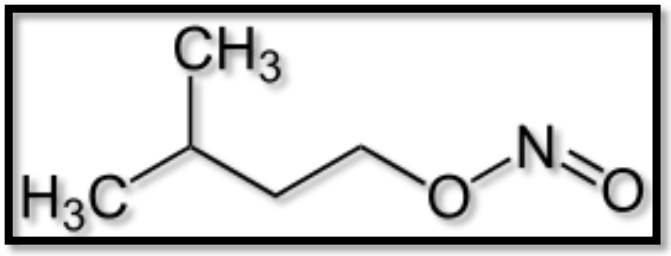
CVS DRUGS: 1. Vasodilators: (5 DRUGS)

1. Amyl Nitrite



NOMENCLATURE: 3-methyl-1-nitrosooxybutane, Pentyl alcohol nitrite

DESCRIPTION: Amyl Nitrite is an antihypertensive medicine. Amyl nitrite is employed medically to treat heart diseases such as angina and cyanide poisoning. Like other alkyl nitrites, amyl nitrite is bioactive in mammals, being a vasodilator which is the basis of its use as a prescription medicine. As an inhalant, it also has psychoactive effect which has led to illegal drug use.

PROPERTIES:

- ✓ Color: Clear colorless to yellowish liquid
- ✓ Odour: fragrant, fruity odor
- ✓ Taste: pungent aromatic taste.
- ✓ Boiling point 205-210°F (96-99°C).
- ✓ Solubility: insoluble in water ; miscible in ethanol;
- ✓ Other Properties: Produces toxic oxides of nitrogen during combustion.

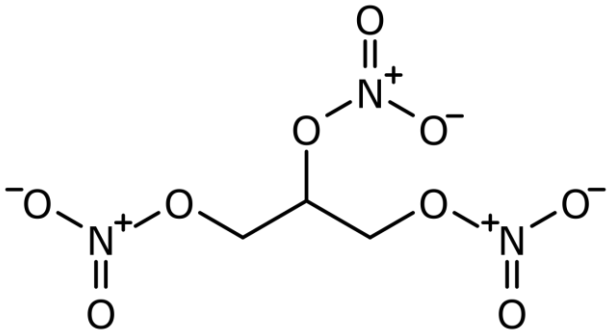
PHARMACODYNAMICS:

- It is a potent vasodilator.
- It expands blood vessels, resulting in lowering of the blood pressure.
- Functions as a source of nitric oxide, which signals for relaxation of the involuntary muscles
- **MOA:**
- Antianginal action- reduction in systemic and pulmonary arterial pressure (afterload)
- and decreased cardiac output because of peripheral vasodilatations, rather than
- coronary artery dilation.

- As an antidote (to cyanide poisoning)- amyl nitrite promotes formation of
- methemoglobin, which combines with cyanide to form nontoxic cyanmethemoglobin.
- **ADVERSE EFFECTS :**
- Hypotension,
- Headache, Flushing Of The Face,
- Tachycardia, Dizziness, And
- Relaxation of Involuntary Muscles, especially the blood vessel walls and the
- anal sphincter.
- **USES:**
- For the treatment of heart disease as well as angina.
- Used as an antidote for cyanide poisoning.
- Used as a cleaning agent and solvent in industries, and in small in perfumes.
- Used as an inhalant drug.
- **PREPARATION:**
- Capsules, inhalants and sold under the name of ***POPPERS.***
- **DOSAGE:**
- Adult - Inhalation 0.3 mL as needed; 2 to 6 inhalations from 1 capsule are usually sufficient. May be repeated in 3 to 5 min.
- **STORAGE CONDITIONS:**
- Store it in a cold place i.e., (2-3)° C

2. NITROGLYCERIN

CATEGOGY: Vasodilators



NOMENCLATURE: 1,2,3-Trinitroxypropane

DESCRIPTION:

Nitroglycerin is used for the treatment of chest pain and high blood pressure.
It was first approved in 2000 and is currently marketed by Pfizer, and other companies, depending on the dosage form.

- A less commonly known fact is that in addition to treating angina, nitroglycerin is also used in an ointment to treat the pain that accompanies anal fissures.
- The rectal ointment form of nitroglycerin was approved by the FDA in 1955.

PROPERTIES:

A colorless or pale yellow solution
Sweet, burning taste
Pungent smell

PHARMACODYNAMICS:

-Nitroglycerin causes the relaxation of vascular smooth muscles, causing arteriolar and venous dilatation.

-It reduces cardiac preload and afterload and reduces coronary artery spasm, decreasing systemic vascular resistance as well as systolic and diastolic blood pressure.

-The reduction of cardiac work by nitroglycerin is thought to cause the most relief of anginal symptoms, with some contributions from arteriolar dilatation effects.

MOA: Nitroglycerin is converted into nitric oxide (NO) in smooth muscle and activates Guanylyl Cyclase, thereby increasing cGMP concentration, and resulting in smooth muscle relaxation.

Dilatation of the veins results in decreased venous return to the heart, thereby decreasing left ventricular volume (reduced preload) and decreasing myocardial oxygen requirements.

Arteriolar relaxation reduces arteriolar resistance (reduced afterload), thereby decreasing myocardial oxygen demands.

In addition, nitroglycerine causes coronary artery dilatation, thereby improving myocardial blood distribution

ADVERSE EFFECTS:

- Hemodynamic effects.
- General effects -Vertigo, fever, flushed skin, and diaphoresis.
- Cardiorespiratory symptoms- syncope, dyspnea, decreased heart rate, or palpitations.
- Neurologic manifestations -paralysis, seizures, coma, and death.

USES:

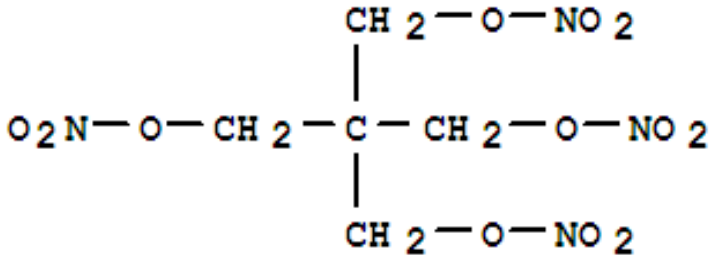
- In the treatment of various tendinopathies, both in pain management and acceleration of soft tissue repair.
- in the treatment of anal fissures,
-used to decrease pain associated with dysmenorrhea.

PREPARATION:

Infusion and injectable solutions, Buccal tab., transdermal films, sublingual spray and tab., intra-anal ointment., with dose of 300-800mcg (sublingual dose),

3. Pentaerythritol Tetranitrate

Category: Vasodilators



Nomenclature: 2, 2-Bis[(nitrooxy)methyl]propane-1,3-diyl dinitrate

- **DESCRIPTION: It** is the lipid soluble poly ester of nitric acid belonging to the family of nitro vasodilators that exhibit vasodilator property.
- In Pentaerythritol tetra nitrate all four hydroxy groups of pentaerythritol have been converted to the corresponding nitrate ester. (It is a powerful explosive also)
- It is a vasodilator with properties similar to those of glyceryl trinitrate, but with a more prolonged duration of action, and is used for treatment of angina pectoris

- . **PROPERTIES**:
- Appears as white crystals. The pure compound is a dangerous explosive, particularly when dry, and is especially sensitive to shock and heat. The admixture of wax reduces sensitivity. Faint and mild odor ; very soluble in acetone, soluble in benzene, toluene

PHARMACODYNAMICS:

- Pentaerythritol tetra nitrate releases free nitric oxide (NO) after denitration reaction, which triggers NO-dependent signaling transduction involving soluble guanylate cyclase (SGC).
- NO binds reversibly to the ferrous-heme center of SGC, thereby causes

conformational change and activates the enzyme.

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USES:

- In the treatment of heart conditions.
- As explosive and pyrotechnics.
- In industrial manufacturing.

PREPARATION:

- Extended release tablets
- Explosive materials

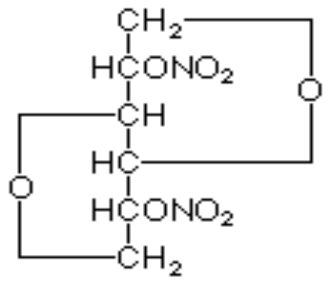
DOSAGE:

10 to 80mg

Vasodilators

4. Isosorbide dinitrate (ISDN)

CATEGORY: Vasodilators



$C_{10}H_8N_2O_8$

NOMENCLATURE: 1,4:3,6-dianhydro-2,5-di-O-nitro-D-glucitol

DESCRIPTION: Isosorbide dinitrate (ISDN) is a medication used for heart failure, esophageal spasms, and to treat and prevent chest pain from not enough blood flow to the heart. It has been found to be particularly useful in heart failure due to systolic dysfunction together with hydralazine in black people.

- Isosorbide dinitrate is a nitrate that dilates (widens) blood vessels, making it easier for blood to flow through them and easier for the heart to pump.
- **PROPPERTIES:**

-Isosorbide dinitrate is a white, crystalline,

-odorless compound

-stable in air and in solution,

-melting point of 70°C
-Isosorbide dinitrate is freely soluble in organic solvents such as acetone, alcohol, and ether, but is only sparingly soluble in water.

PHARMACODYNAMICS:

Similar to other nitrites and organic nitrates, isosorbide dinitrate is converted to nitric oxide (NO), an active intermediate compound which activates the enzyme guanylate cyclase (atrial natriuretic peptide receptor A).

MOA: This stimulates the synthesis of cyclic Guanosine 3',5'-monophosphate (cGMP) which then activates a series of protein kinase-dependent phosphorylation in the smooth muscle cells, eventually resulting in the dephosphorylating of the myosin light chain of the smooth muscle fiber.

The subsequent sequestration of calcium ions results in the relaxation of the smooth muscle cells and vasodilation.

ADVERSE EFFECTS:

Severe allergic reactions -rash; hives; itching; difficulty breathing; tightness in the chest; swelling of the mouth, face, lips, or tongue; fainting; fast or slow heartbeat; nausea; new or worsening chest pain; vomiting.

USES: Isosorbide dinitrate is used to prevent chest pain (angina) in patients with a certain heart condition (coronary artery disease).

This medication belongs to a class of drugs known as nitrates.

It works by relaxing and widening blood vessels so blood can flow more easily to the heart.

PREPARATION:

Isordil- Oral Titradose- Sublingual and extended release tablet

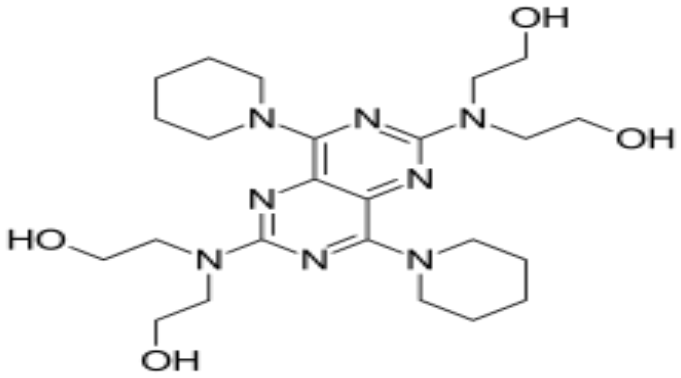
DOSAGE: 5mg; 40mg

STORAGE CONDITIONS:

15-30 C

5. DIPYRIDAMOL:

CATEGORY: Vasodilators



NOMENCLATURE: 2,2',2'',2'''-((4,8-Di(piperidin-1-yl) pyrimido [5,4-d] pyrimidine-2,6-diyl)bis(azanetriyl)) tetra ethanol

DESCRIPTION:

Dipyridamole is a vasodilator and inhibitor of platelet aggregation that is used to decrease the risk of thromboembolic complications and recurrence of stroke in patients known to have atherosclerotic cerebrovascular disease.

Dipyridamole is associated with a low rate of serum enzyme elevations during treatment, but has not been linked to instances of clinically apparent acute liver injury.

PROPERTIES: Slightly soluble in water; Melting Point: 163°C

PHARMACODYNAMICS:

Dipyridamole, a non-nitrate coronary vasodilator that also inhibits platelet aggregation, is combined with other anticoagulant drugs, such as warfarin, to prevent thrombosis in patients with valvular or vascular disorders.

Dipyridamole is also used in myocardial perfusion imaging, as an antiplatelet agent, and in combination with aspirin for stroke prophylaxis.

- Dipyridamole likely inhibits both adenosine deaminase and phosphodiesterase, preventing the degradation of cAMP, an inhibitor of platelet function.
- This elevation in cAMP blocks the release of arachidonic acid from membrane phospholipids and reduces thromboxane A2 activity.
- Dipyridamole also directly stimulates the release of prostacyclin, which induces adenylate cyclase activity, thereby raising the intraplatelet concentration of cAMP and further inhibiting platelet aggregation.

ADVERSE EFFECTS:

- dizziness, stomach upset, diarrhea, vomiting, headache,
- flushing (warmth, redness, or tingly feeling under your skin), particularly at first as your body adjusts to the medication.

USES:

- Used to dilate blood vessels in people with peripheral arterial disease and coronary artery disease.
- Dipyridamole has been shown to lower pulmonary hypertension without significant drop of systemic blood pressure.
- Inhibits formation of pro-inflammatory cytokines (MCP-1, MMP-9) in vitro and results in reduction of hsCRP in patients.
- Inhibits proliferation of smooth muscle cells in vivo and modestly increases unassisted patency of synthetic arteriovenous hemodialysis grafts.
- It increases the release of tissue plasminogen activator from brain microvascular endothelial cells.
- It has been shown to increase myocardial perfusion and left ventricular function in patients with ischemic cardiomyopathy.

PREPARATIONS:

Injection (solution) 5mg/1ml
Injection (liquid)
Tablets 50mg, 75 mg
Mixture Products – Capsule extended release, solution

STORAGE CONDITIONS:

Do not store above 25° C
Keep container tightly closed.