Nitroprusside

Nitroprusside is a nitrate drug with potent venodilator and vasodilator properties. It is administered via IV and is broken down in the blood into NO, which in turn, increases cGMP, leading to smooth muscle relaxation. This translates into vasodilation and venodilation (slightly more venodilation than vasodilation), which is helpful in rapidly reducing the blood pressure, as this drug is rapid acting and has a short half-life. It is because of this drug's properties that it is given during malignant hypertension, which is a severe increase in blood pressure, causing impairment of one or more organ systems. A notable side effect of this drug is cyanide toxicity. Nitroprusside administration can lead to iatrogenic cyanide toxicity if overused. Sodium nitroprusside has 5 CN ligands in its molecule, and breaks down into thiocyanate. This is usually detoxified in the blood, but can reach toxic levels in the blood. Furthermore, the half-life of thiocyanate is not as short as nitroprussides, but is several days, and patients are at risk for toxicity and effects for longer.

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Mechanism of Action

Direct Release of NO
Released NO-gas
Nitroprusside breaks down in circulation to become nitric oxide (NO). Downstream effects of NO in the blood are venodilation and vasodilation.

Increase cGMP
Up-arrow cycle-GraMP
As a result of increased NO, guanylyl cyclase is activated in smooth muscle, increasing cGMP production. This increase in cGMP inactivates myosin light chains and causes smooth muscle relaxation, or arteriodilation. This drug is a potent dilator of venules and arterioles.

Short Half-Life
Shorts Half-Life-clock
This drug has a half-life of 1-2 minutes and is rapidly acting.

Indications

Malignant Hypertension
Malignant-man with Hiker-BP
Nitroprusside is administered intravenously to treat malignant hypertension. Malignant hypertension, or hypertensive emergency, is a serious condition characterized by extremely high blood pressure that acutely impairs one or more organ systems.

Side Effect

Cyanide Toxicity
Sais with Toxic-green-glow
Nitroprusside administration can lead to iatrogenic cyanide toxicity if overused. Sodium nitroprusside has 5 CN ligands in its molecule and breaks down into thiocyanate. This is usually detoxified in the blood but can reach toxic levels in the blood. Common toxicity symptoms include vertigo, confusion, difficulty breathing, and headaches at low doses.