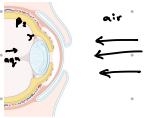
Adrenergic Receptors

Types of receptors						
Class				Structure	Most important location	Effect of stimulation
Metabotropic receptors: G-protein-coupled receptors acting through second messengers (see signal transduction)	Adrenergic receptors	Alpha-adrenergic receptors	Alpha-1 receptor	• G_q proteins $G_q \rightarrow 2nd\ (IP_3)$ ↓ opens K^+ channels ↓ Hyperpolarization	• Smooth muscle ◦ Blood vessels ◦ Bladder neck ◦ GI tract ◦ Eye (iris dilator muscle) • Heart • Glands • Neuronal terminals • To as lesser extent: liver, adipose tissue	• Peripheral vasoconstriction ◦ Arterioles → ↑ afterload ◦ Veins → ↑ preload • GI sphincter contraction • Bladder sphincter contraction → urinary retention • Mydriasis • ↑ Glycogenolysis
			Alpha-2 receptor calm down	• G_i proteins	• Prejunctional nerve terminals • Pancreas • Heart • Glands • Eye (ciliary body) • Platelet • To a lesser extent: smooth muscle of blood vessels, adipose tissue, bladder	• ↓ Norepinephrine release and synthesis (negative feedback) • ↓ Insulin release • ↓ Lipolysis • ↓ Aqueous humor production • ↑ Platelet aggregation
		Beta-adrenergic receptors cAMP	Beta-1 receptor	• G_s proteins	• Heart ◦ SA node ◦ AV node ◦ Atrial and ventricular muscle • CNS • Kidney • To a lesser extent: adipose tissue	• Cardiac excitation ◦ ↑ Heart rate (chronotropy) ◦ ↑ Conduction velocity (dromotropy) ◦ ↑ Force of contraction (inotropy) • ↑ Renin release
			Beta-2 receptor	• G_s proteins	• Liver • Smooth muscle ◦ Blood vessels ◦ Bronchioles ◦ Uterus • Skeletal muscle ↓↓ α_1 + ↑↑ K^+ (in muscle taken from blood) • CNS • Pancreas • To a lesser extent: heart (coronary relaxed)	• Relaxation of smooth muscle ◦ Vasodilation ◦ Bronchodilation ◦ Relaxation of uterus ◦ Bladder relaxation • ↑ Contractility • ↑ Glycogenolysis • ↑ Insulin release
			Beta-3 receptor	• G_s proteins	• Bladder • Adipose tissue • To a lesser extent: heart, smooth muscle of blood cells	• Bladder relaxation • ↑ Lipolysis • Thermogenesis

IP_3

→ and coexpression of the walls



→ not uniformly distributed → we can't make β_1 agonist