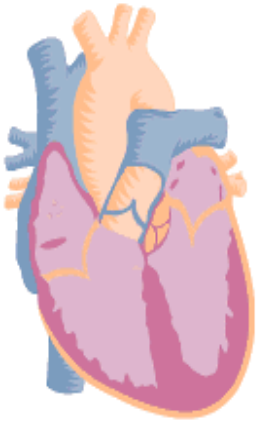


Antianginal medicines

Department of Pharmacology and Clinical Pharmacology

FACTORS AFFECTING MYOCARDIAL OXYGEN SUPPLY AND DEMAND

Oxygen supply	Oxygen demand
Heart rate	*Heart rate*
- diastolic time	
Coronary perfusion pressure	*Ventricular wall tension*
- aortic diastolic blood pressure	- preload
	- afterload
- ventricular end-diastolic blood pressure	*Contractility*
Arterial oxygen content	
- arterial oxygen partial pressure	
- haemoglobin concentration	
Coronary artery diameter	

Varvinskiy, Andrey & Yuan, Shuai & Felicidad, Bo. (2023). UPDATE IN ANAESTHESIA.

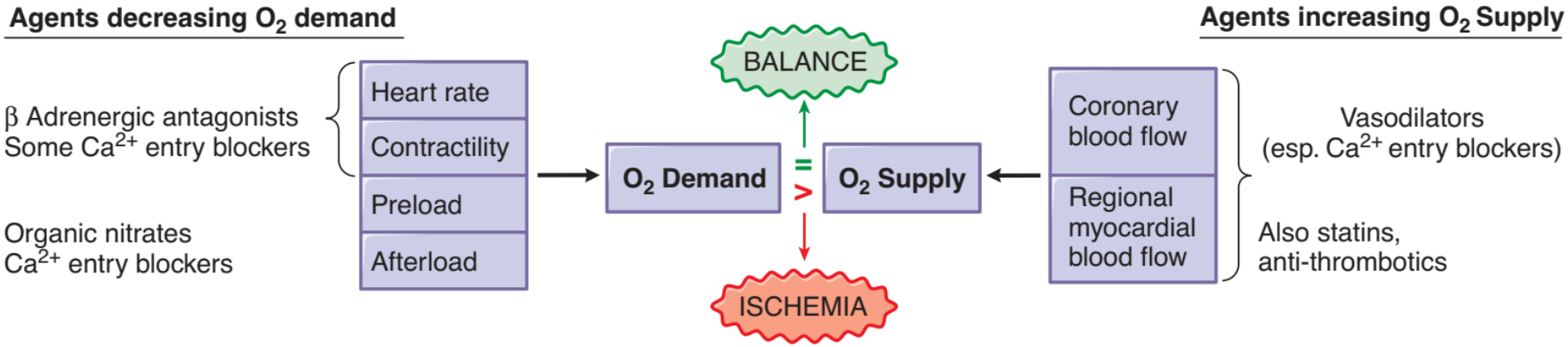


Figure 27–1. *Pharmacological modification of the major determinants of myocardial O_2 supply.* When myocardial O_2 requirements exceed O_2 supply, an ischemic episode results. This figure shows the primary hemodynamic sites of actions of pharmacological agents that can reduce O_2 demand (*left side*) or enhance O_2 supply (*right side*). Some classes of agents have multiple effects. Stents, angioplasty, and coronary bypass surgery are mechanical interventions that increase O_2 supply. Both pharmacotherapy and mechanotherapy attempt to restore a dynamic balance between O_2 demand and O_2 supply.

Goodman and Gilman's The Pharmacological Basis of Therapeutics 12th Ed. (2011)

According to the MOA

I. Remedies that reduce the oxygen demand by the myocardium and increase its delivery.

1. Nitrovasodylators

a) Organic nitrates

- Short acting: Nitroglycerine (Glyceryl trinitrate)
- Long acting: Nitroglycerine (Nitrong, Trinitrolong, Sustac), Isosorbide dinitrate (short acting by sublingual route), Isosorbide mononitrate, Erythrityl tetranitrate, Pentaerythritol tetranitrate

b) Sydnonimine: molsidomine

c) *Nitrate-like drug (NO donator):* Sodium nitroprusside

2. Ca 2+ channel blockers: Nifedipine, Diltiazem, Verapamil, Amlodipine, Felodipine, Lercanidipine
3. Potasium channel activators (oppeners): Nicorandil, Pinacidil, Falipamil, Ivabradine
4. If-channel inhibitors: Ivabradine
5. Late sodium influx inhibitors: Ranolazine
6. Various preparations with anti-anginal action: Amiodarone

II. Remedies that reduce myocardial oxygen demand

- **β- adrenoblockers:**

  Propranolol, Talinolol, Metoprolol, Atenolol

III. Remedies that increase myocardial oxygen delivery:

1. Musculotropic coronarodilators :

a) with adenosine mechanism:

Dipyridamole, Lidoflazine

b) Inhibitors of phfosphodiesteraze:

Aminophylline, Carbocromen, Xantinol nicotinate

c) other spasmolytics:

Drotaverine, Baralgin

2. Remedy that removes reflectory coronarospasm:

Validol.

IV. Cardioprotectors

Trimetazidine

V. Antithrombotic preparations:

- ***Antiplatelet agents: acetylsalicylic acid, clopidogrel, prasugrel***
- ***Anticoagulants: heparin, enoxaparin, bemiparin,rivaroxaban, fondaparinux***

VI. Preparations that inhibit atherosclerosis:

- ***Lipid-lowering agents: atorvastatin, rosuvastatin,pravastatin, fenofibrate***

Clinical classification

A.Used to abort or terminate attack

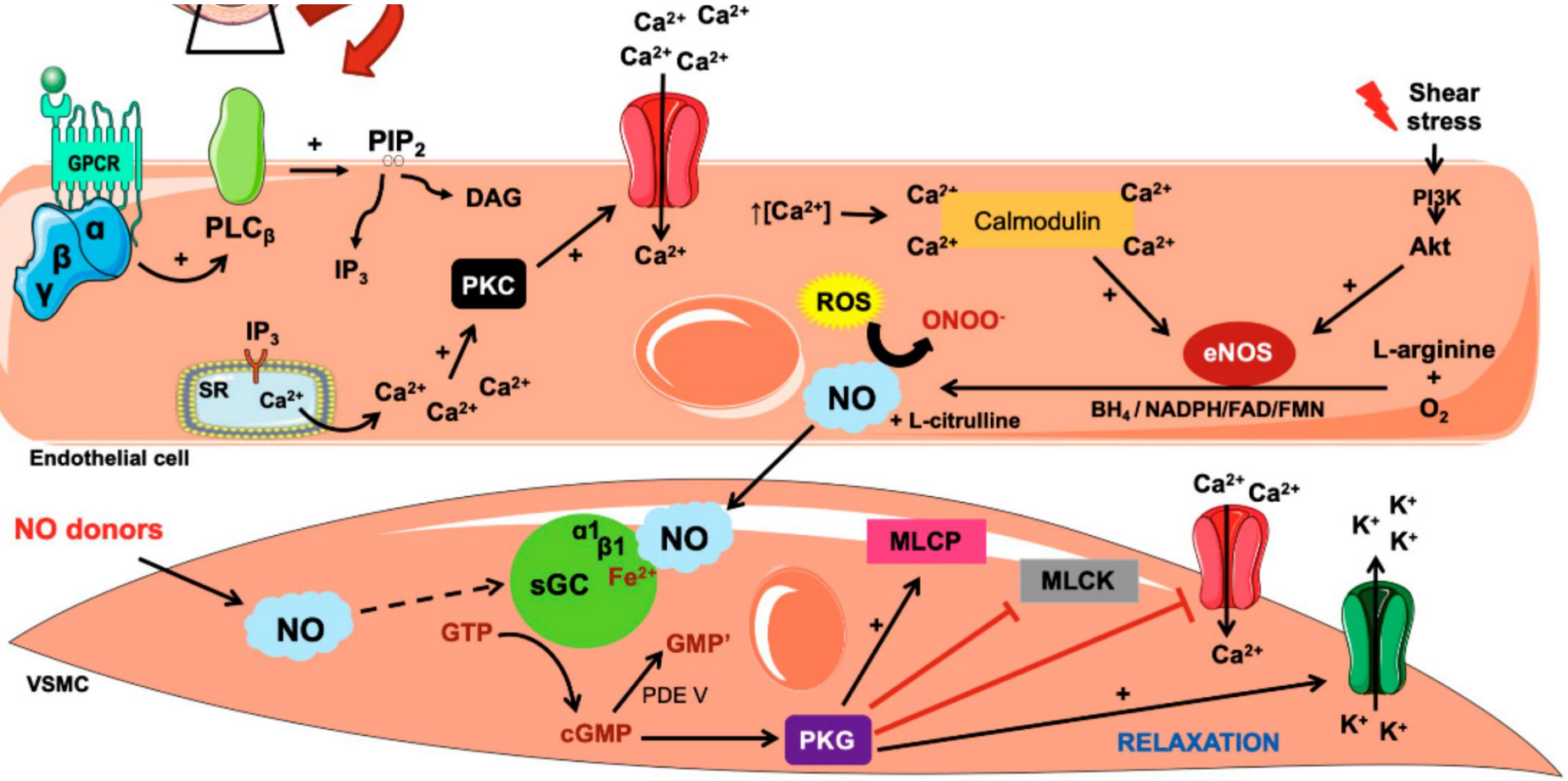
GTN,

Isosorbide dinitrate (sublingually).

B.Used for chronic prophylaxis

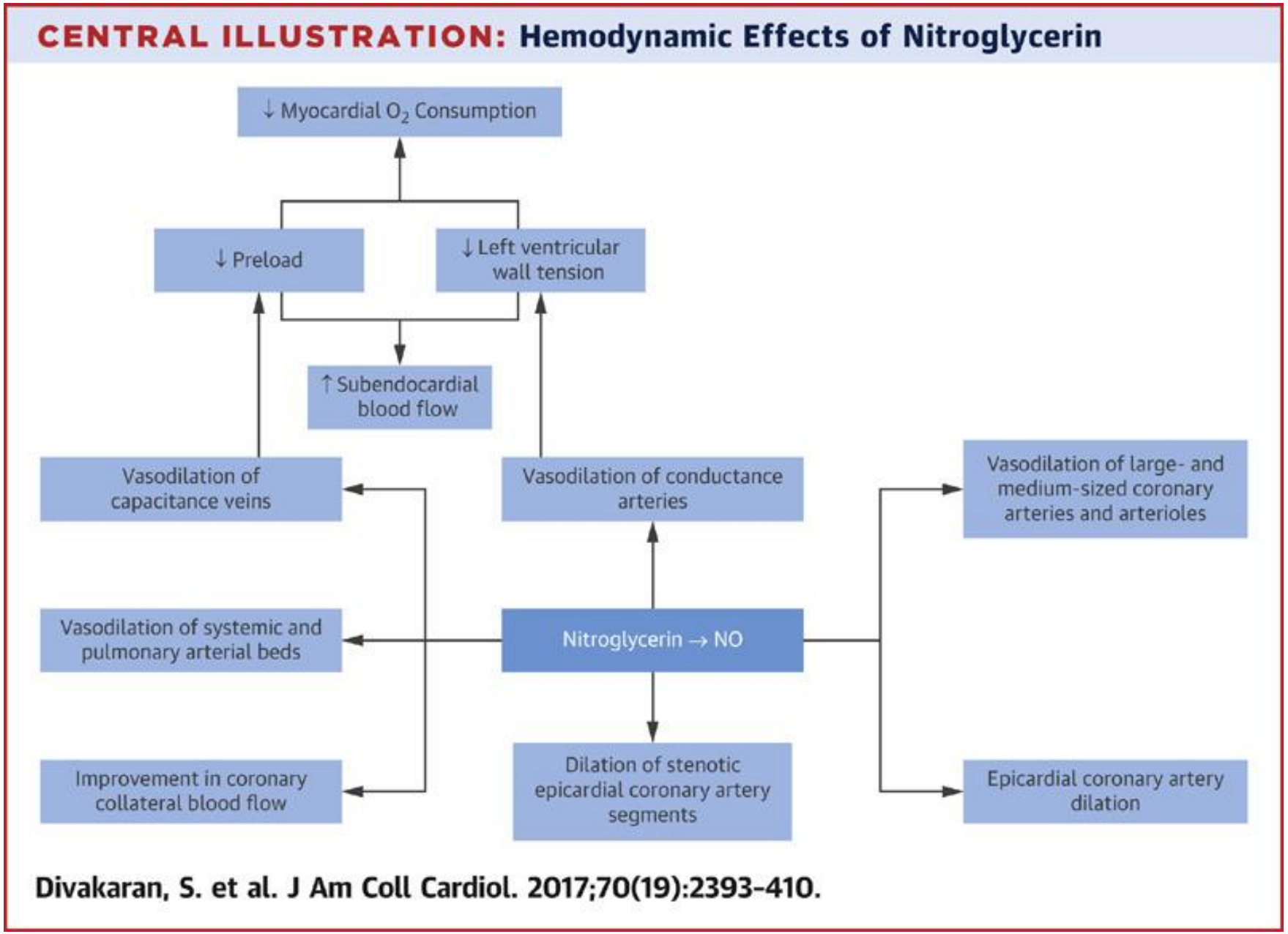
All other drugs.

Molecullar mechanism of action of nitrates

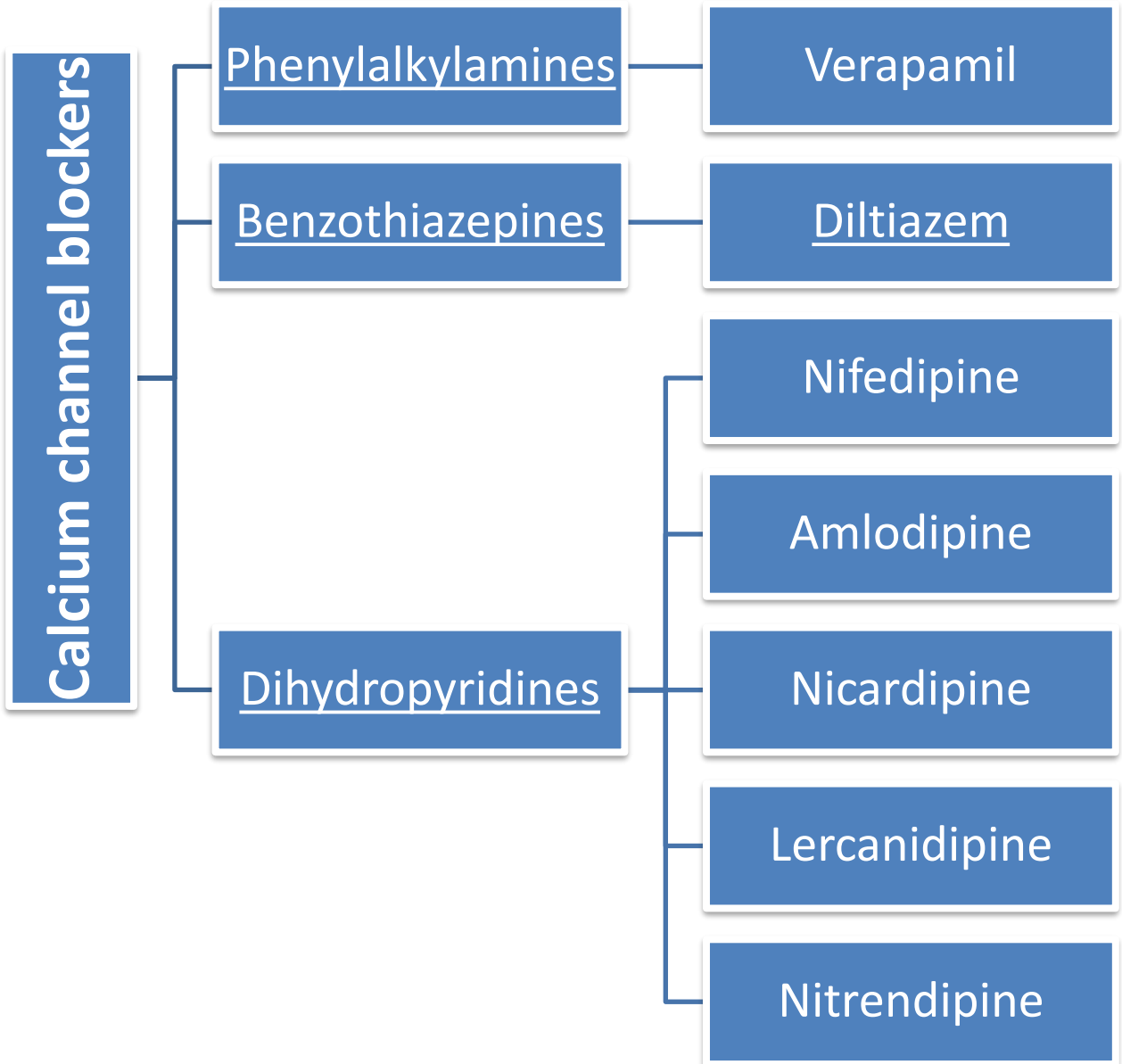


da Silva GM, da Silva MC, Nascimento DVG, Lima Silva EM, Gouvêa FFF, de França Lopes LG, Araújo AV, Ferraz Pereira KN, de Queiroz TM. Nitric Oxide as a Central Molecule in Hypertension: Focus on the Vasorelaxant Activity of New Nitric Oxide Donors. *Biology*. 2021; 10(10):1041. https://doi.org/10.3390/biology10101041

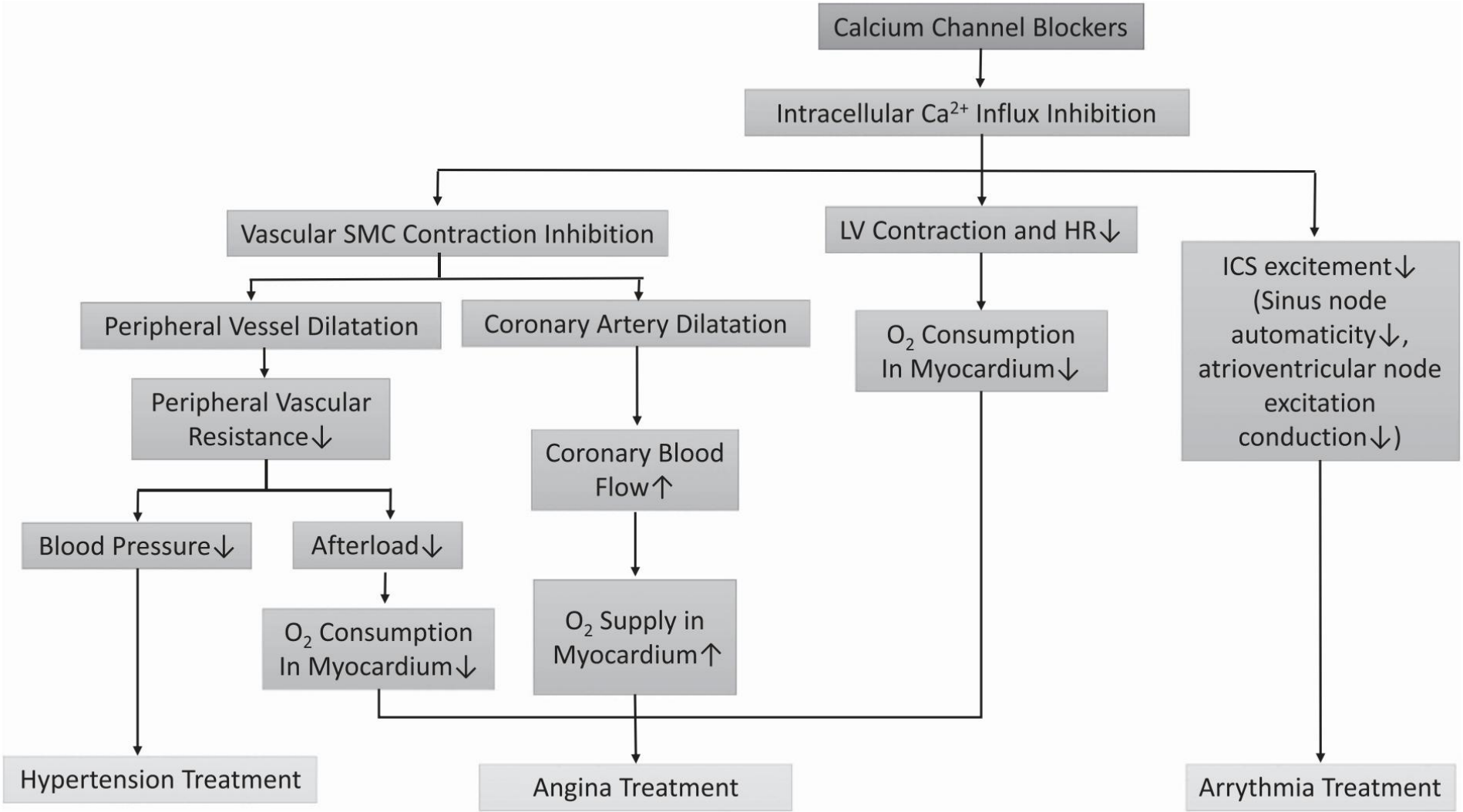
Systemic mechanism of action of nitroglycerin



Calcium channel blockers

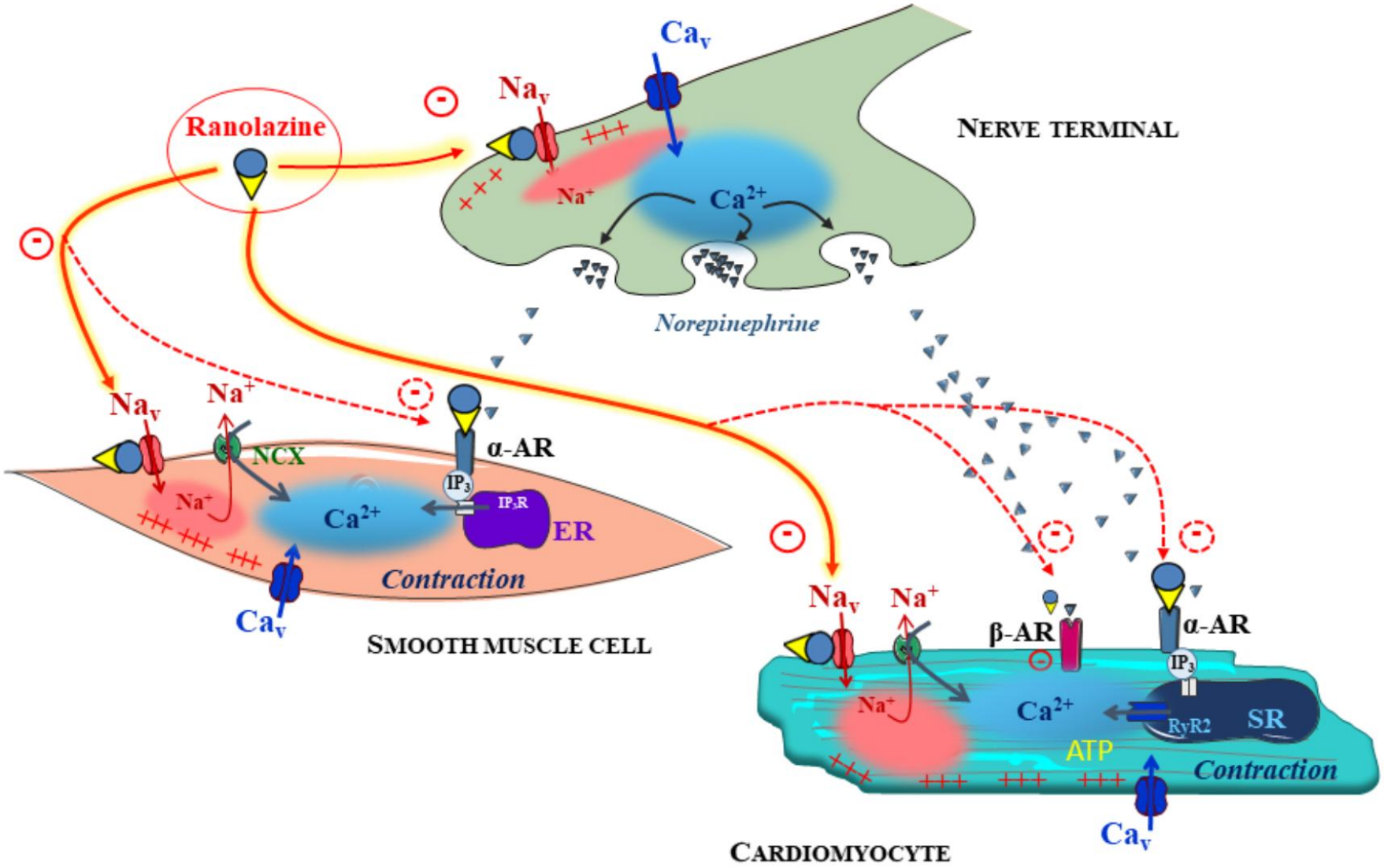


Mechanism of action of calcium channel blockers



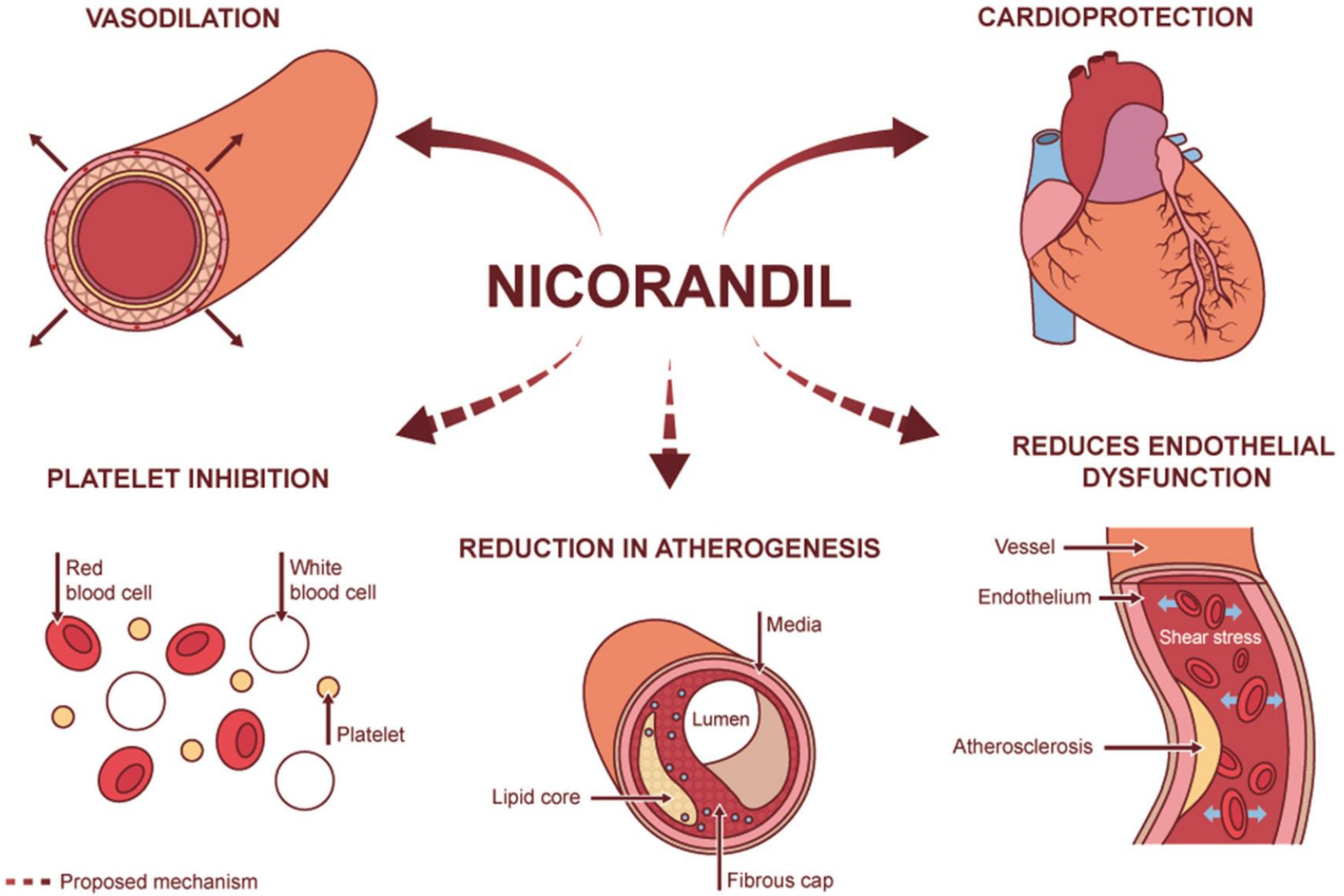
Sueta, D., Tabata, N. & Hokimoto, S. Clinical roles of calcium channel blockers in ischemic heart diseases. *Hypertens Res* **40**, 423–428 (2017). https://doi.org/10.1038/hr.2016.183

Ranolazine



Rouhana S, Virsolvy A, Fares N, Richard S, Thireau J. Ranolazine: An Old Drug with Emerging Potential; Lessons from Pre-Clinical and Clinical Investigations for Possible Repositioning. *Pharmaceuticals*. 2022; 15(1):31. https://doi.org/10.3390/ph15010031

Potassium channel oppeners (activators)



Cheng K, Alhumood K, El Shaer F, De Silva R. The Role of Nicorandil in the Management of Chronic Coronary Syndromes in the Gulf Region. Adv Ther. 2021 Feb;38(2):925-948. doi: 10.1007/s12325-020-01582-w. Epub 2020 Dec 22. PMID: 33351175; PMCID: PMC7889547.

Principles of treatment of acute myocardial infarction

1. For the removal of the painful syndrome:

•Opioid analgesics: fentanyl, morphine, trimeperidine etc.

2. To remove fear, anxiety:

•Anxiolytics: midazolam, diazepam etc.

•Antipsychotics: droperidol etc.

•Neuroleptanalgesia: fentanyl + droperidol = talamonal

3. Treatment of arrhythmias: Antiarrhythmics (lidocaine, procainamide)

4. For the improvement of hemodynamics.

a) In hypertension (hexametonium, trepyrium iodide, furosemide)

b) In hypotension (dopamine, norepinephrine, phenylephrine)

5. For prophylaxis and removal of thrombi.

Anticoagulants (heparin, enoxaparin, bemiparin, rivaroxaban, acecumarol)

Fibrinolytics: streptokinase, alteplase

Antiplatelet agents: acetylsalicylic acid, clopidogrel, prasugrel etc

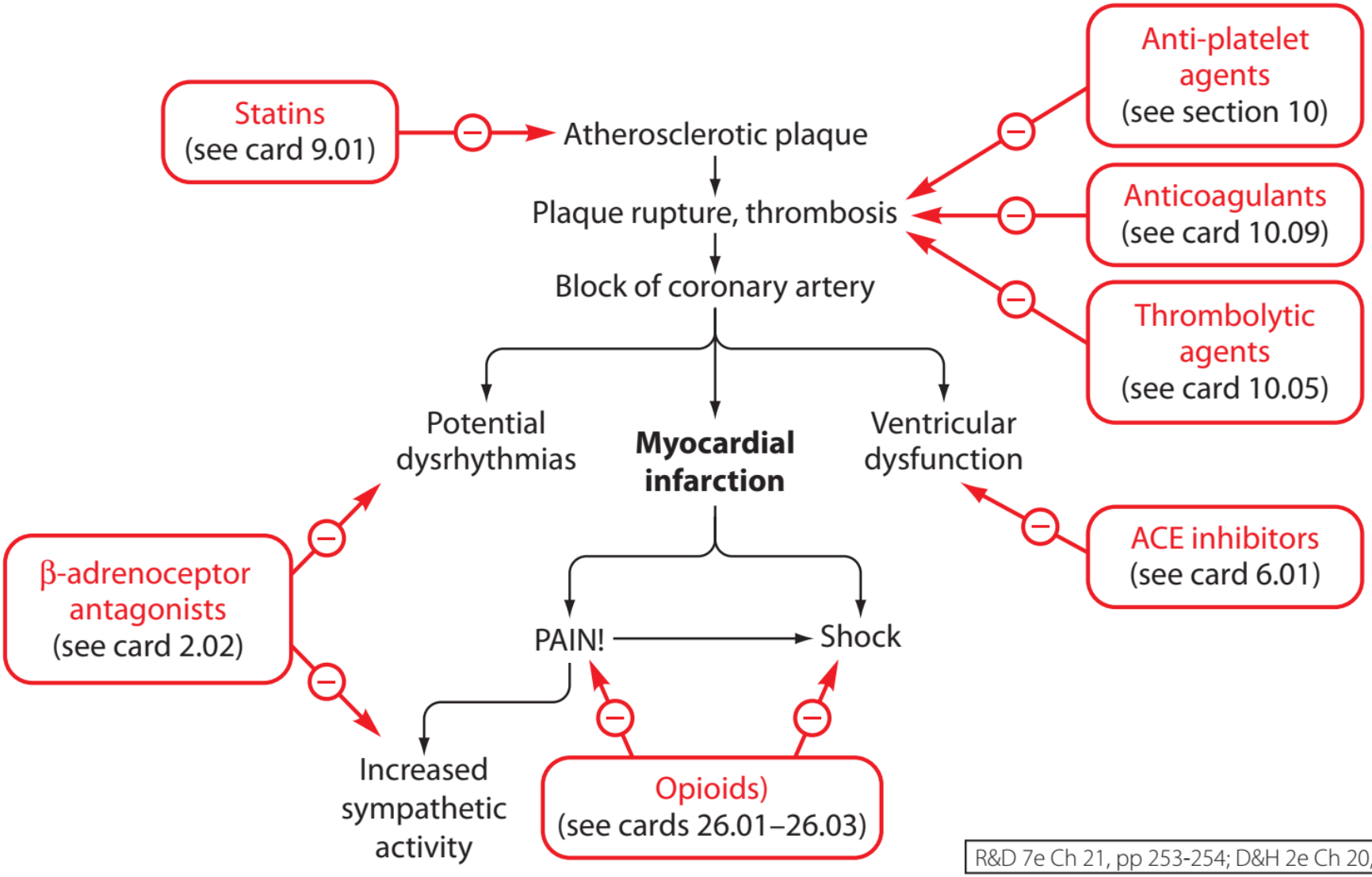
6. ***For the restoration of the acid-base balance and the rheological improvement of the blood:*** sodium bicarbonate, dextran- 40, dextran- 70.

7. For the removal of heart failure

•Positive inotropic agents: Dopamine, Dobutamine;

8. To shrink the necrosis area: Nitroglycerin

Principles of treatment of acute myocardial infarction



R&D 7e Ch 21, pp 253-254; D&H 2e Ch 20, p 52