Al-Mustaqbal University

College of Engineering & Technology

Biomedical Engineering Department

Subject Name: Medical Measurement lab 2

4 Class, Second Semester

Subject Code: [Insert Subject Code Here]

Academic Year: 2024-2025

Lecturer: Assist lect. Hiba Diaa Alrubaie

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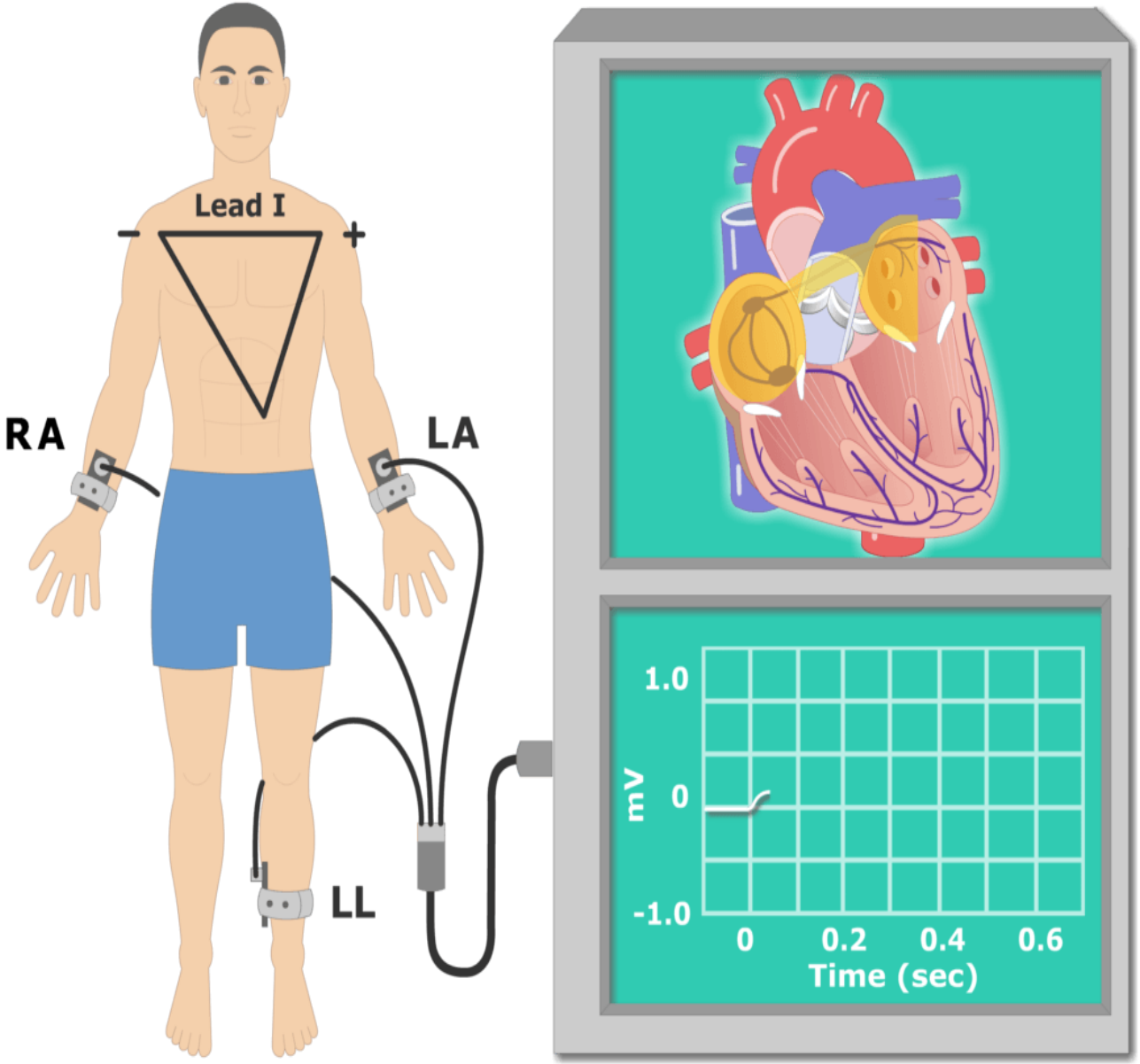
Lecture No.:-4

Lecture Title: [ECG]

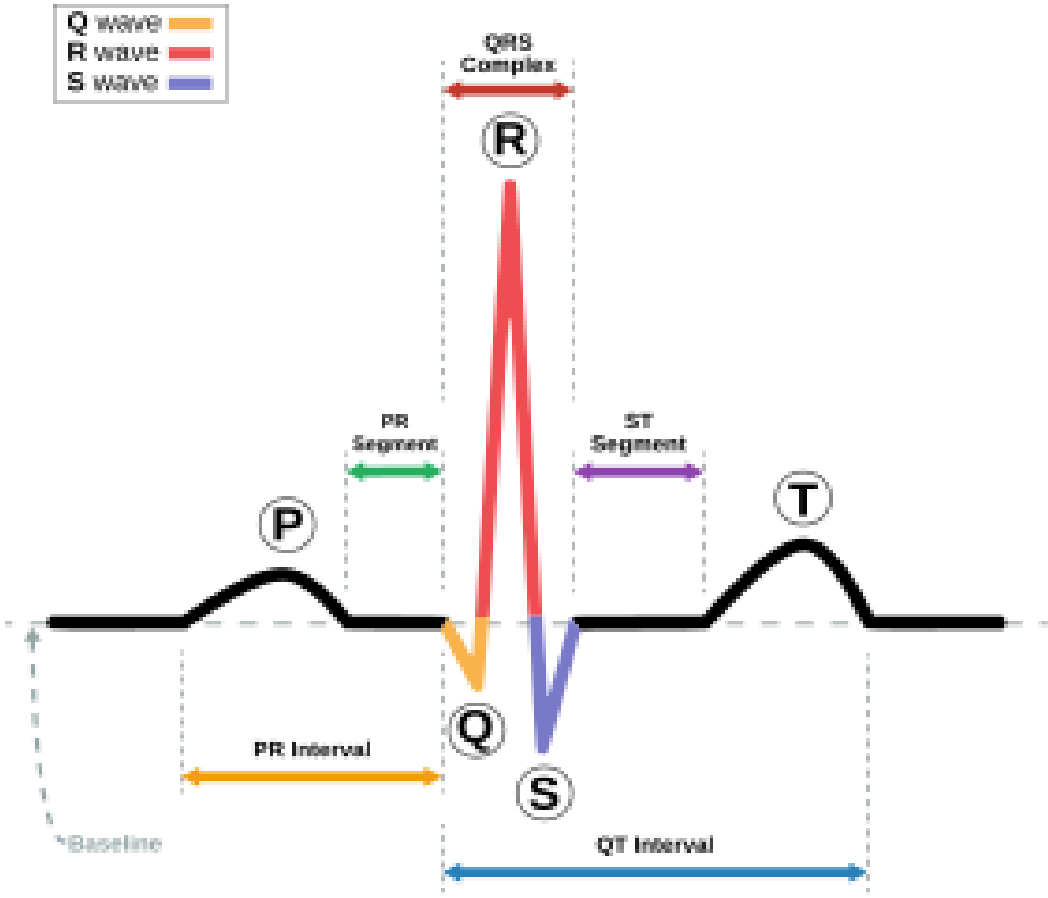
ECG (Electrocardiography) is a technique used to record the electrical activity of the heart over time. It is widely used in diagnosing and monitoring heart conditions. The ECG signal represents the depolarization and repolarization of the heart muscles and is typically displayed as a waveform with characteristic components:



Components of an ECG Signal:

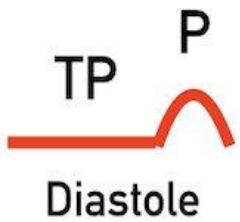
•**P Wave** – in an ECG represents **atrial depolarization**, which is the electrical activation of the **atria** (the upper chambers of the heart). This depolarization causes the atria to contract and push blood into the ventricles. Duration: Normally 0.08 to 0.12 seconds (80-120 ms).Amplitude: Typically less than 2.5 mm in height.

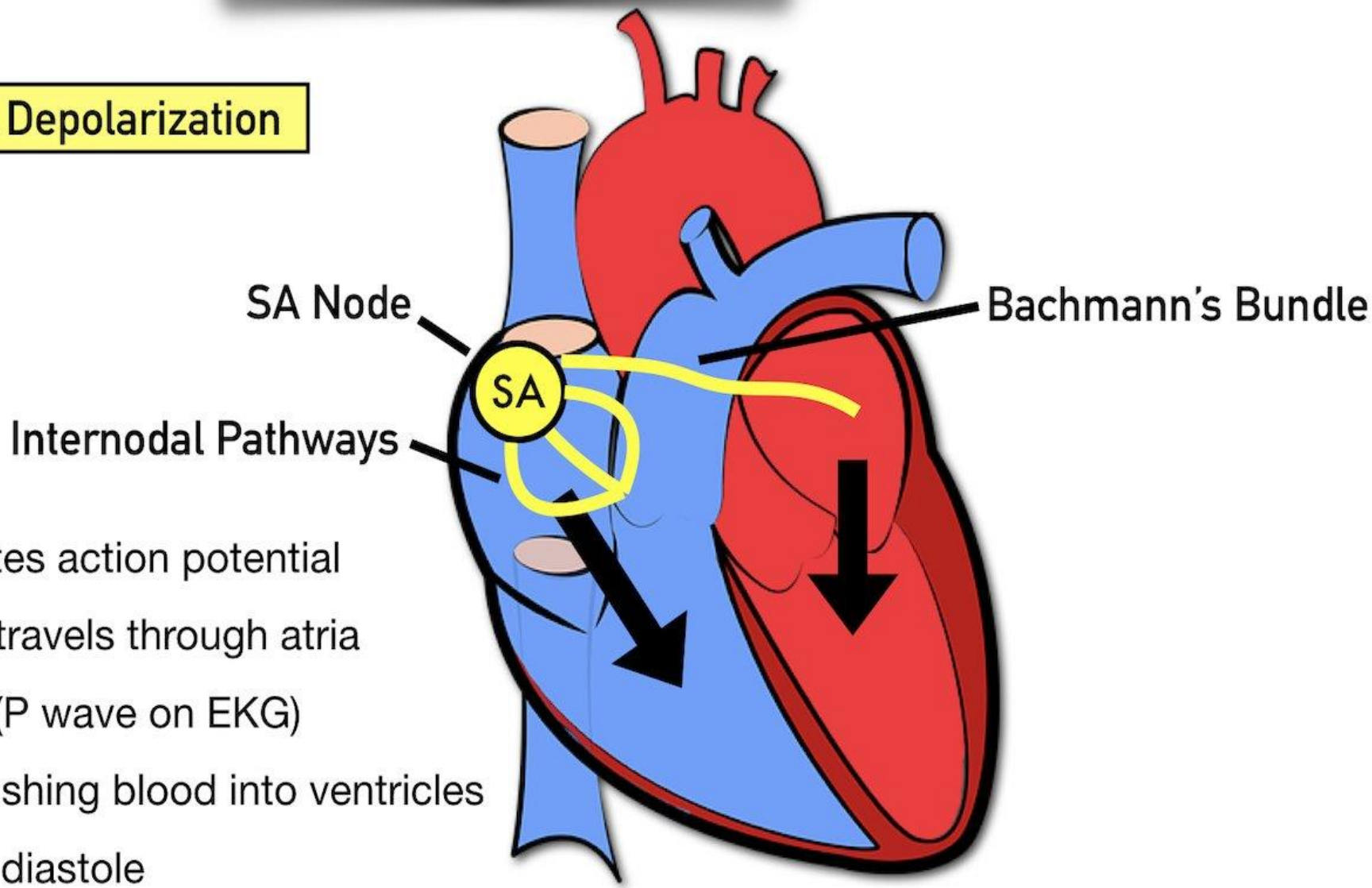
•The P wave is essential in diagnosing atrial abnormalities, conduction disorders, and conditions like atrial fibrillation, atrial flutter, and heart block.



EKGs Made Easy

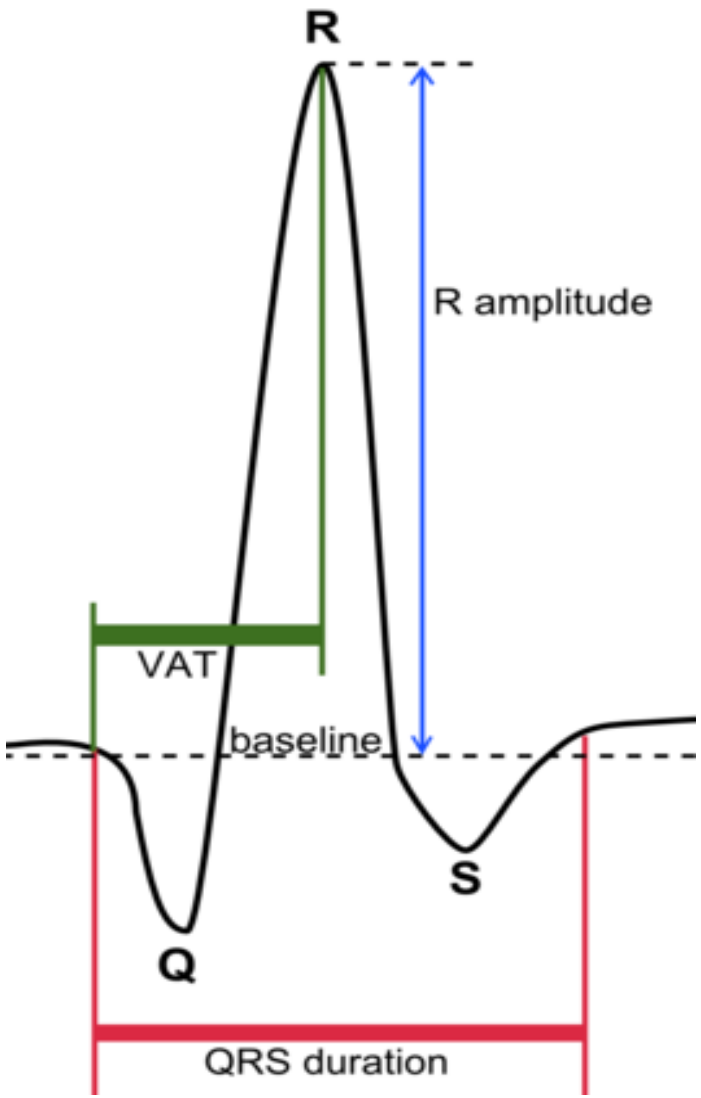
P wave = Atrial Depolarization





- SA node generates action potential
- Action potential travels through atria
- Atria depolarize (P wave on EKG)
- Atria contract pushing blood into ventricles
- Occurs mid-late diastole

QRS Complex – The **QRS complex** in an ECG represents **ventricular depolarization**, which is the electrical activation of the **ventricles** (the lower chambers of the heart). This depolarization triggers **ventricular contraction**, which pumps blood to the lungs and the rest of the body.



Features of the QRS Complex:

1. **Duration**: Normally **0.06 to 0.12 seconds** (60-120 ms).
2. **Amplitude**: Typically **5-30 mm**, depending on the lead and heart condition.
3. **Shape**: Sharp and narrow in a normal heart.

The QRS complex is crucial for diagnosing ventricular arrhythmias, conduction disorders, and heart muscle damage.

It also helps assess the effects of pacemakers and the efficiency of heart function.

T Wave – Ventricular Repolarization

- The **T wave** in an ECG represents **ventricular repolarization**, which is the process of the ventricles returning to their resting state after contraction. This phase prepares the heart for the next cycle of depolarization.