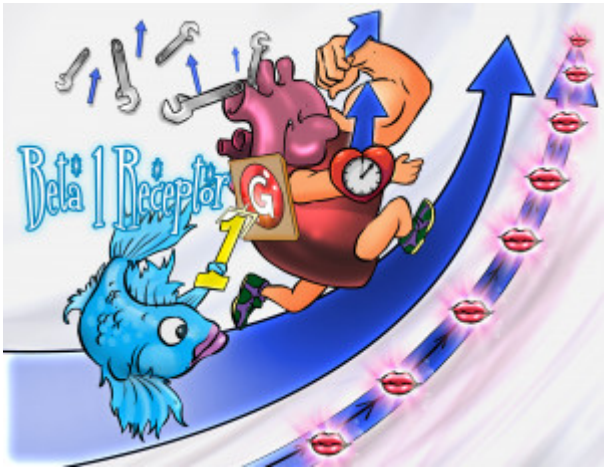
Beta-1 Receptor

The beta-1 adrenergic receptor is a G-protein coupled receptor associated with the Gs subunit. This subunit activates adenylate cyclase to activate the cAMP-dependent pathway. Actions of the beta-1 receptor include an increase in cardiac output via an increase in heart rate, as well as increased cardiac contractility. Activation also leads to increased renin release from juxtaglomerular cells in the kidney and increased lipolysis in adipose tissue. Selective beta-1 agonists include dobutamine, commonly used for cardiogenic shock, and beta blockers include atenolol, esmolol and metoprolol.



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Characteristics

Gs Protein Class
G-spot
The beta-1 adrenergic receptor is a G-protein-coupled receptor associated with the Gs subunit. This subunit activates adenylate cyclase to activate the cAMP-dependent pathway.

Increased Heart Rate
Up-arrow HR Heart-timer
Actions of the beta-1 receptor include increased heart rate in the sinoatrial node. This is known as a chronotropic effect and leads to increased cardiac output in the sympathetic response.

Increased Contractility
Up-arrow heart-flexing
Actions of the beta-1 receptor include increased atrial and ventricular contractility known as an inotropic effect. This leads to increased cardiac output in the sympathetic response.

Increase Renin Release
Up-arrow Wrench
Activation of this receptor leads to increased renin release from juxtaglomerular cells in the kidney. Renin is an enzyme that breaks down angiotensinogen to angiotensin 1, which is further cleaved by ACE enzyme into angiotensin II. Angiotensin II then constricts blood vessels, increases the secretion of ADH and aldosterone and stimulates the thirst reflex in the hypothalamus, leading to an increase in blood pressure. Therefore, increased renin release plays a role in increased blood pressure in the sympathetic response.

Increased Lipolysis
Up-arrow Lip-lights
Lipolysis is the breakdown of lipids, which involves the hydrolysis of triglycerides into free fatty acids, which can undergo degradation by beta-oxidation to produce energy for the body. Activation of this receptor can lead to increased lipolysis to help mobilize energy stores during the sympathetic response.

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