

Exercise walk-through

11.7

Adverse reactions, interactions and safe-medication principles

University Medicine

Adverse reactions, interactions and safe-medication principles

- 1 Types** Type A dose-related, predictable (β -blocker bradycardia); type B idiosyncratic - population reporting (Yellow Card UK, MedWatch US).
- 2 Kinetics** Induction (rifampicin): levels fall, days on/off; inhibition (clarithromycin, grapefruit CYP3A4): rises from first dose.
- 3 Backstop** Five rights - patient, drug, dose, route, time; warfarin INR is where interactions surface.

Interaction mechanisms on the level axis

two kinds of harm

Type A — dose-related

predictable from pharmacology
(β -blocker bradycardia)

Type B — idiosyncratic

not dose-related: allergy, rare toxicity
— found by population reporting

kinetic interactions

INDUCTION ↓

rifampicin, phenytoin:
new enzyme — days on,
days off; outlasts course

INHIBITION ↑

clarithromycin,
grapefruit (CYP3A4):
rises from first dose

warfarin + inhibitor → INR ↑ · + inducer → INR ↓
the INR is where the interaction surfaces

the five rights — patient, drug, dose, route, time — are the behavioural backstop

reporting systems: UK MHRA Yellow Card · US FDA MedWatch (population detects type B)

Induction lowers exposure, inhibition raises it; ADR types split by dose-relatedness.

Check yourself

- V_d 40 L, CL 5 L/h $\rightarrow t_{1/2}$...? (5.5 h.)
- Competitive antagonist does what to the curve...? (Right shift, surmountable.)
- Anticholinergic **toxidrome** looks like...? (Dry, blind, fast, blocked.)
- Warfarin + rifampicin $\rightarrow$ INR...? (Falls - induction.)

Exercises 2.1-2.3

2.1 Define type A vs type B in one line each. [3]

2.2 Which is faster: induction or inhibition? [3]

2.3 Name the five rights. [3]

Exercises 2.1-2.3

2.1 Define type A vs type B in one line each. [3]

2.1

- Type A: dose-related, predictable. Type B: idiosyncratic ✓.
-

2.2 Which is faster: induction or inhibition? [3]

2.2

- Inhibition – occupies existing enzyme at the first dose; induction must build ✓.
-

2.3 Name the five rights. [3]

2.3

- Right patient, drug, dose, route, time ✓.

Exercise 3.1

3.1 A fictional patient stabilised on warfarin twice has medicines added: first a CYP inhibitor, later an inducer.

Predict the INR each time (rises; falls) and time course (inhibitor fast – first doses; inducer slow – days to build enzyme and days to fade) ✓. State where the interaction surfaces (the INR measurement) and what monitoring change follows ✓. [8]

Exercise 3.1

3.1 A fictional patient stabilised on warfarin twice has medicines added: first a CYP inhibitor, later an inducer.

Predict the INR each time (rises; falls) and time course (inhibitor fast – first doses; inducer slow – days to build enzyme and days to fade) ✓. State where the interaction surfaces (the INR measurement) and what monitoring change follows ✓. [8]

3.1

- Inhibitor: warfarin cleared slower → INR rises, within the first co-doses ✓.
- Inducer: clearance faster → INR falls, over days ✓.
- The surface: the INR reading itself ✓.
- Response: shorten monitoring intervals while the pair run together; recheck after any change ✓.

Exercise 3.2

3.2 A fictional near-miss: the right drug at tenfold the intended amount was caught at the bedside.

Classify what would have happened (type A – dose-related, predictable) and why the near-miss chain is behavioural, not pharmacological ✓. Explain the role of the five rights and of population reporting (UK MHRA Yellow Card; US FDA MedWatch) for type B detection ✓ (WHO patient-safety fact sheet, 2023). [7]

Exercise 3.2

3.2 A fictional near-miss: the right drug at tenfold the intended amount was caught at the bedside.

Classify what would have happened (type A – dose-related, predictable) and why the near-miss chain is behavioural, not pharmacological ✓. Explain the role of the five rights and of population reporting (UK MHRA Yellow Card; US FDA MedWatch) for type B detection ✓ (WHO patient-safety fact sheet, 2023). [7]

3.2

- Tenfold dose = type A in the making – dose-related and predictable ✓.
- The near-miss chain is behavioural: prescribing-dispensing-administration ✓.
- Five rights intercept at the bedside before harm ✓.
- Type B needs population eyes – Yellow Card (UK), MedWatch (US) ✓.