

BIOLOGICAL FRAMEWORKS FOR ENGINEERS

Session #17 [Muscle Cells to Tissues]

General Objectives:

- ✓ Review the molecular interactions of the contractile machinery in muscles.
- ✓ Discuss the biomechanics of muscle physiology from a micro and macro perspective

Central Framework:





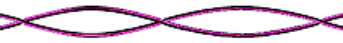

- ✓ Muscles are complex actuators through which chemistry and organization provide the body with movement.

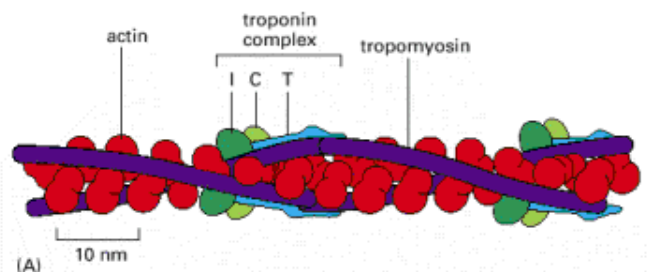
Session Outline:

I. Muscle Overview

II. Structure of Muscle

III. Molecular Participants

- | | | | |
|-----------------------|---|------------------------|--|
| 1. Myosin |  | 4. Troponin |  |
| 2. Actin |  | 5. ATP |  |
| 3. Tropomyosin |  | 6. Calcium ions |  |

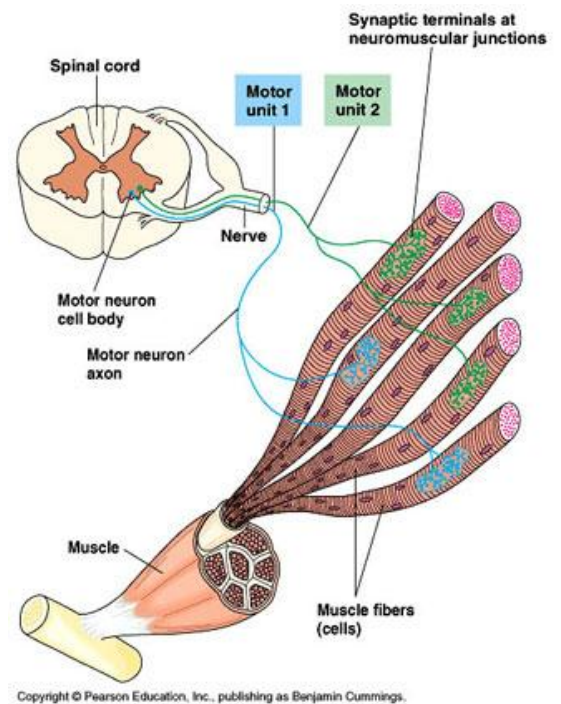


IV. Actomyosin Contraction

V. Proteins which support muscle contraction

- A. Metabolic Pathways
- B. Ligand Gated Ion Channels
- C. Neurons
- D. Ion pumps

VI. Neural Signaling and Muscle Activation



VII. Muscle Mechanics

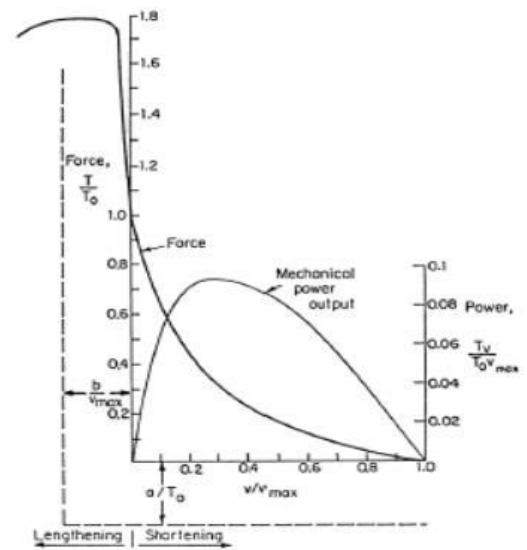
A. Muscle Conditions

- Isometric
- Isotonic

B. Mechanical Events

- Twitch
- Tetanus

C. Force-Velocity Relationship



D. Length – Tension Relationship

