

# MODULE 4 L01


## Nodal Cells

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# 1. Coordination of Cardiac Contractions

- Contraction cycles
  - ❖ Systole - contraction
  - ❖ Diastole – relaxation
- Chamber pressure
  - ❖ Rises
  - ❖ Falls
- Help comes from:
  - ❖ AV valves
    - Blood flows out of atria → ventricles
      - AV valves are open
      - Atrial pressure  $\uparrow$  ventricular pressure
  - ❖ Semilunar valves
    - Blood flows out of ventricles → arterial trunks
      - Semilunar valves are open
      - Ventricular pressure  $\uparrow$  arterial pressure



Proper timing of atrial and ventricular contractions

- Elaborate pacemaking
- Conduction systems

# Types of Cardiomyocytes

- A. Nodal (conductive) cells
  - Pacemakers
- B. Contractive cells
  - All other cardiomyocytes

# Nodal (Conductive) Cells

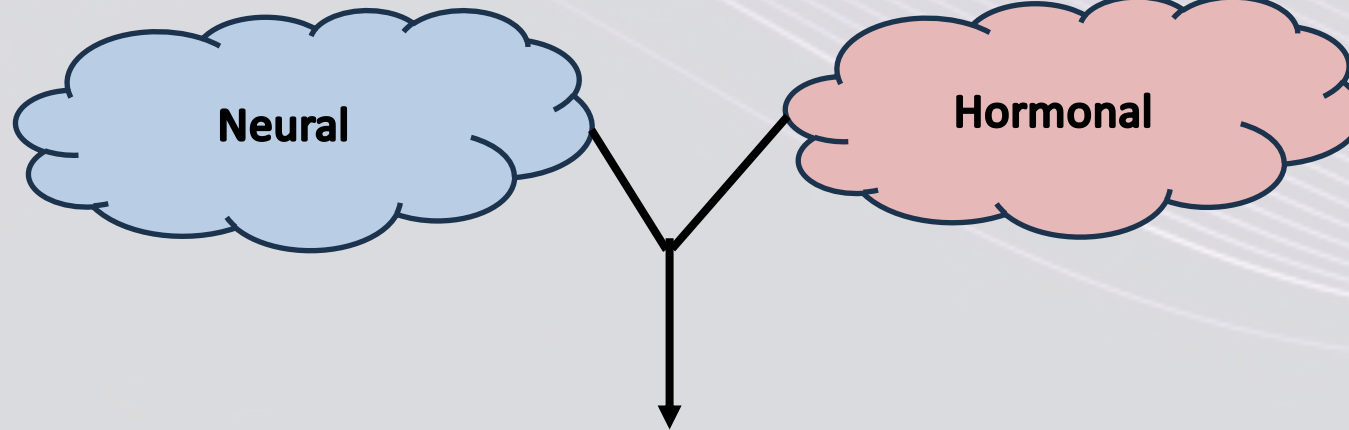
- Are autorhythmic

- ❖ Definition:

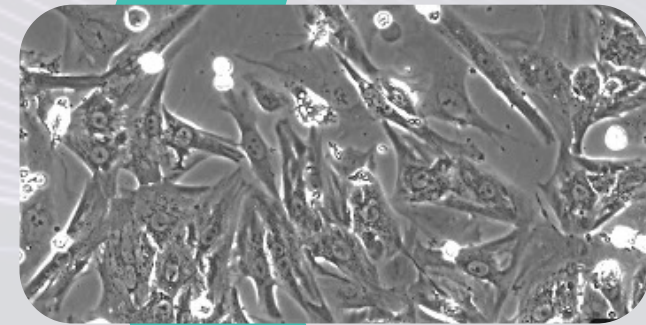
- Inherent ability to generate and conduct impulses



- Cardiac muscle tissue contracts on its own



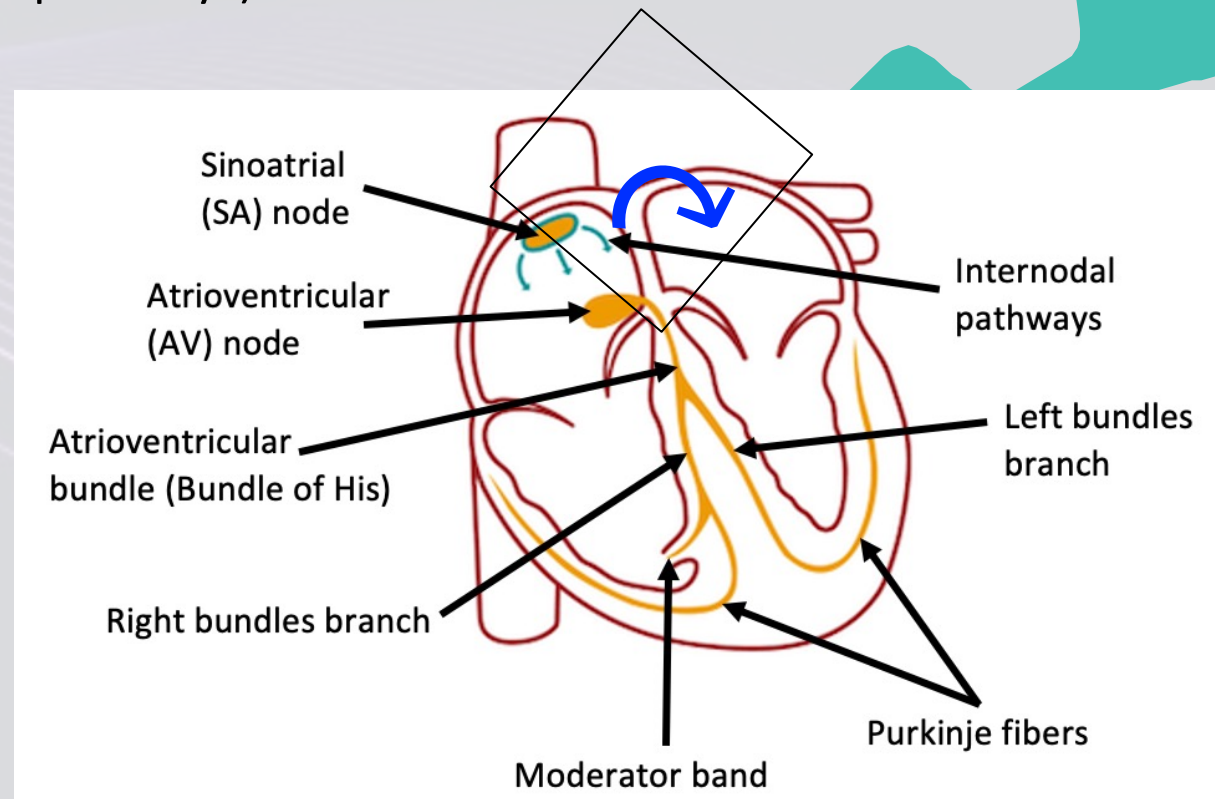
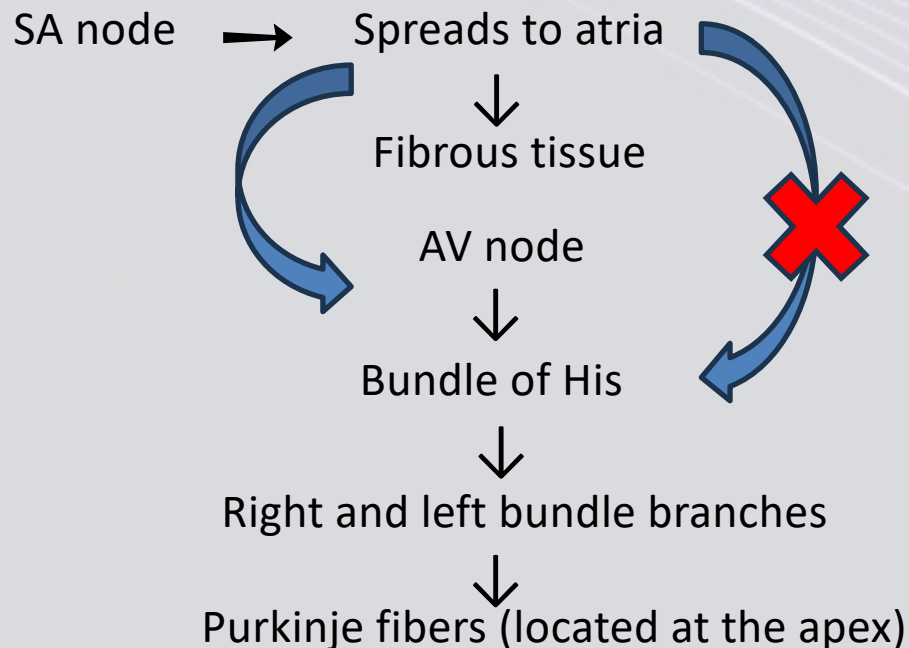
Alter basic rhythm of contraction



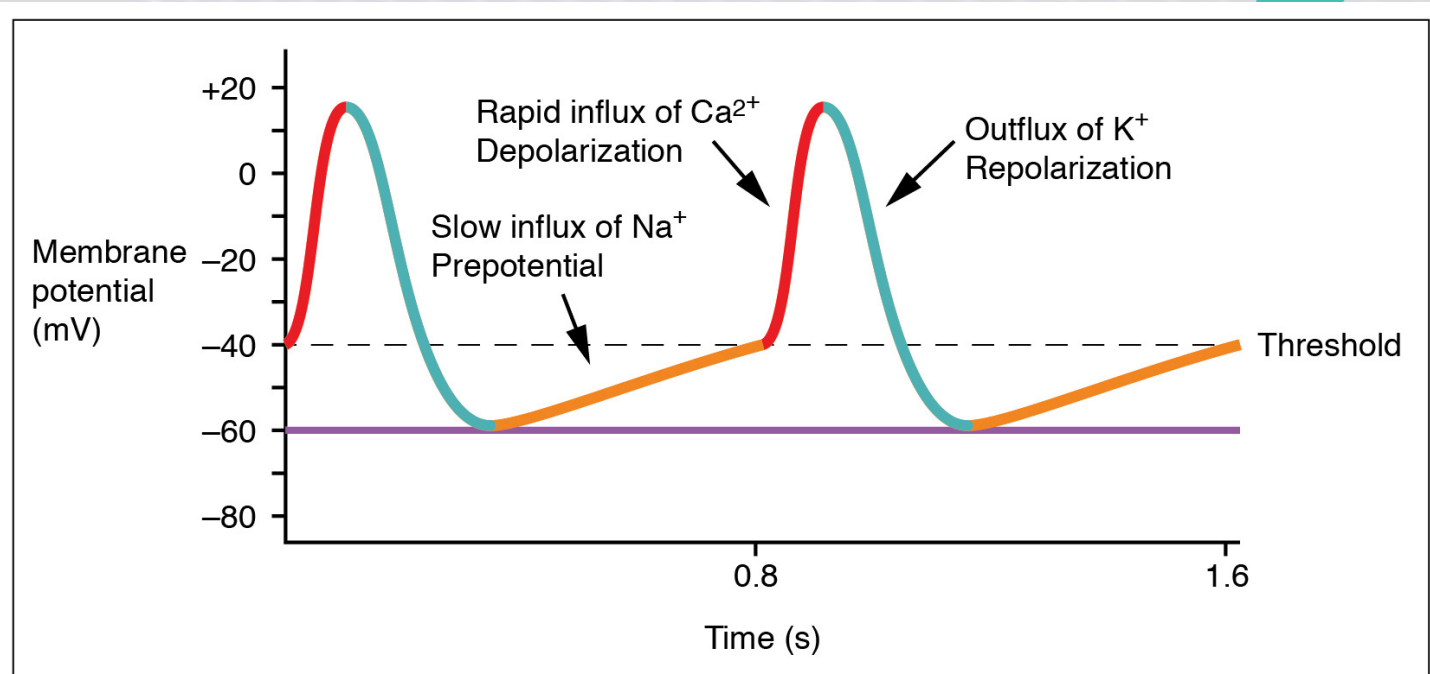
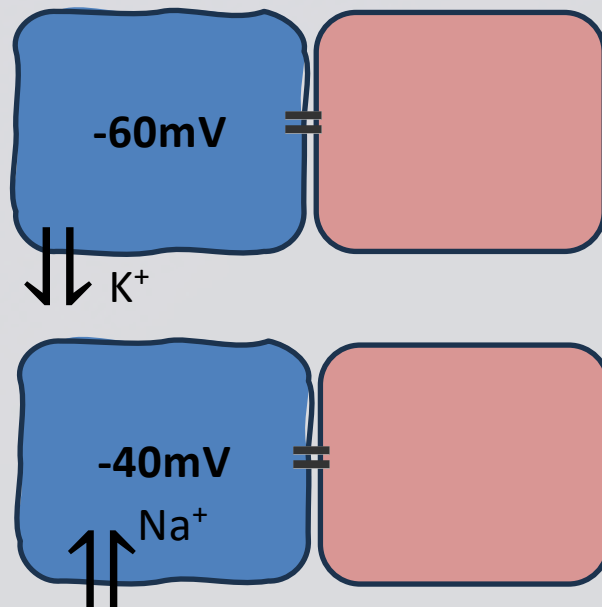
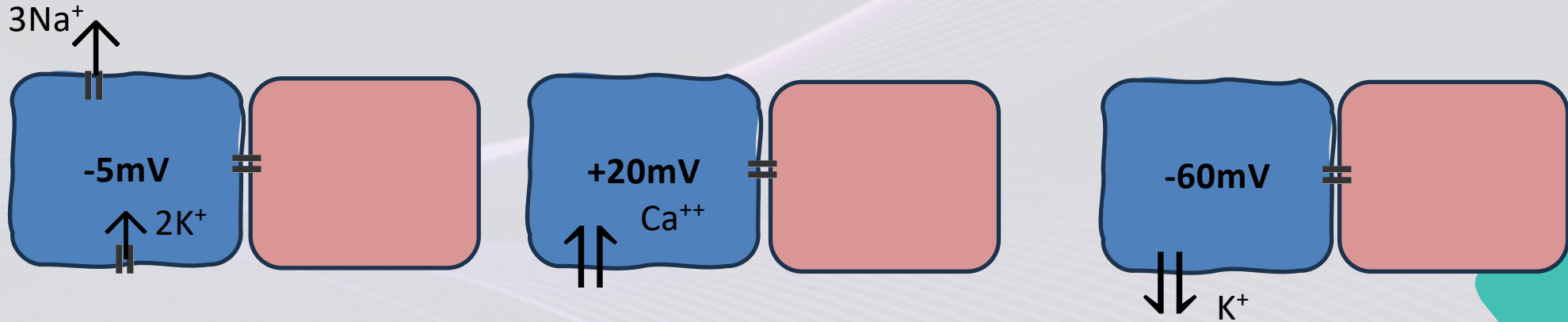


# Heart Pacemaker Cells

- Specialized cells that spontaneously depolarize = action potential → cells contract
  - ❖ Sinoatrial (SA) node
    - Spreads into atria (internodal pathways)
  - ❖ Atrioventricular (AV) node
    - Spreads down to heart apex



# Action Potential at SA Node



# Sinoatrial and Atrioventricular Nodes

## Components of Conducting System

SA node	Contains pacemaker cells that initiate the electrical impulse that results in a heartbeat
Internodal pathways	Are conducting fibers in the atrial wall that conduct the impulse to the AV node while simultaneously stimulating cardiac muscle cells of both atria
AV node	Slows the electrical impulse when it arrives from the internodal pathways
AV bundle	Conducts the impulse from the AV node to the bundle branches
Left bundle branch	Extends toward the apex of the heart and then radiates across the inner surface of the left ventricle
Right bundle branch	Extends toward the apex of the heart and then radiates across the inner surface of the right ventricle
Moderator band	Relays the stimulus through the ventricles to the papillary muscles, which tense the chordae tendineae before the ventricles contract
Purkinje fibers	Convey the impulses very rapidly to the contractile cells of the ventricular myocardium

