

Anti-Anginal

Angina Pectoris

- Angina pectoris, commonly referred to simply as angina, is a clinical syndrome characterized by ischemic chest pain resulting from an imbalance between the myocardial oxygen demand and supply.
- It serves as a symptom of myocardial ischemia, indicating reduced blood flow to the heart muscle.

Pathophysiology

- **Ischemia:** A condition where there is a reduced blood flow to any organ or tissue, leading to a shortage of oxygen (O_2).
- **Myocardial Oxygen Imbalance:** When the heart muscle (**myocardium**) does not receive sufficient oxygen and blood supply, angina pectoris occurs.

Symptoms

A. Primary Symptoms:

- Severe chest pain, typically on the left side.
- Pain may radiate to the neck, back, jaw, and limbs.

B. Associated Symptoms:

- Indigestion
- Nausea
- Vomiting
- Diaphoresis (excessive sweating)

Causes:

- Most commonly caused by coronary artery disease.
- Atherosclerosis (plaque buildup) narrows arteries and restricts blood flow.

Types of Angina:



1. Stable Angina (Classical Angina):

- **Most common type** of angina.

- **Triggers:** Predictable, often induced by physical exertion, stress, or increased workload.
- **Cause:** Atherosclerosis leading to reduced coronary artery perfusion.

2. Variant Angina (Prinzmetal’s or Vasospastic Angina):

- **Uncommon and unpredictable** type.
- Occurs at **rest** and is caused by coronary vasospasm, reducing blood supply and oxygen delivery.
- **Treatment** focuses on relieving vasospasms.

3. Unstable Angina:

- **Occurs at rest** with attacks increasing in intensity and duration.
- Primarily caused by **atherosclerosis** due to plaque buildup, which narrows the arteries and restricts blood flow.

Treatment of Angina:

- **Lifestyle changes:** Increased physical activity, weight loss, quitting smoking, and reducing fatty acid intake.
- **Surgery:** Coronary artery bypass surgery.
- **Medications:** Anti-anginal drugs such as calcium channel blockers, vasodilators, and beta-blockers.

Anti-Anginal Drugs

- Anti-anginal drugs are medications used to alleviate and prevent angina pectoris (chest pain) resulting from myocardial ischemia.
- They work by either increasing the oxygen supply to the heart muscle or decreasing its oxygen demand.
- Effective management of angina often involves a combination of these medications tailored to the patient's specific needs.

Classification of Anti-Anginal Drugs:



Classification of Anti-Anginal Drugs

— Vasodilators (Nitrates)

— Calcium Channel Blockers

1. Vasodilators (Nitrates):

- **Mechanism:** These drugs relax blood vessels, increasing oxygen supply to the myocardium and reducing the workload on the heart.
- **Examples:**
 - *Amyl Nitrite*

- *Nitroglycerin* (common for acute angina relief)
- *Pentaerythritol tetranitrate*
- *Isosorbide dinitrate*
- *Dipyridamole*

2. Calcium Channel Blockers:

- **Mechanism:** These drugs prevent calcium from entering heart and blood vessel cells, leading to muscle relaxation, dilation of arteries, and improved blood flow.
- **Examples:**
 - *Verapamil*
 - *Bepridil hydrochloride*
 - *Diltiazem hydrochloride*
 - *Nifedipine*
 - *Amlodipine*
 - *Felodipine*
 - *Nicardipine*
 - *Nimodipine*

Summary Table

Category	Medications
Vasodilators	<i>Amyl Nitrite, Nitroglycerin, Pentaerythritol Tetranitrate, Isosorbide Dinitrate, Dipyridamole</i>
Calcium Channel Blockers	<i>Verapamil, Bepridil Hydrochloride, Diltiazem Hydrochloride, Nifedipine, Amlodipine, Felodipine, Nicardipine, Nimodipine</i>

Brand Names Of Important Marketed Products A

Used for **angina pectoris** and improving blood supply to the heart.

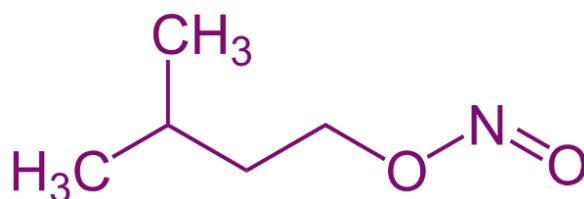
Drug	Brand Name(s)	Use
Nitroglycerin	Sorbitrate, Nitrostat	Acute angina
Isosorbide dinitrate	Isordil, Sorbitrate	Chronic angina
Isosorbide mononitrate	Monotrate, Imdur	Prophylaxis of angina
Amlodipine	Norvasc, Amlong	Vasodilator
Ranolazine	Ranozex, Ranexa	Chronic angina
Nicorandil	Nexovas, Ikorel	Vasodilator and antianginal

Various Vasodilators Drugs

1. Amyl Nitrite

Structure

- Amyl nitrite is an organic compound belonging to the class of alkyl nitrites. It consists of a nitrite group attached to an amyl (pentyl) chain.
- Chemical Formula:** $C_5H_{11}NO_2$



Mode of Action

- Nitric Oxide Donor:** Amyl nitrite releases nitric oxide (NO) upon metabolism.
- Vasodilation:** NO activates guanylate cyclase in vascular smooth muscle, increasing cyclic GMP levels and leading to smooth muscle relaxation.
- Reduction of Afterload:** Decreases venous return and arterial resistance, reducing cardiac workload.

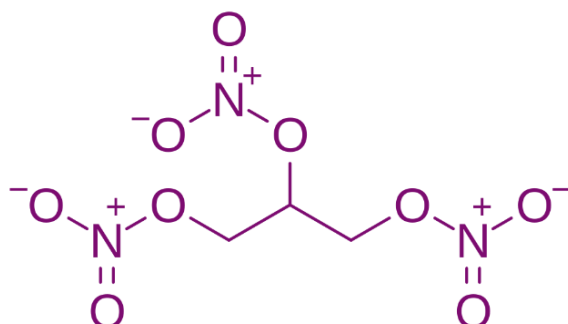
Uses

- Angina Pectoris:** Provides rapid relief from acute angina attacks by dilating coronary arteries.
- Sydenham's Chorea:** Used off-label for its vasodilatory effects.
- Recreational Use:** Sometimes abused for its euphoric effects.

2. Nitroglycerin

Structure

- Nitroglycerin, also known as glyceryl trinitrate, is a nitrate ester of glycerol. It contains three nitrate groups esterified to the three hydroxyl groups of glycerol.
- Chemical Formula:** $C_3H_5N_3O_9$



Mode of Action

- **Nitric Oxide Release:** Nitroglycerin is metabolized to release NO.
- **Vasodilation:** NO activates guanylate cyclase, increasing cyclic GMP and causing smooth muscle relaxation.
- **Reduction of Cardiac Workload:** Dilates veins more than arteries, reducing venous return (preload) and myocardial oxygen demand.

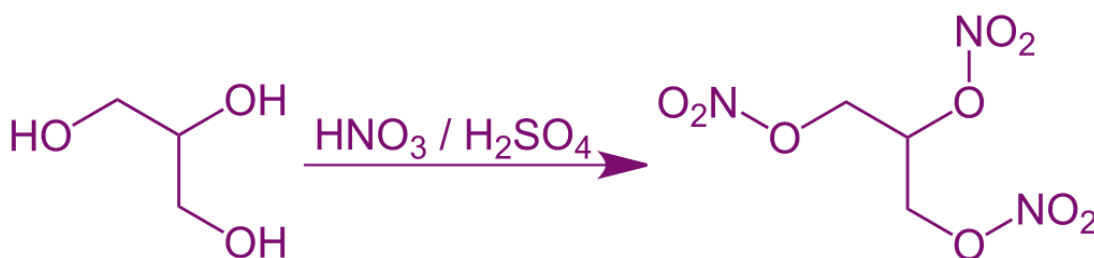
Uses

- **Angina Pectoris:** Acute relief of anginal attacks.
- **Heart Failure:** Management of acute decompensated heart failure.
- **Hypertension:** As an adjunct in hypertensive emergencies.
- **Anal Fistulas:** Applied topically to promote vasodilation and reduce pressure.

Structure-Activity Relationship (SAR)

- **Nitrate Ester Groups:** Essential for NO release; the number and position of nitrate groups influence potency and duration.
- **Glycerol Backbone:** Provides flexibility, allowing proper orientation for enzyme-mediated NO release.
- **Hydroxyl Substituents:** Affect solubility and bioavailability.

Synthesis



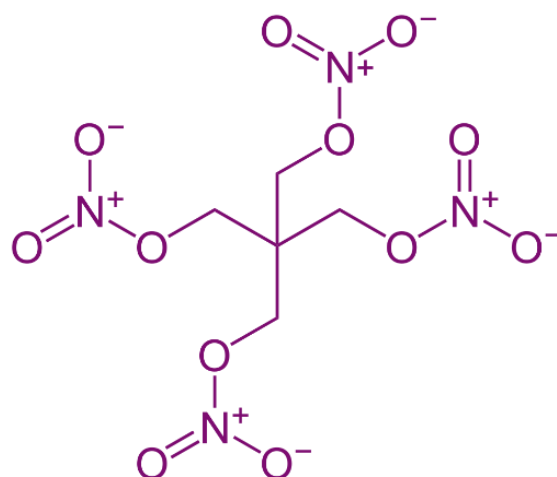
3. Pentaerythritol Tetranitrate

Structure

- Pentaerythritol tetranitrate (PETN) is a nitrate ester of pentaerythritol, featuring four nitrate groups esterified to the hydroxyl groups of pentaerythritol.
- Chemical Formula: $\text{C}_5\text{H}_8\text{N}_3\text{O}_{18}$

Mode of Action

- **Nitric Oxide Release:** PETN metabolizes to release NO, causing vasodilation.



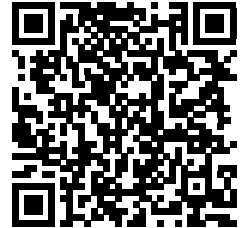


FREE PREVIEW

[Click here to visit our website](#)

PHARMACY PREMIUM NOTES

Complete subject
and semesters are
available on
FirstHope app only.



[Scan or click here](#)

Click here to get the app



Available on Google Play

JOIN THE FIRSTHOPE COMMUNITY

Join our Telegram channel

Click here to join Telegram



[Scan or click here](#)

@FirstHopeNotes

Instagram

@firsthope.official

[Click here to follow >](#)

YouTube channel

FirstHope-Pharmacy / Live streams

[Click here to watch >](#)

WhatsApp channel

Follow FirstHope on WhatsApp

[Click here to join >](#)

FirstHope website

firsthopenotes.com

[Click here to visit >](#)

B.Pharm / D.Pharm / M.Pharm / Pharm.D

Preview notes. Complete subjects and semesters in the FirstHope app.