# Systemic Effects of Beta-Blockers

Beta blockers have numerous systemic effects. A respiratory side effect of beta blocker use is the possibility of causing bronchoconstriction due to inhibition of bronchodilation. There are metabolic effects of beta blockers as well, such as decreasing insulin secretion by the pancreas. Furthermore, beta blockers decrease glycolysis and lipolysis, reducing blood glucose. Diabetic patients should be aware of their blood sugar, as beta blockers may mask the usual signs of hypoglycemia. ? blockers such as timolol and betaxolol are used in the eye, as they reduce intraocular pressure by decreasing aqueous humor production.

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**Respiratory**
Lungs
The lungs have beta 2 receptors and typically bronchodilate when adrenoreceptors are activated. However, when beta blocker drugs are used, bronchoconstriction occurs.

**Bronchoconstriction**
Broccoli-constrictor
Beta 2 adrenoceptor activation leads to bronchodilation. This is easily remembered by the fact that beta-2 receptors affect two lungs. By blocking beta 2 adrenoreceptor activity, beta blocking medications prevent this dilation and thus indirectly lead to bronchoconstriction in patients. As such, these medications should be used with caution in patients with asthma or COPD.

**Metabolic**
Metal-ball
Adrenergic receptors influence the metabolic system; Beta 3 receptors lead to increased lipolysis, while Beta 2 activation leads to increased insulin release. Thus, beta blocking drugs work to decrease lipolysis and insulin release. In diabetic patients taking insulin, beta blockers block the usual symptoms of hypoglycemia and patients should be aware of their blood glucose.

**Decreased Insulin**
Down-arrow Insect-syringe
By blocking beta 2 adrenergic receptors, beta blocking medications decrease insulin release from the pancreas.

**Decreased Glycolysis and Lipolysis**
Down-arrow Glue-laser and Lip-lights
Beta blockers block glycolysis (via decreased glucagon release) and decrease lipolysis. Furthermore, glycogenolysis is also decreased.

**Eye**
Eye
The ciliary epithelium contains beta adrenergic receptors and ligand binding (epinephrine and norepinephrine) stimulates the formation of aqueous humor. Thus beta blockers decrease aqueous humor formation.

**Reduces Intraocular Pressure**
Down-arrow Draining-eye
Beta blockers such as timolol and betaxolol decrease aqueous humor formation by blocking beta adrenergic receptors on the ciliary bodies.

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