



PIPADOR REVISION

MRCOG Part 1 Revision Notes

CT of the Abdomen and Pelvis

IMAGING • LECTURE 40

VISUAL EXAMINATION REVISION NOTES

2026 Edition

MRCOG Part 1 Revision Notes

Lecture 40: CT of the Abdomen and Pelvis

Imaging • Visual revision edition

COLOUR CODE USED THROUGHOUT THESE NOTES

PHYSICS	RADIATION	CONTRAST	PREGNANCY / PE	GYNÆ ONCOLOGY
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LEARNING OBJECTIVES — tick off as you go

- ☐ Explain how CT images are made; Hounsfield units and windowing.
- ☐ Know typical CT doses and radiation principles, especially in pregnancy.
- ☐ Describe contrast phases, reactions, kidney risk and use in pregnancy and lactation.
- ☐ Outline imaging for suspected PE in pregnancy (CTPA vs V/Q).
- ☐ Describe CT's role in ovarian cancer staging and acute gynaecology; choose CT vs MRI.

1 Physical Principles

IN ONE LINE: An X-ray tube and detector ring spin round the patient as the couch moves (helical CT); a computer rebuilds thin slices that can be viewed in any plane.

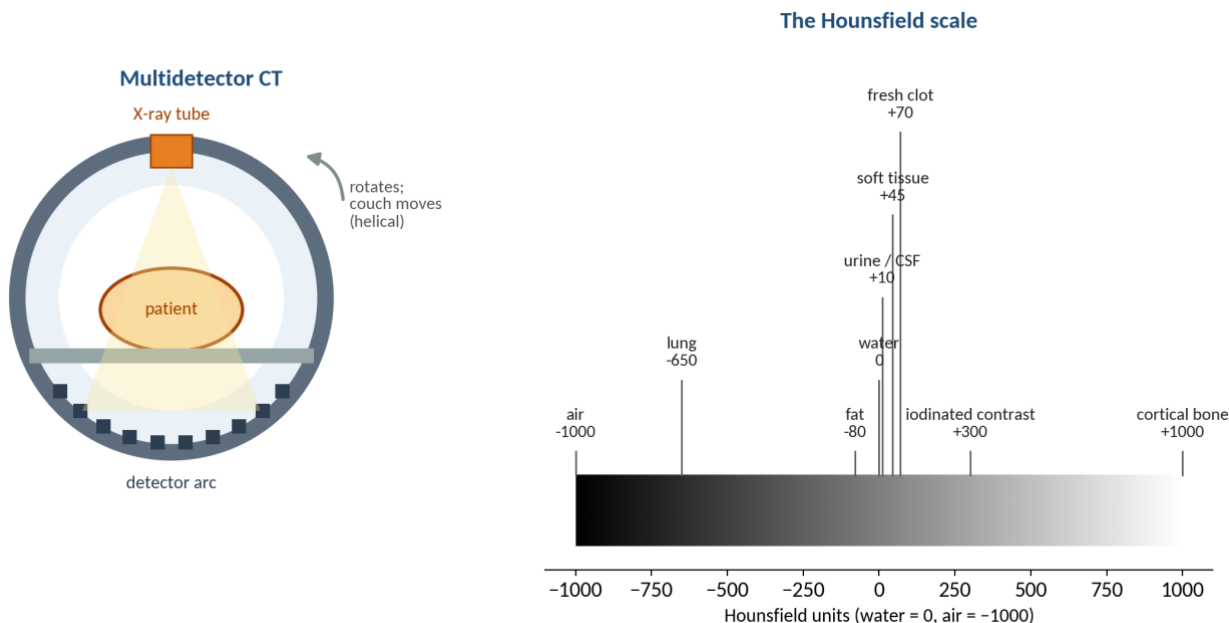


Figure 1. Multidetector CT and the Hounsfield scale.

Tissue	Approximate HU
Air	-1000
Lung	-500 to -800
Fat	-100 to -50 (negative = fat — e.g. a dermoid)
Water	0 (by definition); urine/simple fluid 0–15

Tissue	Approximate HU
Soft tissue / muscle	30–80
Acute (clotted) blood	~60–80 — denser than fluid
Iodinated contrast	~100–600
Cortical bone	up to ~+1000

Windowing: one dataset, different grey-scale 'windows' (below the window = black, above = white)

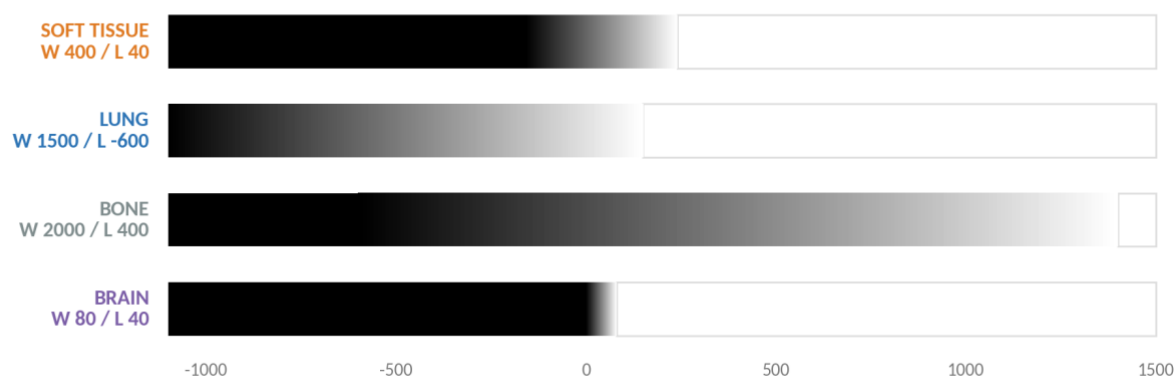


Figure 2. Windowing the same data.

2 Radiation Dose

CT is the biggest source of medical radiation

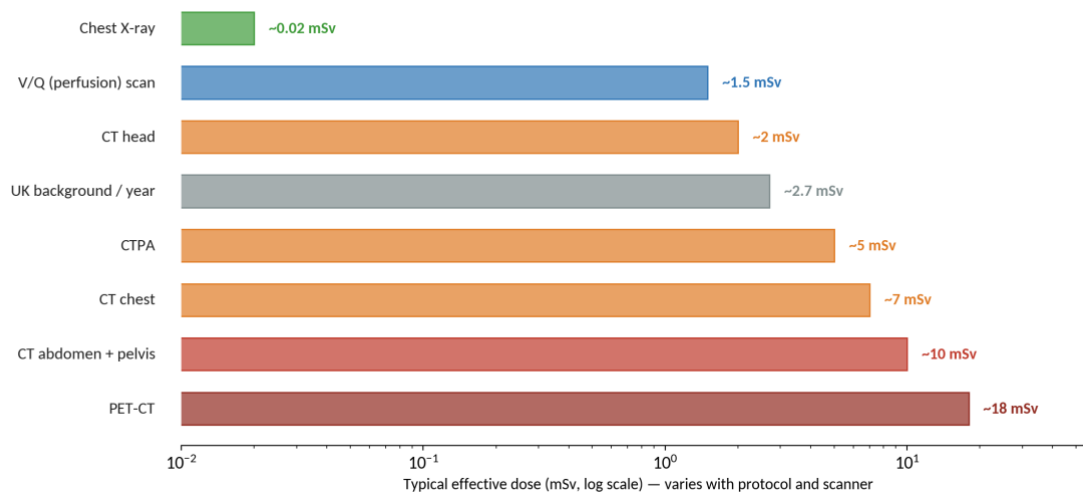


Figure 3. Typical effective doses.

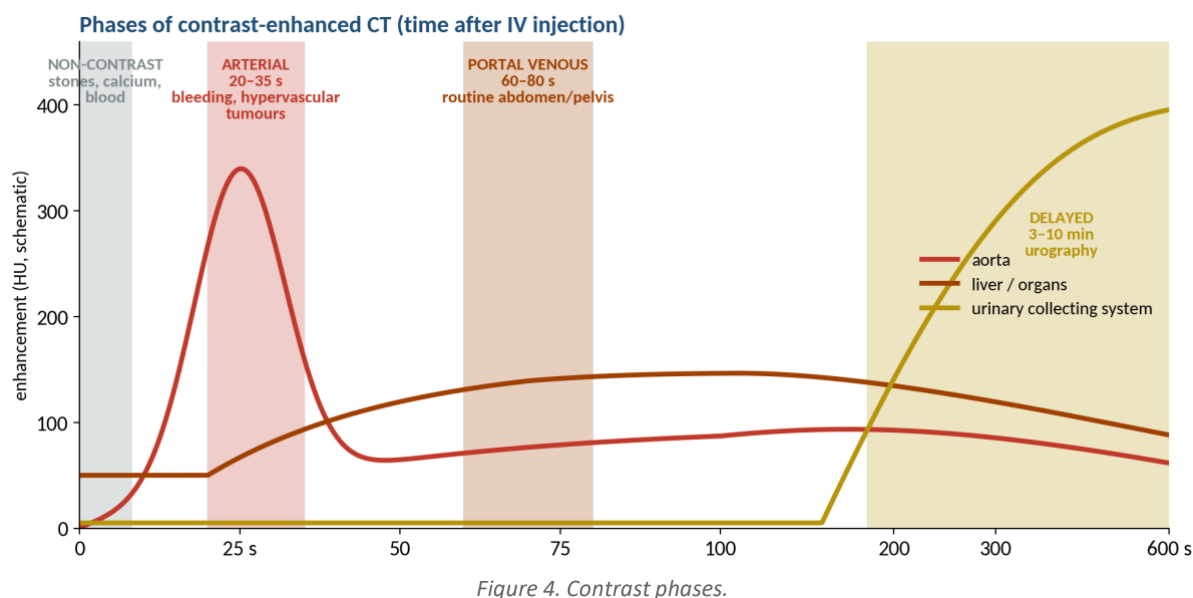
- CT abdomen/pelvis ≈ 10 mSv $\approx$ **4 years of UK background**. Lifetime cancer risk from one scan in a young adult is roughly **1 in 1000–2000** — higher for young women (breast, thyroid).

CT IN PREGNANCY

- Fetal dose from CT abdomen/pelvis up to **~25 mGy** — **below** the ~100 mGy deterministic threshold
- Small **stochastic** (childhood cancer) risk — no safe threshold
- **Ultrasound or MRI first**; CT when genuinely needed
- One CT is **not** a reason to end a pregnancy — counsel honestly

ALARA — HOW

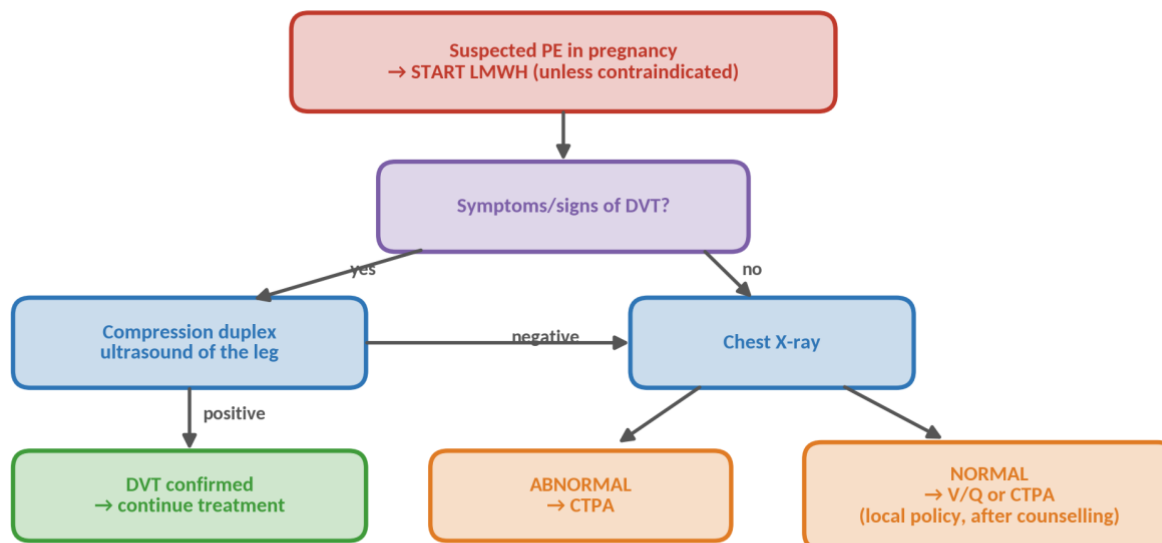
- **Justify**; scan only the area needed
- Dose modulation, low kV, iterative / AI reconstruction
- **Single phase** where adequate
- Lead shielding of the abdomen is **no longer routinely advised** (BIR 2020) — it can raise dose and spoil images

3 Iodinated Contrast

Issue	Key points
Reactions	Mostly mild (urticaria); severe/anaphylactoid ~1 in 10 000 or fewer with non-ionic agents; risk ↑ with previous reaction, asthma, atopy
Post-contrast AKI	Creatinine ↑ > 25% or 44 μmol/L within 48–72 h. Main risk: eGFR < 30, diabetes, dehydration, heart failure, age. Hydrate; consider another test
Metformin	Continue if eGFR ≥ 30; if eGFR < 30 or AKI, stop for 48 h and recheck renal function (RCR)
Thyroid	Iodine load can precipitate thyrotoxicosis (autonomous nodules, untreated Graves')
Pregnancy	Crosses the placenta; not teratogenic; small risk of transient neonatal hypothyroidism — use when needed; newborn thyroid screening (some guidance: check TFTs in week 1)
Breastfeeding	Tiny amounts in milk, poorly absorbed — continue breastfeeding

4 Suspected Pulmonary Embolism in Pregnancy

Suspected PE in pregnancy (after RCOG GTG 37b)



V/Q: lower MATERNAL BREAST dose, slightly higher fetal dose. CTPA: lower fetal dose, higher breast dose; may be non-diagnostic (hyperdynamic circulation). Both fetal doses are very small. Don't delay treatment for imaging.

Figure 5. Imaging pathway (after RCOG GTG 37b).

	CTPA	V/Q (perfusion) scan
Maternal effective dose	Higher (~2–8 mSv)	Lower (~1–2 mSv)
Maternal BREAST dose	Much higher	Very low
Fetal dose	Very low	Slightly higher, still very low
Other	Alternative diagnoses; may be non-diagnostic in pregnancy	Best when the chest X-ray is normal

EXAM HOOK

Thrombosis/VTE remains a leading direct cause of maternal death (MBRRACE-UK). **Start LMWH on suspicion** — never wait for imaging.

5 CT in Gynaecology

Ovarian cancer on staging CT — what to look for (schematic)

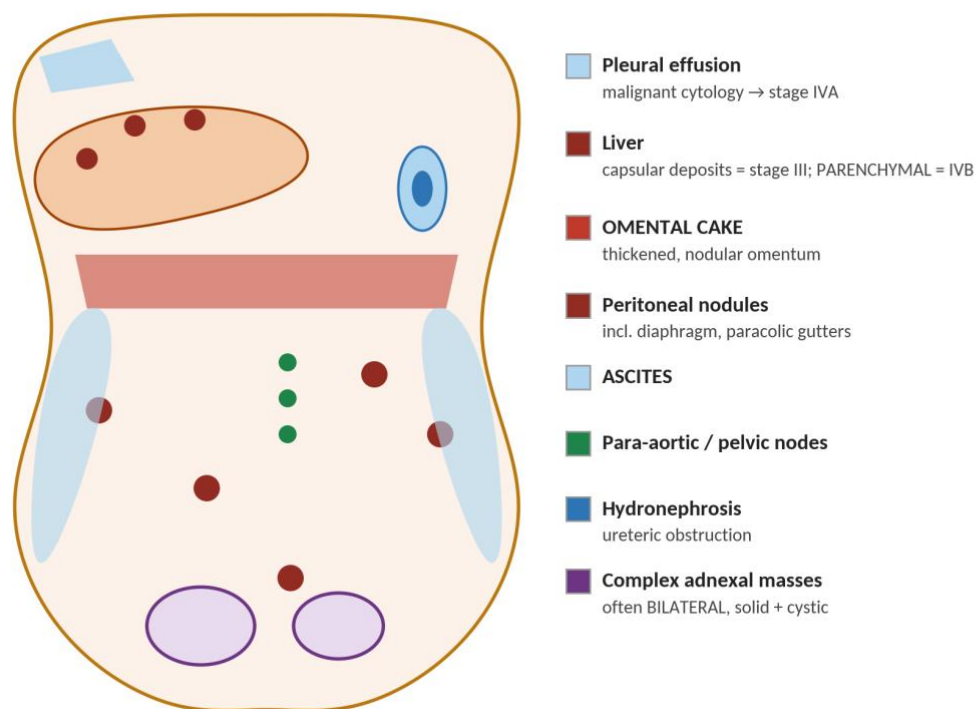


Figure 6. Ovarian cancer — the staging checklist.

OVARIAN CANCER

- **CT chest/abdomen/pelvis with contrast** = standard staging
- Complex, often **bilateral** adnexal masses; **ascites**; **omental cake**; peritoneal nodules; nodes; hydronephrosis
- Liver **parenchymal** mets or malignant effusion = **stage IV**
- PET-CT for recurrence / equivocal findings (~15–20 mSv)

ACUTE PAIN (not pregnant)

- Appendicitis (US first in young women), **tubo-ovarian abscess** (rim-enhancing collection, fat stranding), haemoperitoneum, diverticulitis
- Torsion: **US first**; CT may show an enlarged, displaced ovary
- Renal colic: **low-dose non-contrast CT KUB**
- Trauma: contrast CT in the stable patient

	CT better for...	MRI better for...
Speed	Seconds — trauma, unstable patients	15–60 min
Tissue detail	Calcification, bone, lungs	Soft tissue — uterus, cervix, adnexa
Radiation	Yes	None
Pregnancy	Avoid if possible	Preferred (without gadolinium)
In O&G	Ovarian cancer staging, acute abdomen, trauma, recurrence	Endometrial + cervical staging, fibroids, adenomyosis, accreta, endometriosis

★ PEARL

CTPA gives the maternal breast a much higher dose than V/Q; V/Q gives the fetus slightly more — both are small. RCOG: abnormal CXR → CTPA; normal CXR → V/Q or CTPA by local policy after counselling.

Iodinated contrast is **not contraindicated** in pregnancy; use when essential.

Ovarian cancer → CT; endometrial and cervical cancer → MRI.

6 MRCOG Exam Pearls — Last-Minute Page

Numbers to know

-1000 / 0 HU of air / water	-100 to -50 HU of fat	~10 mSv CT abdomen/pelvis	~25 mGy Max fetal dose, CT A/P
~100 mGy Deterministic threshold	20–35 s Arterial phase	60–80 s Portal venous phase	eGFR < 30 Contrast AKI / metformin risk

HIGH-YIELD CHECKLIST

- ☐ HU: air -1000, fat negative, water 0, fresh blood ~70, bone ~+1000.
- ☐ Windows: soft tissue, lung, bone, brain — same data.
- ☐ CT A/P ~10 mSv; fetal dose up to ~25 mGy — below deterministic threshold.
- ☐ US/MRI first in pregnancy; routine lead shielding no longer advised.
- ☐ Phases: non-contrast, arterial, portal venous, delayed.
- ☐ Contrast AKI risk eGFR < 30; metformin stop 48 h only if eGFR < 30/AKI.
- ☐ Iodinated contrast: crosses placenta, not teratogenic; breastfeeding continues.
- ☐ Suspected PE: start LMWH; DVT signs → leg Doppler; abnormal CXR → CTPA; normal → V/Q or CTPA.
- ☐ CTPA → breast dose; V/Q → slightly more fetal dose.
- ☐ Ovarian cancer staging = CT: omental cake, ascites, nodes, liver, effusion.
- ☐ CT for ovarian; MRI for endometrial and cervical cancer.

Quick-fire self-test — cover the right-hand column

Question	Answer
HU value of water?	0
A negative-HU component in an adnexal mass suggests...?	Fat — dermoid
Phase used for routine abdomen/pelvis?	Portal venous (~60–80 s)
Typical effective dose of CT abdomen/pelvis?	~10 mSv
Which PE test gives the lower maternal breast dose?	V/Q scan
First step for suspected PE in pregnancy?	Start LMWH (unless contraindicated)
Abnormal CXR in suspected PE in pregnancy → ?	CTPA
Can a woman breastfeed after iodinated contrast?	Yes
When is metformin paused after contrast?	eGFR < 30 or AKI — for 48 h
Standard staging test for ovarian cancer?	Contrast CT chest/abdomen/pelvis

Question	Answer
Liver parenchymal metastases in ovarian cancer = stage?	IVB

7 References

- RCOG Green-top Guideline No. 37b. Thromboembolic Disease in Pregnancy and the Puerperium: Acute Management. 2015.
- Royal College of Radiologists. Standards for intravascular contrast administration to adult patients. 3rd ed. 2015.
- British Institute of Radiology. Guidance on using shielding on patients for diagnostic radiology applications. 2020.
- MBRRACE-UK. Saving Lives, Improving Mothers' Care (latest report).