

Arrhythmias

Dr Wainaina Samuel

Arrhythmias

- Arrhythmias and conduction disorders are caused by abnormalities in the generation or conduction of these electrical impulses or both.
- Any heart disorder, including congenital abnormalities of structure or function, can disturb rhythm.
- Systemic factors that can cause or contribute to a rhythm disturbance include electrolyte abnormalities, hypoxia, hormonal imbalances, and drugs and toxins.

Normal cardiac rhythm

- The resting sinus heart rate in adults is usually 60 to 100 beats/min.
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- Sinus bradycardia occur in young people, particularly athletes, and during sleep.
- Sinus tachycardia occur during exercise, illness, or periods of intense emotion through sympathetic neural and circulating catecholamine drive.
- Normally, a marked diurnal variation in heart rate occurs, with lowest rates just before early morning awakening.
- A slight increase in rate during inspiration with a decrease in rate during expiration (respiratory sinus arrhythmia) is also normal;

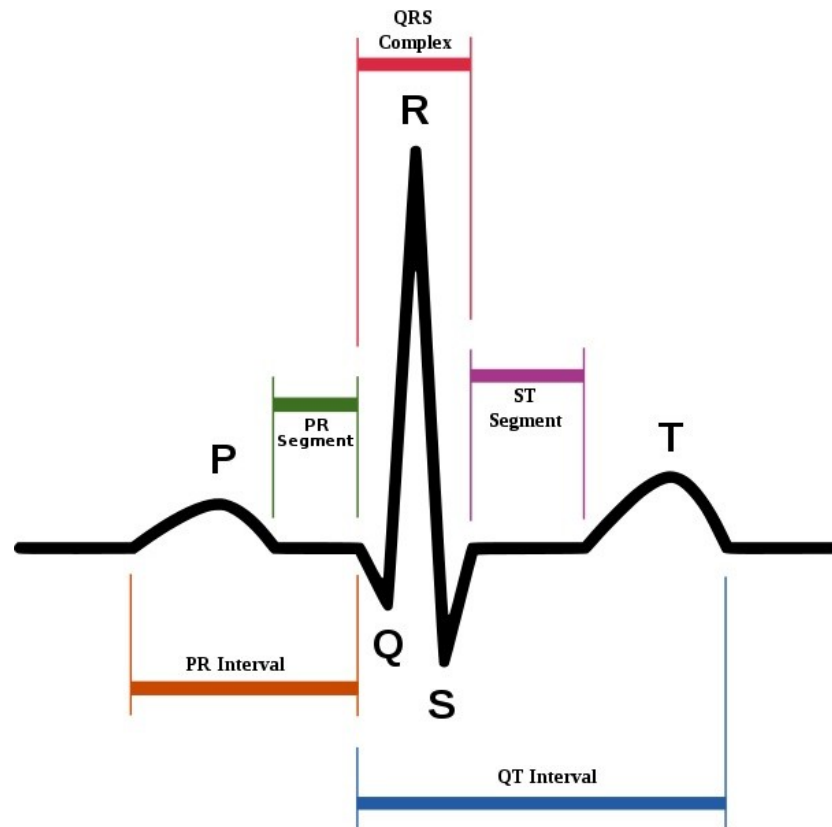
Pathophysiology

- Rhythm disturbances result from abnormalities of impulse formation, impulse conduction, or both.
- Bradyarrhythmias result from decreased intrinsic pacemaker function or blocks in conduction, principally within the AV node or the His-Purkinje system.
- Tachyarrhythmias are caused by reentry.
- **Reentry** is the circular propagation of an impulse around 2 interconnected pathways with different conduction characteristics and refractory periods

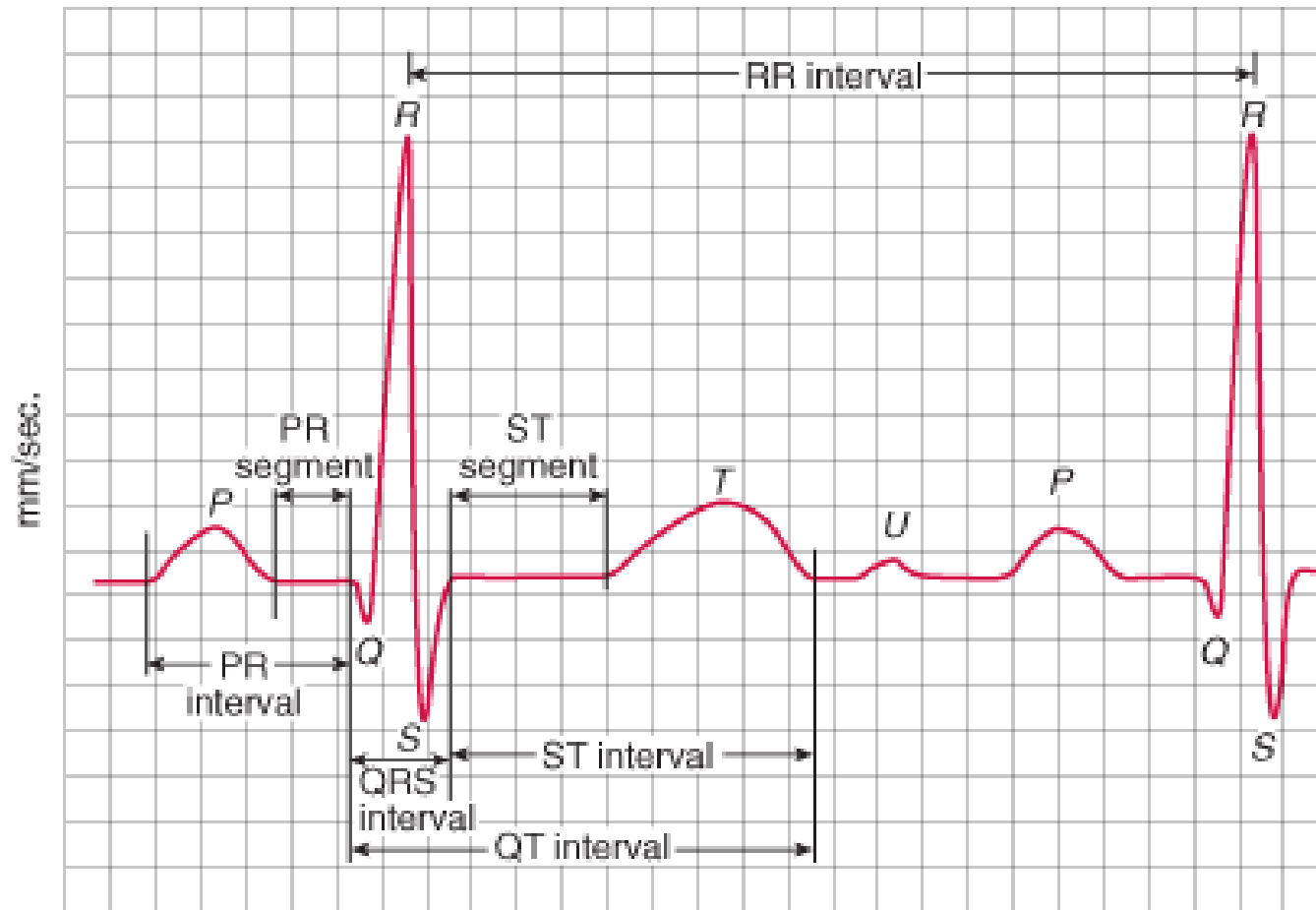
Electrocardiogram(ECG)

- Most cardiac electrical activity is represented on the ECG although SA node, AV node, and His-Purkinje depolarization does not involve enough tissue to be detected.
- The P wave represents atrial depolarization. The QRS complex represents ventricular depolarization, and the T wave represents ventricular repolarization.

QRS COMPLEX



ECG Printout



mm/mV 1 square = 0.04 sec/0.1mV

Interpretation of the QRS Complex

- The PR interval is the time from the beginning of atrial activation to the beginning of ventricular activation.
- Much of this interval reflects slowing of impulse transmission in the AV node.
- The R-R interval represents the ventricular rate.
- The QT interval represents the duration of ventricular depolarization.
- Normal values for the QT interval are slightly longer in women; they are also longer with a slower heart rate.

Symptoms and Signs

- Palpitations (sensation of skipped beats or rapid or forceful beats),
- Hemodynamic compromise (eg, dyspnea, chest discomfort, presyncope, syncope),
- Cardiac arrest.
- Polyuria results from release of atrial natriuretic peptide during prolonged supraventricular tachycardias (SVTs).

Diagnosis

- The ECG is primary tool of diagnosis
- The key diagnostic features are .
 1. Rate of atrial activation
 2. Rate and regularity of ventricular activation
 3. The relationship between the two

Classification of Arrhythmias

1. Bradyarrhythmias

- ECG diagnosis of bradyarrhythmias depends on the presence or absence of P waves, morphology of the P waves, and the relationship between P waves and QRS complexes

2. Tachyarrhythmias

- Tachyarrhythmias are defined by the QRS complexes

Bradyarrhythmias

- 1. AV block** is indicated by a bradyarrhythmia with no relationship between P waves and QRS complexes and more P waves than QRS complexes
- 2. Absence of AV block** is indicated by a regular QRS bradyarrhythmia with a 1:1 relationship between P waves and QRS complexes.

Tachyarrhythmias

- **Atrial fibrillation** (AF): Atrial ECG signals (usually best seen in lead V1) that are continuous, irregular in timing and morphology, and very rapid (> 300 beats/min) without discrete P wave
- **Atrial flutter**: Regular, discrete, uniform atrial signals (usually best seen in leads II, III, and aVF) without intervening isoelectric periods, usually at rates > 250 beats/min

Treatment

- The need for treatment of arrhythmias depends on the symptoms and the seriousness of the arrhythmia.
- Treatment is directed at causes.
- direct antiarrhythmic therapy, including
 1. antiarrhythmic drugs,
 2. cardioversion-defibrillation,
 3. implantable cardioverter-defibrillators(ICDs),
 4. pacemakers
 5. catheter ablation
 6. surgery

Disopyramide Procainamide*	APB and VPB suppression, SVT and VT suppression, AF or atrial flutter, and VF suppression
Quinidine*	Oral: 200–400 mg q 4–6 h
Lidocaine Mexiletine	Suppression of ventricular arrhythmias (VPB, VT, VF)