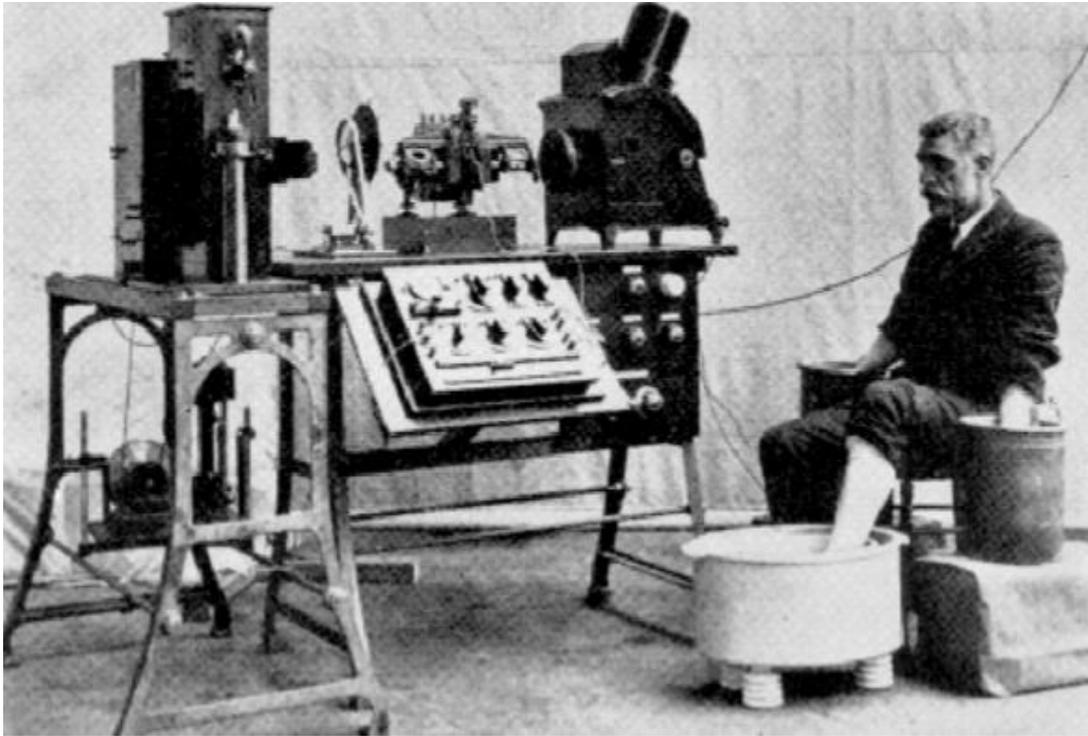
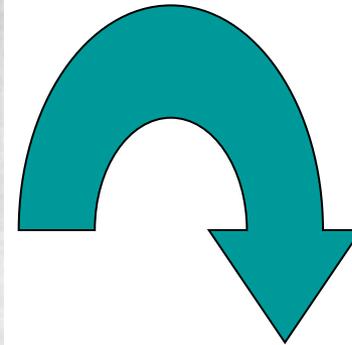

ECGs

By Jen Middleton, Cardiology SpR



Einthoven ECG machine manufactured in 1911



Today's ECG machine

Aims and Objectives

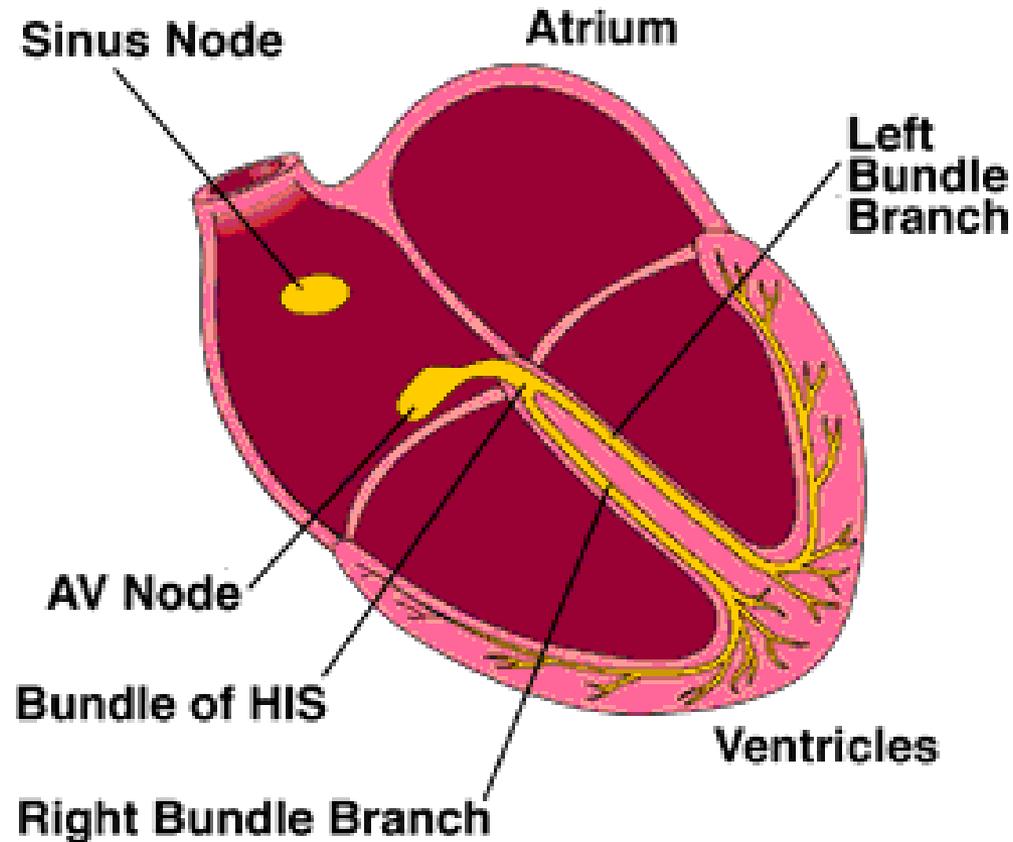
- Be aware of the normal conduction of the heart
 - Understand what a normal ECG looks like
 - Be able to systematically read an ECG and pick up any abnormalities.
-

Rules for reading ECG's

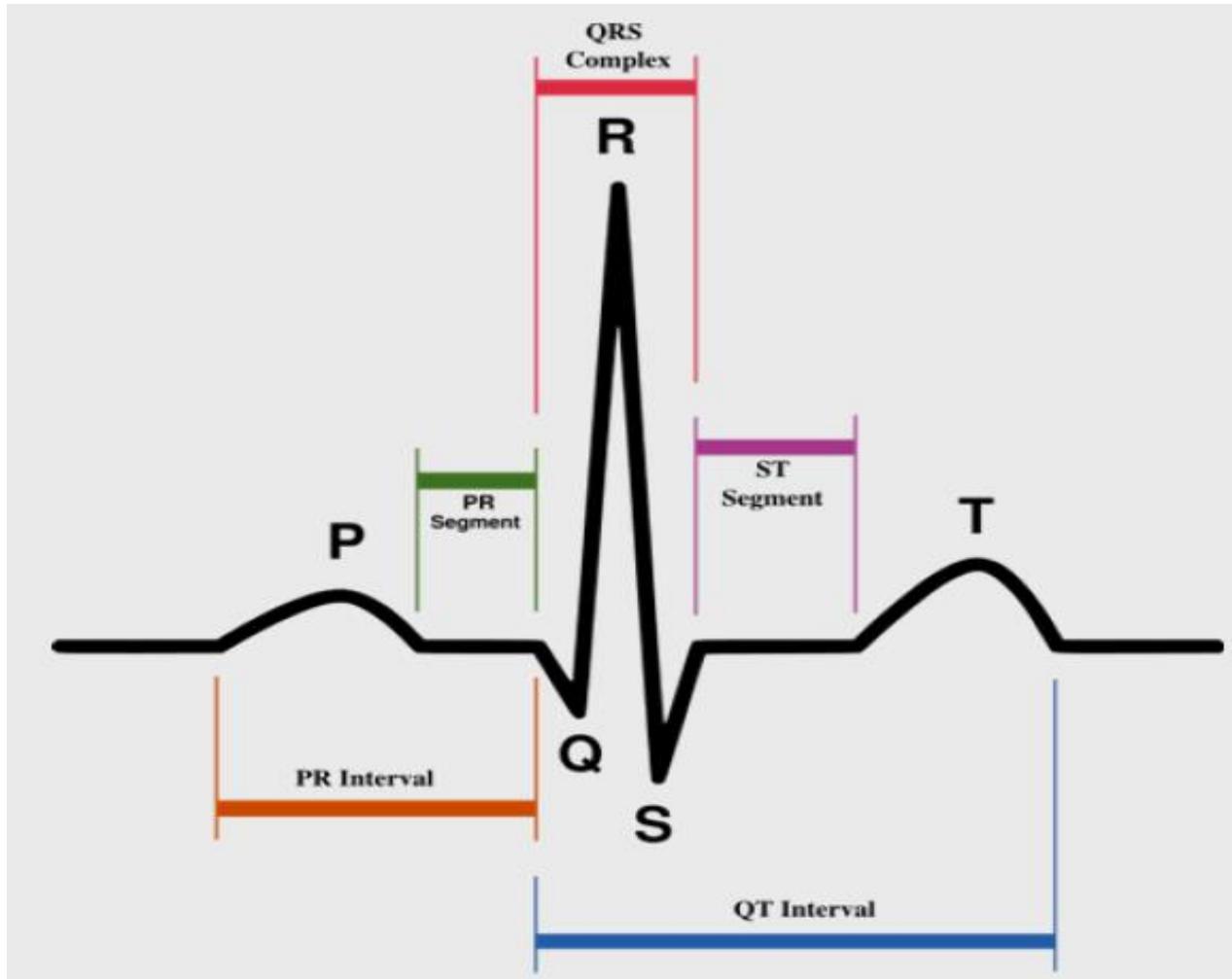


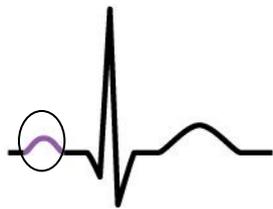
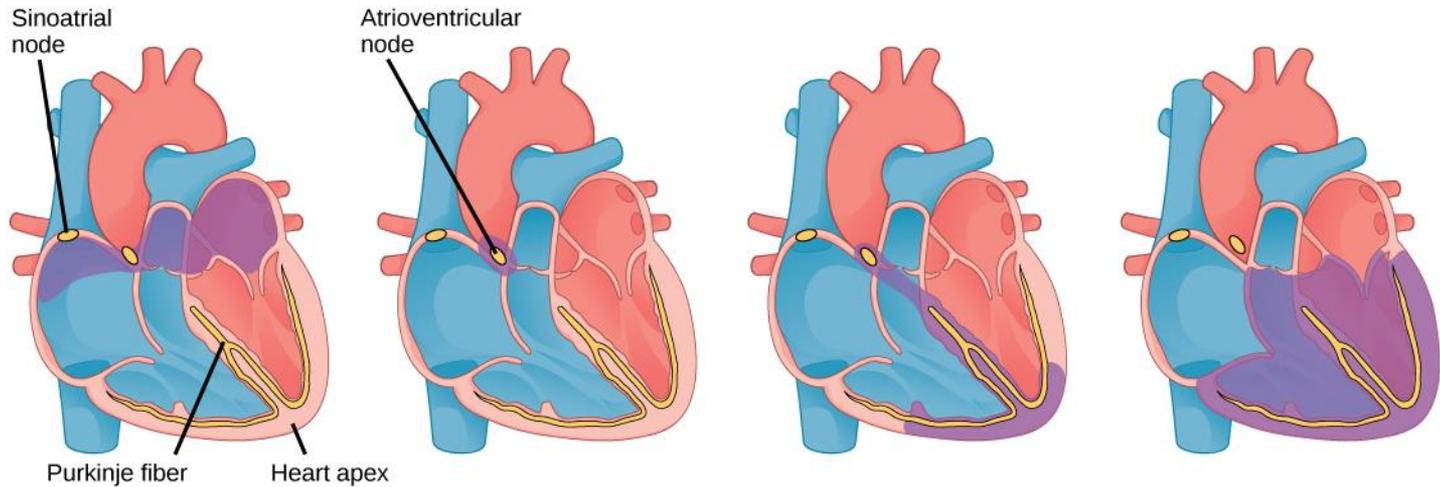
- **DON'T PANIC!!!**
 - Be systematic, pick a routine for reading ECGs and stick to it.
 - Practice, practice, practice
 - Ask if you're stuck
 - Best way to be tell if an ECG is abnormal is to be able to easily recognise a 'normal' ECG.
-

Conducting system of the heart

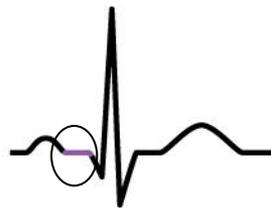


The ECG

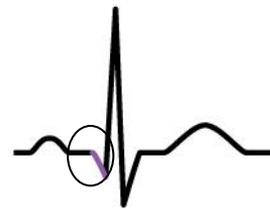




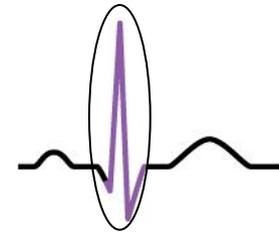
(a) An electrical impulse travels from the sinoatrial node to the walls of the atria, causing them to contract.



(b) The impulse reaches the atrioventricular node, which delays it by about 0.1 second.



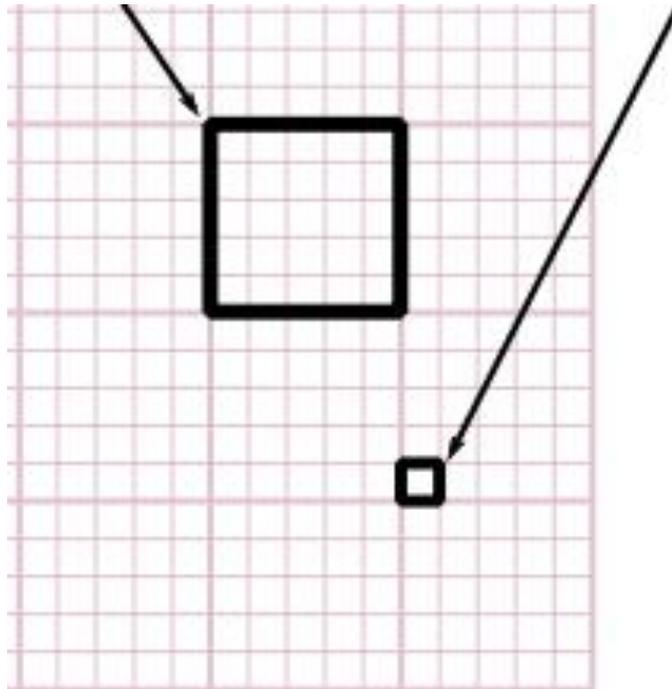
(c) Bundle branches carry signals from the atrioventricular node to the heart apex.



(d) The signal spreads through the ventricle walls, causing them to contract.

Big square = 200ms

Little square = 40ms



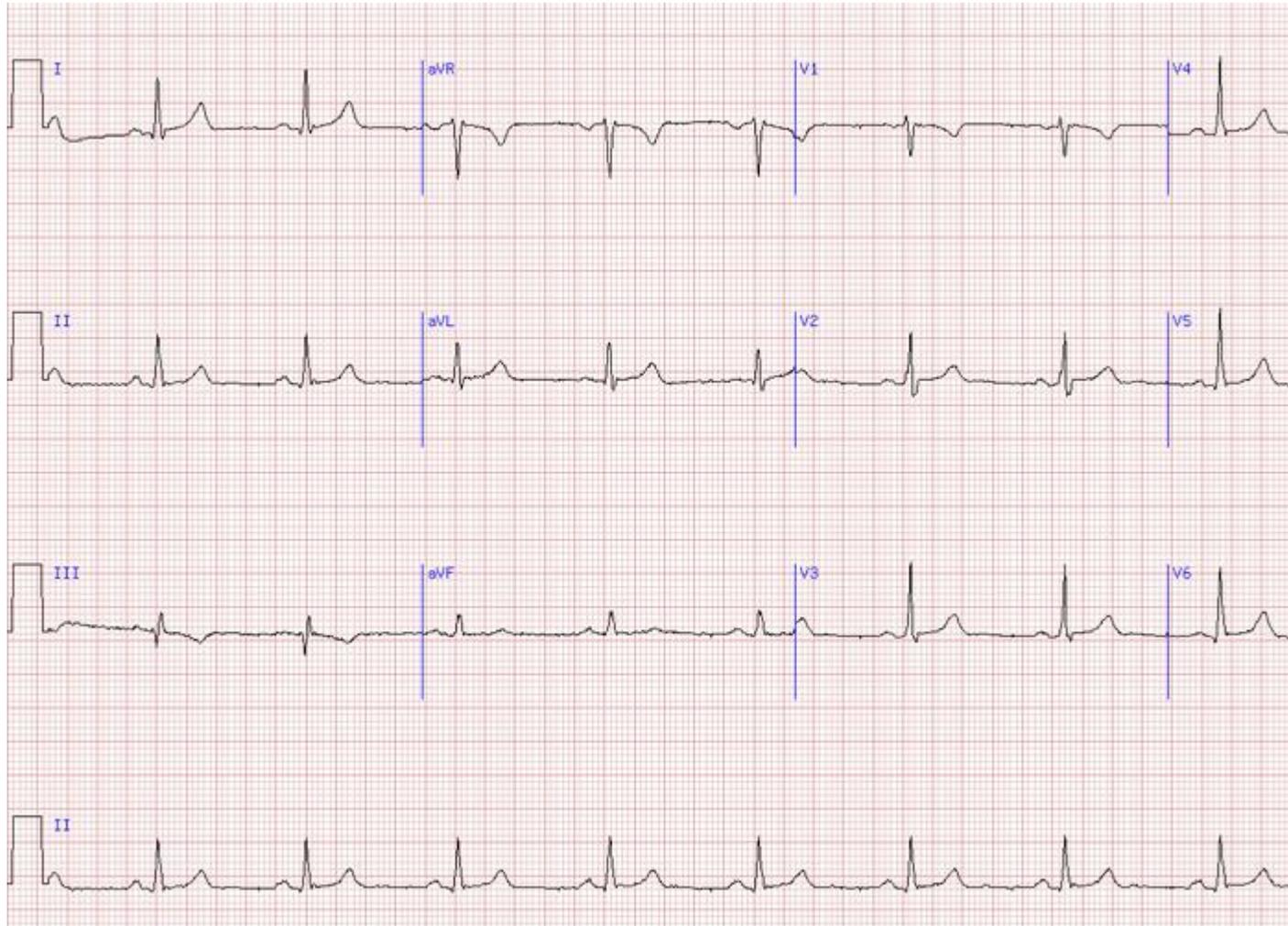
Normal values

- Rate 60-100 bpm
 - PR interval 120-200ms (3-5 small squares)
 - QRS duration <120ms (3 small squares)
 - QTc interval <440ms men/ 460ms women
-

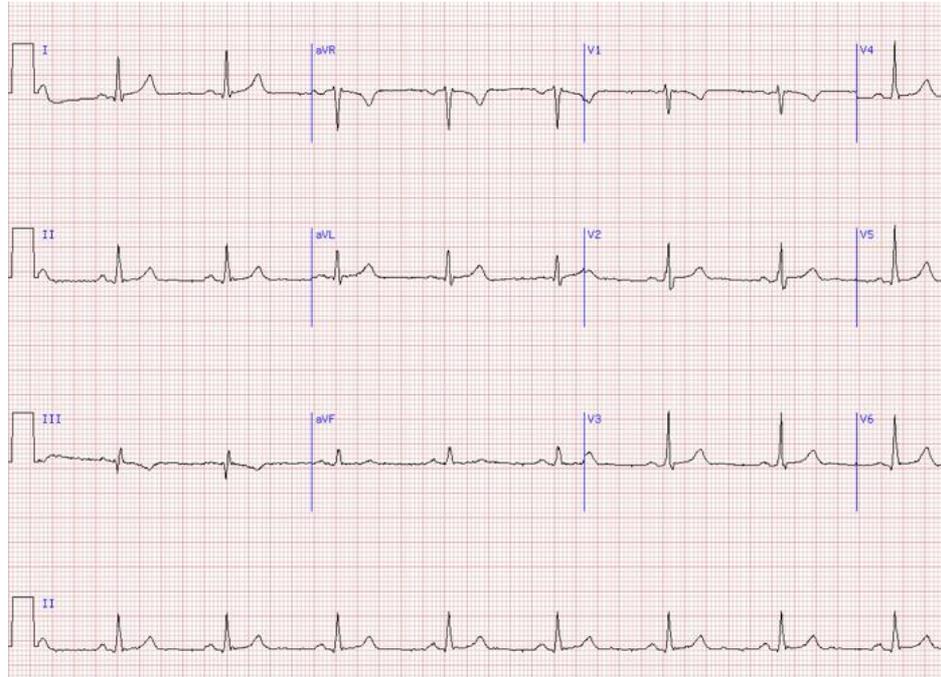
How to read an ECG

- Identifying features eg patient's name
 - Rate ($300 / \text{number of big squares between QRS complexes or number QRS complexes} \times 10$)
 - Rhythm (is each p wave followed by a QRS/ is it in a regular pattern)
 - Then take each part in turn: P/PR/QRS (width/height)/ ST/T/QT
-

Rhythm



Normal Sinus Rhythm



- Rate 60bpm
- Rhythm NSR
- No other abnormalities

Rate

- 1. Fast (Sinus tachycardia $>100\text{bpm}$)



- 2. Slow (Sinus bradycardia $<60\text{bpm}$)



Tachycardias

Unstable:

- Reduced GCS
- Systolic BP < 90
- Chest pain
- Heart failure

1. **Is the patient stable or unstable?**
 2. **If unstable seek help ? For synchronised cardioversion (DCCV)**
 3. **If stable is the rhythm broad or narrow (QRS < 3 small sq)?**
(broad originates from ventricles and is more serious, narrow from atria)
1. **Is the rhythm regular or irregular?**

****we are talking about patients with a pulse!!*

Broad complex tachycardia (with pulse)

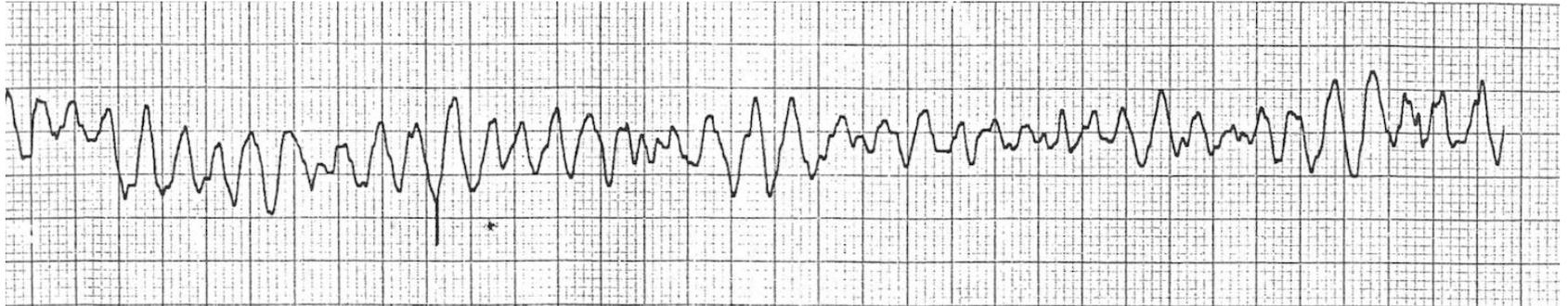
- Regular = Ventricular tachycardia (unless proven otherwise)



- Treatment: amiodarone/ bblockers
- (Irregular = do not worry about this for now!!!!!!)

Broad complex tachycardia (no pulse)

- Cardiac arrest :Follow ALS algorithm
- Regular and organised = VT like before
- Irregular, unorganised = Ventricular Fibrillation



60 year old man on telemetry on CCU

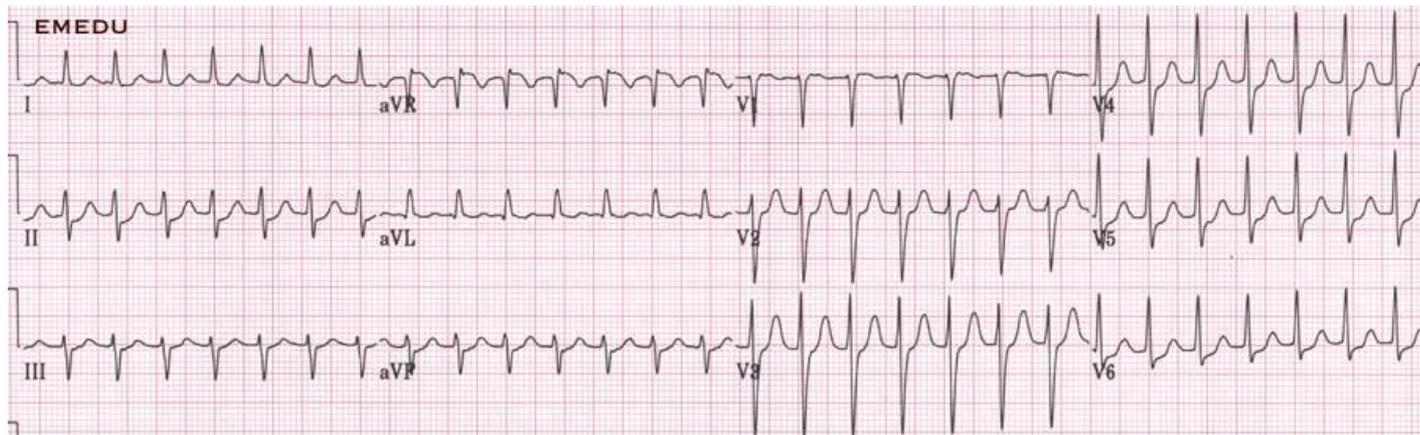
- He is sat up chatting with relatives
- Alarm buzzes and monitor prints this:



- What do you do?
-

Narrow Complex tachycardia

- Regular, no distinguishable p waves
- =Supraventricular tachycardia
- Treatment:
 1. Vagal manouvres (carotid sinus massage/ valsalva)
 2. Adenosine with ecg monitoring



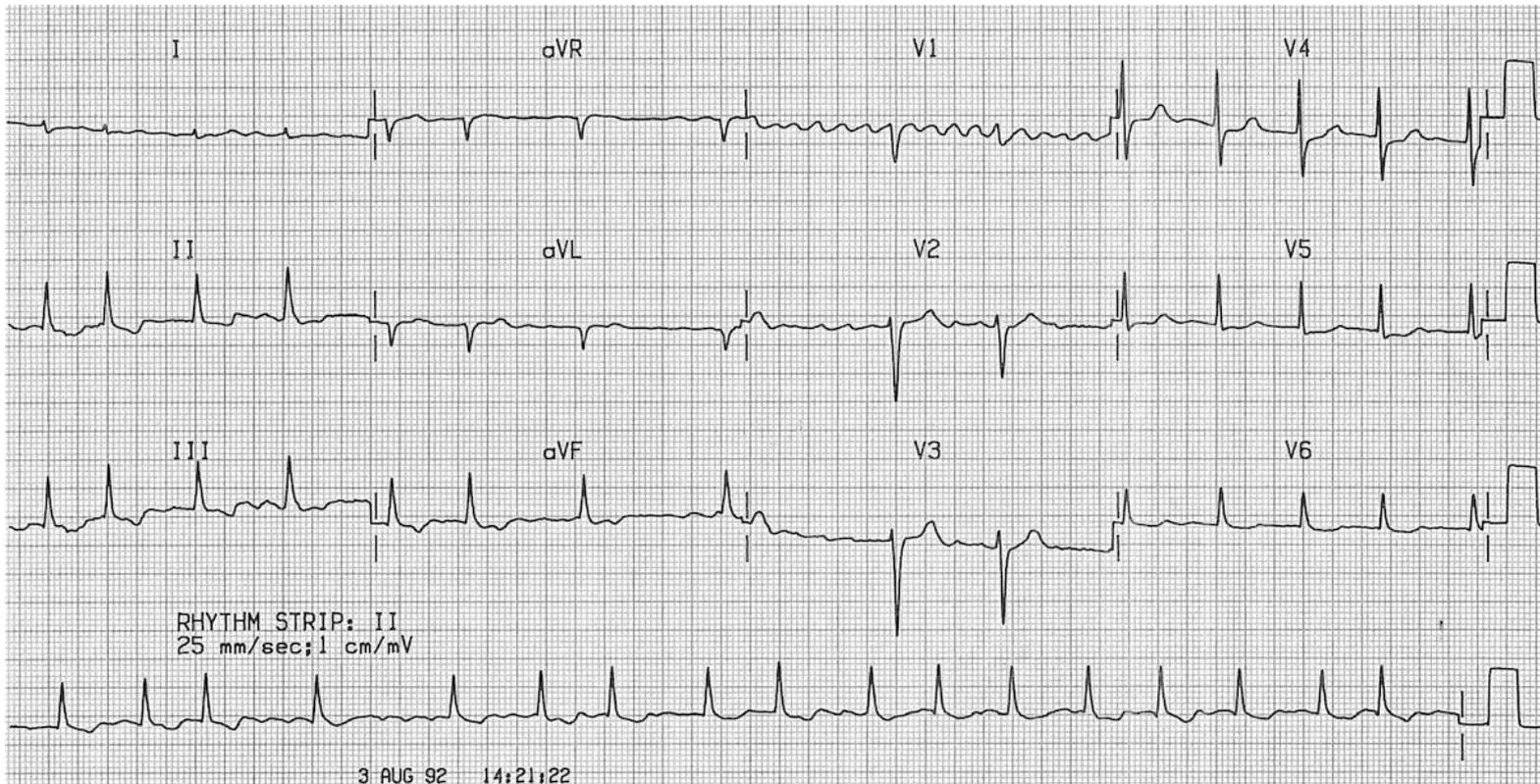
- If not successful seek senior help ? Atrial flutter (tends to be 150bpm)



Saw tooth' pattern

Narrow Complex tachycardia

- Irregular, no p waves = Atrial fibrillation



Atrial Fibrillation

- **Treatment:**

1. Rate vs rhythm control
2. Stroke prevention ?warfarin

Bradycardia

- To determine the degree of heart block look at the association between the p wave and the QRS complex.
- 1. 1st degree heart block = prolonged PR interval



Second degree heart block:

Mobitz 1/wenkebach:

Increasingly long PR interval then non conducted/ dropped QRS complex



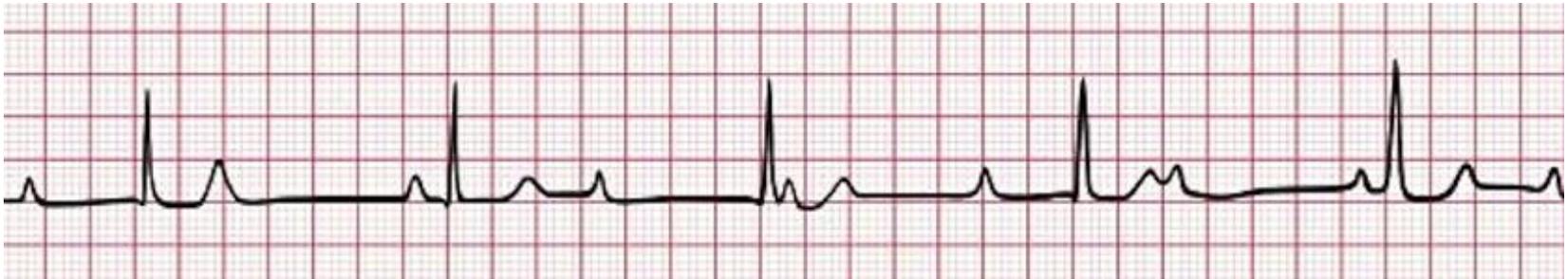
Mobitz 2:

Constant PR interval then 'dropped' QRS complex



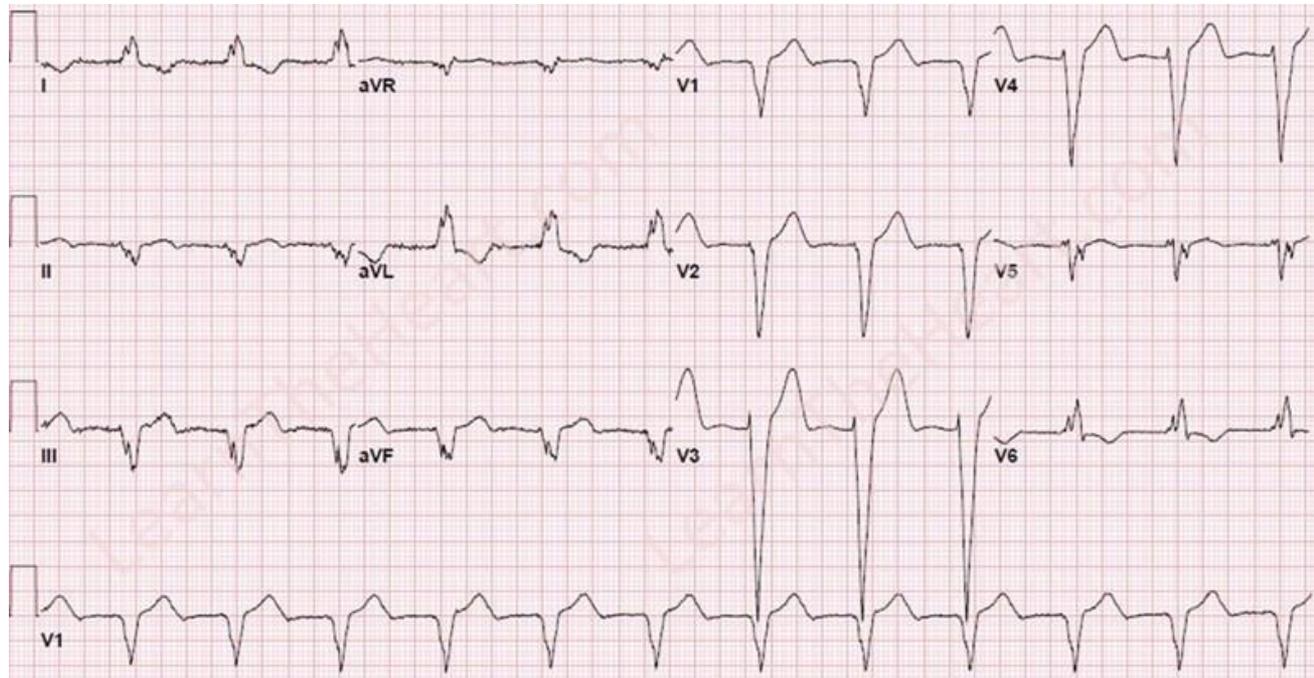
Third degree / complete heart block

No association between P wave and QRS complex



QRS width

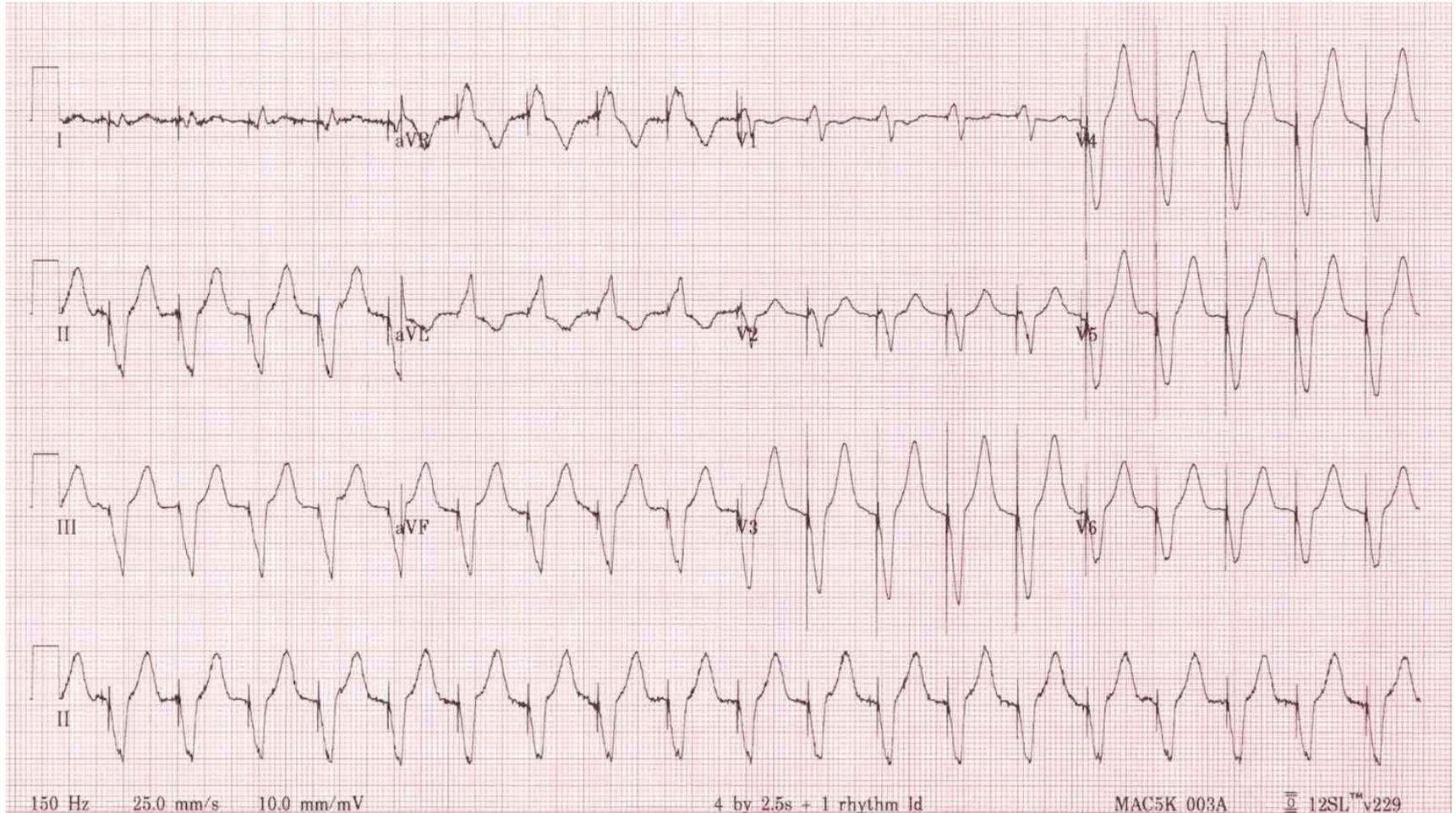
If $> 120\text{ms}$ then = bundle branch block



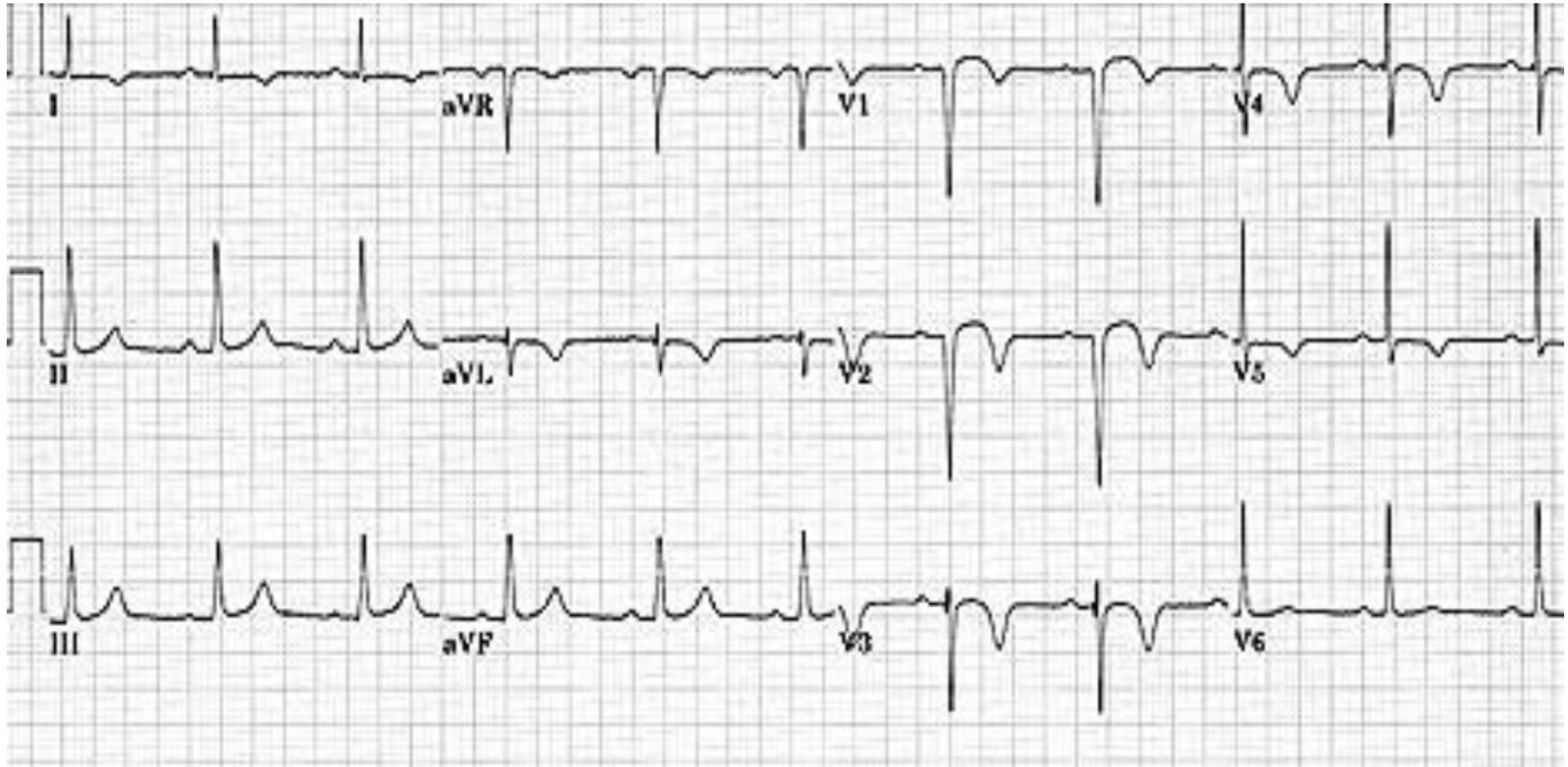
Left BBB

In LBBB you cannot interpret ST segments even though they look elevated!!

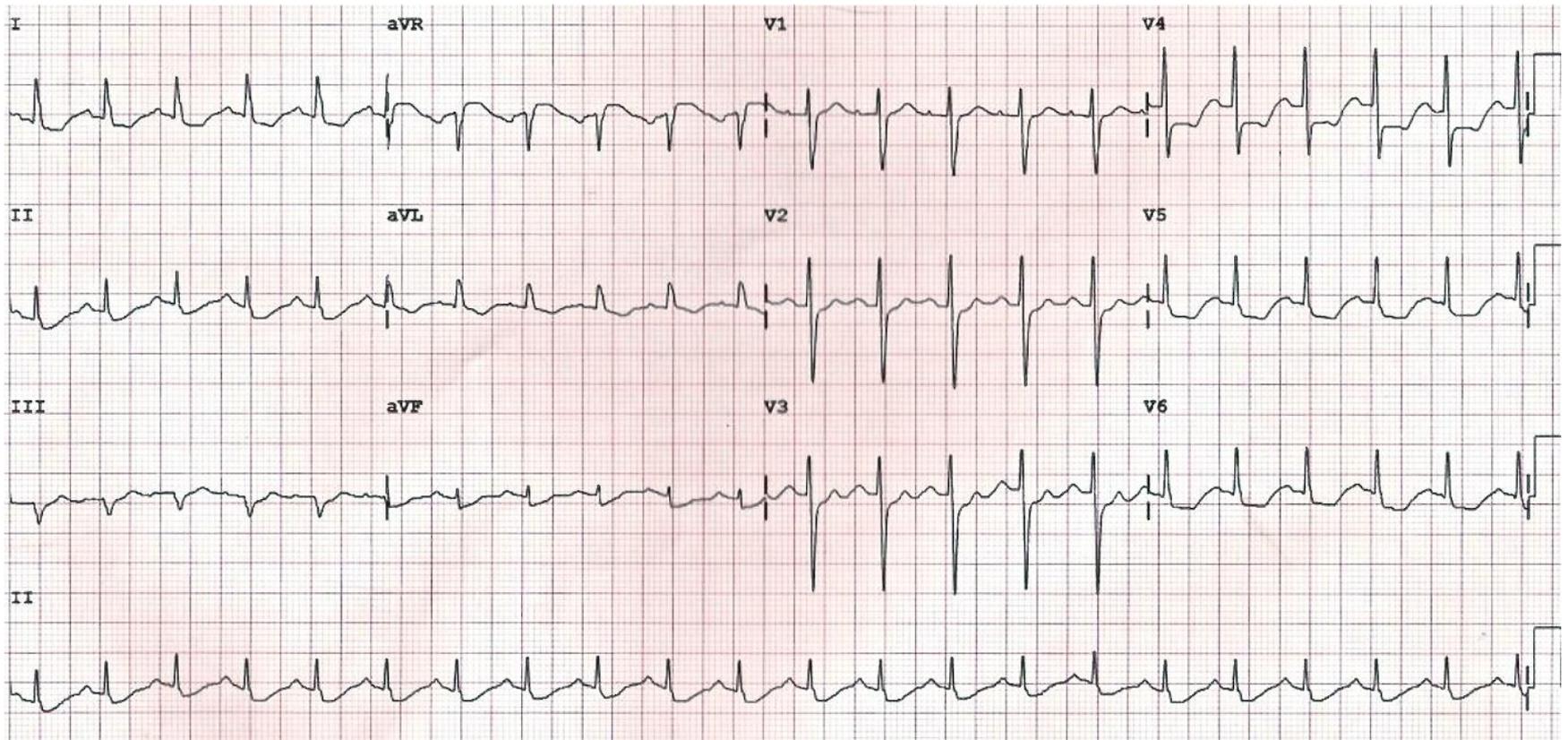
What is this?



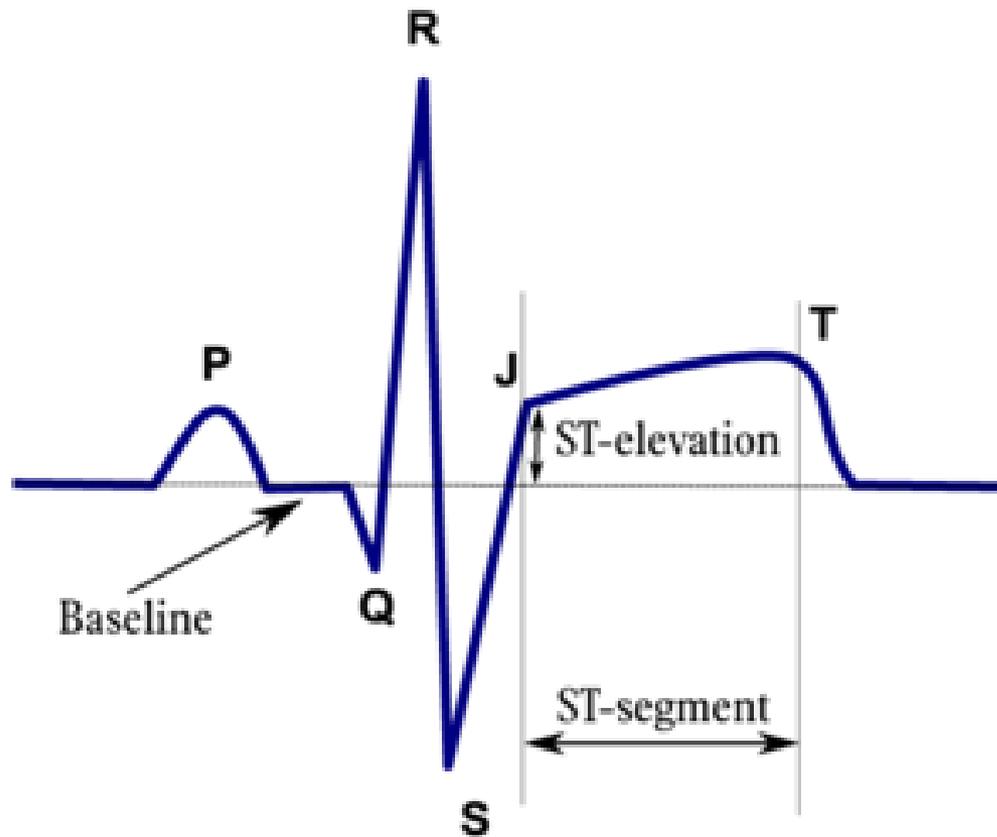
ST/T segments in MI



ST depression

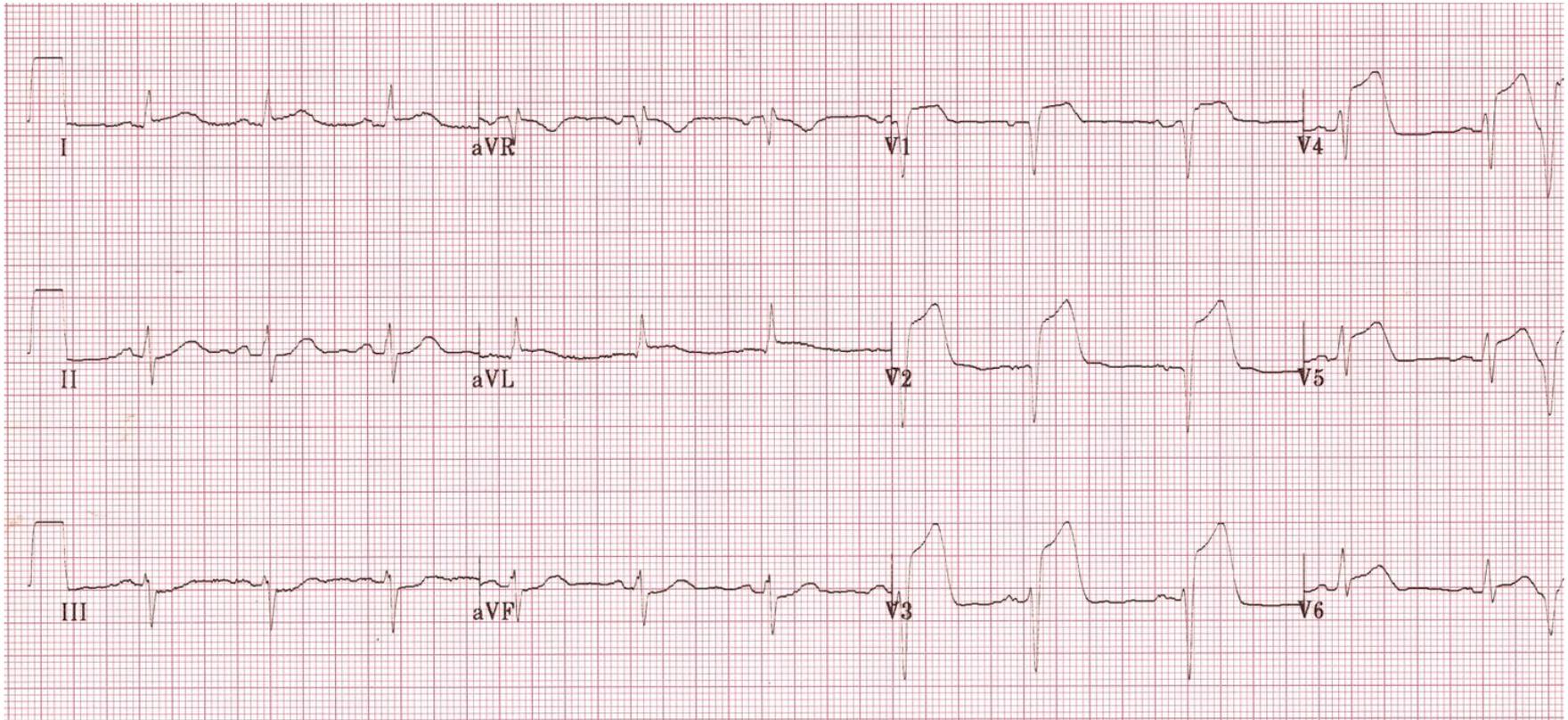


ST elevation

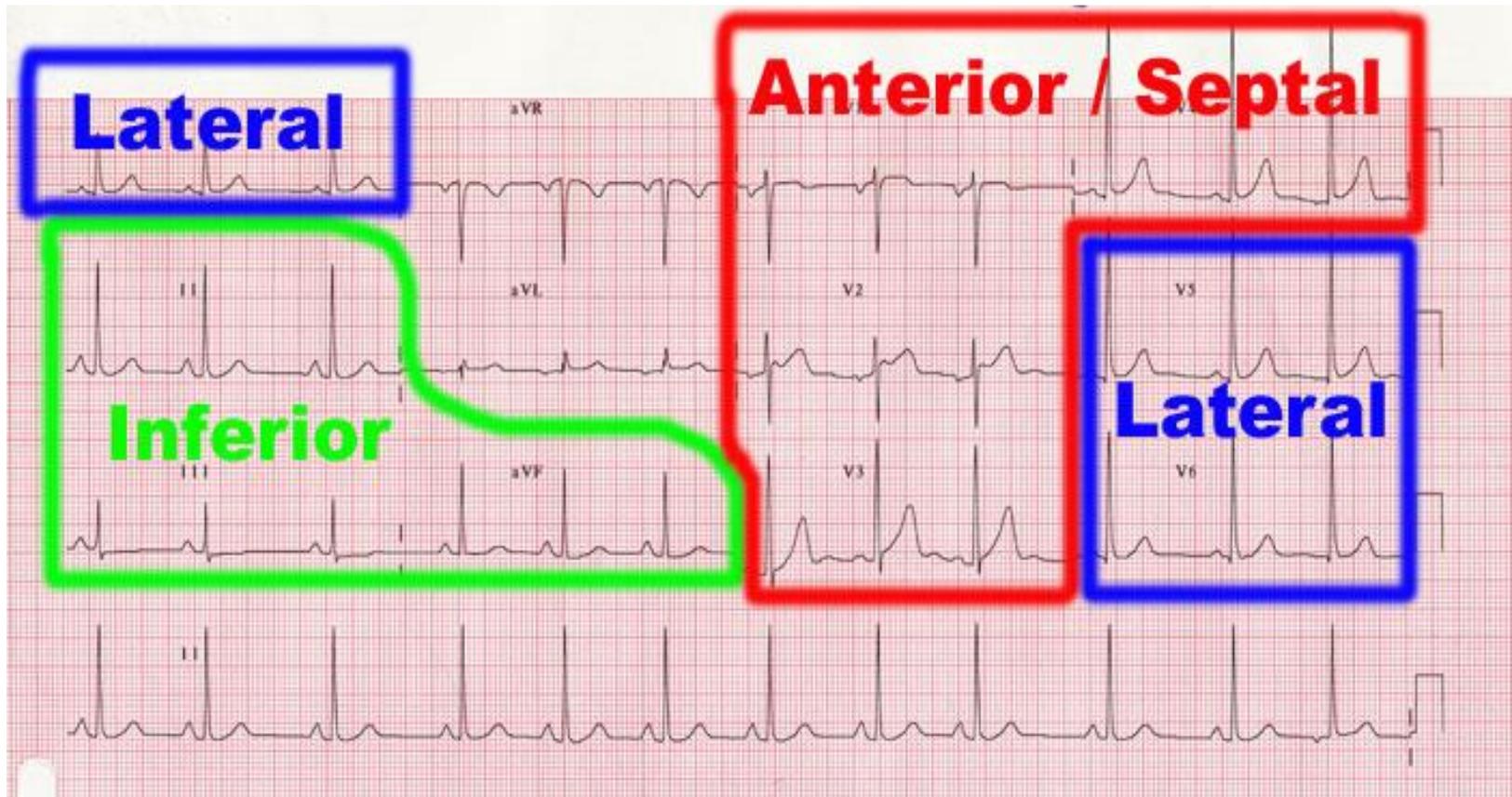


How to measure ST elevation?

ST elevation



STEMI





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