

## BIOLOGICAL FRAMEWORKS FOR ENGINEERS

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### Session #26 [m: The Heart]

#### General Objectives:

- ✓ The heart is a sophisticated pump that moves blood through the body.
- ✓ Coordinated calcium fluxes and actin-myosin contraction is central to the function of the heart.

#### Central Framework:

- ✓ The vascular system is a dynamic flow system with feedback control enabling the body systemically to maintain the viability and metabolic activity of individual tissues and cells

#### Session Outline:

##### A. Anatomy

Left heart

Right heart

Atrium

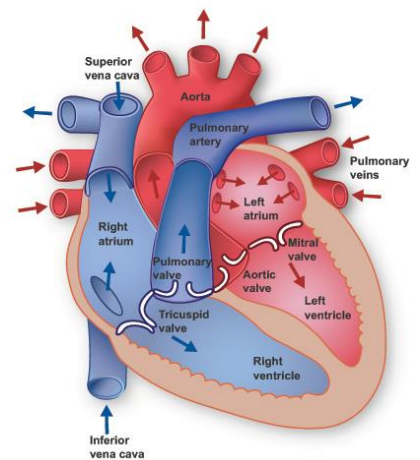
Ventricle

Tricuspid and mitral valves

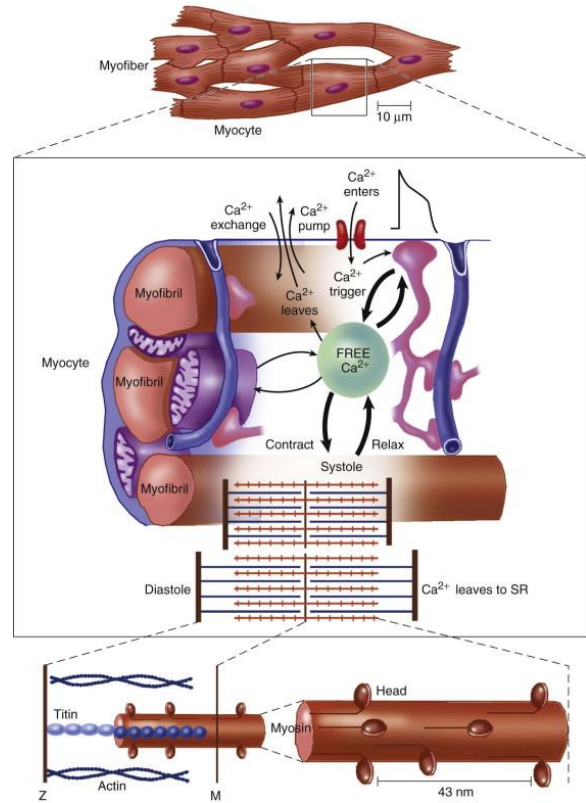
Pulmonary and aortic valves

Systole

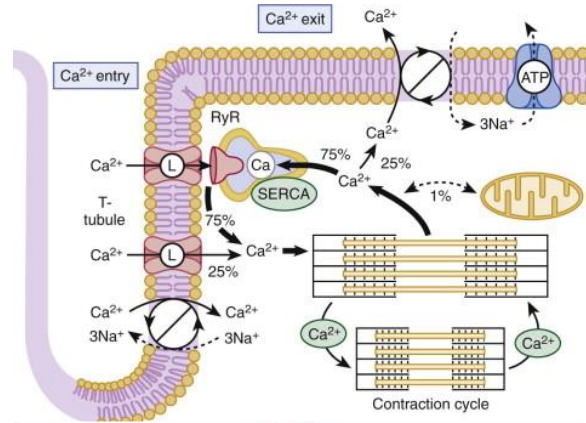
Diastole



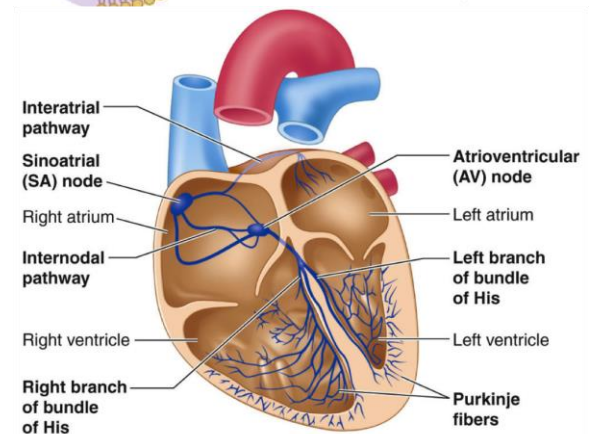
B. Cardiomyocytes



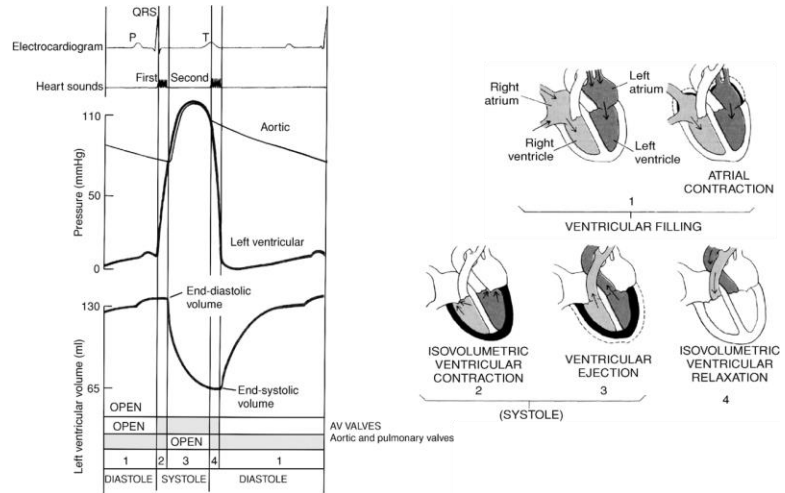
C. Calcium Handling



D. Heart Signal

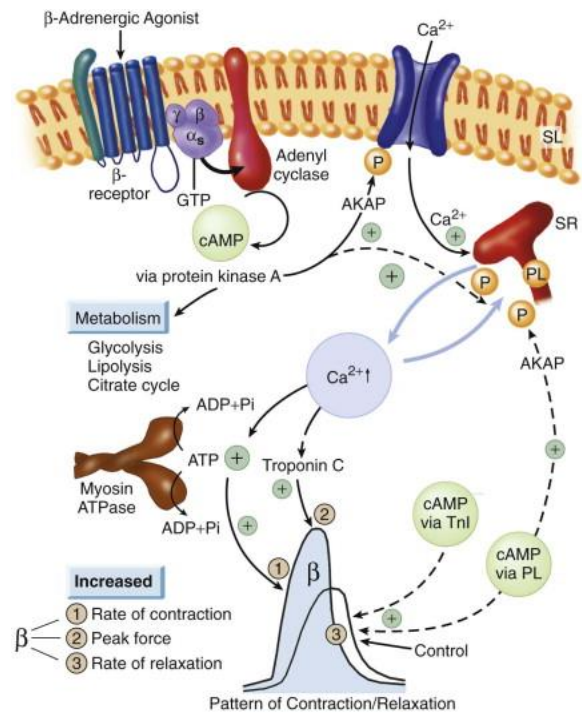


E. Cardiac Cycle



F. Frank-Starling Law

G. Beta-adrenergic stimulation



## H. Replacement Parts

Heart Valves

Left Ventricular Assistive Devices

Artificial Hearts

Cardiac Stem Cells