1.05 Understand the functions and disorders of the muscular system
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• What are the characteristics of muscles?
• What are the functions of the muscular system?
• What are common disorders of the muscular system?
• How are muscular disorders treated?
• How does the muscular system relate to the body’s support and movement?
Characteristics of Muscles

- Contractibility
- Excitability
- Extensibility
- Elasticity
Characteristics of Muscles

Contractibility - When a muscle shortens or contracts

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Characteristics of Muscles

Contractility

Myoneural stimulation

+ 

contraction of muscle proteins

= 

movement and heat

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Characteristics of Muscles

Contractibility

Neurotransmitter at site of muscle stimulus.

The sodium-potassium pump of the membrane of a muscle cell.

The purpose of this slide is to illustrate the complexity of the process of movement.

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Characteristics of Muscles

Excitability

1.05 Understand the functions and disorders of the muscular system
• Excitability: the ability to respond to certain stimuli by producing electric signals called impulses.
Characteristics of Muscles

Extensibility - The muscles' ability to be stretched.

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Characteristics of Muscles

Elasticity- the muscles ability to return to its original length when relaxing.
Characteristics of Muscles

Contractibility
Excitability
Extensibility
Elasticity
Muscle Tone

Discuss muscle tone.

• Atrophy:
  
  \textit{a- \underline{\hphantom{a}}} -trophic \underline{\hphantom{a}}

  \textit{Muscles wasting}

• Hypertrophy:
  
  \textit{hyper- \underline{\hphantom{a}}} -trophic \underline{\hphantom{a}}

  \textit{Muscles increase in diameter( become stronger)}
Muscle Tone

John just got a cast off his leg. His calf muscle on the affected leg is 1” smaller in diameter than his other calf muscle.

• What happened?

• How do you explain this to him?
Muscle Tone
Exercise & Training

What are the advantages of exercise?
• Control weight
• Combat health conditions
• Improve mood

Are there any disadvantages of exercise?
Muscle Fatigue

Discuss muscle fatigue:

- What causes muscle fatigue?
  - From accumulation of lactic acids in the muscles
- How does the body correct muscle fatigue?
  - Rest, taking in of oxygen through respirations
- Is muscle fatigue dangerous? Why / why not?
- Discuss aerobic and anaerobic exercise.
  - Give examples of each.
    - Weight lifting
    - Long distance running or cycling
    - Read page 219 muscular fuel

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Functions of the Muscular System

What are the functions of the muscular system?

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Movement: Skeletal Muscle

- Receptors in muscles provide the brain with information about body position and movement.
- The brain controls the contraction of skeletal muscle.
Movement

Discuss the mechanism of skeletal muscle movement to include:
- Point of origin
- Point of insertion

Identify the:
- Prime mover – movement in a single direction
- Antagonist – movement in the opposite direction
- Synergists – steady the movement.

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Movement: Digestive System

The nervous system regulates the speed at which food moves through the digestive tract.
Movement: Circulatory System

Heartbeat

The nervous system and hormones regulate the speed at which the heart beats.
Posture

• How does the muscular system effect posture?
Body Heat

What is the body’s response to cold? Why?

How is this response helpful?

How does the body respond to exercise? Why?
Myopathy

Myo-pathy

1.05 Understand the functions and disorders of the muscular system
Fibromyalgia - Chronic pain lasting 3 or more months in specific muscle points.

Discuss the pictures and how they relate to fibromyalgia.

**Cause** - Unknown

**Symptoms** - Muscle pain, fatigue, headache, numbness or tingling, joint pain

**Diagnosis** - by symptoms

**Treatment** - Pain relief, proper sleep, exercise, relaxation and stretching techniques, medication.

**Prognosis**

1.05 Understand the functions and disorders of the muscular system
Hernia- Occurs when an organ protrudes through a weak muscle.

Discuss hernias.

Causes- Weak muscles
Locations- Inguinal, abdominal, hiatal
Symptoms- visual bulging, pain, discomfort
Diagnosis- Patient history, physical examination
Treatment- surgery
Prevention

1.05 Understand the functions and disorders of the muscular system
Muscle Spasms
(Involuntary hypertonicity)

Discuss muscle spasms.

Causes- muscle overuse.
Locations- any muscle
Symptoms- pain
Diagnosis- pt. history and physical
Treatment- rest from specific task, passive stretching, dietary electrolyte replacement
Prognosis

1.05 Understand the functions and disorders of the muscular system
Muscular Dystrophy - A group of diseases in which the muscle cells deteriorate.

• Discuss the picture and how it relates to muscular dystrophy.

*Cause* - Most common type: genetic

*Symptoms* - Muscle weakness,

*Diagnosis* - Physical exam, genetic tests, muscle biopsy

*Treatment* - Physical therapy, respiratory therapy, orthopedic appliances, drug therapy

*Prognosis* - Depends on the progression of the disease.
Myasthenia Gravis - Occurs when the connection between the nerves and muscle is lost.

Discuss the picture and how it relates to myasthenia gravis.

**Cause** - autoimmune attack

**Symptoms** - muscle weakness, often starting with facial or eye muscles

**Diagnosis** - Blood tests, electromylogram (EMG)

**Treatment** - Rest, cholinesterase inhibitors, removal of the thymus gland

**Prognosis** - Symptoms may go into remission, but most people need to be on medication indefinitely.

1.05 Understand the functions and disorders of the muscular system
Strain

- What happened here?
- What symptoms is this man having? Why?
- How will he treat them? – **RICE-** (rest, ice, compression, elevation), Pain relievers, physical therapy, surgery.
- What is his prognosis?
Tendonitis

Discuss the pictures and how they relate to tendonitis.

Cause - Chronic overuse or disease

Symptoms - pain, stiffness, weakness

Diagnosis - examination, xray, patient history

Treatment - anti-inflammatory drugs, Ultrasound, lasers, shock waves

Prognosis

1.05 Understand the functions and disorders of the muscular system
Tetanus - an infectious disease characterized by continuous spasms of the voluntary muscles.

Discuss the picture and how it relates to tetanus.

Cause - bacterial infection

Symptoms - Progressive muscle spasm, paralysis, stiffness and pain, especially in the jaw.

Diagnosis - physical exam, lab test, history of a wound

Treatment - wound hygiene, tetanus anti-toxin, sedation, pain management

Prognosis - can be fatal if not treated early.

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