

## BIOLOGICAL FRAMEWORKS FOR ENGINEERS

### Session #20 [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. Neural Signaling and Muscle Activation

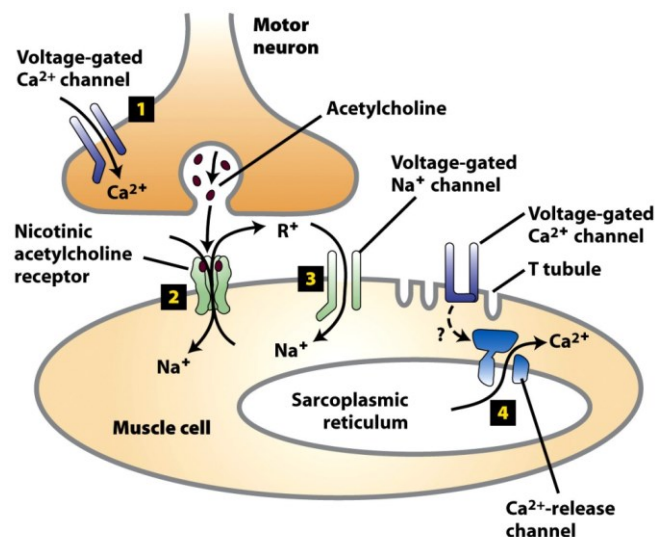


Figure 23-21  
Molecular Cell Biology, Sixth Edition  
© 2008 W. H. Freeman and Company

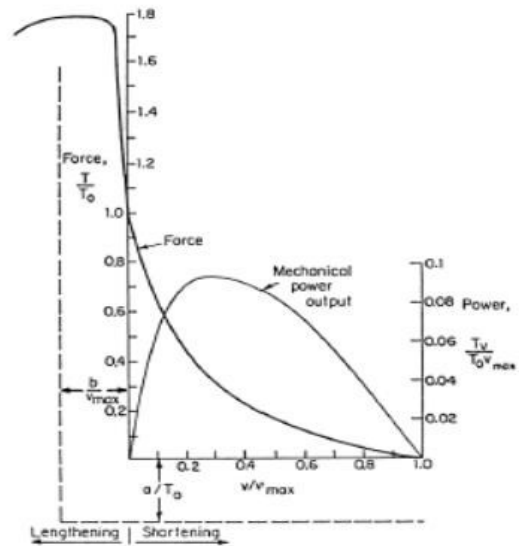
### III. Muscle Mechanics

#### A. TWITCH

#### B. Muscle Conditions

- Isometric
- Isotonic
- Tetanus

#### C. Force-Velocity Relationship



#### D. Length – Tension Relationship

