PIPADOR REVISION

MRCOG Part 1 Revision Notes

Pharmacokinetics

PHARMACOLOGY • LECTURE 364

VISUAL EXAMINATION REVISION NOTES

2026 Edition

364

MRCOG PART 1 REVISION NOTES | PHARMACOLOGY

Pharmacokinetics

ADME, bioavailability, volume of distribution, clearance, half-life, kinetics and drug monitoring

ADME	t½	4–5 t½	F
Absorption, distribution, metabolism, excretion	= 0.693 × Vd / CL	To steady state	Bioavailability

■ KEY FACTS: Learning objectives

- Define pharmacokinetics and describe absorption, distribution, metabolism and excretion.
- Define key parameters: bioavailability, volume of distribution, clearance, half-life, steady state.
- Describe zero- and first-order kinetics, therapeutic drug monitoring and O&G examples.

364.1 ADME

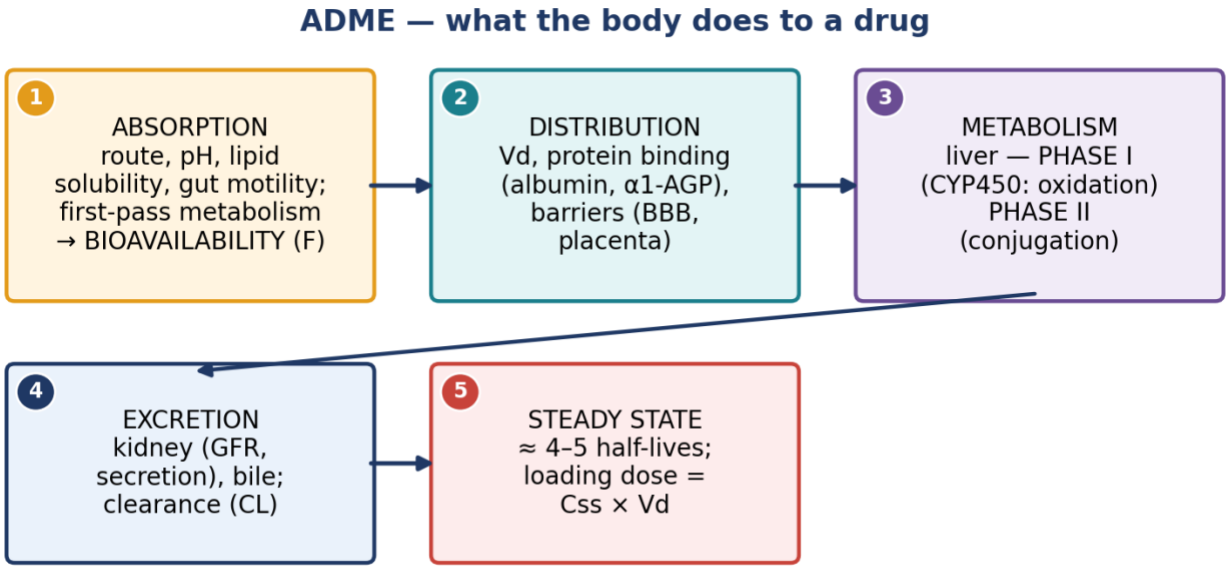


Figure 364.1 — ADME

Process	Key points / O&G examples
Absorption	• Oral (first-pass metabolism — e.g. low oral bioavailability of progesterone, GTN) • Vaginal/rectal (misoprostol, progesterone pessaries bypass first pass, uterine first-pass effect) • IM (ceftriaxone, oxytocin) • Transdermal (HRT patches)
Distribution	• **Vd** = amount in body / plasma concentration • Lipophilic drugs large Vd • Protein binding (albumin — acidic drugs; α1-acid glycoprotein — basic drugs, local anaesthetics) • Barriers: blood–brain, placenta

Process	Key points / O&G examples
Metabolism	• **Phase I** (CYP450 oxidation/reduction/hydrolysis) → **Phase II** (glucuronidation, sulphation, acetylation) → water-soluble metabolites • Prodrugs (codeine → morphine via CYP2D6) • Pharmacogenetics (CYP2D6 ultra-rapid, slow acetylators)
Excretion	• Renal (filtration, secretion, reabsorption — pH-dependent) • Biliary/enterohepatic (COC, antibiotics) • Lungs (volatile anaesthetics), breast milk

364.2 Key parameters

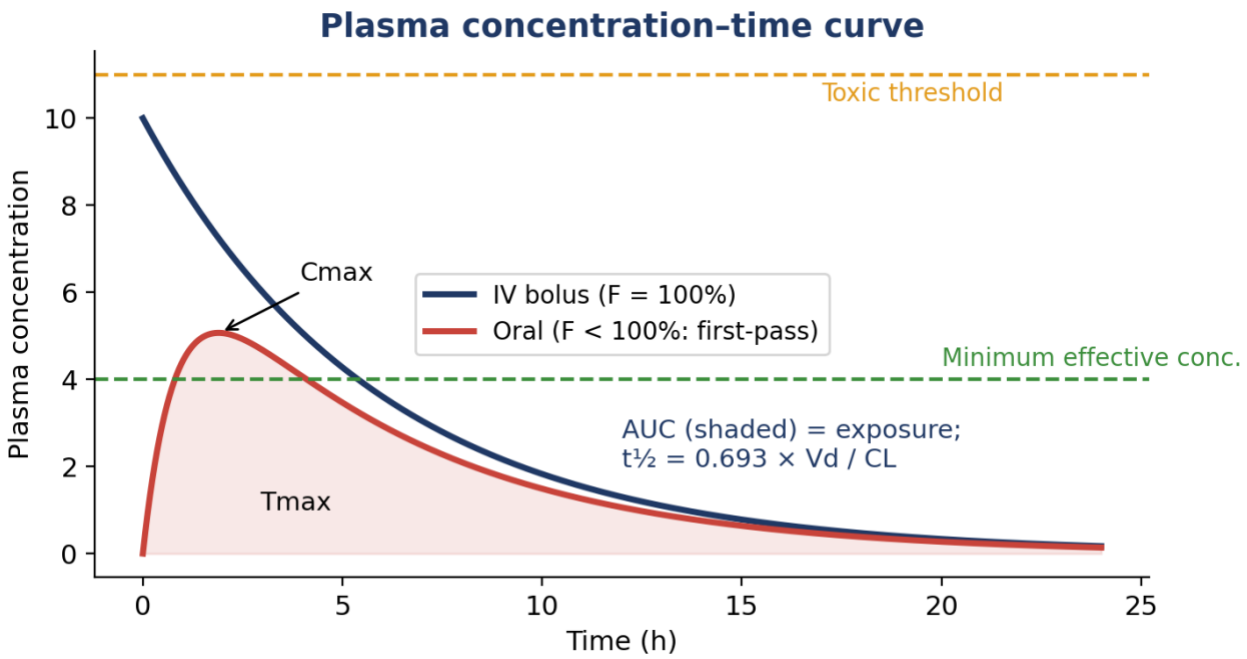


Figure 364.2 — Plasma concentration–time curve

- **First-order kinetics**: a constant **fraction** eliminated per unit time (most drugs) — t½ constant.
- **Zero-order kinetics**: a constant **amount** eliminated (saturated enzymes) — alcohol, high-dose phenytoin, aspirin overdose → small dose increases cause large level rises.
- **Loading dose** = target Css × Vd (e.g. $MgSO_4$ 4 g IV loading, then 1 g/h maintenance); maintenance dose = Css × CL.
- **Therapeutic drug monitoring** for narrow therapeutic index drugs: gentamicin, vancomycin, lithium, phenytoin, digoxin, tacrolimus
  - **Magnesium** (therapeutic 2–4 mmol/L).

364.3 Must-know summary

■ EXAM TIP

- ADME; bioavailability reduced by first-pass metabolism (avoid with vaginal/sublingual routes).
- Vd, CL and t½ (t½ = 0.693 Vd/CL); steady state after 4–5 half-lives.
- First-order (fraction) vs zero-order (amount) — phenytoin, alcohol.
- Loading dose for rapid effect ($MgSO_4$); TDM for narrow therapeutic index drugs.

■ **MNEMONIC / MEMORY AID**

'A Drug Must Exit' — Absorption, Distribution, Metabolism, Excretion.