

Muscular System: Gross Muscle, Movements and Diseases



Effect of Exercise on Muscles

- **Exercise has many effects on the muscles, connective tissue, bone, and the nerves that stimulate the muscles**

- **Makes muscles become more efficient and effective**
- **Increase joint mobility**
- **Increase flexibility**
- **Good posture, helps prevent injury**

Trained muscles have better tone or state of readiness to respond





Types of Exercise

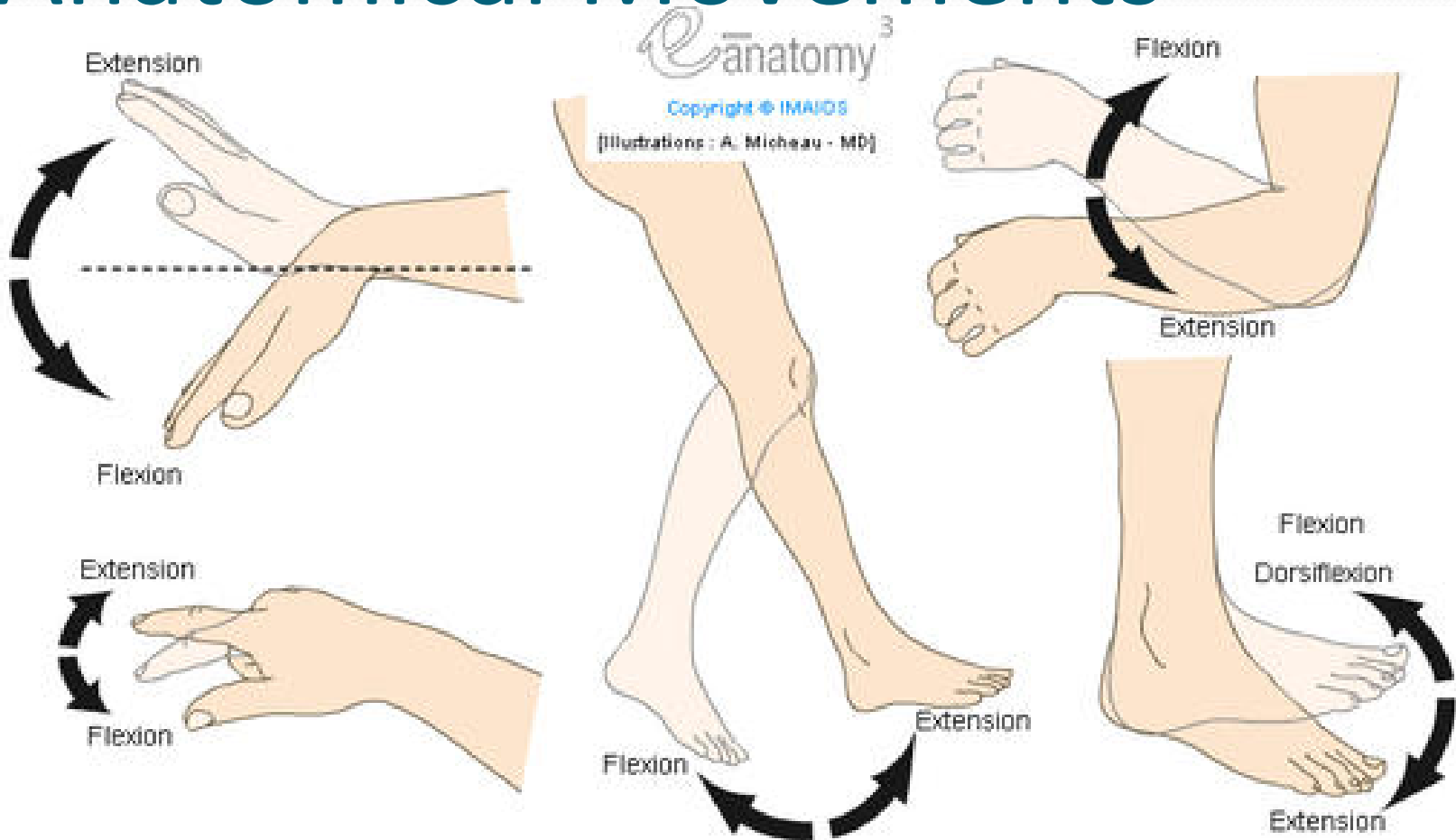
- High Intensity

short duration produces strength, size and power gains in muscles

- Low Intensity

for long durations will give endurance benefits

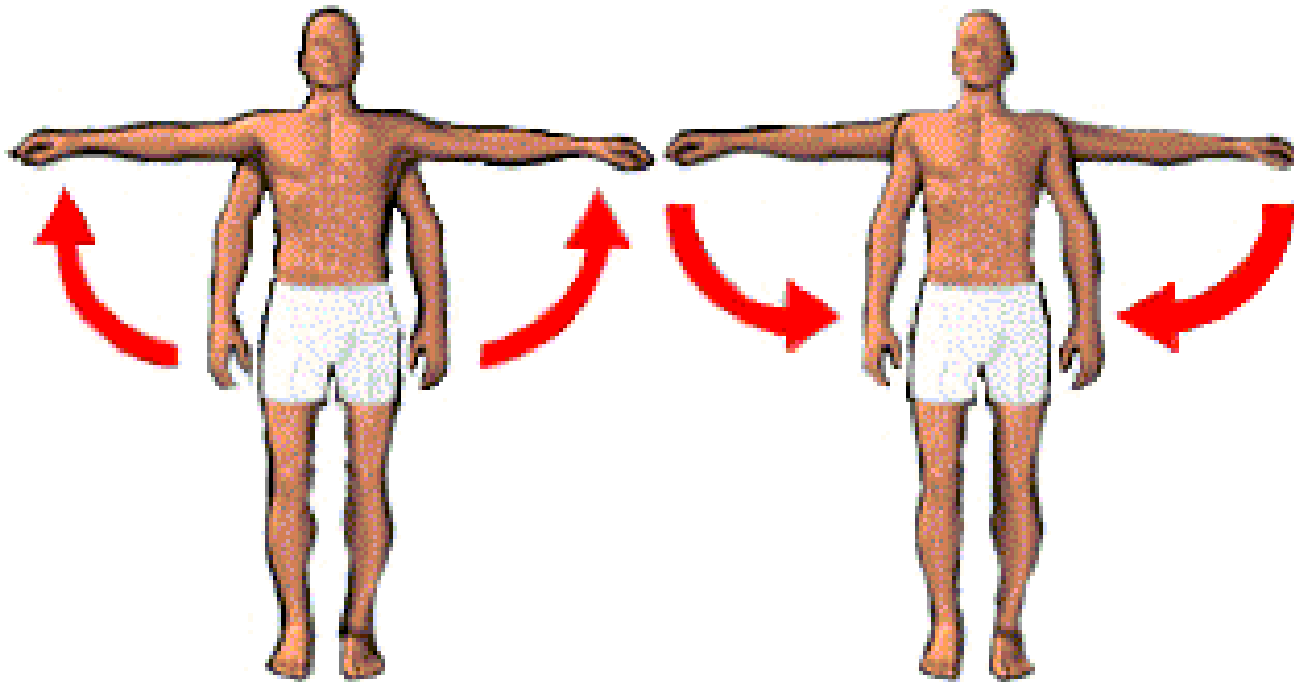
Anatomical Movements



Flexion is the movement which **DECREASES** the angle of the joint involved upon

Extension is the movement which **INCREASES** the angle of the joint being acted upon

Anatomical Movements con'd



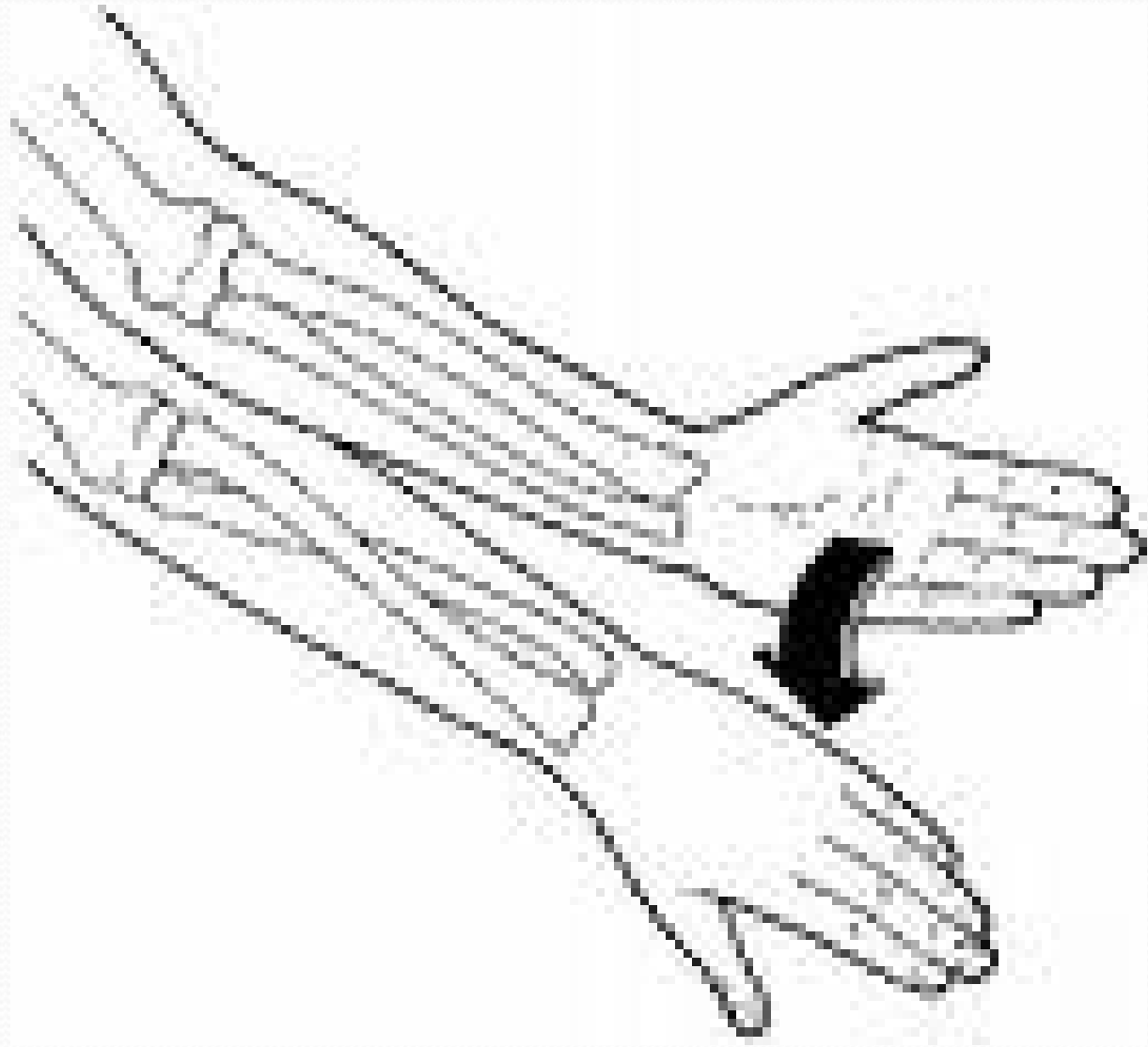
Abduction

Adduction

Abduction is movement AWAY from the midline, or to abduct.

Adduction is movement Toward the midline, or to add.

PRONATION- a rotational movement of the forearm at the radioulnar joint



SUPINATION- a position of either the forearm or foot; in the forearm when the palm faces anteriorly, or faces up (when the arms are unbent and at the sides).

Strains

- **Definition:**

- Injuries from overexertion or trauma which involve stretching or tearing of muscle fibers

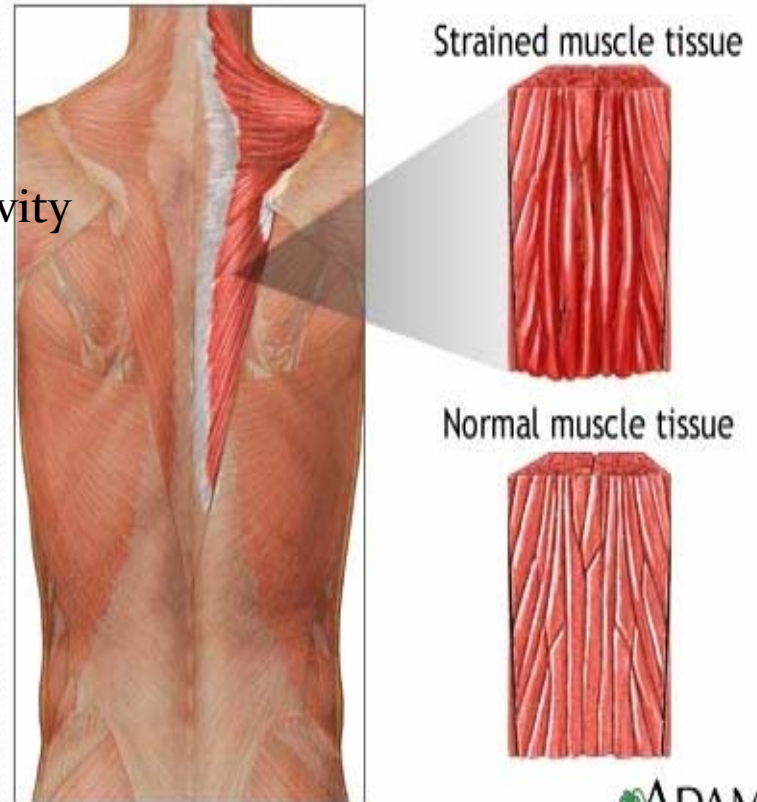
- They often are accompanied by pain and inflammation of the muscle and tendon.

- **Causes:**

- Excessive physical activity or effort
- Improperly warming up before a physical activity
- Poor flexibility

- **Symptoms:**

- Pain and difficulty moving muscle
- Discolored and bruised skin
- Swelling



Strains

- **First Aid:**

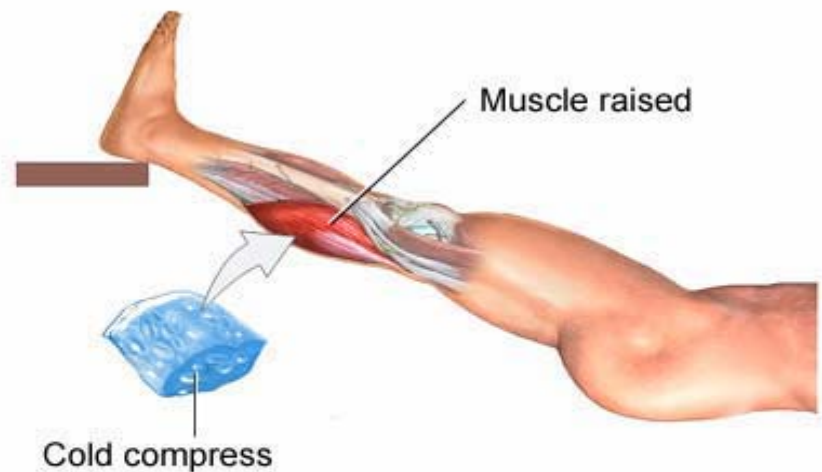
- Think “RICE”
- R: Rest
- I: Ice
- C: Compression
- E: Elevation

- **Prevention:**

- Warm up properly before sports
- Keep muscles strong and flexible

- **Contact a Medical Professional:**

- Injury still tender after a few days
- Injury is bleeding



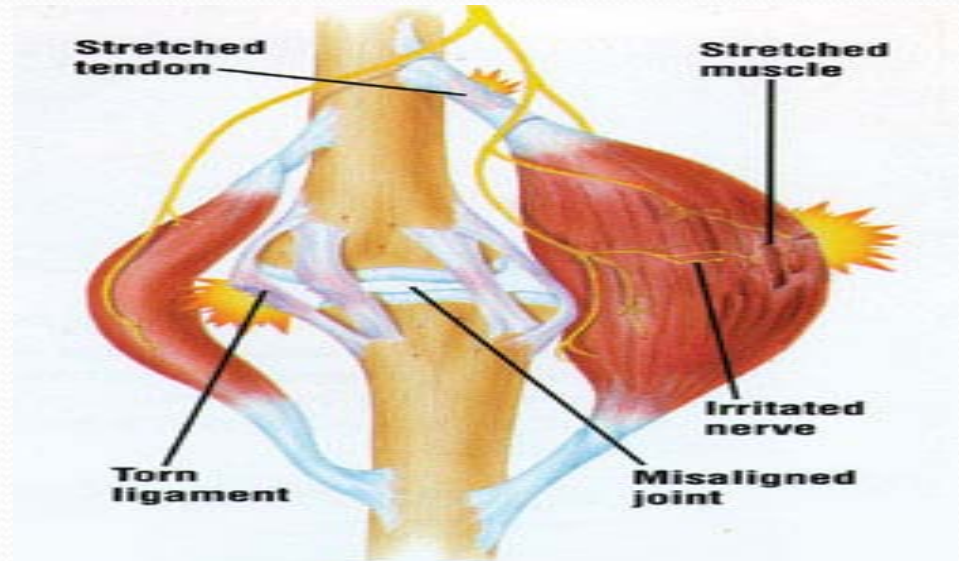
Sprain

- **Definition:**

- Injury near a joint
- Involves a ligament

- **Signs and Symptoms of Sprains:**

- The usual signs and symptoms of a muscle sprain include pain, swelling, bruising, and the loss of functional ability (the ability to move and use the joint)
- Sometimes people feel a pop or tear when the injury happens. However, these signs and symptoms can vary in intensity, depending on the severity of the sprain.



Sprain

Prevention:

- Stretch before you exercise or workout.
- Wear proper shoes for the activity.
- Warm up properly before activities.
- Do not run on icy or uneven surfaces.

When to see a Doctor:

- You have severe pain and cannot put any weight on the injured joint.
- The area over the injured joint or next to it is very tender when you touch it.
- The injured area looks crooked or has lumps and bumps (other than swelling) that you do not see on the uninjured joint.



Type III Sprain

- ligaments torn completely

ADAM.

Muscle Cramps

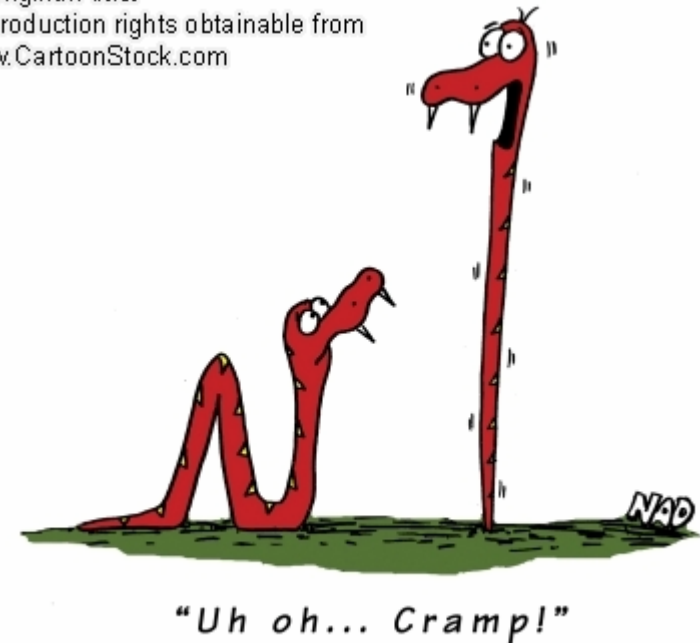
- **Definition:**

- A muscle cramp is thus defined as an involuntarily and forcibly contracted muscle that does not relax
- This causes a visible or palpable hardening of the involved muscle
- Any of the muscles that are under our voluntary control (skeletal muscles) can cramp

- **Causes:**

- Dehydration!
- Low blood levels of either calcium or magnesium
- Both increase the excitability of both the nerve endings and the muscles they stimulate.

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Poliomyelitis

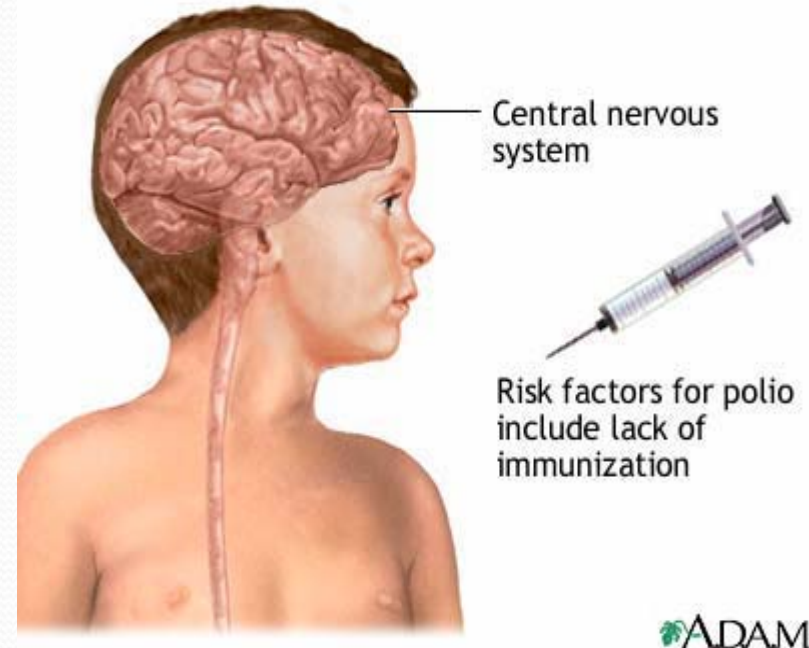
Definition:

- Viral infection of the nerves that control skeletal muscle movement
- The virus spreads by direct person-to-person contact, by contact with infected mucus or phlegm from the nose or mouth, or by contact with infected feces
- The time from being infected with the virus to developing symptoms of disease (incubation) ranges from 5 - 35 days (average 7 - 14 days)
- After a period of viremia, the virus becomes neurotropic and produces destruction of the motor neurons in the anterior horn and brainstem.

Risks include:

- Lack of immunization against polio and then exposure to polio
- Travel to an area that has experienced a polio outbreak

<http://www.nlm.nih.gov/medlineplus/ency/article/001402.htm>



Poliomyelitis

- **Treatment:**
 - Antibiotics for urinary tract infections
 - Moist heat to reduce muscle pain and spasms
 - Pain killers to reduce headache, muscle pain, and spasms
 - Physical therapy
- **Prevention:**
 - Polio immunization (vaccine) effectively prevents poliomyelitis in most people (immunization is over 90% effective).

THE UNTREATED POLIO PATIENT

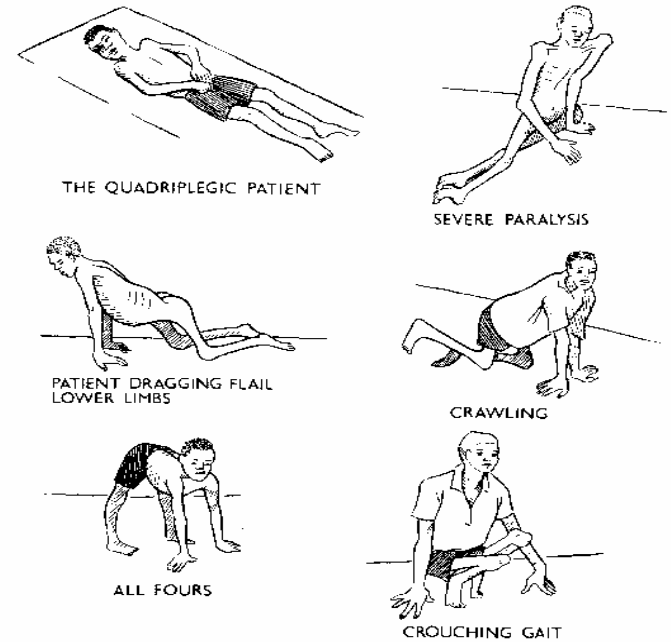


Fig. 2(a)

Muscular Dystrophies

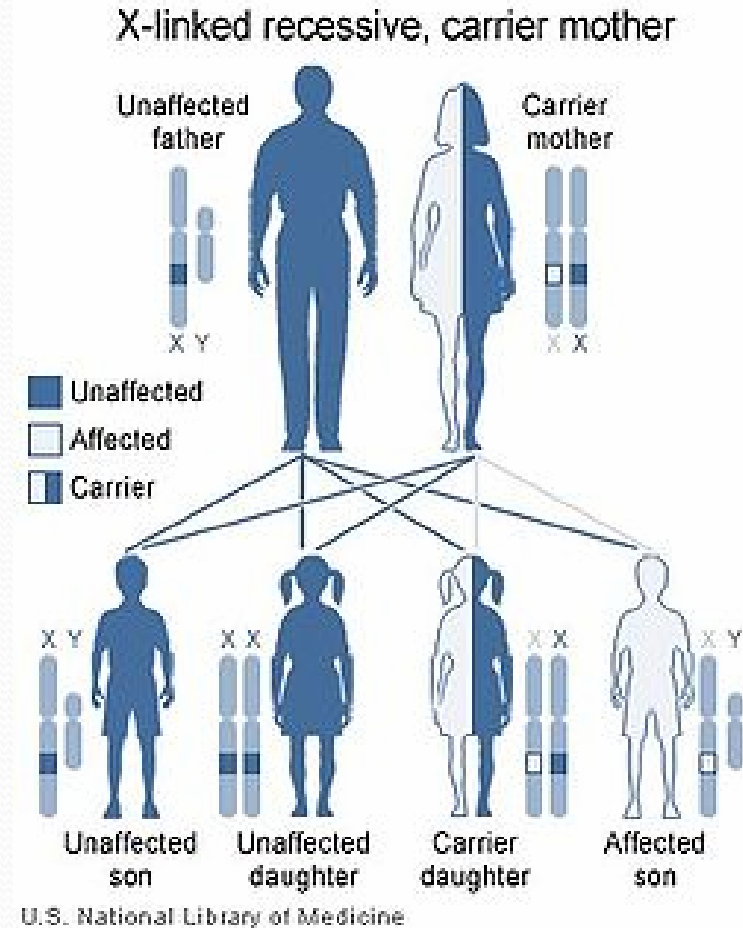
- **Definition:**
 - Most commonly caused by mutation of gene for the protein dystrophin which helps in attaching and organizing the filaments in the sacromere.
 - Duchenne Muscular Dystrophy and Becker muscular dystrophy are the two most common types.
 - The gene for dystrophin is on the X chromosome so the disorder is sex-linked.



Muscular Dystrophy

- **Duchene Muscular Disorder:**

- Duchenne muscular dystrophy is caused by a defective gene for dystrophin (a protein in the muscles)
- However, it often occurs in people without a known family history of the condition
- Because of the way the disease is inherited, males are more likely to develop symptoms than are women.
- The sons of females who are carriers of the disease (women with a defective gene but no symptoms themselves) each have a 50% chance of having the disease
- The daughters each have a 50% chance of being carriers



Muscular Dystrophy

- **Becker Muscular Dystrophy:**
- **Definition :**
 - One of nine types of muscular dystrophy, a group of genetic, degenerative diseases primarily affecting voluntary muscles.
- **Cause :**
 - Insufficient production of dystrophin, a protein that helps keep muscle cells intact.
- **Onset :**
 - Adolescence or adulthood.

•Treatment:

- There is no known cure for Duchenne muscular dystrophy.
- Treatment aims to control symptoms to maximize quality of life.
- Gene therapy may become available in the future.

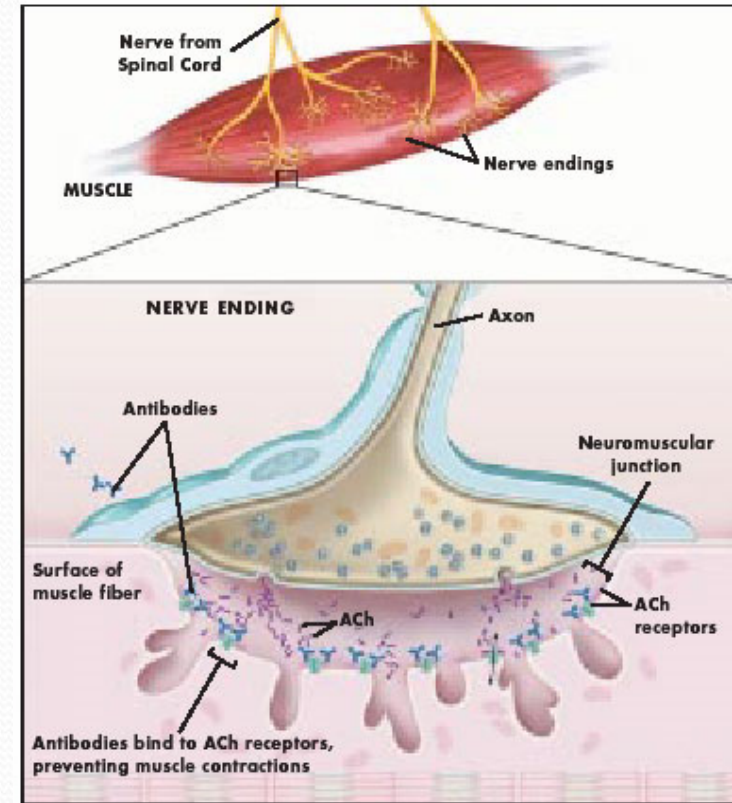
Myasthenia Gravis

- **Definition:**

- Autoimmune disease affecting the neuromuscular junction
- Affecting the ability of the impulse to cause the muscle contraction
- Administering an inhibitor of acetylcholinesterase can temporarily restore contractibility

- **Symptoms:**

- Muscle weakness, including:
 - Swallowing difficulty, frequent gagging, or choking
- Paralysis
- Muscles that function best after rest
- Drooping head



Myasthenia Gravis

- **Causes:**

- This is caused when immune cells target and attack the body's own cells (an autoimmune response)
- This immune response produces antibodies that attach to affected areas, preventing muscle cells from receiving chemical messages (neurotransmitters) from the nerve cell

- **Treatment:**

- There is no known cure for myasthenia gravis
- Some medications, such as neostigmine or pyridostigmine, improve the communication between the nerve and the muscle
- Prednisone and other medications that suppress the immune response may be used if symptoms are severe and there is inadequate response to other medications