





# The ECG & Arrhythmias

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## **Key teaching objectives**

Understand the indications for ECG monitoring

Know how to monitor the ECG

Understand the basic physiology of the ECG

Understand the 6-stage approach to rhythm recognition

Recognise the common 12-lead ECG patterns associated with acute myocardial infarction

Recognise and treat common arrhythmias





# How to monitor the ECG

- 3-lead monitoring
- 12-lead monitoring
- Hands-free adhesive pads



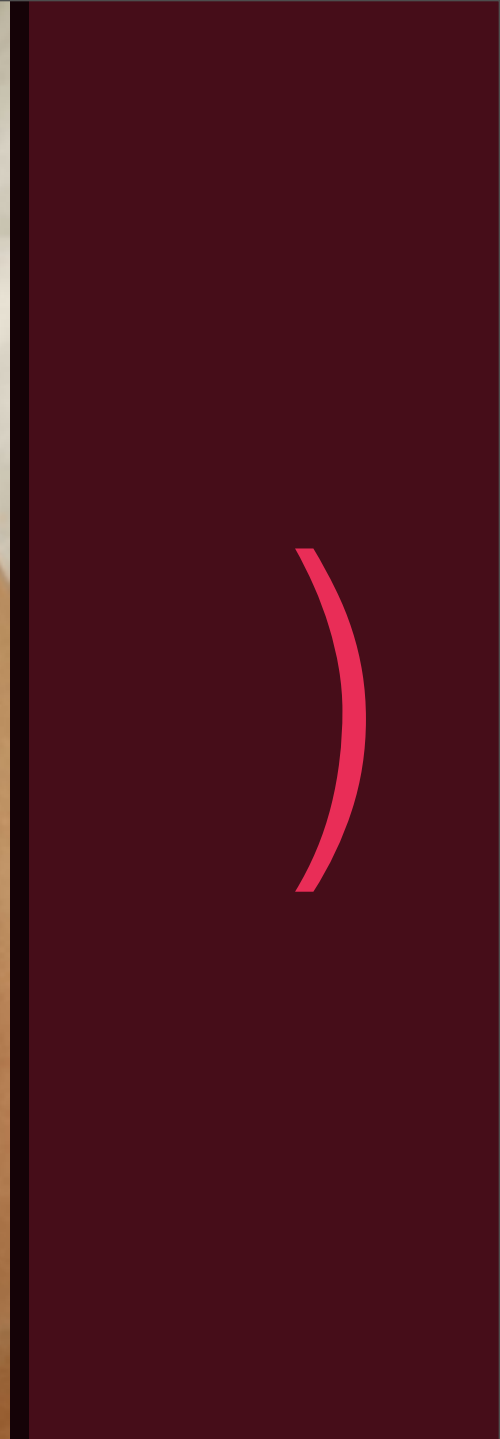










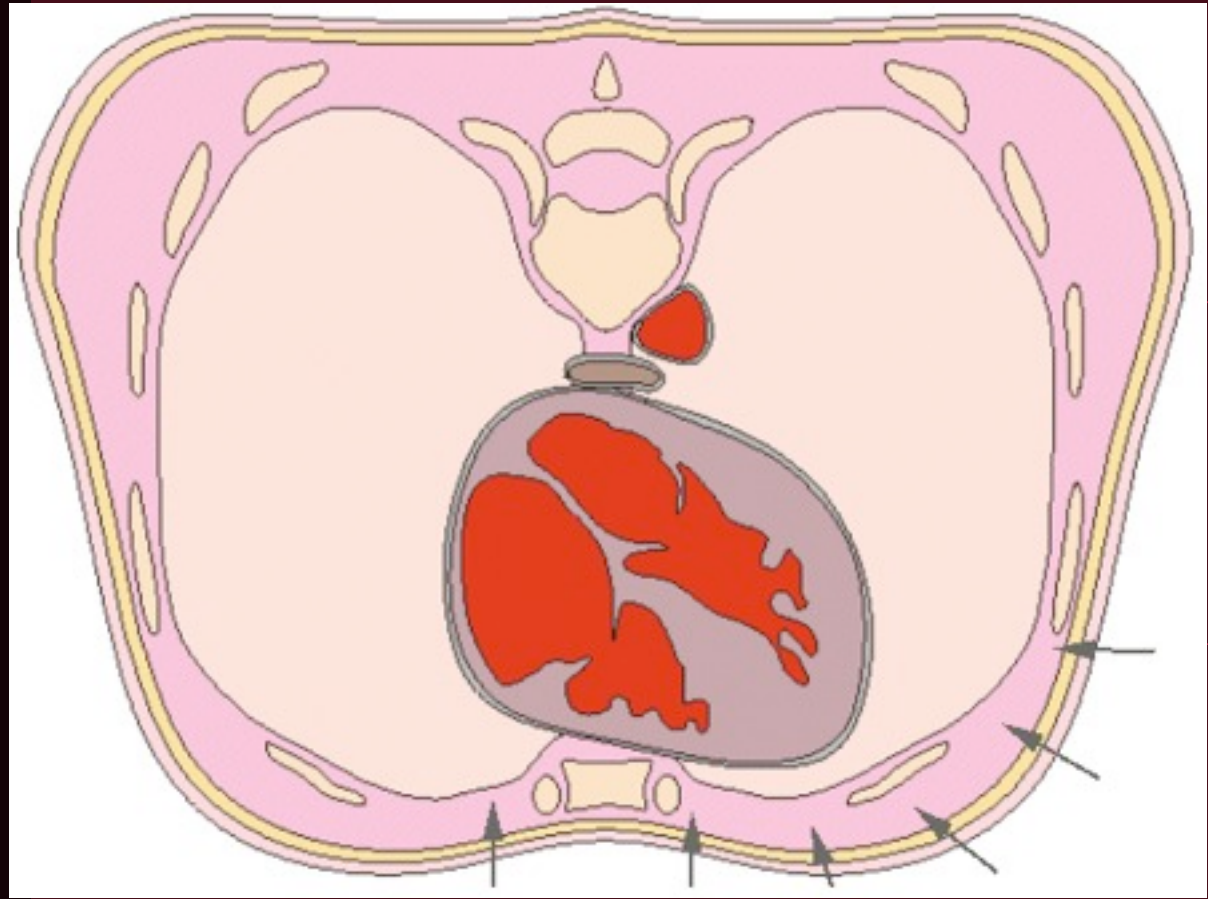


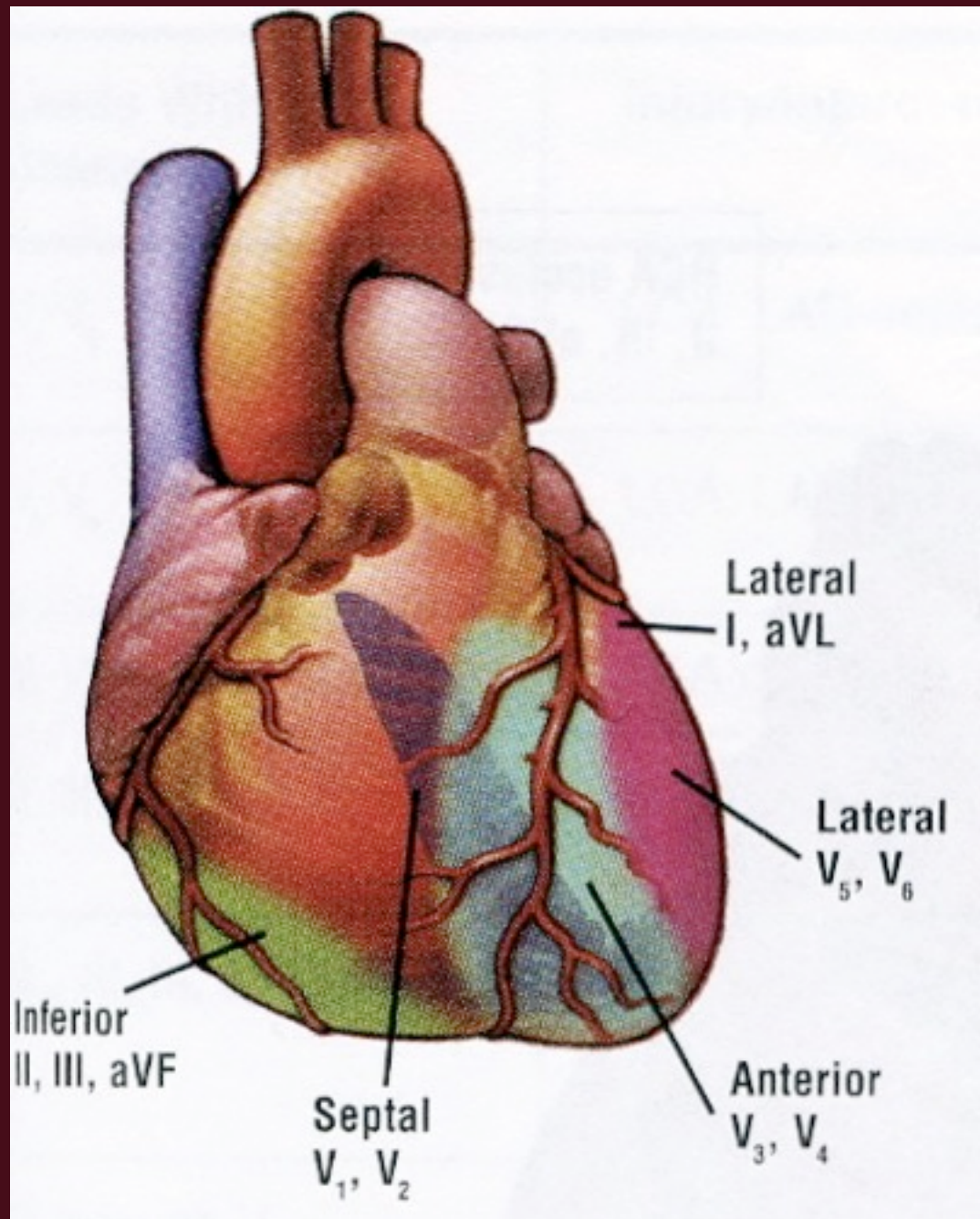






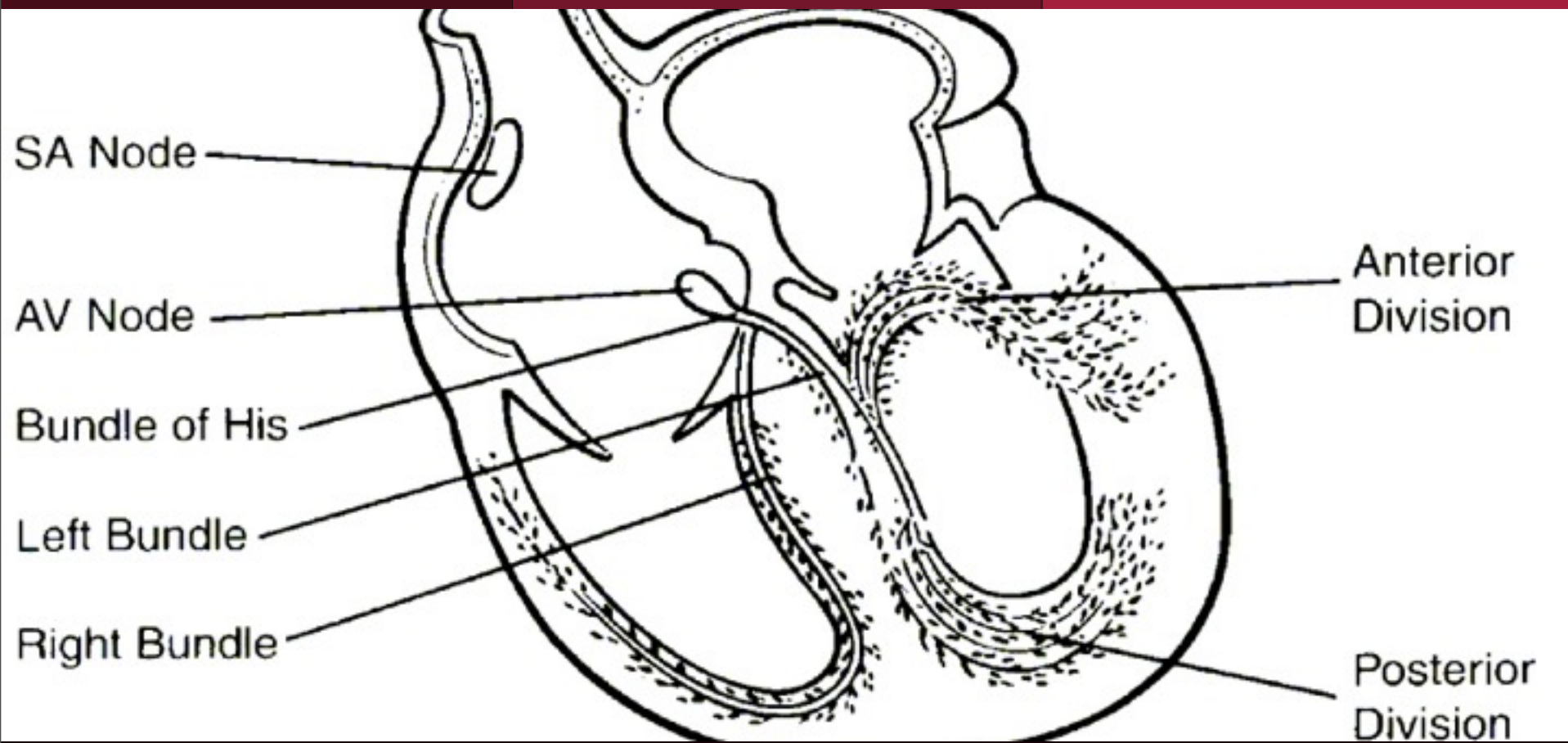










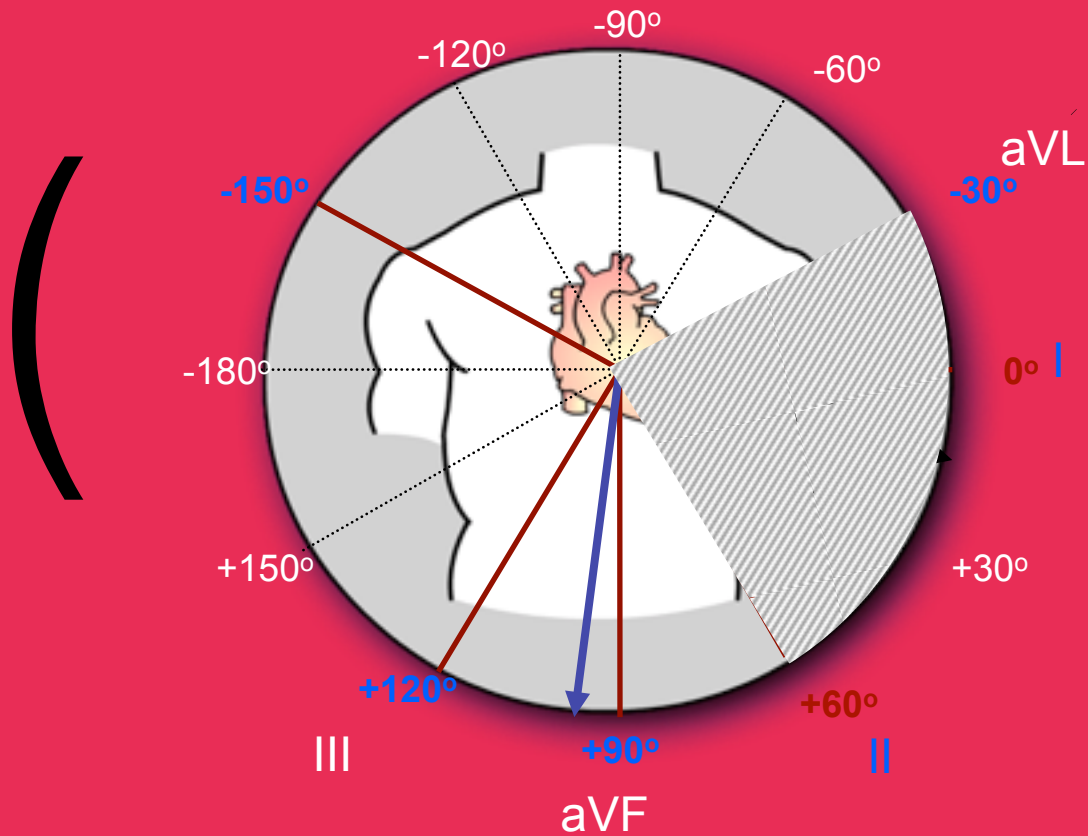




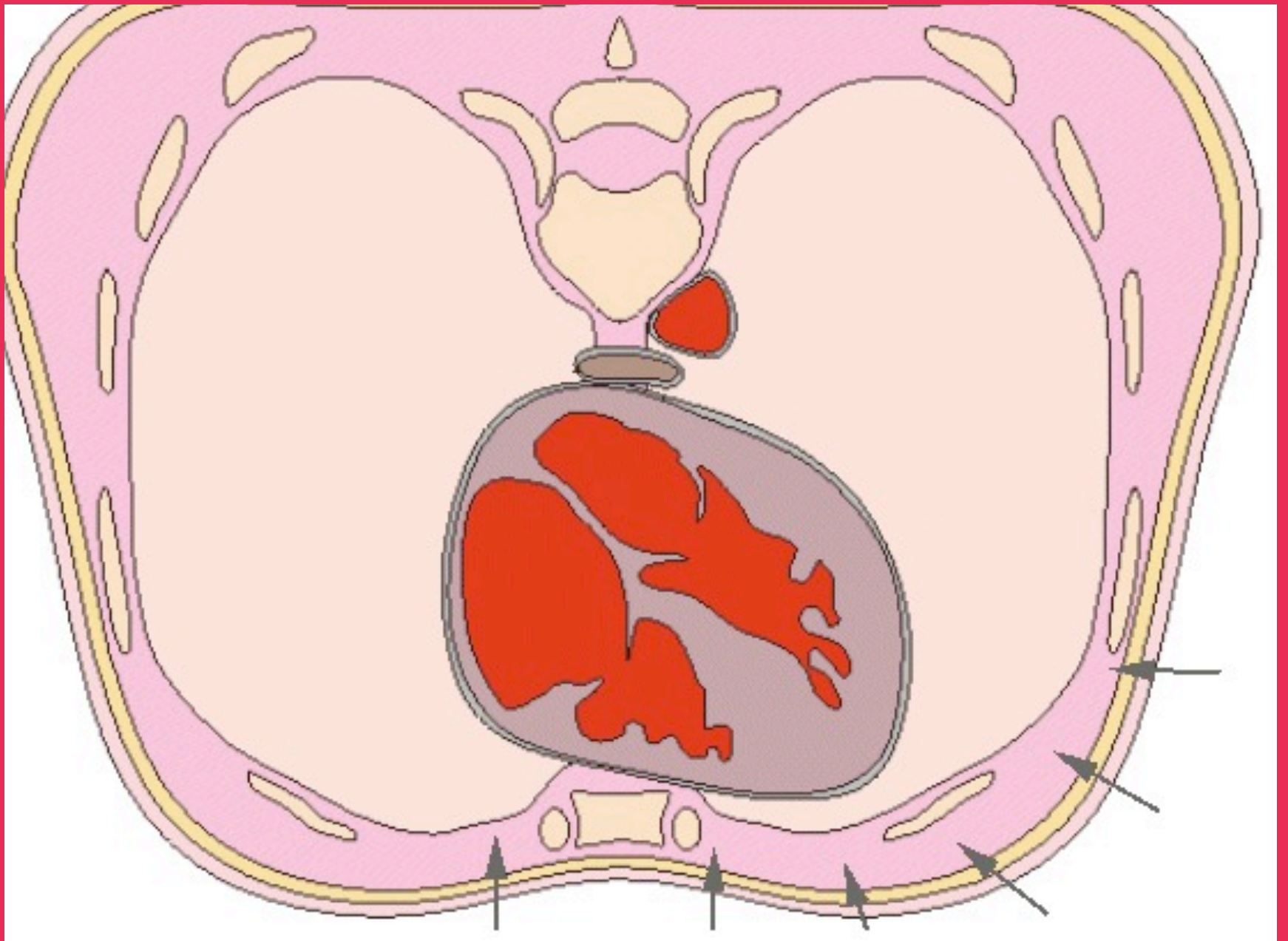


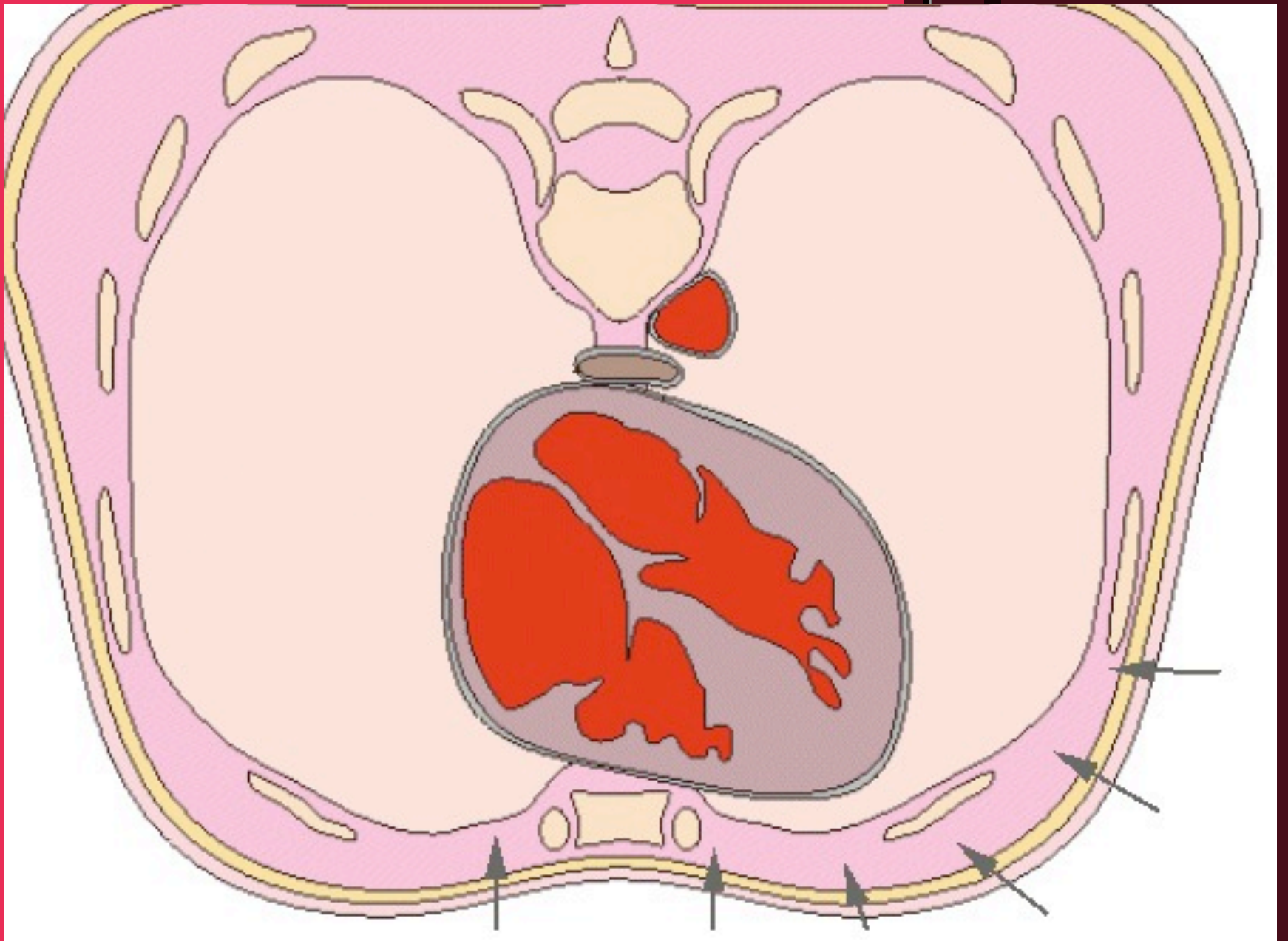


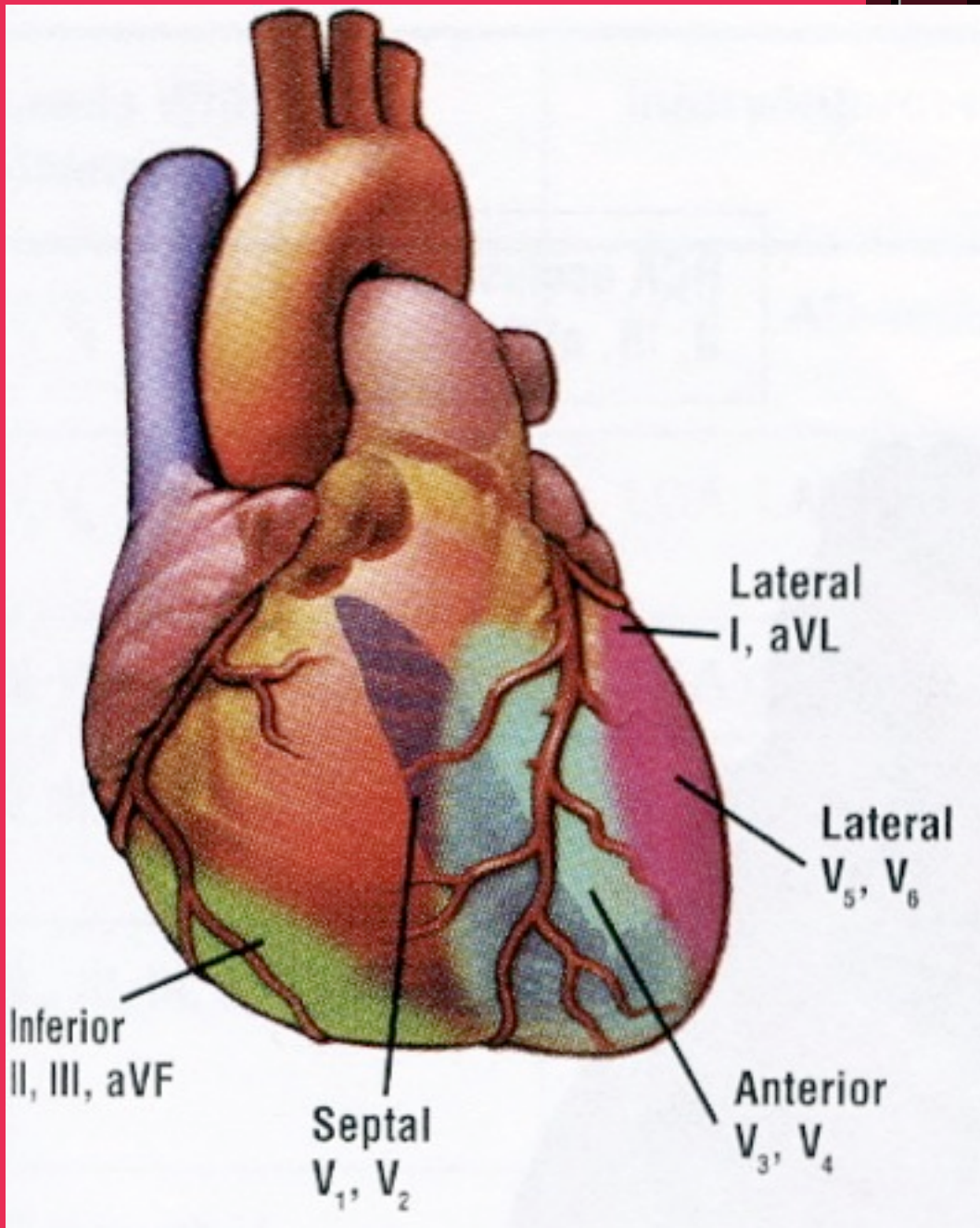
# Reciprocal Changes

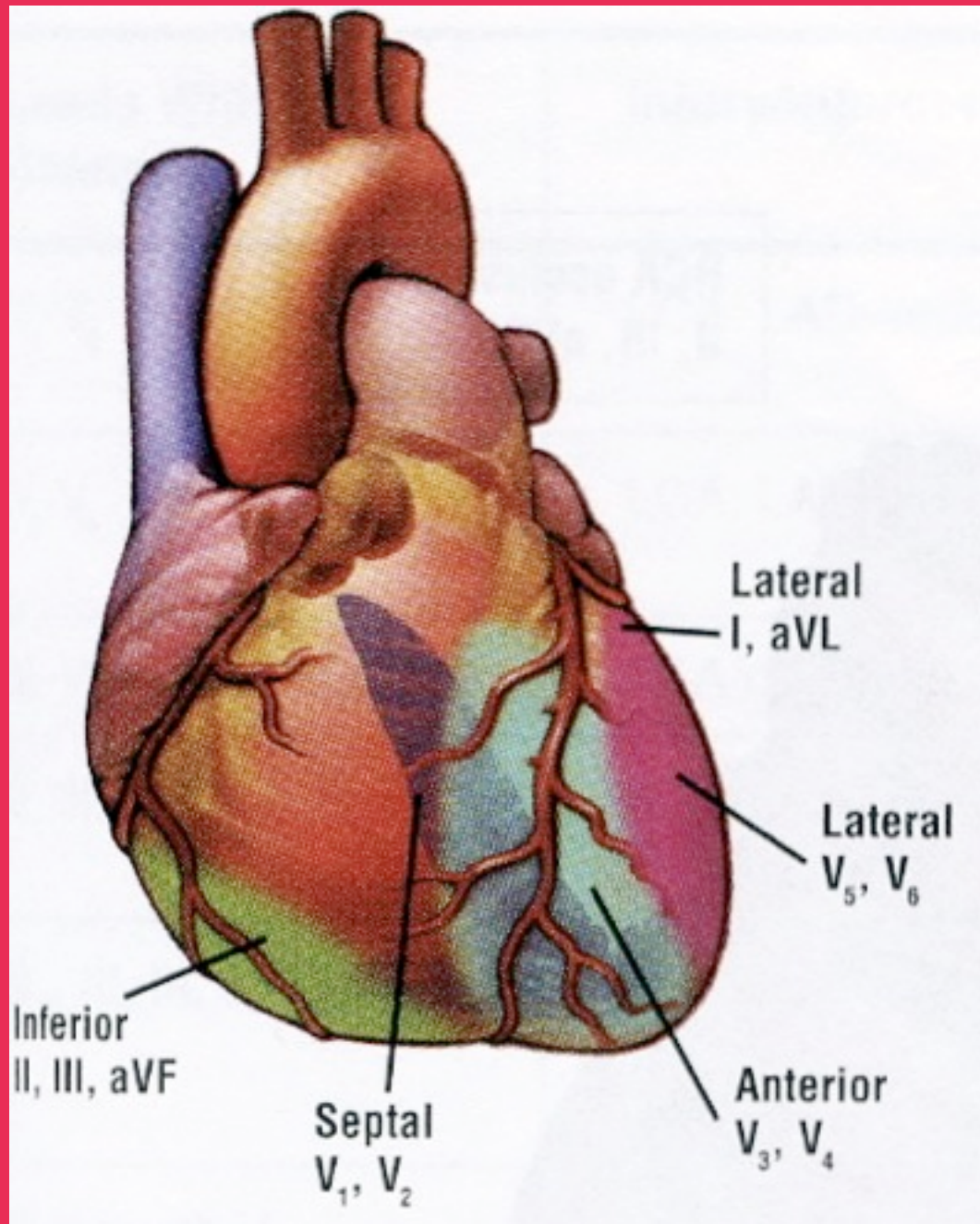












Inferior  
II, III, aVF

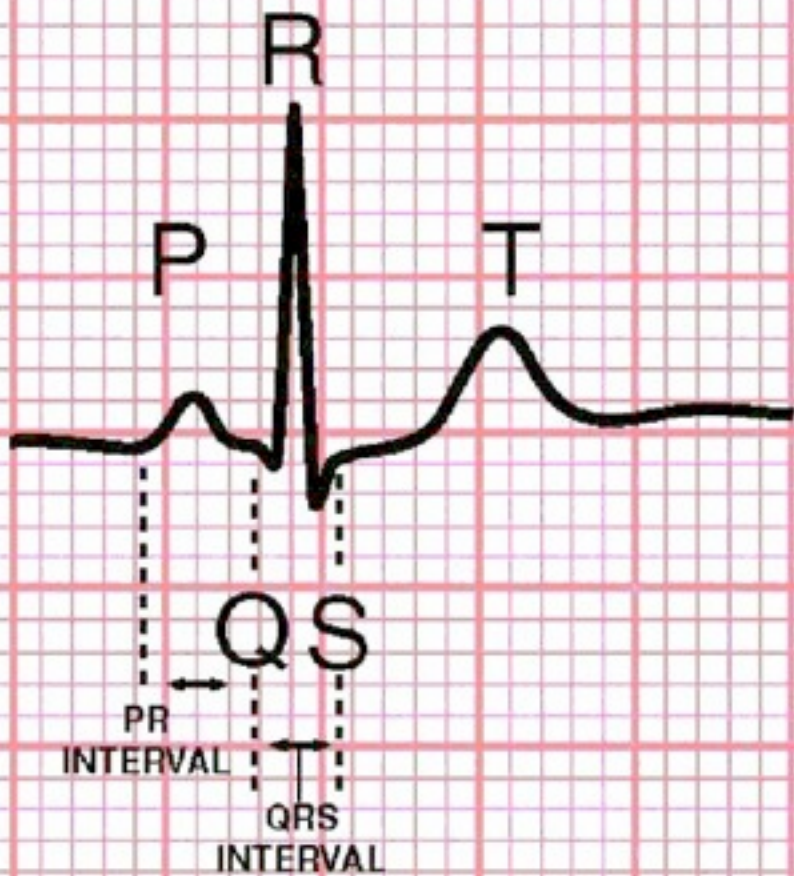
Septal  
V<sub>1</sub>, V<sub>2</sub>

Lateral  
I, aVL

Lateral  
V<sub>5</sub>, V<sub>6</sub>

Anterior  
V<sub>3</sub>, V<sub>4</sub>





# Intervals

PR: 0.12-0.2s

QRS: <0.12s

QTc: 0.38-0.42

$$QTc = QT / \sqrt{RR}$$





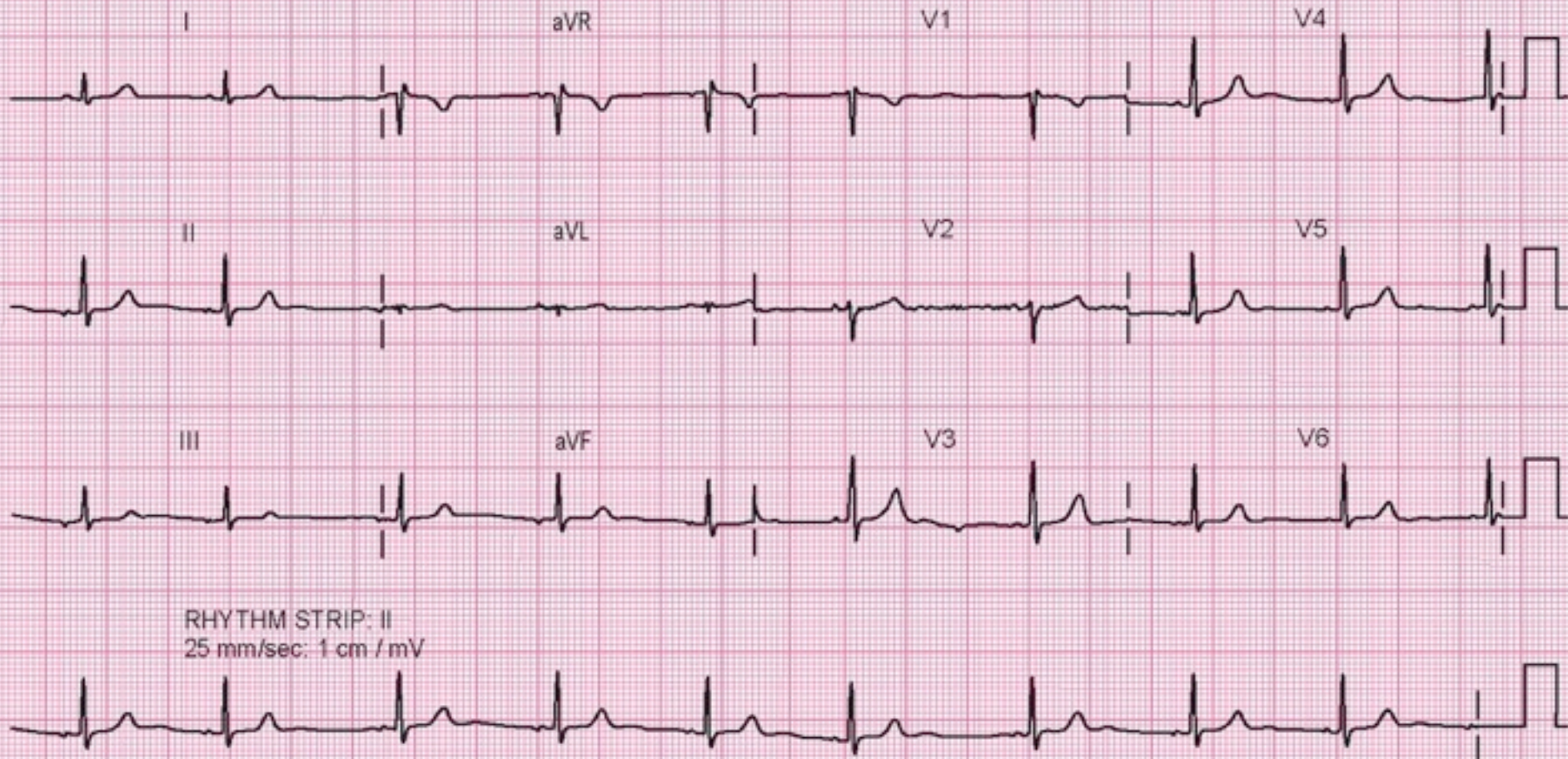


( ECG  
examples





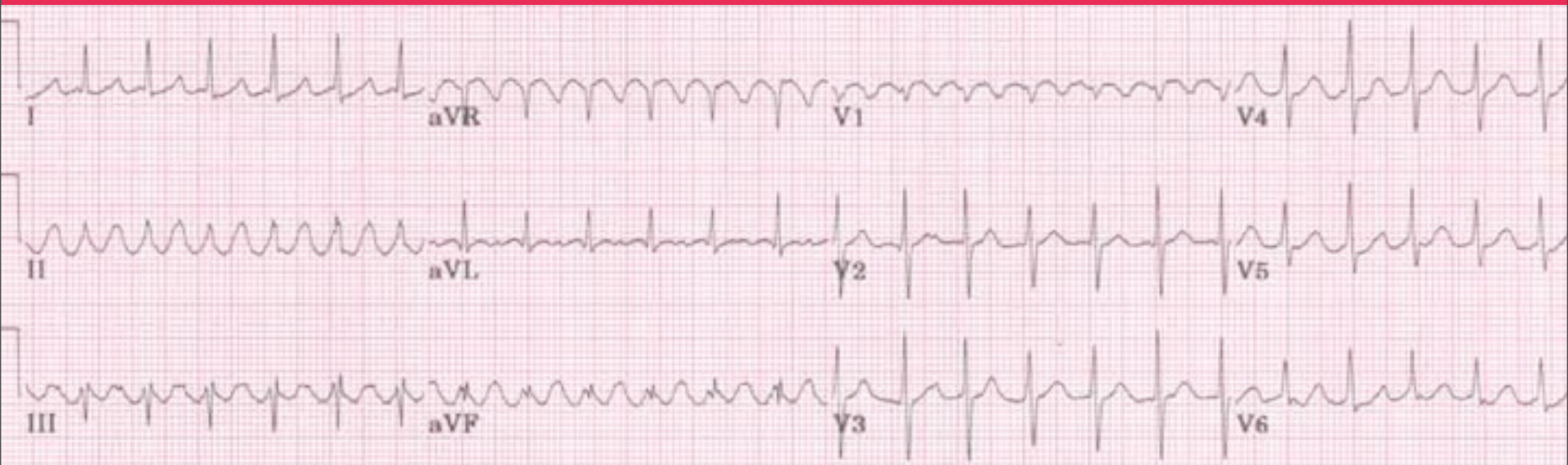






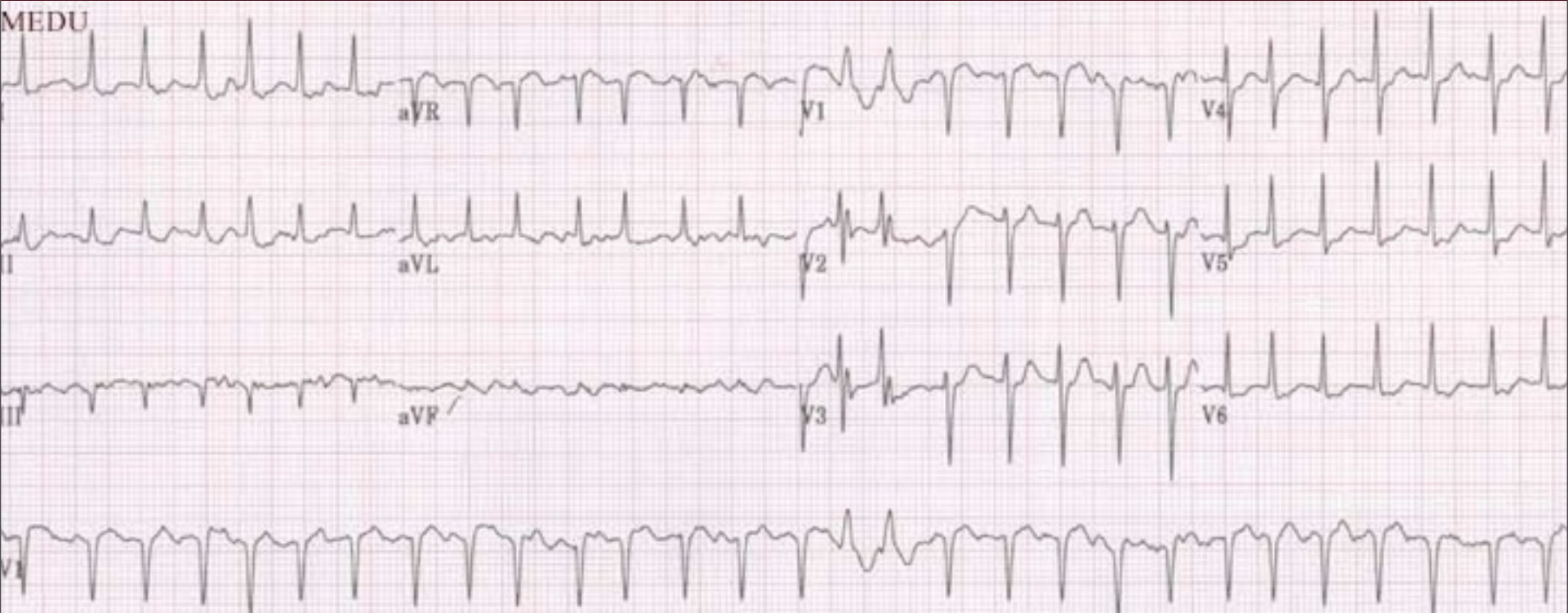












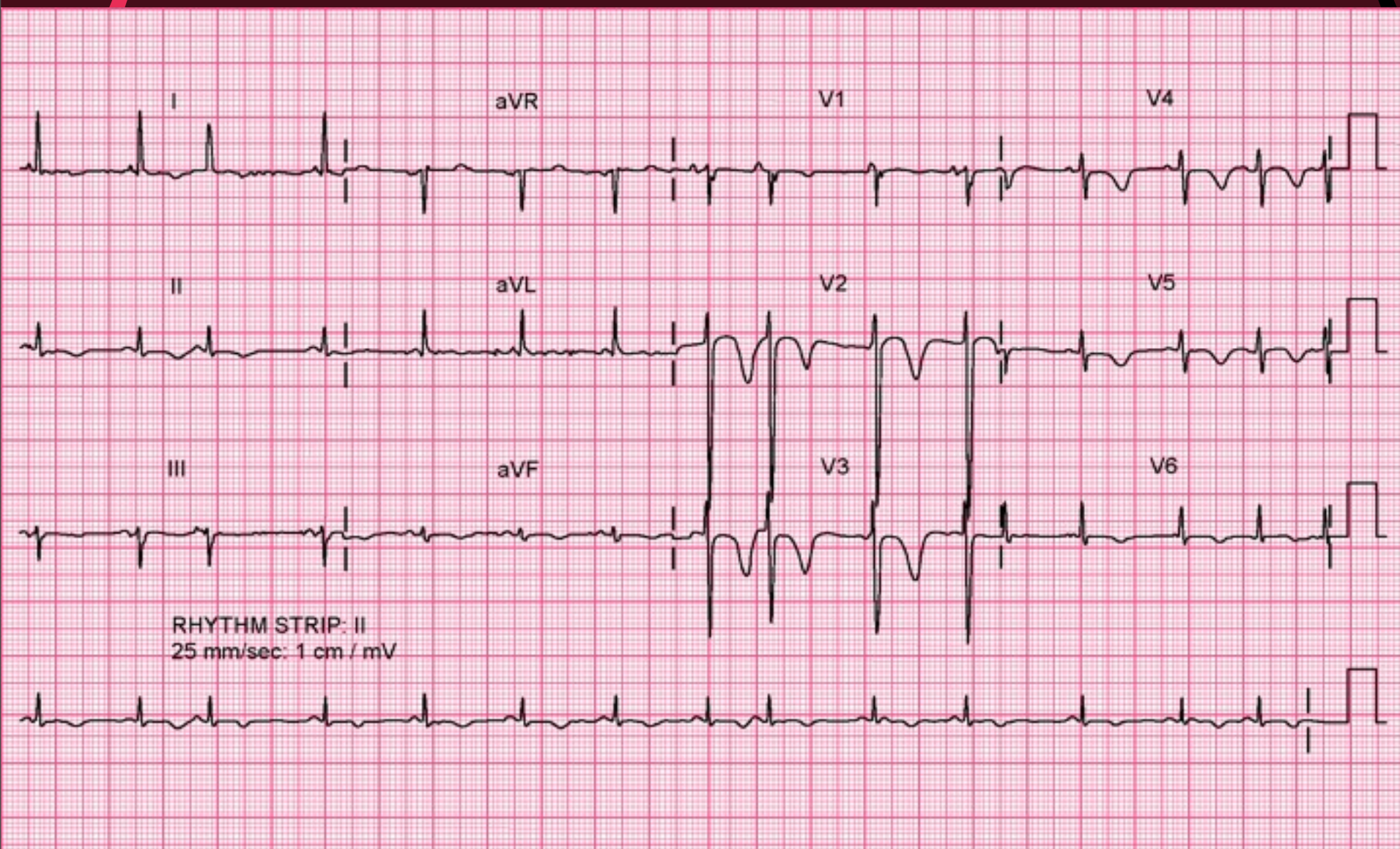






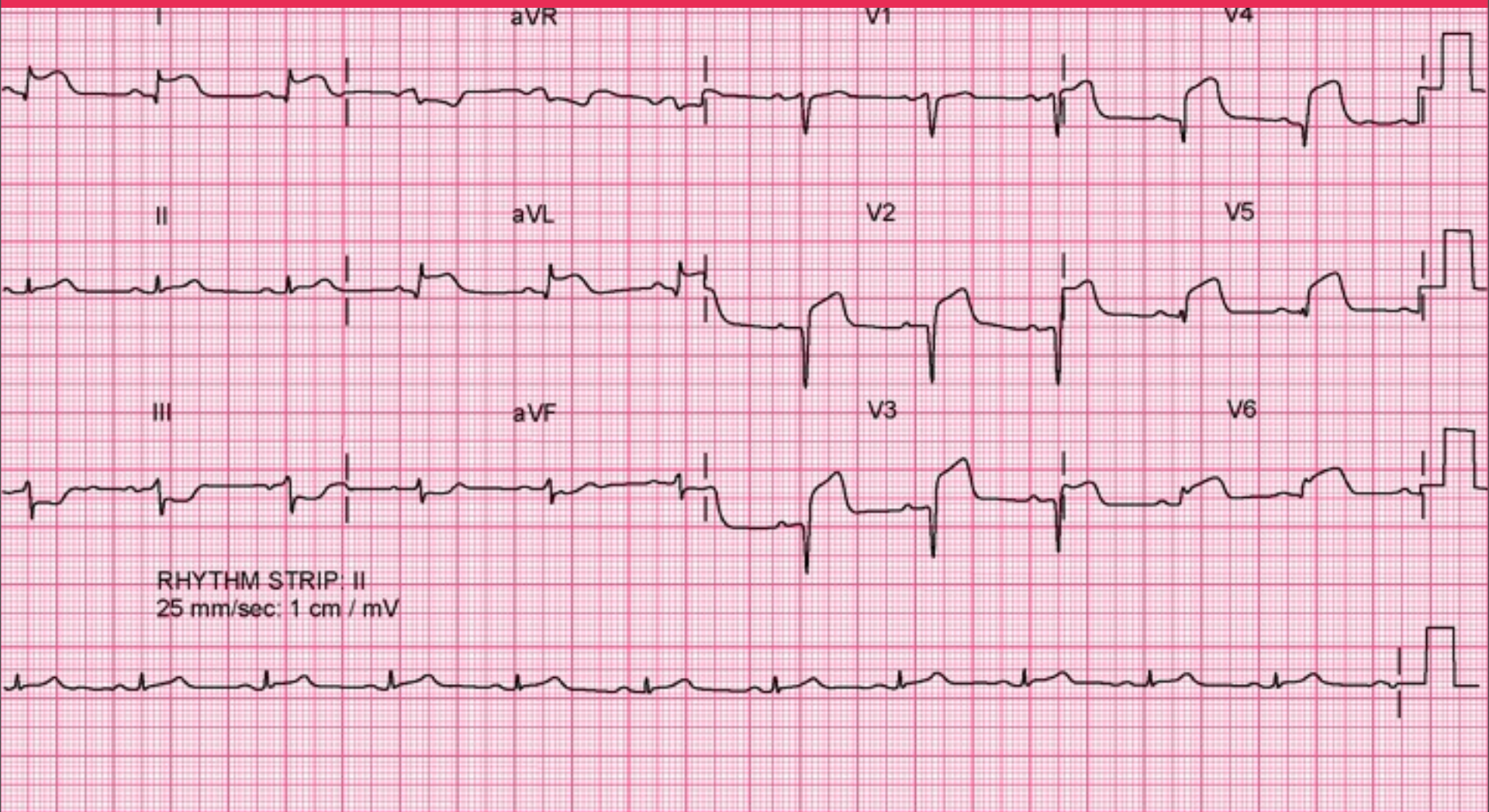






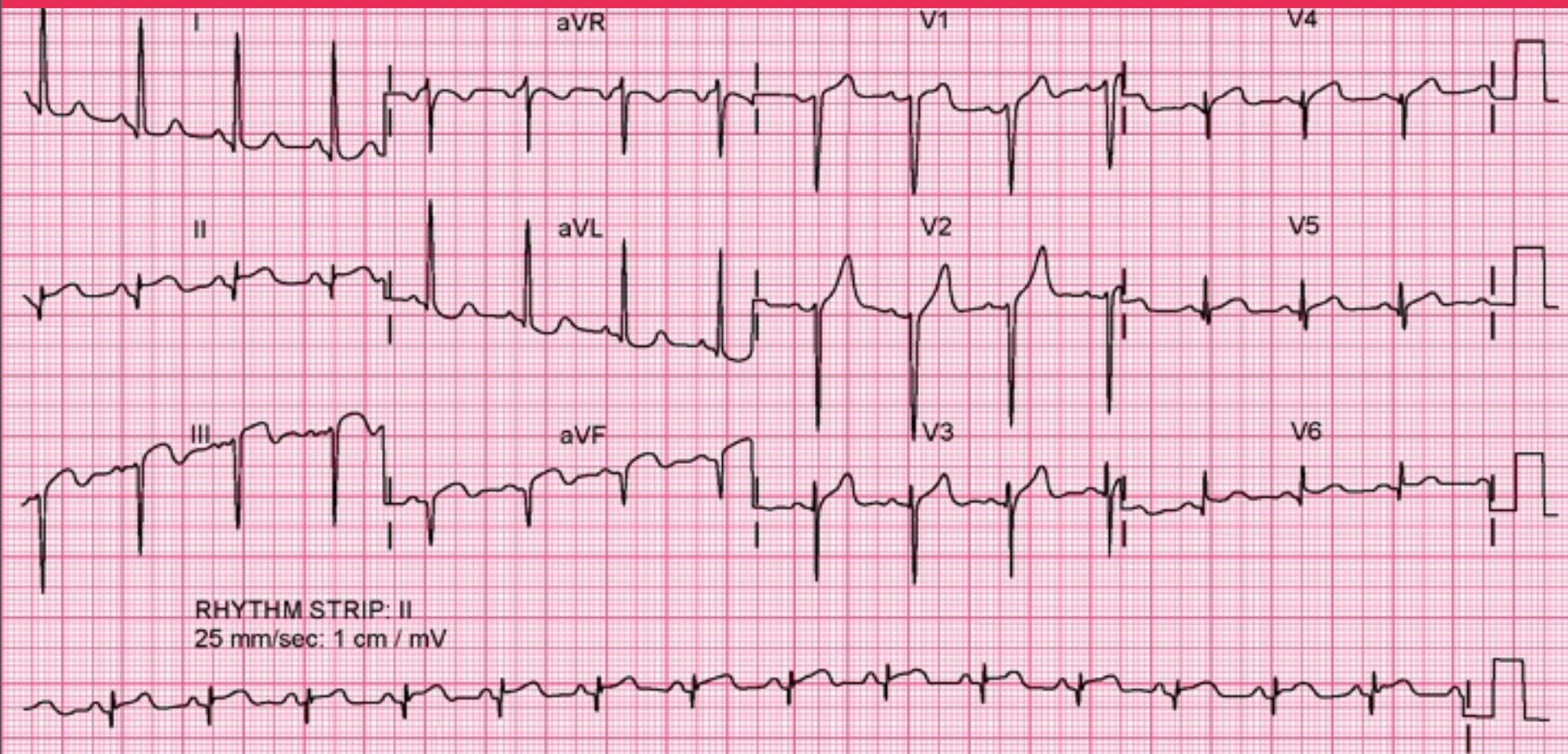








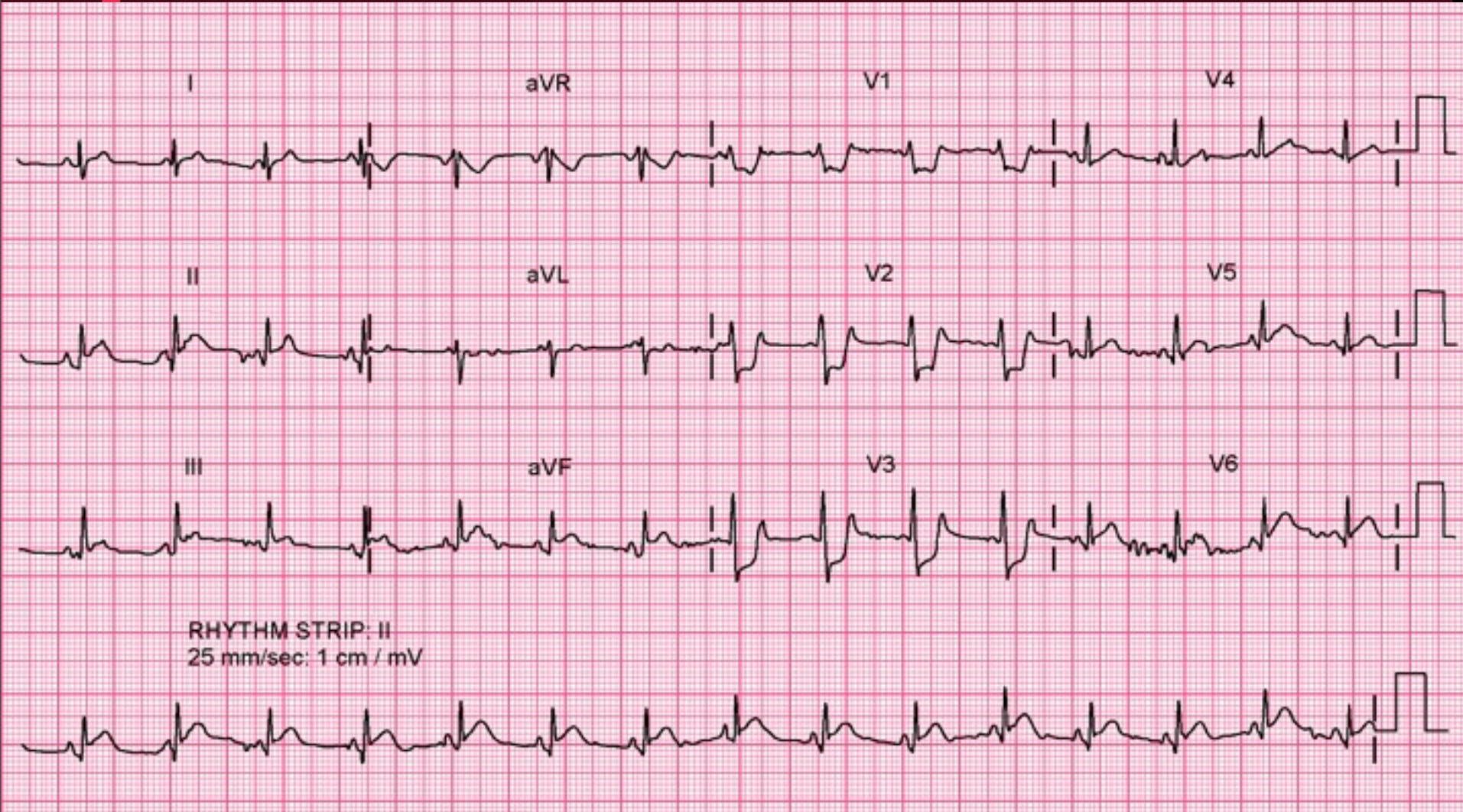






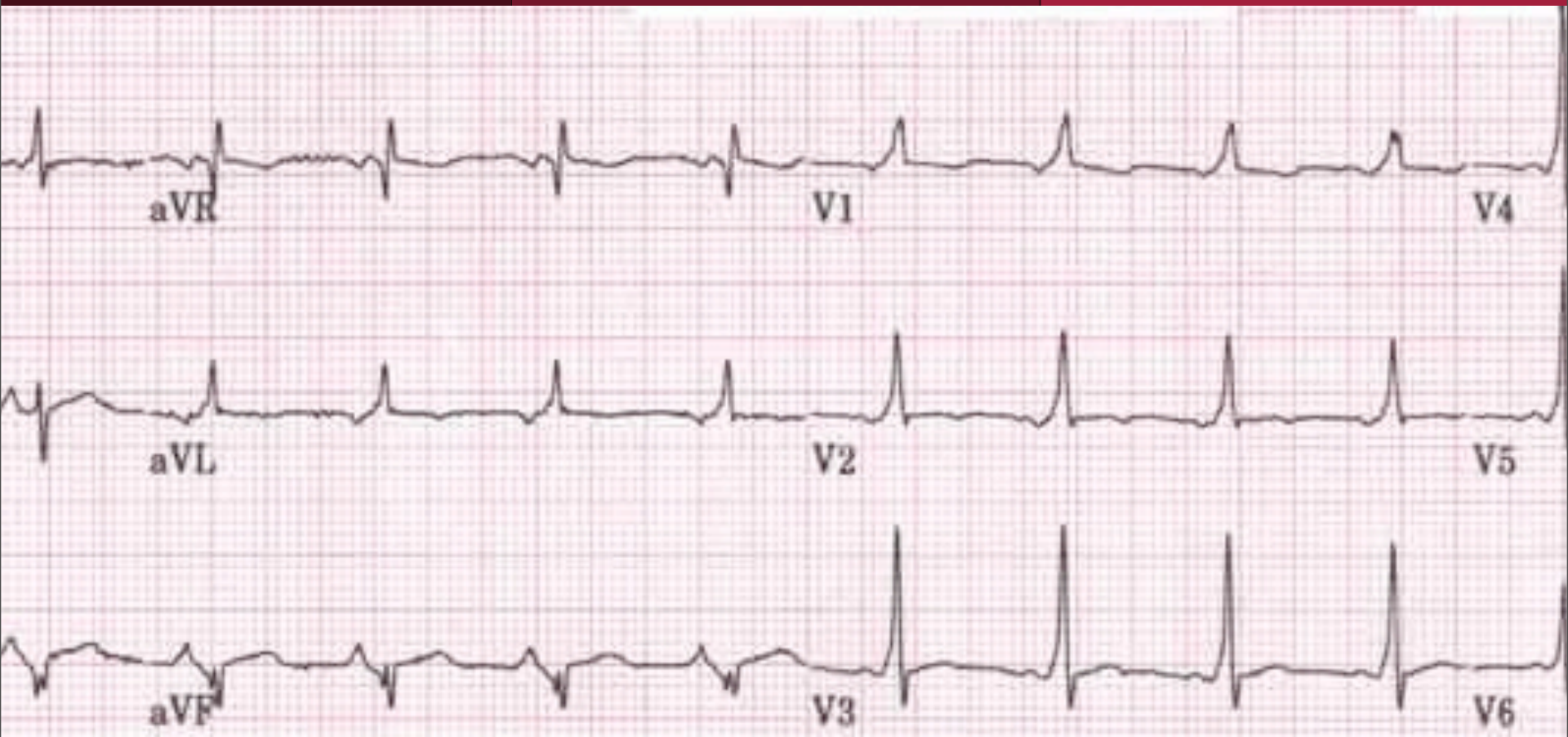






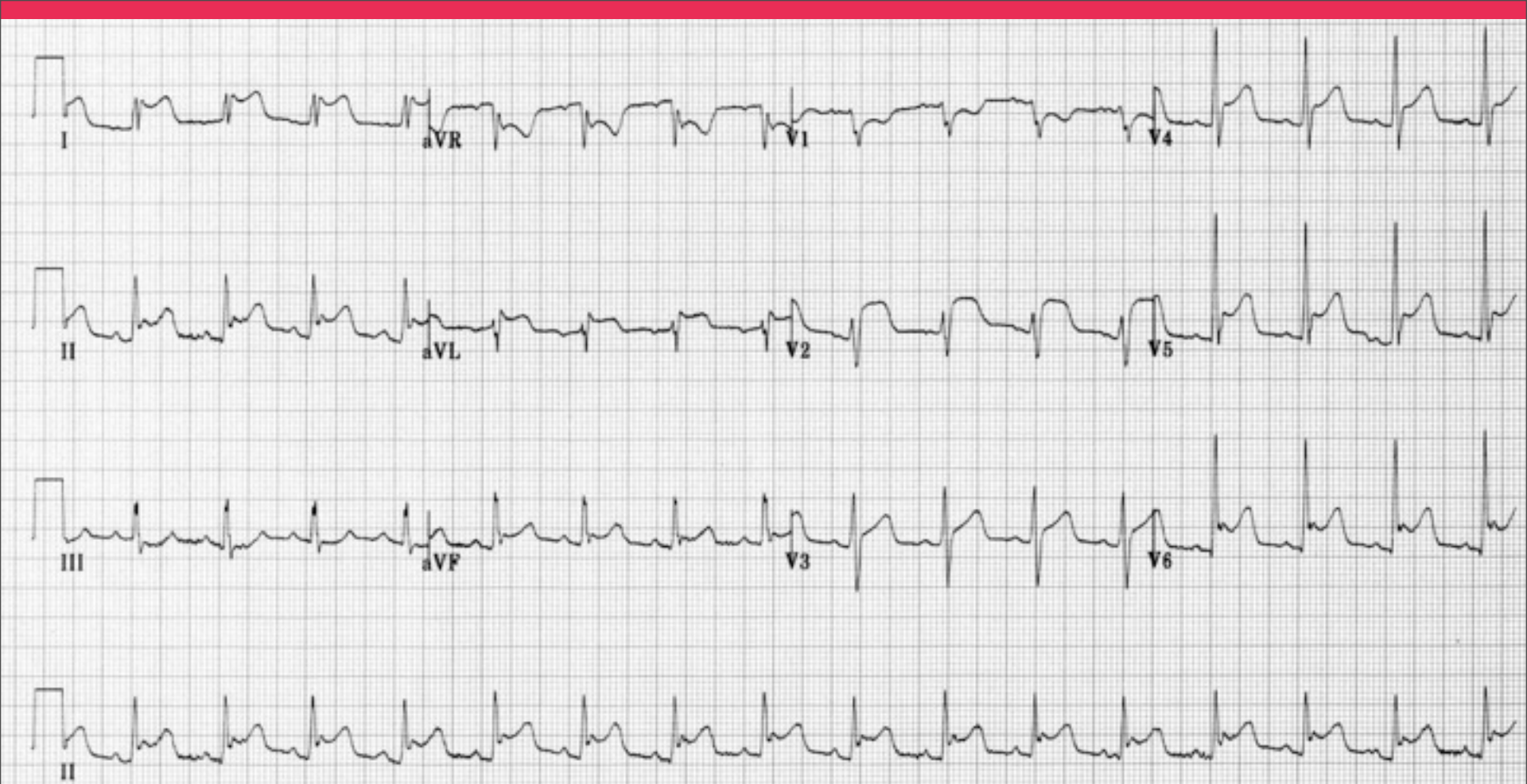








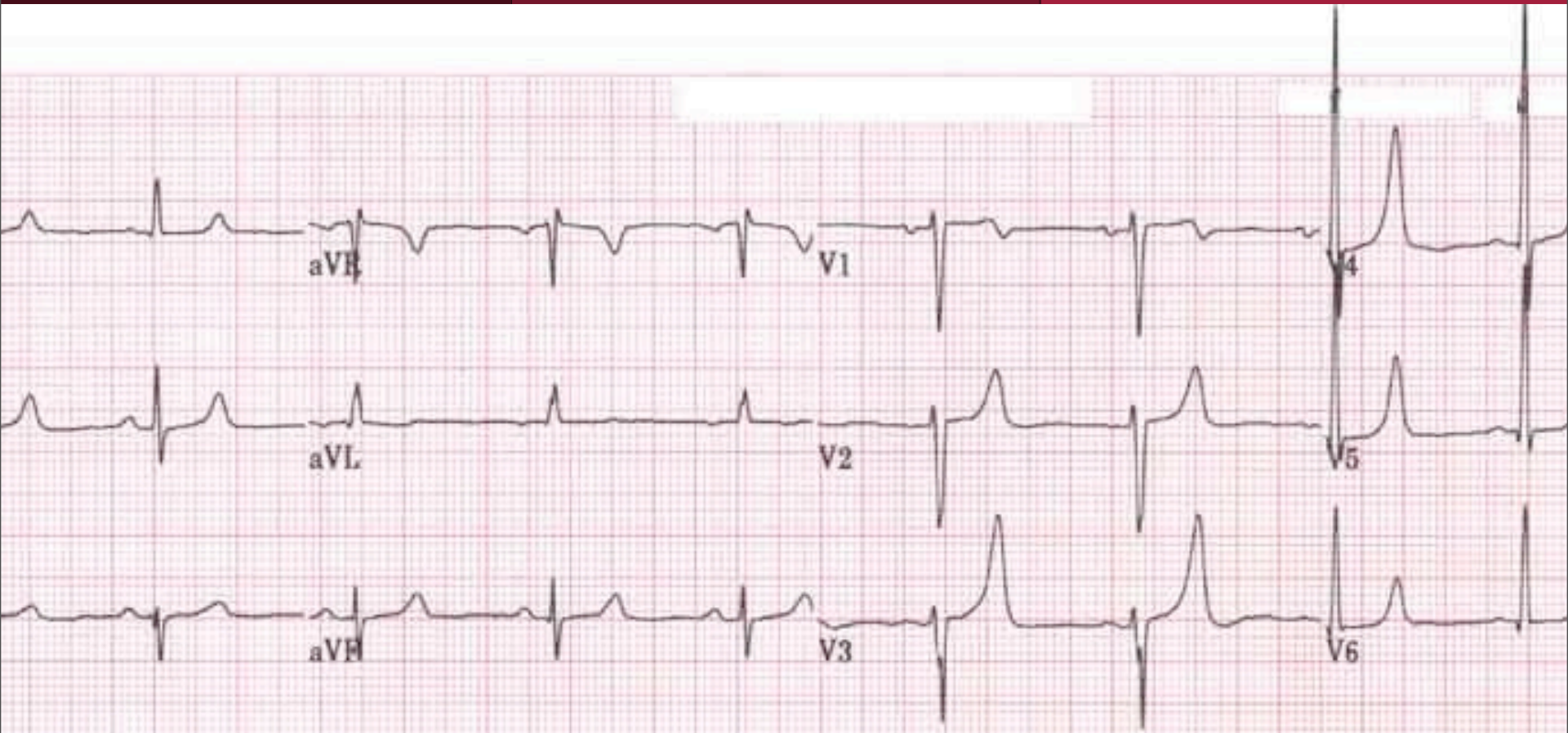








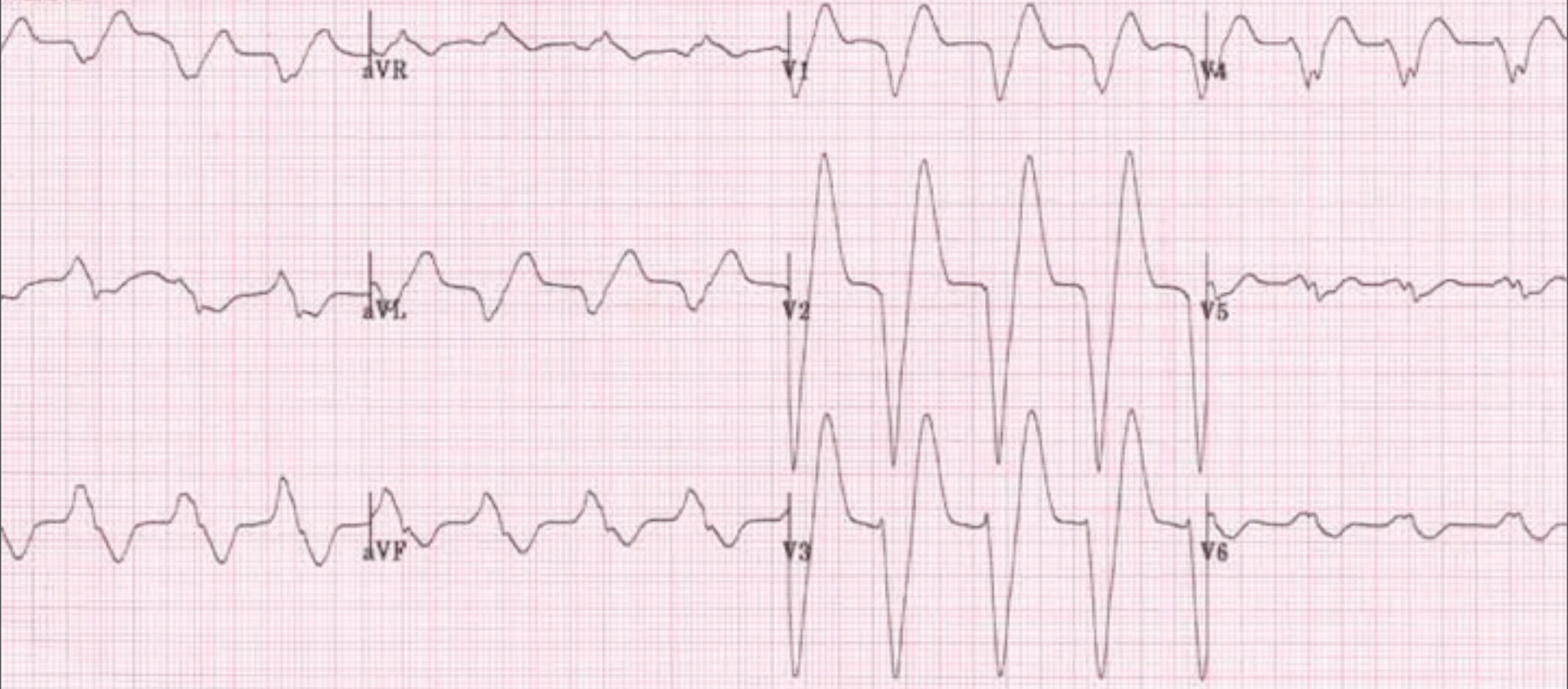








MEDU



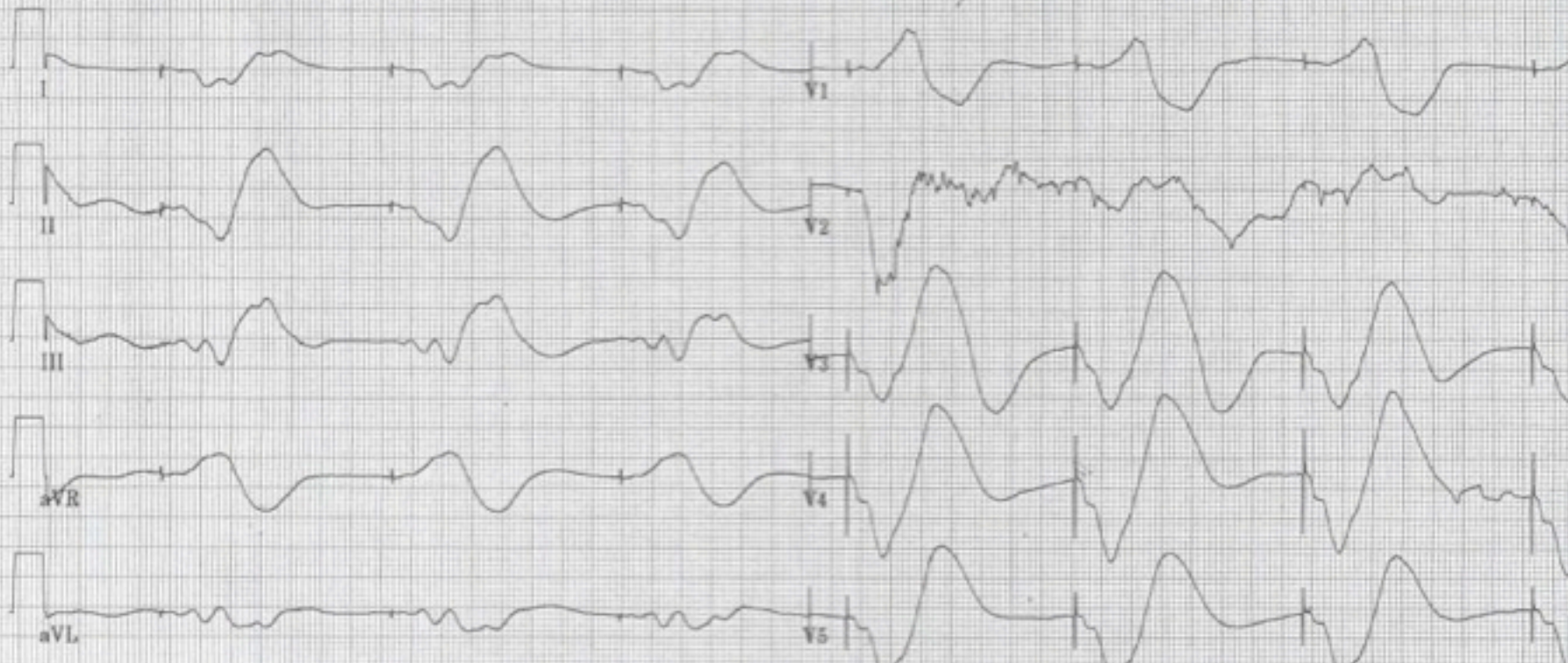






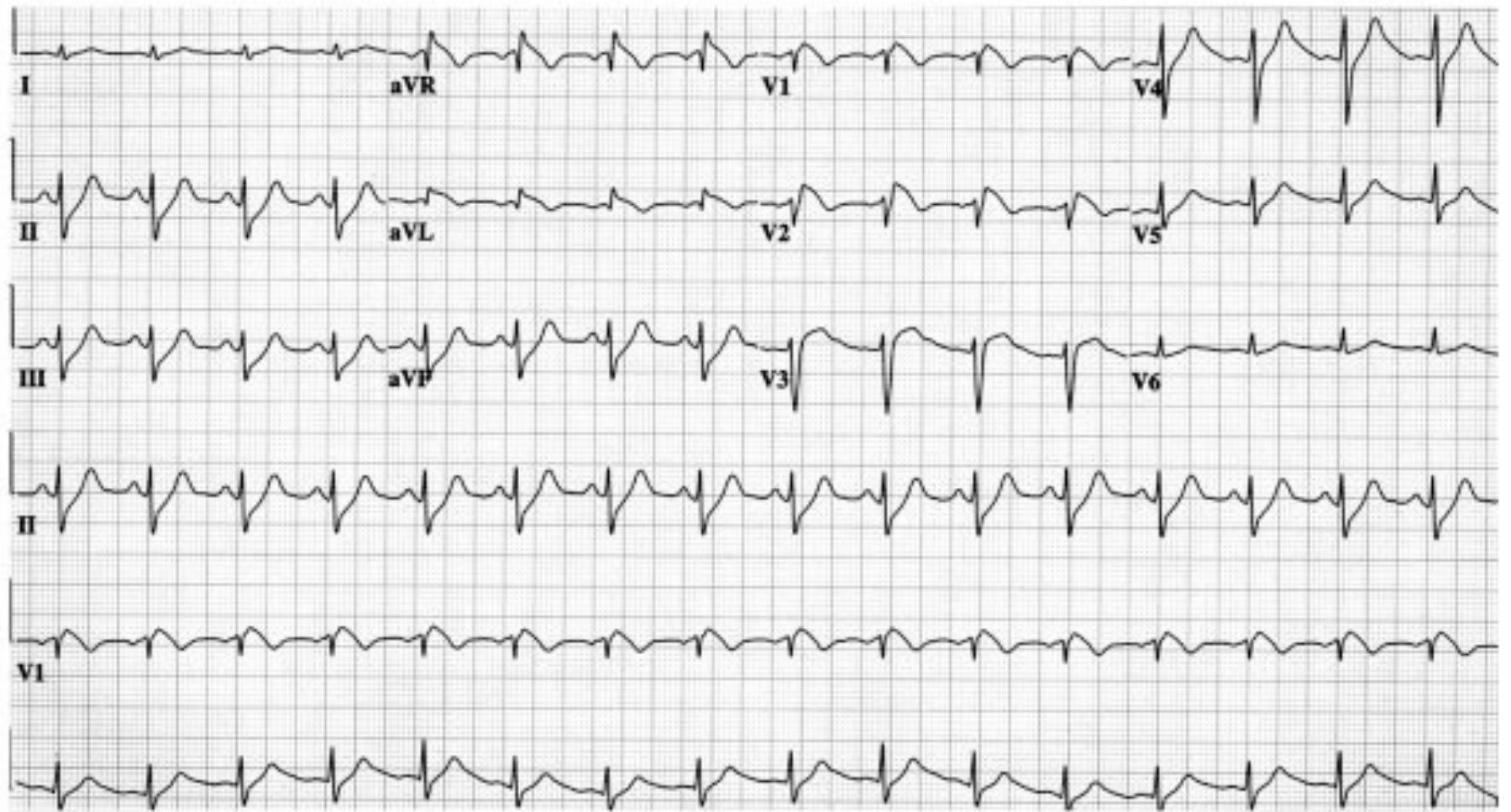
STAT/SCHED: 1

PRE/POSTOP













Referred by: HEART FAILURE

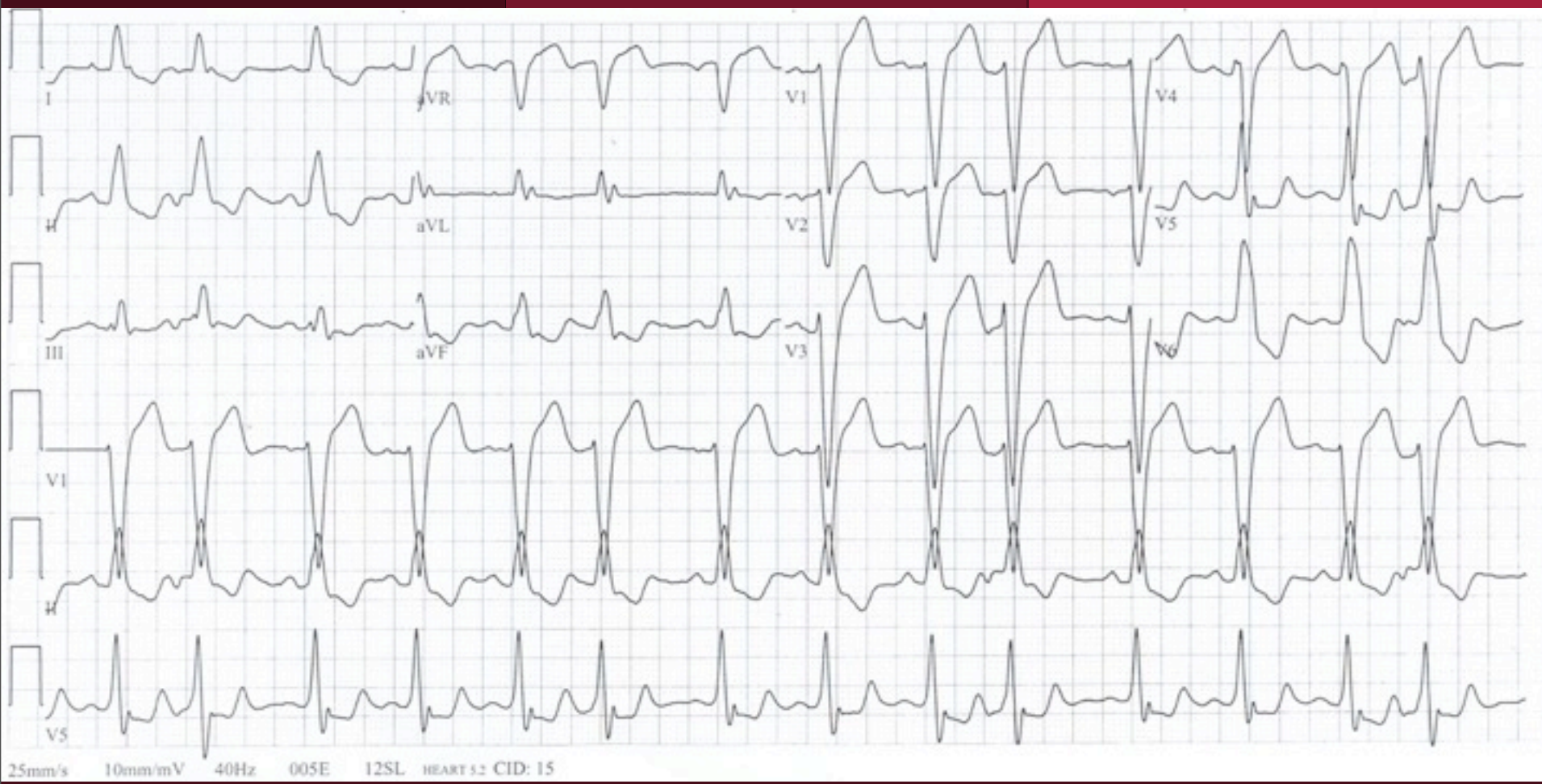
Unconfirmed





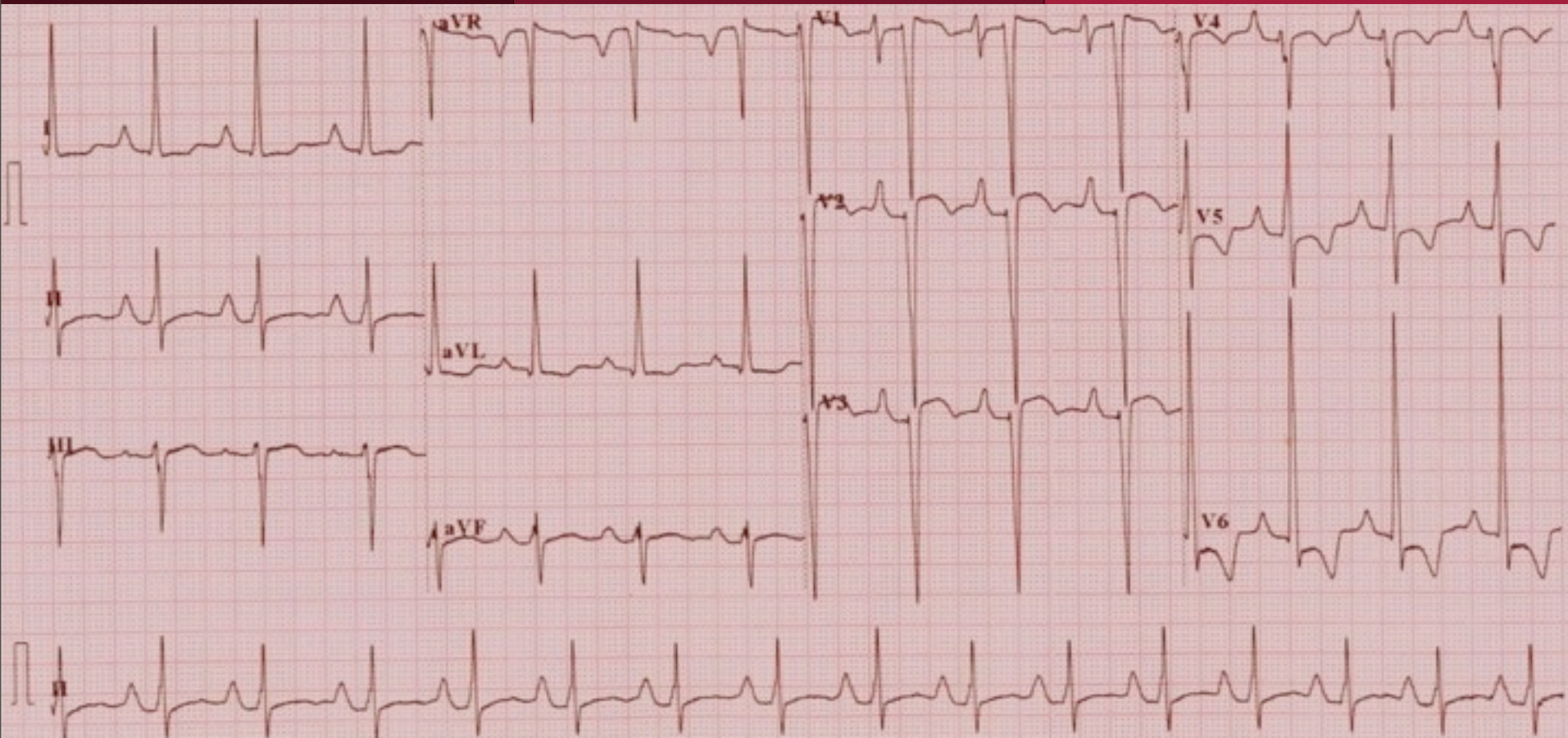
















# How to read a rhythm strip

1. Is there any electrical activity?
2. What is the ventricular (QRS) rate?
3. Is the QRS rhythm regular or irregular?
4. Is the QRS width normal or broad?
5. Is atrial activity present?  
(If so, what is it? P waves? Other atrial activity?)
6. How is atrial activity related to ventricular activity?



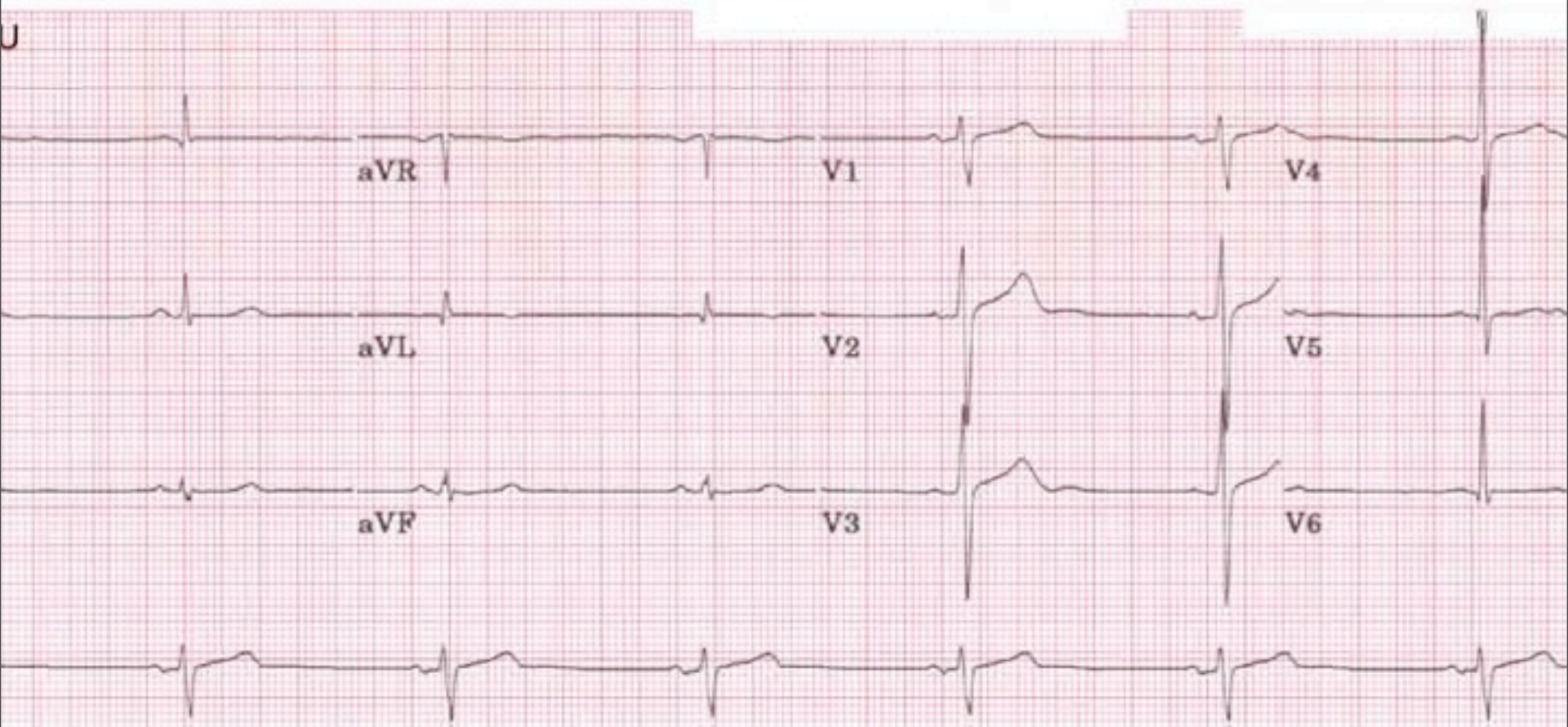




**(bradyarrythmias)**



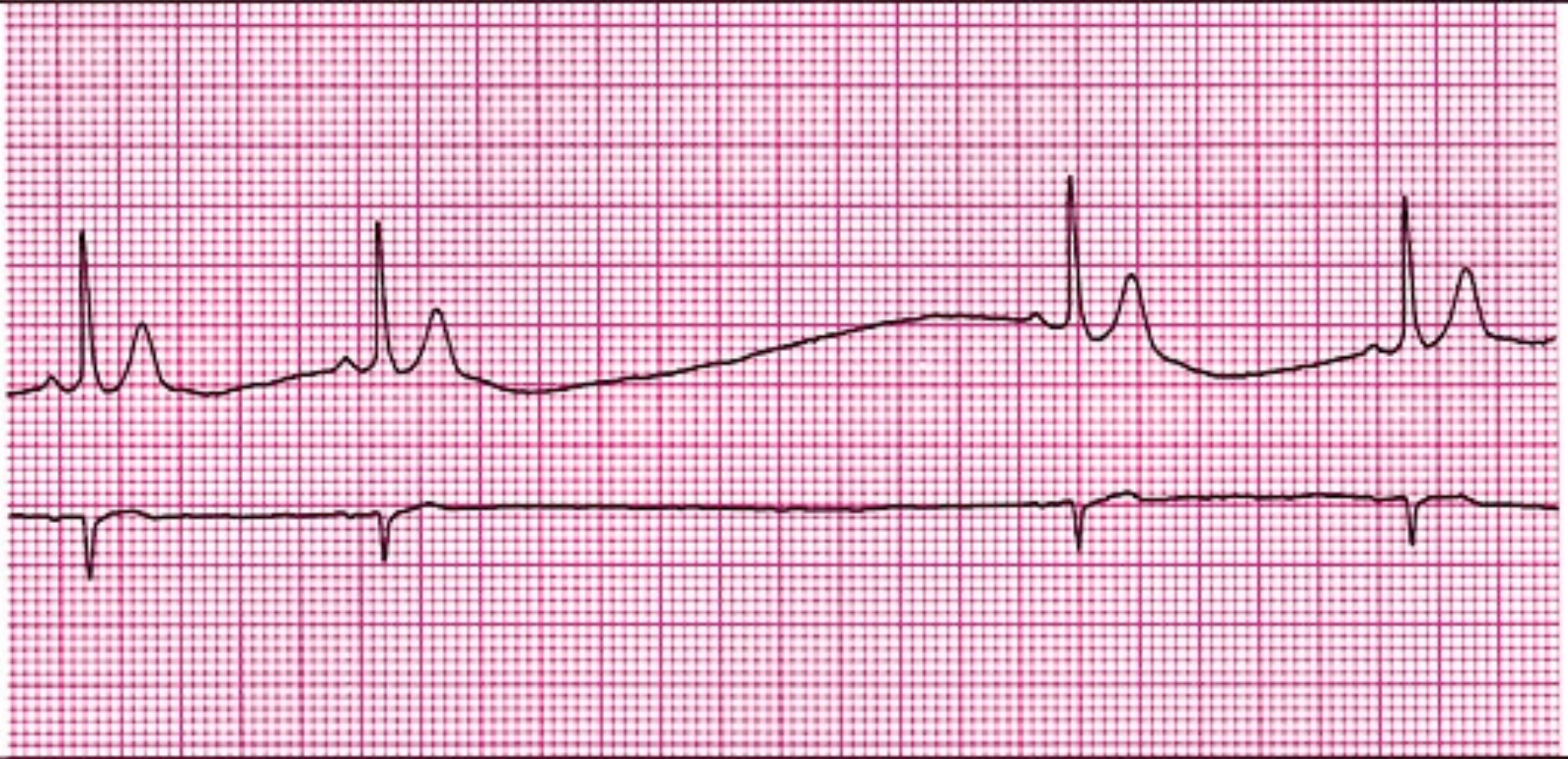






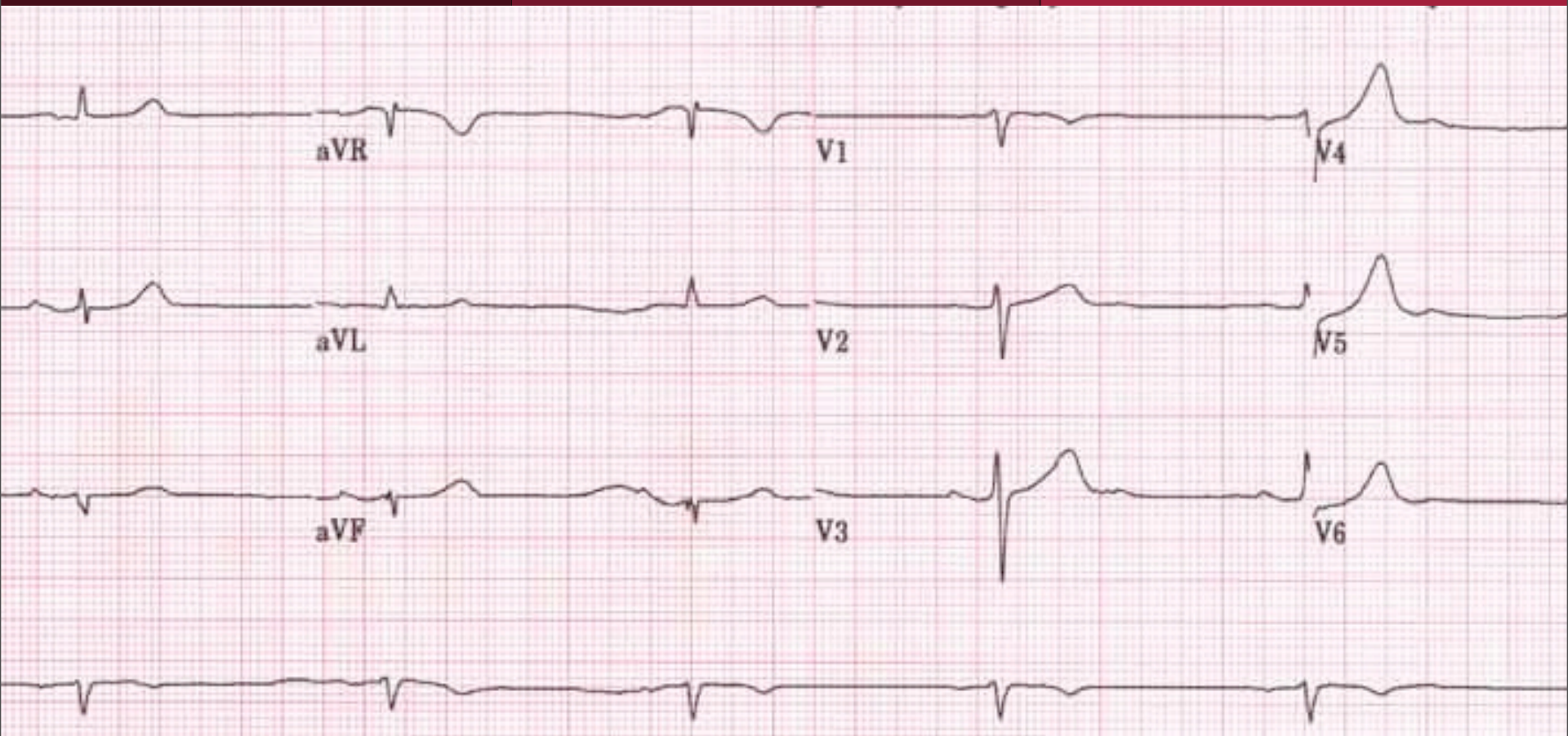










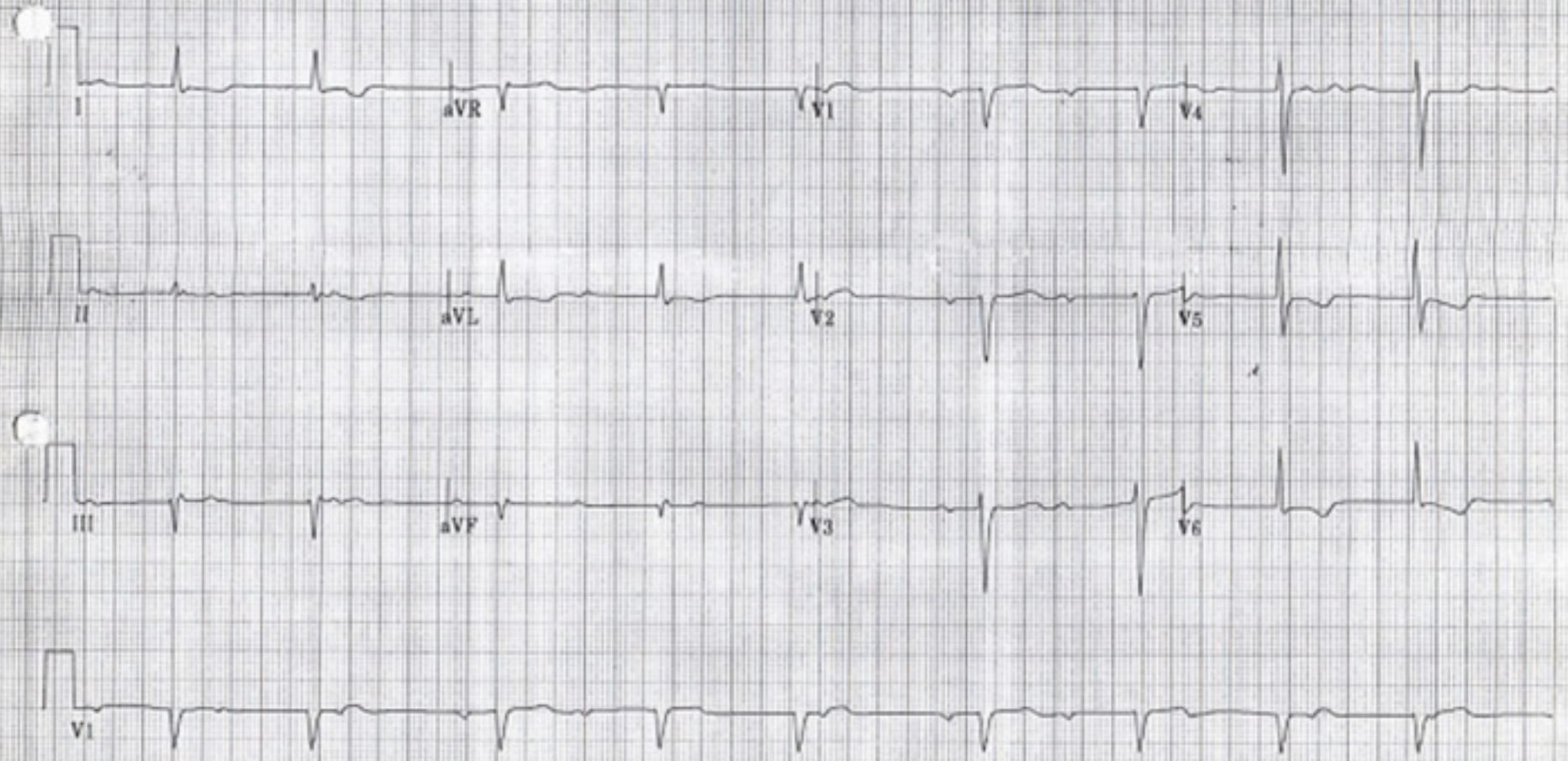






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Unconfirmed



100 Hz 25.0 mm/s 10.0 mm/mV  
Universal

marquette electronics, inc | 4 by 2.5s + 1 rhythm ld

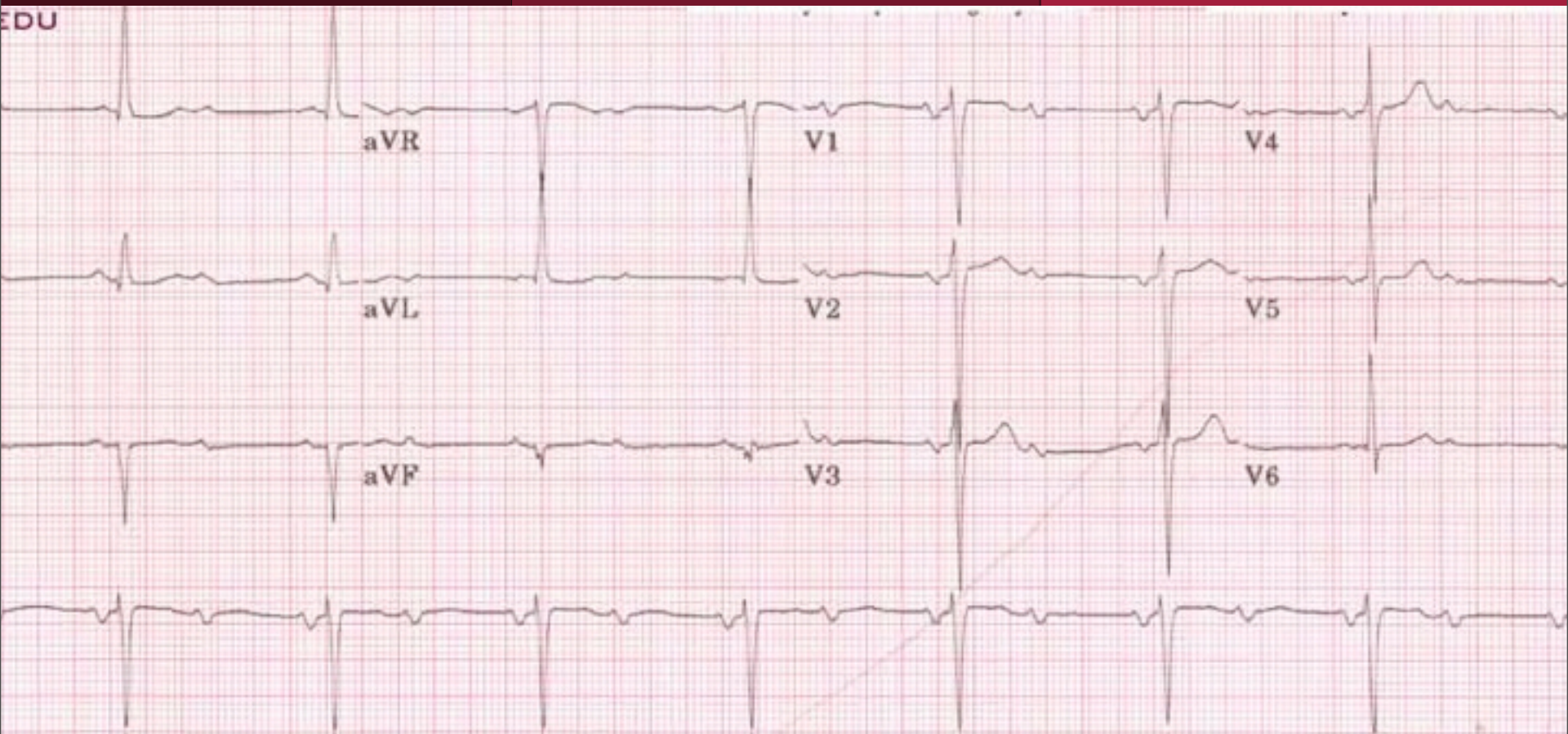
Jupiter, Florida U.S.A. MAC5K 003A

II 12SL™ v229



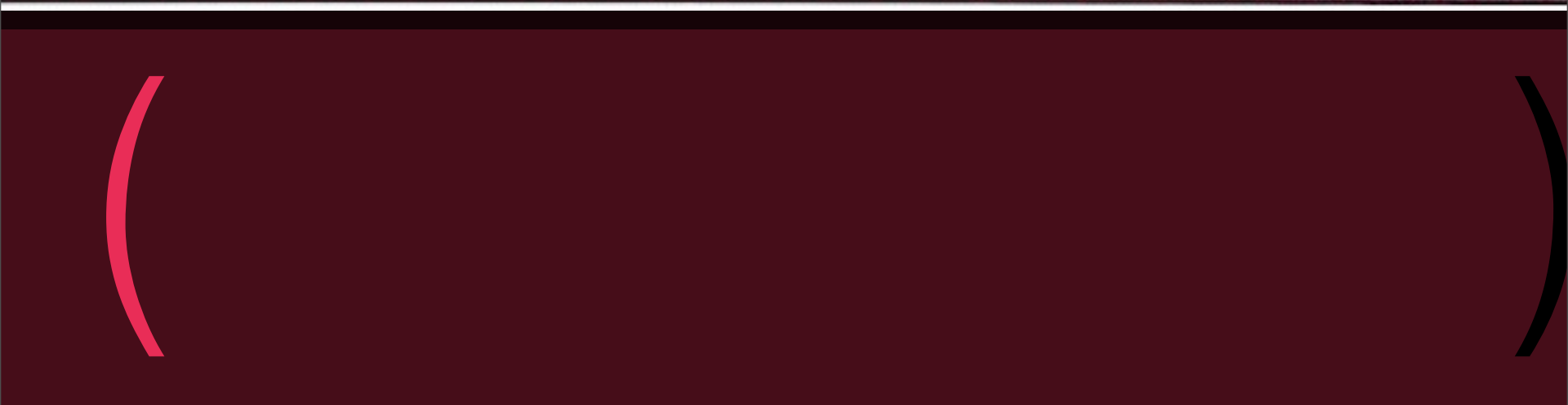
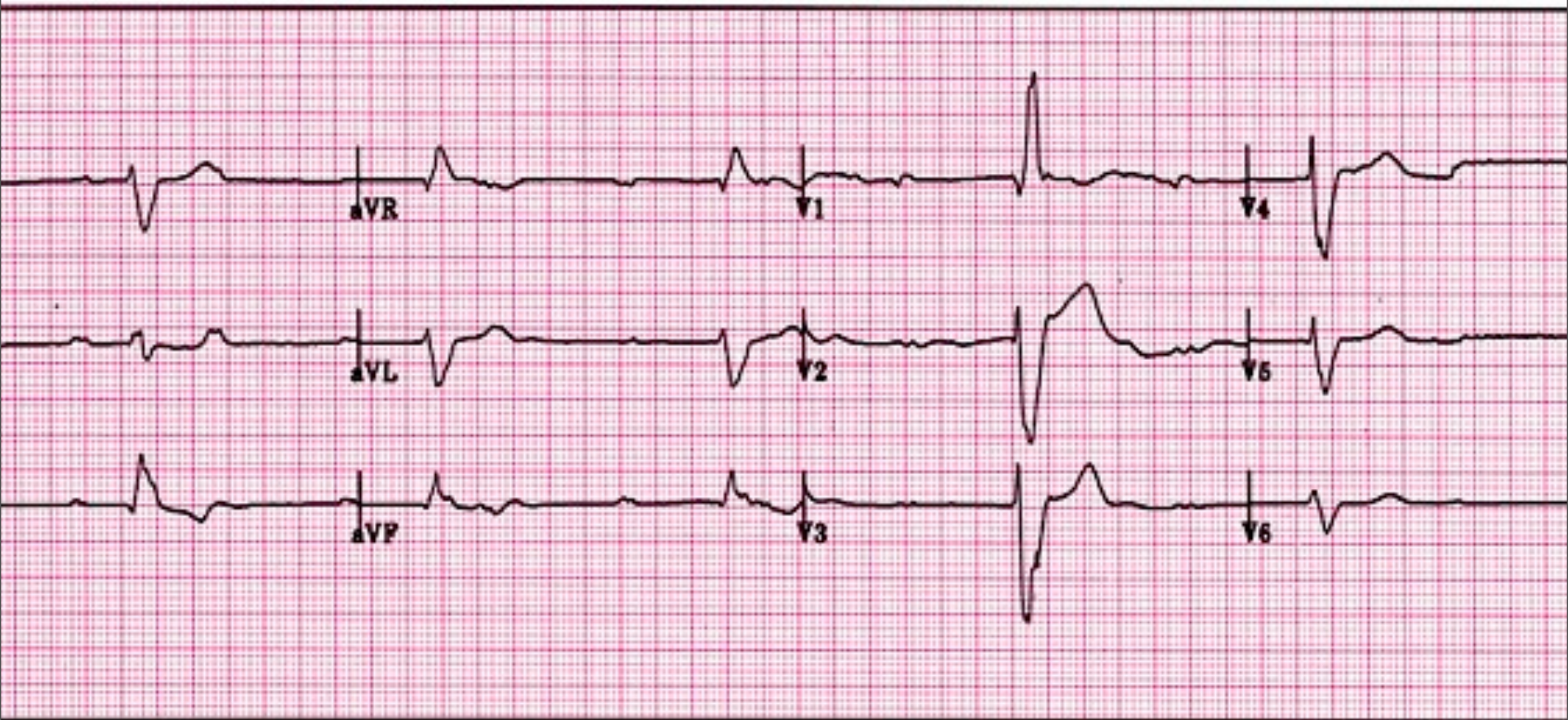






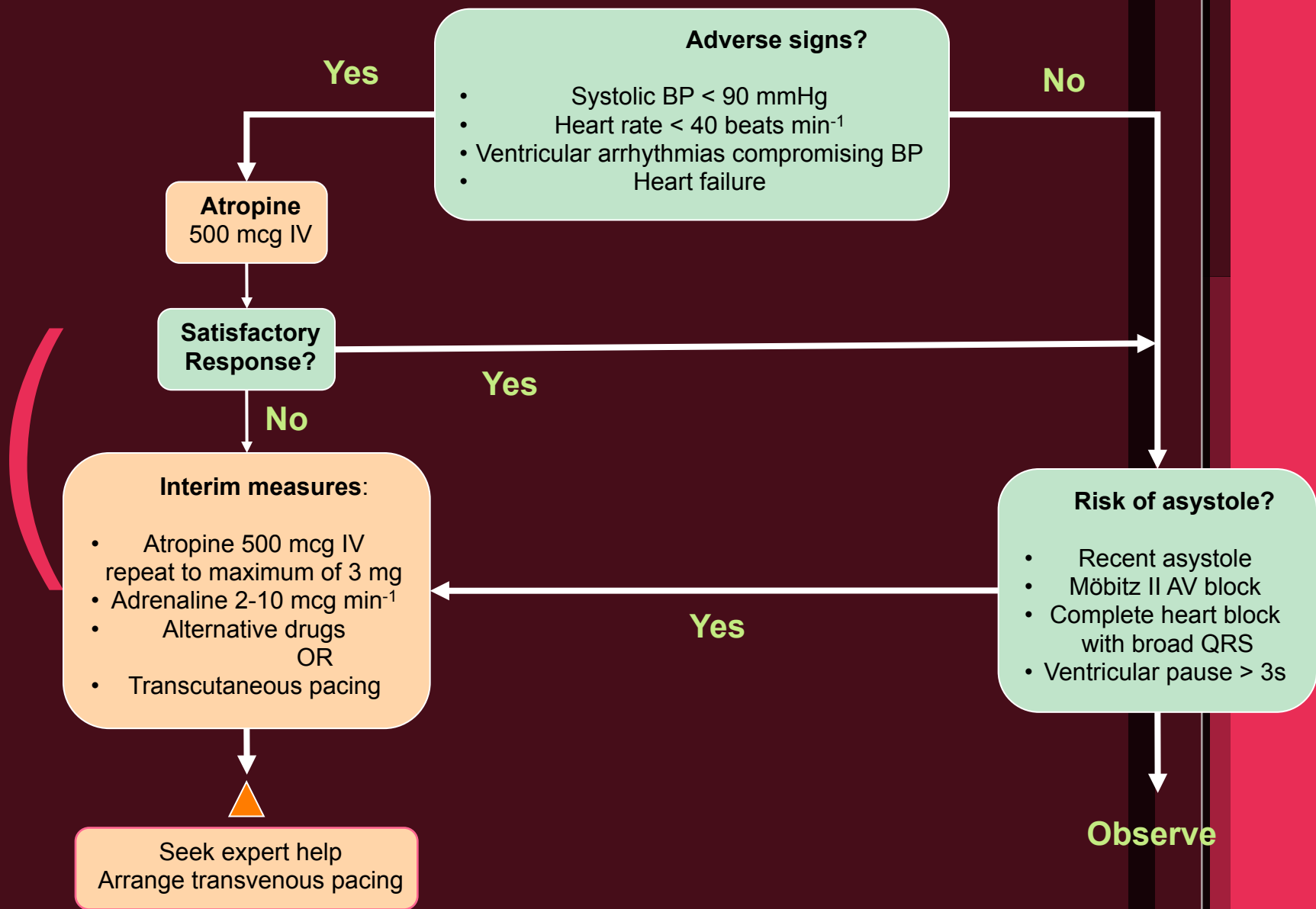


















**tachyarrythmias**



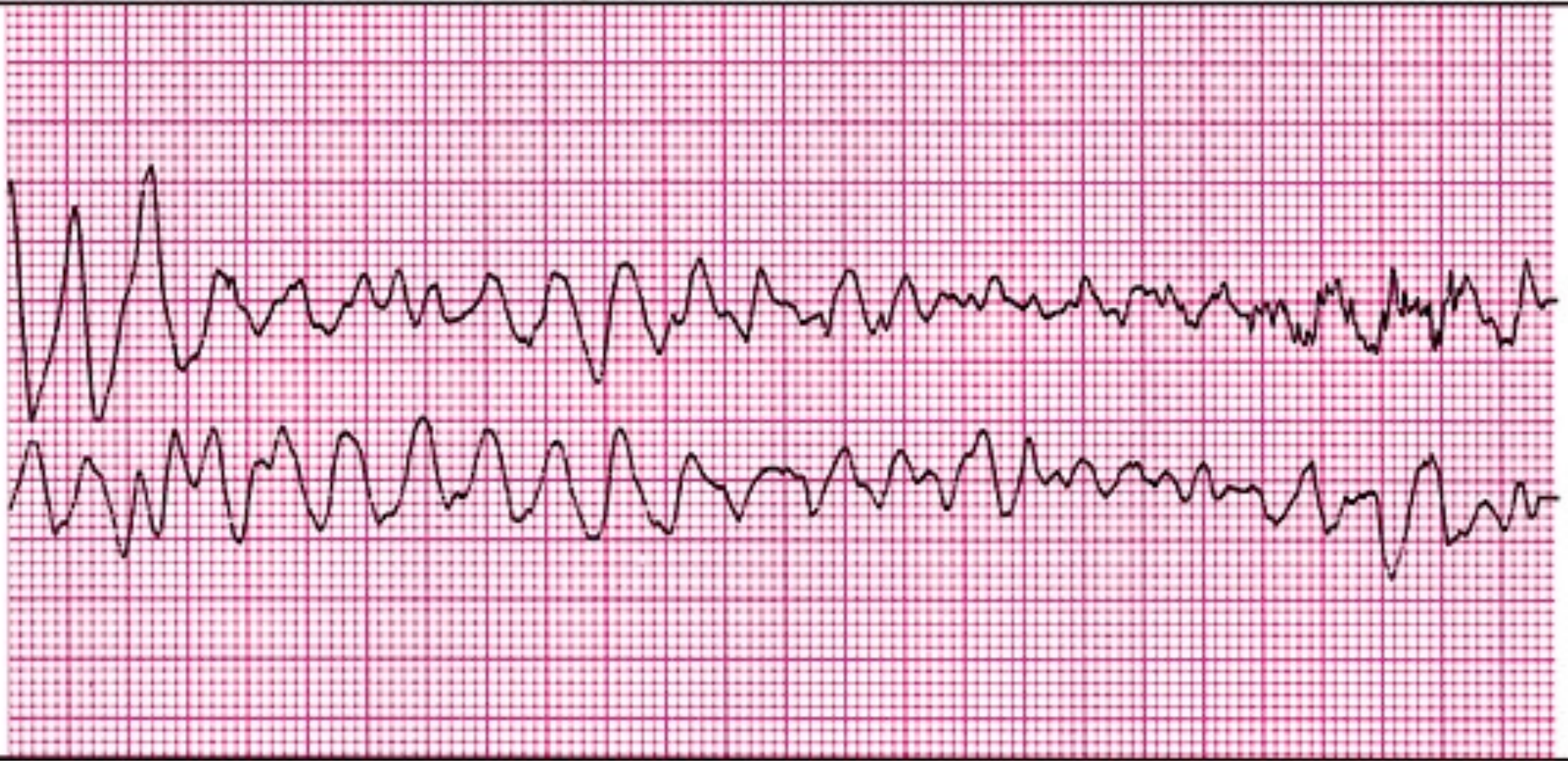






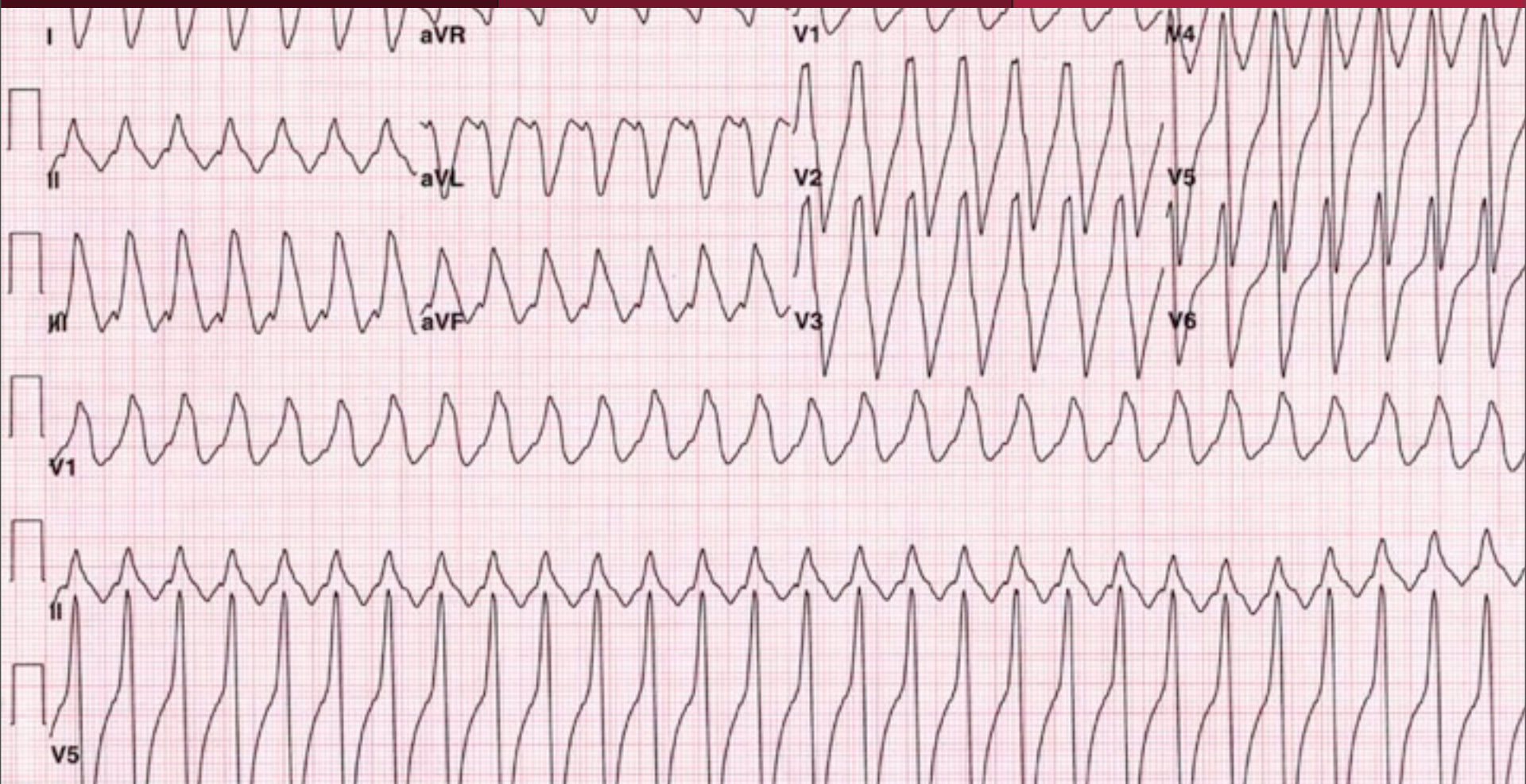






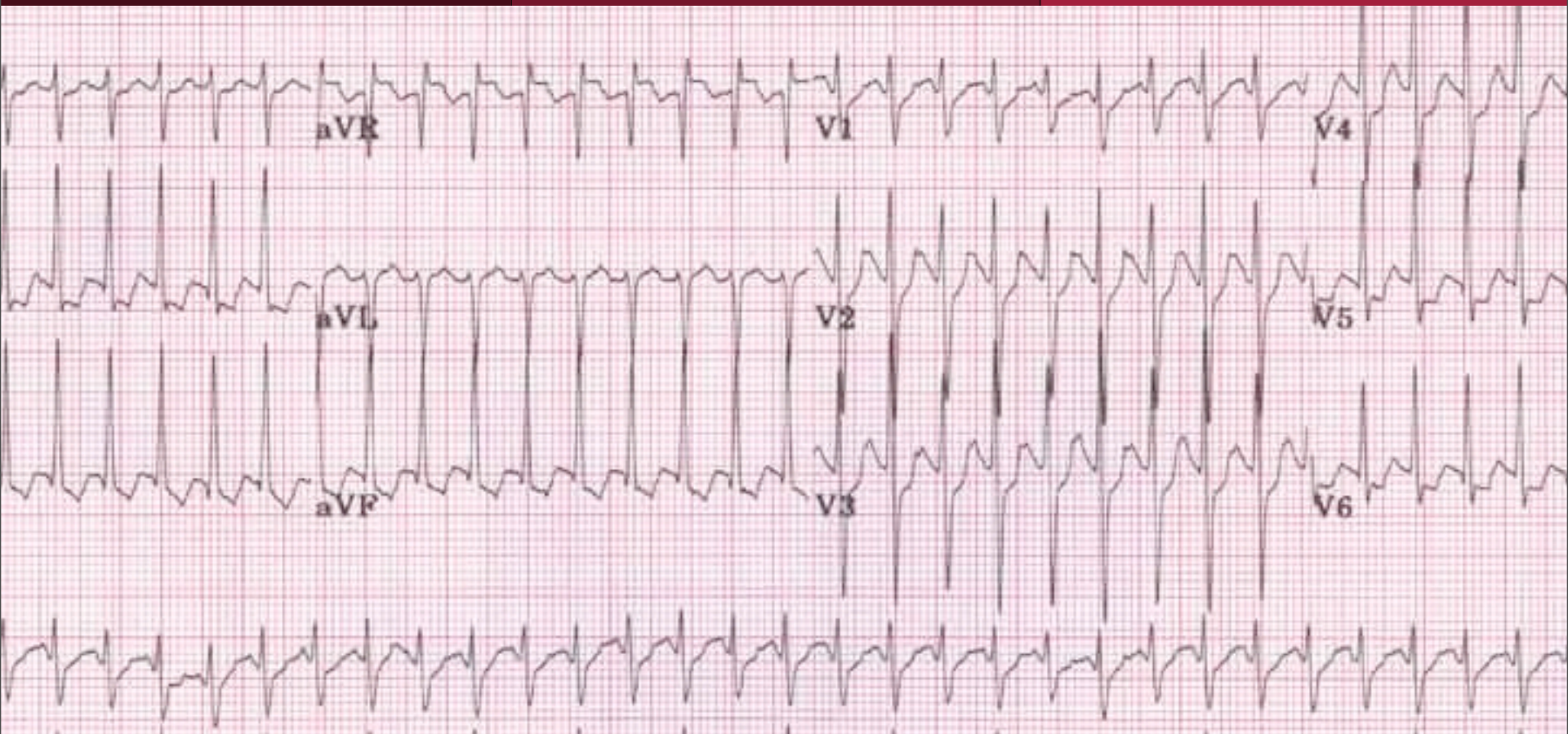








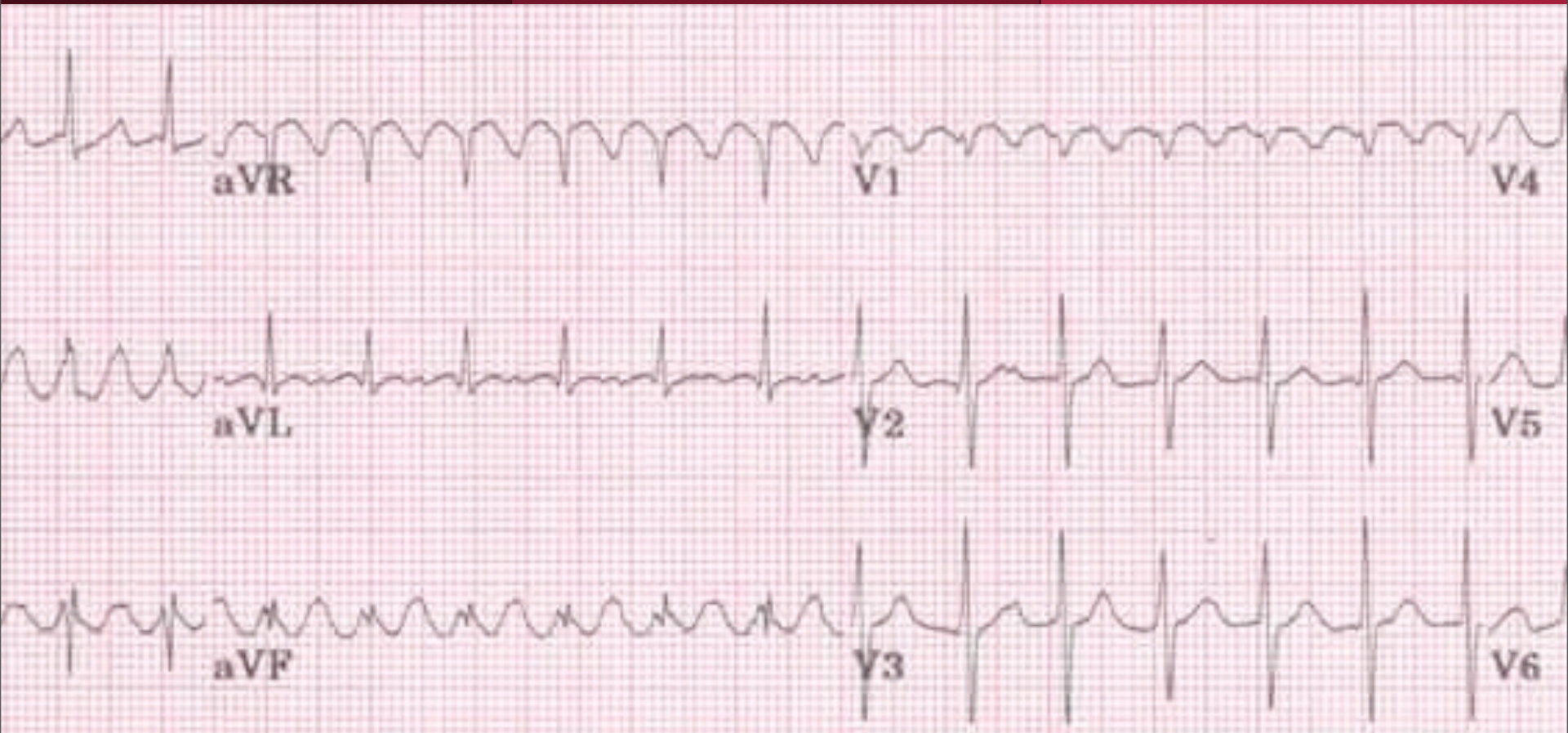






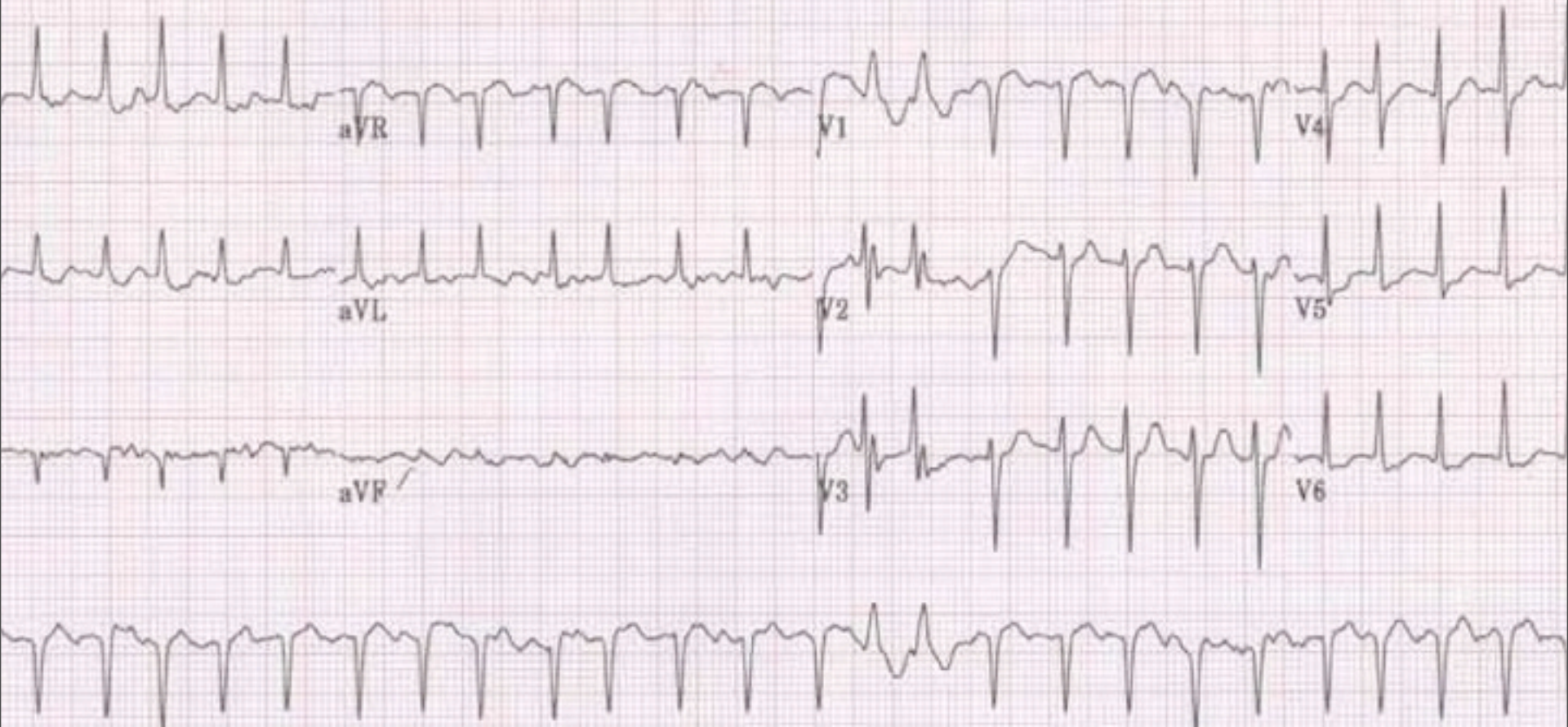
















# Tachycardia Algorithm (with pulse)

- Support ABCs: give oxygen; cannulate a vein
- Monitor ECG, BP, SpO<sub>2</sub>
- Record 12-lead if possible, if not record rhythm strip
- Identify and treat reversible causes (e.g. electrolyte abnormalities)

**Is patient stable?**  
 Signs of instability include:  
 1. Reduced conscious level 2. Chest pain  
 3. Systolic BP < 90 mmHg 4. Heart failure  
 (Rate related symptoms uncommon at less than 150 beats min<sup>-1</sup>)

**Synchronised DC Shock\***  
 Up to 3 attempts

- Amiodarone 300 mg IV over 10-20 min and repeat shock; followed by:
- Amiodarone 900 mg over 24 h

**Is QRS narrow (< 0.12 sec)?**

**Broad QRS**  
 Is QRS regular?

**Narrow QRS**  
 Is rhythm regular?

**Irregular**

**Seek expert help**

Possibilities include:

- **AF with bundle branch block** treat as for narrow complex
- **Pre-excited AF** consider amiodarone
- **Polymorphic VT (e.g. torsade de pointes - give magnesium 2 g over 10 min)**

**Regular**

If **Ventricular Tachycardia** (or uncertain rhythm):

- Amiodarone 300 mg IV over 20-60 min; then 900 mg over 24 h

If previously confirmed **SVT with bundle branch block**:

- Give adenosine as for regular narrow complex tachycardia

**Regular**

- Use vagal manoeuvres
- Adenosine 6 mg rapid IV bolus; if unsuccessful give further 12 mg.
- Monitor ECG continuously

Normal sinus rhythm restored

**Yes**

Probable **re-entry PSVT**:

- Record 12-lead ECG in sinus rhythm
- If recurs, give adenosine again & consider choice of anti-arrhythmic prophylaxis

**Irregular**

**Irregular Narrow Complex Tachycardia**  
 Probable **atrial fibrillation**  
 Control rate with:

- β-Blocker IV or digoxin IV
- If onset < 48 h consider: Amiodarone 300 mg IV 20-60 min; then 900 mg over 24 h

**Seek expert help**

Possible **atrial flutter**

- Control rate (e.g. β-Blocker)

\*Attempted electrical cardioversion is always undertaken under sedation or general anaesthesia







Questions?

