

CT & MRI decoder

HOUNSFIELD LADDER (WATER = 0 BY DEFINITION)

TISSUE	HU
Air / gas	−1000
Lung	−900 ... −500
Fat	−120 ... −80
Water / simple fluid	0 (± 10)
CSF, urine, transudate	0 ... +15
Soft tissue / muscle	+30 ... +70
Acute clot	+50 ... +90
Enhancing tissue	+80 ... +200+
Mineral / cancellous	+200 ... +700
Cortical bone	+700 ... +1500
Metal	> +2000 (streak)

WINDOWS & CONTRAST

Window maps an HU range onto visible greys (width = range, level = centre). Read every study in ≥ 3 windows.

Bone W 2000 / L 500 **Lung** W 1500 / L −600

Soft tissue W 400 / L 40 **Brain** W 80 / L 40 **Liver** W 150 / L 70

ROI habit: pre & post contrast on every mass/fluid.

Enhancement > +20 HU significant; +100 = marked (hypervascular).

Phases: arterial 15–25 s (arteries, shunts, bleeding) · portal 60–90 s (parenchyma, masses, nodes) · delayed 3–10 min (ureters, fibrous, washout).

MPR kills superimposition; 3D renders are for shape only (thresholds hide lysis).

MRI SEQUENCE GRID

SEQUENCE	BRIGHT	DARK	USE FOR
T1W	fat, gadolinium, subacute blood, protein	water/CSF, oedema, bone, gas	anatomy, enhancement
T2W	water, CSF, oedema, most lesions, fat	cortical bone, gas, haemosiderin	lesion detection, discs, cord
FLAIR	oedema/lesions (CSF nulled)	CSF	periventricular, brain
STIR	fluid/oedema (fat nulled)	fat	spine, marrow, muscle
T2* (GRE)	—	blood products, mineral, gas (bloom)	haemorrhage
DWI / ADC	restricted diffusion	—	infarct, abscess
T1 + Gd	barrier breakdown / vascular	—	tumour, inflammation, meninges

Two-question decoder: CSF bright? → T2 (yes) / T1, FLAIR (no). Fat bright? → T1, T2 (yes) / STIR, fat-sat (no).

BRAIN — FOUR QUESTIONS

1 Symmetric? bilateral symmetric = metabolic / toxic / nutritional / degenerative (hepatic encephalopathy, thiamine, osmotic demyelination) · asymmetric = tumour, infarct, abscess

2 Where? grey vs white matter, nuclei, ventricles, meninges

3 Mass effect? midline shift, herniation = urgency

4 Enhancement? ring (abscess, necrotic tumour) · homogeneous + dural tail extra-axial = meningioma · meningeal = inflammation

Ageing brain: ventriculomegaly, wide sulci, thin interthalamic adhesion, T2* microbleeds.

SPINE — PROTOCOL & VOCABULARY

Sagittal T2 + STIR (screen) → transverse T2 at EVERY abnormal level → T1 pre/post if infection/neoplasia → dorsal STIR for roots.

Disc: bright & tall = healthy · dark & narrow = degenerate · bright line in dark annulus = fissure (HIZ).

Compression: CSF ring effaced, cord deformed on transverse. Quantify with cord cross-sectional ratio vs normal level.

Location: extradural (disc, tumour, haemorrhage) · intradural-extramedullary (nerve-sheath tumour, meningioma; 'golf-tee') · intramedullary (glioma, myelitis, infarct).

Signal void in fluid = gas or blood (T2* confirms).