Nitroglycerin

Nitroglycerin is a nitrate medication used to treat angina and pulmonary edema. This drug is quickly acting and is a potent vasodilator. When used in low doses, as it is for angina and pulmonary edema, it venodilates on a much larger scale than it arteriodilates, causing it to decrease cardiac preload. When given at higher doses, this drug arteriolodilates as well, and can be used as an antihypertensive agent. Nitroglycerin is broken down in the bloodstream into nitric oxide, NO, which leads to activation of guanylyl cyclase and a resulting increase in cGMP. This acts to relax smooth muscle, decreasing blood vessel pressure. Side effects of these drugs are directly related to its vasodilatory effects and include hypotension, reflex tachycardia, flushing and Monday disease, which is mostly seen in industrial workers. This drug is contraindicated for use in combination with Viagra (sildenafil), as it can lead to unsafe, rapid decreases in blood pressure.



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Indications

Pulmonary Edema
Lungs Edamame
Nitroglycerin is a drug indicated for use with cardiogenic pulmonary edema, as it is a quick and potent vasodilator, which leads to preload and afterload reduction. This decreases the amount of blood flowing into the heart (preload), decreasing edema in the lungs. The decreased afterload decreases pressure on the heart so it can effectively pump more blood from the lungs to the rest of the body.

Angina
Angel with Chest Pain-bolts
Nitroglycerin is a well-known anti-anginal agent. It is used for its rapid onset of action and reliable ability to treat angina pectoris.

Mechanism of Action

Decreases Preload
Down-arrow Vines on Preload Heart-pump
Nitroglycerin has a bigger effect on veins than on arterioles. The resultant venodilation causes a decrease in preload because less blood enters the heart. Nitroglycerin also causes arteriolodilation at higher doses. This makes it useful in decreasing afterload and managing hypertension as well.

Releases NO in Blood
Releasing NO into Blood
Nitroglycerin is broken down to release nitric oxide (NO). NO activates guanylyl cyclase in smooth muscle, leading to an increase in cyclic-GMP, which acts to relax smooth muscle contraction and leads to vasodilation of both veins and arterioles, but preferentially veins.

Side Effects

Hypotension
Hippo-BP
Due to the potent vasodilation caused by this medication, hypotension is a common side effect.

Reflex Tachycardia
Reflex-hammer Tac-heart-card
Nitroglycerin can lead to tachycardia in many patients. This symptom is a compensatory mechanism for maintaining cardiac output as blood pressure drops.

Flushing
Flashlight
Use of nitroglycerin leads to flushing; a consequence of its arteriolodilatory effects. This is especially common in the face and neck regions of patients.

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Monday Disease

Case of the Mondays

Monday disease is seen in industrial workers who are regularly exposed to nitroglycerin. This drug leads to cerebral vasodilation and resultantly terrible headaches. These workers then develop a tolerance to nitroglycerin after exposure through the week and feel fine. After the weekend, when they are not exposed, they return on Monday and again feel the effects of nitroglycerin.

Contraindications

Viagra (Sildenafil)

Caution-tape Hugh Hefner

Nitroglycerin is contraindicated for use in combination with Viagra (sildenafil). Both drugs work to potentiate cGMP, and venodilation. This combination can lead to unsafe drops in blood pressure.

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