

Electrocardiography (ECG or EKG)

ECG is the process of recording the electrical activity of the heart over a period of time using electrodes placed on the skin.

The purpose of ECG

ECG is use to detect a previous heart attack (a heart attack in emergency situations), blocked or narrowed heart arteries, heart valve problems, heart defects, and arrhythmias

Electrocardiogram: is a graphic record of the heart's electrical activity.

Electrodes and leads

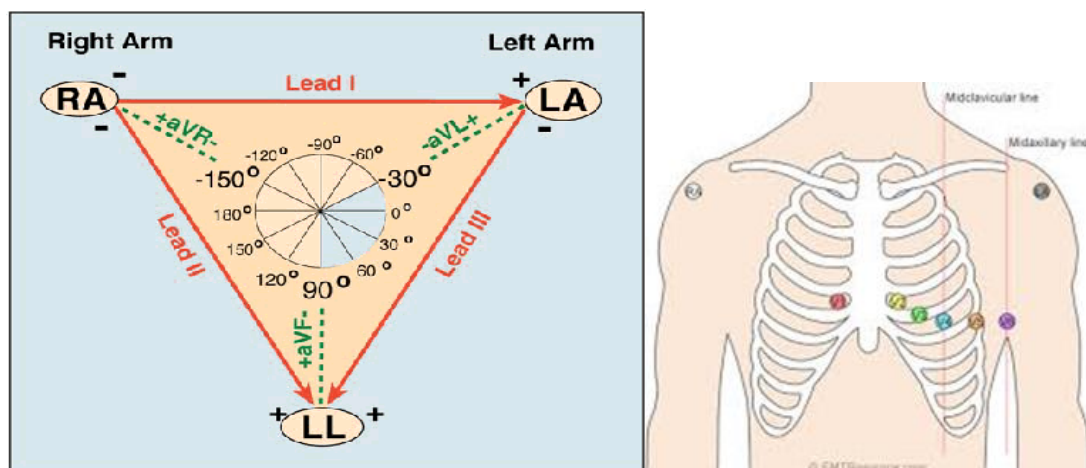
Electrode is a conductive pad in contact with the body that makes an electrical circuit with the electrocardiograph

lead is a connector to an electrode.

There are three sets of leads: three limb leads, three augmented limb leads (vertical) and six precordial leads or chest leads (horizontal)

Limb leads are

Bipolar limb leads: I, II, and III and unipolar augmented leads : aVR, aVL & aVF (RA=white LA=black LL=red RL=green)



Chest electrodes positions

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

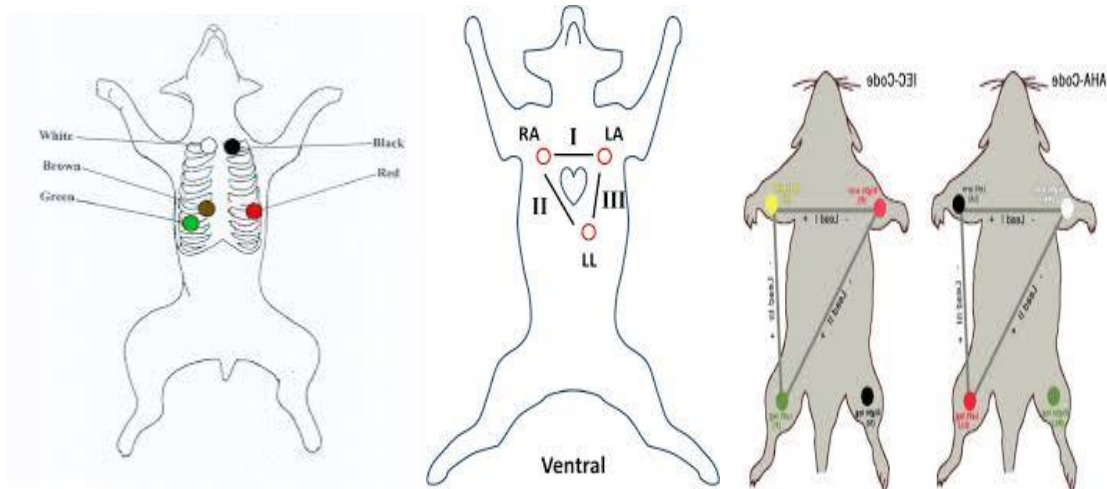
V2 – 4th intercostal space – *left sternal edge*

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*



Parts of the ECG explained

P-waves represent atrial depolarization. In sinus rhythm, there should be a P-wave preceding each QRS complex.

PR interval It represents the time taken for electrical activity to move between the atria and ventricles.

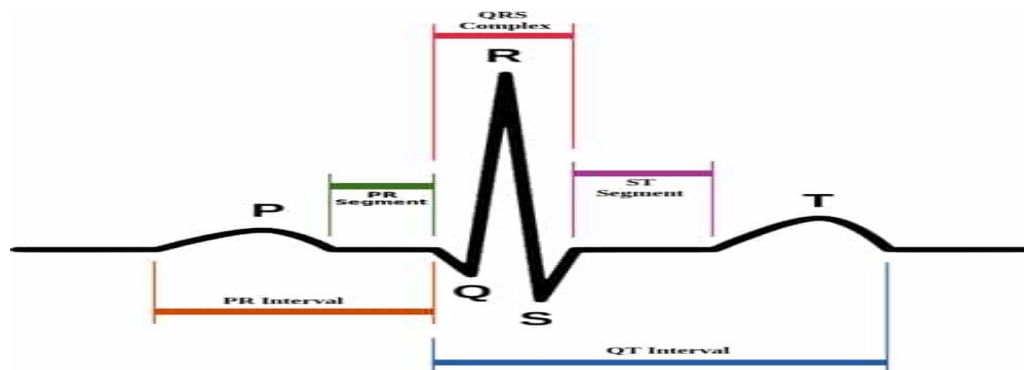
QRS complex represents depolarization of the ventricles.

ST segment is an isoelectric line that represents the time between depolarization and repolarization of the ventricles (i.e. contraction).

T-wave represents ventricular repolarization. It is seen as a small wave after the QRS complex.

RR-interval It represents the time between two QRS complexes.

QT-interval It represents the time taken for the ventricles to depolarize and then repolarize.



ECG Chart or paper

The ECG which are recorded upon is standardized paper

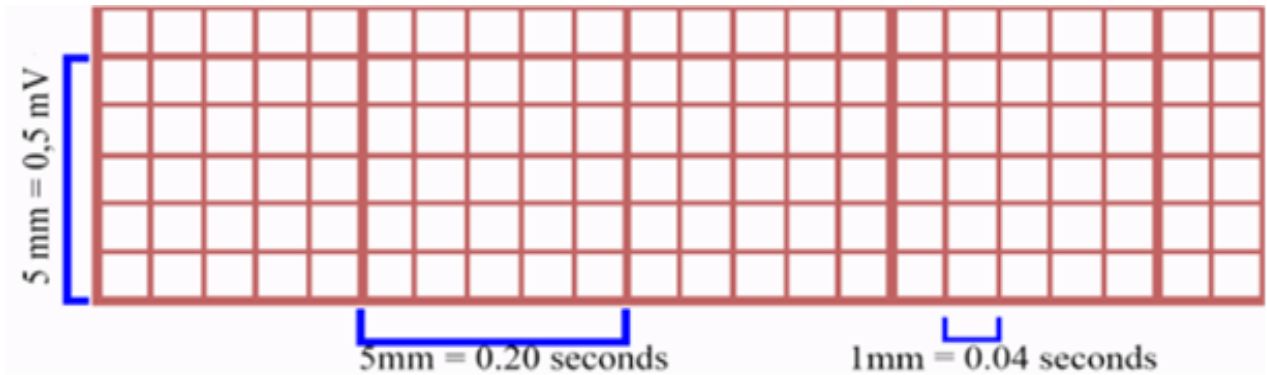
Each small square represents 0.04 seconds

Each large square on the paper represents 0.2 seconds

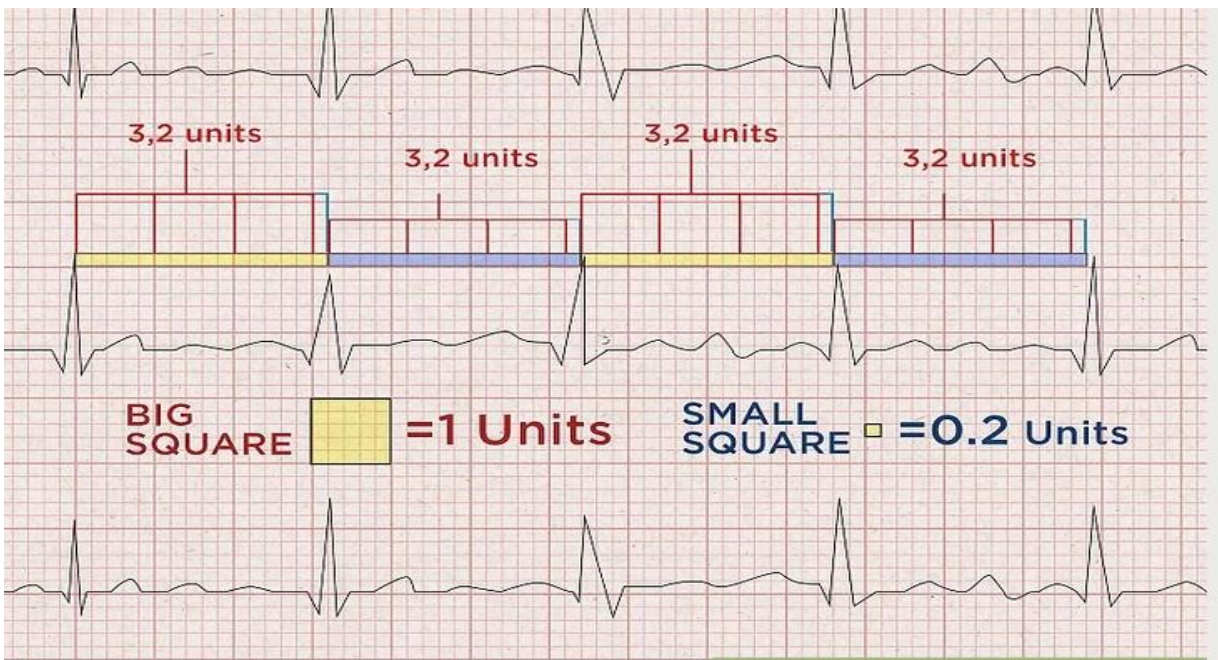
5 large squares therefore = 1 second

300 large squares = 1 minute

Heart rate = 300/ number of big squares separating QRS complexes



Calculate the heart rate from ECG





Sinus rhythm

Looking at the ECG you'll see that:

- RHYTHM - Regular
- RATE - (60-100 bpm)
- QRS DURATION - Normal
- P WAVE - Visible before each QRS complex
- P-R INTERVAL - Normal (<5 small Squares).



Sinus bradycardia

Looking at the ECG you'll see that:

- RHYTHM - Regular
- RATE - Less than 60 beats per minute
- QRS DURATION - Normal
- P WAVE - Visible before each QRS complex
- P-R INTERVAL - Normal



Sinus Arrhythmia