



Treatment of Angina Pectoris

by E.Z

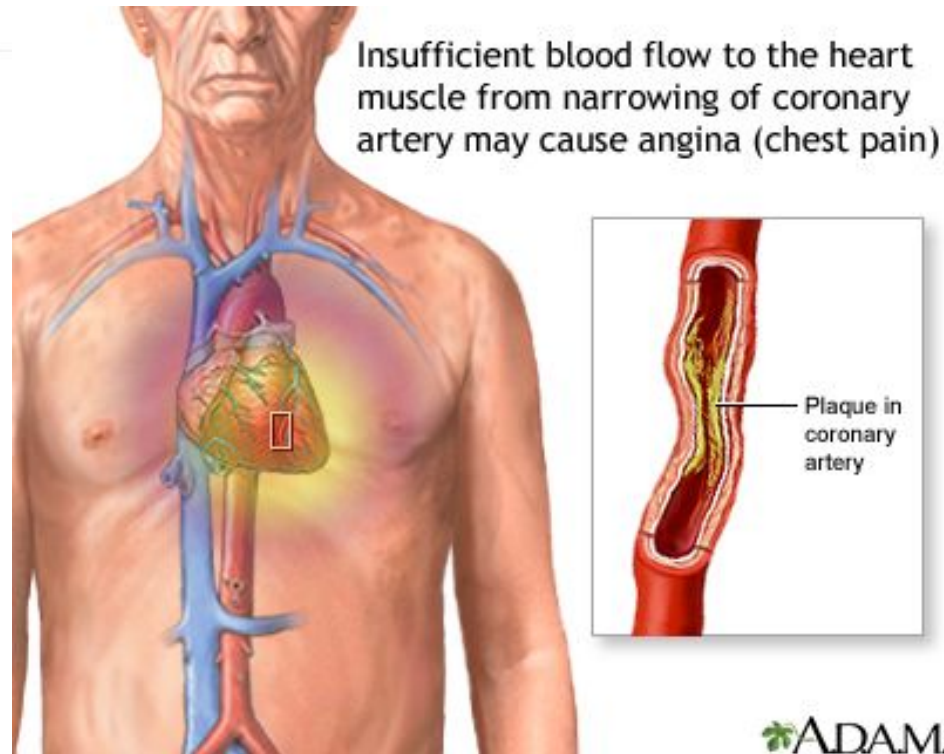
Syndrome

- Chest pain
- Symptoms: pain in your arms, neck, jaw, shoulder or back accompanying chest pain; nausea; fatigue; shortness of breath; sweating; dizziness
- Diagnosis: Chest radiography, graded exercise stress testing, ECG, selective coronary angiography
- Risk factors: smoking, diabetes, high blood pressure, obesity, genetics, etc



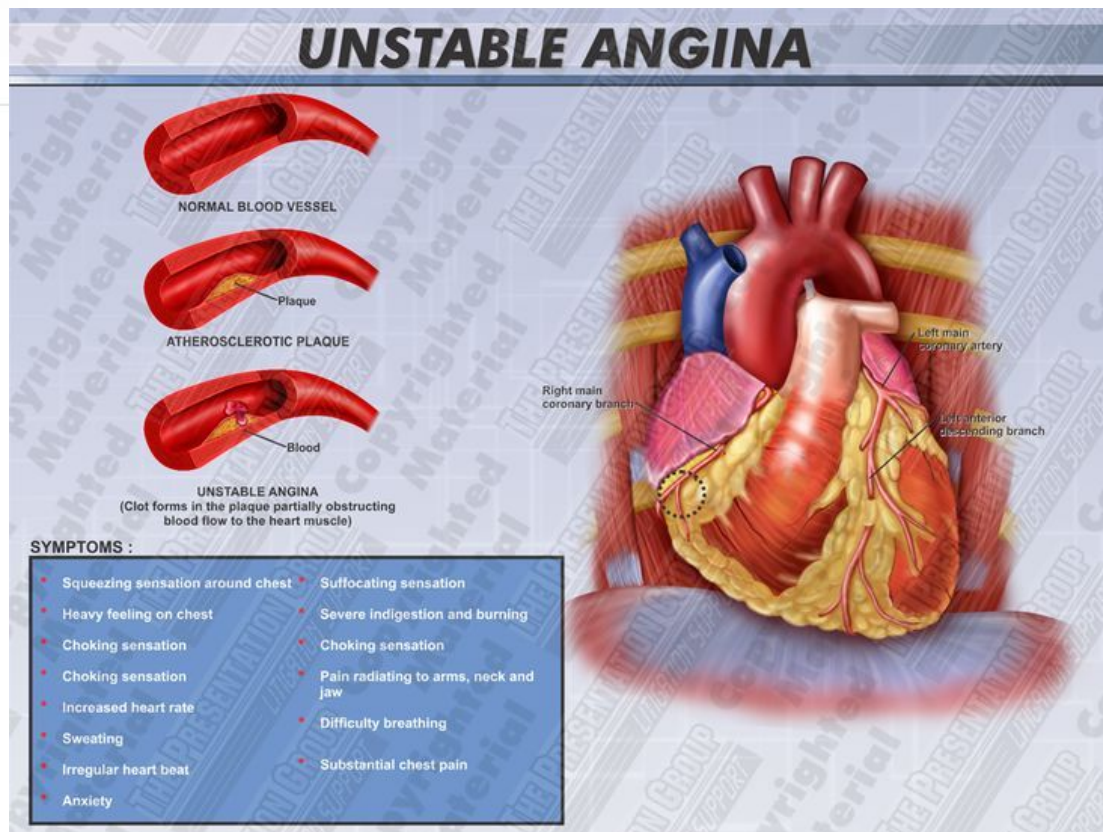
Stable angina

- Coronary artery disease
- Develops when your heart works harder
- Lasts a short time
- Disappears sooner



Unstable angina

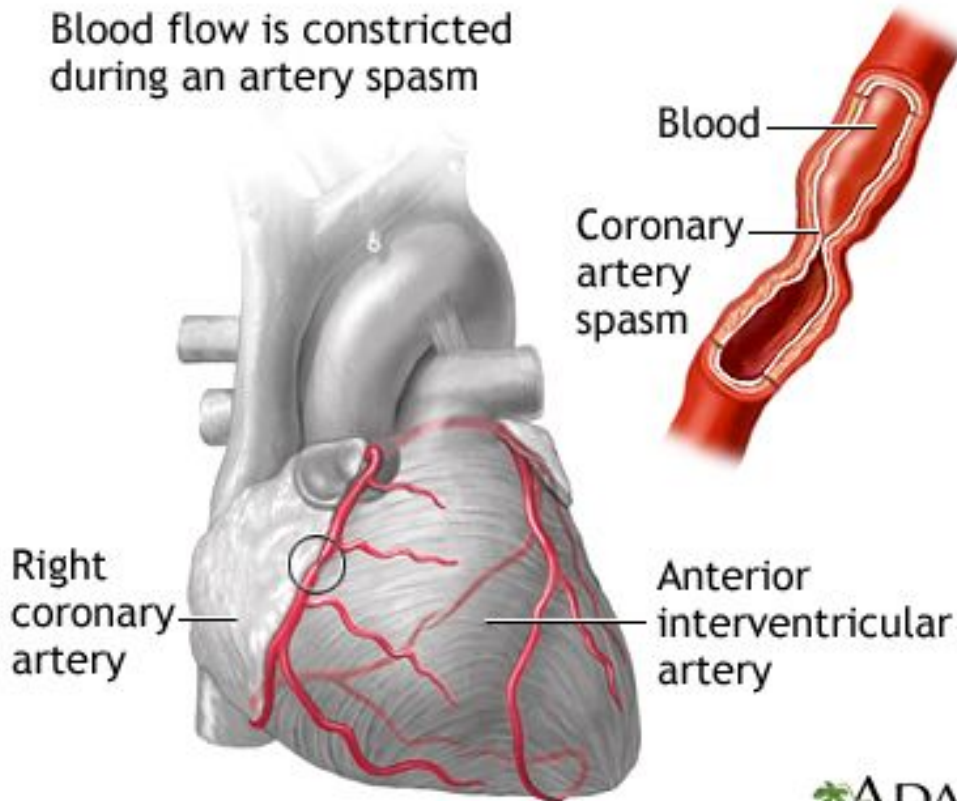
- Acute coronary syndrome
- Occurs even at rest
- Usually more severe and lasts longer
- May not disappear with rest or use of angina medication



Prinzmetal angina

- Reversible spasms of arteries
- Occurs at any time
- Is often severe
- May be relieved by angina medication

Blood flow is constricted during an artery spasm





Determinants of O₂ requirement

Diastolic factors

- Blood volume
- Venous tone

Systolic factors

- Peripheral resistance
- Heart rate
- Heart force
- Ejection time



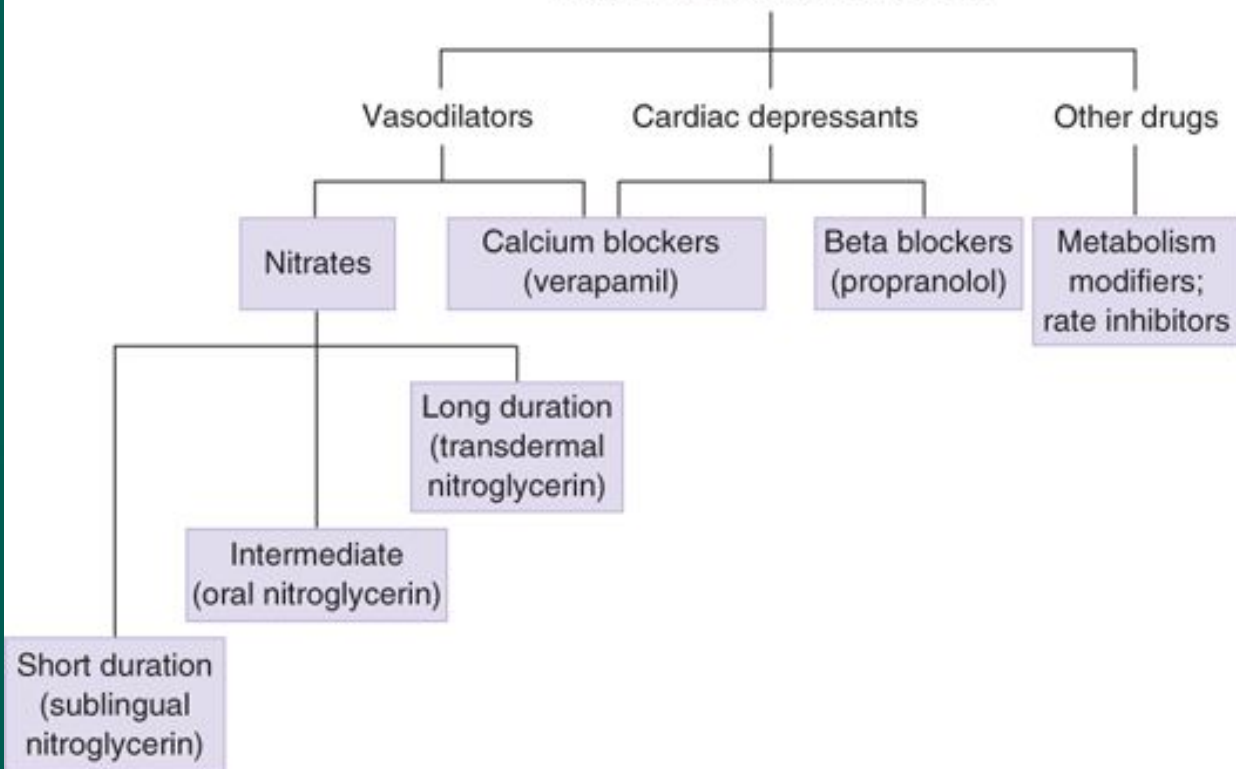
Strategies

- To increase O₂ delivery
- To reduce O₂ requirement
- To increase O₂ utilization (new theory)

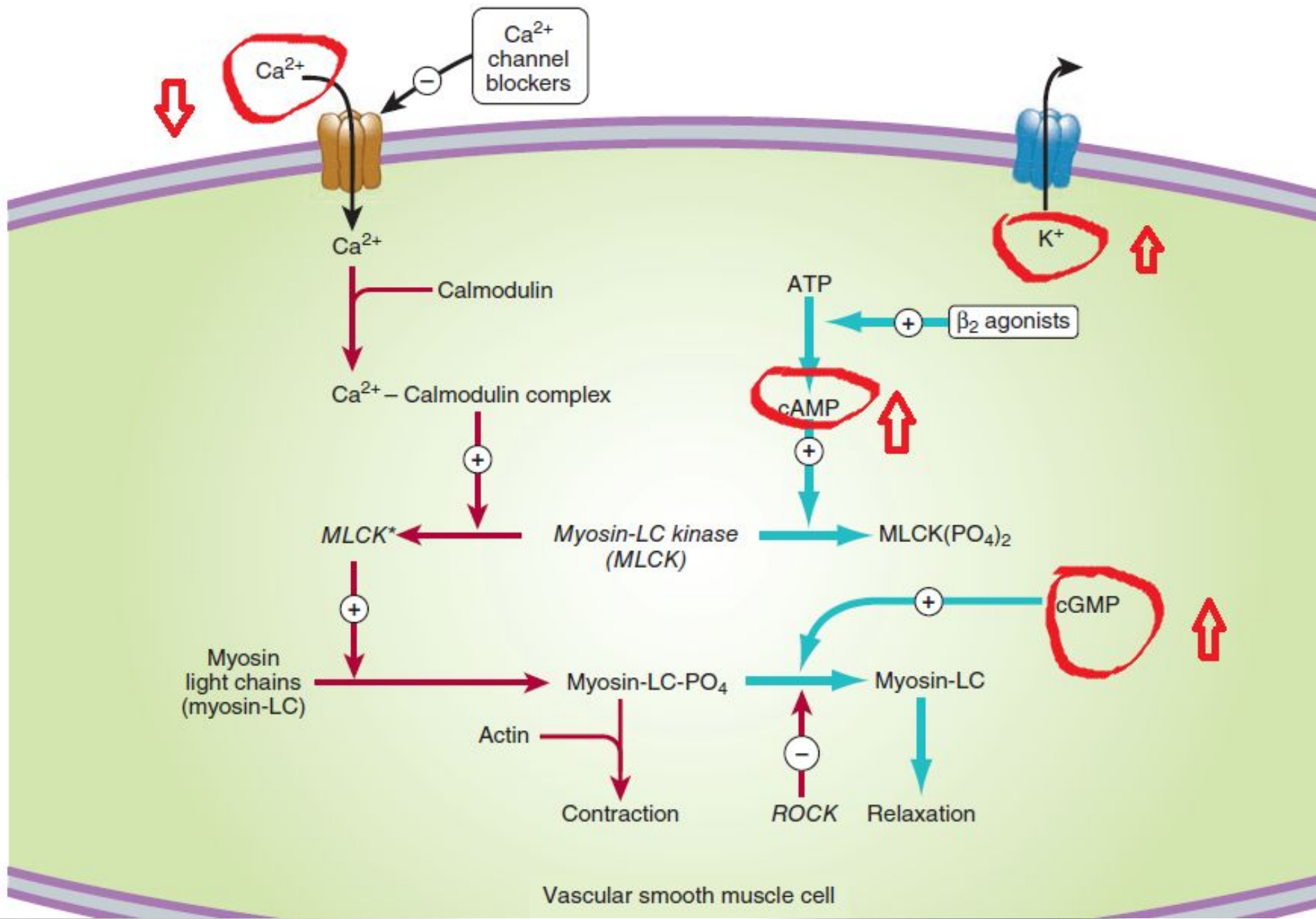


Drugs

Drugs used in angina pectoris

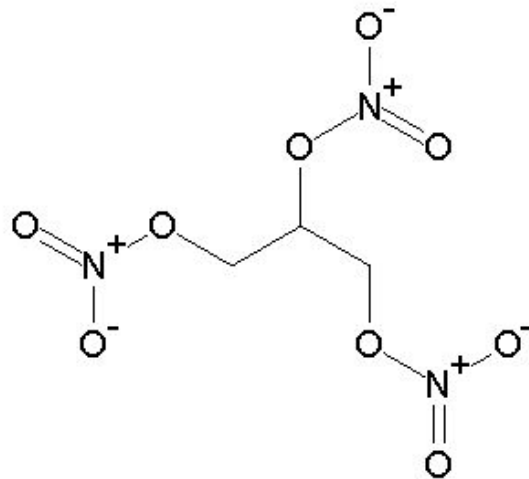
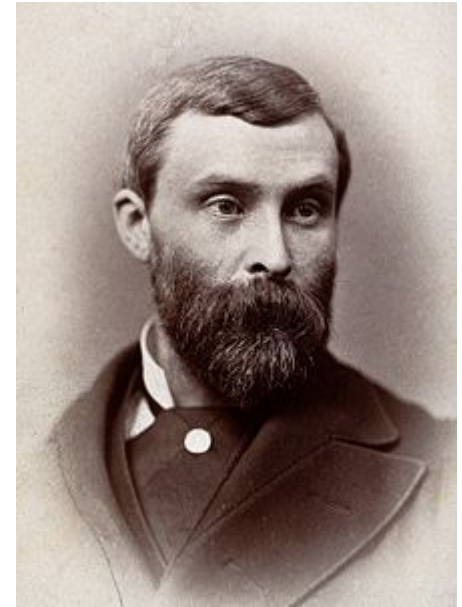


Source: A.J. Trevor, B.G. Katzung, M. Kruidering-Hall: Katzung & Trevor's Pharmacology: Examination & Board Review, 11th Ed. www.accesspharmacy.com
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Nitrates & Nitrites

- * In 1867, Lauder Brunton described the antianginal properties of nitrites
- * were first used as an antianginal agent in 1879
- * 3 types: short-acting, intermediate, long
- * nitroglycerin



Nitrates



NITROGLYCERIN



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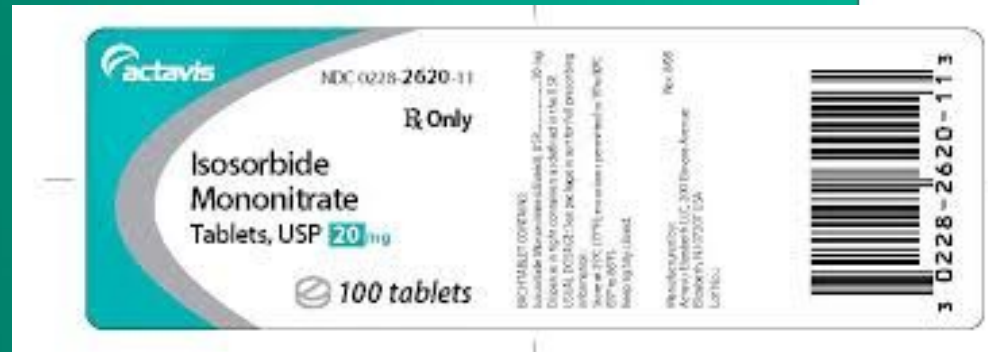
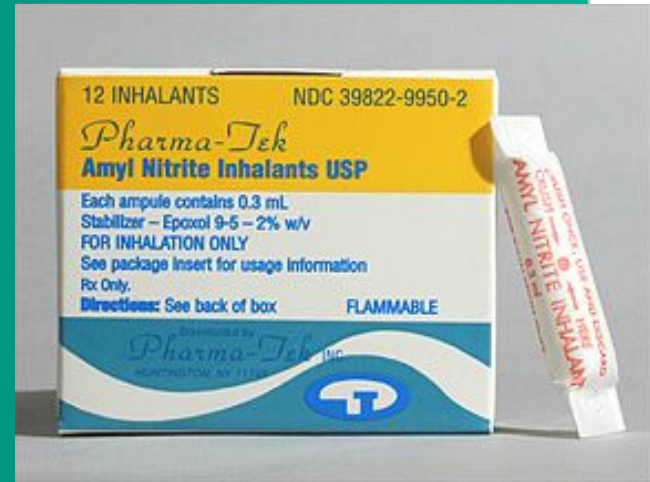
Pharmacokinetics

- Oral bioavailability is low
- Total duration of effect is 30 min
- Pentaerythritol tetranitrate is for long use



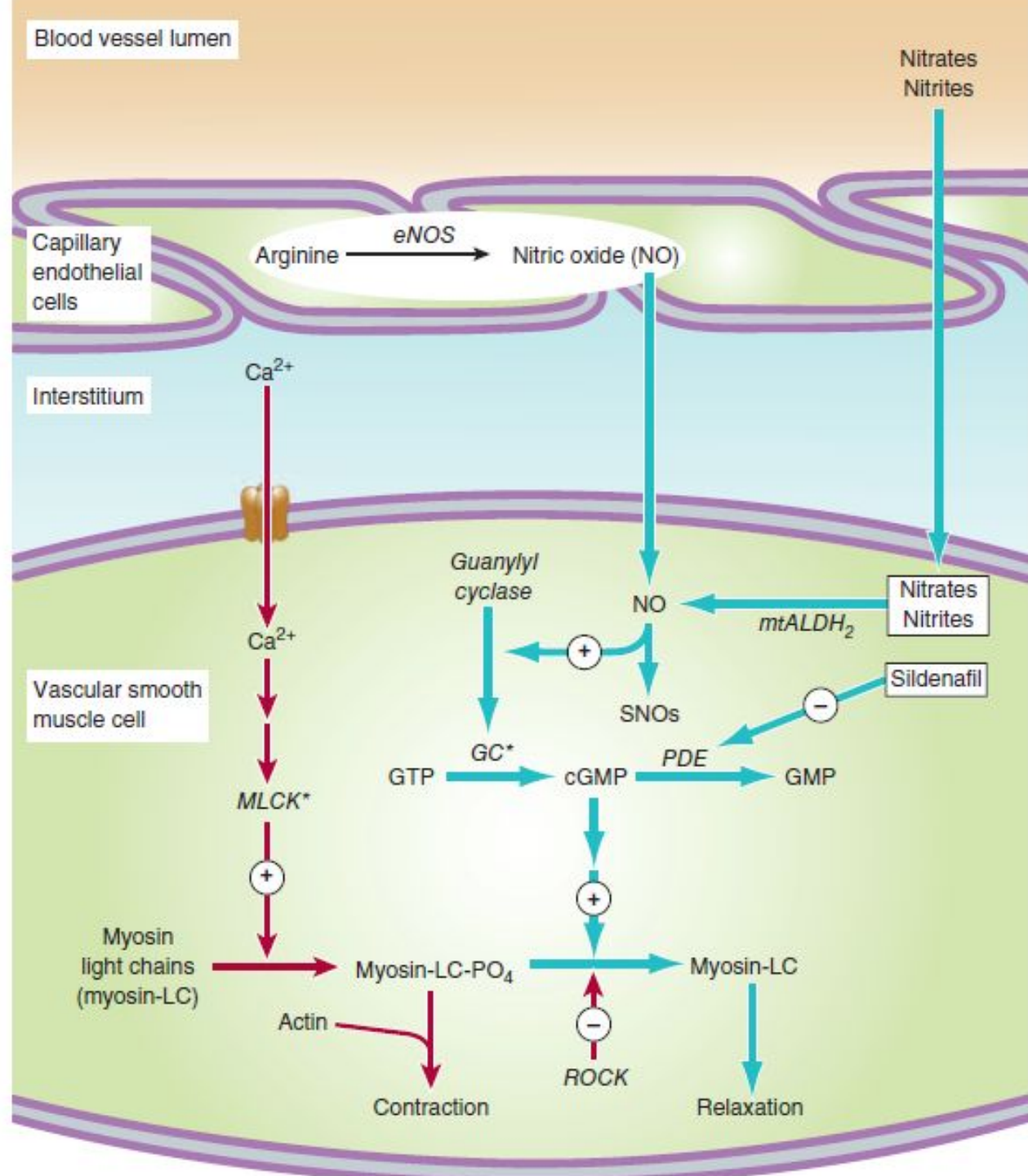
Pharmacokinetics

- Amyl nitrate is for inhalation
- Isosorbide mononitrate (100 % bioavailability)



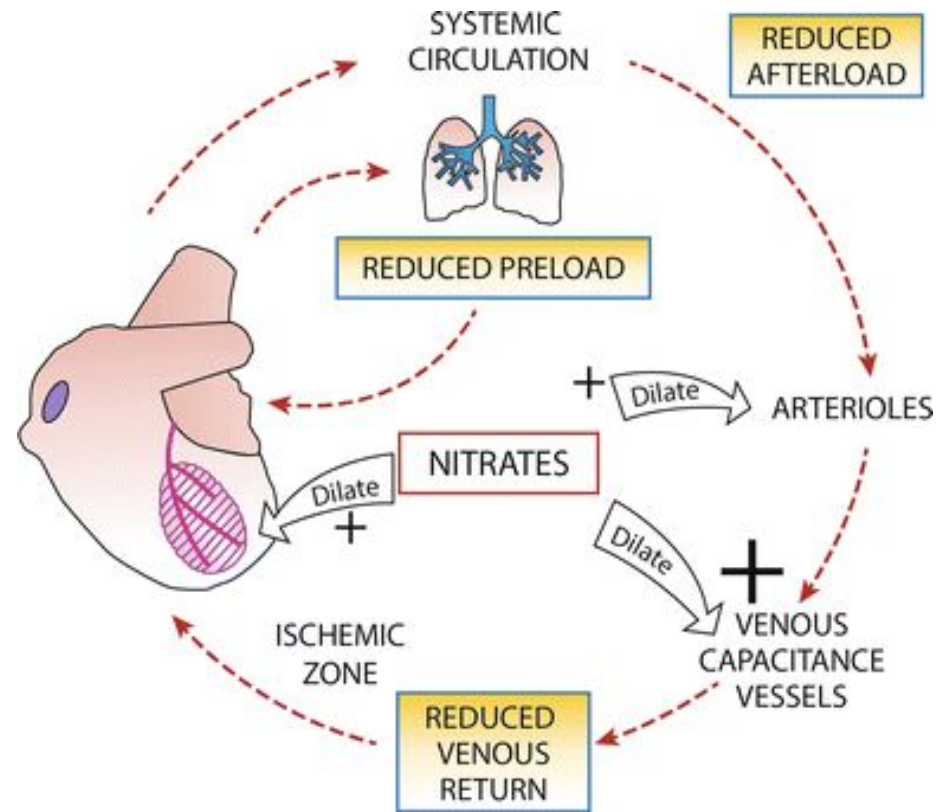


In smooth muscles:
 glutathione
 S-transferase
 Mitochondria
 l enzyme:
 aldehyde
 dehydrogenase isoform

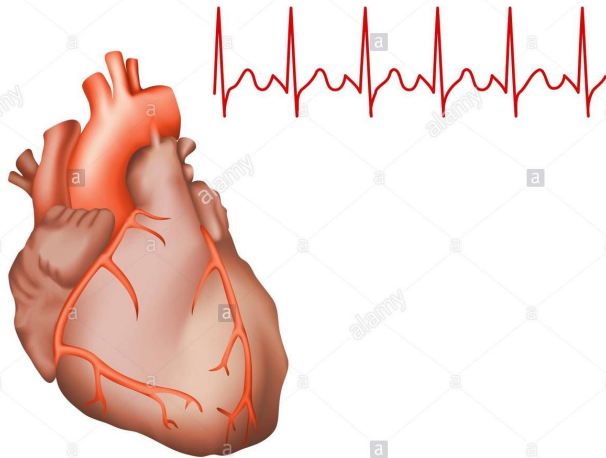


Effects

- *relaxation of vessels
- *compensatory responses:
 - baroreceptors mechanisms
 - hormonal mechanisms

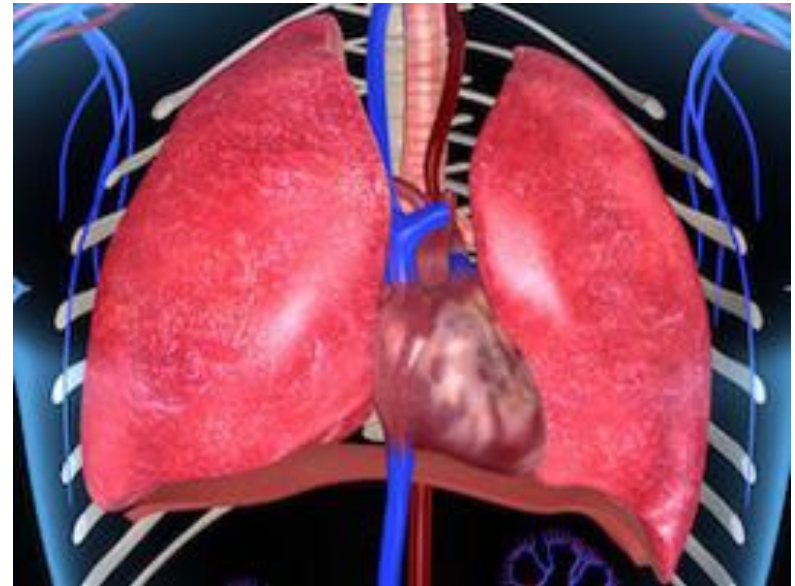
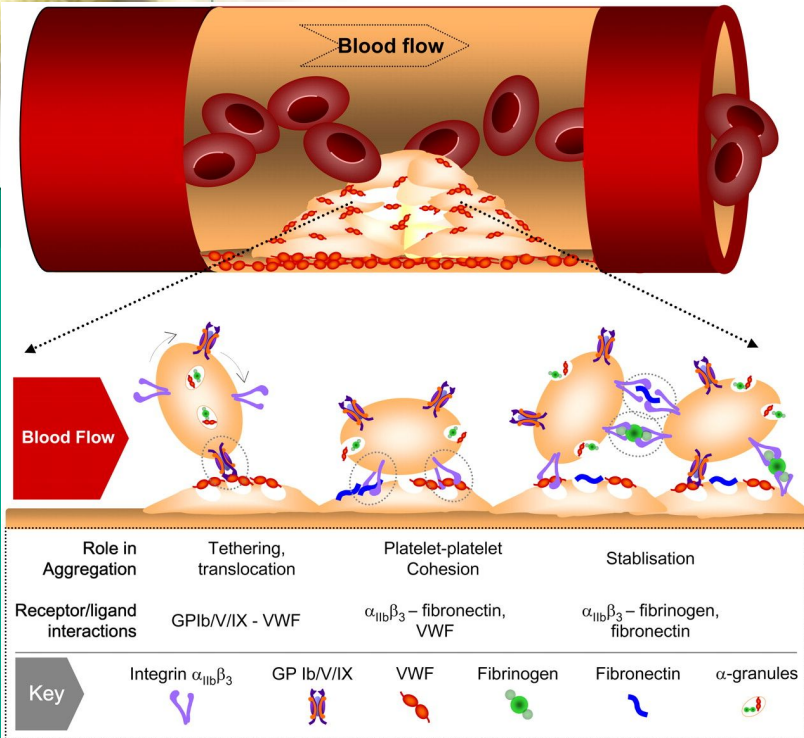


Tachycardia



Effects

- *relaxation of bronchi, GU, GI tracts
- *decrease in platelet aggregation



Cyanide poisoning

- Nitrite ion + hemoglobin = methemoglobin
- Cyanide poisoning: cytochrome iron complexing by CN^-
- Methemoglobin has high affinity for CN^-

Cyanide Poisoning



JMJ

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Toxicities

- Orthostatic hypotension
- Tachycardia
- Throbbing headache
- Contraindicated if intracranial pressure is elevated
- Tolerance:
 - tachyphylaxis
 - Monday disease

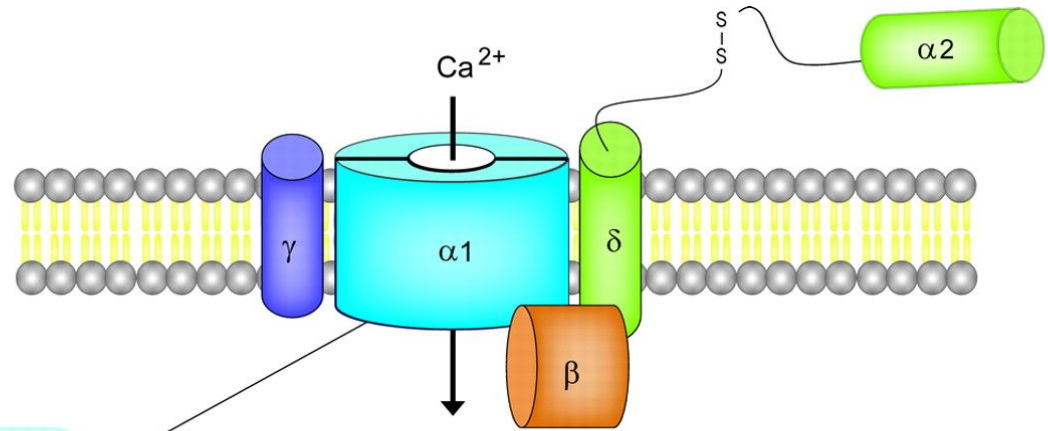
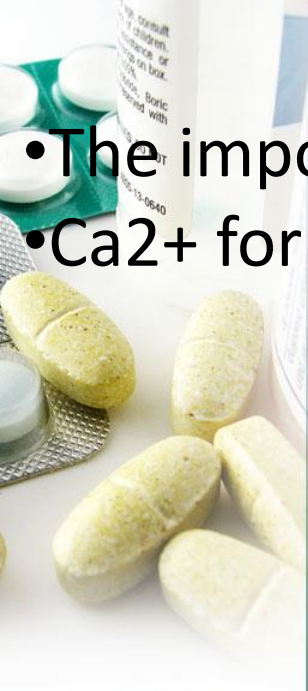


Clinical use

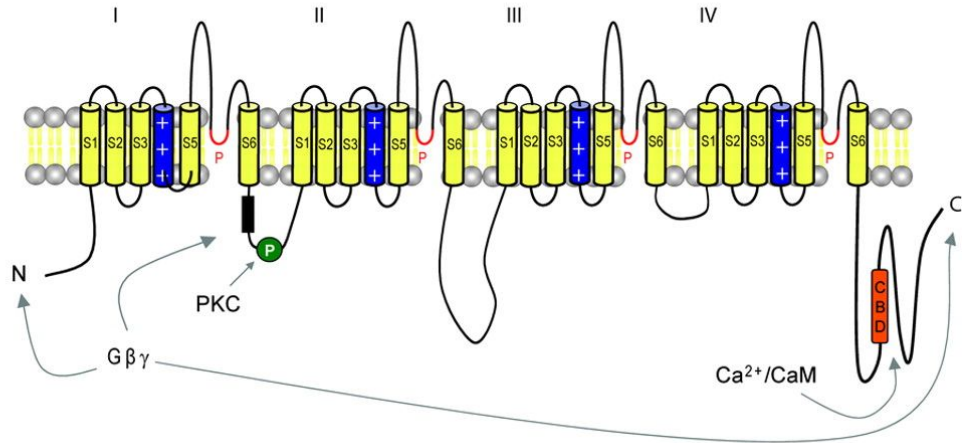
- Immediate treatment of angina
- prophylaxis

Calcium channel-blocking drugs

- The important one is L-type channel
- Ca^{2+} for contraction

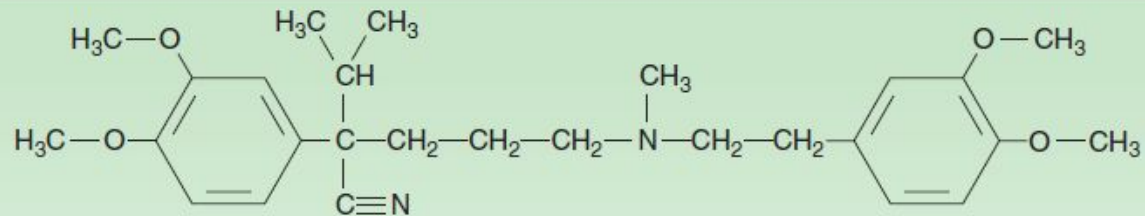


- L { $Ca_v1.1$
 $Ca_v1.2$
 $Ca_v1.3$
 $Ca_v1.4$
- P/Q $Ca_v2.1$
- N $Ca_v2.2$
- R $Ca_v2.3$
- T { $Ca_v1.1$
 $Ca_v1.2$
 $Ca_v1.3$

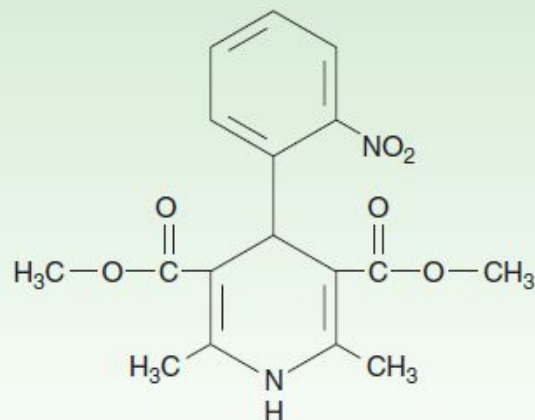


Calcium channel-blocking drugs

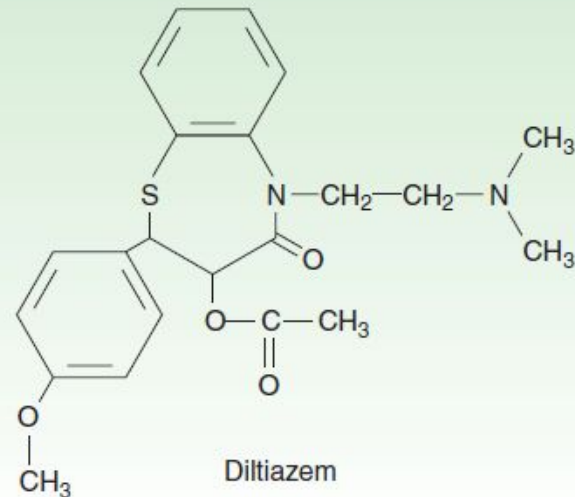
- Dihydropyridines (nifedipine)
- Nondihydropyridines (verapamil, diltiazem)
- Orally active



Verapamil



Nifedipine



Diltiazem

Chemical structures of several calcium channel-blocking drugs.

Effects

- Relaxation of smooth muscles
- Reduction in PVR
- Reduction of coronary artery spasm
- BP is reduced
- Impulse generation in the SA and conduction is reduced
- Reduced cardiac contractility

Effects

- Nimodipine reduce morbidity after a subarachnoid hemorrhage
- Nicardipine prevents cerebral vasospasm + verapamil:
 - * inhibits release of insulin
 - * reverse the resistance of cancer cells
- + interfere with platelet aggregation

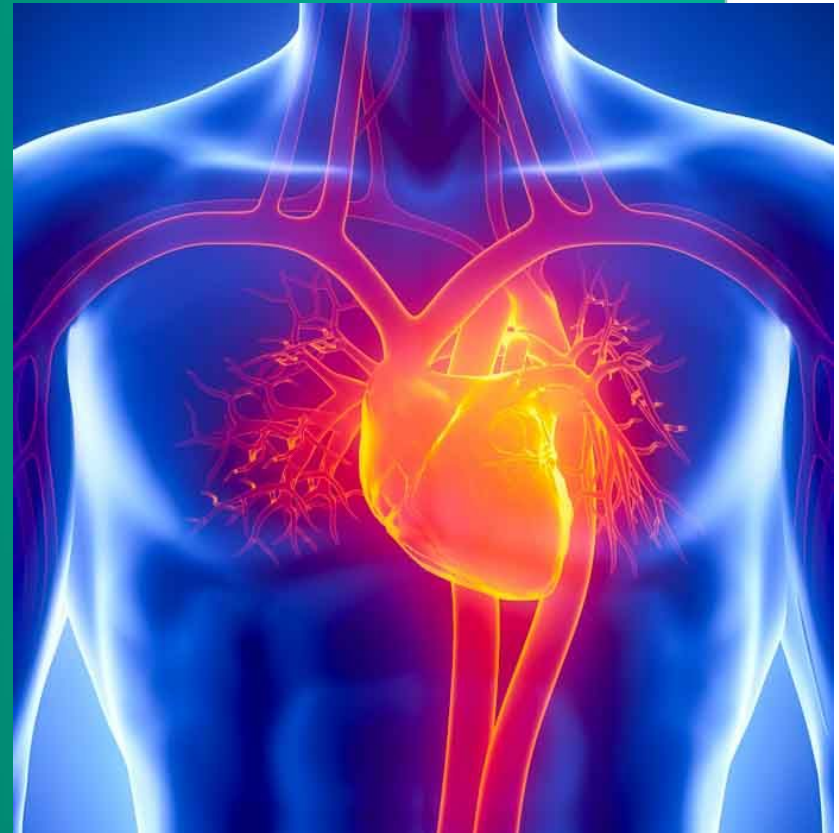
Toxicity

- Cardiac depression
- Nifedepine increases the risk of MI
- Flushing
- Dizziness
- Nausea
- Constipation
- Peripheral edema



Clinical uses

- Hypertension
- Angina
- Tachyarrhythmias
- Migraine
- Raynaud's phenomenon



Beta-blocking drugs

- Nonselective blockers: propranolol
- Selective blockers: atenolol, metoprolol
- Orally and parenterally
- Only for prophylactic therapy
- Effects:
 - decreased hr
 - decreased bp
 - decreased contractility

BETA BLOCKER ACTIONS

β_1

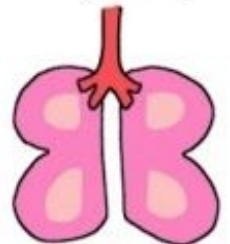
Blockers Affect
(1 = Heart)



The Heart

β_2

Blockers Affect
(2 = Lungs)



The Lungs

Toxicity

- Fatigue
- Insomnia
- Erectile dysfunction
- Worsening of claudication
- Contraindications:
 - Asthma
 - Severe bradycardia
 - Severe unstable left ventricular failure

The Potential **Risks** and **Dangers** of **BETA BLOCKERS**



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Other drugs

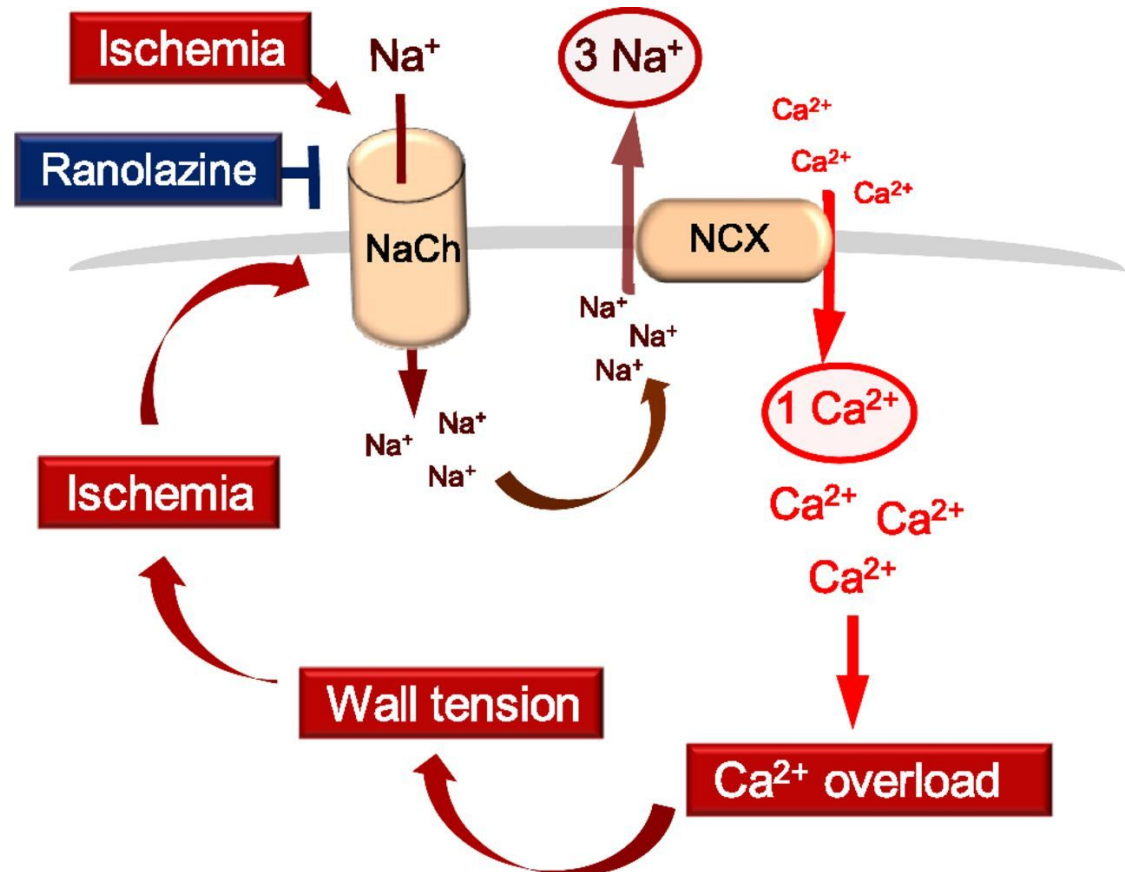
- Ranolazine:

- reduces a late Na current

- reduces diastolic tension, cardiac contractility, work

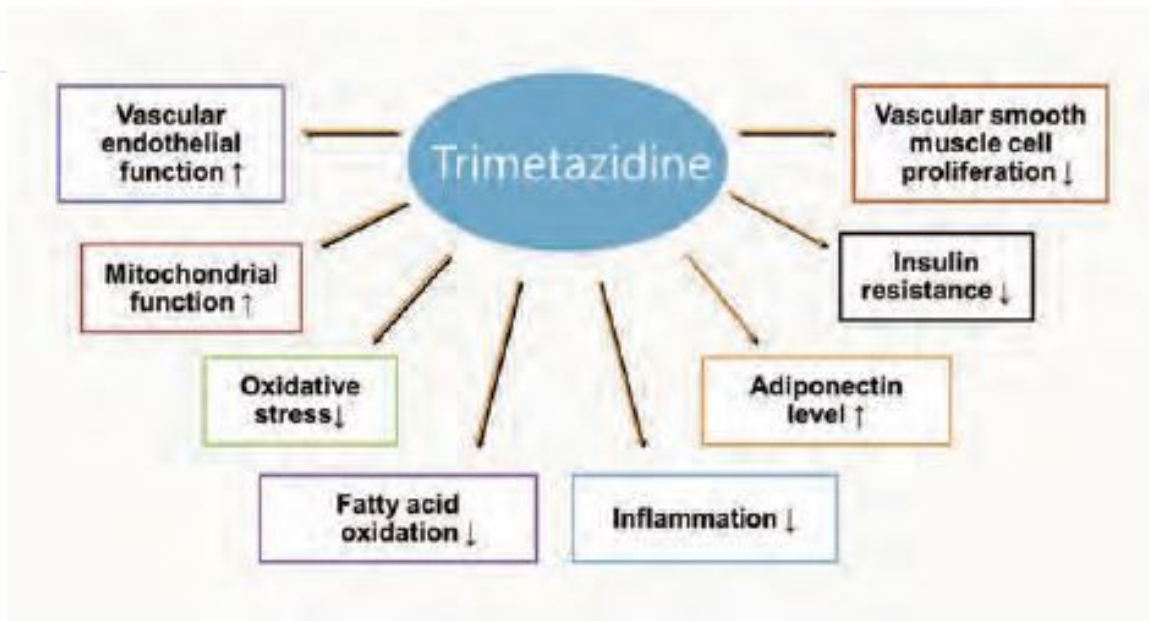
- prolongs QT

- for angina



Other drugs

- Trimetazidine:
 - pFOX inhibitor
 - inhibits the fatty acid oxidation
 - for ischemia



Other drugs

- Perhexiline:

- shift myocardial metabolism to glucose oxidation
- but! Hepatotoxicity, peripheral neuropathy

- Ivabradine:

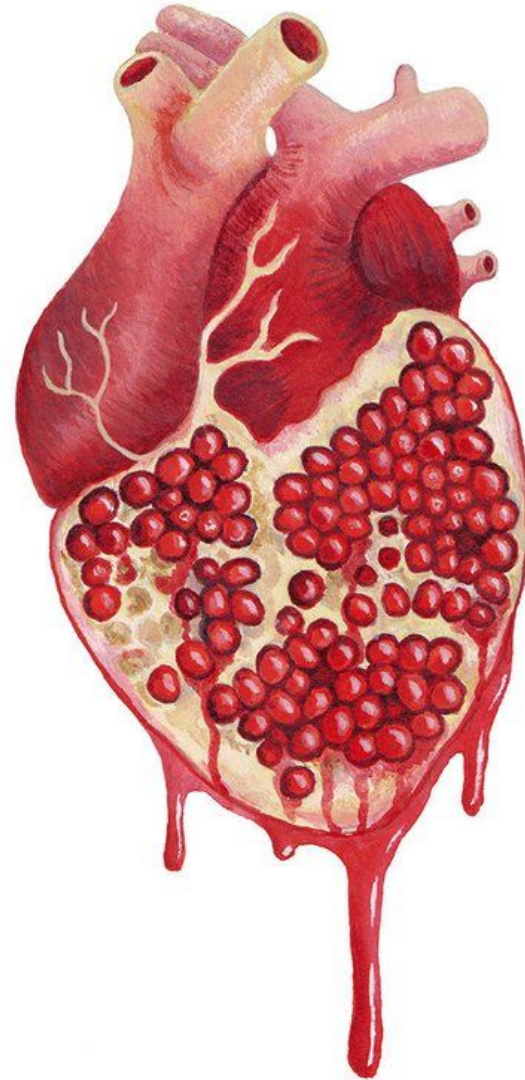
- inhibits Na channels in the SA node
- reduces hr
- for angina and heart failure

- Fasudil:

- inhibits smooth muscle Rho kinase = relaxation
- reduces coronary vasospasm; for angina

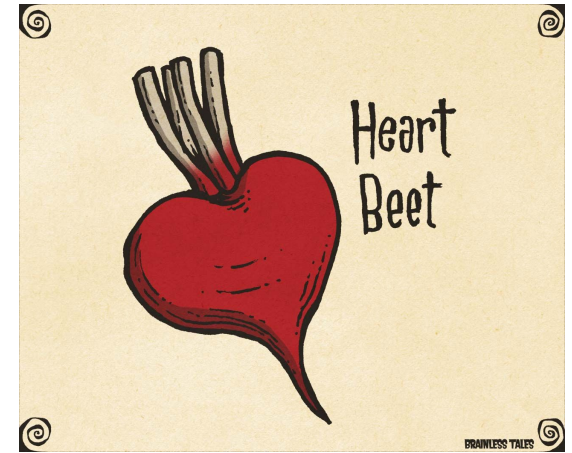
5 reasons to eat pomegranate

- It's tasty
- It's beautiful
- It prevents anemia
- It improves digestion
- It lowers blood pressure



Don't forget about:

- beetroots
- cashews
- potatoes
- Green tea
- Dark chocolate
-



Thanks!

