

Exercise walk-through

11.2

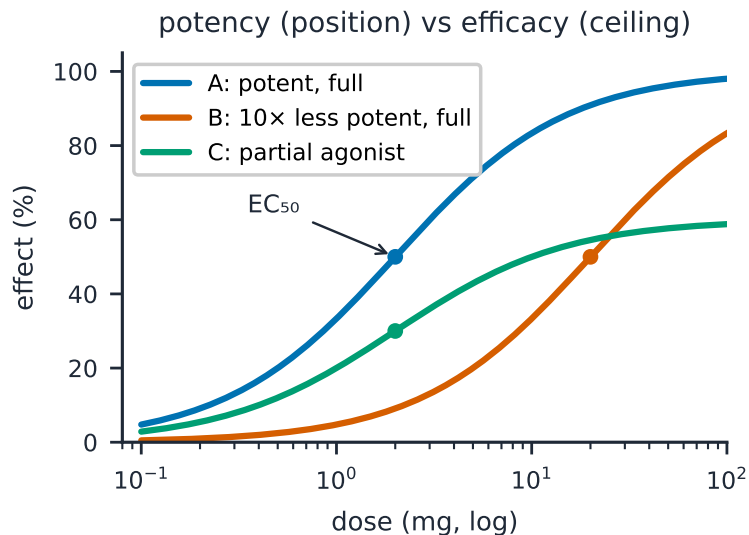
Pharmacodynamics

University Medicine

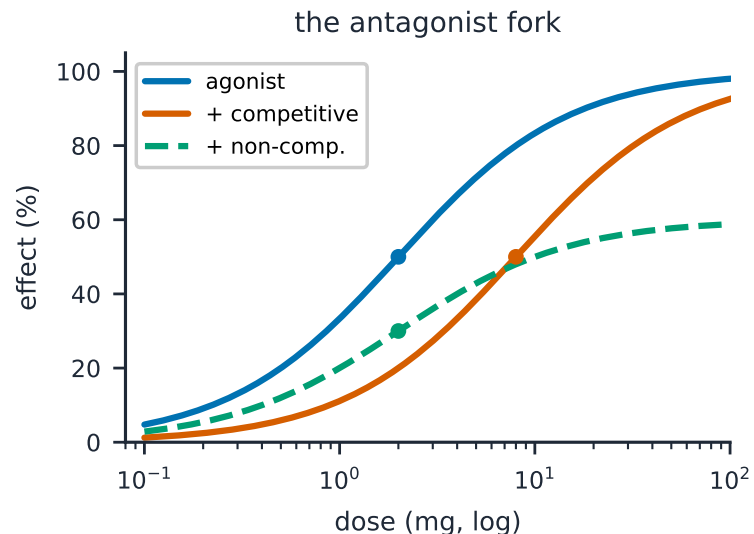
Pharmacodynamics: position and ceiling

- 1 **Curves** EC_{50} = **potency**; E_{max} = **efficacy**; **partial agonist** lowers the ceiling and displaces full agonists.
- 2 **Antagonists** Competitive: parallel right shift, surmountable. Non-competitive: ceiling falls - no dose wins.
- 3 **Margin** $TI = TD_{50}/ED_{50}$ (illustrative $100/10 = 10$); narrow TI = monitor levels.

Dose-response curve families



$TI = TD_{50} / ED_{50}$ · illustrative: $100/10 = 10$ · surmountable vs unsurmountable



Potency is position, **efficacy** is ceiling; antagonists shift right or cut it.

Exercises 2.1-2.3

2.1 Two drugs, same E_{max} , EC_{50} differs $10\times$ – name the difference. [3]

2.2 What does a partial agonist do to the ceiling of a mixture? [3]

2.3 State the therapeutic index formula. [3]

Exercises 2.1-2.3

2.1 Two drugs, same E_{max} , EC_{50} differs $10\times$ – name the difference. [3]

2.1

- Potency – B is $10\times$ less potent, equally efficacious ✓.
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2.2 What does a partial agonist do to the ceiling of a mixture? [3]

2.2

- Lowers it – the partial agonist competes and caps the mixture near its own ceiling ✓.
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2.3 State the therapeutic index formula. [3]

2.3

- $TI = TD_{50}/ED_{50}$ (illustrative $100/10 = 10$) ✓.

Exercise 3.1

3.1 Three illustrative curves: A (EC_{50} 2 mg, E_{max} 100 %), B (EC_{50} 20 mg, E_{max} 100 %), C (EC_{50} 2 mg, E_{max} 60 %).

Classify each on both axes (A potent and full; B 10× less potent, equally efficacious; C potent partial agonist) ✓. Predict C's effect co-given with a full agonist at saturating concentration (ceiling pulled toward C's 60 %) ✓. State which of A or B is preferred if both reach the target and A costs the same (potency then matters for dose size only) ✓.

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Classify each on both axes (A potent and full; B 10× less potent, equally efficacious; C potent partial agonist) ✓. Predict C's effect co-given with a full agonist at saturating concentration (ceiling pulled toward C's 60 %) ✓. State which of A or B is preferred if both reach the target and A costs the same (potency then matters for dose size only) ✓. [8]

3.1

- A: potent, full efficacy ✓.
- B: 10× less potent (EC_{50} 20 mg), same ceiling ✓.
- C: potent but partial – E_{max} 60 % ✓.
- C + full agonist at saturation: ceiling pulled toward 60 % (displacement) ✓.
- Potency only sets dose size; if both reach target, either serves ✓.

Exercise 3.2

3.2 An illustrative antagonist pair on the same agonist curve.

Compare competitive (parallel right shift; effect restored by raising agonist concentration) with non-competitive (ceiling falls; no concentration wins) ✓. Explain which pattern an overdose of agonist can overcome and why ✓.

[7]

Exercise 3.2

3.2 An illustrative antagonist pair on the same agonist curve.

Compare competitive (parallel right shift; effect restored by raising agonist concentration) with non-competitive (ceiling falls; no concentration wins) ✓. Explain which pattern an overdose of agonist can overcome and why ✓. [7]

3.2

- Competitive: right shift, parallel, surmountable ✓.
- Non-competitive: ceiling lowered, unsurmountable ✓.
- Overcome: the competitive case – more agonist outcompetes at the binding site ✓.
- The non-competitive case removes the rope: no tug-of-war is possible ✓.