جامعة المستقبل
AL MUSTAQBAL UNIVERSITY

كلية العلوم
قسم الانظمة الطبية الذكية

Lecture: (8)

Subject: **ECG**
Level: First
Lecturer: MSc. Mustafa Yousif

Introduction

- ECGs detect the sequence of electrical events that occur during contraction (depolarization) and relaxation (repolarization) cycle of heart.
- Depolarization is initiated by sinoatrial node (SA node), natural pacemaker of heart, transmits electrical stimulus to atrioventricular (AV) node.
- From here, the impulse is conducted through Bundle of His & along the Bundle branches to Purkinje fibres causing the heart to contract.
- When there is dysfunction of pacemaker of SA node, AV node acts as a pacemaker.

Electrocardiograph & Electrocardiogram

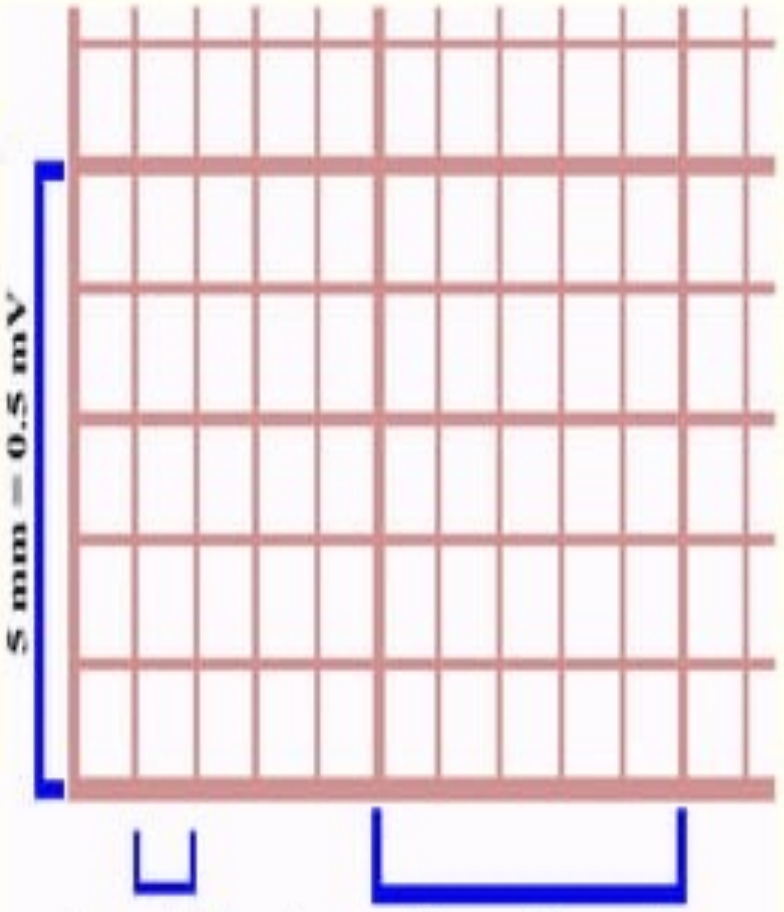
- Electrocardiogram: The machine which is used to record the electrical activity of heart is ELECTROCARDIOGRAM.
- Electrocardiograph: The graph on which this electrical activity is recorded is called ELECTROCARDIOGRAPH.

Significance of ECG

- ECG gives information about rate and rhythm of the heart.
- The physical orientation of heart i.e axis.
- Its a diagnostic tool for various heart conditions like hypertrophies , ischemia, infarction , arrhythmias conduction problems and pace maker activity.

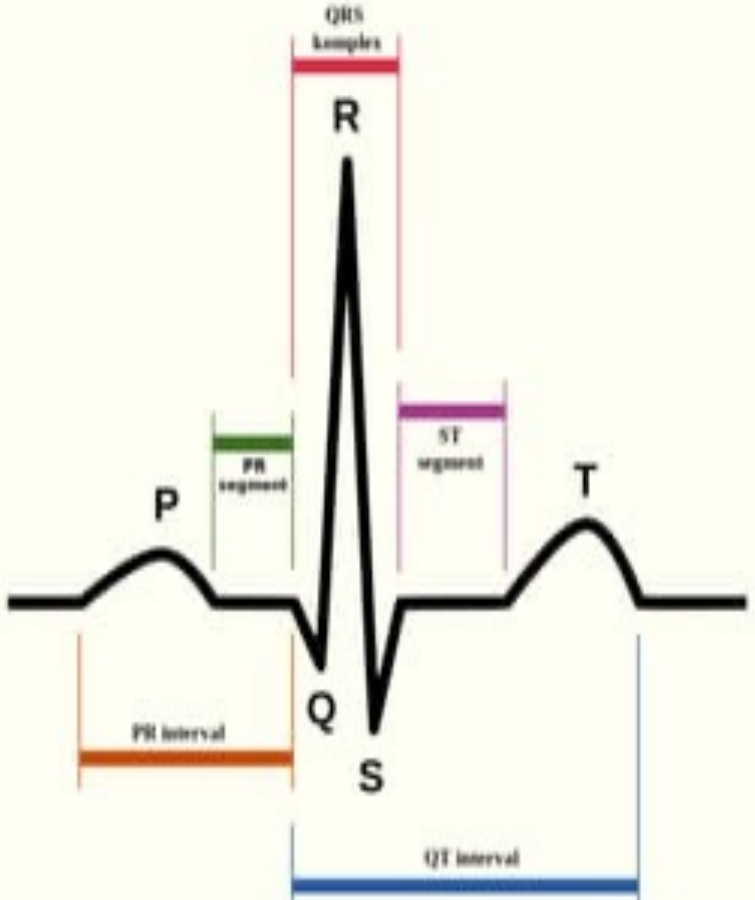
Basic Idea

- ECG are recorded on a graph paper that travels at 25 mm/sec. It is divided into large squares of 5 mm width, which represents 0.2 sec horizontally.
- Each large square is divided into five square of 1 mm width (0.04 sec horizontally).
- Electrical activity is measured in millivolts (mV).



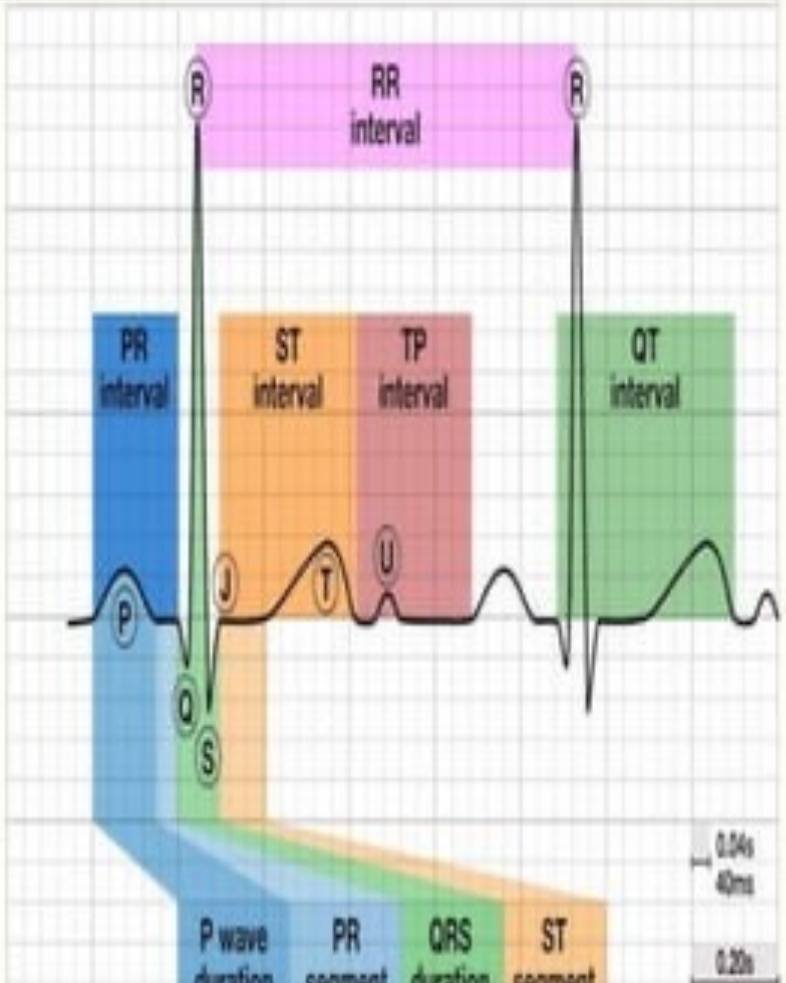
ECG wave

- An ECG complex consists of five waveforms labelled with letter P, Q, R, S, T, which represent the electrical events that occur in one cardiac cycle.



P- wave

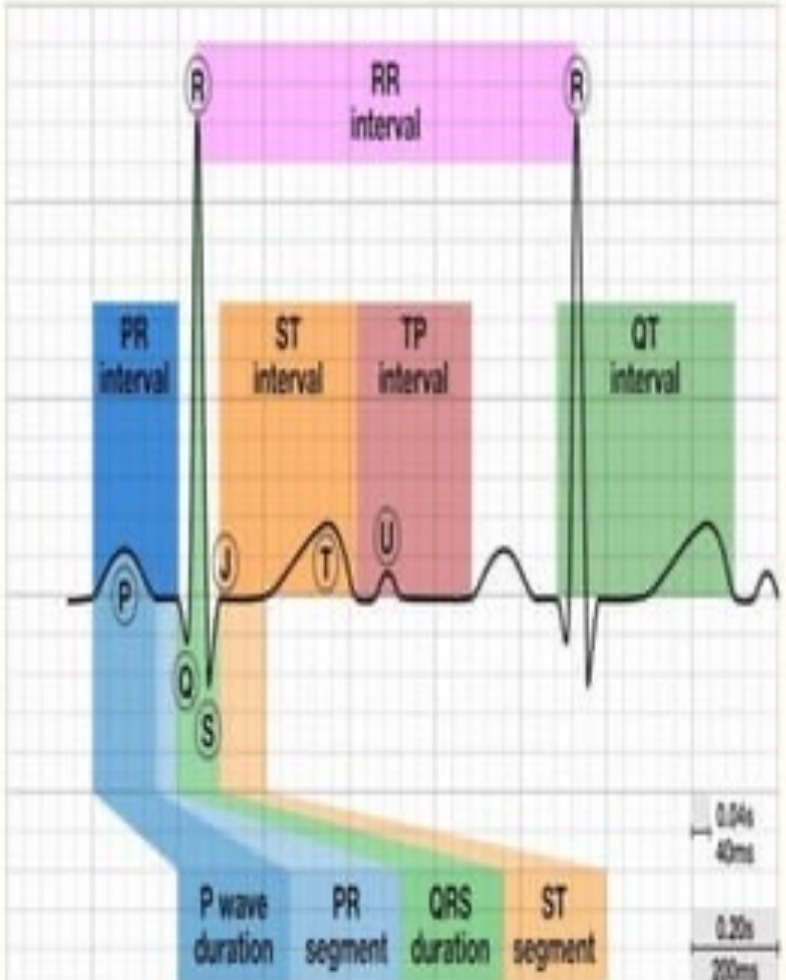
- Represents the activation of atria (atrial depolarization).
- P Amplitude: <2.5 mm
- P Duration: 0.06-0.12 s



PR interval

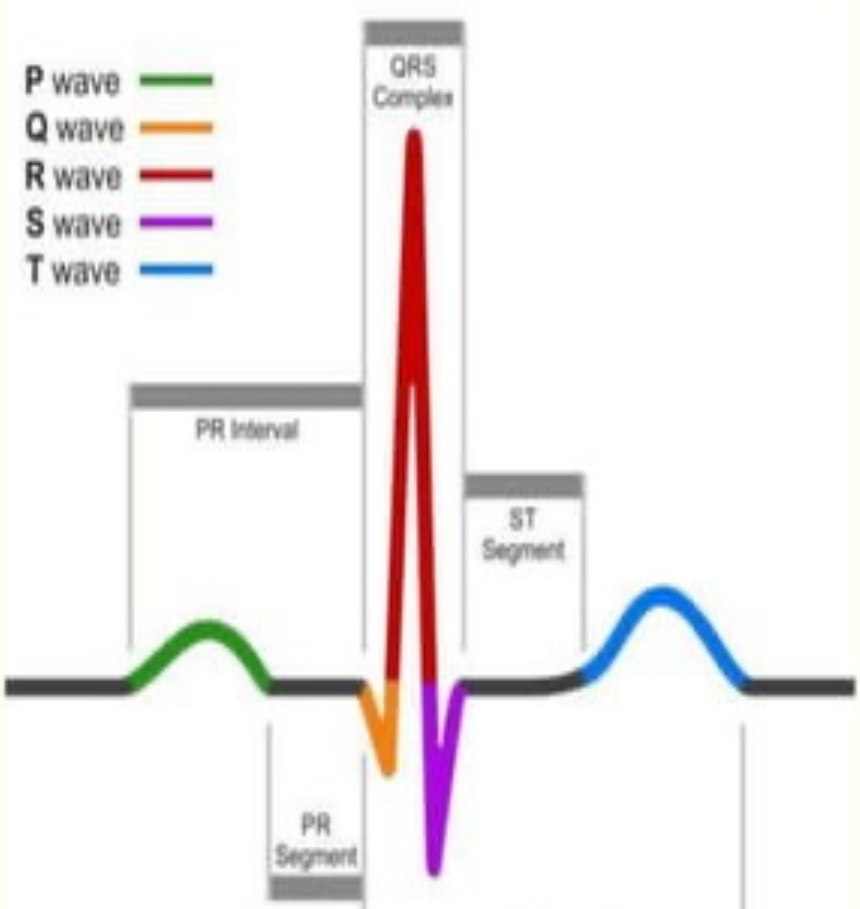
- It represents the time between the onset of atrial depolarization and the onset of ventricular depolarization i.e, the time taken for the impulse to travel from the SA node through the AV node and the His-Purkinje system.

- PR Duration: 0.12-0.20 s.

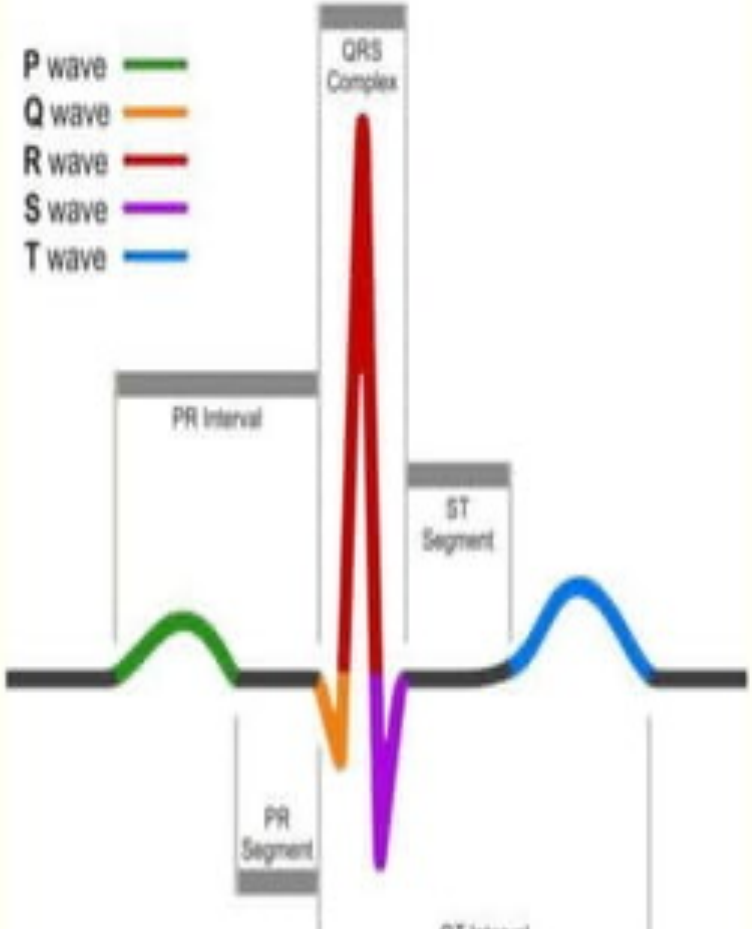


QRS Complex

- Represents the activation of ventricles (ventricular depolarization).
- QRS amplitude: 5-30 mm
- QRS duration: 0.06-0.10 s



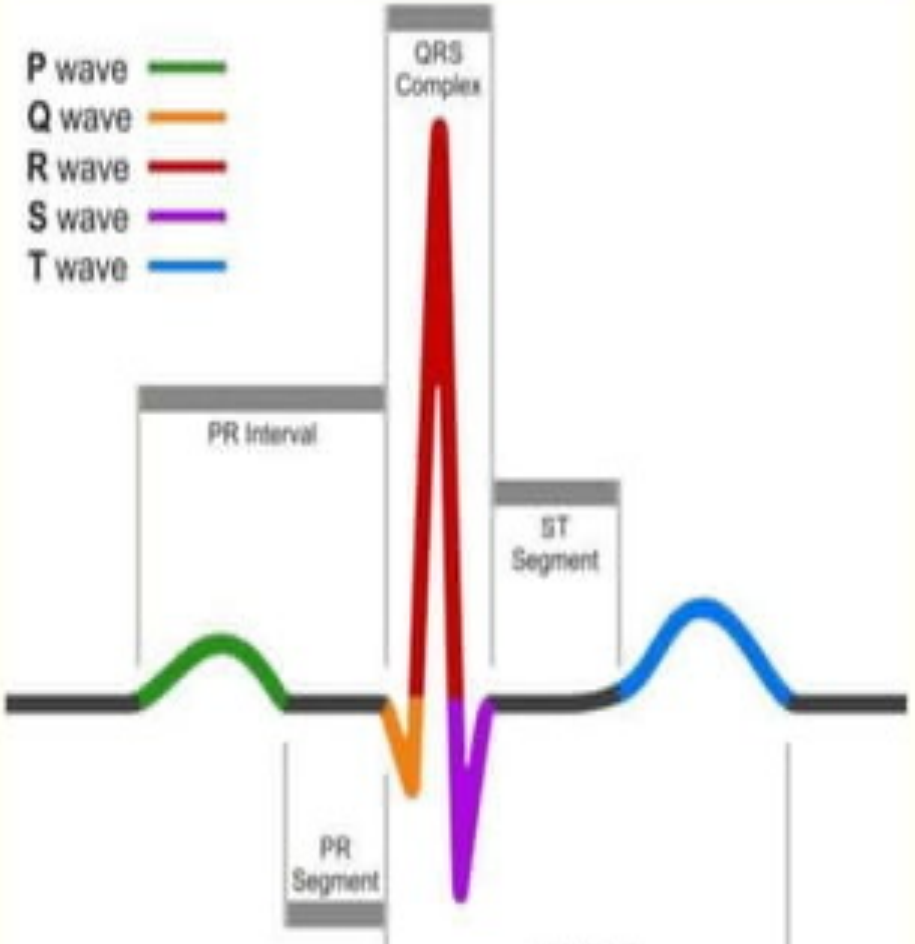
ST Segment



- It represents the end of ventricular depolarization and the beginning of ventricular repolarization.

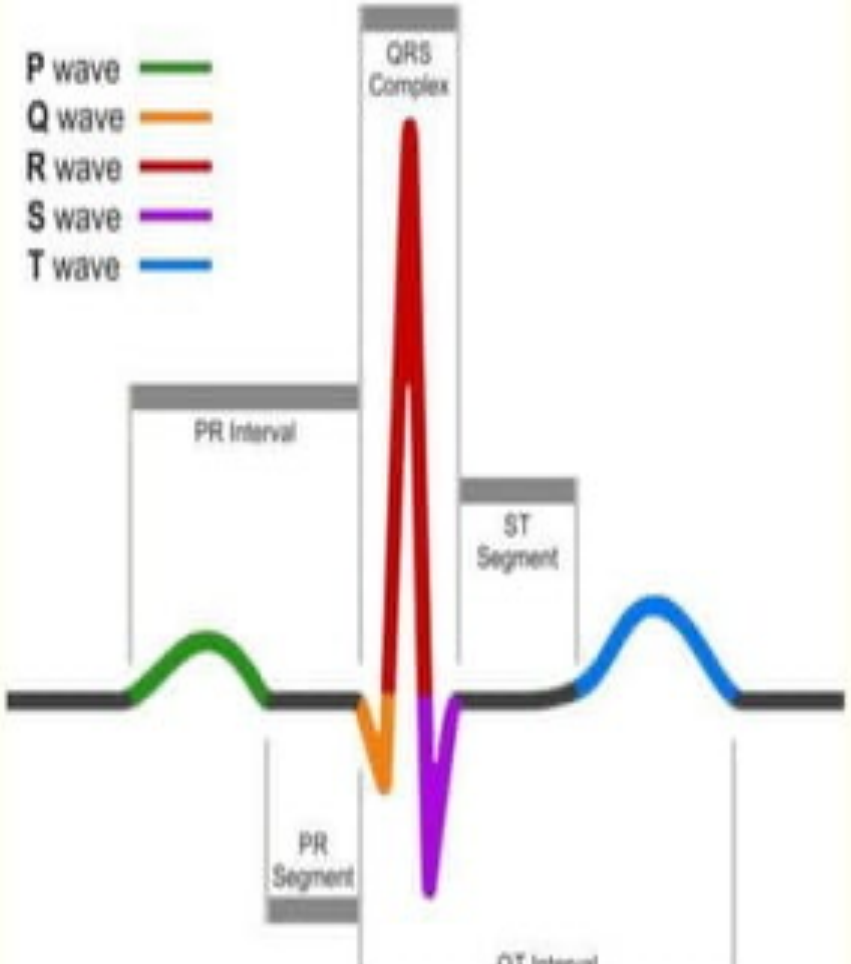
T-wave

- Represents ventricular repolarization.
- T amplitude: <10 mm



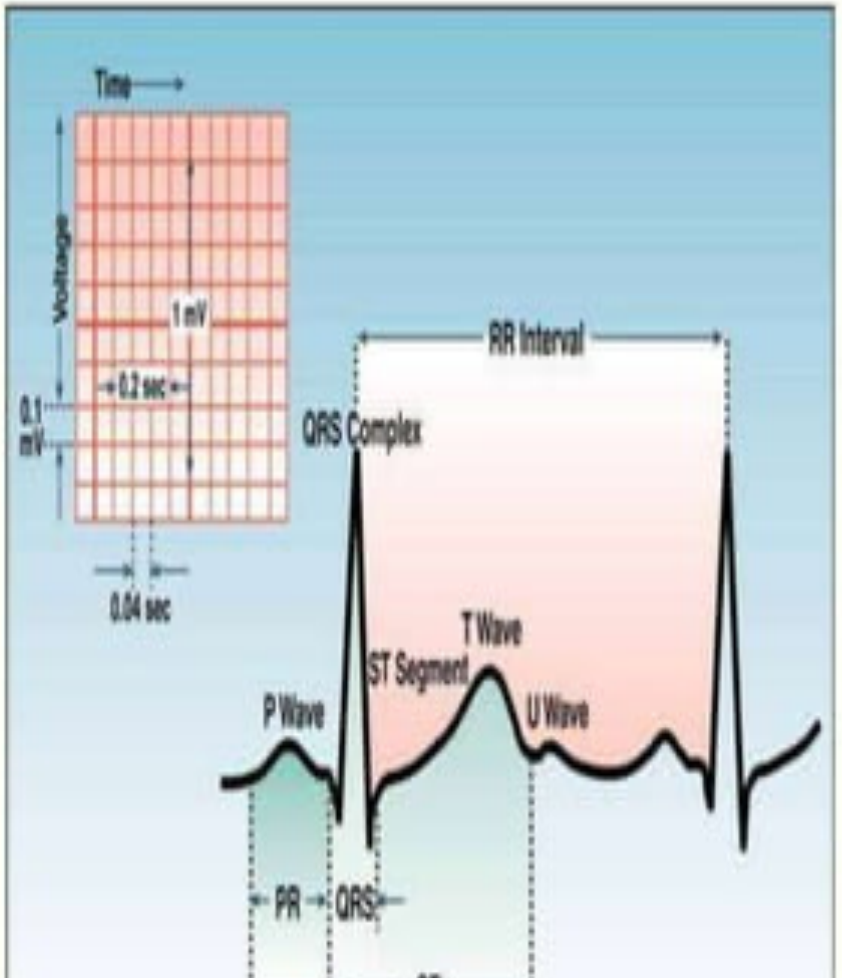
QT Interval

- It represents the total time for ventricular depolarization and repolarization.
- QT interval: 0.35-0.45 s



U wave

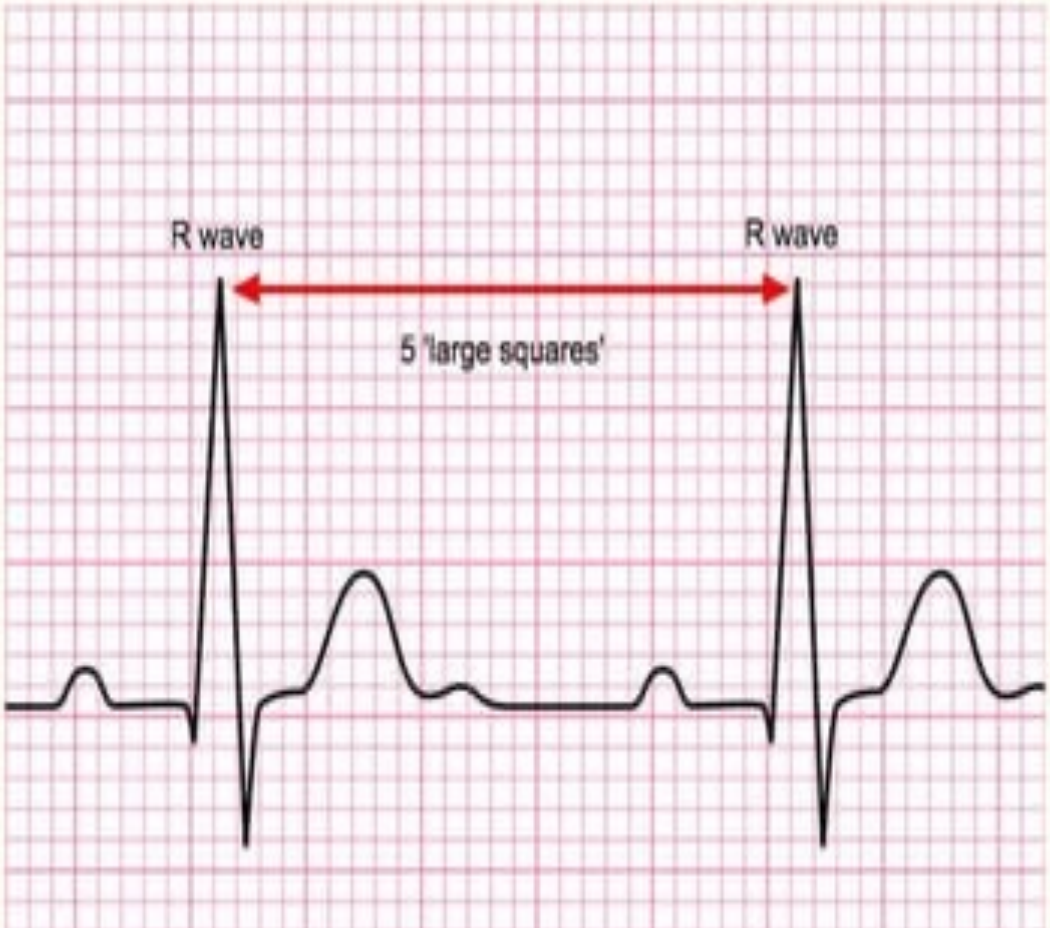
- It represents repolarization of the His-Purkinje system and is not present always in an ECG.



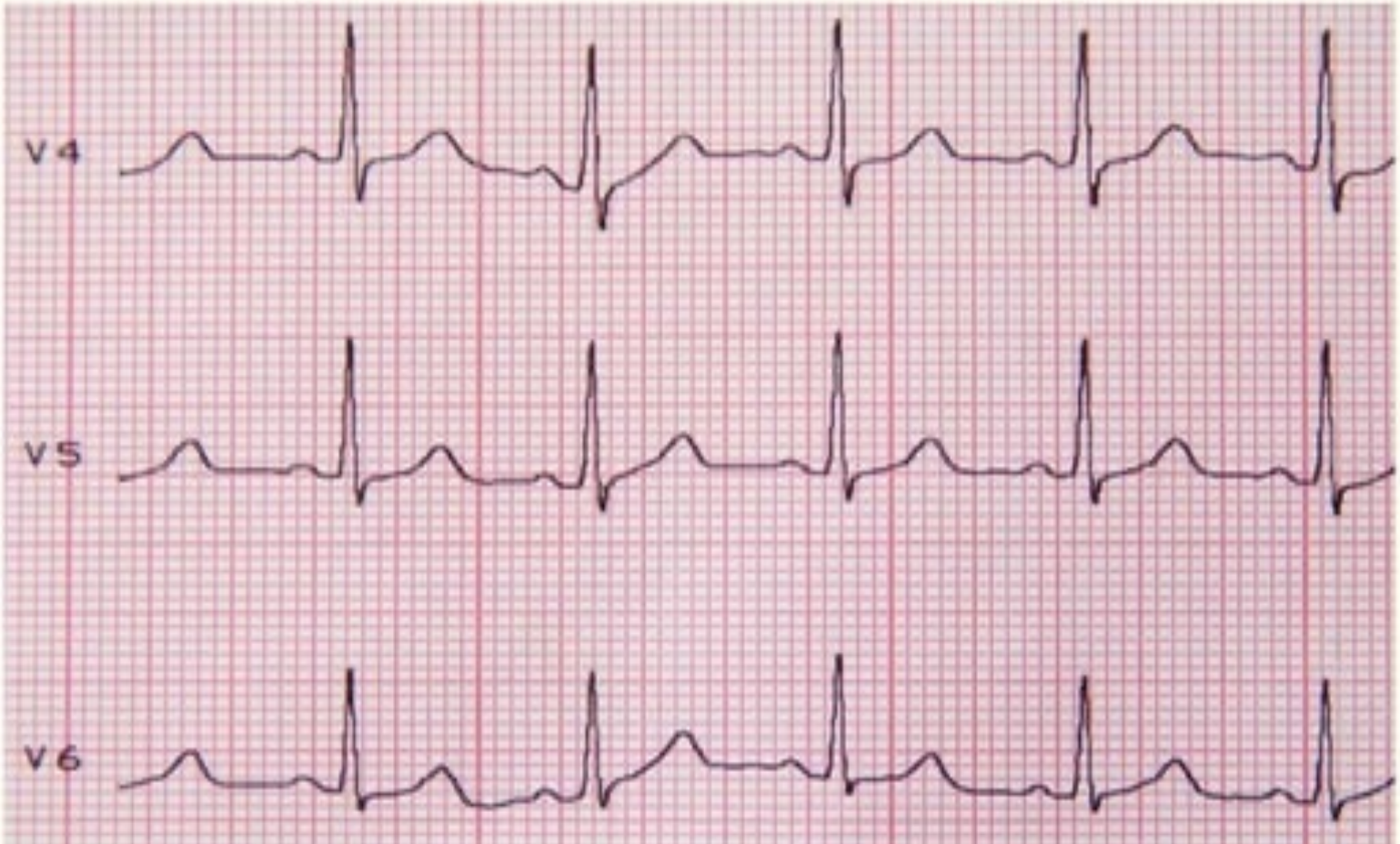
Heart rate count

- Normal range at rest is between 60-100 beats per minute (bpm).
- Bradycardia: It is an abnormal condition when the heart beats slower than normal heart rate, i.e, <60 beats/minute.
- Tachycardia: It is an abnormal condition when the heart beats faster than normal heart rate, i.e, >100 beats/minute.
- *HR = 300 / number of large squares between successive R waves.*
- *HR = 1500 / number of small squares between successive R waves.*

Count the heart rate



Count the heart rate



Your Queries Please!!!