Alpha 2 Receptor

The alpha-2 adrenergic receptor is a G protein-coupled receptor (GPCR) associated with the Gi subunit. This subunit functions to inhibit the production of cAMP from ATP. Catecholamines like norepinephrine and epinephrine signal through this receptor which is classically located on vascular prejunctional terminals where it inhibits the release of norepinephrine in a form of negative feedback. Common effects of this receptor include suppression of sympathetic outflow, inhibition of insulin release from the pancreas, inhibition of lipolysis in adipose tissue, inhibition of aqueous humor production in the eye, as well an increase in platelet aggregation.

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Characteristics

Gi Subunit
Gi-Joe-guy
The alpha-2 adrenergic receptor is a G protein-coupled receptor (GPCR) associated with the Gi subunit. This subunit functions to inhibit the production of cAMP from ATP.

Decrease Sympathetic Outflow
Down-arrow Simba-lion
This receptor is classically located on vascular prejunctional terminals, where it inhibits the release of norepinephrine in a form of negative feedback. Therefore, activation of this receptor leads to a decrease in sympathetic outflow.

Decrease Insulin Release
Down-arrow Insect-syringe
Release of insulin is strongly inhibited by norepinephrine, which leads to increased blood glucose levels during stress. Although norepinephrine weakly activates beta-2 adrenergic receptors which stimulate insulin release, there is a dominance of the role of the alpha-2 receptor, which decreases insulin release. This leads to an overall decrease of insulin release from the pancreas.

Decrease Lipolysis
Down-arrow Lip-lights
Lipolysis occurs when certain hormones that induce lipolysis trigger receptors that activate adenylate cyclase to increase production of cAMP, which activates lipases found in adipose tissue. Because activation of alpha-2 receptors inhibits the production of cAMP, activation of these receptors plays a role in decreasing lipolysis from adipose tissue as a part of negative feedback of the sympathetic pathway.

Increase Platelet Aggregation
Up-arrow Plates
Platelets, also called thrombocytes, are involved in hemostasis, leading to the formation of blood clots. Platelets aggregate using fibrinogen and von Willebrand factor, and are stimulated by ADP, thromboxane and alpha-2 receptor activation.

Decrease Aqueous Humor Production
Down-arrow Water from Eye-fountain
Stimulation of the alpha-2 adrenergic receptor inhibits the production of aqueous humor by the ciliary body in the eye. This is the reason that alpha-2 agonists such as brimonidine are used in the treatment of glaucoma where intraocular pressure is high due to excess aqueous humor production or reduced aqueous humor drainage.