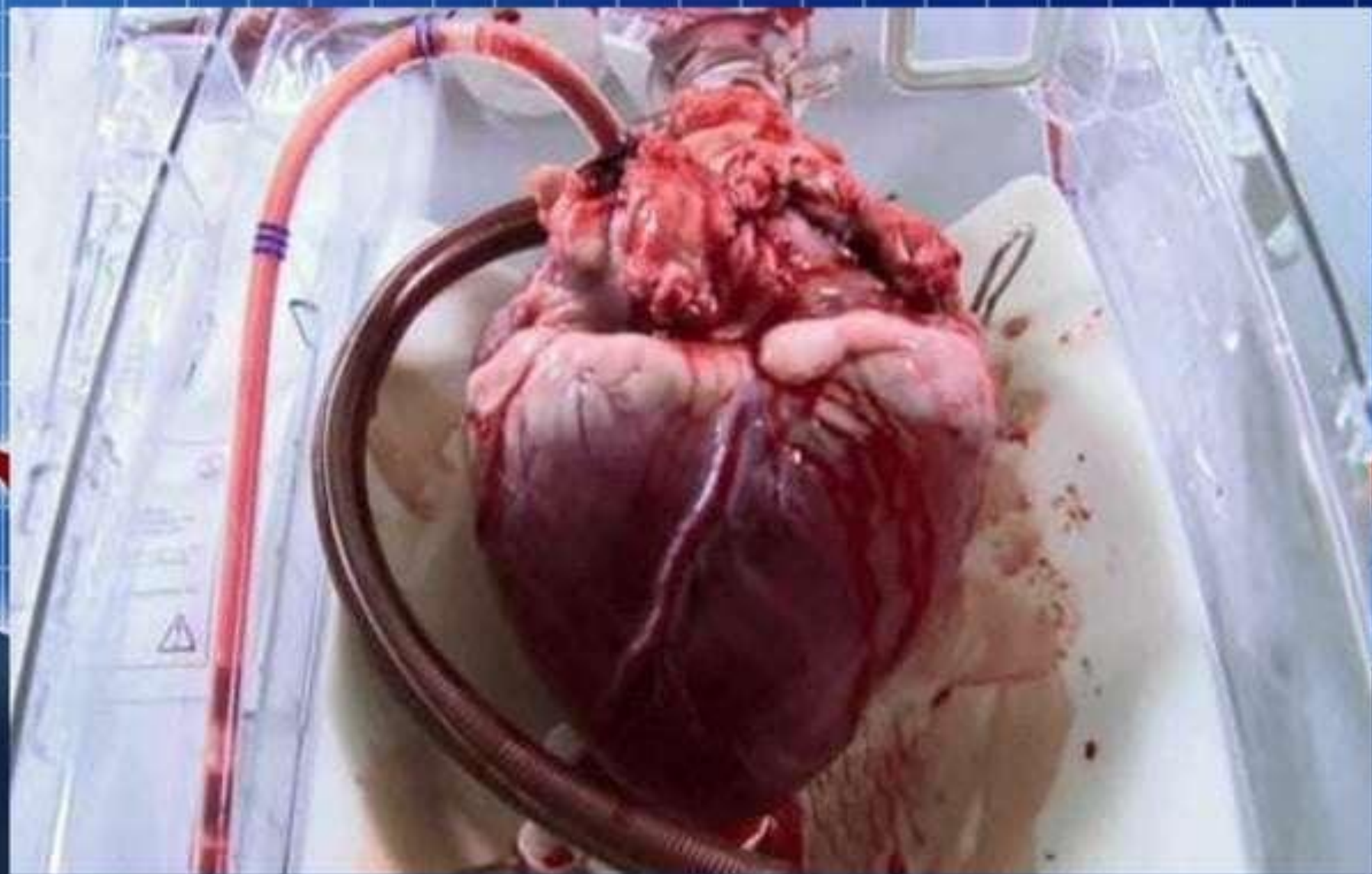


GENERATION AND CONDUCTION OF CARDIAC IMPULSE



**BY:
S. DASH**





Frontal plane through heart

Sinoatrial (SA) node

Anterior internodal

Atrioventricular (AV) node

Middle internodal

Posterior internodal

Right atrium

Right ventricle

Arch of aorta

Bachman's bundle

Left atrium

Atrioventricular (AV) bundle (bundle of His)

Left ventricle

Right and left bundle branches

Purkinje fibers

Anterior view of frontal section

STEPS INVOLVED:

Step 1: Pacemaker Impulse Generation

The first step of cardiac conduction is impulse generation.




The **sinoatrial (SA) node** (pacemaker of the heart) contracts, generating **nerve impulses** that travel throughout the **heart wall**.

This causes both **atria** to contract. The SA node is located in the upper wall of the right atrium. It is composed of nodal tissue that has characteristics of both muscle and **nervous tissue**.

Step 2: AV Node Impulse Conduction

The atrioventricular (AV) node lies on the right side of the partition that divides the atria, near the bottom of the right atrium.



When the impulses from the SA node reach the AV node, they are delayed for about a tenth of a second.

This delay allows atria to contract and empty their contents into the ventricles prior to ventricle contraction.

Step 3: AV Bundle Impulse Conduction

The impulses are then sent down the atrioventricular bundle.



This bundle of fibers branches off into two bundles and the impulses are carried down the center of the heart to the left and right ventricles.

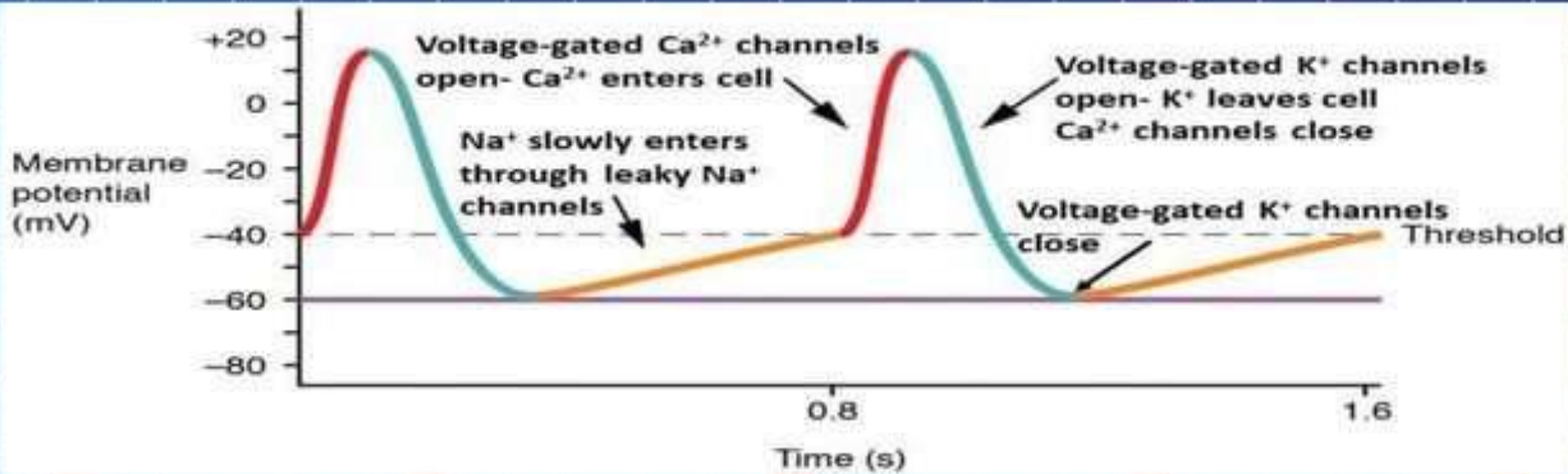
Step 4: Purkinje Fibers Impulse Conduction

At the base of the heart, the atrioventricular bundles start to divide further into Purkinje fibers.



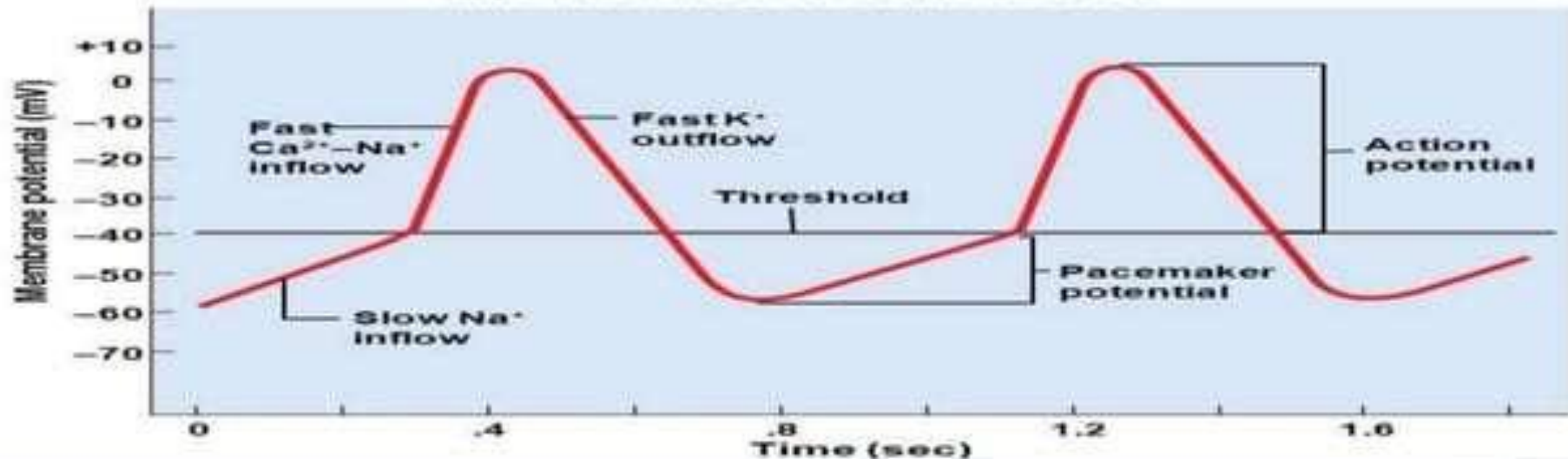
When the impulses reach these fibers they trigger the muscle fibers in the ventricles to contract.

The right ventricle sends blood to the lungs via the pulmonary artery. The left ventricle pumps blood to the aorta.



SA Node Potentials

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□ ELECTROCARDIOGRAM

Electrocardiography is the process of producing an electrocardiogram (ECG or EKG), a recording – a graph of voltage versus time – of the electrical activity of the heart using electrodes placed on the skin.



These electrodes detect the small electrical changes that are a consequence of cardiac muscle **depolarization** followed by **repolarization** during each cardiac cycle (heartbeat).

Changes in the normal ECG pattern occur in numerous cardiac abnormalities, including cardiac rhythm disturbances (such as **atrial fibrillation** and **ventricular tachycardia**), inadequate coronary artery blood flow (such as **myocardial ischemia** and **myocardial infarction**), and electrolyte disturbances (such as **hypokalemia** and **hyperkalemia**).

Electrocardiographs are recorded by machines that consist of a set of electrodes connected to a central unit.

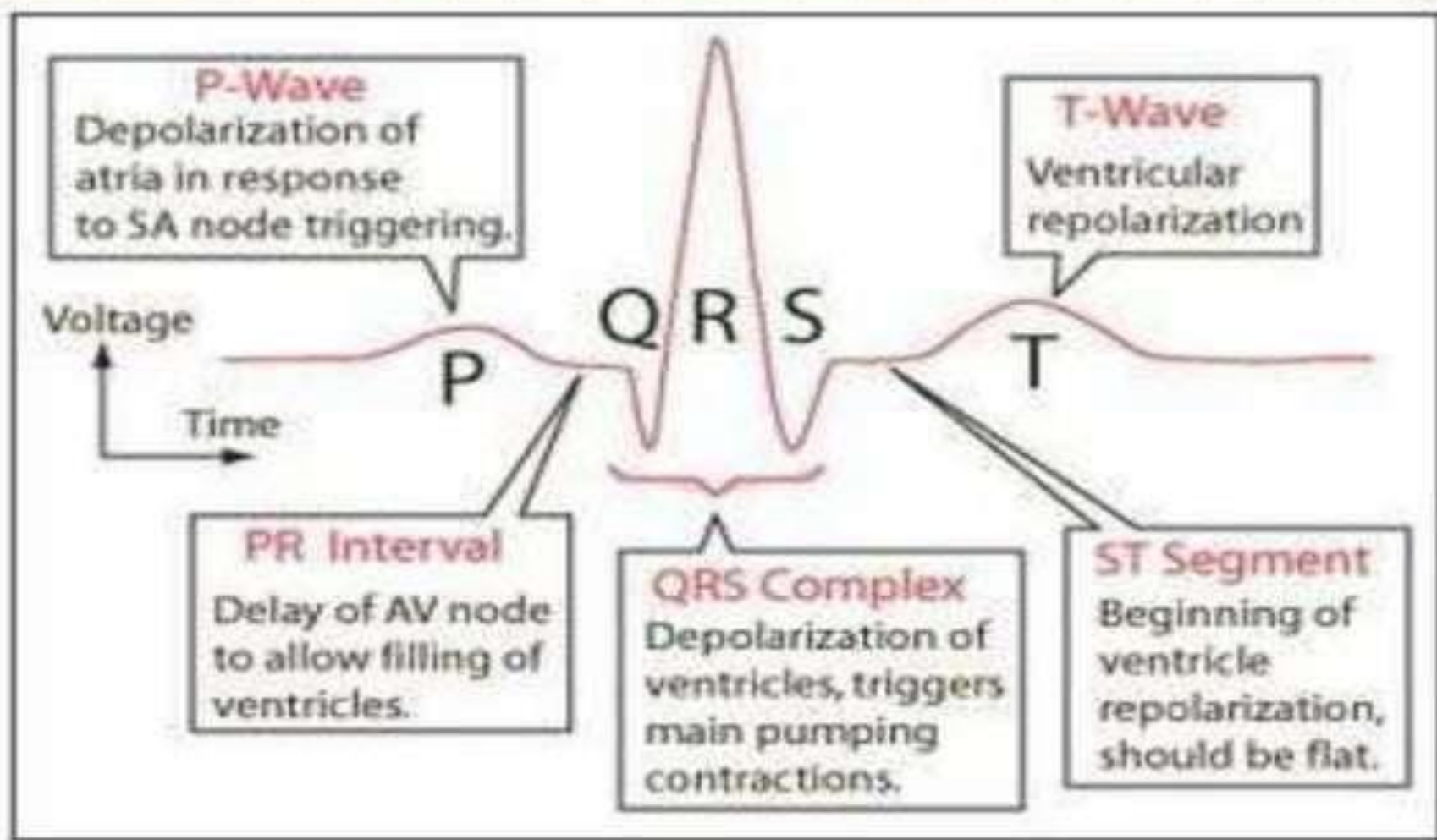
Electrocardiographs use **analog-to-digital converters to convert the electrical activity of the heart to a **digital signal**.**



Recent advancements in electrocardiography include developing even smaller devices for inclusion in fitness trackers and smart watches . These smaller devices often rely on only two electrodes to deliver a single lead.

AN ELECTROCARDIOGRAPH WITH INTEGRATED DISPLAY AND KEYBOARD.





COMPONENTS OF ECG

ARRHYTHMIA

An arrhythmia is a problem with the rate or rhythm of your heartbeat.

It means that your heart beats too quickly, too slowly, or with an irregular pattern.



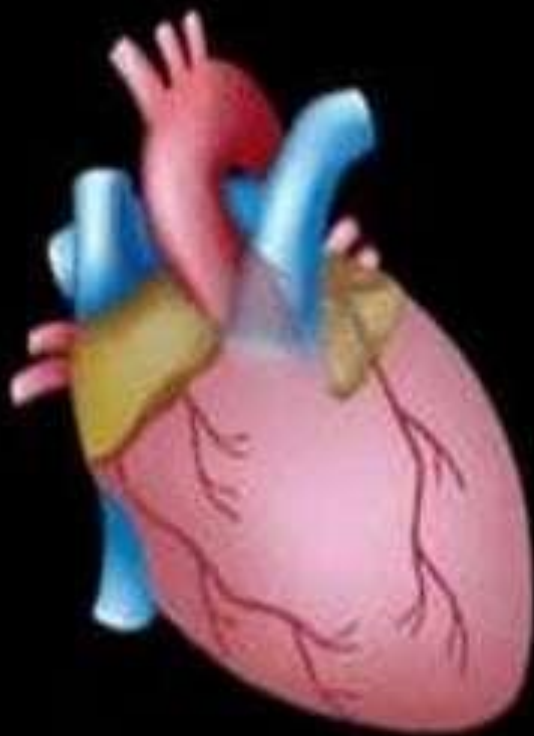
When the heart beats faster than normal, it is called tachycardia.

When the heart beats too slowly, it is called bradycardia.

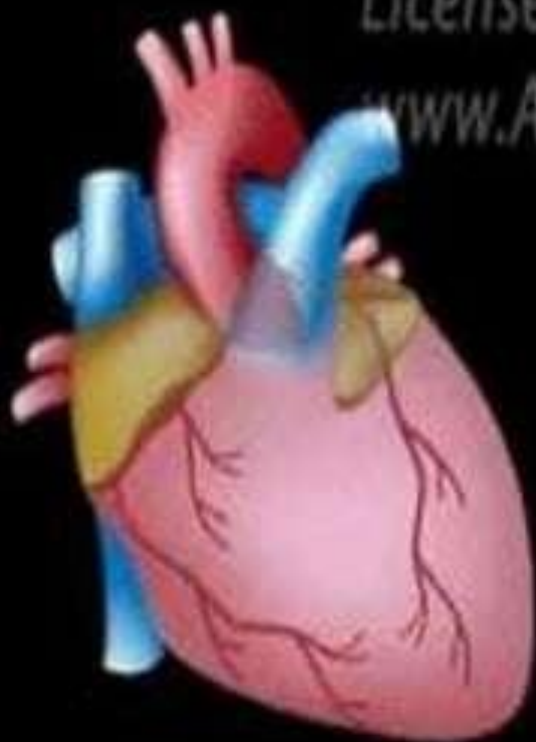
The most common type of arrhythmia is atrial fibrillation, which causes an irregular and fast heart beat.

SINUS RHYTHMS

Normal



Bradycardia



Tachycardia



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Normal



A-Fib



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Many factors can affect your heart's rhythm, such as having had a heart attack, smoking, congenital heart defects, and stress. Some substances or medicines may also cause arrhythmias.



SYMPTOMS OF ARRHYTHMIAS INCLUDE

- Fast or slow heart beat
- Skipping beats
- Lightheadedness or dizziness
- Chest pain
- Shortness of breath
- Sweating

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THANK YOU

