ADRENERGIC RECEPTORS

WATCH VIDEO!

Adrenergic receptors are a class of G protein-coupled receptors on the surface of cells that are targets of the catecholamines, primarily norepinephrine and epinephrine. They are widely distributed throughout the body and play a key role in the sympathetic nervous system.

Types of receptors

1 Alpha receptors (α)

- Located in: primarily smooth muscle cells of blood vessels, iris of the eye, GI/urinary tract
- Function: vasoconstriction, increased peripheral resistance, increased blood pressure, contraction of the radial muscle of the iris (dilates the pupil), contraction of the sphincters in the GI and urinary tracts

Alpha-2 (α2)

- Located in presynaptic nerve terminals, platelets, and in the pancreas
- Function: inhibition of norepinephrine release, decreased insulin release, platelet aggregation

2 Beta receptors (β)

Beta-1 (β1)

- Located in: primarily the heart
- Function: increase heart rate, increase force of contraction, increase AV node conduction

Beta-2 (β2)

- Located in: smooth muscle of the lungs, blood vessels, liver, skeletal muscle
- Function: bronchodilation, vasodilation, increase muscle/liver glycogenolysis, increase release of glucagon

Beta-3 (β3)

- Located in: adipose tissue, bladder
- Function: lipolysis and relaxation of the detrusor muscle of the bladder

Medications to promote or counter effects

α receptors:

- **Alpha agonists** (promote α receptors effect): phenylephrine (a1) for nasal congestion and hypotension; clonidine (a2) for hypertension
- **Alpha antagonists** (counter α receptors effect): prazosin (a1) for hypertension and benign prostatic hyperplasia; phentolamine (a1 and a2) for hypertensive emergencies
- Nursing interventions: monitor blood pressure, watch for signs of excessive vasoconstriction or vasodilation

β receptors:

- **Beta agonists** (promote β receptor effects):
  - Isoproterenol for bradycardia and heart block; dobutamine (β1) for heart failure ; albuterol (β2) for asthma and COPD
  - Nursing interventions: monitor heart rate and blood pressure, assess for hyperglycemia
- **Beta antagonists** (counter β receptor effects):
  - Propranolol for hypertension and arrhythmias; metoprolol (β1) for hypertension and heart failure; labetalol for hypertension and hypertensive emergencies
  - Nursing interventions: monitor heart rate and blood pressure (regularly check for bradycardia and hypotension); adjust dosages based on therapeutic response and side effects like fatigue, dizziness, or heart block; assess for bronchoconstriction; monitor blood glucose levels