🔵 CLASS I — Sodium Channel Blockers

These drugs block fast Na^+ channels in phase 0. → ↓ Chronotropic + ↓ Dromotropic Effects
Subgroups differ by **binding kinetics**, **effect on AP duration**, and **clinical use**.

Class IA — Procainamide

Mechanism → other than the main one? (3)

- Blocks **fast Na^+ channels** → slows phase 0 upstroke → **slows conduction**, **prolongs QRS**.
- Also blocks **K^+ channels** → **prolongs action potential**, **prolongs QT**.
- Direct depressant effect on **SA + AV nodes** (↓ HR, ↓ AV conduction).
- **Anticholinergic / antivagal** activity partially counters bradycardia.
- **Ganglion-blocking effect** → ↓ peripheral vascular resistance → **postural hypotension**.

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Therapeutic Uses

- Not first-line for any arrhythmia.
- Effective for **atrial and ventricular arrhythmias**.
- **Second/third choice** (after lidocaine or amiodarone) for **sustained ventricular arrhythmias post–MI**.

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Adverse Effects

- **QT prolongation → torsades de pointes** (very important).
- **Excessive conduction slowing → new arrhythmias**.
- **Drug-induced lupus-like syndrome** (arthralgia, arthritis, pleuritis, pericarditis, rarely renal).

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KEY TAKEAWAY vs Other Class I drugs

- **Only Class IA drug mentioned**.
- **Only drug associated with lupus-like syndrome**.
- **Prolongs AP + QT**, unlike Class IB (shorten/neutral) and Class IC (neutral AP).

Class IB — Lidocaine

Mechanism

- Rapid block of Na^+ channels during **phase 0 and phase 2**.
- **Use-dependent block** → more effective at **higher HR** or active ischemic tissue.
- ↓ **Ventricular excitability**.

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Uses

- **IV only** (destroyed in GI tract).
- **Ventricular tachycardia** and **ventricular fibrillation** especially:
  - **Post–MI**
  - **Post-cardiac surgery**
  - **Post-catheterization**

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Contraindications

- **WPW syndrome** → increases conduction through accessory pathway → VF.
- **Severe heart block** → may → complete block/asystole.

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Adverse Effects

- **Cardiac:** hypotension, HF, bradycardia, cardiac arrest.
- **CNS:** light-headedness, seizures, unconsciousness, tinnitus, visual disturbances.
- **Respiratory depression**.

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Related Drug

- **Mexiletine** = oral analogue of lidocaine.

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KEY TAKEAWAY vs Other Class I

- Best for **acute ischemic ventricular arrhythmias**.
- **Fastest kinetics**, least proarrhythmic.
- Does **NOT** prolong QT.
- Opposite of procainamide: shortens conduction without QT prolongation.

Class IC — Flecainide

Mechanism

- Potent blockade of **Na^+ and K^+ channels** with **slow unbinding kinetics** ("slow on–off").
- Despite K^+ block → **NO QT or AP prolongation.**
- Suppresses PVCs.

Uses

- **Supraventricular arrhythmias** in patients with **normal hearts**.
- Not first-line.

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Adverse Effects

- Major **proarrhythmic risk** in:
  - patients with prior MI
  - structural heart disease
  - ventricular tachyarrhythmias
- **Increases mortality** in these patients.

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KEY TAKEAWAY

- Strongest Na^+ blocker but **dangerous in structural heart disease**.
- Does **not affect AP duration** (unlike IA or III drugs).

Class IC — Propafenone

Mechanism

- Same Na^+ channel–blocking kinetics as flecainide (slow unbinding).
- **Weak β-blocking activity** (unique).
- Does **not** prolong AP.

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Uses

- Primarily for **supraventricular arrhythmias**.

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Adverse Effects

- **Metallic taste** (like metronidazole).
- **Constipation**.
- Can worsen arrhythmias. just like Flecainide

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KEY TAKEAWAY

- Class IC with **β-blocking properties**, unlike flecainide.

🔵 CLASS II — Beta Blockers

↓ Chronotropic effect + ↓ Dromotropic
↓ HR ↓ prolonged PR Interval

Primarily affect **atria → SA node → AV node**.
Reduce HR, prolong AV nodal refractory period → **increase PR interval**.

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Mechanism of Action

- **Negative chronotropy** (↓ HR).
- **Slow AV nodal conduction** → useful in atrial flutter/fibrillation to slow ventricular rate.
- Reduce **catecholamine-induced ectopy**. (Tachycardia)
  ↳ Ex: Smokers

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Therapeutic Uses

- **Supraventricular + ventricular arrhythmias**.
- **Post–MI survival improvement** → ↓ O_2 demand, ↓ ischemia, ↓ risk of ventricular arrhythmias.
- **Atrial flutter/fibrillation** rate control.
- Smokers with catecholamine-triggered extrasystoles.

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Special Drugs

Esmolol

- Very short-acting IV β-blocker.
- Used for **acute perioperative arrhythmias**.

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Propranolol / Nadolol

- **Nonselective β-blockers**.
- More effective subgroup for arrhythmia suppression.

Adverse Effects

- Bradycardia.
- ↓ contractility → **HF worsening** if started rapidly in unstable patients. (Given for stable patients only)
- Mask hypoglycemia symptoms in diabetics (esp. non-selective β-blockers).
- Fatigue, depression, sexual dysfunction.
- Dyslipidemia (↑ TG, ↓ HDL) — **not seen with vasodilating β-blockers** (carvedilol, labetalol). (slight weight gain)
- **Withdrawal syndrome** → tachycardia + ischemia. (Rebound syndrome)

- A potential adverse effect of β-blockers is the **worsening of heart failure** if they are started during acute decompensation or if the dose is increased too rapidly. They have **cardioprotective effects when initiated at low doses**. Therefore, β-blocker therapy should be started **only in clinically stable patients**, with **slow and careful dose titration**.