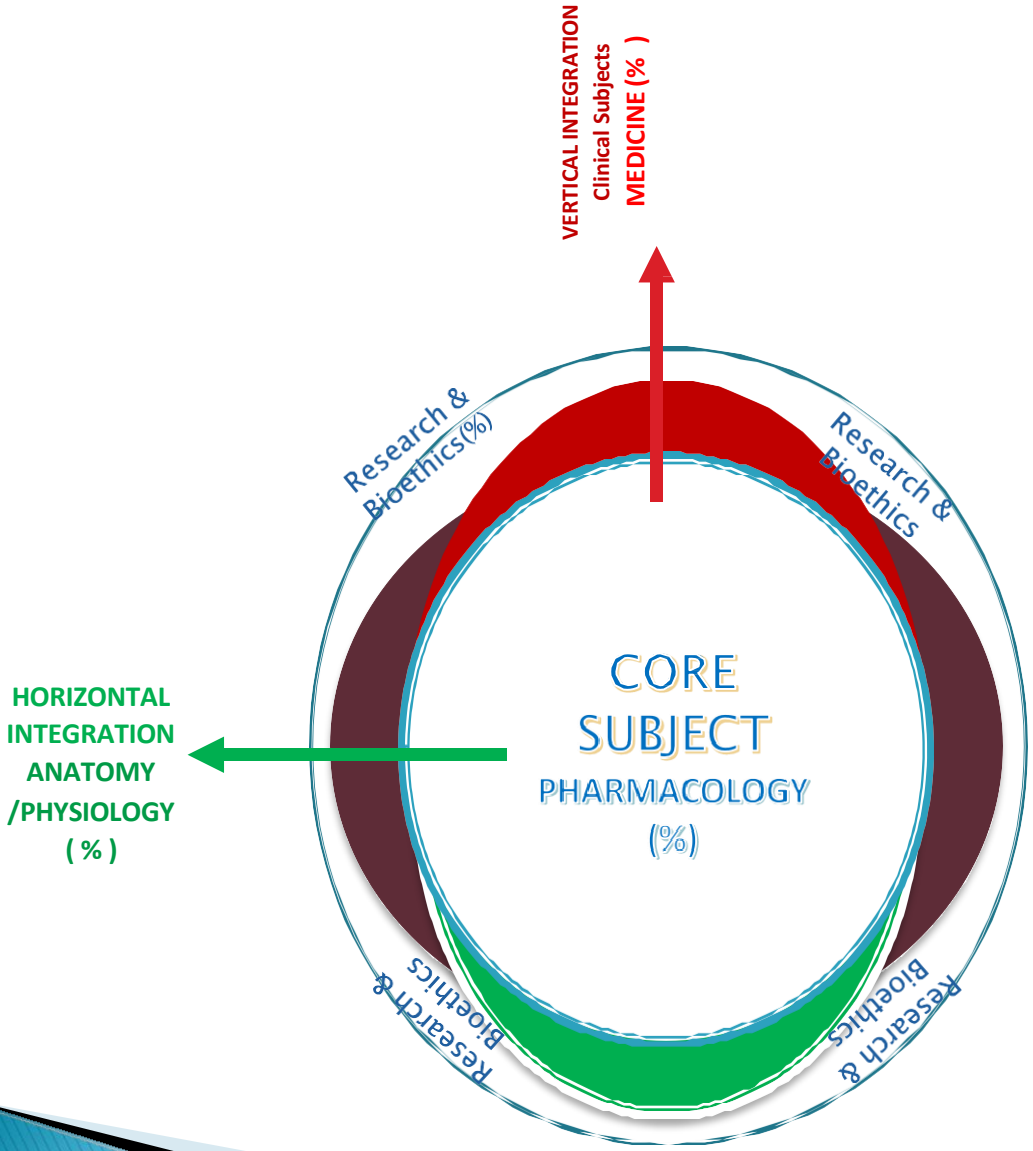

بسم الله الرحمن الرحيم

MOTTO AND VISION

- To impart evidence based research oriented medical education
- To provide best possible patient care
- To inculcate the values of mutual respect and ethical practice of medicine

Prof. Umar's Clinically Oriented Integration Model
For Basic Sciences Interactive Lectures



3rd Year Pharmacology LGIS (slides)
Core Subject- slides (70%)
Horizontal Integration- (5%) slides)
Vertical integration (Clinical Subjects) • (Medicine) – slides (20%)
Research & Bioethics slide (5%)

Dose Response Curve

SOURCE :

Bertram G. Katzung Basic & Clinical Pharmacology 15th Edition

Google for images & research article

Core subject

1. What is the difference between a graded and a quantal dose-response curve?

a) A graded curve is based on the response of a population, while a quantal curve is based on an individual.

b) A graded curve shows an individual's response, whereas a quantal curve shows a population's response.

c) A graded curve uses fixed doses, while a quantal curve uses varying doses

d) A quantal curve provides a continuous range of responses, while a graded curve shows a binary response.

e) There is no difference; both curves are the same.

Core subject

2. What is represented on the y-axis of a graded dose-response curve?

a) The cumulative percentage of the population responding
b) The time to maximum effect
c) The percentage of maximum response
d) The number of receptors occupied
e) The rate of drug absorption

3. What does the EC50 value represent in a graded dose-response curve?

a) The dose at which half of the population exhibits a therapeutic effect.
b) The concentration of a drug that causes the maximal response.
c) The dose at which 50% of the maximum effect is observed.
d) The dose required to cause toxicity in 50% of subjects.
e) The maximal concentration at which the drug still produces a therapeutic effect.

4. Which of the following is true for a quantal dose-response curve?

a) It represents the response of individual cells to a drug.
b) It is useful for understanding the drug's safety margin.
c) It can be used to determine the maximal efficacy of a drug.
d) It is typically used to assess the potency of a drug.
e) It only considers the pharmacokinetics of a drug.

Core subject

5. Which of the following is typically derived from a quantal dose-response curve?

a) Ceiling effect
b) Efficacy
c) threshold dose
d) Therapeutic index
e) Slope of the response curve

Core subject

6. Which of the following best describes the therapeutic index (TI)?

a) The difference between the EC50 and the LD50
b) The range of doses where the drug is effective
c) The ratio of a drug's EC50 to its LD50
d) The slope of the dose-response curve
e) The EC50 value at which 50% of the population responds to the drug

Core subject

7. Which of the following would indicate a higher potency of a drug?

a) A shift of the curve to the right
b) A shift of the curve to the left
c) A wider therapeutic index
d) A steeper slope
e) A higher maximum response

Vertical integration- medicine

8. A 60-year-old male is treated with a sedative for anxiety. The physician notes that increasing the dose of the drug leads to a higher intensity of sedation, but beyond a certain dose, the effect plateaus. The physician uses a graded dose-response curve to guide dosing decisions.

Which of the following is most likely represented by the plateau phase in the graded dose-response curve?

a) The point where there is no further increase in the therapeutic effect with increasing dose.

b) The dose at which the drug causes toxic effects in the majority of patients.

c) The dose at which 100% of patients show a therapeutic response.

d) The threshold dose at which the drug first becomes effective.

e) The dose at which the drug causes the maximum tolerated side effects.

9. If 10mg of oxycodone produces greater analgesic response than does aspirin at any dose, which is correct.

a) Oxycodone is more efficacious than aspirin
b) Oxycodone is more potent than aspirin
c) Oxycodone is less potent than aspirin
d) Aspirin is full agonist and oxycodone is partial agonist
e) Oxycodone and aspirin act on the same target site

10. In the presence of picrotoxin, diazepam is less efficacious at causing sedation, regardless of dose. Picrotoxin has no sedative effect even at highest dose. Which of the following statement is correct.

a) Picrotoxin is competitive antagonist
b) Picrotoxin is non-competitive antagonist
c) Diazepam is less efficacious then picrotoxin
d) Diazepam is less potent then picrotoxin
e) Picrotoxin is less potent than diazepam

Learning Objectives

By the end of the lecture, students should be able to:

- Define types of dose response curves
- Define Efficacy, Potency, therapeutic index, therapeutic range.
- Interpret Significance of the above values inclinical settings.

Core subject

Dose response curve

It is graphical representation of a dose-response relationship, the magnitude of response of an organism from exposure to drugs

Core subject

Types of dose response curves

1. Graded dose- response curve
2. Quantal dose -effect curve

Core subject

Graded dose response curve

- Increase in dose of drug will produce gradual increase in response.
- Response is continuous.
- (e.g increase in blood pressure, decrease in blood glucose)

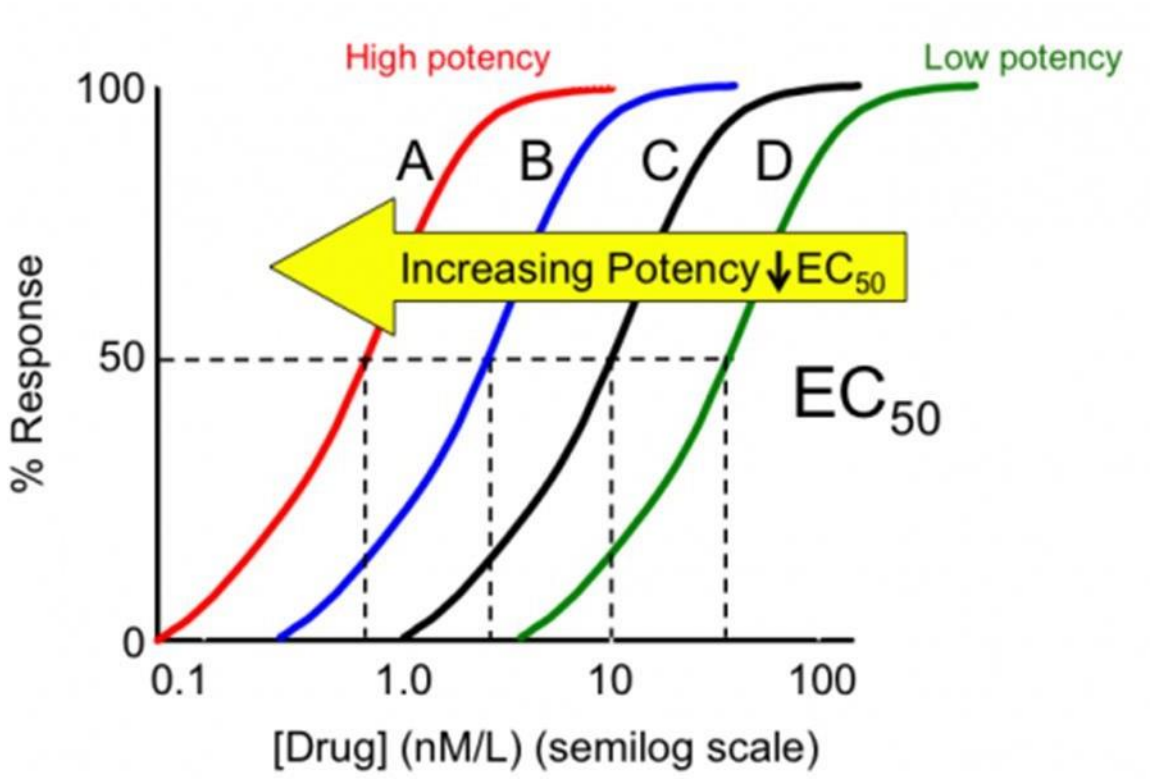
Core subject

Graded response curve

1) **Threshold dose** (dose producing FIRST noticeable effect)
2) **ED5O/EC5O**
3) **ED100/ED max**.
4) **Potency**
5) **Efficacy**
6) **Shape of the Slope**

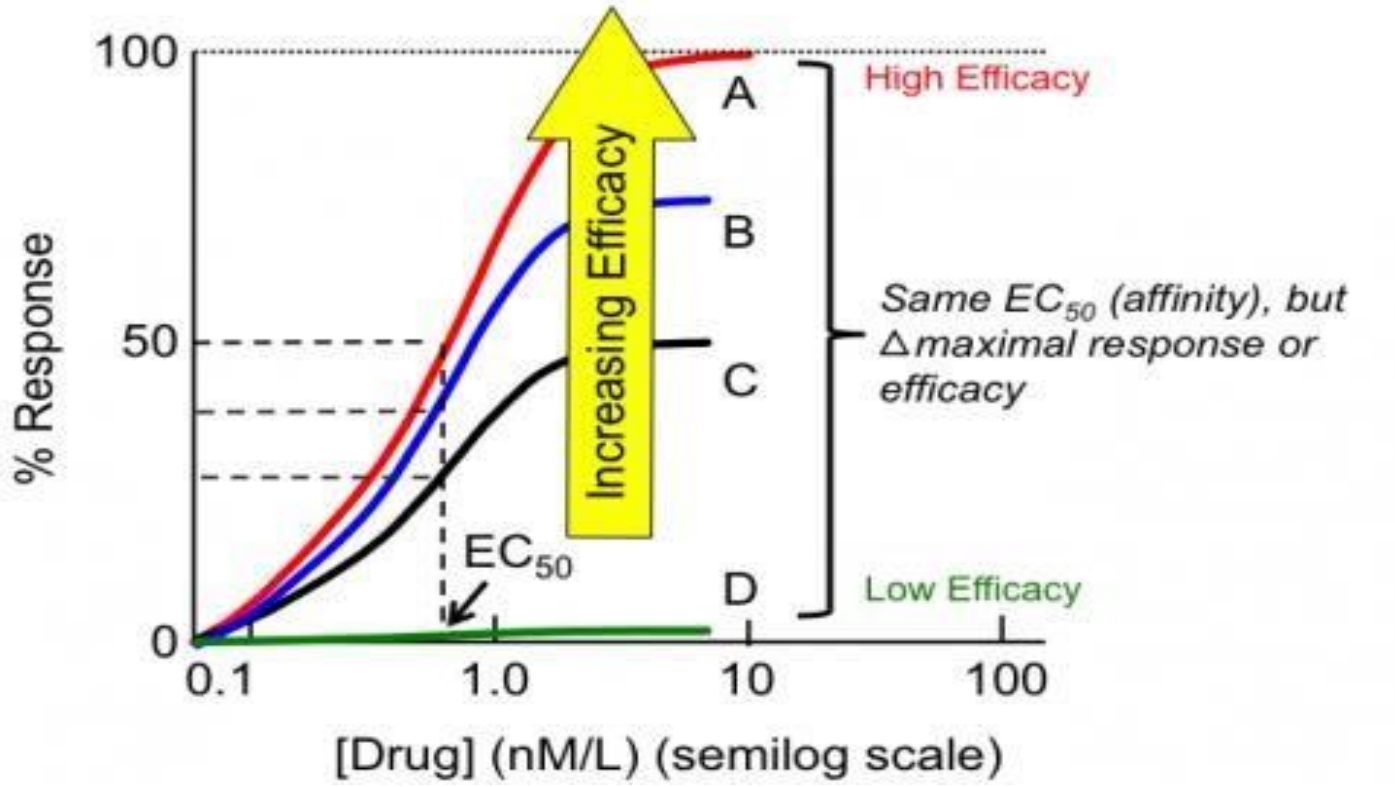
Vertical integration- medicine

POTENCY



Vertical integration- medicine

EFFICACY



Core subject

DRC and Drug Interactions

- Graded dose response is also useful to study pharmacodynamic drug interactions

- Affinity
- Intrinsic activity
- Agonist (full, partial, inverse)
- Antagonist (competitive, non-competitive)

Further reading

Bioethics and research

- Schwab P, Linhardt L, Bauer S, Buhmann JM, Karlen W. Learning counterfactual representations for estimating individual dose-response curves. InProceedings of the AAAI Conference on Artificial Intelligence 2020 Apr 3 (Vol. 34, No. 04, pp. 5612-5619).
- Leucht S, Crippa A, Siafis S, Patel MX, Orsini N, Davis JM. Dose-response meta-analysis of antipsychotic drugs for acute schizophrenia. American Journal of Psychiatry. 2020 Apr 1;177(4):342-53.