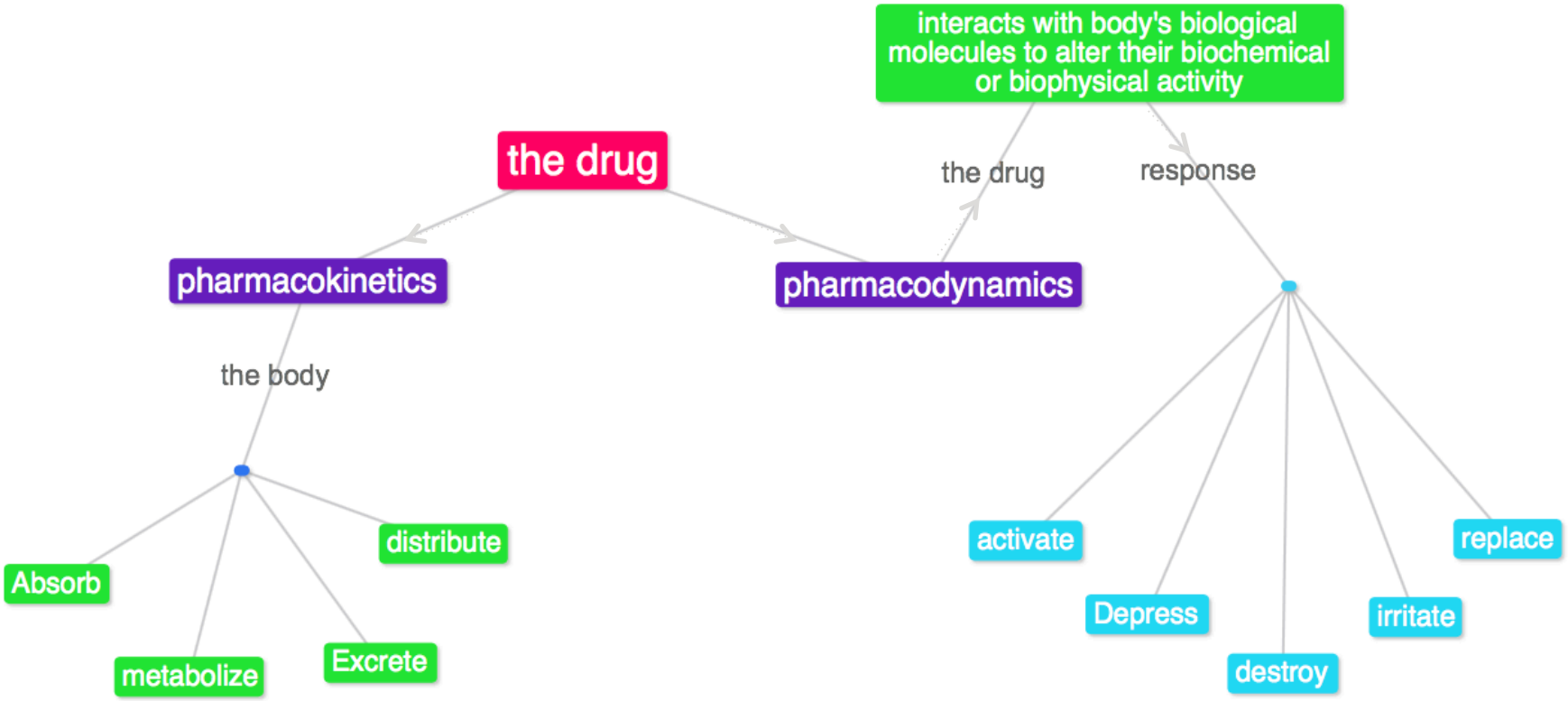
Lecture 5

Pharmacodynamics : molecular mechanism of drug action II

Objectives:

1. Identify different targets of drug action
2. Differentiate between their patterns of action; agonism versus antagonism
3. Elaborate on drug binding to receptors

- Additional Notes
- Important
- Explanation –Extra-



Drug in side the body → It will interact with specific biological molecules "target" → Then it will alter their biochemical and biophysical → This will produce response

PHARMACOKINETICS

What the body do to the drug

- Absorb
- Distribute
- Metabolize
- Excrete

PHARMACODYNAMICS

What the drug will do to the body

- Depress
- Activate
- Replace
- Irritate
- Destroy

Pharmacodynamics

Targets >> proteins

- **1- Structural** protein found in the cell membrane
  - **Tubulin** "one of the cytoskeleton protein"
    Is a target for :
    - **Vincristine** "anti cancer drug"
    - **Colchicine** "Used to treat Gout"
- **2- Regulatory**

2-Regulatory

1-Enzyme The drug competes with the natural substrate for the enzyme "so the enzyme is the target for drug" it can either be :		2-Ion channels Responsible for influx or out-flux of ions through cell membranes along their concentration gradients. They are activated by alteration in action potential and are controlled by gating machinery by block or modulation	
1-Reversible	2-Irreversible	1-Blockers (*block Na influx through* Na channel in **nerve fibers.**)	2-Modulator (block K+ out-flux via the K channels **in pancreatic cells**)
Neostigmine reversibly compete with	**Organophosphates** irreversibly competes with	**Local Anesthetics**	**Sulfonylurea drugs**
ACH for		Na channel Blockers	K Channel Modulator
cholinesterase at MEP	**cholinesterase**		

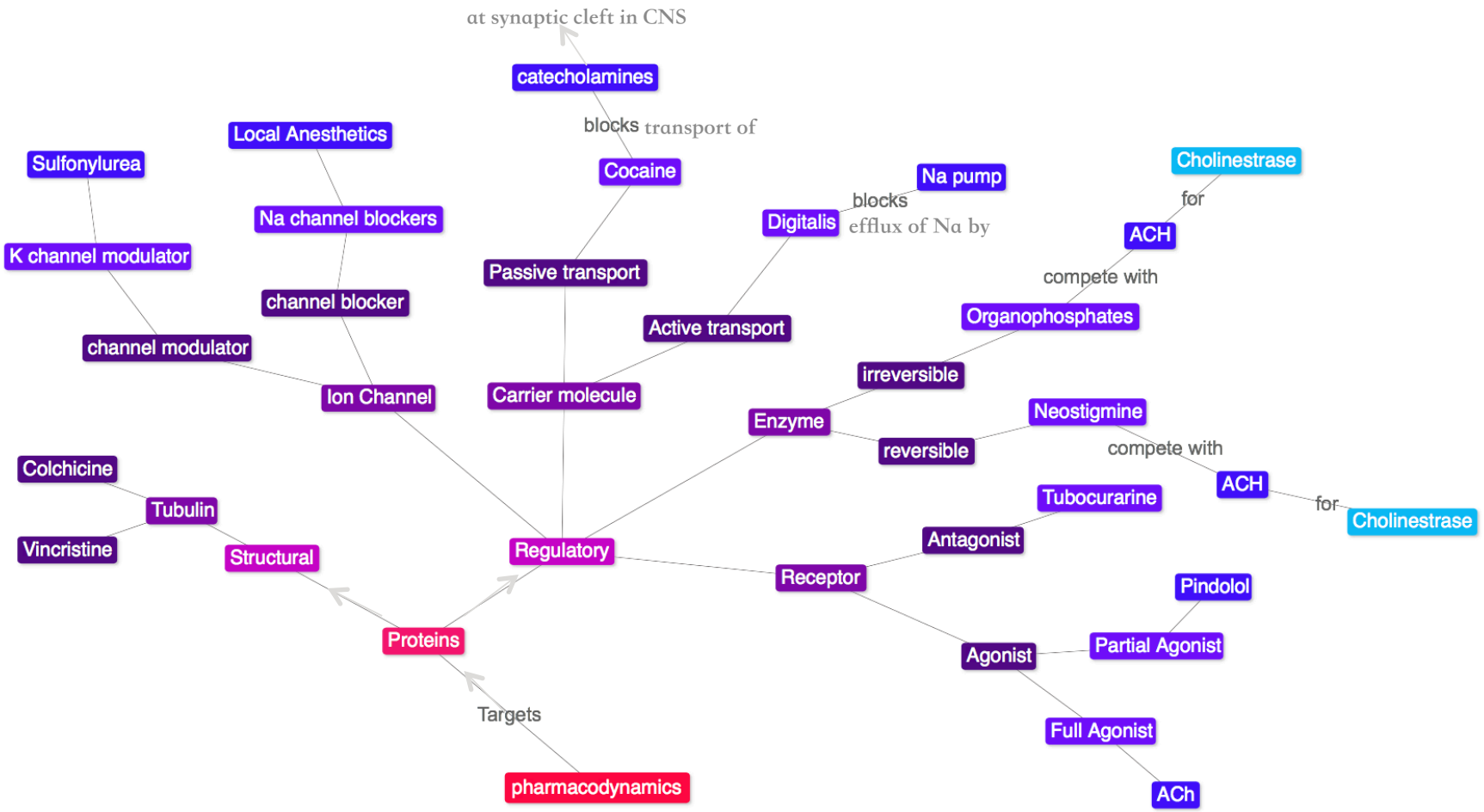
3-Receptor Responsible for selectively sensing and binding of a stimulus (ligand) and its coupling to a response via a set of signal transduction machinery			4-Carrier molecules Responsible for molecules between intracellular compartments, through cell membranes or in extracellular fluids. The drug binds to such molecules altering their transport ability	
Endogenous LIGAND "that is naturally in the body"	Drug (A) -**Agonist** -	Drug (B) -**Antagonist** -	Antiporter **-Active transport-**	Symporter **-Passive transport-**
Bind Occupy: When a drug bind to receptor + **Initiate Activate**: This process will activate receptor	**Affinity**: The tendency of a drug to bind to the receptors + **Efficacy**: The ability for it, once bound, to activate the receptor	**Affinity** **NO EFFICACY!** Which means there's NO response	**Digitalis** blocks efflux of	**Cocaine** blocks transport of
Physiological response	**Pharmacological** response	**NO response**	**catecholamines**	**Na**
	ACh	**Tubocurarine**		
			at **synaptic cleft** in **CNS**	by **Na pump**

Agonist: It can either have :

- **high** intrinsic efficacy → full agonist → Max response
- **Low** intrinsic efficacy → Partial Agonist → Submax response

agonist → **Pindolol:** produces **less decrease in heart rate than pure antagonists** such as **propranolol.**

summary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Tubulin
Vincristine
Structural
Regulatory
Receptor
Tubocurarine
Antagonist
Pindolol
Partial Agonist
Agonist
Full Agonist
ACh
Proteins
Targets
pharmacodynamics

Check your understanding here ! –MCQ's-

1-Tubulin is a target for?

a. Colchicine
b. Histamine
c. Fructose

2-Which one of the following responsible for carrying of ions and small molecules?

a. Enzymes
b. Carrier molecule
c. Receptor

3-Blocks the transport of catecholamines at synaptic cleft?

a. Cocaine
b. Colchicine
c. Neostigmine

4-Which one of the following is the function of digitalis?

a. Blocks the efflux of Na by Na pump
b. Blocks transport o catecholamines
c. Blocks Na influx through Na channel

Answers : 1-a 2-b 3-a 4-a

5-Via which channel does the Solfonylurea block?

a. Receptor
b. K channel
c. Na channel

6-A drug that possesses an affinity but no efficacy?

a. Ach
b. Tubocurarine
c. Colchicine

7-Tendency of a drug to bind to the receptors?

a. Efficacy
b. Affinity
c. Agonist

8-Which one of the following has High intrinsic efficacy?

a. Agonist
b. Antagonist
c. Ligand

Answers : 5- b 6- b 7- b 8- c

Good luck!

Done by Pharmacology team 434

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