

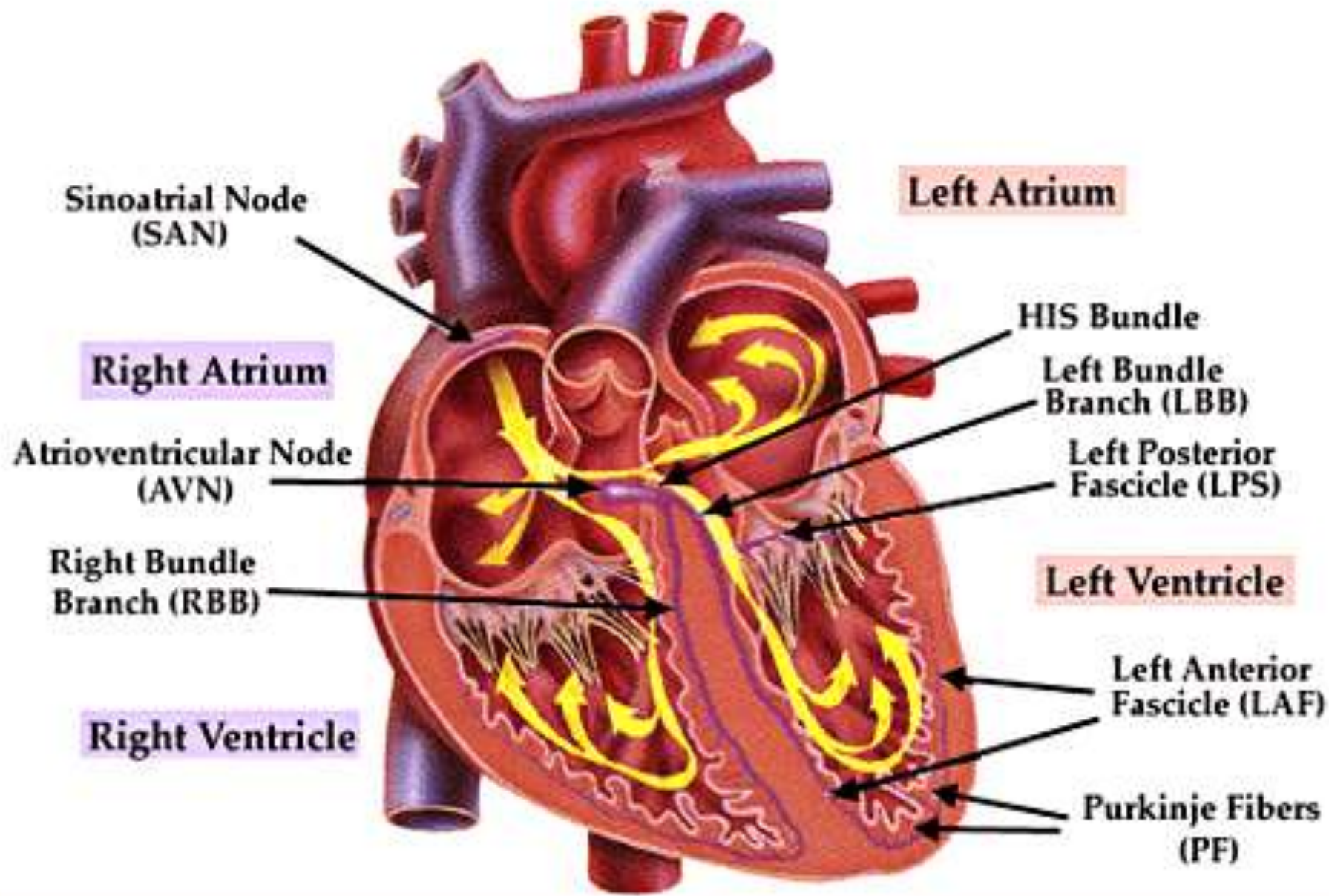


Normal ECG



DEFINITION

- An electrocardiogram is a graphical representation of the electrical impulses produced by the heart.



Cardiac Conduction System



CONDUCTION SYSTEM

- S.A NODE
- A.V NODE
- BUNDLE OF HIS
- BUNDLE BRANCHES
- PURKINJE'S FIBERS



ELECTROPHYSIOLOGY

- NORMAL RESTING CELL
- Outside of the cell membrane positive charges.
- Inside of the cell membrane negative charges.



DEPLORATION

- Positive ions inside the cell.
- Negative ions migrate to the surface.
- Reverses the polarity.



REPOLARISATION

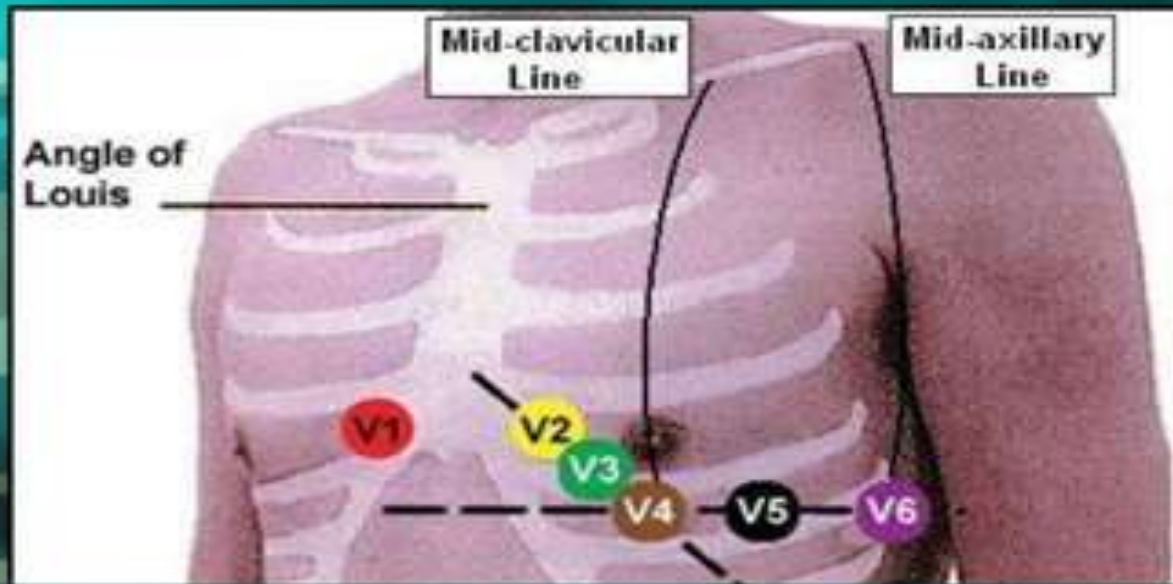
- Positive ions return to outer surface.
- Negative ions migrate in to cell.



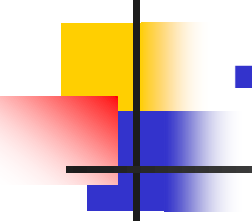
ECG LEADS

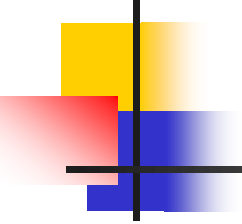
- 12 Lead ECG consists of
 - Bipolar Limb Leads [I, II, III]
 - Unipolar Augmented Limb Leads [AVR, AVL, AVL]
 - Chest Leads [V1 to V6]

Precordial Leads



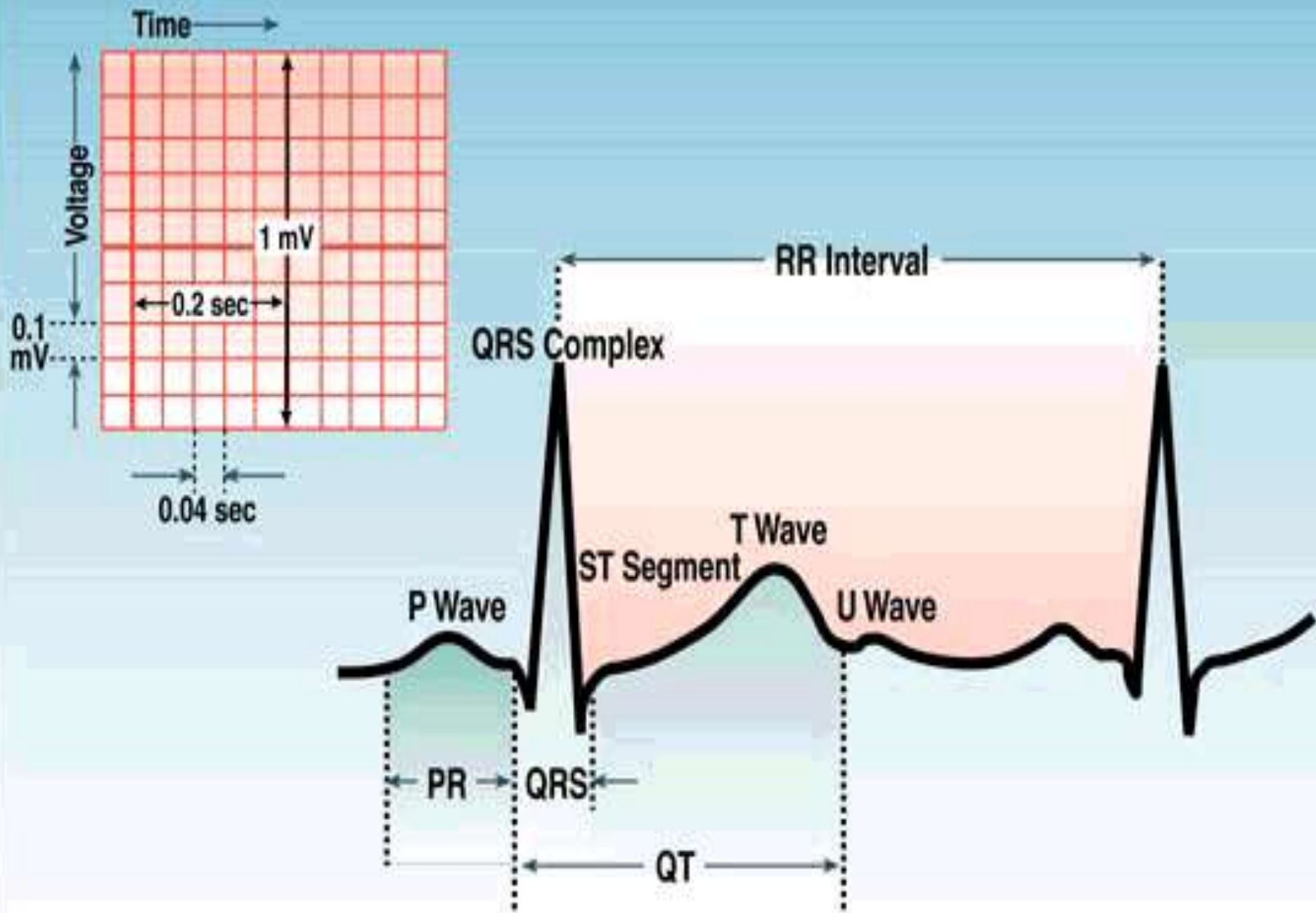
PRECARDIAL POSITIONS

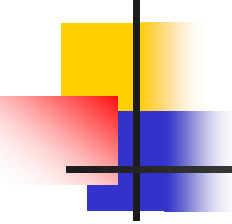
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- V1: 4th intercostal space at right sternal border.
 - V2: 4th intercostal space at left sternal border.
 - V3: Mid point of V2 and V4.
 - V4: 5th intercostal space in the mid-clavicular line.
 - V5: 5th intercostal space in the anterior axillary line.
 - V6: 5th intercostal space in the mid-axillary line.



ECG – PAPER

- Coated with silver, thermal sensitized.
- Vertical and horizontal lines [1 mm]
- Vertical axis represents voltage [1 mm = 0.1mv]
- Horizontal axis represents time [1 mm = 0.04 sec]





WAVES AND COMPLEXES

- P WAVE: Atrial depolarization.
- P Wave is upright in all leads except aVR.
- 3 mm in height [0.3 mv]
- 3 mm horizontally [0.12 sec]



CONTINUED.....

- QRS COMPLEX
- Ventricular depolarization.
- Comprising of Q.R.S Waves.
- Q Wave: Negative deflection which precedes the R wave. Denotes depolarization of the ventricular **septum** from left to right.



CONTINUED

- R Wave: 1st positive deflection of the QRS complex.
- Denotes depolarization of the ventricles, the first anteroseptal portion followed by the major ventricular muscle mass.



CONTINUED

- S Wave: The S wave is the 1st negative deflection of the QRS complex that follows R wave.
- It occurs due to depolarization of **rest** part of the ventricles.



CONTINUED.....

- T wave produced by ventricular repolarization.
- Dome-shaped wave.(5-10 mm)
- Normally upright, except in leads III, aVF, V₁, V₂.



CONTINUED

- U Wave: Represents the **slow** repolarization of the **Purkinje's** fibers, papillary muscles or ventricular septum.
- It follows the T wave and precedes the P wave of the next cycle.
- Upright in most of the leads.



CONTINUED

- P-P AND R-R INTERVAL.
- p-p and R-R intervals are equal.
- Used to calculate heart rate.
- P-P interval denotes atrial rate and R-R interval denotes ventricular rate.



CONTINUED

- CALCULATION OF HEART RATE
-
- Heart rate = $300 \div$ No. of large squares between two P or R wave.



CONTINUED.....

- P-R Interval
- Measured from beginning of the P wave to beginning of the QRS complex.
- It is the time interval between atrial and ventricular depolarization.
- Normal PR interval is 0.12 – 0.20 sec



CONTINUED

- QRS INTERVAL
- Time taken for ventricular depolarization.
- Measured from the beginning of Q wave to the end of the S wave.
- Normal QRS interval is 0.100 sec.



CONTINUED

- QT INTERVAL
- Represents the duration of ventricular **systole** and is measured from beginning of the Q wave to the end of T wave.
- Normal duration 0.420 sec



CONTINUED

- PR SEGMENT
- Measured from the **end** of the P wave to the beginning of the QRS complex.
- Normally isoelectric.

CONTINUED

- ST JUNCTION(J point)
- Point at which QRS complex ends and ST segment begins.
- ST SEGMENT
- Measured from ST junction to **beginning** of the T wave.
- May be slightly depressed or elevated in chest leads but usually isoelectric.
- Represents time **between** ventricular depolarization and repolarization.