

BIOLOGICAL FRAMEWORKS FOR ENGINEERS

Session #27 [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

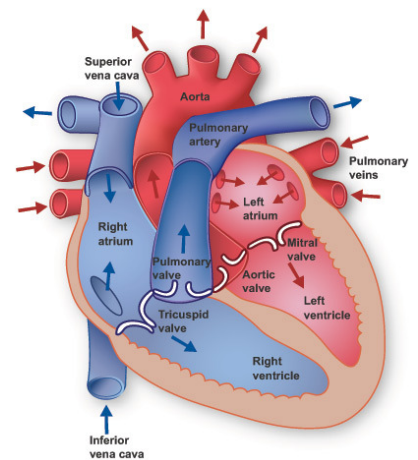
Ventricle

Tricuspid and mitral valves

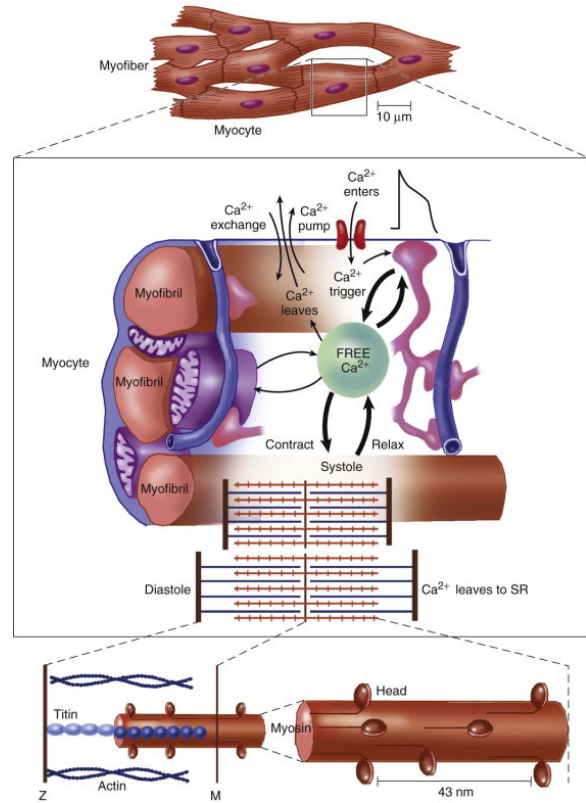
Pulmonary and aortic valves

Systole

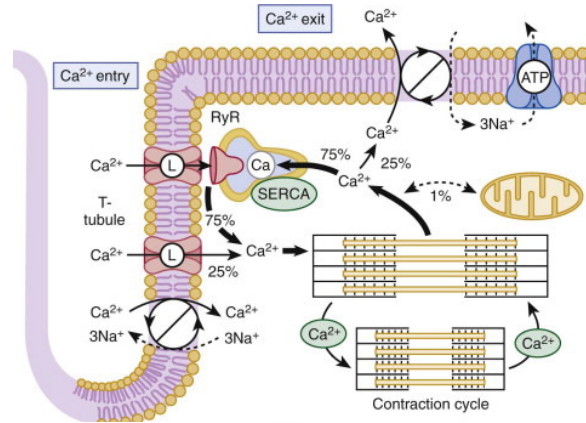
Diastole



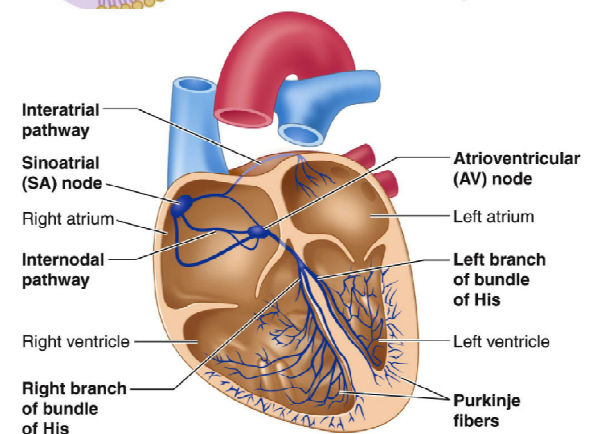
B. Cardiomyocytes



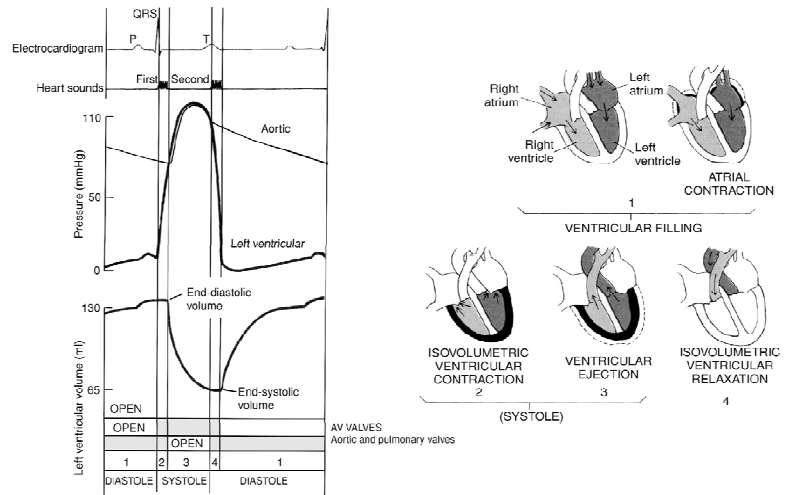
C. Calcium Handling



D. Heart Signal

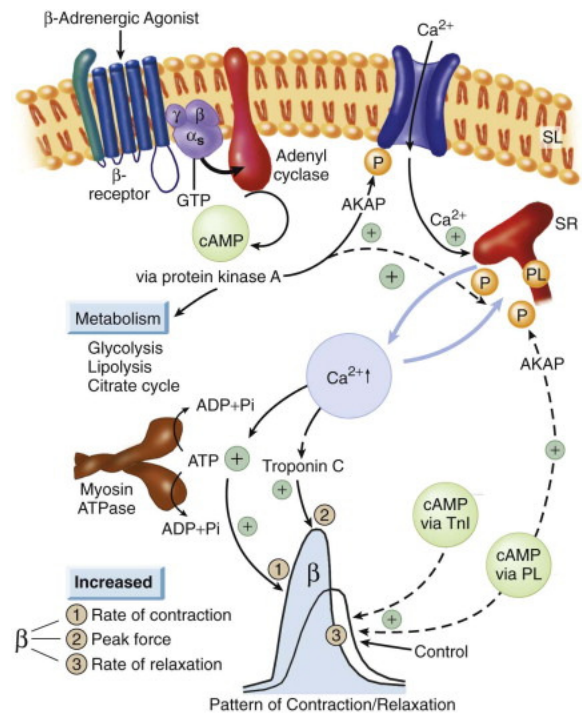


E. Cardiac Cycle



F. Frank-Starling Law

G. Beta-adrenergic stimulation



H. Replacement Parts

Heart Valves

Left Ventricular Assistive Devices

Artificial Hearts

Cardiac Stem Cells