

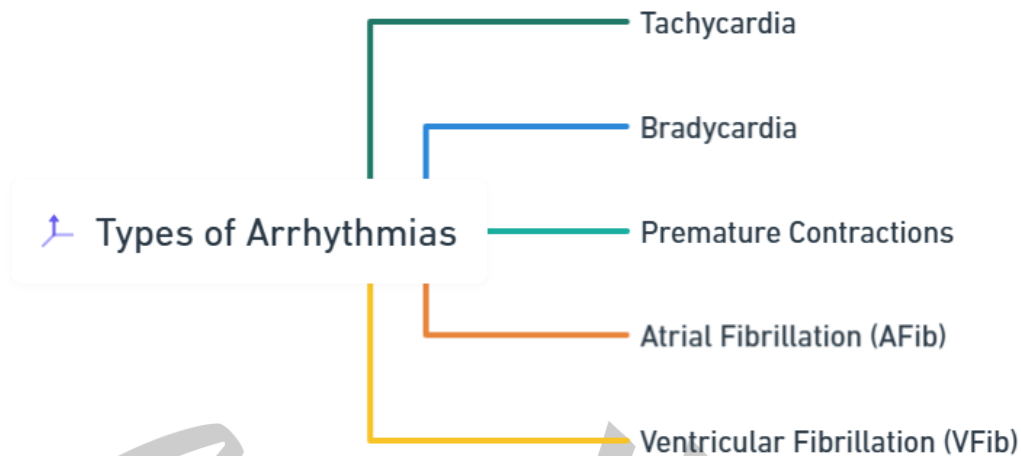
Anti-Arrhythmic Drugs

Arrhythmia

Definition:

- Arrhythmia is an irregular heart rhythm, causing the heart to beat too fast, too slow, or erratically, impacting its blood-pumping efficiency.

Types of Arrhythmias:



1. **Tachycardia:** Fast heart rate (>100 bpm), e.g., Atrial fibrillation, Ventricular tachycardia.
2. **Bradycardia:** Slow heart rate (<60 bpm), e.g., Sinus bradycardia, Heart block.
3. **Premature Contractions:** Early beats (PACs, PVCs).
4. **Atrial Fibrillation (AFib):** Irregular, rapid beats from the atria.
5. **Ventricular Fibrillation (VFib):** Chaotic, life-threatening rhythm from the ventricles.

Causes:

- Coronary artery disease, electrolyte imbalances, high blood pressure, heart valve disorders, congenital defects, lifestyle factors (e.g., caffeine, alcohol), and certain medications.

Symptoms:

- Palpitations, dizziness, shortness of breath, chest pain, and fainting (in severe cases).

Diagnosis:

- ECG, Holter monitor, event recorder, echocardiogram, and electrophysiological studies.

Treatment:

1. **Lifestyle Modifications:** Limit caffeine/alcohol, manage stress, quit smoking.
2. **Medications:** Anti-arrhythmias, beta-blockers, calcium channel blockers.
3. **Medical Procedures:** Electrical cardioversion, pacemaker, ICD, catheter ablation.
4. **Surgical Interventions:** Maze procedure to guide electrical signals.

Anti-Arrhythmic Drugs

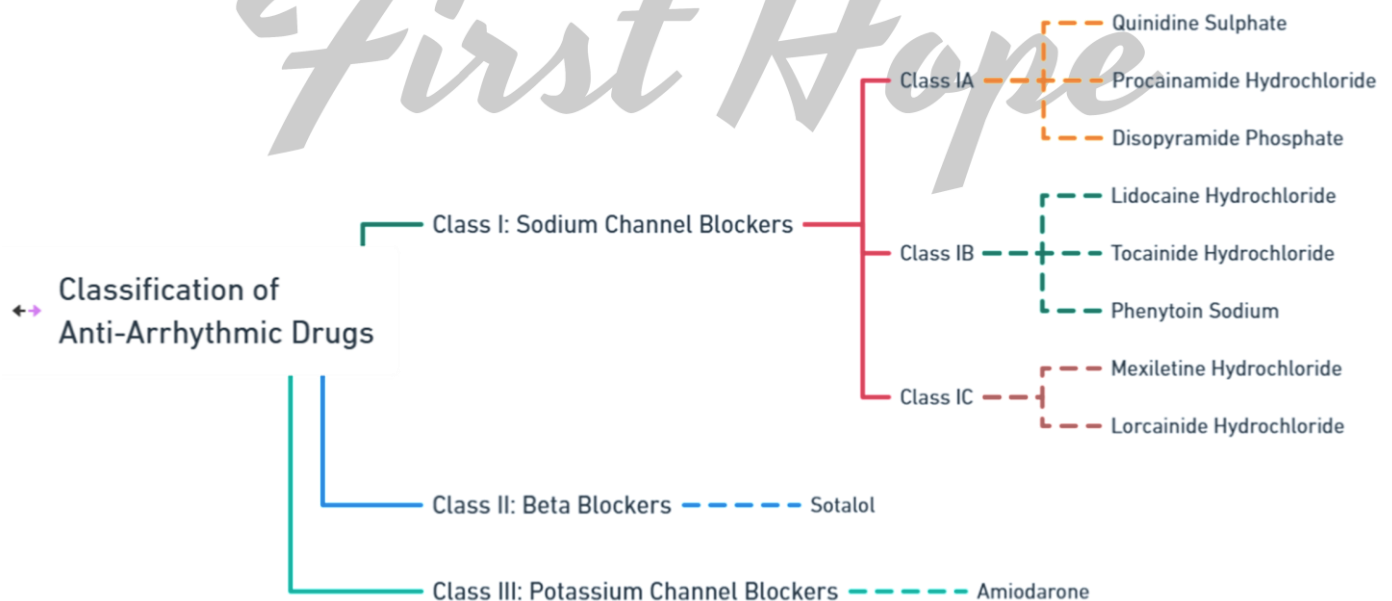
- Anti-arrhythmic drugs are medications used to treat and prevent abnormal heart rhythms (arrhythmias).
- These drugs work by modifying the electrical activity of the heart to restore and maintain a normal heart rhythm, thereby ensuring efficient blood circulation throughout the body.

Pathophysiology of Arrhythmias

- Arrhythmias occur due to disturbances in the normal electrical conduction system of the heart. These disturbances can result from:
 - **Enhanced Automaticity:** Increased spontaneous depolarization of cardiac cells.
 - **Triggered Activity:** Abnormal depolarizations during or after repolarization.
 - **Reentrant Circuits:** Circular electrical pathways that perpetuate abnormal rhythms.
- Anti-arrhythmic drugs aim to correct these disturbances by targeting various aspects of cardiac electrophysiology.

Classification of Anti-Arrhythmic Drugs

Anti-arrhythmic drugs are primarily classified according to the **Vaughan Williams Classification**, which categorizes these medications based on their primary mechanism of action on cardiac cells.



1. Class I: Sodium Channel Blockers

- These drugs inhibit sodium (Na^+) channels, reducing the rate of rise of the action potential (phase 0) in cardiac cells.
- They are further subdivided into:

A. Class IA

- **Mechanism:** Moderate blockade of Na^+ channels; also block potassium (K^+) channels, prolonging action potential duration and refractory period.
- **Drugs:**

- Quinidine Sulphate
- Procainamide Hydrochloride
- Disopyramide Phosphate
- **Uses:** Atrial and ventricular arrhythmias.
- **Side Effects:** Prolonged QT interval, torsades de pointes, hypotension.

B. Class IB

- **Mechanism:** Mild blockade of Na⁺ channels; shorten action potential duration and refractory period.
- **Drugs:**
 - Lidocaine Hydrochloride
 - Phenytoin Sodium
 - Tocainide Hydrochloride
- **Uses:** Ventricular arrhythmias, especially post-myocardial infarction.
- **Side Effects:** CNS toxicity (e.g., seizures, tremors), numbness.

C. Class IC

- **Mechanism:** Potent blockade of Na⁺ channels with minimal effect on action potential duration.
- **Drugs:**
 - Mexiletine Hydrochloride
 - Lorcaïnide Hydrochloride
- **Uses:** Atrial and ventricular arrhythmias.
- **Side Effects:** Bradycardia, hypotension, proarrhythmic effects.

2. Class II: Beta Blockers

- These drugs block beta-adrenergic receptors, decreasing the effects of sympathetic stimulation on the heart.
 - **Mechanism:** Reduce heart rate, myocardial contractility, and conduction velocity through the atrioventricular (AV) node.
 - **Drugs:**
 - Sotalol
 - **Uses:** Atrial fibrillation, ventricular arrhythmias, prevention of arrhythmic recurrence.
 - **Side Effects:** Bradycardia, hypotension, fatigue, bronchoconstriction.

3. Class III: Potassium Channel Blockers



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