting average CT number is 150, which does not relate to any actual CT number of any tissue within the slice.

# Partial volume Artifact

- Partial volume artifact is visible most commonly in the base of the skull, vascular structures, thin flat surface etc. can be reduced by thin slice thickness or voxel size.

# Motion artifact

- Motion artifacts are produced in a CT image if an object moves, but is assumed to be static during the reconstruction process. Anatomical structures move periodically due to respiration or cardiac pulsation and it is difficult for injured patients or children to stay completely still during scanning. The movements can cause significant artifacts, but can be eliminated by spiral CT single breath-hold scanning.



# Streak artifact

- It is general assumption that every detector at every position in CT scanner detect some amount of transmitted radiation but if due to presence of metal the transmitted radiation is absorbed then the detector will not be able to record a single transmission. This is against the basic principle of image reconstruction and CT scanner will not account for such violation and streak artifact will appear on the image.





# Ring artifact

These are rare on modern CT systems, but appeared on third-generation systems due to miscalibrated detectors.

# Data error artifact

- Data error artifact may be produced due to non linearity of the detector assembly or deficiency in analog to digital conversion or any statistical error in the computation or reconstruction algorithm.