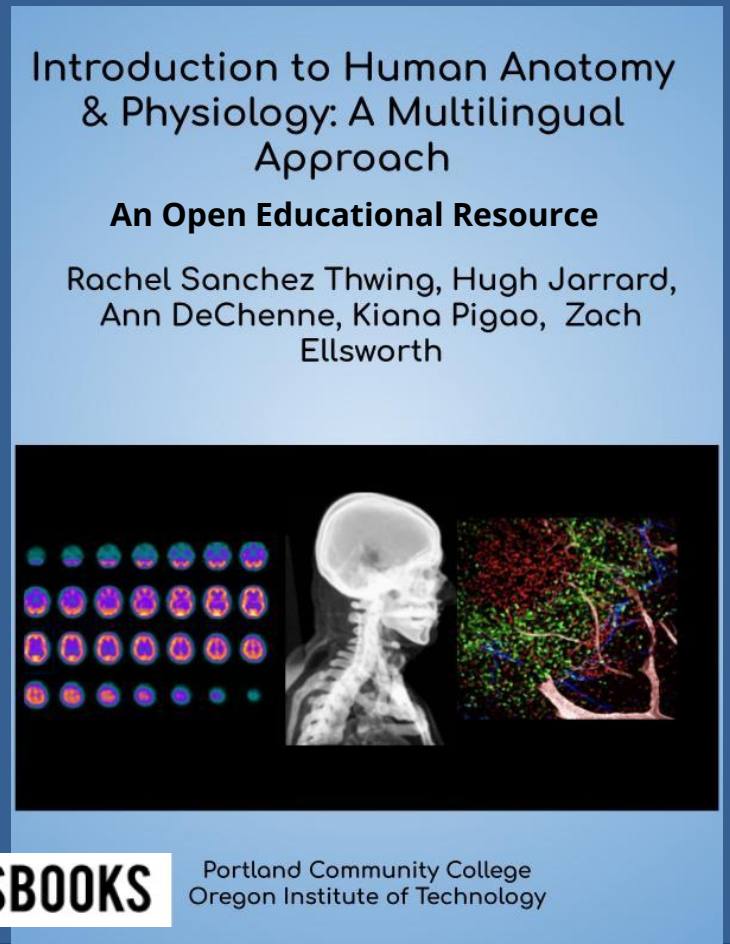
Muscular System:
Diseases



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Lesson 4: Diseases of the Muscular System

Learning Objectives:

Relate breakdowns in homeostasis to pathological presentations of the muscular system.

See the Muscular System Wordlist!

- Can be found in accompanying materials to this lecture
- Materials are available in English, Spanish, Russian, Vietnamese, Filipino, East African French, Kiswahili (Swahili) and Chinese.

Module 4 Muscular System Word List

Microscopic Structure:
actin
endomysium
epimysium
fascicle
intercalated disc
motor end-plate
myofibril
myosin
perimysium
sarcomere
sarcolemma
synaptic cleft
T-tubule
Thick filament (myosin)
Thin filament (actin)
Tropomyosin
Troponin

Muscle type:
Cardiac muscle
Skeletal muscle
Smooth muscle

Major Muscles of the Body:
Orbicularis oculi m.
Buccinator m.
Orbicularis oris m.
Sternocleidomastoid m.
Frontalis m.
Temporalis m.
Occipitalis m.
Trapezius m.
Latissimus dorsi m.
Deltoid m.
External oblique m.
Rectus abdominis m.
Pectoralis major m.
Triceps brachii m.
Biceps brachii m.
Brachioradialis m.
Supinator m.
Pronator teres m.
Quadriceps femoris
Rectus femoris m.
Vastus lateralis m.
Vastus medialis m.
Vastus intermedius m.
Biceps femoris m.
Gluteus maximus m.
Tibialis anterior m.
Gastrocnemius m.
Soleus m.

Muscle Actions:
abduction
adduction
flexion
insertion
origin
pronation
supination

Muscle contraction:
acetylcholine
autorhythmicity
contractility
depolarize
excitability
excitation-contraction coupling
motor unit
neuromuscular junction (NMJ)
neurotransmitter
power stroke
twitch
tetanus
twitch
voltage-gated sodium channels
wave summation

Disruptions in Homeostasis:
atrophy
fibrosis
hypertrophy
paralysis

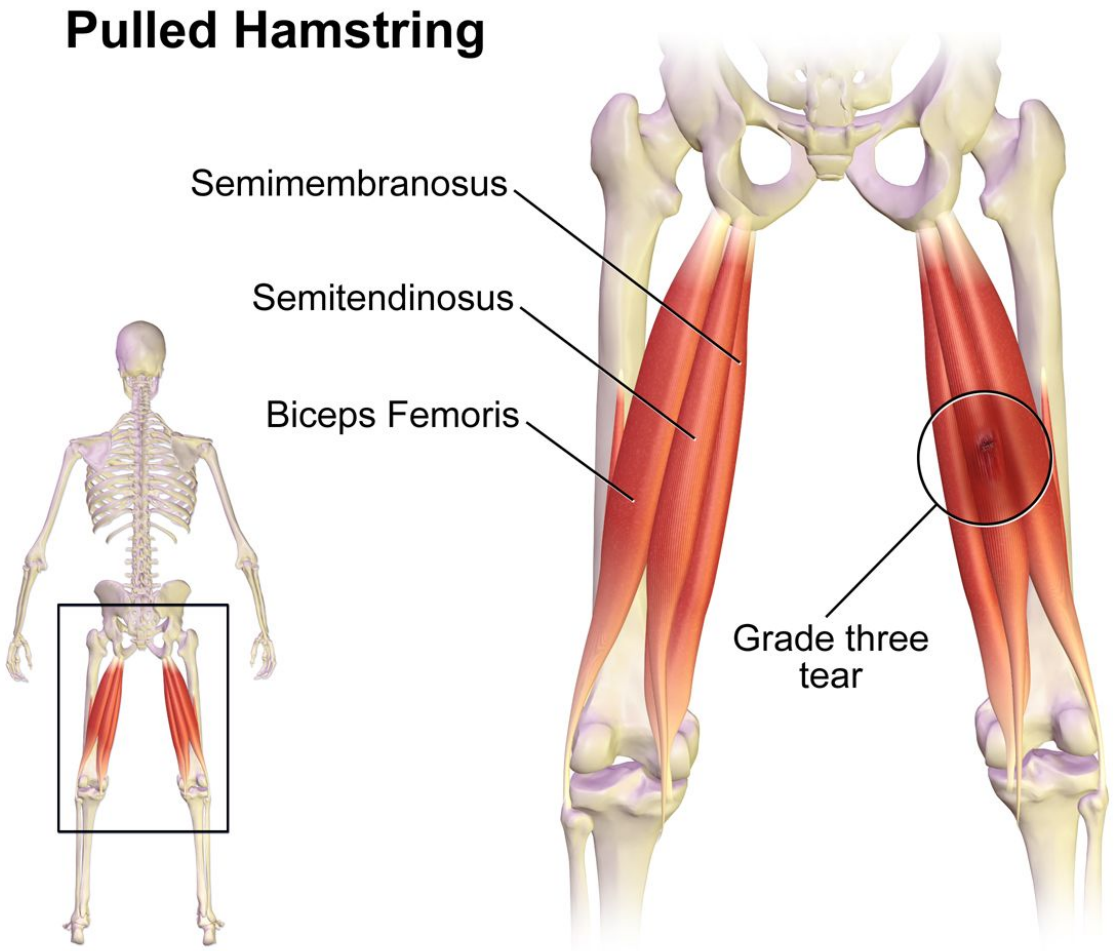
Athletic Injuries

Cramps
painful muscle spasms caused by heavy exercise, extreme cold, dehydration, electrolyte loss, low blood glucose or inadequate blood flow

Pulled muscle
strained muscles or tears in the tendons

Muscle Tears or Ruptures
Tearing of the **rotator cuff** muscles
common in sports like swimming and baseball

Tearing of hamstrings common in sports like basketball and soccer



Duchenne Muscular Dystrophy (DMD)

A hereditary condition
where muscular tissue is replaced by fat and fibrous tissue

- Caused by the inability to make protein (dystrophin) that connects actin to muscle cell membrane
- Causes progressive weakness in muscles
- Starts in the lower limbs, then moves to abdominal and spinal muscles
- Death usually occurs by age 20

Muscle Hypertrophy

Resistance Exercise affects muscles by:

- Increasing formation of myofibrils within muscle cell
- makes muscle fiber thicker
- Hypertrophy is enlargement of the muscle achieved by addition of structural proteins

Muscles atrophy due to disuse and lower levels of circulating hormones

Effects of aging can be mitigated by regular exercise

Figure 10.19 **Hypertrophy** by Openstax College

Effects of Aging on the Muscular System

Muscle is replaced by fat

Older muscles have:

- Fewer myofibrils
- Smaller mitochondria
- Less ATP
- Fewer motor neurons

Muscles atrophy due to disuse and lower levels of circulating hormones

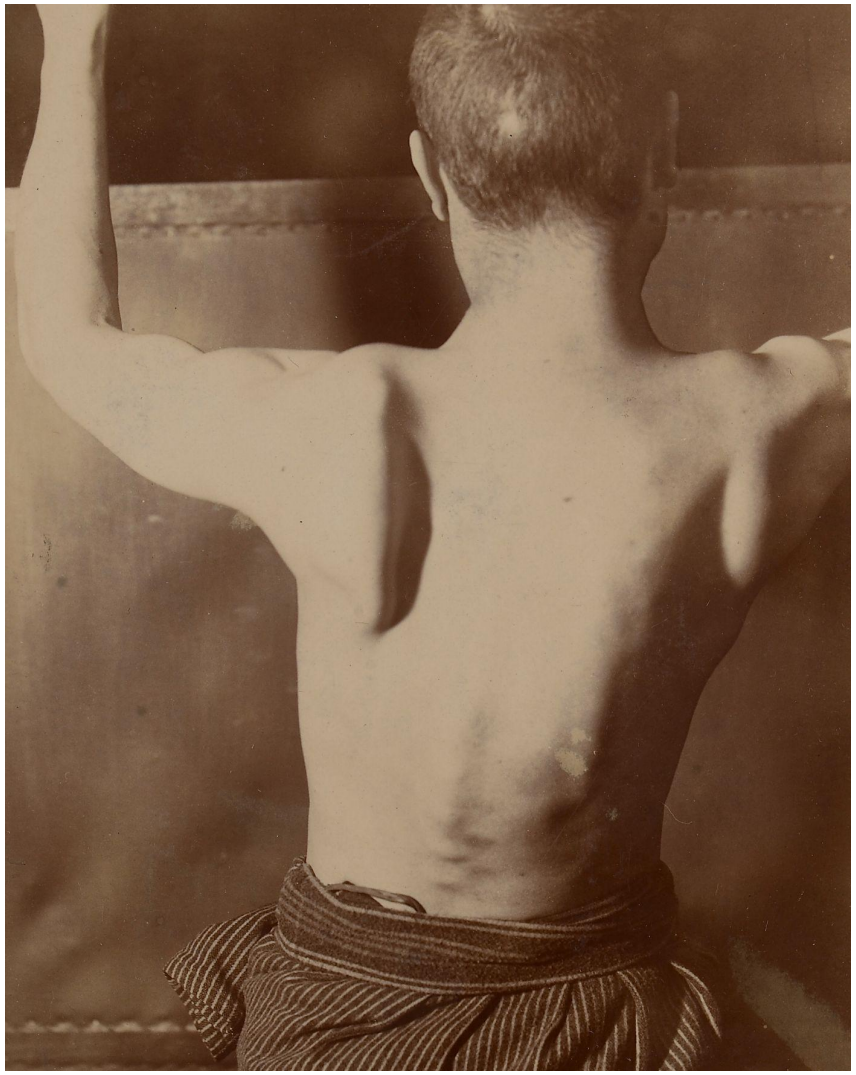
Effects of aging can be mitigated by regular exercise

Elderly Exercise By National Institutes of Health, Public Domain, via Wikimedia Commons

Paralysis

Complete or partial loss of muscle function in one or more parts of the body

- Occurs when messages between the brain and muscles are disrupted
- Often due to damage to the nervous system
- Flaccid paralysis
- Spastic Paralysis



Paralysis of the Serratus Magnus By St Bartholomew's Hospital Photographic Society, CC BY 4.0, via Wikimedia Commons

Lesson 4: Diseases of the Muscular System Summary

Summary:

Relate breakdowns in homeostasis to pathological presentations of the muscular system.