

# Drugs used to treat Coronary Artery Disease

(Angina Pectoris and Myocardial Infarction)

## Organic nitrates

- Coronary artery disease (CAD) is the most common form of heart disease by 2020 it is estimate that it will be the major cause of death in all regions of the world.
- Disease of coronary arteries is almost always due to atherosclerotic plaque and its complications, which narrow the coronary arteries and decrease their elasticity, impairs dilation of coronary arteries and responsiveness to normal stimuli.

## Management of CAD

Non pharmacologic management of angina and MI include:

- ✓ risk factor modification,
- ✓ patient education, and
- ✓ revascularization procedures (e.g., coronary artery bypass graft).

**Drug Management:** The drug therapy of myocardial ischemia has two goals:

1. Prevention of MI & death by:

◆ Cholesterol lowering drugs

◆ Antiplatelet drugs

\*\*Low dose of aspirin (75–100 mg)

\*\*Clopidogrel (75 mg daily)

2. Prevention of myocardial ischemia and anginal pain  
**(Anti-anginal drugs).**

- **Three groups or classes of drugs are used to relieve or prevention the symptoms of angina.**
- **Organic Nitrates (nitroglycerin)**
- Beta-blockers: e.g., Atenolol, Metoprolol, Bisoprolol
- Calcium channel blockers e.g., Nifedipine, Nicardipine

# Organic nitrates

## • Mechanism of action and effects

- Organic nitrates are thought to relax vascular smooth muscle by their intracellular conversion to nitrite ions and then to nitric oxide – NO,
- (NO is the main potent physiological vasodilator –normally produced by endothelial cells).
- The primary therapeutic action of the organic nitrates is their ability to relax both arterial and venous smooth muscle and improve blood delivery to the heart muscle:
  1. Dilation of veins reduces the amount of blood returning to the heart this decreases blood volume and pressure within the heart (preload), which in turn decreases cardiac workload and oxygen demand.
  2. Dilation of coronary arteries and relax coronary spasm or vasoconstriction and improve myocardial perfusion → bring more blood to the myocardium and allow more oxygen to reach ischemic tissue → terminating the pain.
  3. Nitrates dilate arterioles, which lowers peripheral vascular resistance (afterload). This results in lower systolic blood pressure and, consequently, reduced cardiac workload.

## Organic nitrates are of two types:

- Glyceryl trinitrates (GTN) are available in an assortment formulations sublingual tablets (0.3 – 0.6 mg), translingual spray (0.4 – 0.8 mg), transmucosal (buccal) tables – are rapid acting drugs terminate an acute anginal attack within 2 – 3 min. Sustained release oral tablets, transdermal patches and topical ointment – slow acting drugs 20 – 60 min – are used for extended protection against anginal attacks. Sublingual and buccal tablets subject to extensive 1<sup>st</sup> pass effect or metabolism in the liver – therefore ineffective when swallowed.
- Isosorbide dinitrates – available in sublingual tablets and sustained release oral tablets.
- Isosorbide mononitrates – available in sustained release oral tablets.

# Adverse effects and Nursing Interventions

The adverse effects associated with these drugs are related to vasodilation.

- CNS effects include headache, dizziness, and weakness. Headache may be more distressing than the angina and diminishes over the 1<sup>st</sup> few weeks of treatment. In the meantime, can be reduced with analgesics.
- Postural hypotension, which can be severe and must be monitored.
- Reflex tachycardia that occurs when blood pressure falls
- With the transdermal preparation, there is a risk of contact dermatitis and local hypersensitivity reactions.
- Continuous nitrate therapy causes **pharmacological tolerance (tachyphylaxis)** – mostly **occurs with long- acting** preparations – to prevent this effect nitroglycerin should be used in lowest effective dosages and all long-acting forms should be taken with a medication-free period each day (usually 8 hrs. during night).