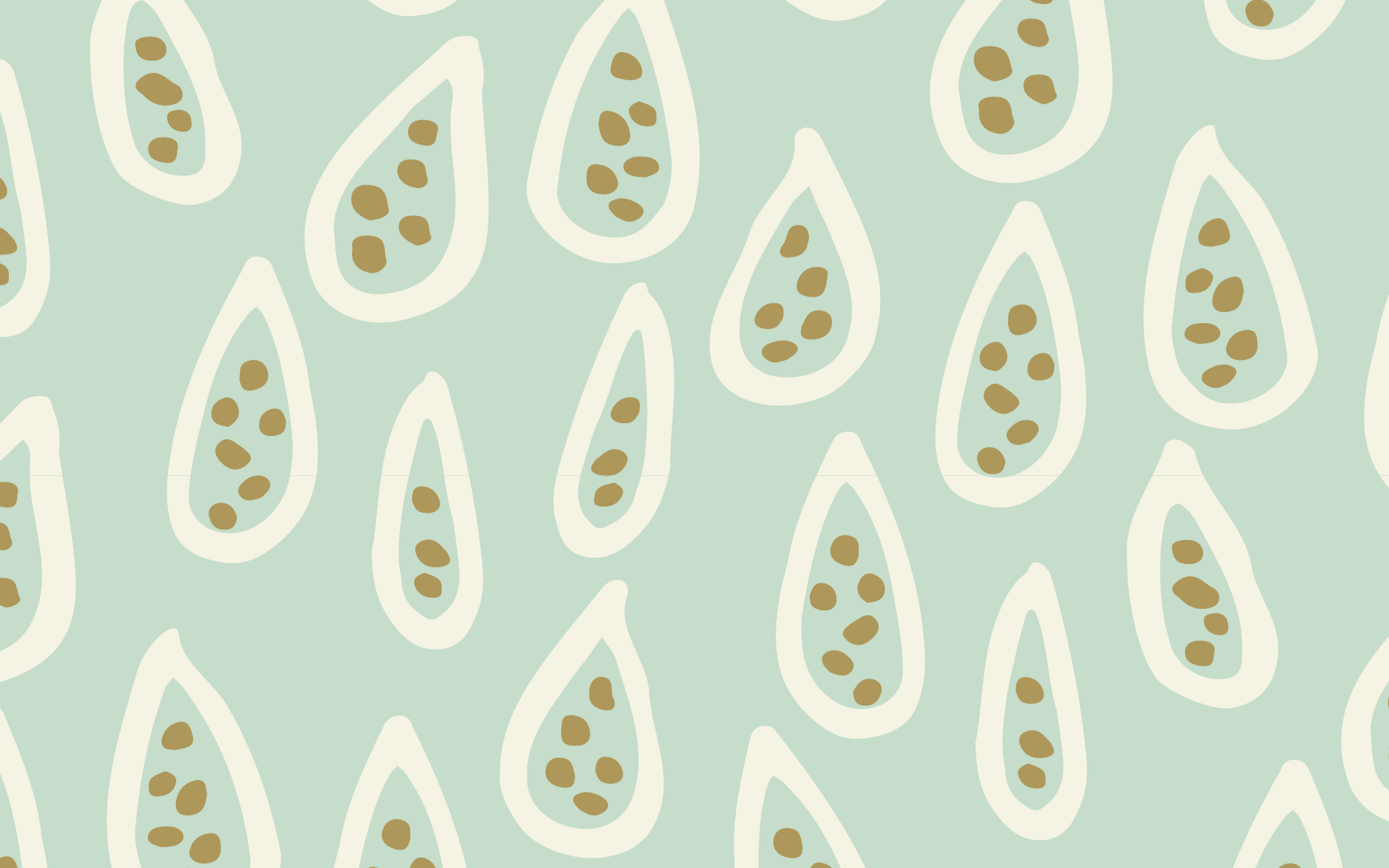

Major Receptor families

G-protein coupled Receptors

Binding of a ligand on the extracellular part of the receptor, will activate the triple-subunit G protein associated. α-subunit will exchange GDP into GTP and that will cause its dissociation leading to series of activation processes, they're usually amplified responses.

* Many receptors such as:
  - a- Hormone peptide receptors
  - b- Neurotransmitter receptors
    - Muscarinic
    - Adrenergic

Enzyme-linked Receptors

- Receptors that are associated with specific enzymatic activity, so that the binding of the ligand to the receptor will activate this enzyme to perform its function such phosphorylation.

eg: Receptors that are associated with tyrosine kinase activity, so binding of insulin in insulin receptors will activate the TK activity phosphorylating tyrosine residues in the protein leading to changing of 3D structure of protein functional changes.

Note: Binding could either lead to activation or inhibition

ligand-gated Ion channels

* the binding of a ligand activates the movement (influx / efflux) of ions across the membrane so that will lead to functional / structural changes
so → the flow of ions is regulated by the binding of the ligand.

Intracellular Receptors

A- Cytosolic Receptors
B- Nuclear Receptors

→ should diffuse inside the cell, to do that they should cross the membrane and be lipophilic

eg: Steroid hormones (ligands)

they cross the membrane bind with the receptor in the cytosol, then the receptor-ligand complex will migrate to the nucleus and that will lead to activation/inhibition of gene expression

MECHANISM OF DRUG WORK

Antagonism. Inhibition

- A- Cell-Surface Antagonists
- B- Nuclear Antagonists.
- C- Enzyme Inhibitors
- D- Transport Inhibitors
- E- Signal transduction inhibitors
- F- Ion channel Blockers

Other Non-conventional ways of drug action.

- Destruction of structural protein
- Binding to Macromolecules
- Interaction with small molecules
- Act as Enzymes
- Act as Nutrients
- Act as antigens
- Binding free atoms + molecules
- Having unknown mechanisms of actions.
- Exerting functions via physiological properties
- Work with antisense action

Agonism, Activation.

A- Ion channel Openers
B- Agonists for cell surface receptors
C- Enzyme Activators.
D- Agonist of Nuclear Receptors.

the binding of the chemical endogenous ligand which will activate the receptors and will induce cellular response.

Agonists (drug) mimic the endogenous chemical ligands.

Cell Surface Antagonists

Binding of an antagonist to the receptor, which will prevent the binding of the endogenous chemical ligands thus preventing the activation of the receptor and the production of a cellular response. Meaning that the antagonist doesn't perform an opposite function to the endogenous ligand it just occupies its place preventing it from exerting function.

Neutral Antagonist.

* this drug is said to antagonize or block the receptor thus blocking the response.

those Antagonists could bind

- the same site of the binding of the endogenous ligand
  - Reversibely → Competitive
  - Irreversibely → Non competitive (Formation of covalent bond).
- on a remote site on the receptor causing conformational changes that.
  - 1- displace the ligand
  - 2- prevent it from binding → Allosteric → Non-competitive as it doesn't bind to the same site of binding of the ligand
  - Make the receptor inaccessible for the ligand.

Type of the Blocker	Important Examples	their uses
Cell - Surface Antagonists	Angiotensin Receptor Blockers	- high blood pressure, heart failure chronic renal insufficiency.
	Beta - Adrenoceptor Blockers	- heart failure, high blood pressure, myocardial infarction, angina, anxiety
Nuclear Antagonists	Metalocorticoid Receptor Antagonist	edema → due to liver cirrhosis. heart failure
	Estrogen Receptor Antagonist	treatment + prevention of Breast cancer
Enzyme Inhibitor	Cyclooxygenas Inhibitors	Pain relief especially in arthritis
	Angiotensin Converting Enzyme Inhibitor	high blood pressure, heart failure chronic renal insufficiency
	HMG - CoA Reductase Inhibitors	hypercholestrolemia
Ion channels Inhibitors	Calcium channel Blockers	high blood pressure, angina
	Sodium Channel Blockers	Cardiac arrhythmias

Blocker	Important Examples	Their uses
Transport Inhibitors	Selective Seretonin Reuptake Inhibitor →	Anti-depression.
	Inhibitors of Na-2Cl-K Symporter →	↑ out put of urine + sodium → ↓ edema.
Inhibitors of Signal Transduction Proteins	Tyrosine Kinase Inhibitors →	myelocytic leukemia
	Type 5 phosphodiesterase Inhibitors →	dysfunction.