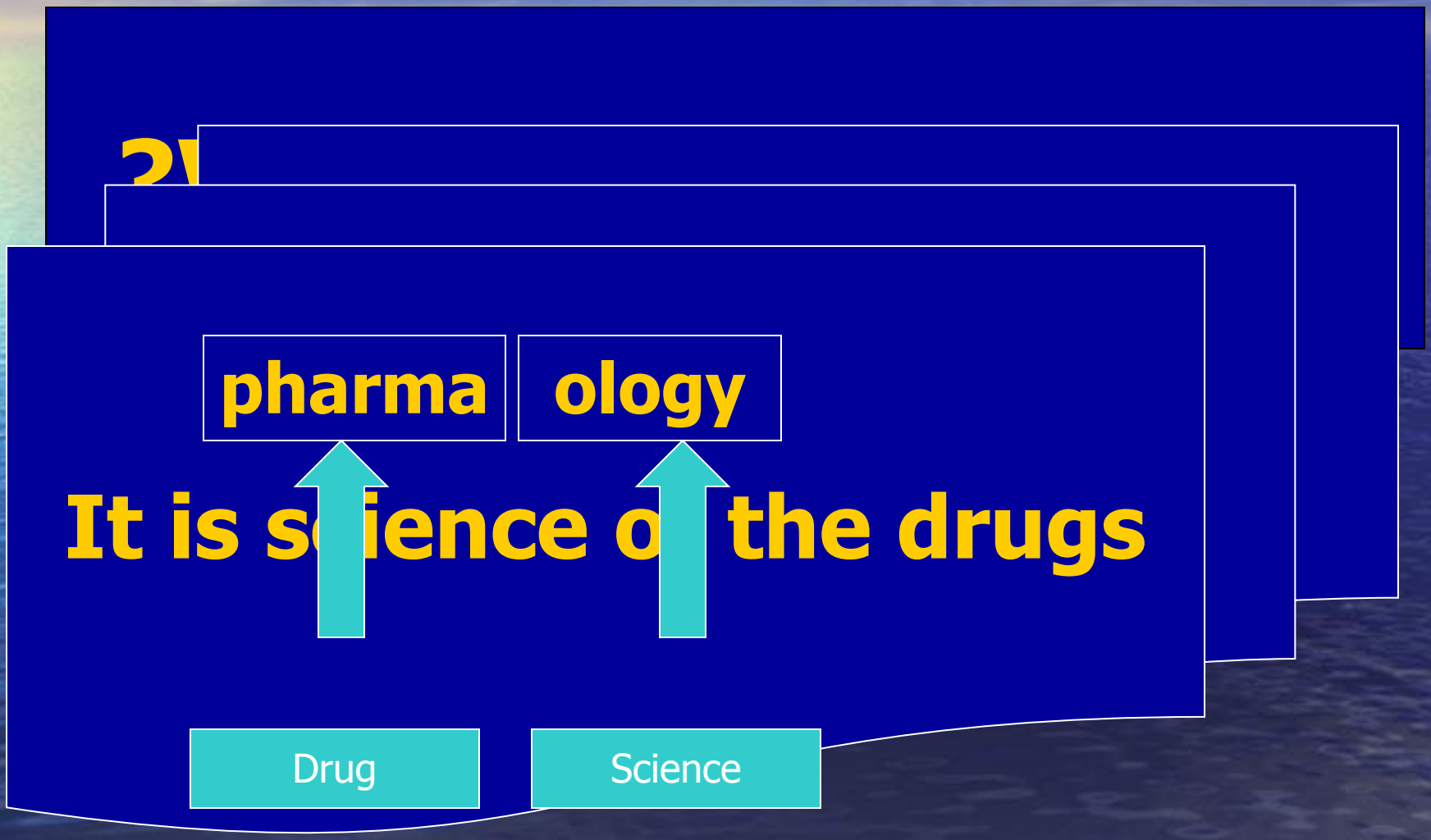
Practical pharmacology

Part 1


pharma
ology
It is science of the drugs
Drug
Science

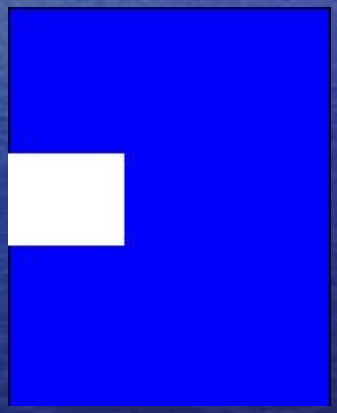
2What is Drug

It is the chemical that affect physiological body function through interaction with receptors

?What is Drug

It is the chemical that affect physiological body function through interaction with receptors

A



Respon
se

Forces involved in D-R interaction

- Covalent bonds
- Ionic bonds
- Hydrogen bonds
- Vander waals bonds

Forces involved in D-R interaction

- Covalent bonds
- Ionic bonds
- Hydrogen bonds
- Vander waals bonds

Forces involved in D-R interaction

Covalent bonds

Strong

irreversible

Alkylating agents

Forces involved in D-R interaction

- Covalent bonds
- Ionic bonds
- Hydrogen bonds
- Vander waals bonds

Forces involved in D-R interaction

Ionic bonds

common

Affected by pH

Forces involved in D-R interaction

- Covalent bonds
- Ionic bonds
- Hydrogen bonds
- Vander waals bonds

Forces involved in D-R interaction

Hydrogen bonds

?

Forces involved in D-R interaction

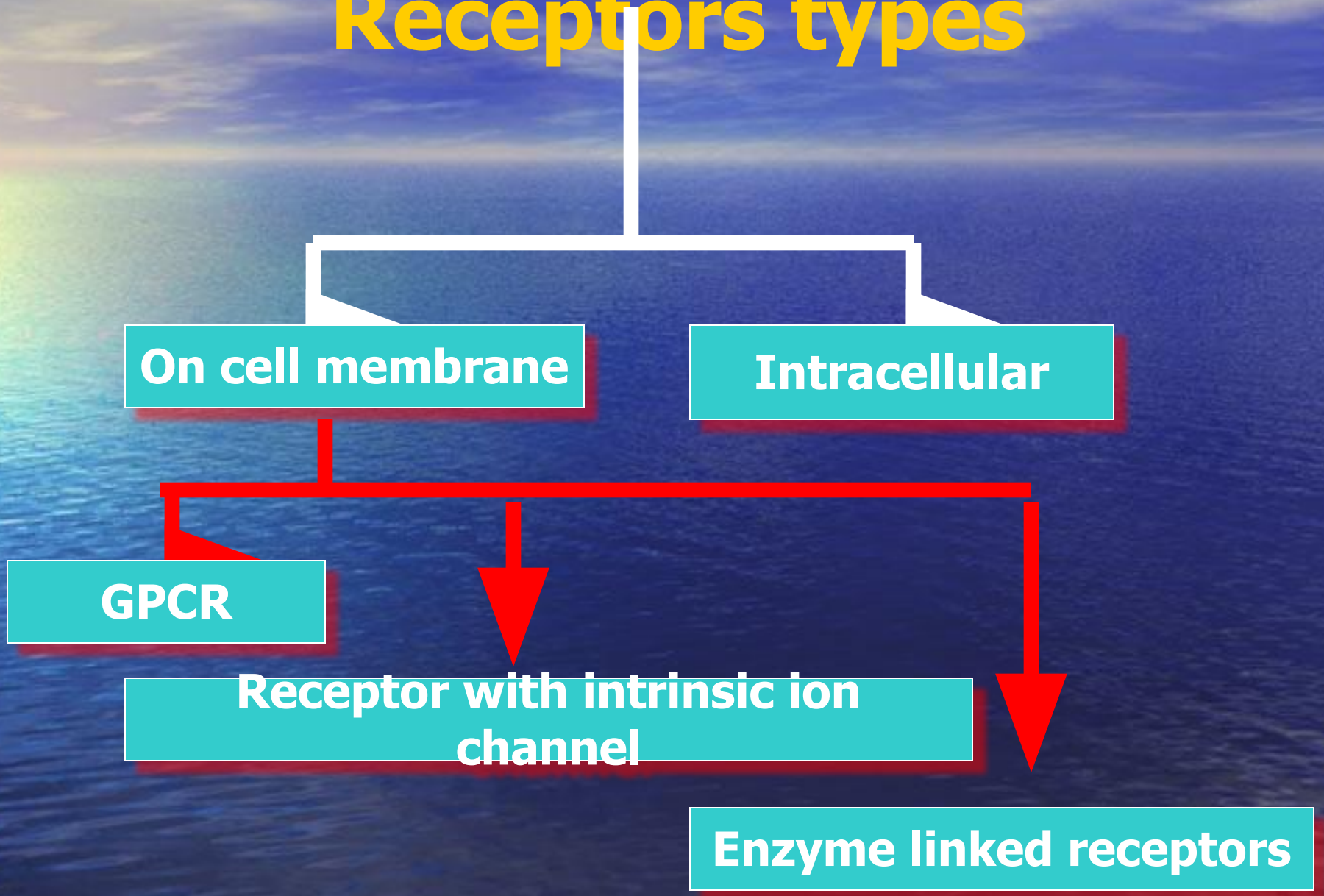
- Covalent bonds
- Ionic bonds
- Hydrogen bonds
- Vander waals bonds

Forces involved in D-R interaction

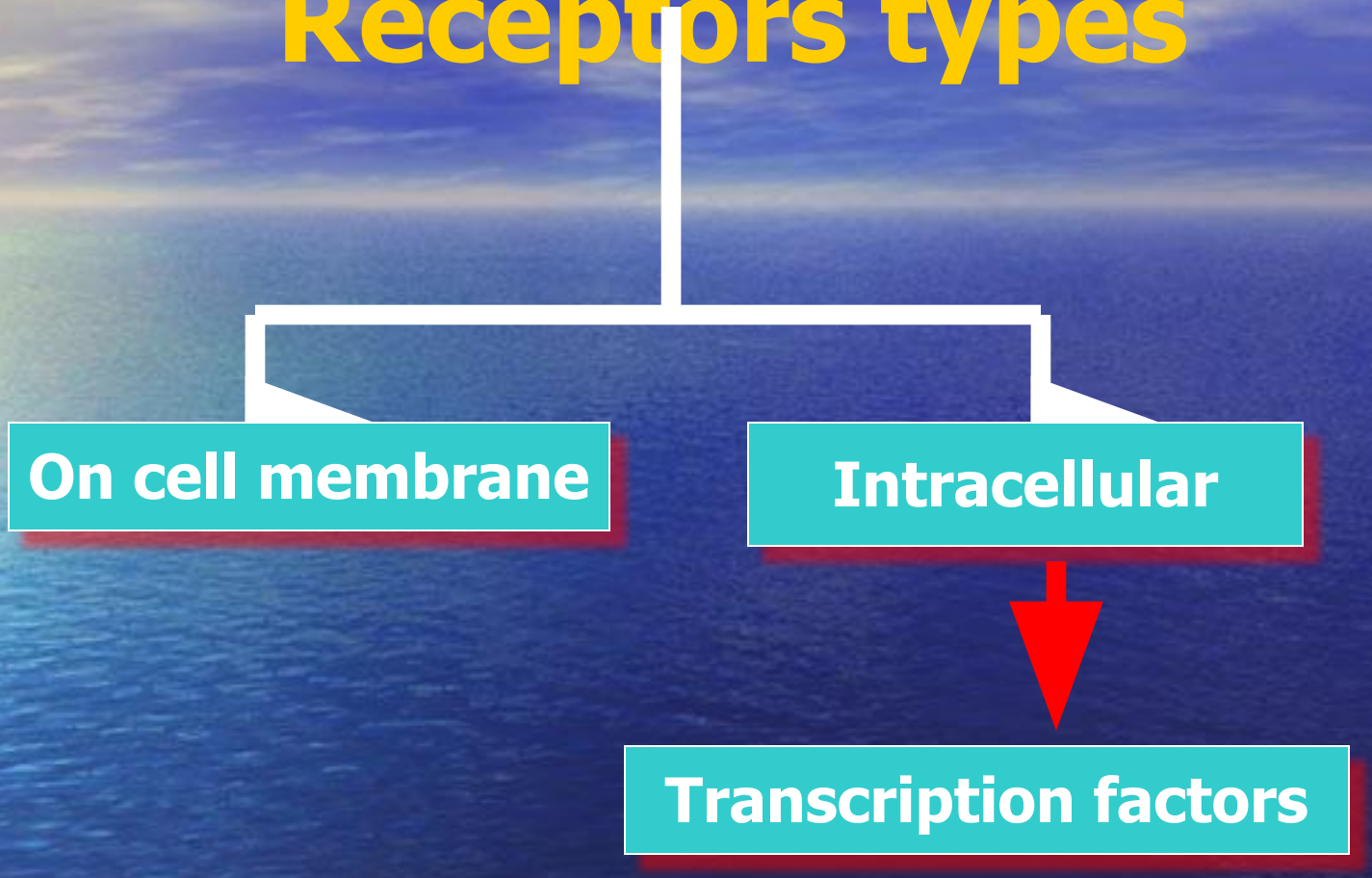
Vander waals bonds

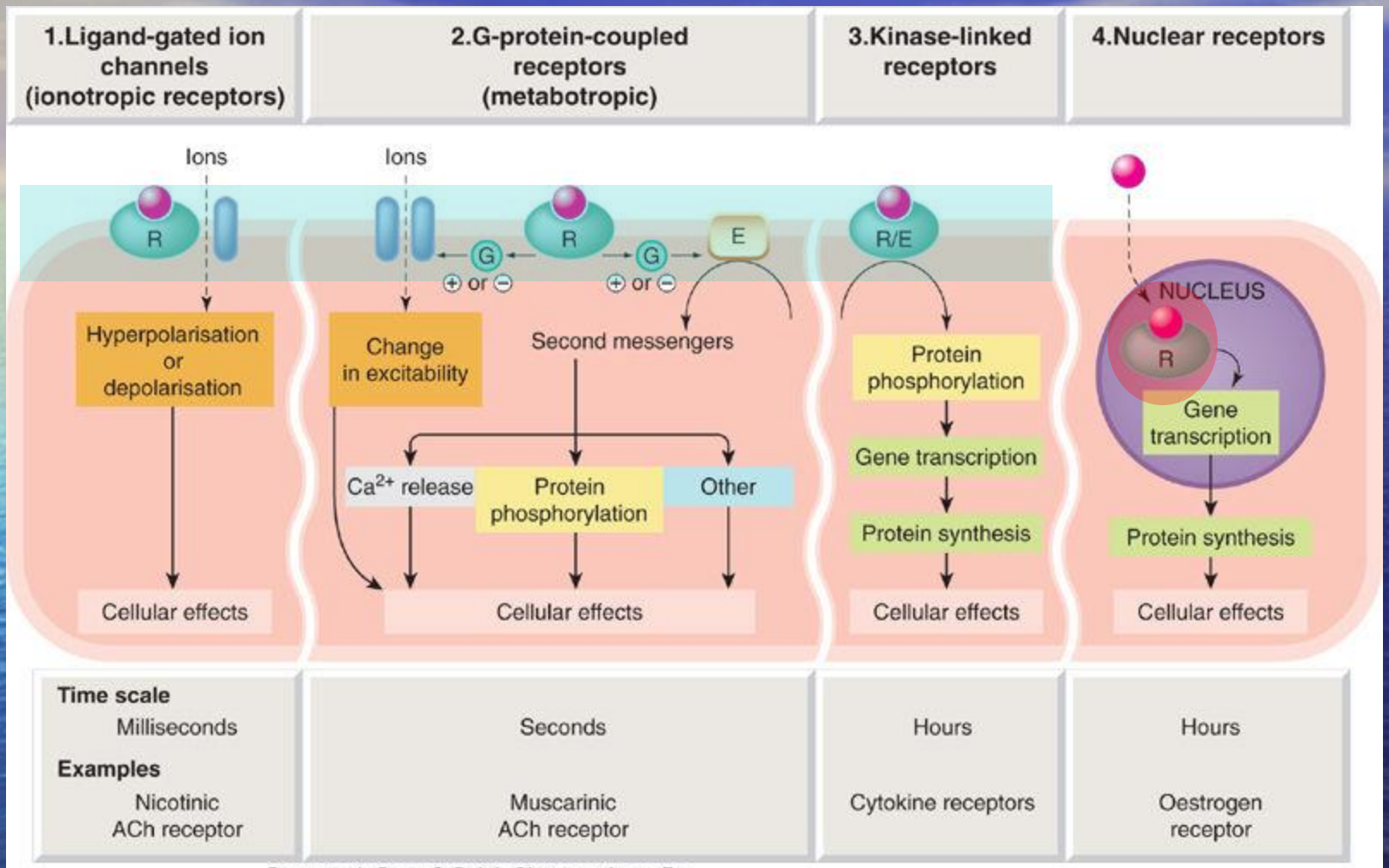
?

Receptors types



Receptors types





Drug-Receptor Interaction

K_1 is association rate constant

Drug-Receptor Interaction

K_2 is dissociation rate constant

Drug-Receptor Interaction

At equilibrium

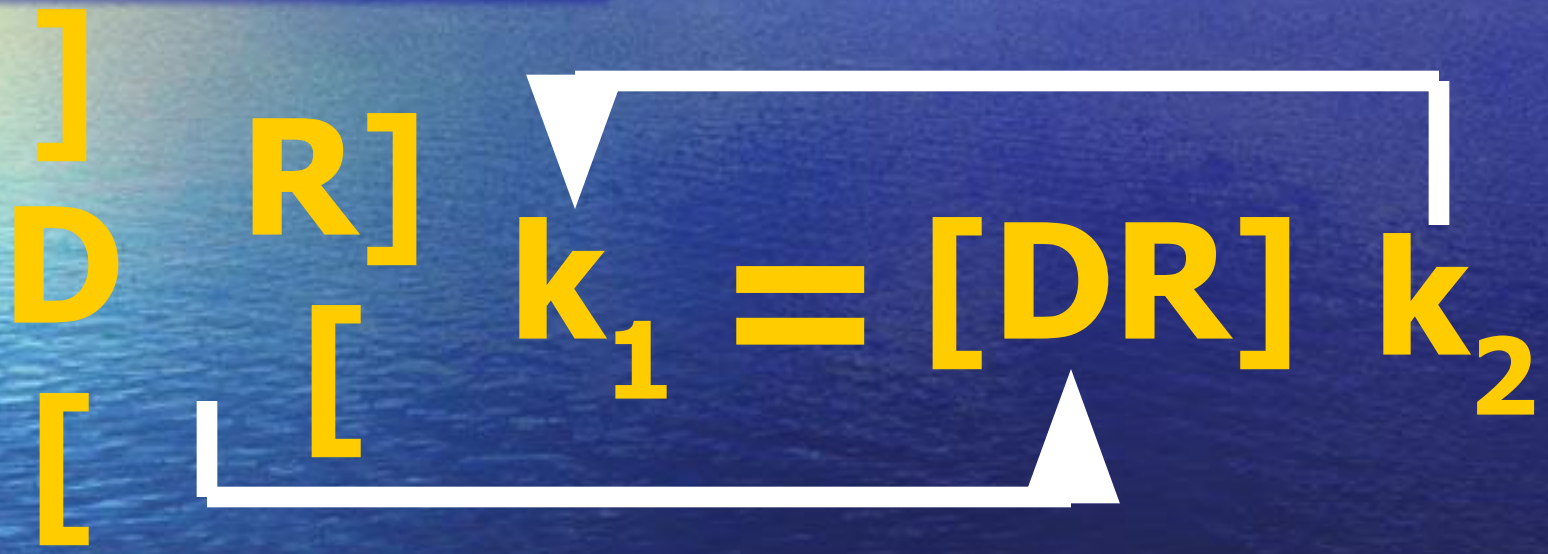
Drug-Receptor Interaction

At equilibrium

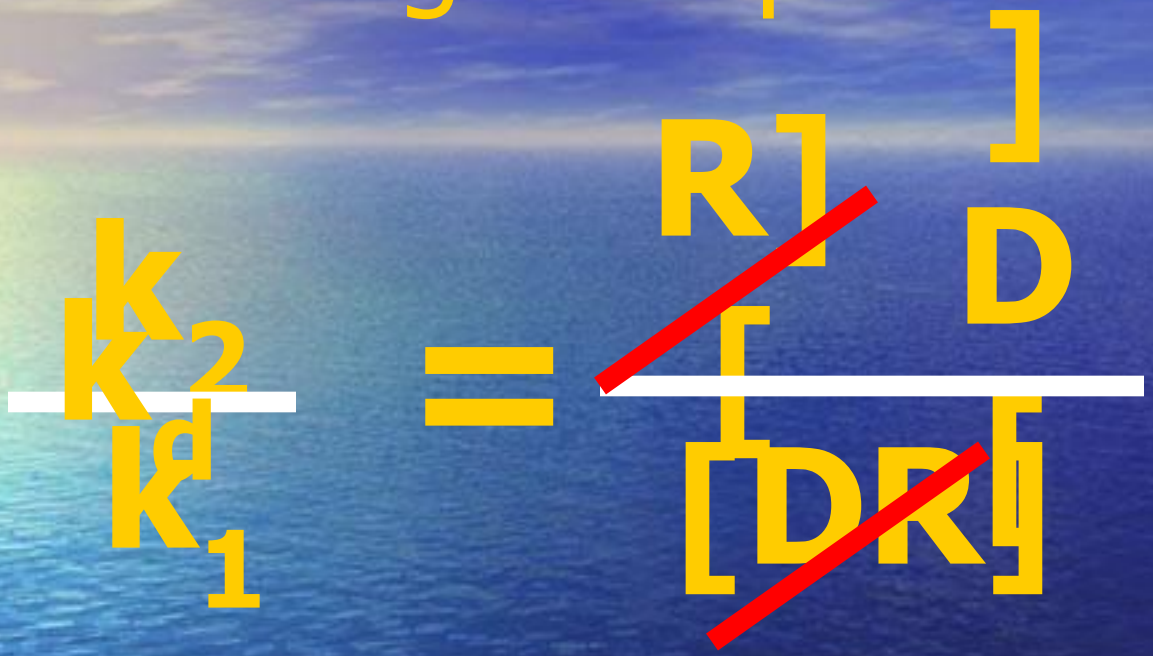
$$[D][R] \; k_1 = [DR] \; k_2$$

Drug-Receptor Interaction

At equilibrium



Drug-Receptor Interaction



Kd (dissociation equilibrium constant) is conc. of the drug that bind 50 % of the receptors

k_d

- It is a measure of drug affinity
- Its units is conc. units

Drug A Has higher K_d than Drug B

? Which one has a higher affinity

Important concepts

- Affinity
- Efficacy
- potency

Affinity

- The ability of the drug to bind to the receptor
- Measured by Kd
- Both agonist and antagonist have affinity to their receptors

Efficacy

- It is the ability of the drugs to elicit pharmacological effect
- Measured by E_{max}
- Agonist has efficacy and antagonist has no efficacy

potency

- The ability of the drug to produce response at lower conc.

- Measured by ED50

The drug may be

- Agonist
- Antagonist
- Partial agonist

Agonist

- Has affinity and efficacy
- IA=1

Antagonist

- Has affinity but no efficacy
- IA=0

Partial agonist

- Has affinity and efficacy
- IA=0-1

antagonism

- Physical
- Chemical
- Physiological
- Pharmacokinetic
- pharmacodynamic

Chemical antagonism

- One drug reacts chemically with an active drug to form an inactive compound,
- It involves precipitation, complexation, neutralization redox reaction.
- Intended ☐treatment of heavy metal toxicity by complexation with chelators.
- Incidental ☐ complexatin of tetracycline calcium in dairy products.

Physiological antagonism

- 2 drugs act on different sites in the same or different system.

- a- Intended □ Norepinephrine in case of anaphylaxis.
- b-Incidental □ patient taking barbiturates for anxiety, co-administration of anti-tussive (ephedrine).

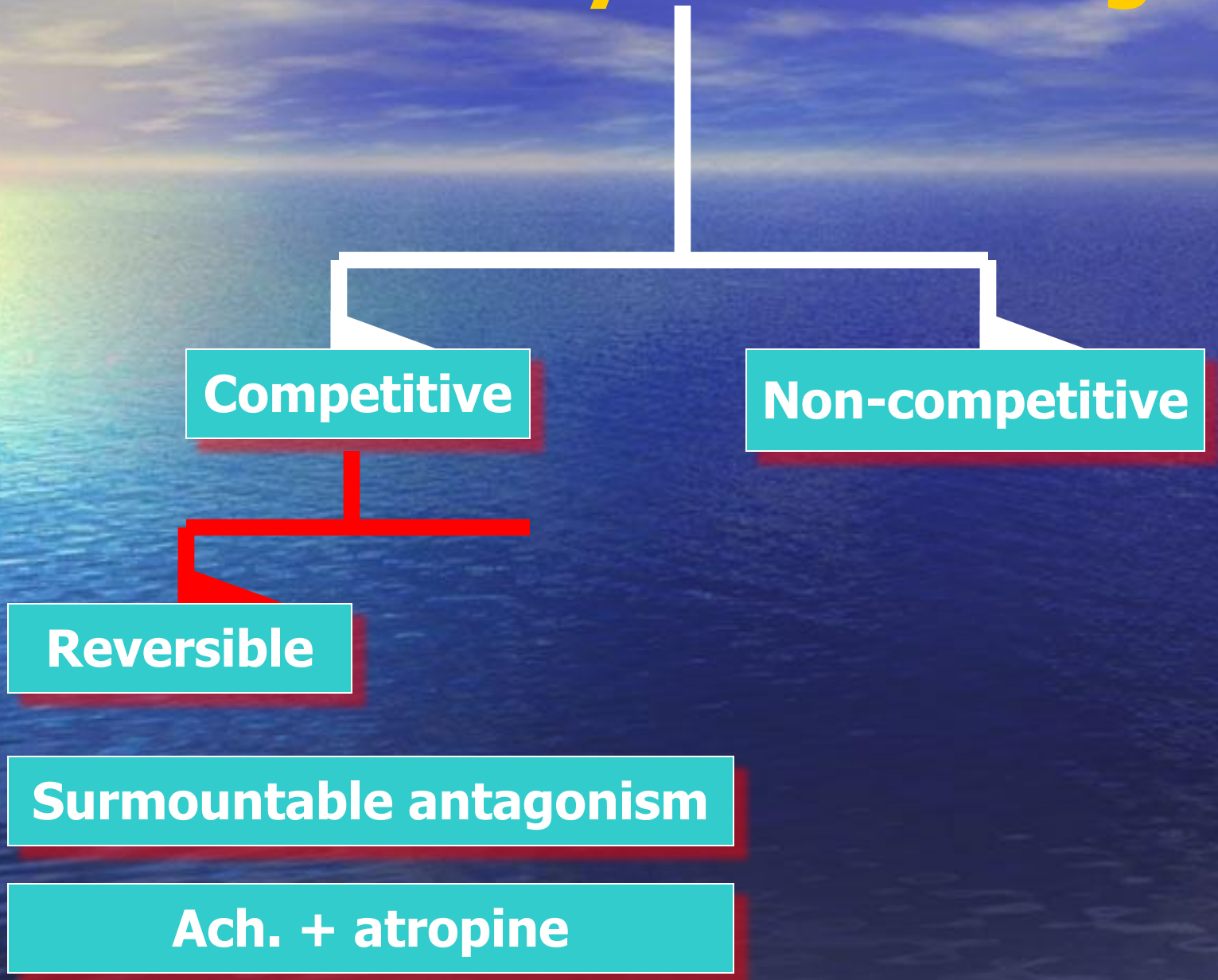
Pharmacokinetic antagonism (ADME)

- a- Intended □ forced alkaline diuresis in management of barb Poisoning.

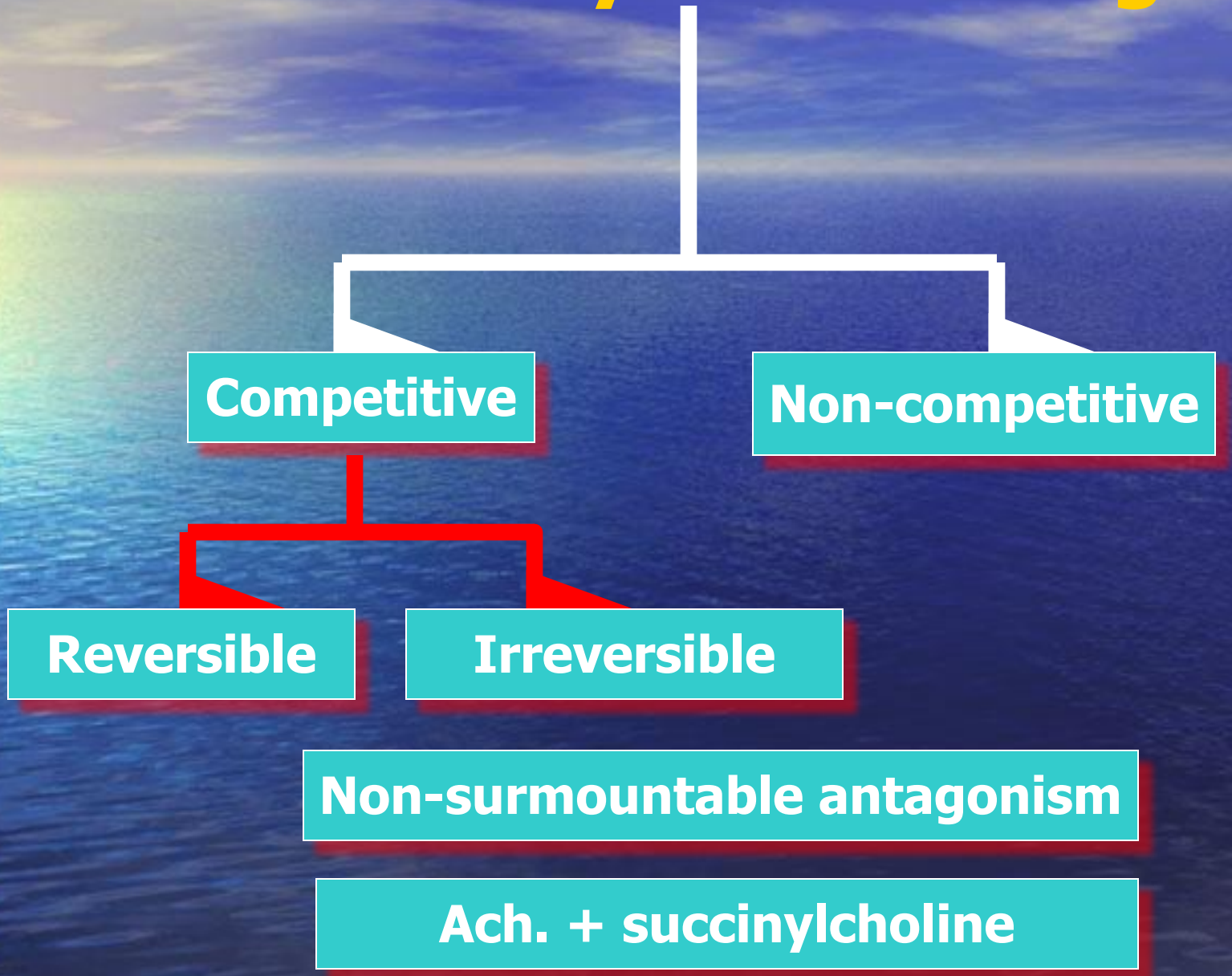
- b- Incidental □ Barb. + other drugs

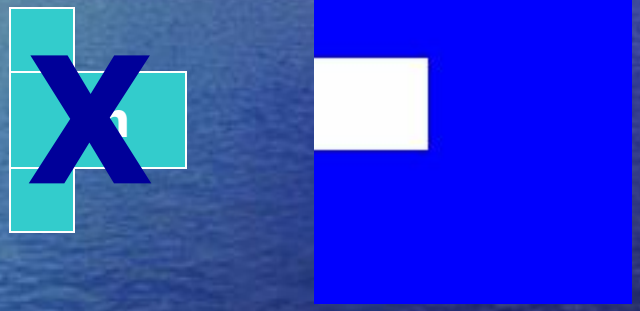
Induction of the metabolism of concomitant drugs, their decrease plasma level.

Pharmacodynamic antagonist

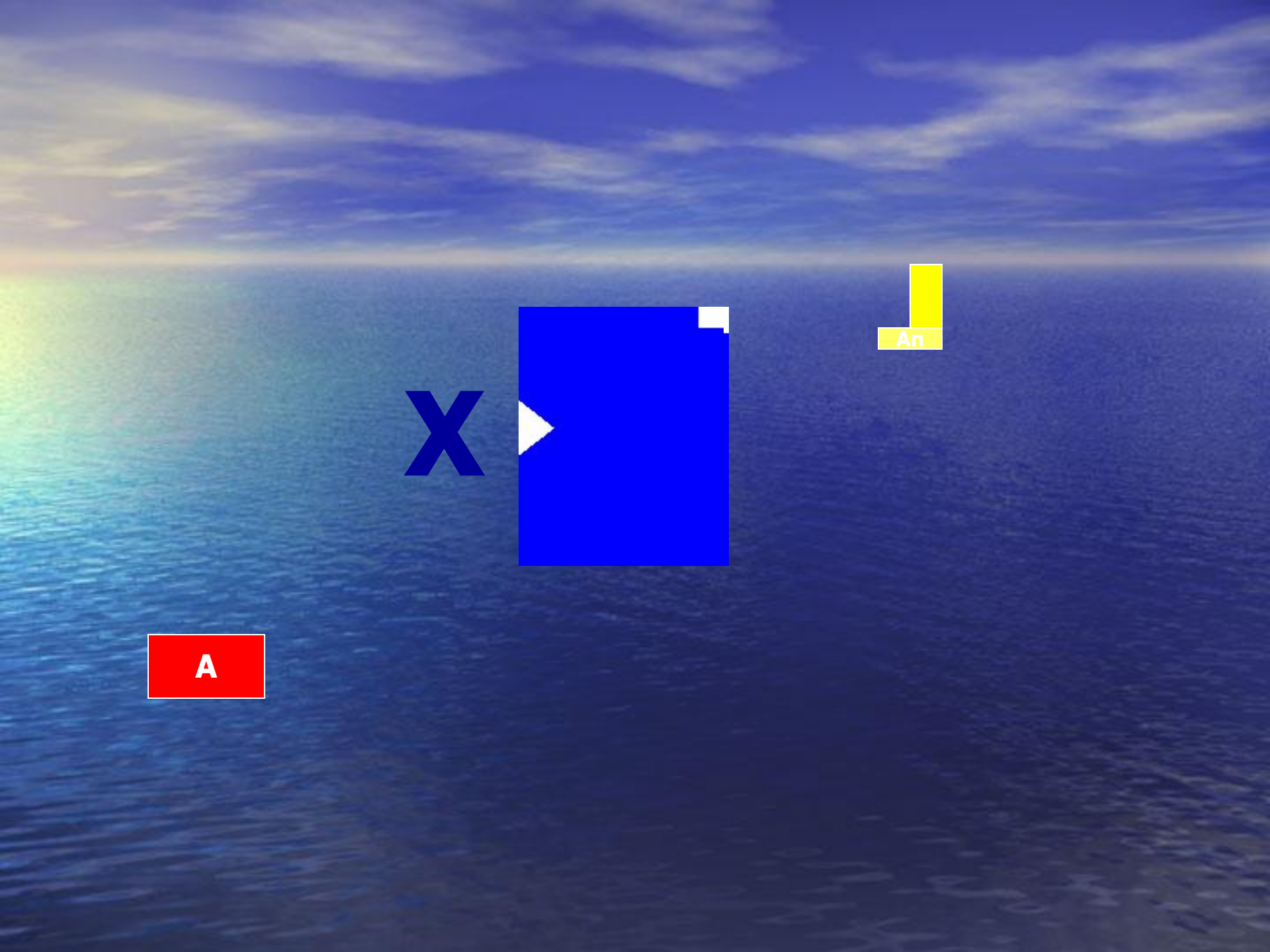


Pharmacodynamic antagonist



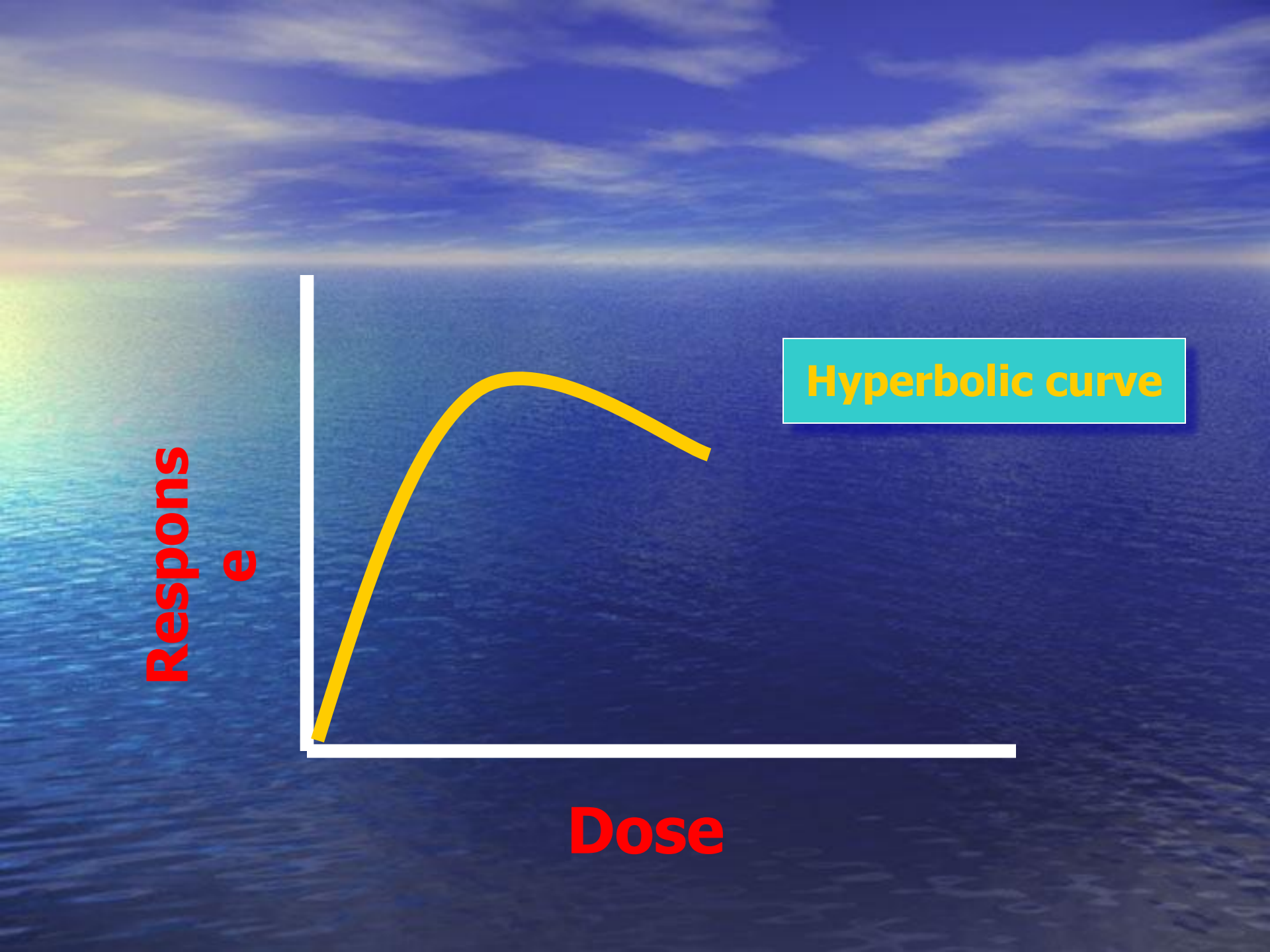


A

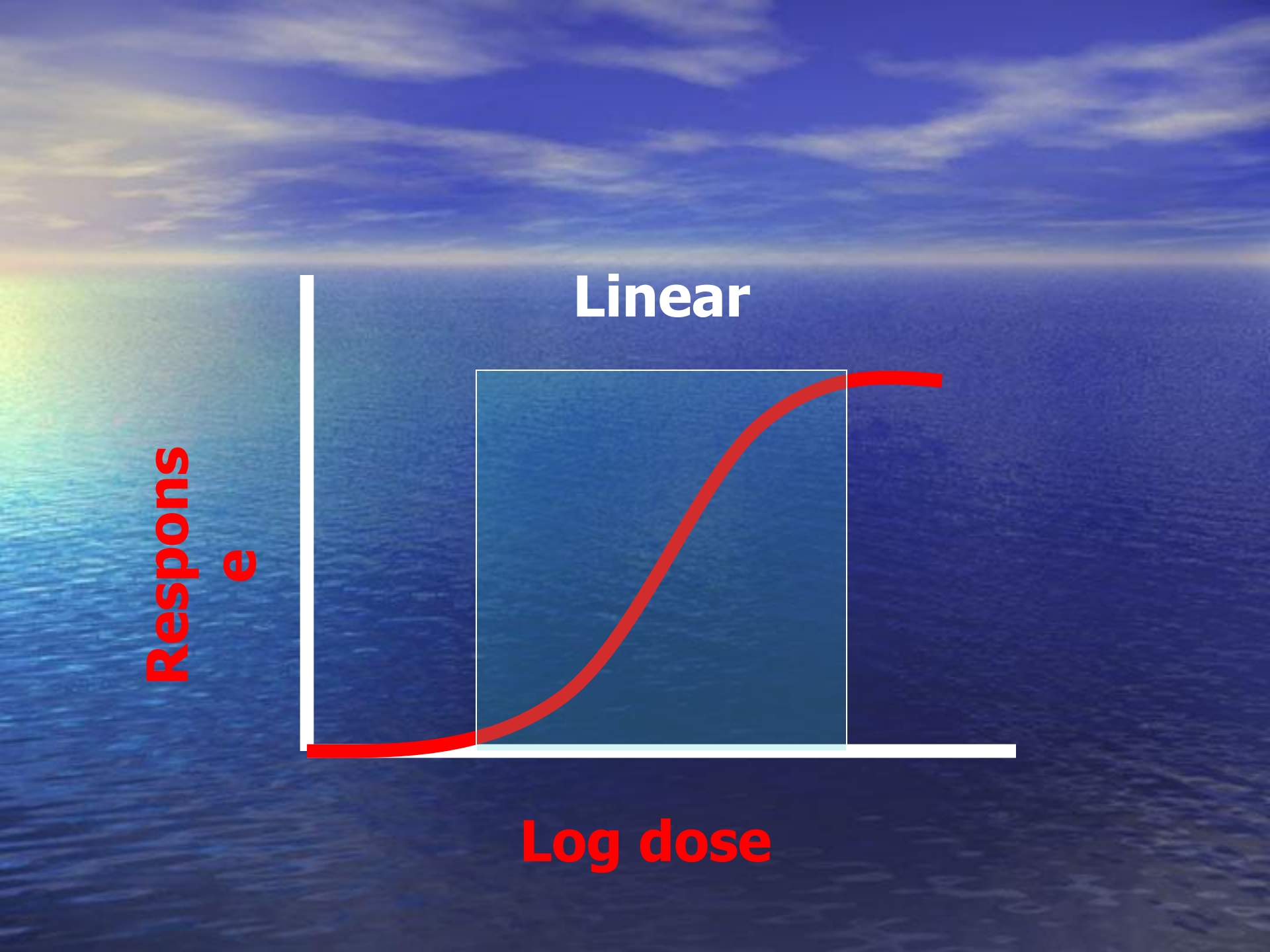

An
X
A

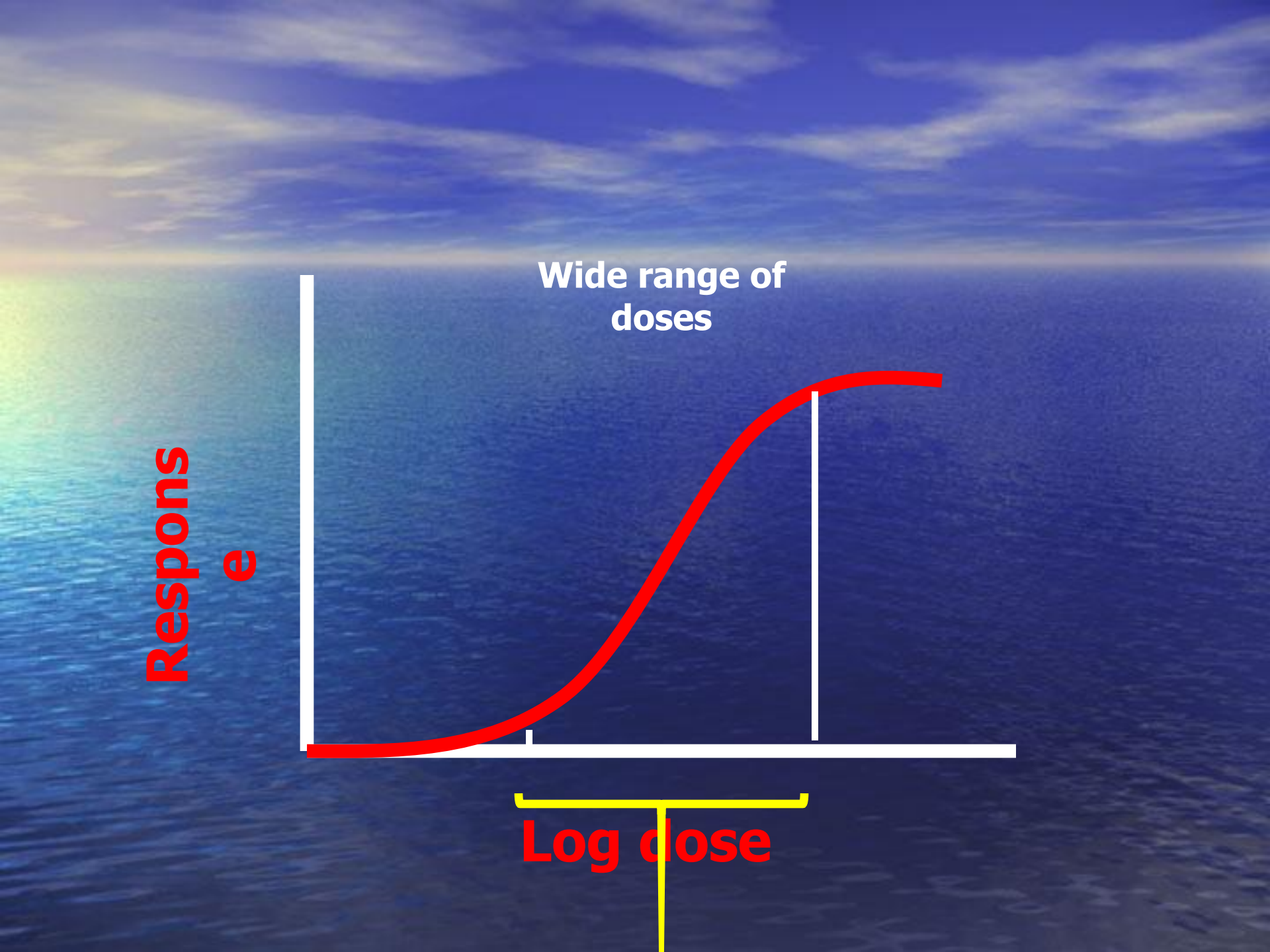
Dose-Response Curve

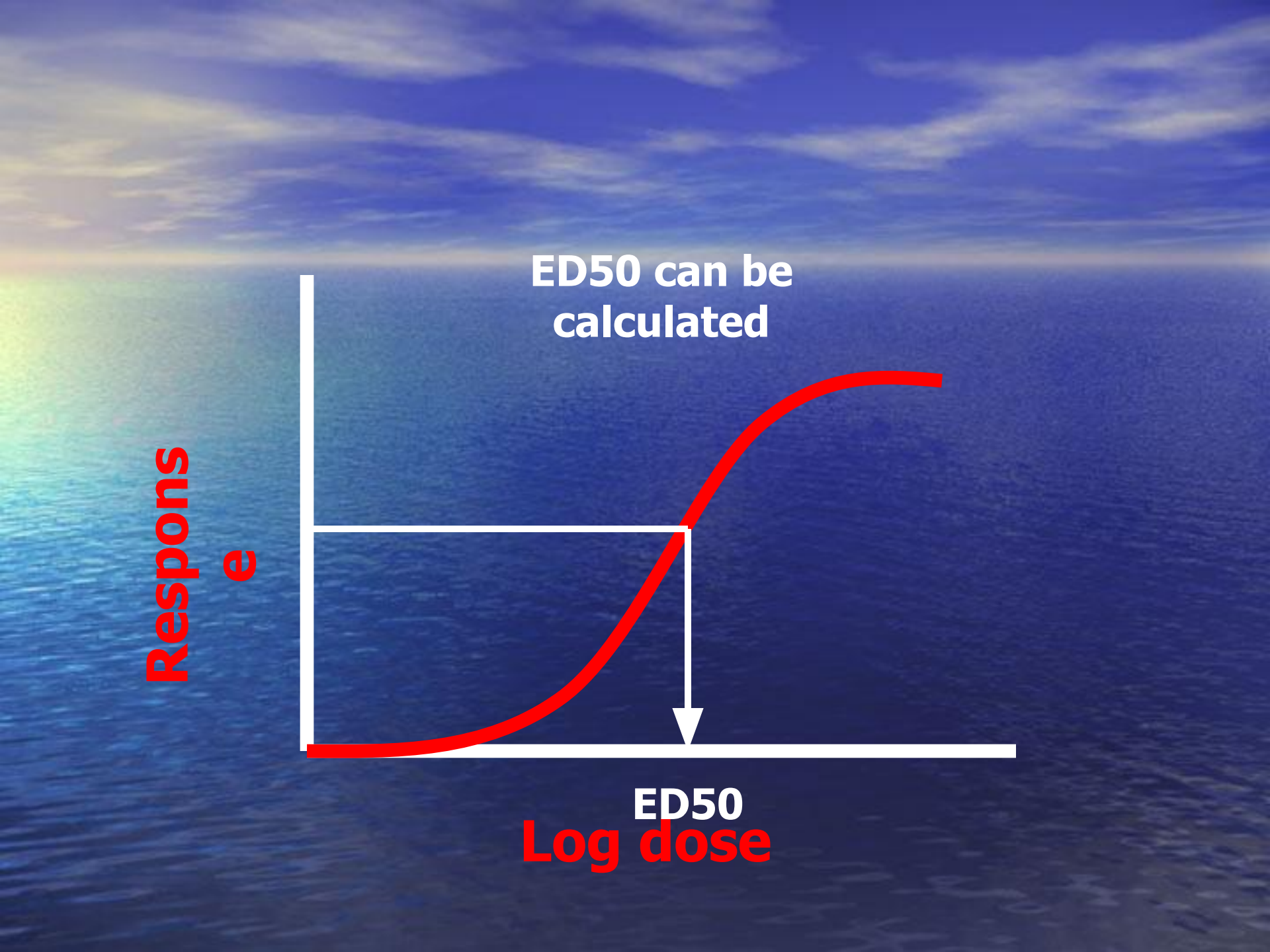
- What ?
- Types ?


Hyperbolic curve
Response
Dose

Sigmoidal shaped curve


Linear
Response
Log dose


Wide range of doses
Response
Log dose

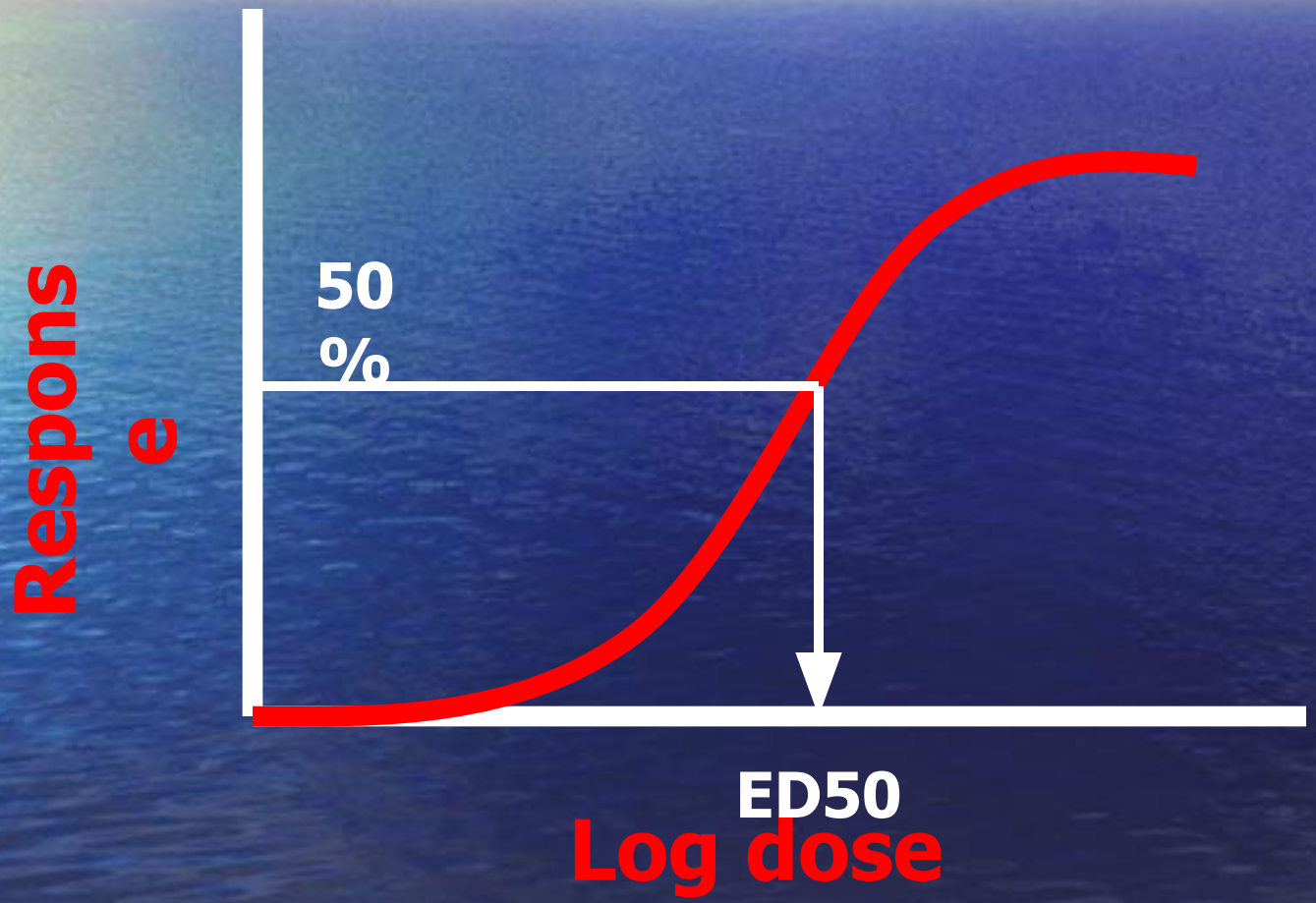

ED50 can be calculated
Response
ED50
Log dose

Graded DRC

- Depends on graded response

- ED50 ?

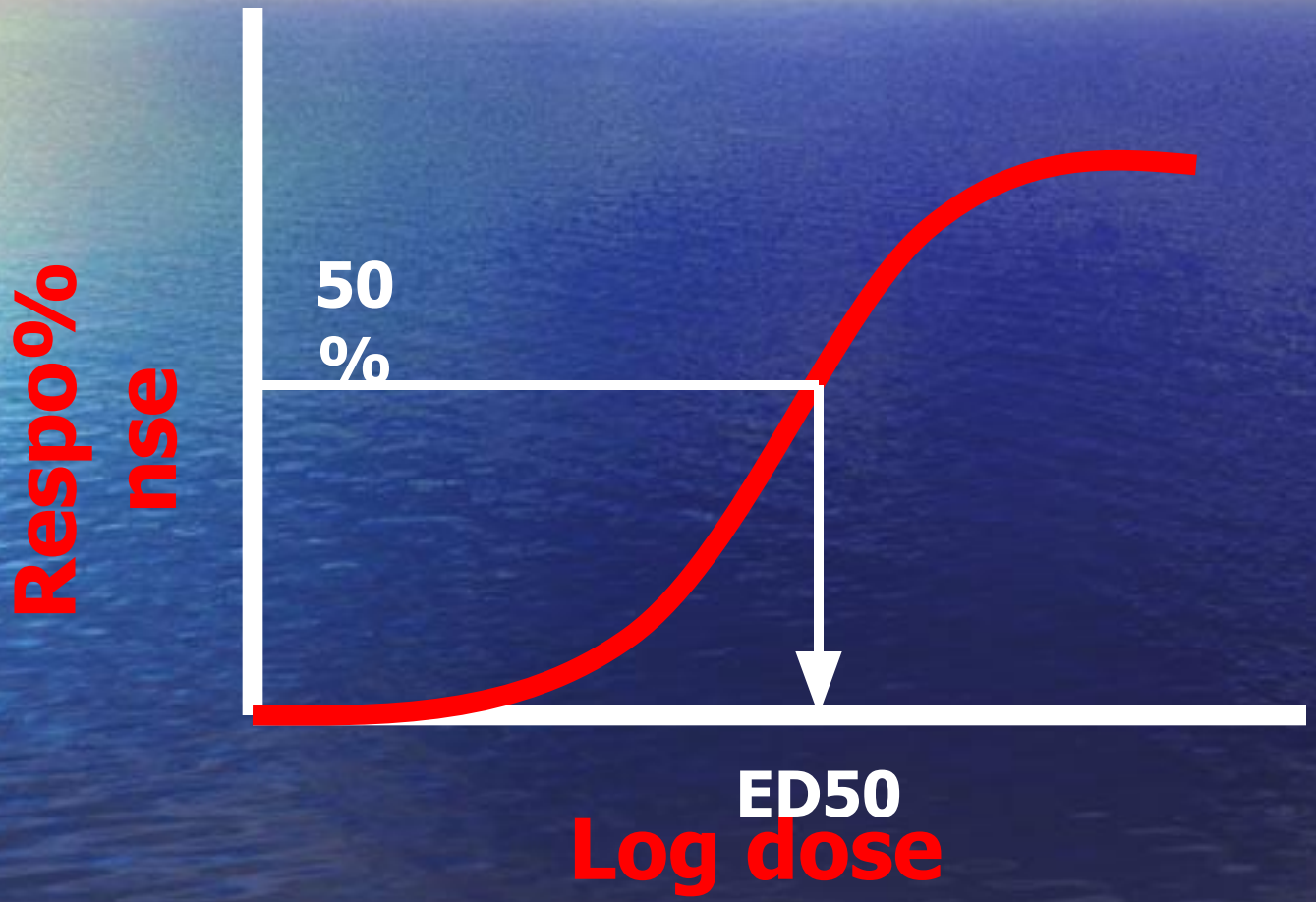
The dose that give 50% of maximal response


Respons
e
50
%
ED50
Log dose

Quantal DRC

- Depends on quantal response
- ED50 ?

The dose that give response in 50% of population


Respo%
nse
50
%
ED50
Log dose

ED50

- Compare between potencies of two drugs

Drug A — Has higher ED50 than — Drug B

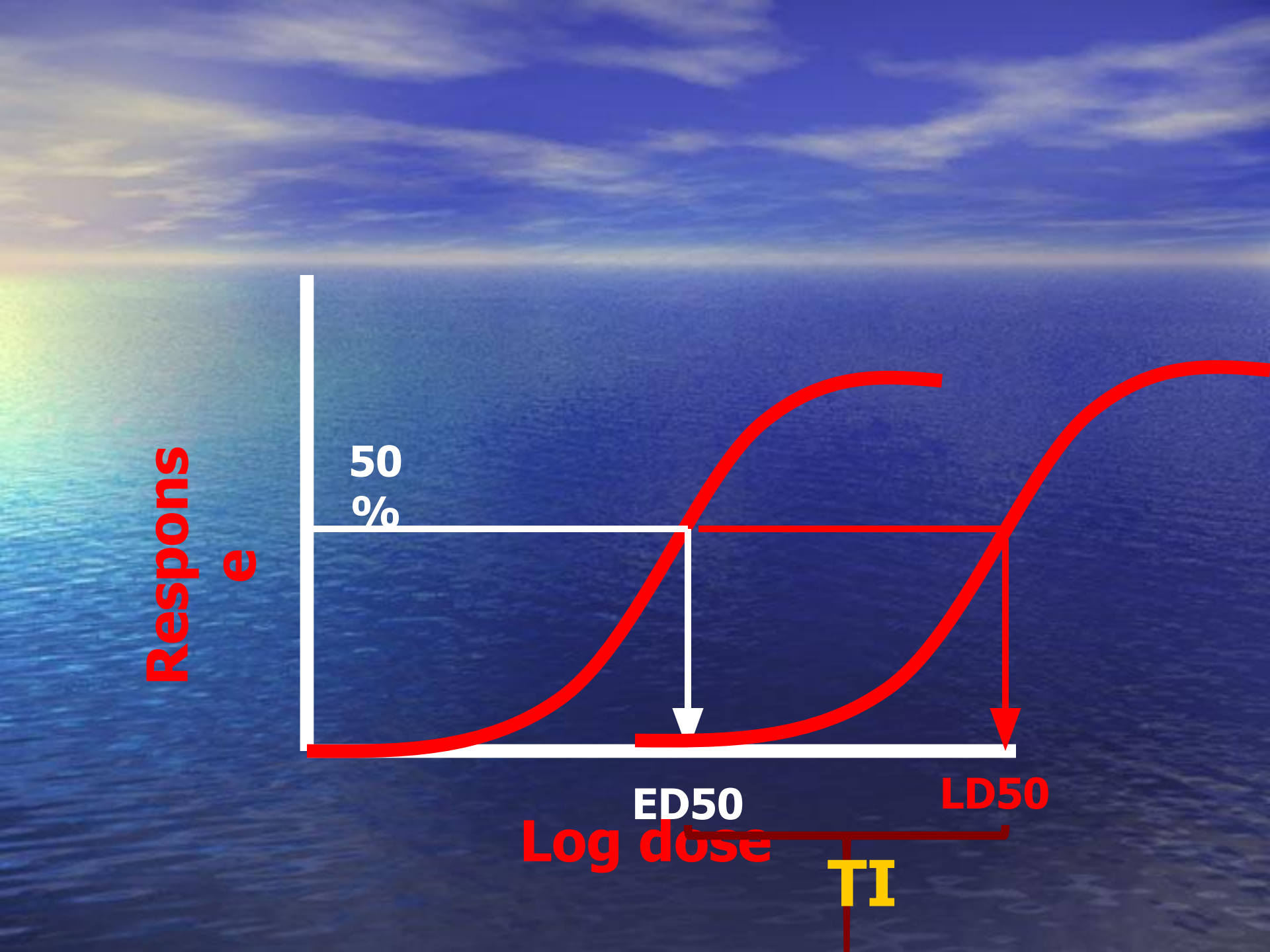
? Which one is more potent

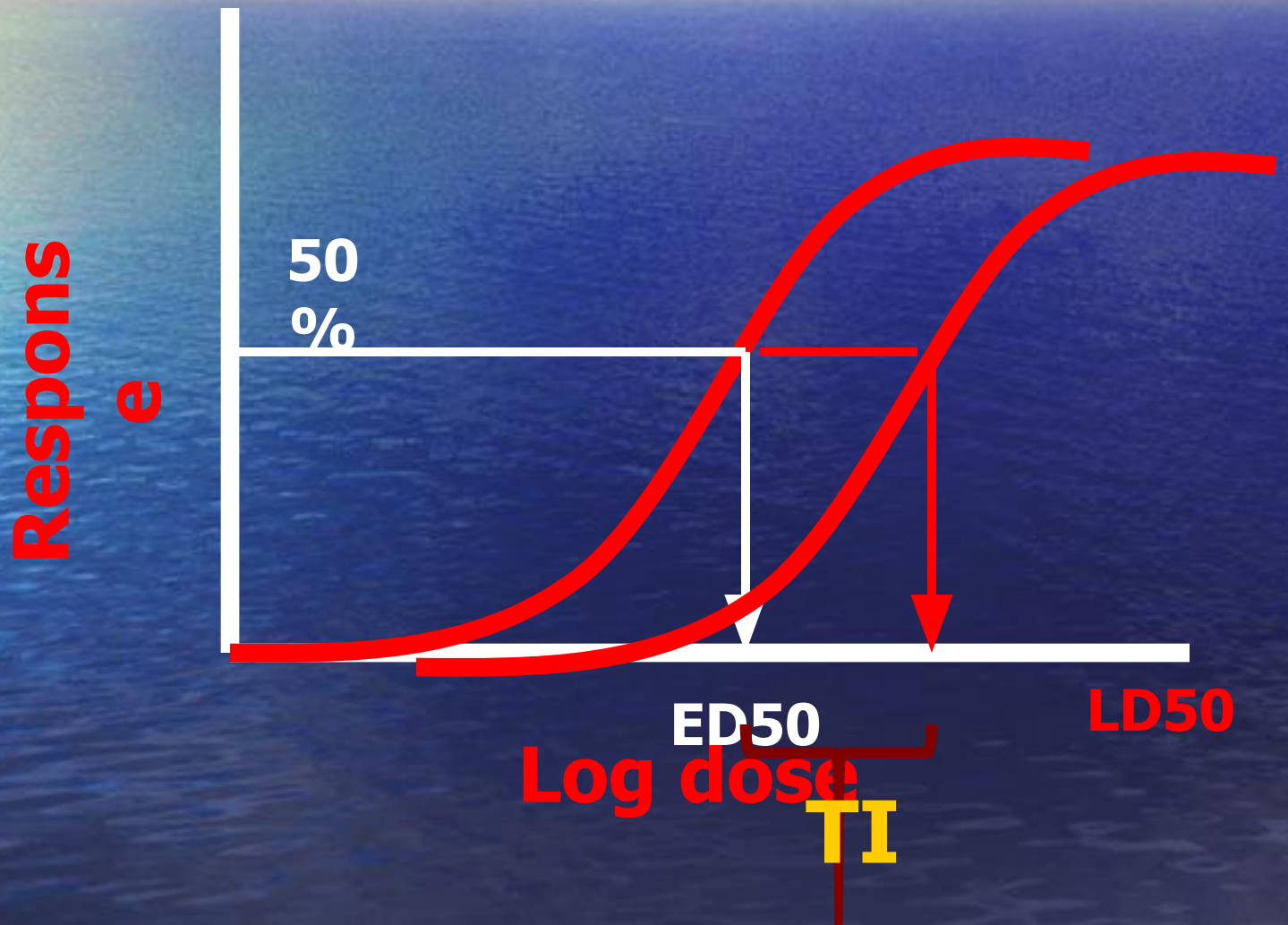
ED50

- Calculation of the therapeutic index

$$TI = \frac{LD50}{ED50}$$

Is a measure of drug safety


Respons
e
50
%
ED50
LD50
Log dose
TI

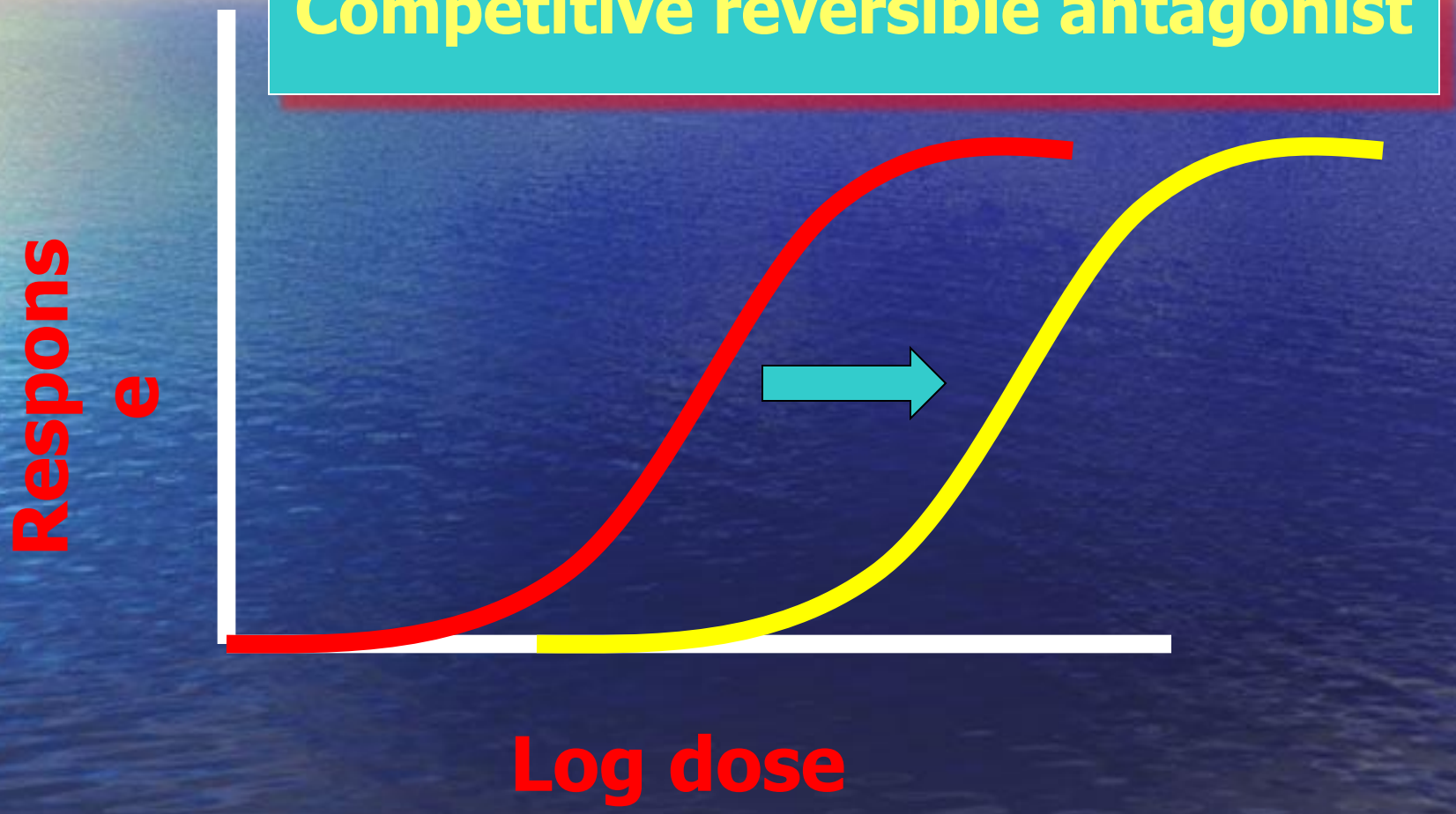

Respons
e
50
%
ED50
LD50
Log dose
TI

Drug A Has higher TI than Drug B

? Which one is more safer

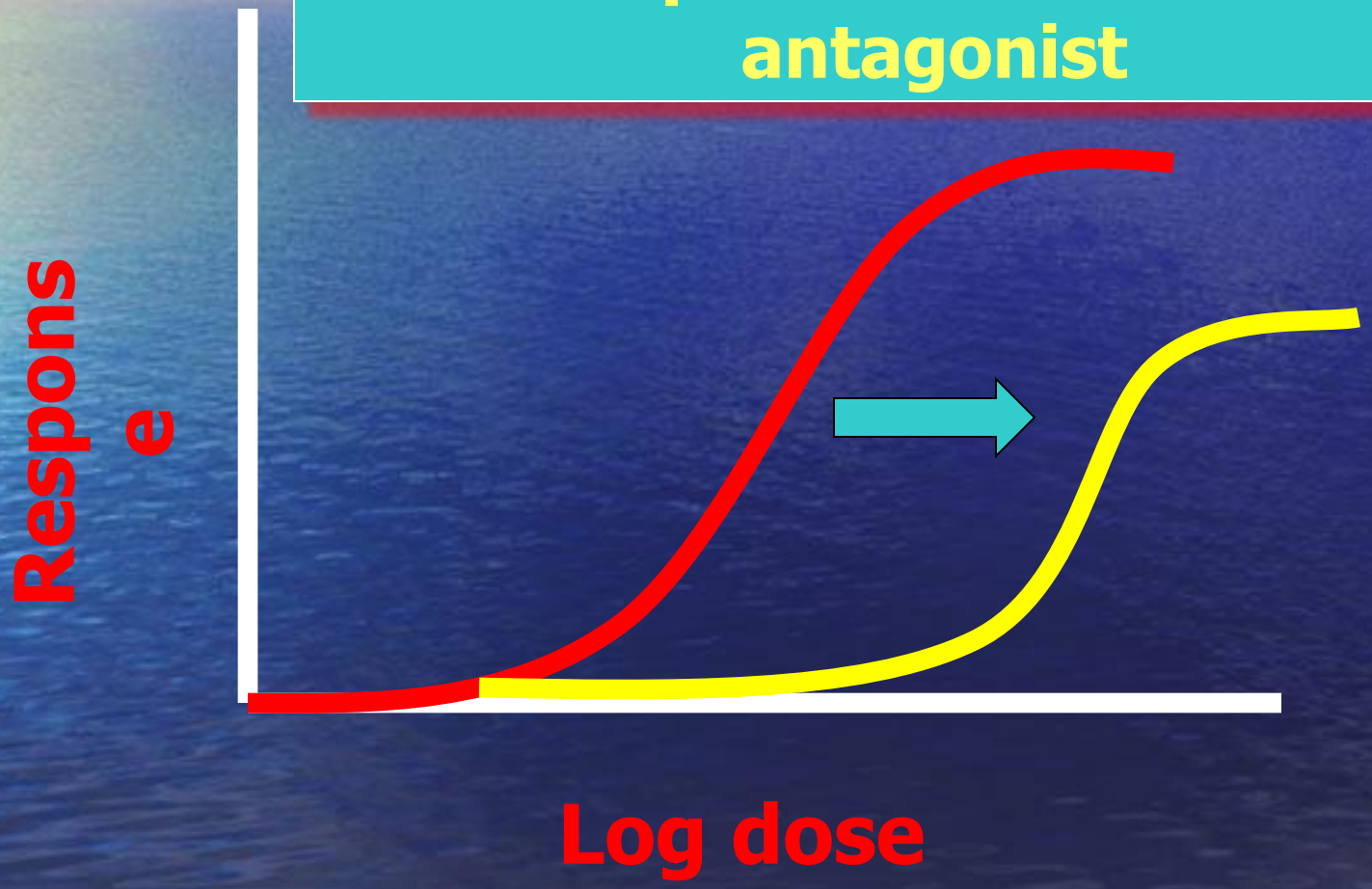
DRC & antagonists

Competitive reversible antagonist



DRC & antagonists

Competitive irreversible antagonist



DRC & antagonists

non-competitive antagonist

Important notes

Parrallism

Indicate competition

Important notes

Emax

Indicate reversibility


Thank you