SNS COLLEGE OF ALLIED HEALTH SCIENCE

SNS Kalvi Nagar, Coimbatore - 35

Affiliated to Dr MGR Medical University, Chennai

DEPARTMENT OF OPERATION THEATRE AND ANAESTHESIA TECHNOLOGY - II YEAR

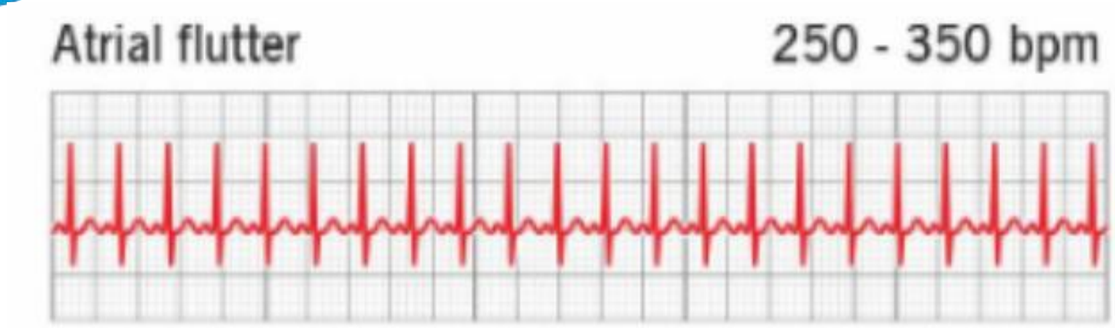
COURSE NAME: PHARMACOLOGY

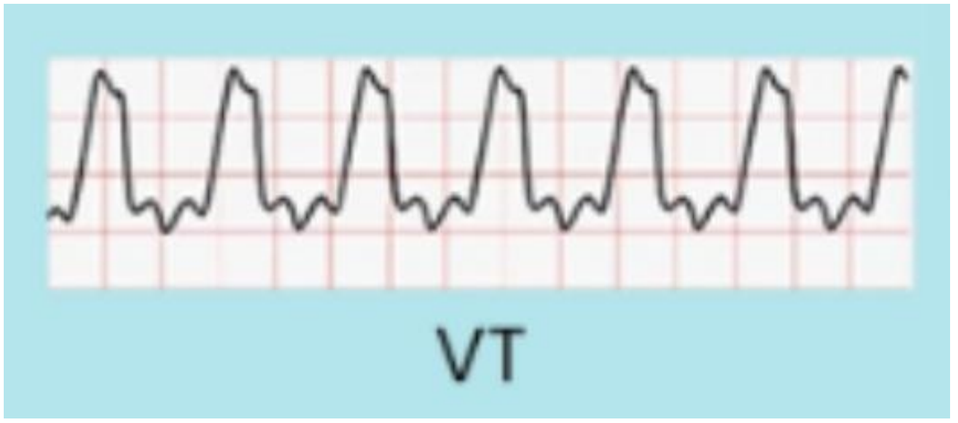
TOPIC - ANTIARRHYTHMICS

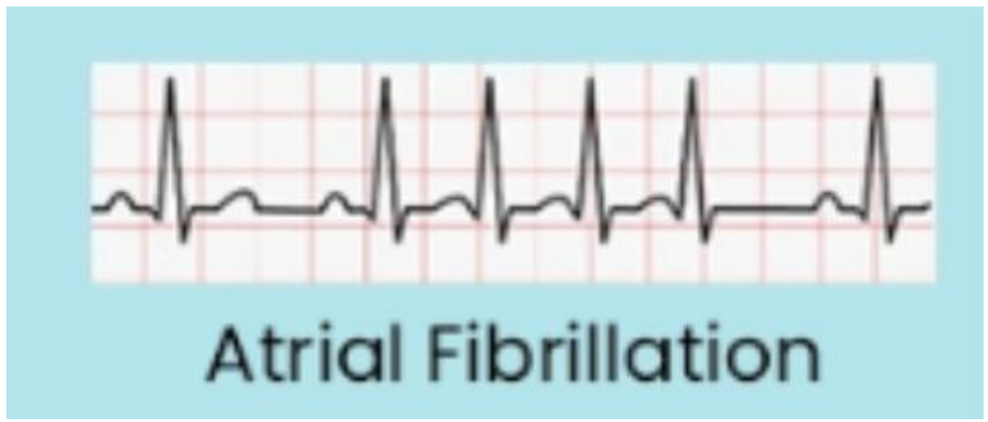
MRS.GAYATHIRI.K
Lecturer

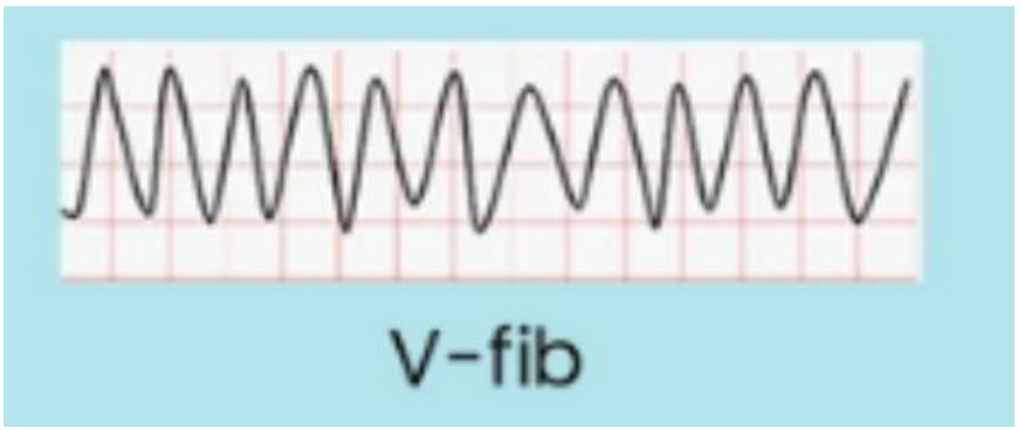
Introduction to Antiarrhythmics

- **Definition**: Drugs that prevent or treat cardiac arrhythmias by modifying heart electrical activity.
- **Purpose**: Restore normal rhythm, prevent complications (e.g., thromboembolism, sudden cardiac death).
- **Types of Arrhythmias**:
  - Supraventricular
    (e.g., atrial fibrillation, Flutter
  - Ventricular (e.g., ventricular tachycardia, fibrillation)


Atrial flutter
250 - 350 bpm


VT


Atrial Fibrillation


V-fib

Classification of Antiarrhythmic Drugs

Vaughan-Williams Classification:

- **Class I**: Sodium channel blockers
  - Ia: Quinidine, Procainamide
  - Ib: Lidocaine, Mexiletine
  - Ic: Flecainide, Propafenone
- **Class II**: Beta-blockers (e.g., Propranolol, Metoprolol)
- **Class III**: Potassium channel blockers (e.g., Amiodarone, Sotalol)
- **Class IV**: Calcium channel blockers (e.g., Verapamil, Diltiazem)
- **Others**: Adenosine, Digoxin

Class Ia - Quinidine

- **Definition**: Sodium channel blocker with moderate blockade.
- **Mechanism of Action**: Blocks Na+ channels, slows phase 0 depolarization; prolongs APD via K+ channel block.
- **Pharmacodynamics**: Prolongs QT interval, reduces conduction velocity.
- **Pharmacokinetics**:
  - **Absorption**: Oral
  - **Metabolism**: Hepatic.
  - **Excretion**: Renal
  - **Dosage**: 200-400 mg every 6 hours (oral).
- **Onset/Duration**: 1-2 hours/6-8 hours.
- **Interactions**: Increases digoxin levels; QT prolongation with erythromycin.
- **Side Effects**: Cinchonism, hypotension, proarrhythmia.

Class Ia - Procainamide

- **Definition**: Sodium channel blocker with intermediate kinetics.
- **Mechanism of Action**: Blocks Na+ channels, slows conduction; prolongs APD via K+ channel effects.
- **Pharmacodynamics**: Prolongs QT interval, moderate conduction slowing.
- **Pharmacokinetics**:
  - **Absorption**: Oral, IV available.
  - **Metabolism**: Hepatic
  - **Excretion**: Renal
  - **Dosage**: 500-1000 mg every 4-6 hours (oral); 20-50 mg/min IV.
- **Onset/Duration**: 30 min (oral), immediate (IV)/3-4 hours.
- **Interactions**: Cimetidine, amiodarone increase levels.
- **Side Effects**: Lupus-like syndrome, agranulocytosis.

Class Ib - Lidocaine

Class: Antiarrhythmic (Class IB), local anesthetic
Definition: Blocks sodium channels to stabilize cardiac membranes and provide local anesthesia.
Pharmacodynamics: Decreases automaticity and conduction velocity in cardiac tissue.
Pharmacokinetics:

Absorption: IV, IM, topical; rapid onset.
Distribution: Widely distributed.
Metabolism: Hepatic.
Excretion: Renal
Mechanism of Action: Blocks voltage-gated sodium channels.

Adverse Effects: CNS toxicity (seizures, confusion), cardiovascular depression, hypersensitivity.
Uses: Ventricular arrhythmias, local anesthesia.
Mode of Administration: IV, IM, topical.
Dilution: 1–2% solution, may dilute in NS for IV infusion.
Dosage: 1–1.5 mg/kg IV bolus, followed by 1–4 mg/min infusion.

Class Ic - Flecainide

- **Definition**: Potent sodium channel blocker.
- **Mechanism of Action**: Strongly blocks Na+ channels, slows phase 0 depolarization; no APD change.
- **Pharmacodynamics**: Prolongs PR, QRS intervals, potent conduction slowing.
- **Pharmacokinetics**:
  - **Absorption**: Oral
  - **Metabolism**: Hepatic
  - **Excretion**: Renal
  - **Dosage**: 50-150 mg every 12 hours (oral).
- **Onset/Duration**: 1-2 hours/12-24 hours.
- **Interactions**: CYP2D6 inhibitors (e.g., fluoxetine) increase levels.
- **Side Effects**: Proarrhythmia, heart failure exacerbation.

Class III - Amiodarone

Class: Antiarrhythmic (Class III)
Definition: Treats tachy arrhythmias by prolonging cardiac repolarization.
Pharmacodynamics: Prolongs action potential duration and refractory period.
Pharmacokinetics:

Absorption: Oral, IV.
Metabolism: Hepatic.
Excretion: Bile, urine
Mechanism of Action: Blocks potassium channels, prolonging action potential.

Adverse Effects: Pulmonary toxicity, thyroid dysfunction, photosensitivity, corneal micro deposits, QT prolongation.
Uses: Ventricular and supraventricular arrhythmias.
Mode of Administration: IV, oral.
Dilution: 150 mg in 100 mL D5W for IV.
Dosage: 150 mg IV over 10 minutes, then 1 mg/min for 6 hours, 0.5 mg/min for 18 hours; oral 200–400 mg daily.

Class III - Sotalol

- **Definition**: Potassium channel blocker with beta-blocking properties.
- **Mechanism of Action**: Blocks K+ channels, prolongs APD; non-selective beta-blockade.
- **Pharmacodynamics**: Prolongs QT interval, slows heart rate.
- **Pharmacokinetics**:
  - **Absorption**: Oral.
  - **Metabolism**: Minimal hepatic metabolism.
  - **Excretion**: Renal.
- **Dosage**: 80-160 mg twice daily (oral).
- **Onset/Duration**: 1-2 hours/12-24 hours.
- **Interactions**: QT-prolonging drugs increase torsades risk.
- **Side Effects**: Torsades de pointes, bradycardia.

Other - Adenosine

- **Definition**: Purinergic receptor agonist.
- **Mechanism of Action**: Activates A1 receptors, slows AV node conduction, causes transient AV block.
- **Pharmacodynamics**: Rapidly terminates supraventricular tachycardias.
- **Pharmacokinetics**:
  - **Absorption**: IV only.
  - **Metabolism**: Degraded by adenosine deaminase.
  - **Excretion**: Renal (metabolites), half-life <10 seconds.
- **Dosage**: 6 mg IV bolus, then 12 mg if needed.
- **Onset/Duration**: <30 sec/10-20 sec.
- **Interactions**: Dipyridamole enhances effect; caffeine antagonizes.
- **Side Effects**: Flushing, dyspnea, chest pain.

Other - Digoxin

- **Definition**: Cardiac glycoside for rate control.
- **Mechanism of Action**: Inhibits Na+/K+ ATPase, increases vagal tone, slows AV conduction.
- **Pharmacodynamics**: Slows heart rate in atrial fibrillation, no QT effect.
- **Pharmacokinetics**:
  - **Absorption**: Oral.
  - **Metabolism**: Minimal hepatic.
  - **Excretion**: Renal
  - **Dosage**: 0.5-1 mg (loading), 0.125-0.25 mg/day.
- **Onset/Duration**: 1-2 hours (oral), 5-30 min (IV)/2-3 days.
- **Interactions**: Amiodarone, verapamil increase levels.
- **Side Effects**: Nausea, arrhythmias, visual disturbances

THANK YOU