Class IV: Calcium Channel Blockers

Verapamil. It blocks both activated and inactivated L-type Ca^{2+} channels – depresses calcium-mediated depolarization. Verapamil decreases conduction velocity and increases refractory period of AV node; useful in

- Terminating re-entry involving AV node (PSVT)
- Reducing ventricular rate in atrial flutter and fibrillation

It decreases slope of phase 4 depolarization in the SA node (bradycardia) and in the ectopic foci.

Pharmacokinetics, adverse effects, drug interactions and uses are discussed on pp. 117-119.

Diltiazem. All features are similar to verapamil but it is comparatively less potent than verapamil.

Miscellaneous Agents

Adenosine. It is a purine nucleoside that is administered as a rapid i.v. bolus for rapid control of PSVT. The duration of action of adenosine is less than 1 minute because it is rapidly transported into red blood corpuscles (RBCs) and endothelial cells.

Mechanism of Action

Intravenous adenosine

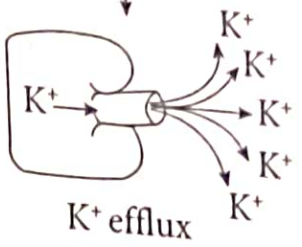
↓

Binds to specific G-protein-coupled adenosine (A_1)-receptors

↓

Activates ACh-sensitive K^+ channels in the atrium, SA and AV nodes

↓



K^+ efflux

↓

- Hyperpolarization and decreased automaticity of SA node → decreased sinus rate
- Reduced duration of action potential in atria, reduced excitability
- Increased refractory period and slowing of conduction in AV node

Adenosine also decreases Ca^{2+} currents in AV node → depresses AV node.

Through its action on AV node, it blocks re-entry of impulses involving AV node and terminates an attack of PSVT. It is the preferred drug for rapid termination of PSVT because it has:

(1) High efficacy.

(2) A short duration of action – adverse effects last for brief period.

(3) Minimal negative inotropic action.

Adverse Effects and Disadvantages. These include Asystole, Bronchospasm, Chest pain, Dyspnoea, Expensive, Flushing, Hypotension and Headache. Side effects are transient due to its short duration of action.