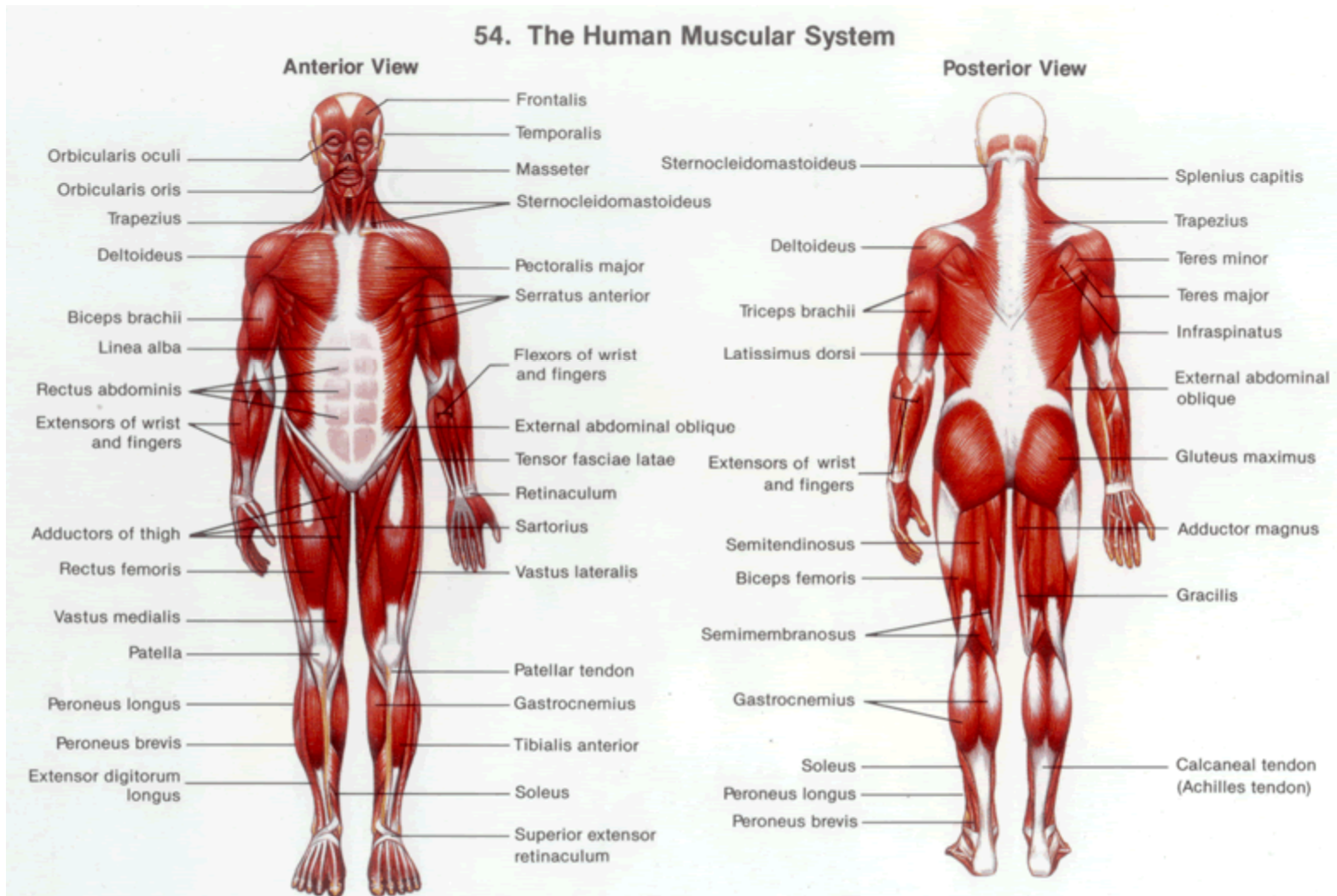


# Chapter 17

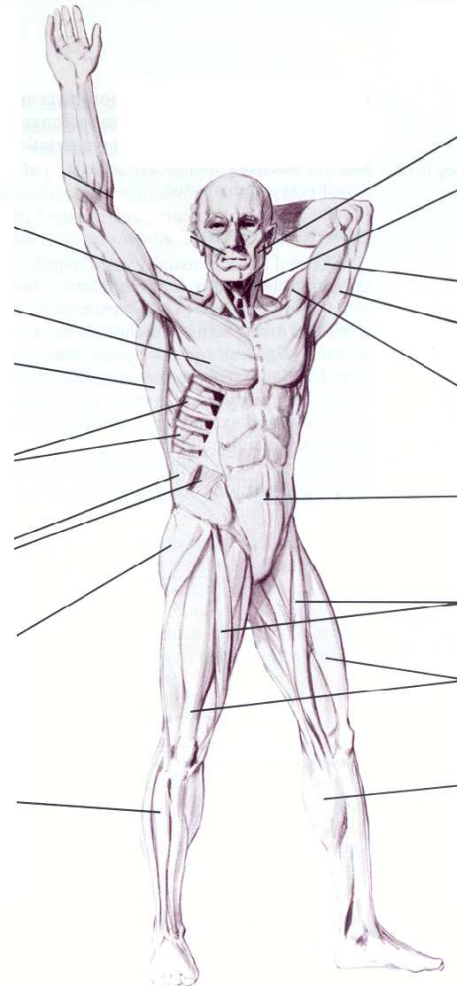
## Musculature System

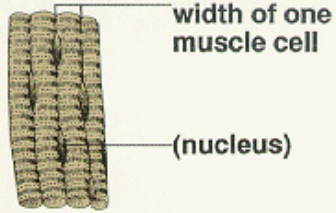
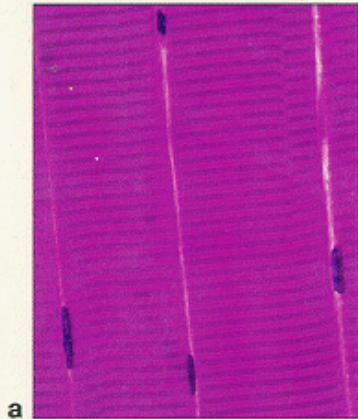
# The Musculature System



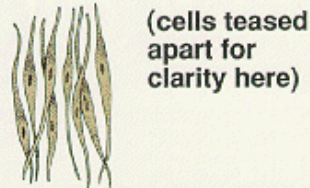
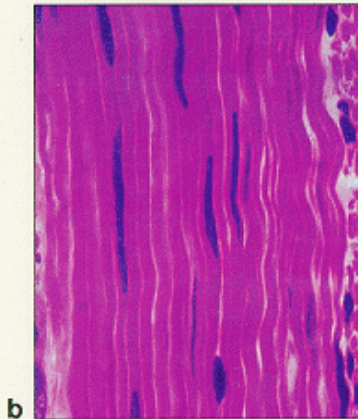
# The Musculature System

- Includes 3 types of Muscle:
  - Striated, Smooth & Cardiac
- Function of the Muscles:
  - Provide means of Movement
  - Keeps blood pumping
  - Moves food thru Digestive System
- Skeletal Muscle usually in **Antagonistic Pairs**
  - Flexor (bicep)
  - Extensor (tricep)



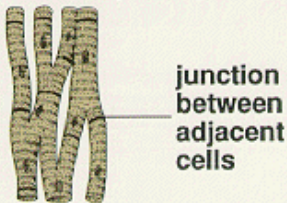
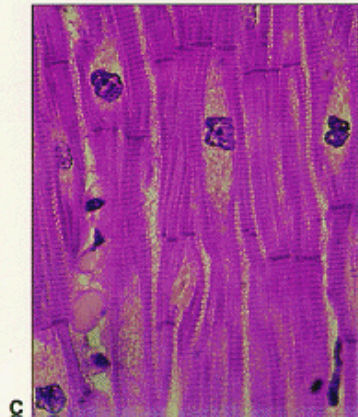


**TYPE:** Skeletal muscle  
**DESCRIPTION:** Long, striated cells with multiple nuclei  
**COMMON LOCATIONS:** In skeletal muscles  
**FUNCTION:** Contraction for voluntary movements



**TYPE:** Smooth muscle  
**DESCRIPTION:** Long, spindle-shaped cells, each with a single nucleus  
**COMMON LOCATIONS:** In hollow organs (e.g., stomach)  
**FUNCTION:** Propulsion of substances along internal passageways

- Organ
- Smooth
- Involuntary



**TYPE:** Cardiac muscle  
**DESCRIPTION:** Branching, striated cells fused at plasma membranes  
**COMMON LOCATIONS:** Wall of heart  
**FUNCTION:** Pumping of blood in the circulatory system

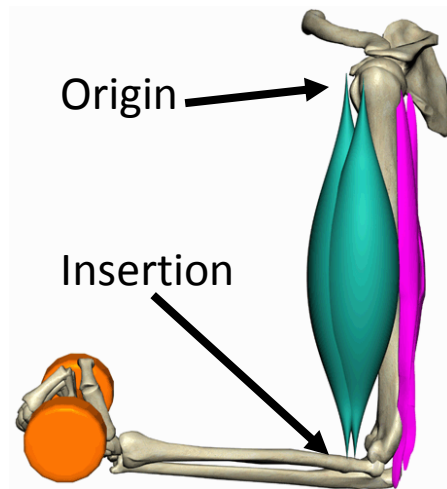
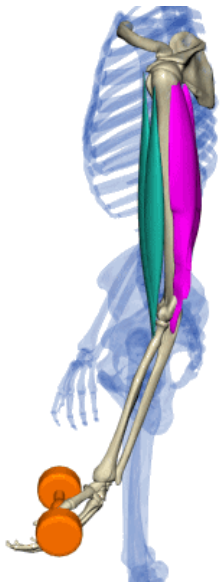
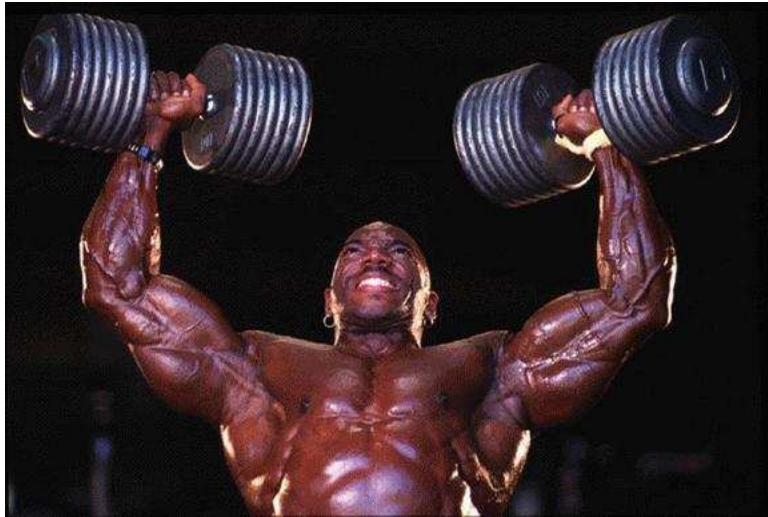
- Heart
- Cardiac
- Involuntary

# The Musculature System

## 3 Types of Muscle Tissue

Skeletal, Smooth and Cardiac

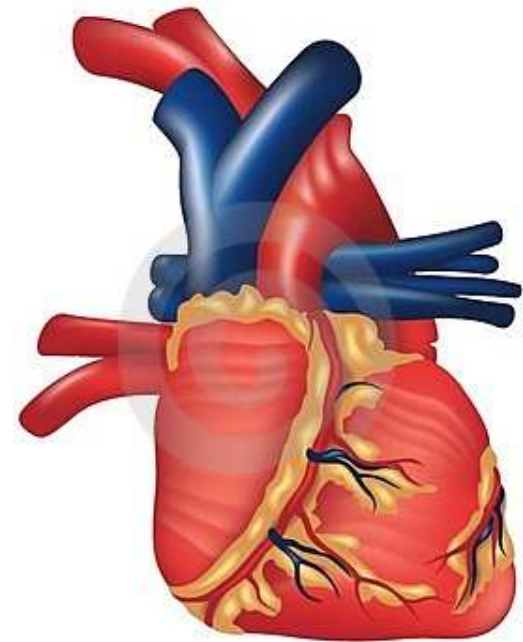
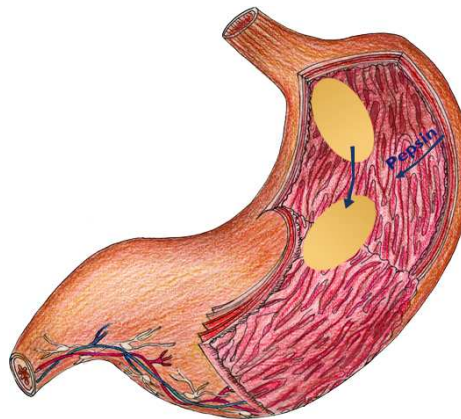
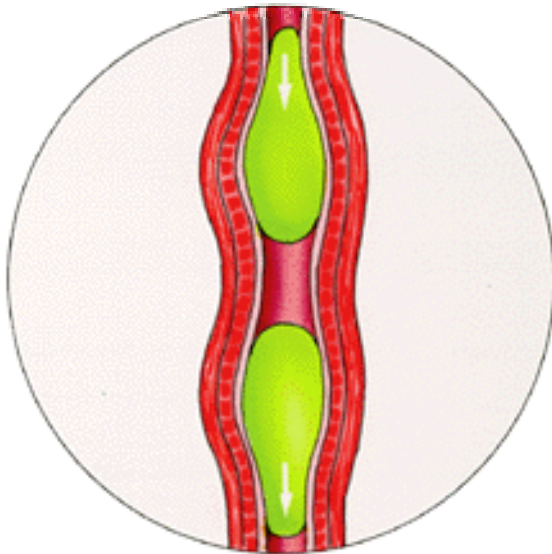
# How Muscles Work



- Muscles can only **contract** & get shorter
- They cannot push things, they only pull.
- They are attached to two different bones and cause them to bend at the joint
  - **Origin** – place the muscle attaches or begins (proximal)
  - **Insertion** – place on the other side of joint muscle attaches (distal side)
- They work in Antagonistic Pairs
  - **Flexors** – cause the joint to bend – bicep
  - **Extensor** – causes the joint to extend (straighten out) - tricep
- Muscles are attached to bones w/ **tendons**

# Smooth & Cardiac Muscle

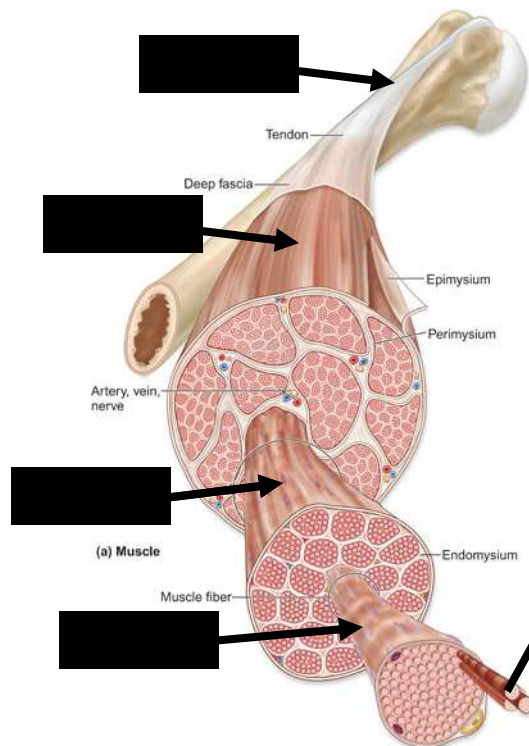
- **Smooth Muscle** – usually are not voluntarily controlled. Found in the walls of hollow organs of the digestive tract & blood vessels.
  - They assist in the movement of food thru the digestive system (**peristalsis**) and movement of blood thru the circulatory system.
- **Cardiac Muscle** – found only in the heart. Similar to both Striated & Smooth Muscle tissue. Involuntarily controlled by brain.



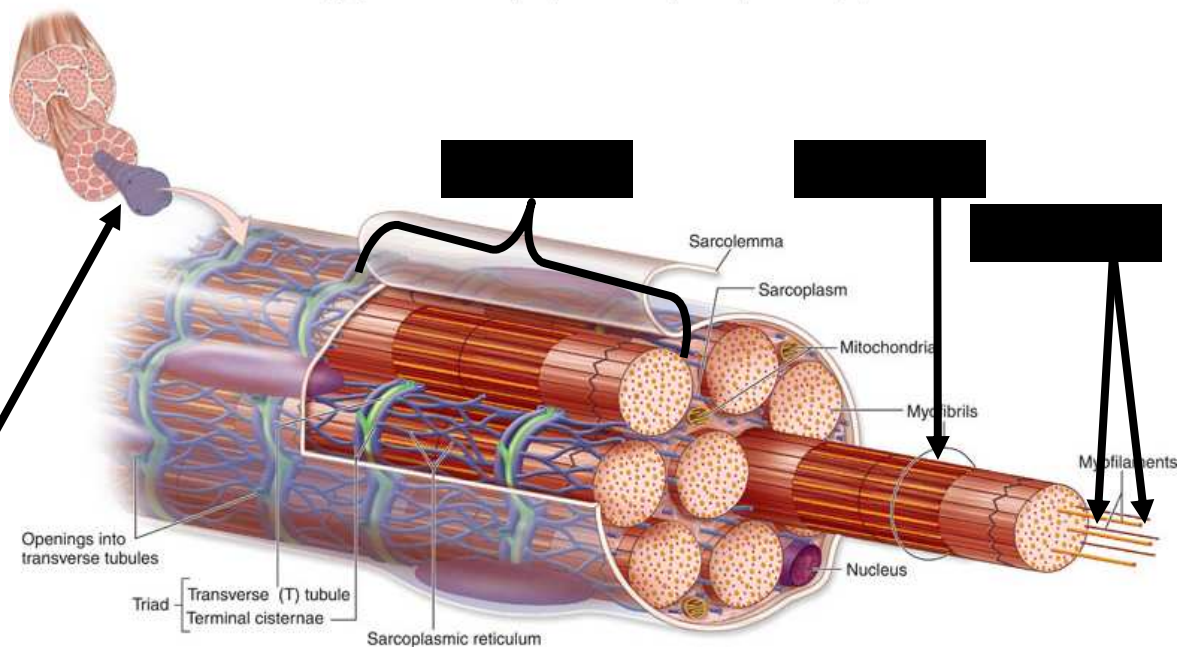
# Skeletal Muscle Structure

- Skeletal **muscles** are made up of **bundles** of **muscle fibers** which in turn are made of **myofibrils** (multi-nucleated muscle cells).
- Each myofibril is made of
  - thin **filaments** called **Actin** and thick filaments called **Myosin**.
- **Muscle → Bundle → Fibers → Myofibrils → Filaments → Actin & Myosin**
- Each fiber is divided into functional units called sarcomeres

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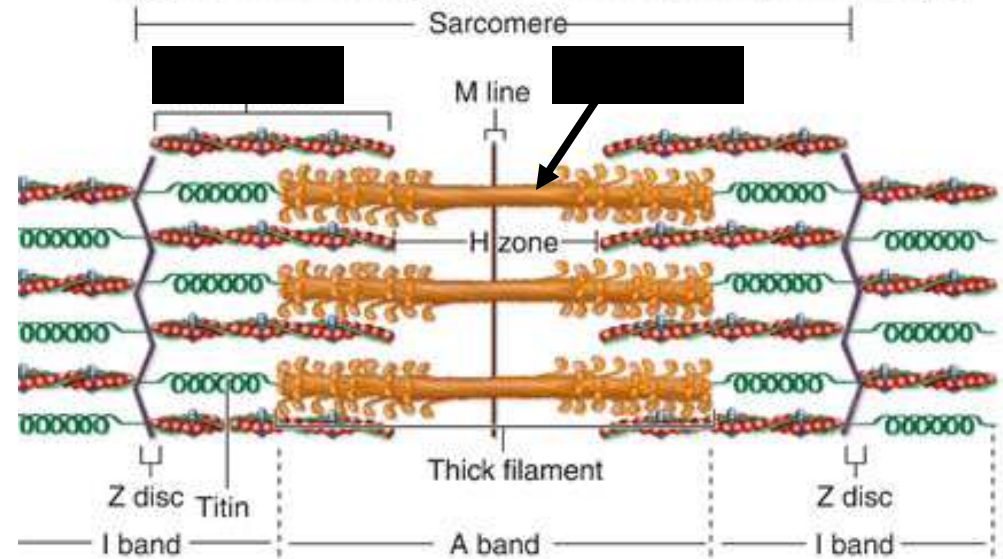
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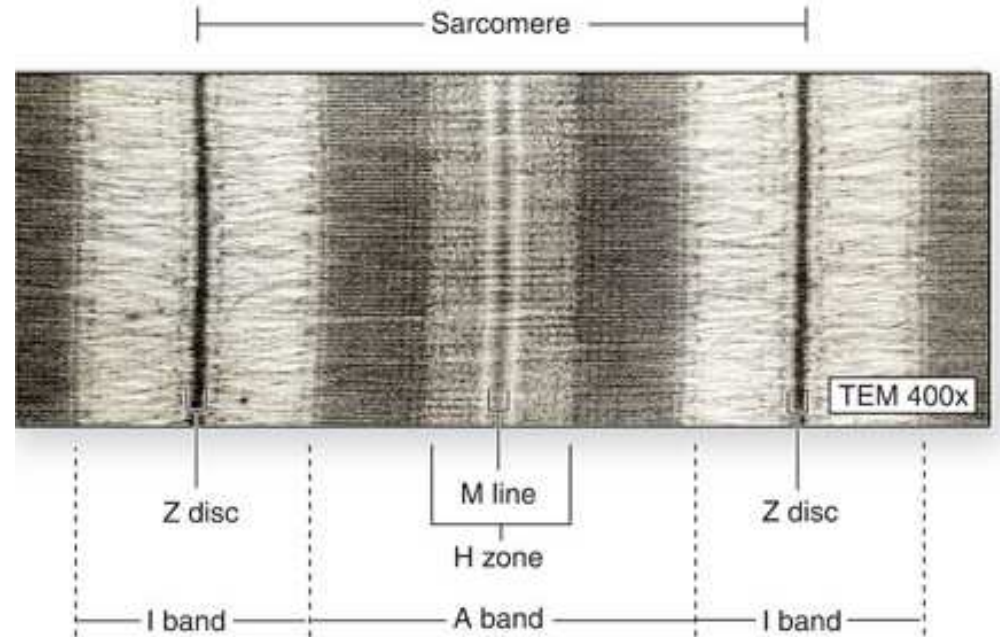
# Skeletal Muscle Sarcomere

- Sarcomere is divided into various zones.
  - Each Sarcomere is separated by Z discs
  - Light colored bands are I bands
  - Dark colored bands are A bands
  - Middle of the dark A band is H zone
  - Middle of H zone is the M line
- Muscle contraction begins after a nerve stimulates the muscle fiber.

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b)



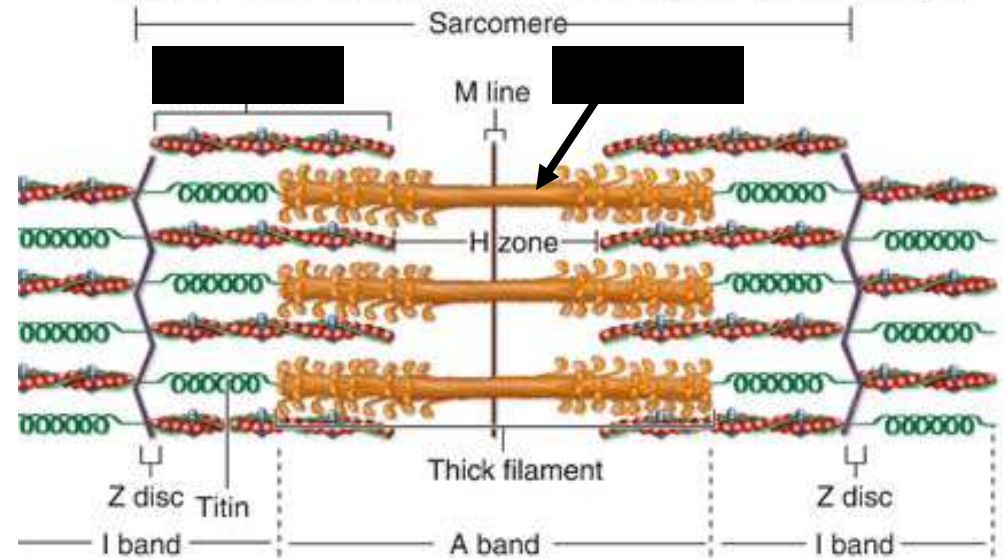
c)



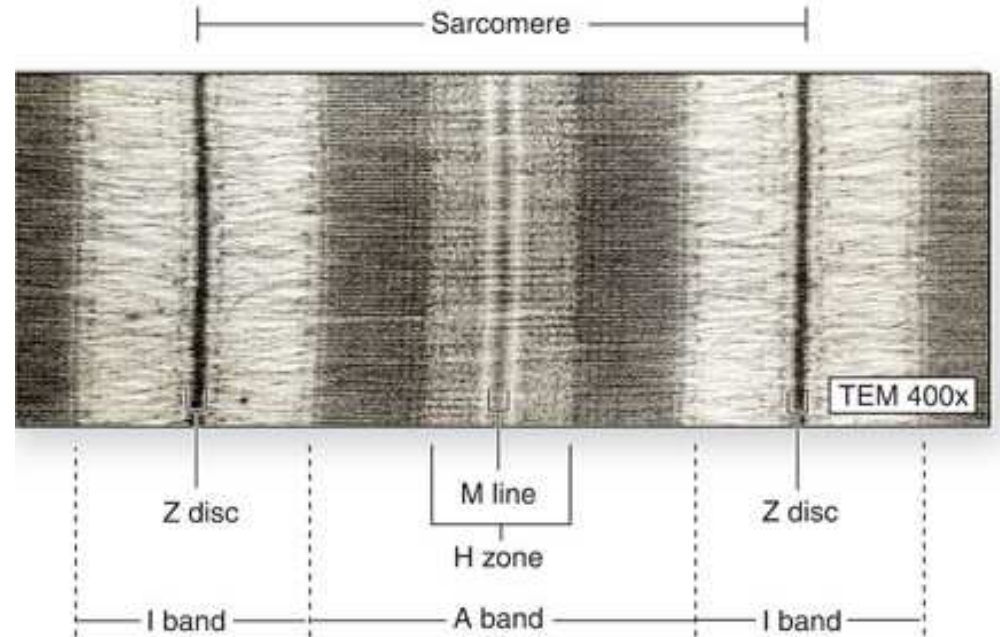
# Skeletal Muscle Contraction

- Muscle contraction begins after a nerve stimulates the muscle fiber.
- Impulse causes **Actin** filaments to slide over (like a ratchet) the **Myosin** filaments.
- This shortens the length of the **sarcomere**.
- Once contracted, the H zone closes up.
- This shortening isn't much until you add up the thousands of sarcomeres in each muscle bundle.

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b)



c)

# Need-to-Know Skeletal Muscles

Know these muscles: **Masseter, Trapezius, Deltoid, Pectoralis, Latissimus dorsi, intercostals, Rectus abdominis, External obliques, Biceps brachii, Triceps, Gluteus, Rectus femoris, Biceps femoris, gastrocnemius**

