SNS COLLEGE OF ALLIED HEALTH SCIENCE

Affiliated to The Tamil Nadu Dr MGR Medical University, Chennai

DEPARTMENT OF CARDIAC TECHNOLOGY

COURSE NAME : Basic Electrocardiography

UNIT : ECG Lead Systems, Axis Determination & Recording

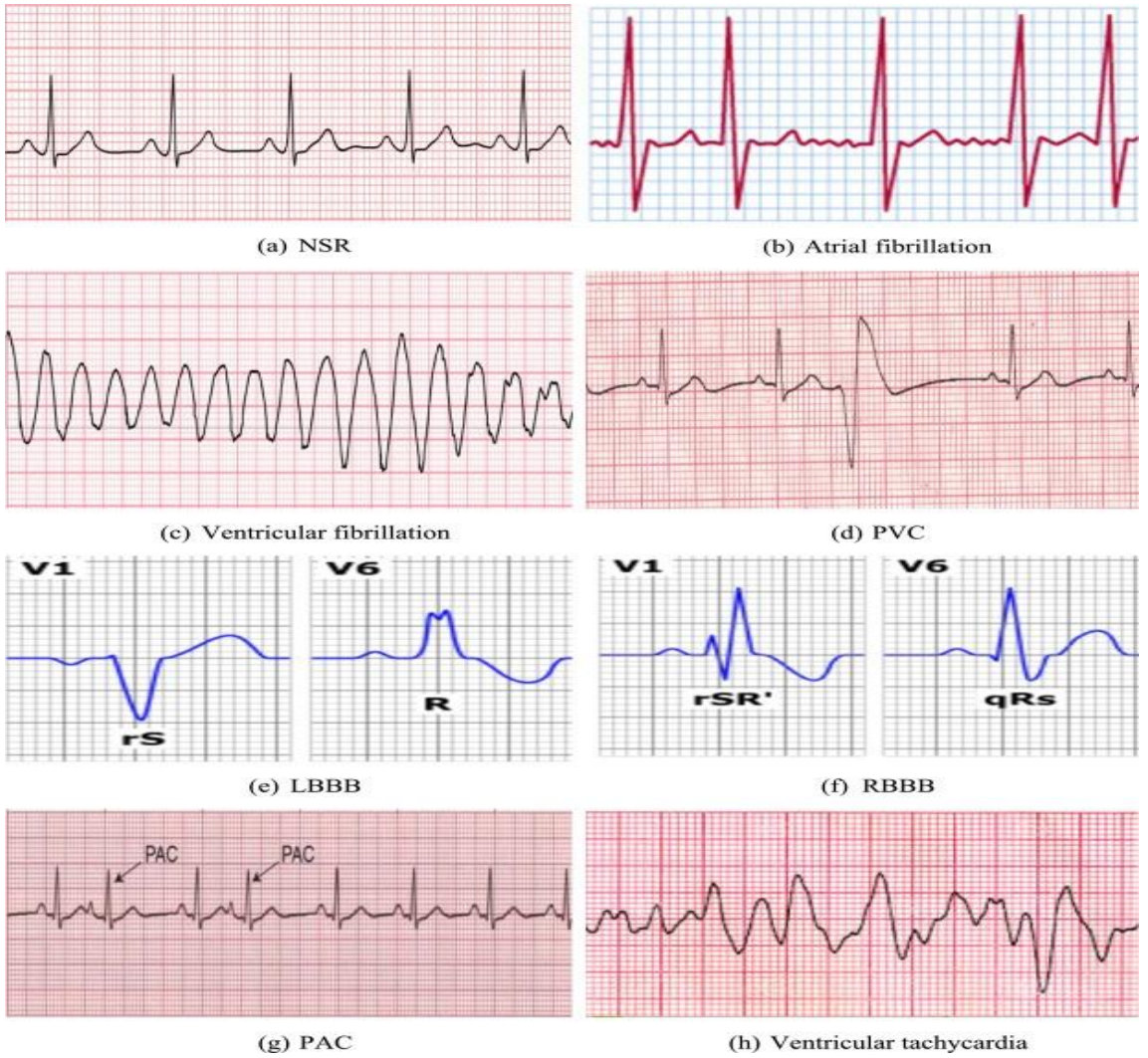
TOPIC : Recording ECG in Adults & Paediatrics

FACULTY NAME: Kavipriya S

EMPATHIZE – Understanding the Clinical and Learning Need

Objective:

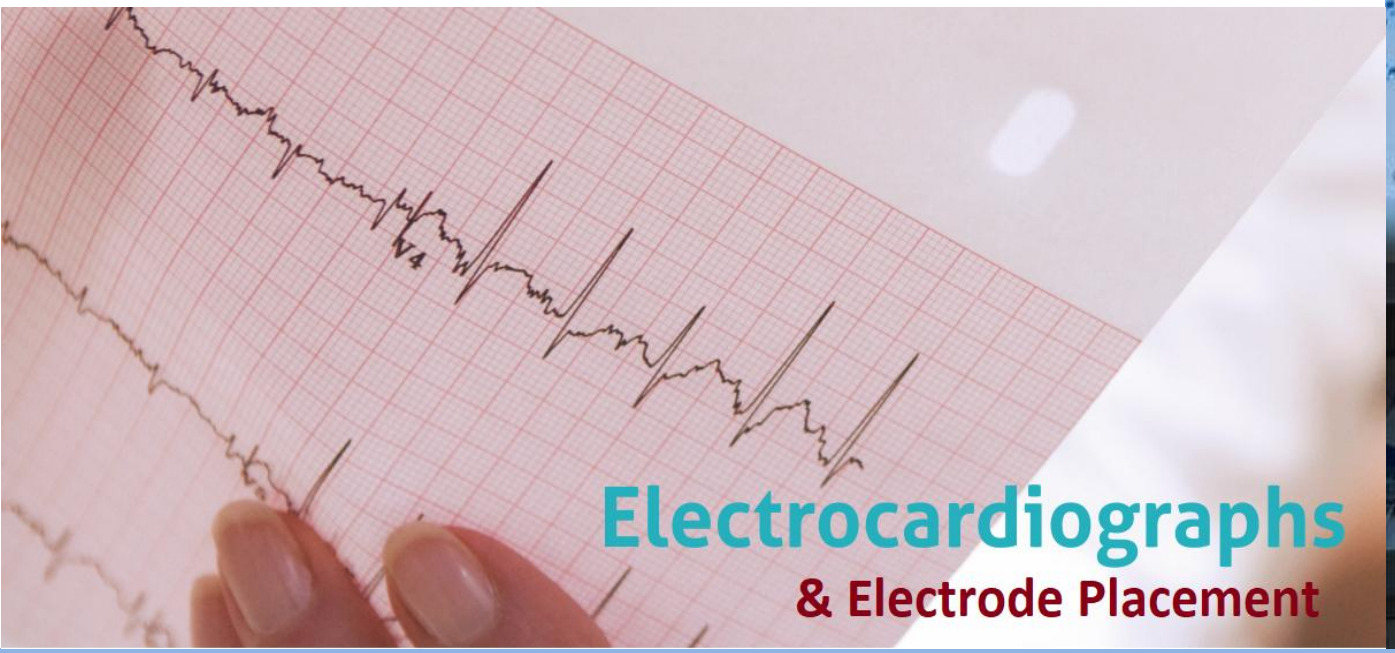
- ECG recording is a **vital, non-invasive diagnostic test** that measures the **electrical activity of the heart** over time.
- Accurate ECG recording is essential for identifying:
  - ✓ **Arrhythmias**
  - ✓ **Conduction abnormalities**
  - ✓ **Myocardial infarction**
  - ✓ **Congenital heart defects (especially in pediatrics)**

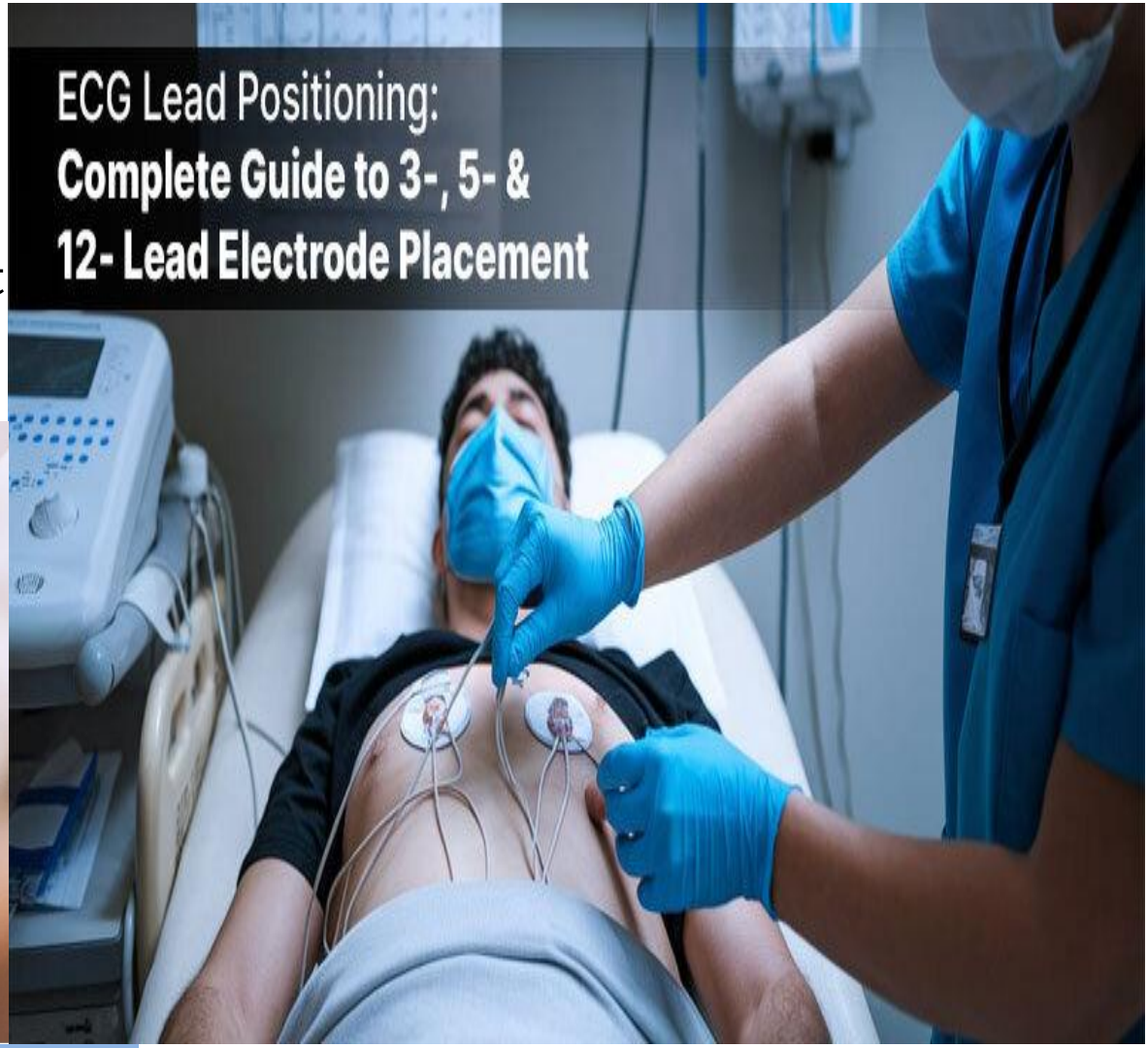


Fundamental Concept: The Basis of ECG Recording

Why It Matters:

- Errors in **electrode placement**, **lead connection**, or **patient preparation** can lead to **misinterpretation.**
- **Pediatric ECGs** differ significantly due to **smaller heart size, faster rate**, and **different axis orientation.**





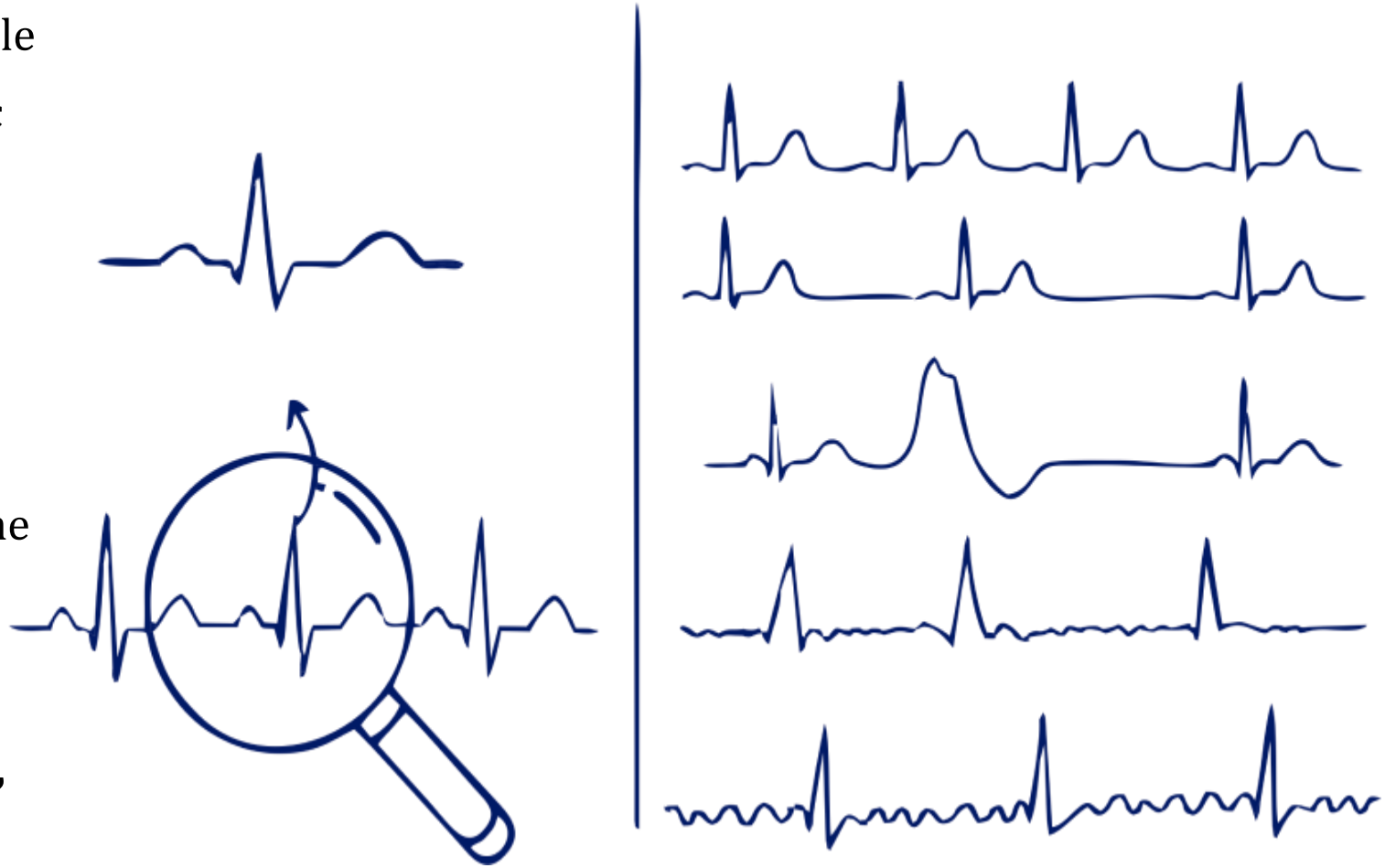
💡 2. DEFINE — Identifying the Core Concept

Problem Statement:

👉 "How can we obtain accurate and reliable ECG recordings in both adults and pediatric patients while minimizing errors?"

Definition:

- **Electrocardiography (ECG)** is the **recording of electrical activity of the heart** detected by electrodes placed on the skin surface.
- It records **depolarization and repolarization** waves that produce the **P, QRS, and T complexes**.



🧠 3. IDEATE — Concept Development

A. Basic Requirements

- **ECG Machine** (standard 12-lead or 3-channel)
- **Electrodes & Lead wires**
- **Electrolyte gel or conductive pads**
- **Paper speed:** usually **25 mm/sec**
- **Voltage calibration:** 1 mV = 10 mm deflection

🧠 IDEATE — Concept Formation & Theory

B. Patient Preparation

For Adults:

•Ensure patient is **relaxed, comfortable, and lying supine.**

•**Remove metallic objects** (watches, jewelry, belts).

•**Clean skin** with alcohol wipes to remove oils and sweat.

•**Shave hair** if necessary for better electrode contact.

🧠 IDEATE — Concept Formation & Theory

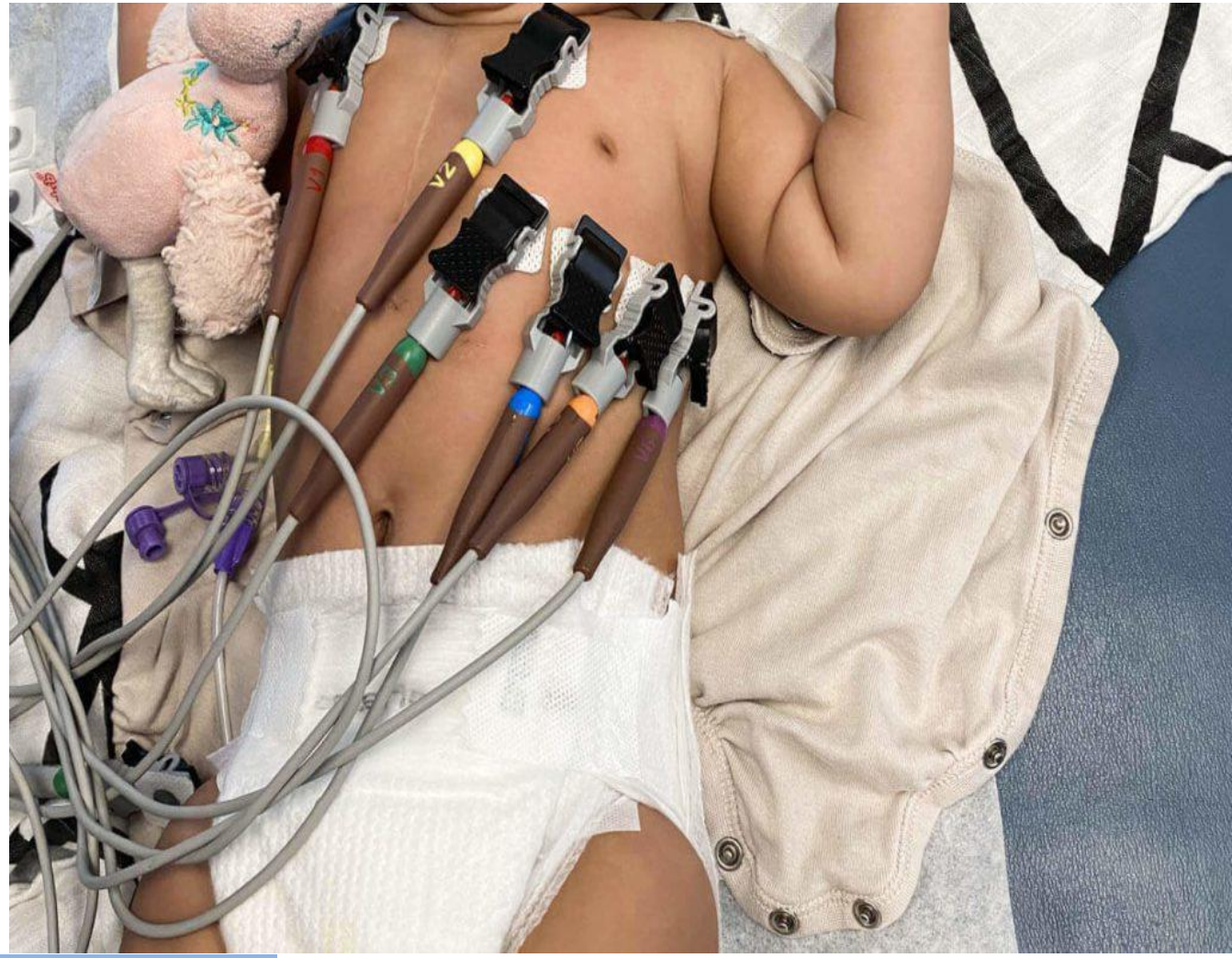
For Pediatrics:

•Use **smaller electrodes or neonatal electrodes**.

•Calm the child — crying or movement can cause artifacts.

•Maintain **warm room temperature** to prevent shivering.

•In infants, allow the child to lie on parent's lap for reassurance.



PROTOTYPE — Visualizing & Integrating the System

Electrode	Placement Site
RA (Right Arm)	Right wrist or upper arm
LA (Left Arm)	Left wrist or upper arm
RL (Right Leg)	Right ankle (ground electrode)
LL (Left Leg)	Left ankle

PROTOTYPE — Step-by-Step ECG Recording Process

A. Stepwise Method

1.Check equipment: Ensure ECG machine is working and properly calibrated.

2.Prepare patient: Explain the procedure, obtain consent, ensure comfort.

3.Position electrodes: Apply electrodes firmly with good skin contact.

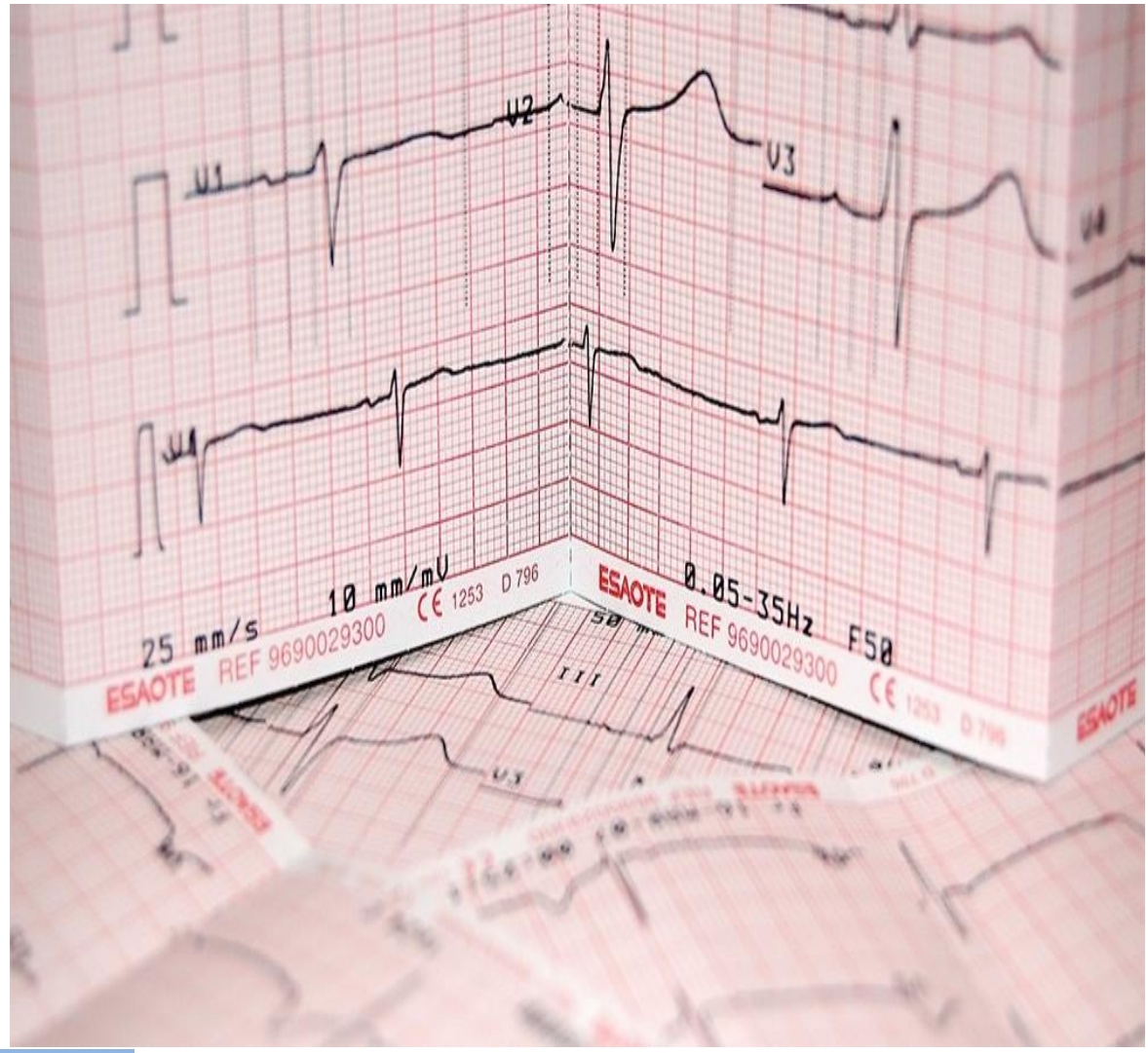
4.Connect lead wires according to color code and lead system.

5.Ensure calibration mark appears (1 mV = 10 mm).

PROTOTYPE — Step-by-Step ECG Recording Process

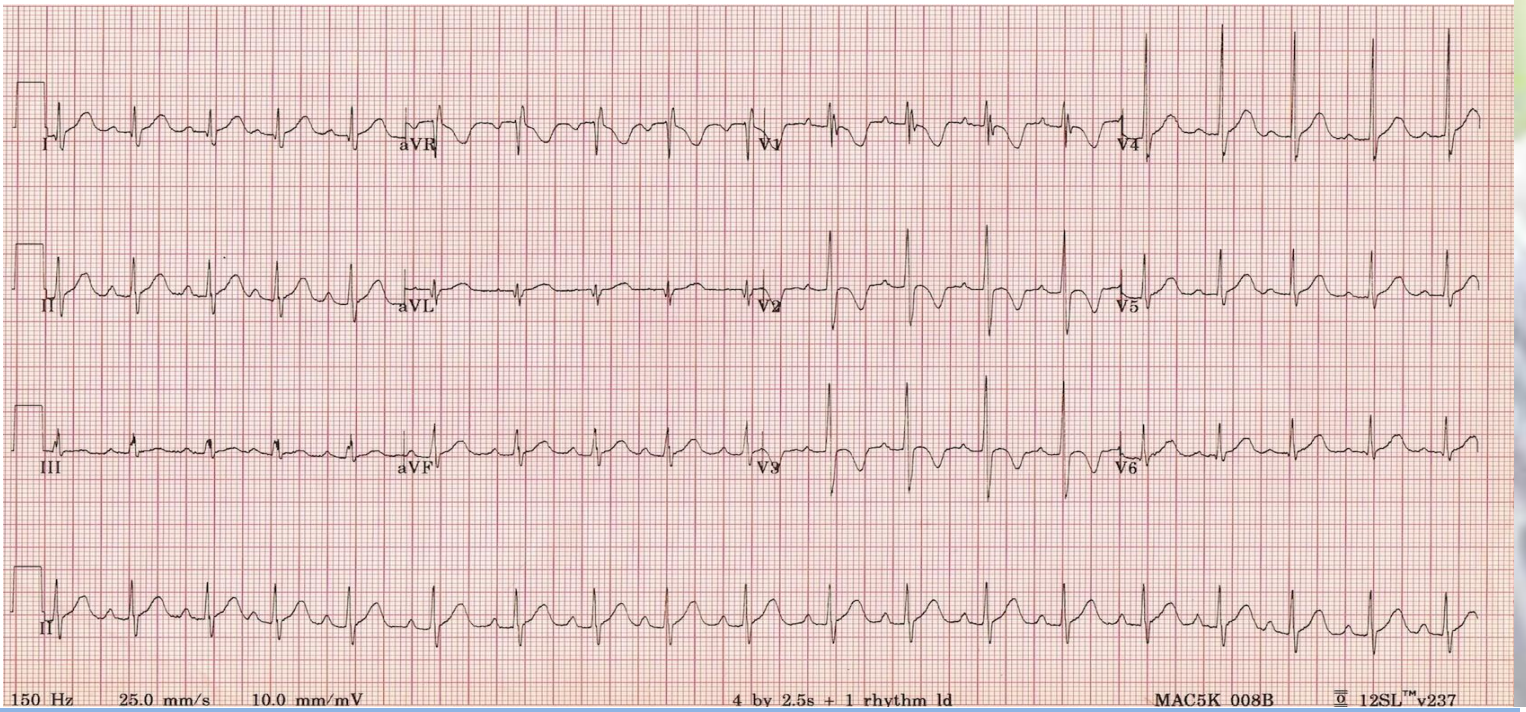
A. Stepwise Method

1. **Select paper speed** (25 mm/sec for normal rhythm, 50 mm/sec for tachycardia).
2. **Instruct patient to remain still** and breathe normally.
3. **Record ECG**: Press record; check for noise, muscle tremors, or drift.
4. **Label ECG** with patient name, age, date, and lead identification.
5. **Clean electrodes** after recording.



B. Special Considerations in Pediatrics

- **Heart rate** is higher (100–160 bpm in infants).
- **QRS axis** may be rightward due to dominant RV.
- **P and T waves** are smaller.
- Use **faster paper speed (50 mm/sec)** to spread out the ECG for easier reading.
- For neonates, **shorter lead wires** reduce artifacts.

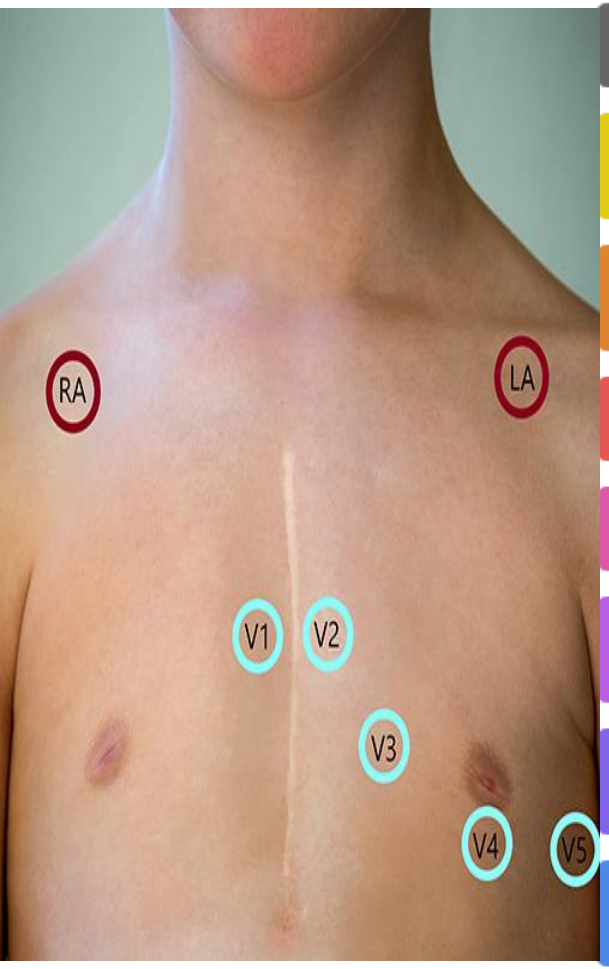


TEST — Troubleshooting & Quality Control

Common Error	Cause	Correction
Baseline drift	Movement, loose electrode	Secure electrodes, ask patient to relax
Muscle artifacts	Tension, shivering	Relax patient, warm room
AC interference	Electrical noise	Keep cables away from power cords
Flat line in one lead	Loose wire	Reconnect lead properly
Distorted waveform	Wrong lead placement	Verify positions before recording

Summary

Adult vs. Pediatric ECG Parameters



Parameter	Adults	Pediatrics
Heart Rate	60–100 bpm	100–160 bpm (infants)
Paper Speed	25 mm/sec	50 mm/sec (optional)
Electrode Size	Standard	Small/Neonatal
Electrode Site	Limbs & chest	Closer to trunk
Patient Position	Supine	Supine or parent's lap
Dominant Axis	Leftward	Rightward (newborns)
Common Issues	AC noise, muscle tremor	Movement, crying, baseline drift

REFERENCE BOOKS

- **Guyton & Hall**, *Textbook of Medical Physiology* (14th Edition)
- **Sembulingam & Sembulingam**, *Essentials of Medical Physiology*
- **John R. Hampton**, *The ECG Made Easy*
- **Chatterjee & Price**, *Clinical Electrocardiography: Simplified Approach*
- **Goldberger**, *Clinical Electrocardiography: A Simplified Approach*