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المحاضرة التاسعة – المرحلة الثانية
الطب الباطني – تقنيات التخدير

Electrocardiograph (ECG)

electrocardiogram, or electrocardiograph. In some countries, the abbreviation used is ‘EKG

The ECG is essential for the diagnosis, and therefore the
- management, of abnormal cardiac rhythms. It helps with the diagnosis of the cause of chest pain, and the proper use of early intervention in myocardial infarction depends upon it. It can help with the diagnosis of the cause of dizziness, syncope and breathlessness

THE ELECTRICITY OF THE HEART

The contraction of any muscle is associated with electrical changes called 'depolarization', and these changes can be detected by electrodes attached to the surface of the body. Since all muscular contraction will be detected, the electrical changes associated with contraction of the heart muscle will only be clear if the patient is fully relaxed and no skeletal muscles are contracting.

Although the heart has four chambers, from the electrical point of view it can be thought of as having only two, because the two atria contract together ('depolarization'), and then the two ventricles contract together.

Fig. 1.1

The wiring diagram of the heart

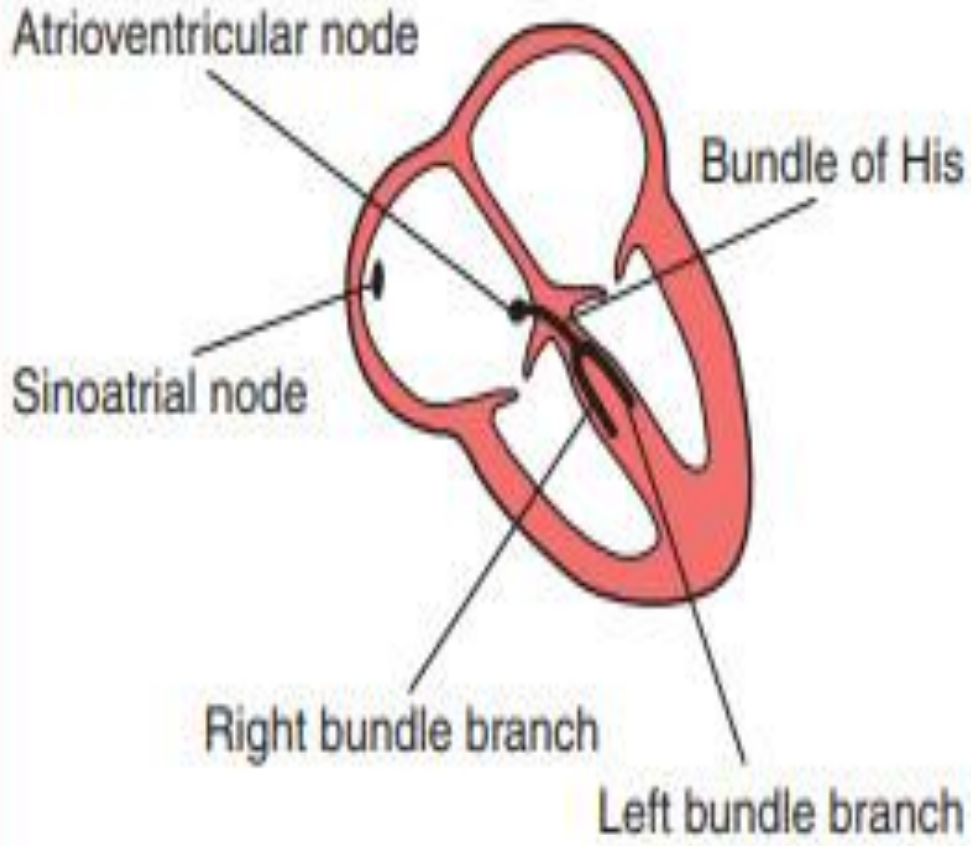
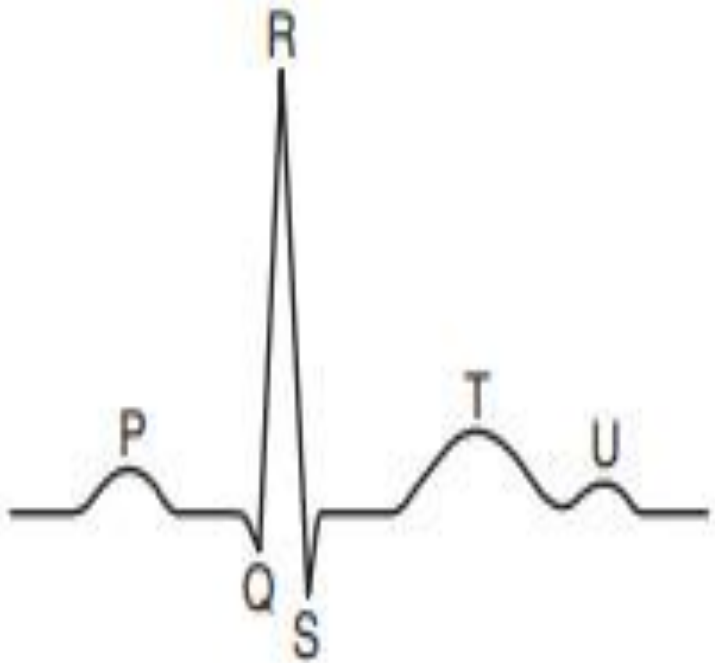
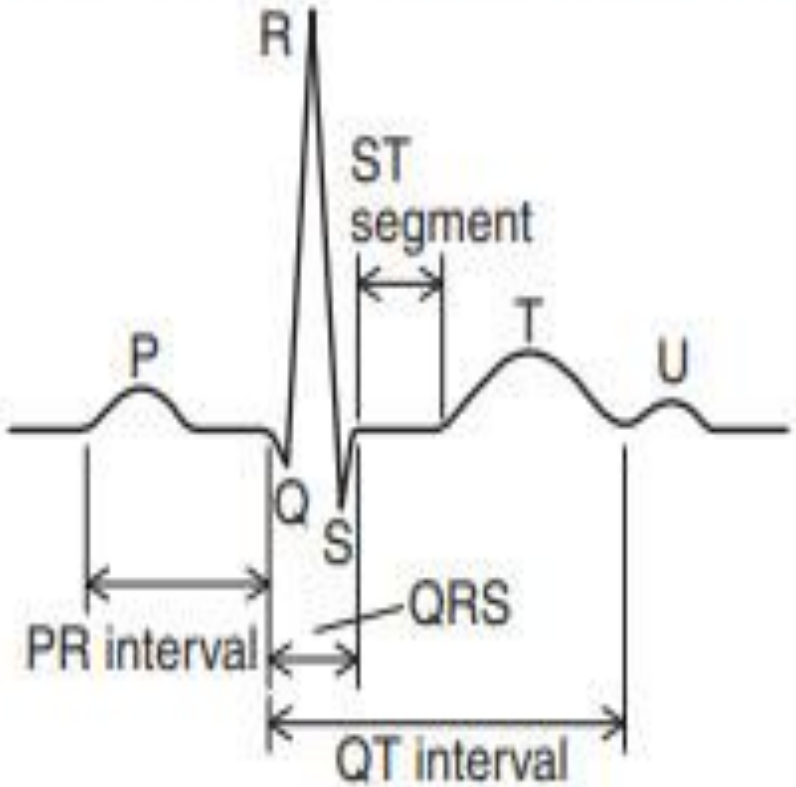


Fig. 1.2

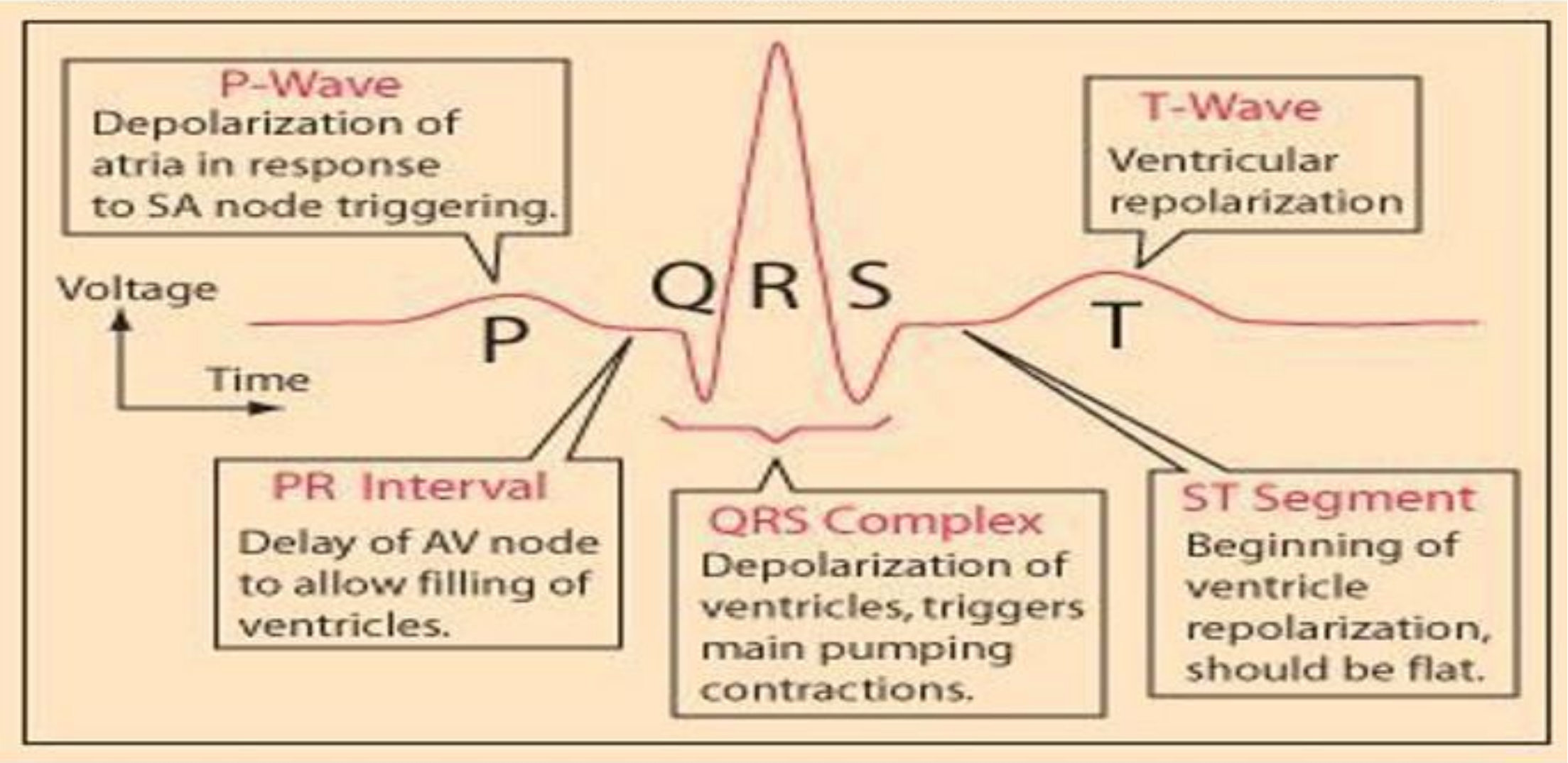
Shape of the normal ECG, including a U wave



The components of the ECG complex



You have to know normal in order to know abnormal



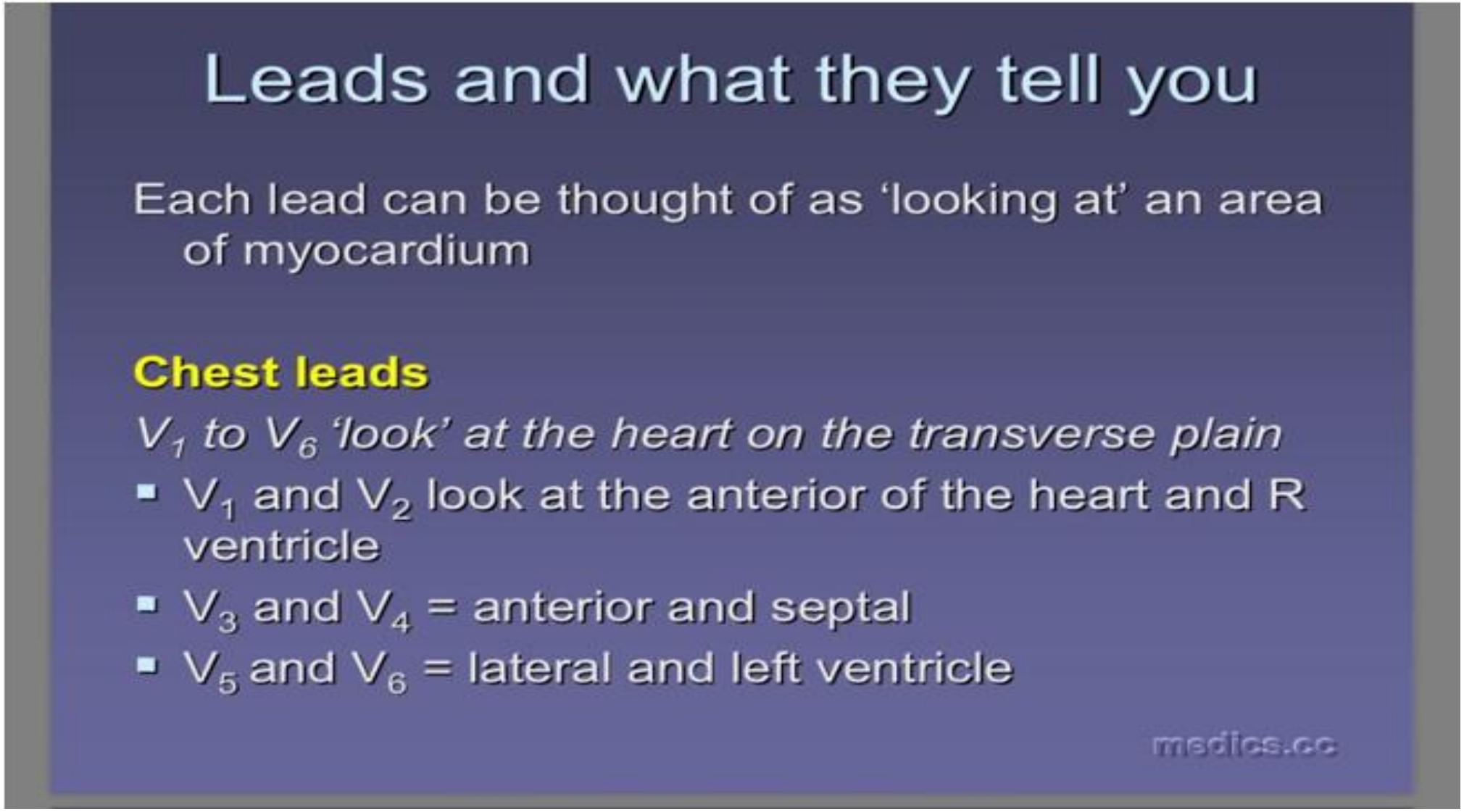
Definitions

- **P wave**: represent atrial depolarization
- **QRS complex**: represent ventricular depolarization
- **T wave**: represent ventricular repolarization
- **U wave**: thought to represent repolarization of the Purkinje fibers
- **PR interval**: from the start of the P wave to the start of Q wave
- It represent the time taken for electrical activity to move between the atria and ventricles
- **QT interval:** start at the beginning of QRS complex and finished at the end of the T wave
- It represent the time taken for the ventricles to depolarise and then repolarize
- **ST segment:** start at the end of the s wave and finished at the start of T wave
- Is an isoelectric line that represent the time between depolarization and repolarization of ventricles

How to report an ECG

1. Rhythm •
2. Conduction intervals •
3. Cardiac axis •
4. A description of the QRS complexes •
5. A description of the ST segments and T waves •

Chest leads


Leads and what they tell you
Each lead can be thought of as 'looking at' an area of myocardium
Chest leads
V1 to V6 'look' at the heart on the transverse plain
V1 and V2 look at the anterior of the heart and R ventricle
V3 and V4 = anterior and septal
V5 and V6 = lateral and left ventricle
medics.cc

CHEST ELECTRODES POSITIONS

V1 – 4th intercostal space – *right sternal edge*

V2 – 4th intercostal space – *left sternal edge*

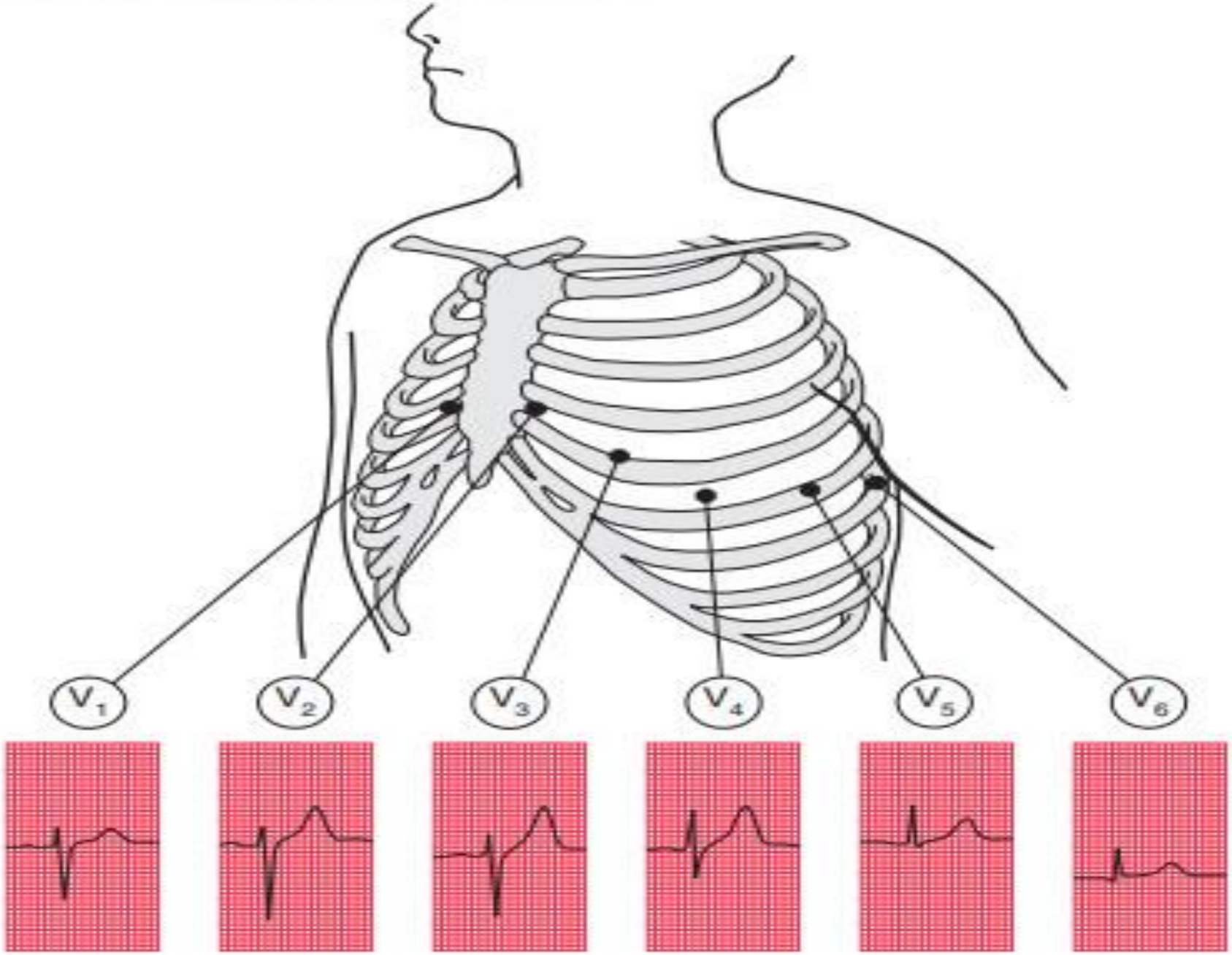
V3 – midway between V2 and V4

V4 – 5th intercostal space – *midclavicular line*

V5 – left anterior axillary line – *same horizontal level as V4*

V6 – left mid-axillary line – *same horizontal level as V4 & V5*

The ECG patterns recorded by the chest leads

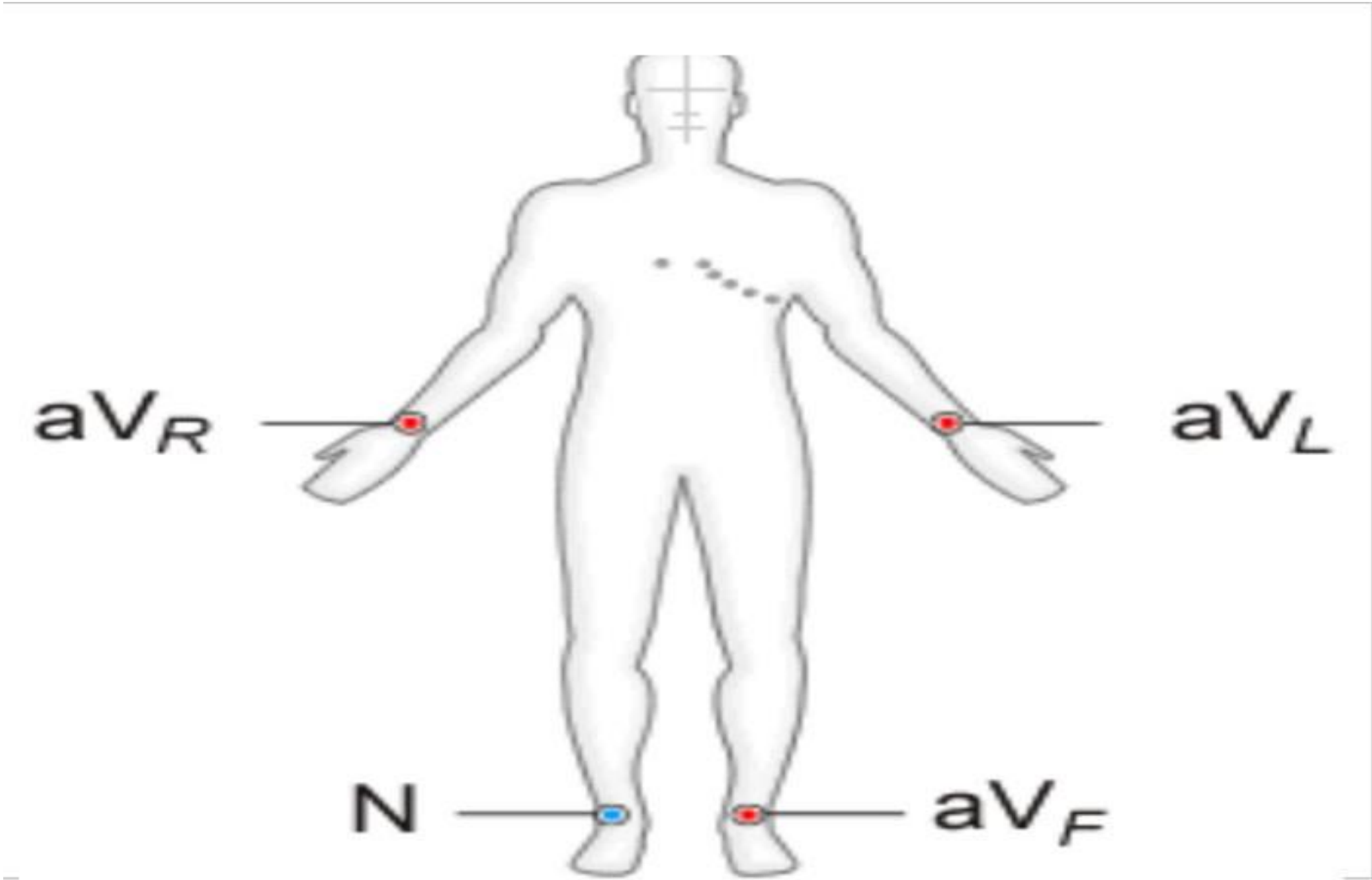


Limb leads

Limb leads

Limb leads look at the heart in the coronal plane

- aVL, I and II = lateral
- II, III and aVF = inferior
- aVR = right side of the heart


aV$_R$
aV$_L$
N
aV$_F$

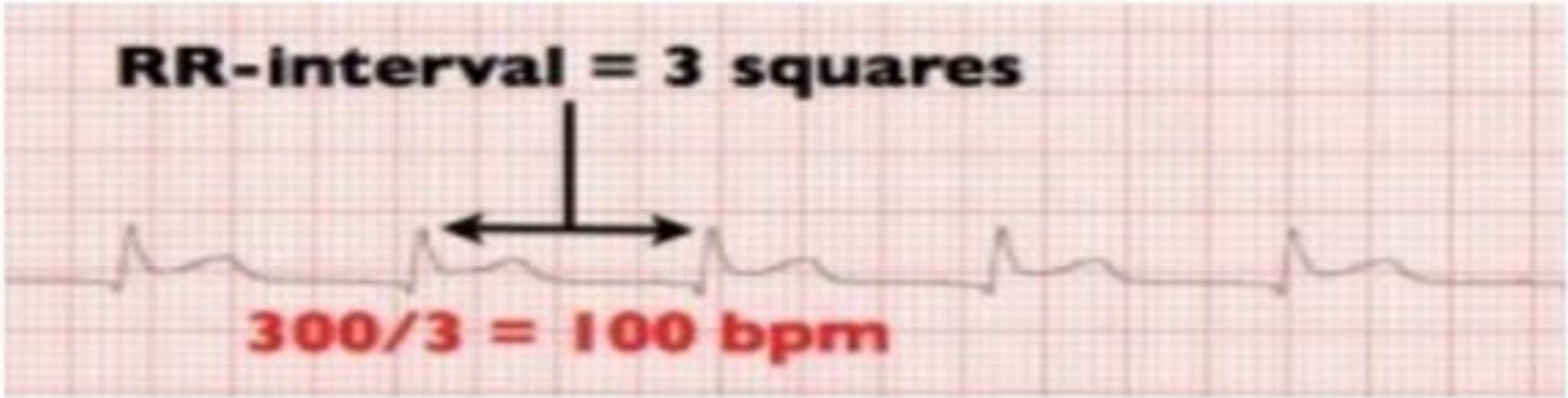
RATE

Heart rate can be calculated simply with the following method:

Work out the number of large squares in one R-R interval

Then divide 300 by this number and you have your answer

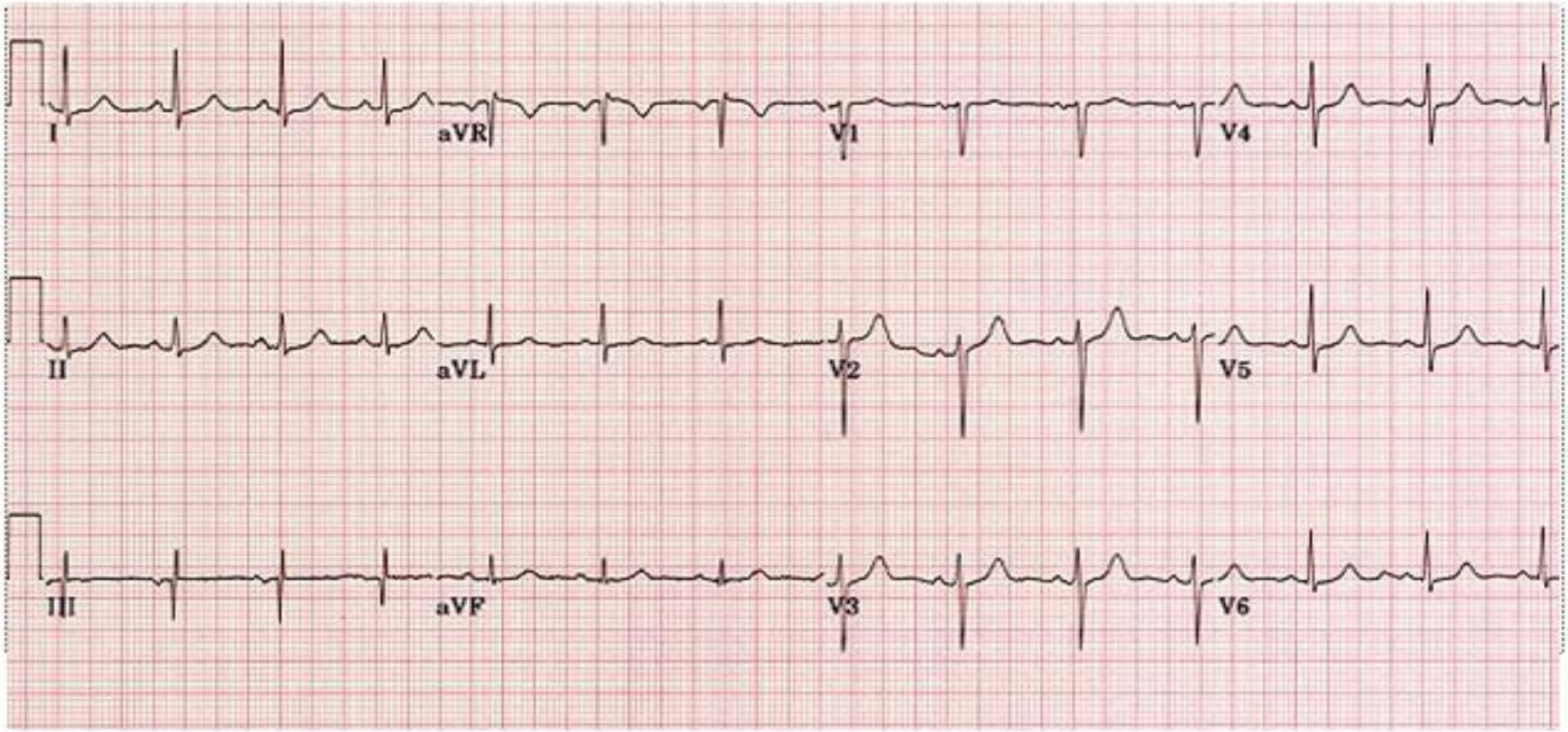
e.g. if there are 4 squares in an R-R interval 300/4 = 75 beats per minute



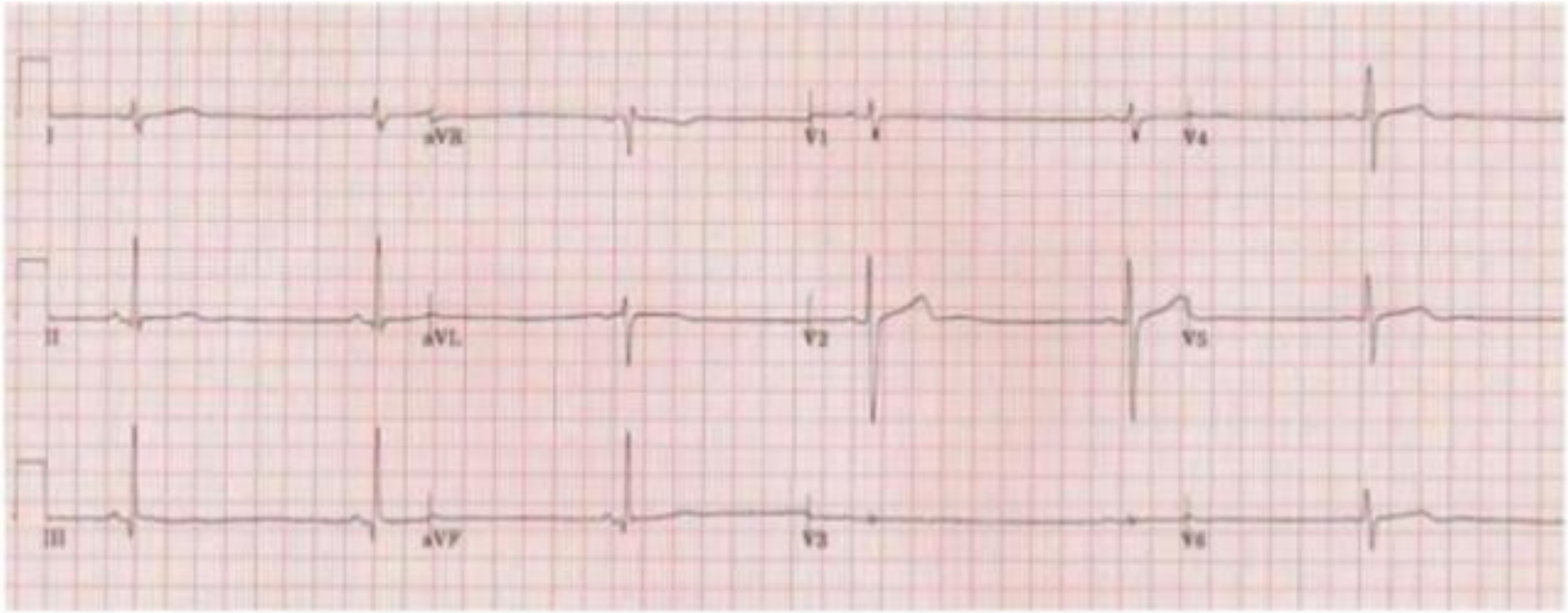
Rate

- Adults
  - Bradycardia < 60bpm
  - Normal 60-100bpm
  - Tachycardia >100bpm
- Children
  - Normal range of heart rate is age dependent

Normal ECG

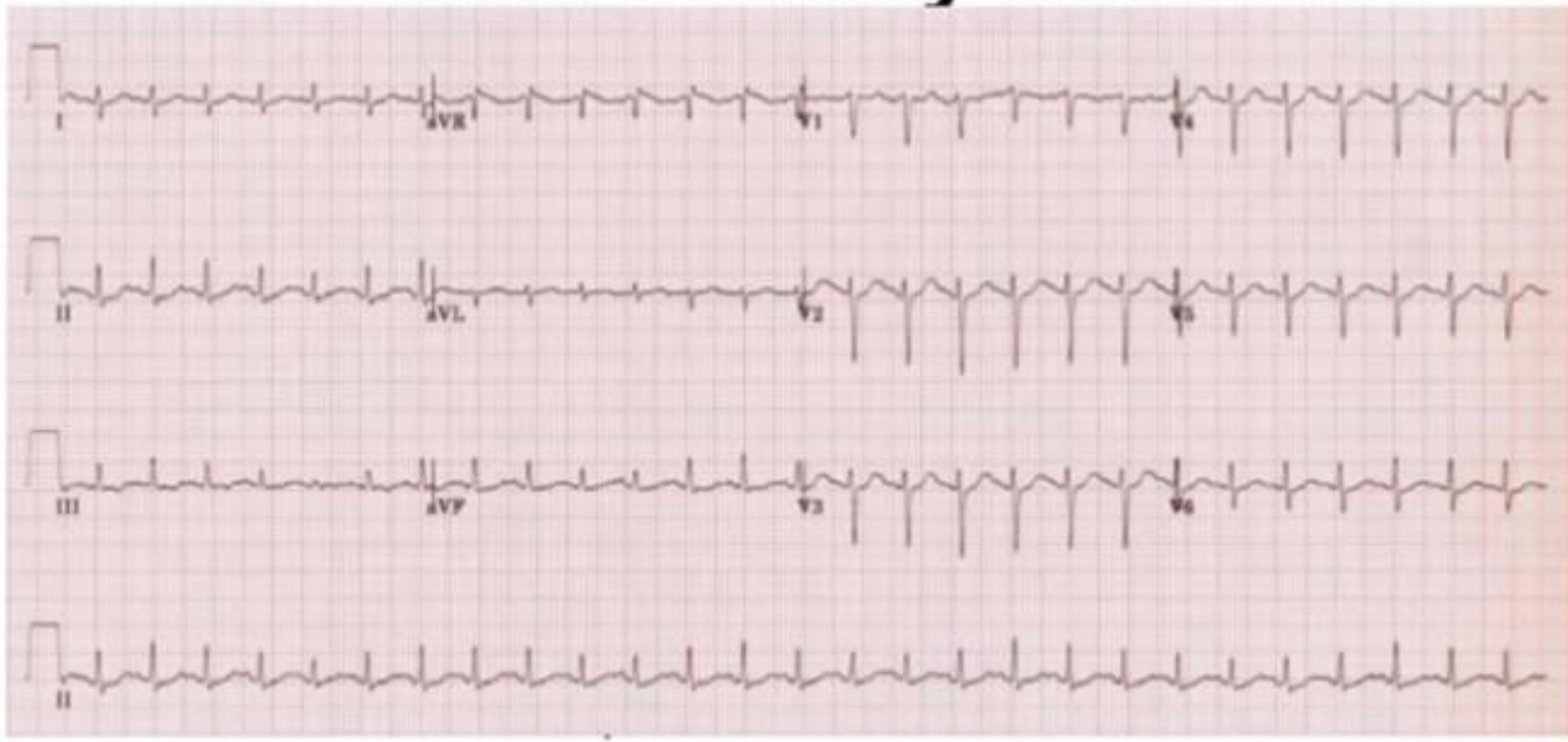


Sinus Bradycardia



- Heart rate 35bpm

Sinus Tachycardia



waves

Rhythm •

Look for R-R interval if they are equally spaced from each other the • rhythm is regular

If not the rhythm is irregular like AF

Atrial fibrillation

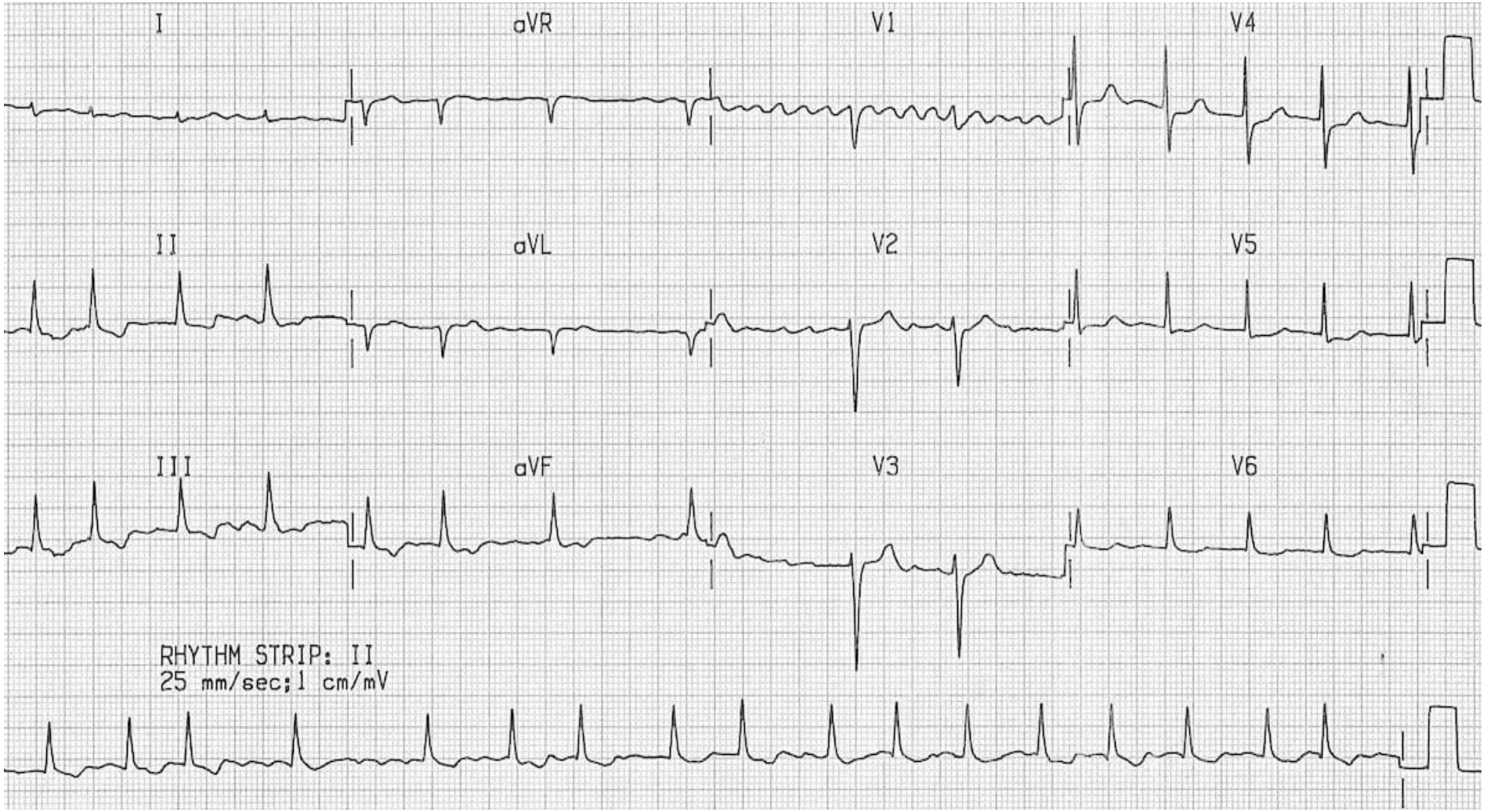


Fig. 16.38 Supraventricular tachycardia. The rate is 180/min and the QRS complexes are normal.

THANK YOU