Antianginal Drugs

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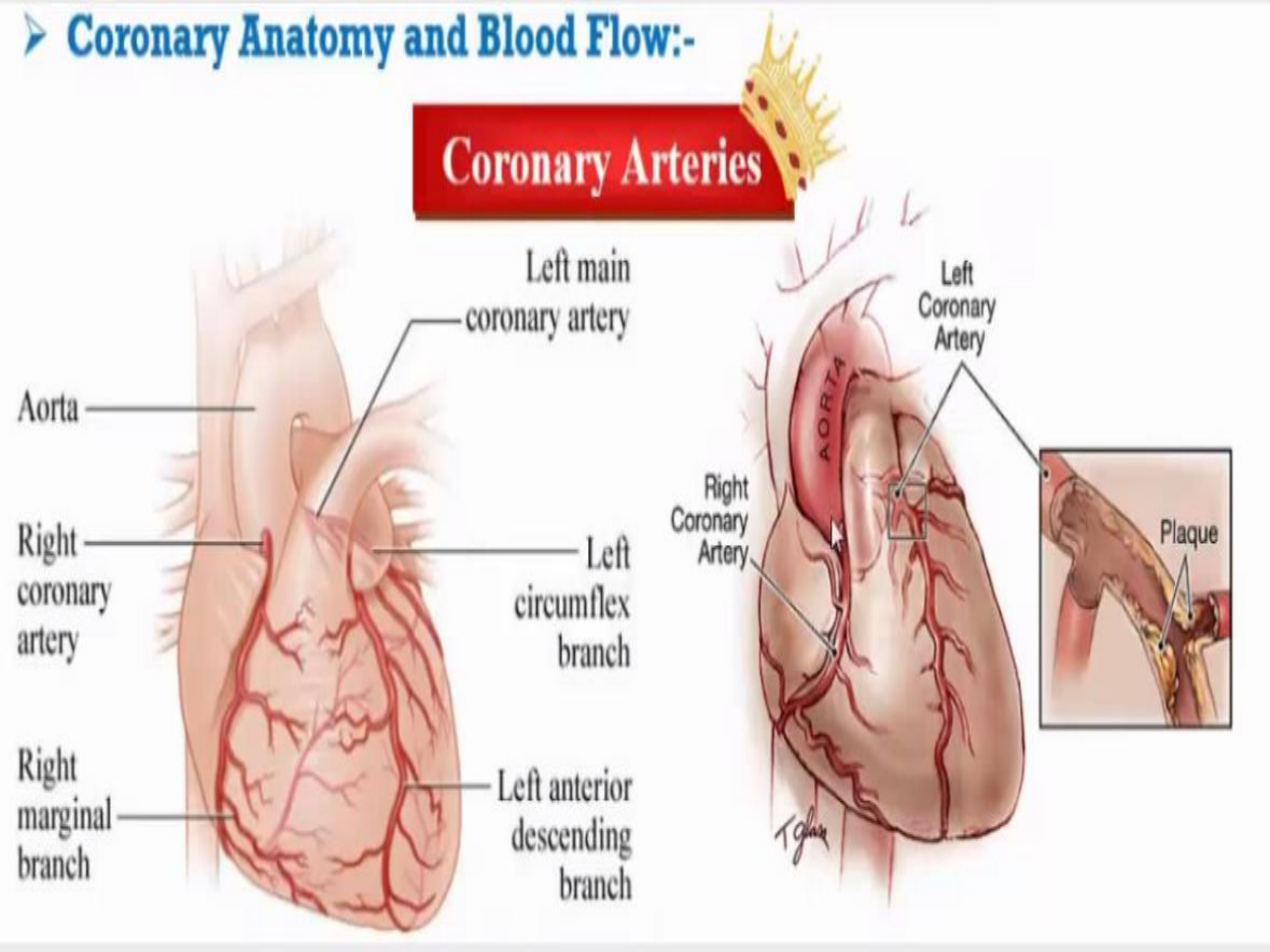
Coronary Anatomy and Blood Flow:-

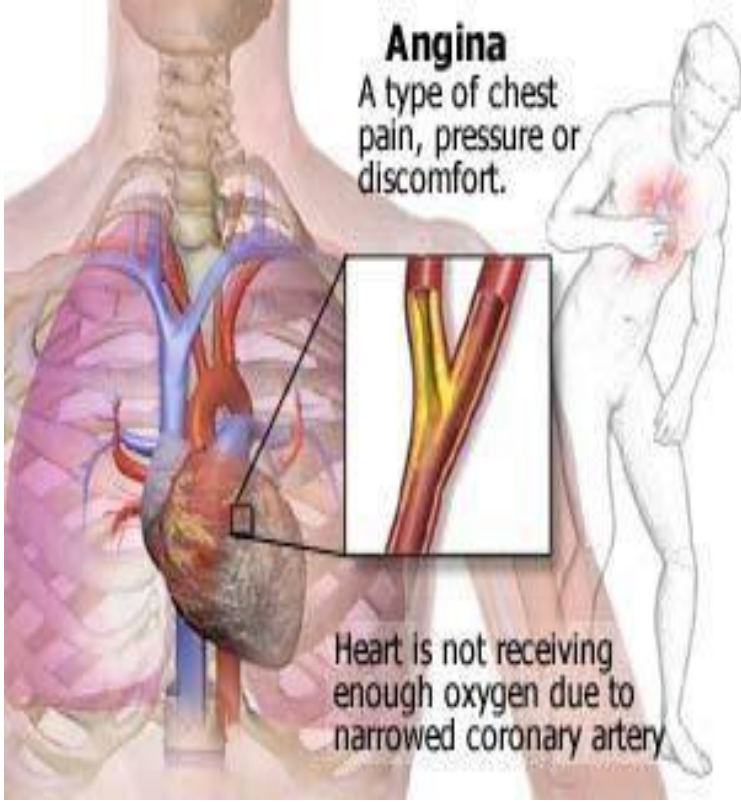


Angina pectoris

Definition:

Angina, the term derives from Latin **angere** “to strangle” and **pectus** “chest”, and can be translated as “a strangling feeling in the chest”

The pain is usually located substernally but is sometimes perceived in the neck, jaw, shoulder and arm, or epigastrium.



Decrease O2 supply ….. Increase O2 demand

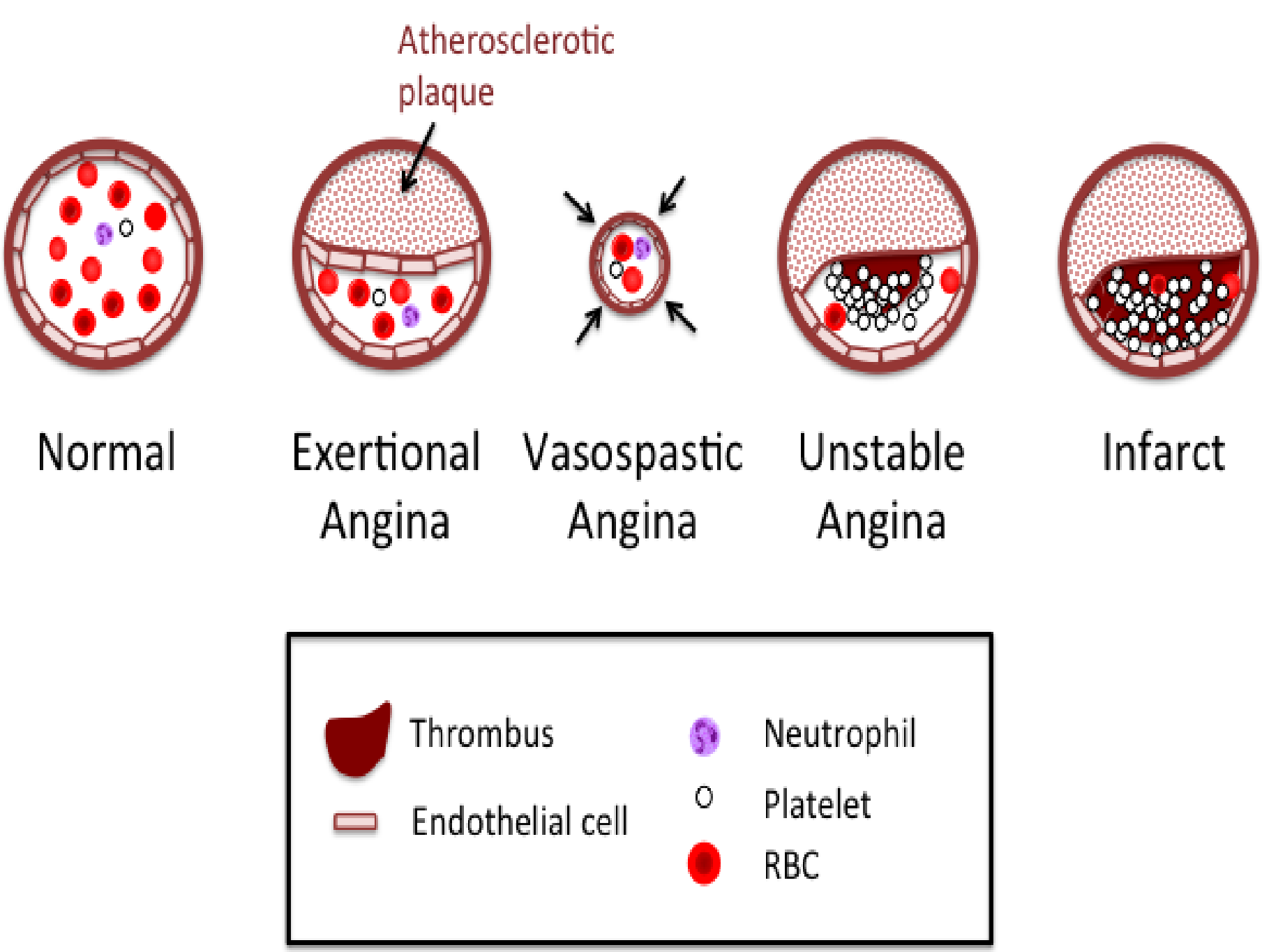
TYPES OF ANGINA

- Angina pectoris has three patterns:

1) stable, effort-induced, classic, or typical angina

2) unstable angina crescendo angina, acute coronary syndrome

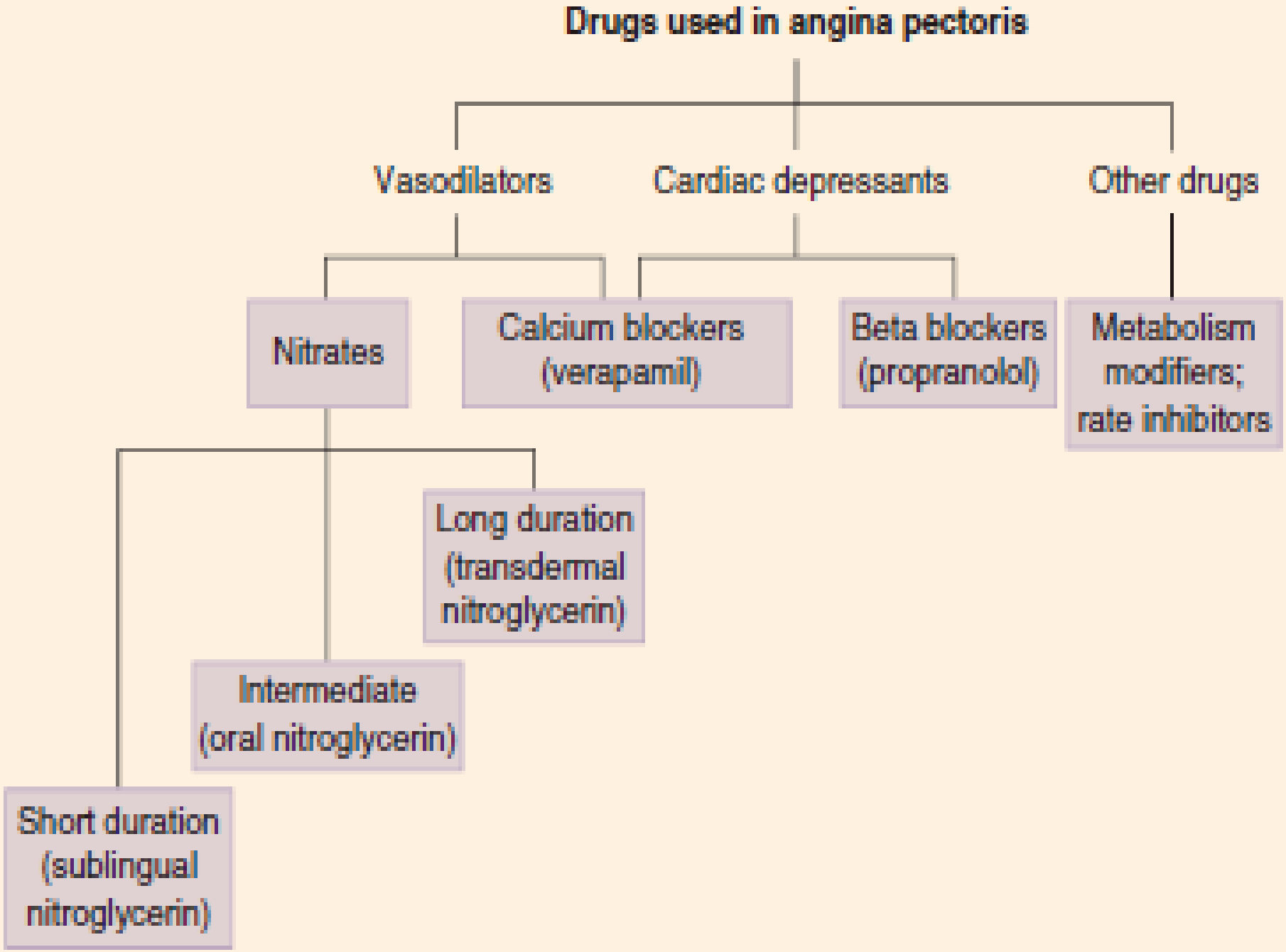
3) Prinzmetal, variant, vasospastic, or rest angina.


Atherosclerotic plaque
Normal
Exertional Angina
Vasospastic Angina
Unstable Angina
Infarct
Thrombus
Endothelial cell
Neutrophil
Platelet
RBC

TREATMENT STRATEGIES

- The defect that causes anginal pain is inadequate coronary oxygen delivery relative to the myocardial oxygen requirement. This defect can be corrected in 2 ways:

- **By increasing oxygen delivery (vasodilators: nitrates and calcium channel blockers)**
- **By reducing oxygen requirement: (β blockers, calcium channel blockers nitrates)**


Drugs used in angina pectoris
Vasodilators
Cardiac depressants
Other drugs
Nitrates
Calcium blockers (verapamil)
Beta blockers (propranolol)
Metabolism modifiers; rate inhibitors
Long duration (transdermal nitroglycerin)
Intermediate (oral nitroglycerin)
Short duration (sublingual nitroglycerin)

ORGANIC NITRATES

- These compounds cause a reduction in myocardial oxygen demand.
- They are effective in stable, unstable , and variant angina.

Mechanism of action

- Organic nitrates relax vascular smooth muscle by their intracellular conversion to nitrite ions and then to nitric oxide, which activates guanylate cyclase and increases the cells' cyclic guanosine monophosphate (cGMP). Elevated cGMP ultimately leads to dephosphorylation of the myosin light chain, resulting in vascular smooth muscle relaxation.

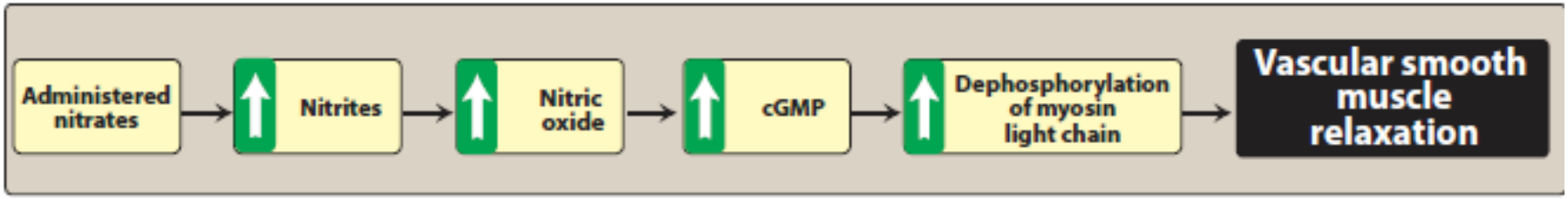


Figure 21.5
Effects of nitrates and nitrites on smooth muscle. cGMP, = cyclic guanosine 3′,5′-monophosphate.

β-ADRENERGIC BLOCKERS

- β-Blockers decrease the oxygen demands of the myocardium by blocking β1 receptors, decreased heart rate, contractility, cardiac output, and blood pressure.

- can reduce both the frequency and severity of angina attacks.

CALCIUM CHANNEL BLOCKERS

- The calcium channel blockers protect the tissue by inhibiting the entrance of calcium into cardiac and smooth muscle cells of the coronary and systemic arterial beds.
- All calcium channel blockers are, arteriolar vasodilators that cause a decrease in smooth muscle tone and vascular resistance.

- In the treatment of effort-induced angina, calcium channel blockers reduce myocardial oxygen consumption by decreasing vascular resistance, thereby decreasing **afterload**.

NEWER DRUGS

- **A newer strategy** attempts to increase the **efficiency of oxygen utilization** by shifting the energy substrate preference of the heart from fatty acids to glucose. Drugs that may act by this mechanism are termed partial fatty acid oxidation inhibitors (**pFOX inhibitors**) and include **ranolazine** and **trimetazidine**. However, more recent evidence suggests that the major mechanism of action of ranolazine is inhibition of late sodium current.

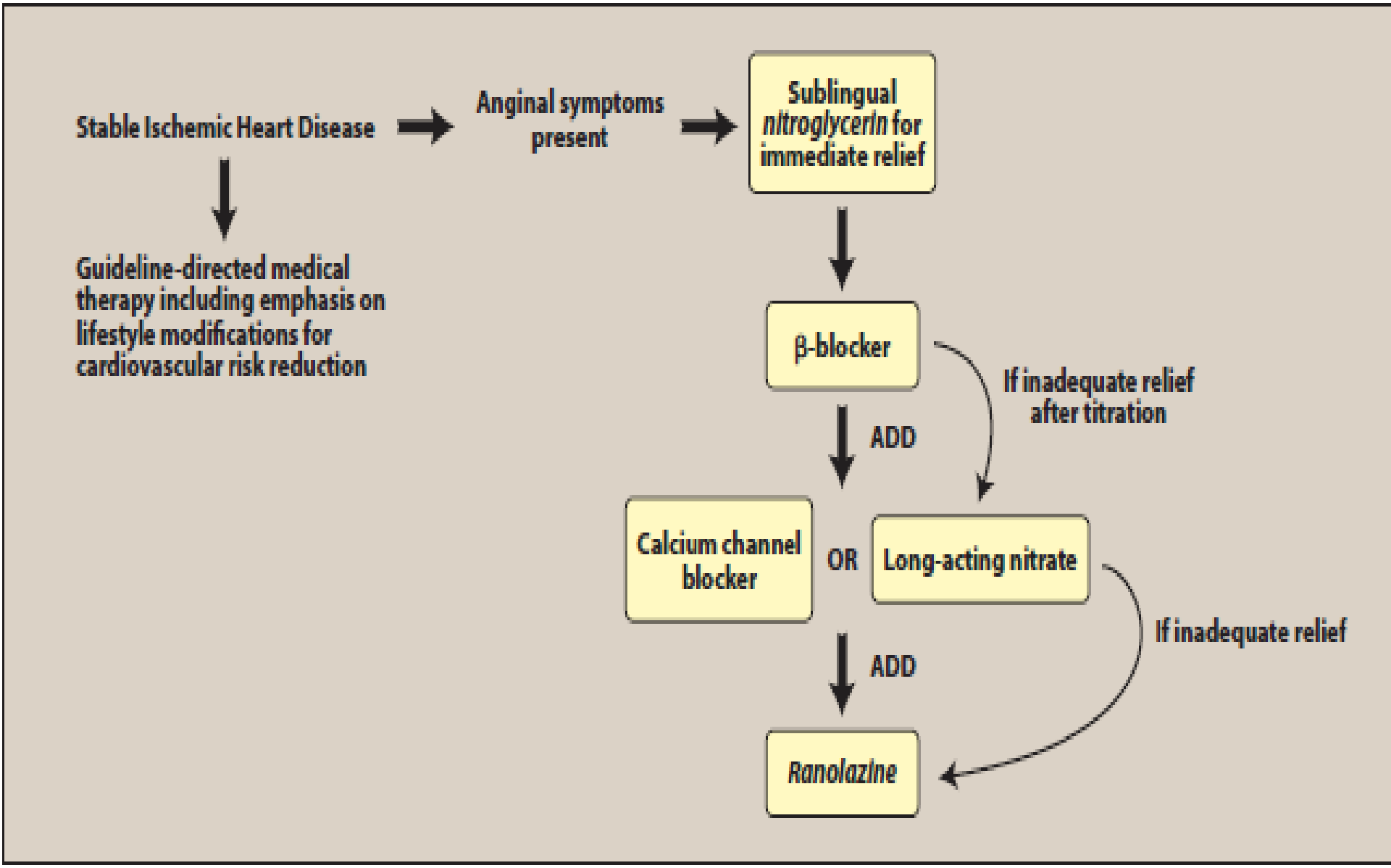


Figure 21.4

Treatment algorithm for improving symptoms in patients with stable angina.

Non pharmacological treatment

- **Myocardial revascularization** corrects coronary obstruction either by **bypass grafting** or by **angioplasty** (enlargement of the lumen by means of a special catheter). Very important in treatment of severe angina.

- Therapy of unstable angina differs from that of stable angina in that urgent angioplasty is the treatment of choice in most patients and platelet clotting is the major target of drug therapy.