

Internal Affairs

■ How the Muscular System Works with Other Body Systems

□ How Other Systems Work with the Muscular System

Integumentary System

- Facial musculature attached to skin produces facial expression when contracted
- Covers and protects body musculature
- Removes excessive body heat
- Initiates synthesis of vitamin D needed for muscle contraction

Skeletal System

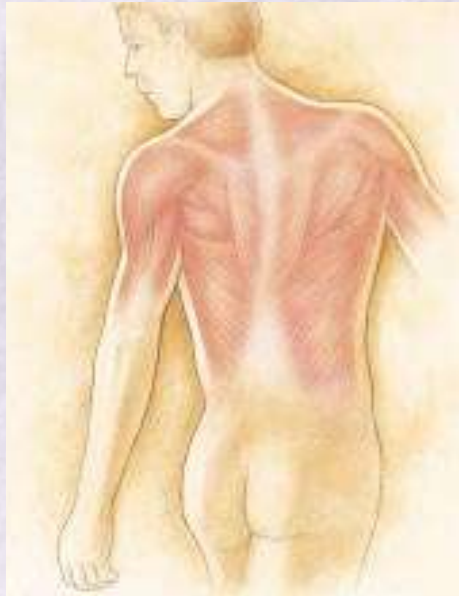
- Enables body movement and stabilizes joints
- Muscle contractions maintain the health and strength of bone
- Source of calcium and phosphate
- Provides attachment sites for muscles
- Joints of skeleton provide levers for movement

Nervous System

- Sensory receptors monitor body position via autonomic nervous system
- Muscles give expression to thoughts, emotions, and motor commands that arise in central nervous system
- Coordinates muscle contraction
- Increases cardiac output and respiratory rates during periods of muscle activity

Endocrine System

- Provides protection to certain endocrine glands
- Exercise stimulates secretion of stress hormones
- Sex hormones promote muscle development and maintenance
- Specific hormones regulate calcium and phosphate concentrations
- Epinephrine and norepinephrine stimulate muscle contraction



Circulatory System

- Tonus and voluntary muscle contractions assist blood movement, particularly within veins
- Transports O₂ and CO₂, nutrients, and fluids to and from muscles; removes lactic acid and heat

Lymphatic System

- Supports and protects superficial lymph nodes
- Muscle contractions assist lymph movement
- Exercise elevates levels of immune cells and antibodies
- Maintains balanced amount of interstitial fluid within muscle tissue
- Lymphocytes provide defense against infection

Respiratory System

- Respiratory muscles enable ventilation of lungs; sound production
- CO₂ generated by exercise stimulates respiratory rate and depth
- Provides O₂ and eliminates CO₂ to and from muscles

Digestive System

- Enables chewing and swallowing
- Supports and protects organs of GI tract
- Provides nutrients for growth, maintenance, and repair of muscles
- Liver regulates blood glucose levels

Urinary System

- Muscles of urinary tract surround urinary bladder and form urethral sphincter
- Muscles of pelvic floor support urinary bladder
- Eliminates metabolic wastes from muscles
- Assists regulation of calcium and phosphate concentrations

Reproductive System

- Supports pelvic viscera
- Contributes to erection; pelvic thrust during coitus; abdominal and pelvic muscles aid childbirth
- Gonads produce sex hormones that promote muscle development and maintenance