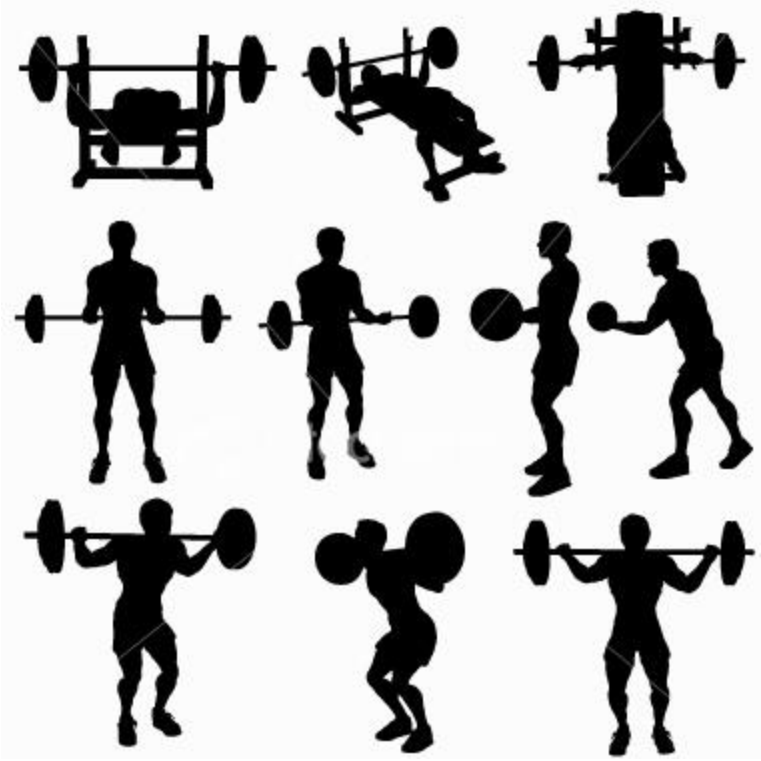
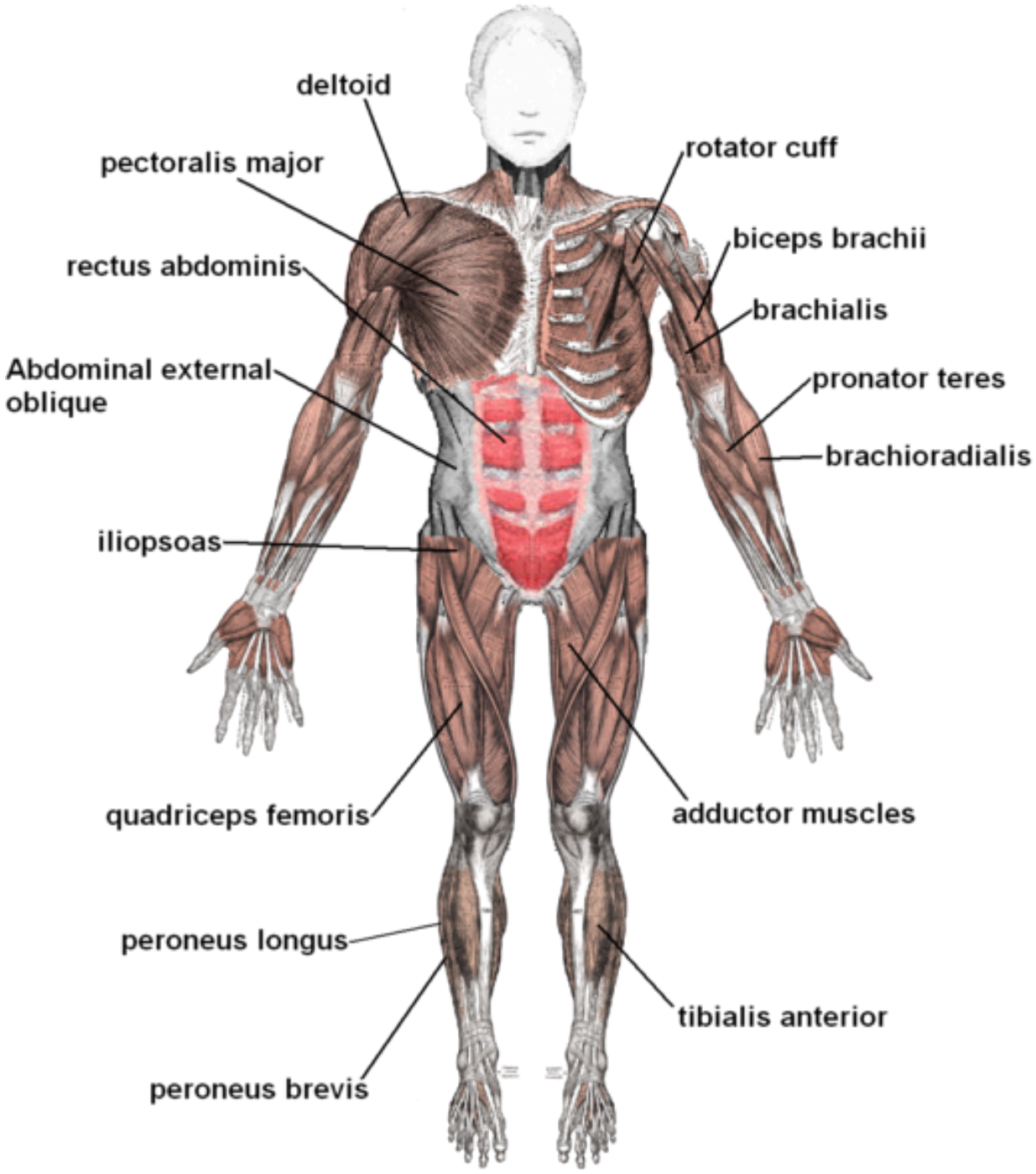
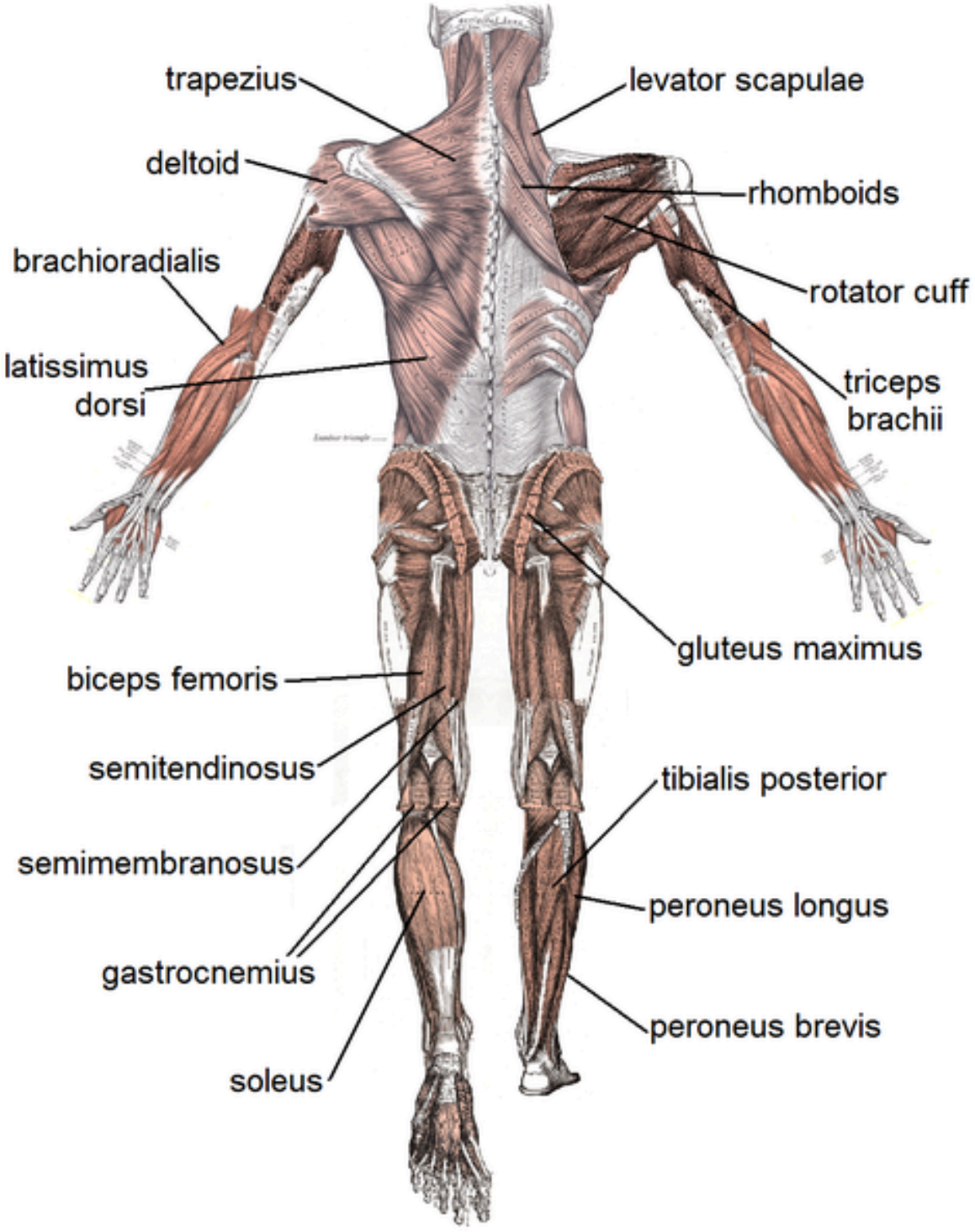
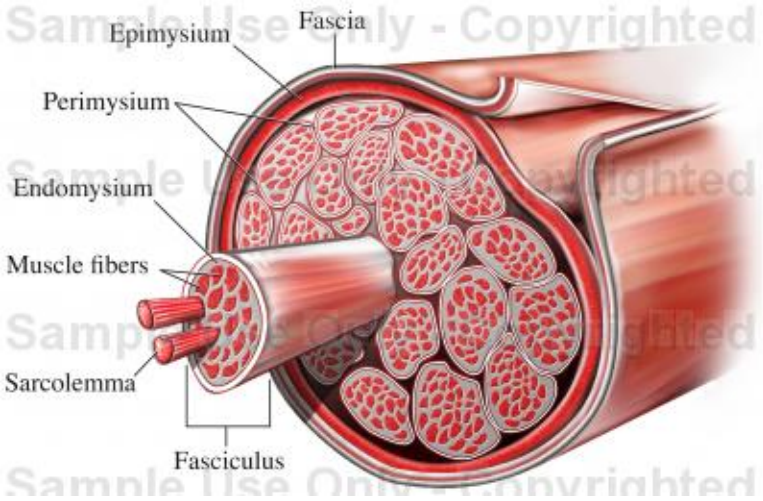



deltoid
pectoralis major
rectus abdominis
Abdominal external oblique
iliopsoas
quadriceps femoris
peroneus longus
peroneus brevis
rotator cuff
biceps brachii
brachialis
pronator teres
brachioradialis
adductor muscles
tibialis anterior

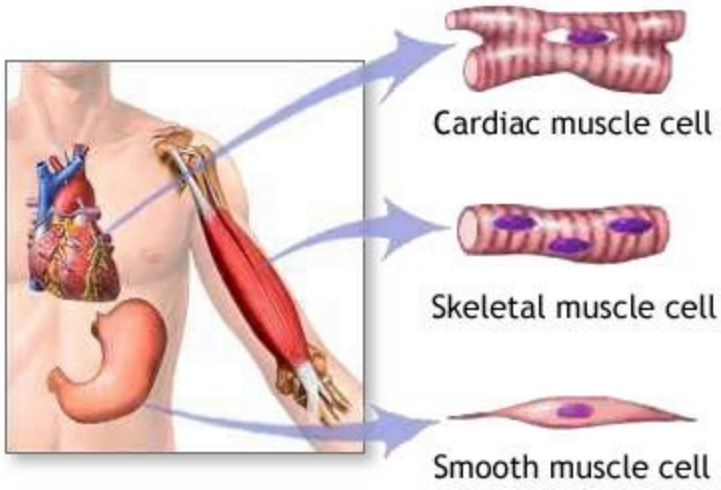

trapezius
levator scapulae
deltoid
rhomboids
brachioradialis
rotator cuff
latissimus
dorsi
triceps
brachii
gluteus maximus
biceps femoris
semitendinosus
tibialis posterior
semimembranosus
peroneus longus
gastrocnemius
peroneus brevis
soleus

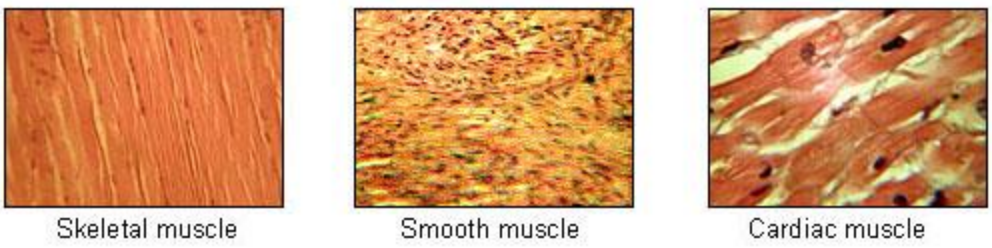
From Wikipedia:

Muscle (from Latin *musculus*, diminutive of *mus* "mouse"[1]) is a contractile tissue of animals and is derived from the mesodermal layer of embryonic germ cells. Muscle cells contain contractile filaments that move past each other and change the size of the cell. They are classified as skeletal, cardiac, or smooth muscles. Their function is to produce force and cause motion. Muscles can cause either locomotion of the organism itself or movement of internal organs. Cardiac and smooth muscle contraction occurs without conscious thought and is necessary for survival. Examples are the contraction of the heart and peristalsis which pushes food through the digestive system. Voluntary contraction of the skeletal muscles is used to move the body and can be finely controlled. Examples are movements of the eye, or gross movements like the quadriceps muscle of the thigh.
There are two broad types of voluntary muscle fibers: **slow twitch** and **fast twitch**. Slow twitch fibers contract for long periods of time but with little force while fast twitch fibers contract quickly and powerfully but fatigue very rapidly.
Muscles are predominantly powered by the oxidation of fats and carbohydrates, but anaerobic chemical reactions are also used, particularly by fast twitch fibers. These chemical reactions produce adenosine triphosphate (ATP) molecules which are used to power the movement of the myosin heads.

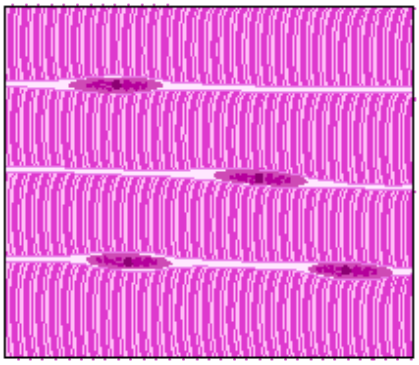


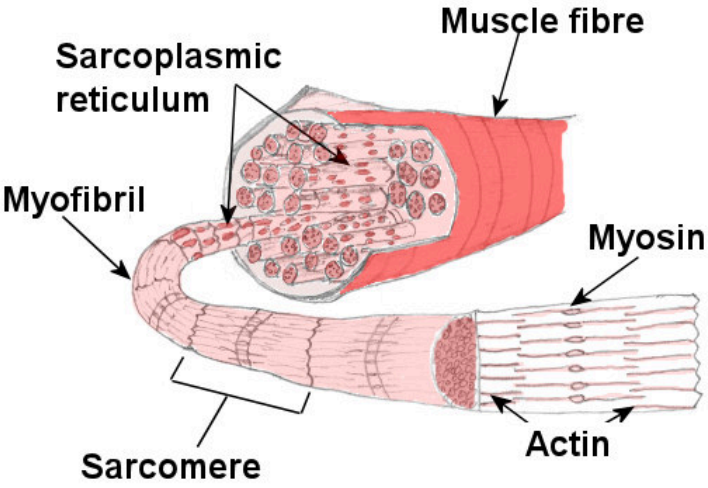
Three types of muscle





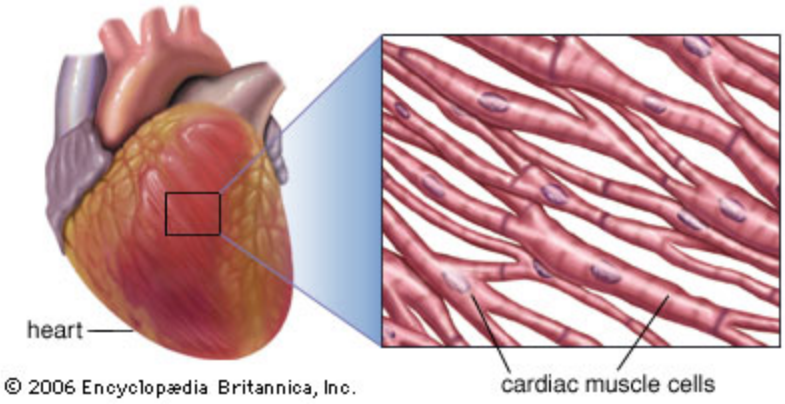
Skeletal muscle - causes body movements and locomotion by pulling on bones or skin. Under voluntary control. Makes up the body's flesh. Capable of extreme strength and delicate precision.
Made of long, cylindrical cells with many nuclei. The obvious bands called striations, are where the contracting filaments align (actin and myosin)

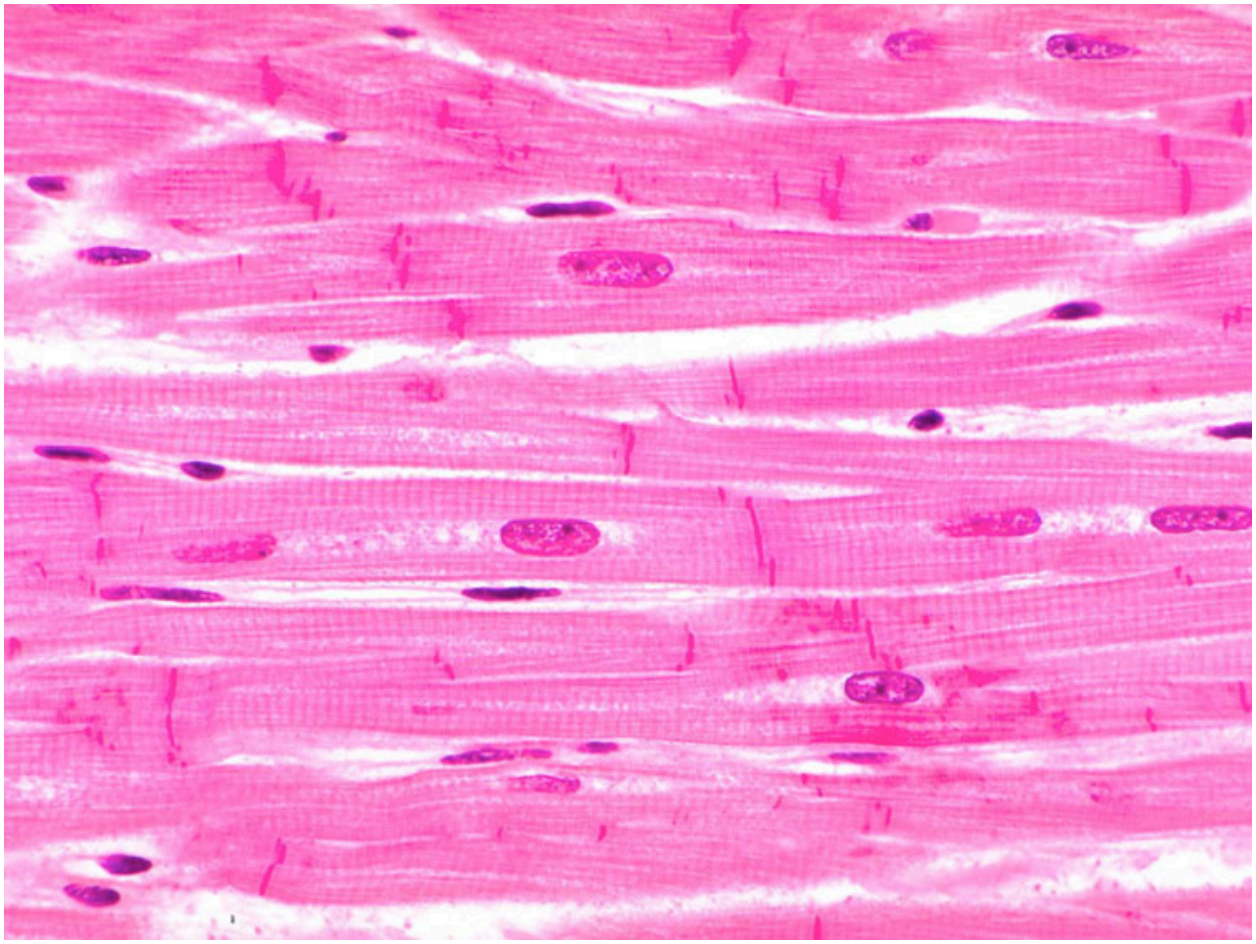


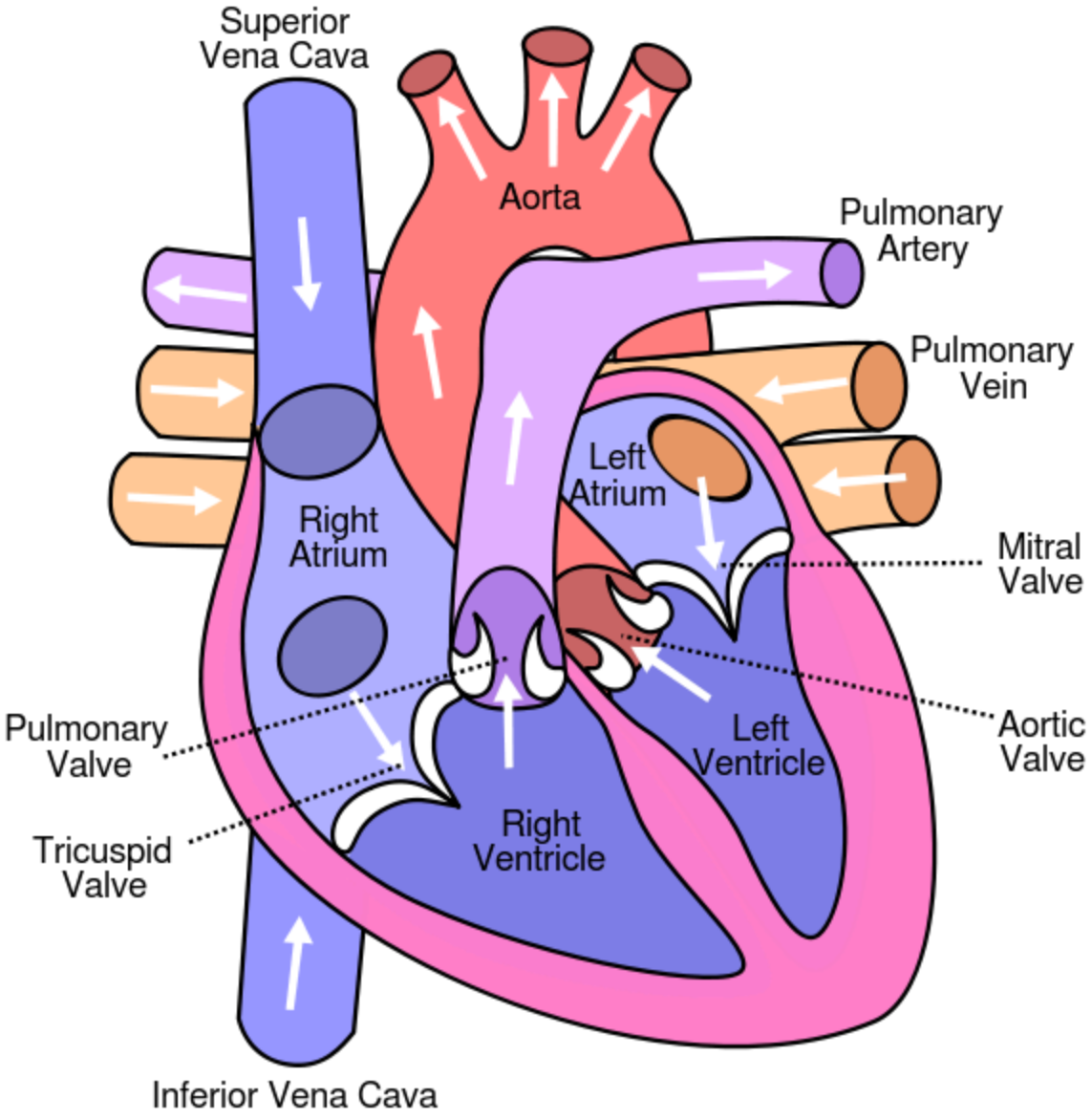


Skeletal muscle

Cardiac muscle - Only found in the walls of the heart, these cells contract to help propel blood through blood vessels to all parts of the body. These involuntary cells usually have only one nucleus each, but still have the striations. They are also branching cells that fit together at tight connections called intercalated discs.

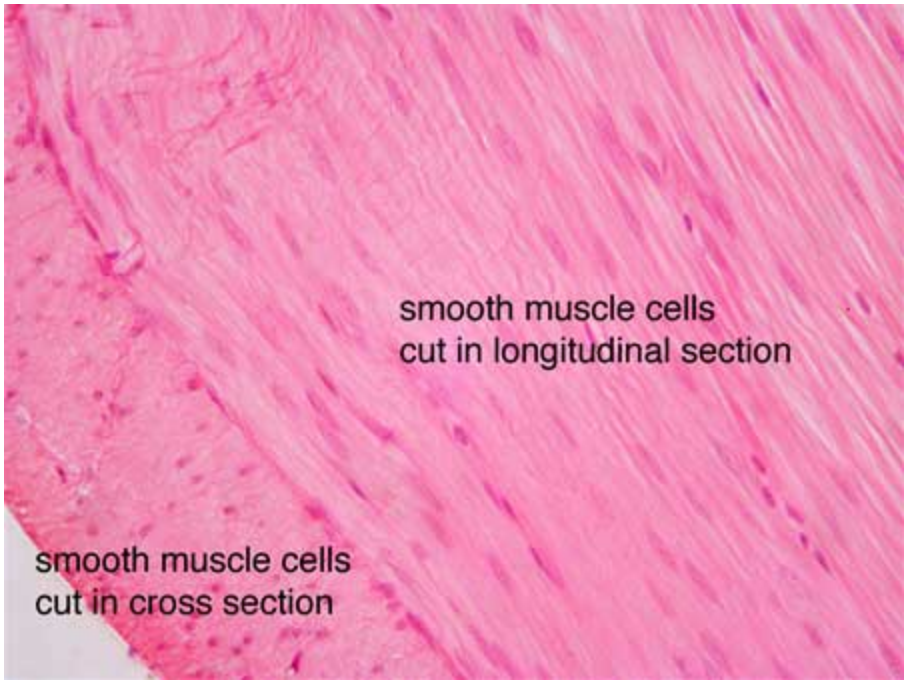




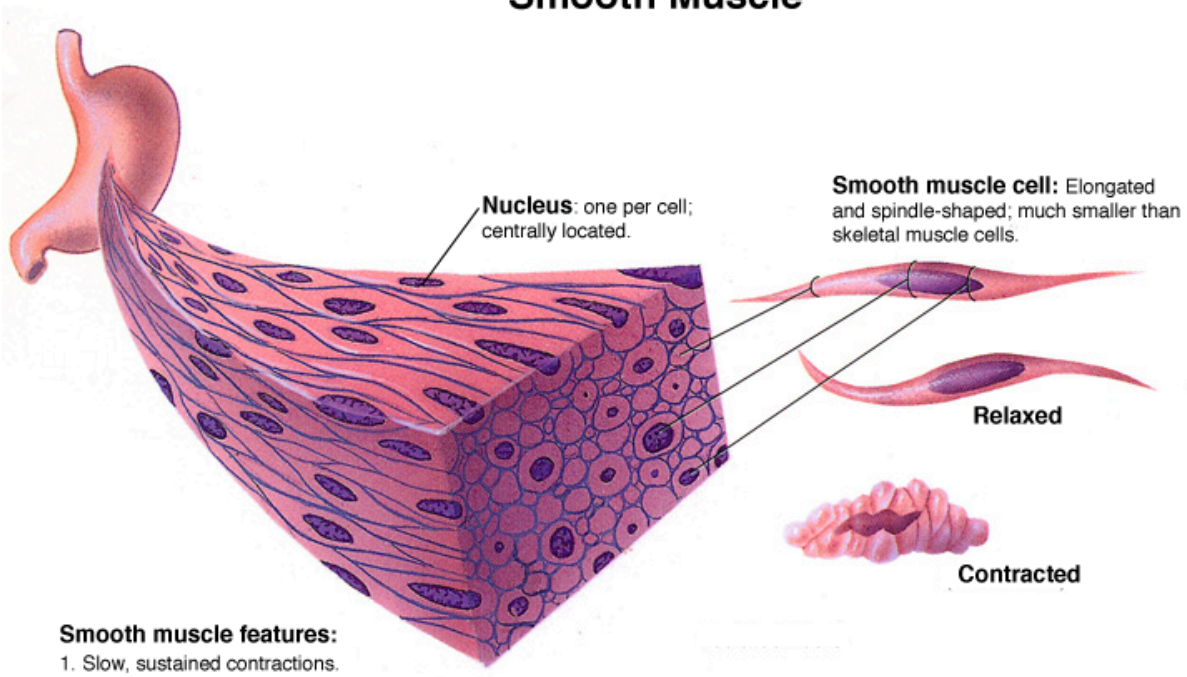


Smooth muscle - involuntary muscles that make up the walls of hollow organs of the digestive and urinary systems, as well as blood vessels. They act to squeeze materials through the organs by squeezing

and relaxing. They are spindle shaped muscle cells with individual nuclei. No striations are present. Cells are arranged closely to make sheets of muscle.

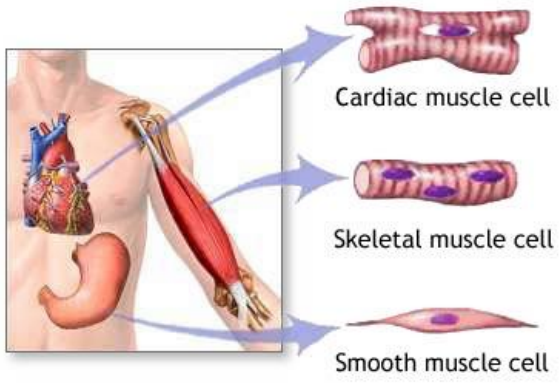


Smooth Muscle



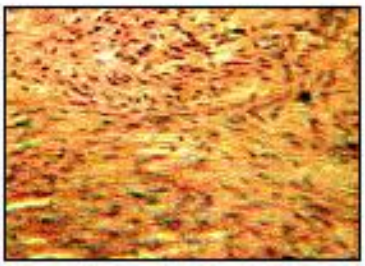
Smooth muscle features:

1. Slow, sustained contractions.
2. Under autonomous (non-voluntary) control.
3. Contain actin and myosin filaments but lack sarcomeres.
3. Prominent locations:
    1. Wall of GI tract.
    2. Walls of arteries and veins.
    3. Around glands.

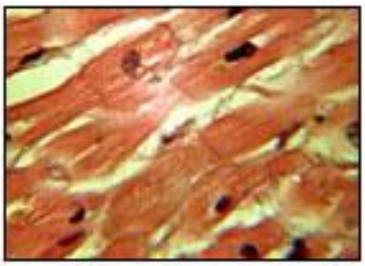


A.D.A.M.

Skeletal muscle



Smooth muscle



Cardiac muscle

Skeletal muscle or "voluntary muscle" is anchored by **tendons** to **bone** and is used to affect **skeletal** movement such as **locomotion** and in maintaining posture. Though this postural control is generally maintained as an unconscious reflex, the muscles responsible react to conscious control like non-postural muscles. An average adult male is made up of 42% of skeletal muscle and an average adult female is made up of 36% (as a percentage of body mass).[3]

Smooth muscle or "involuntary muscle" is found within the walls of organs and structures such as the **esophagus**, **stomach**, **intestines**, **bronchi**,**uterus**, **urethra**, **bladder**, **blood vessels**, and the **arrector pili** in the skin (in which it controls erection of body hair). Unlike skeletal muscle, smooth muscle is not under conscious control.
Cardiac muscle is also an "involuntary muscle" but is more akin in structure to skeletal muscle, and is found only in the heart.

Dark vs. White “Meat”

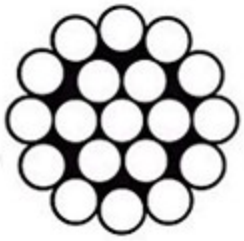
Type I, slow oxidative, slow twitch, or "red" muscle is dense with capillaries and is rich in mitochondria and myoglobin, giving the muscle tissue its characteristic red color. It can carry more oxygen and sustain aerobic activity.

Type II, fast twitch muscle, It can contract more quickly and with a greater amount of force than oxidative muscle, but can sustain only short, anaerobic bursts of activity before muscle contraction

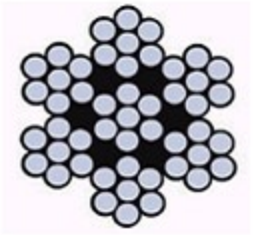
becomes painful.

Skeletal muscles as organs

Skeletal muscles are organized into bundles of cable-like fibers of tissue.

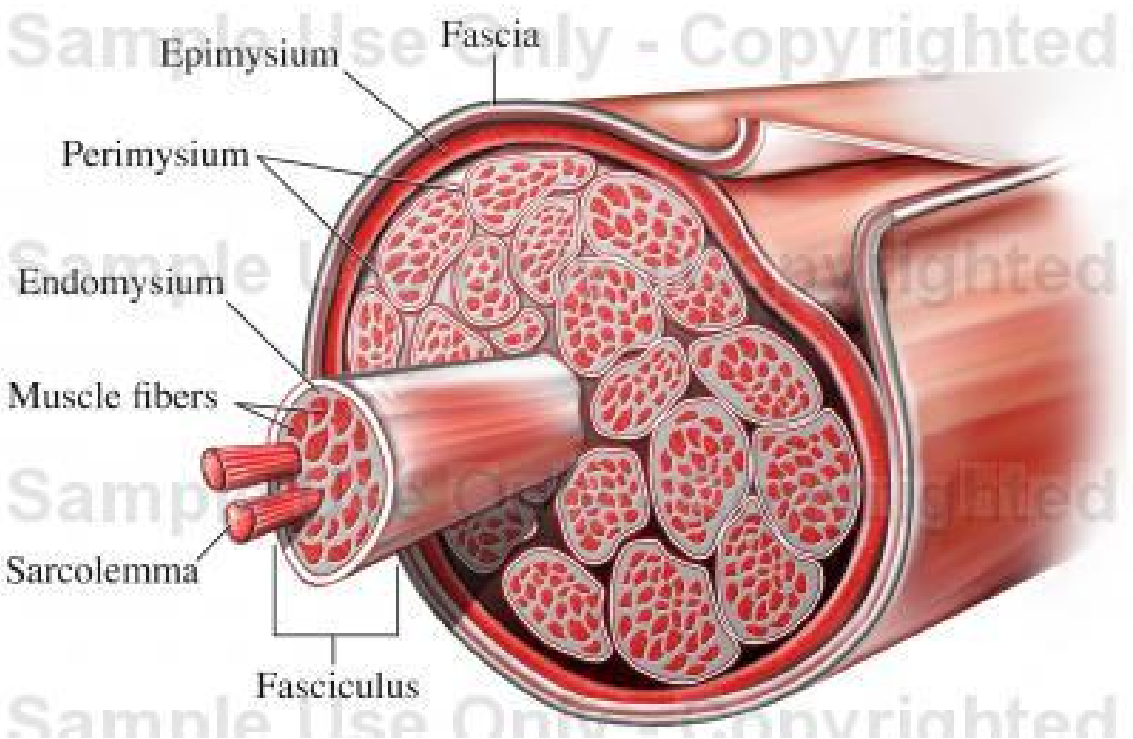


1/19 316 Stainless Wire Construction – suitable for straight use



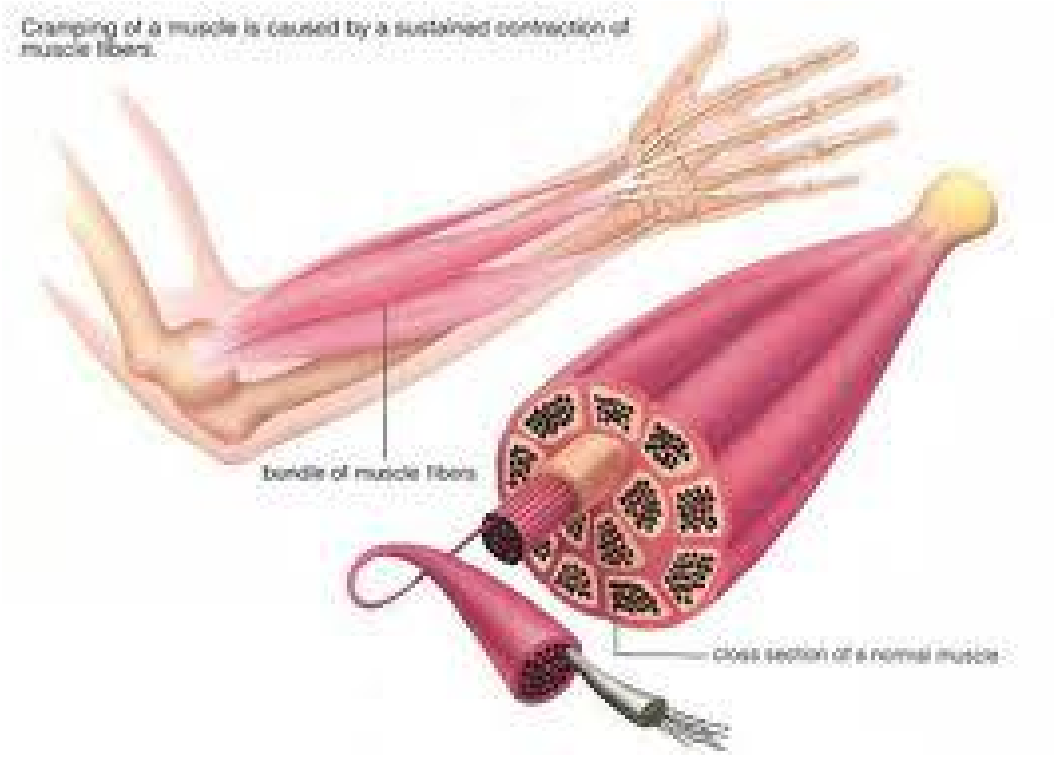
7/7 316 Stainless Wire Construction – suitable for use where some flexibility for bends is needed

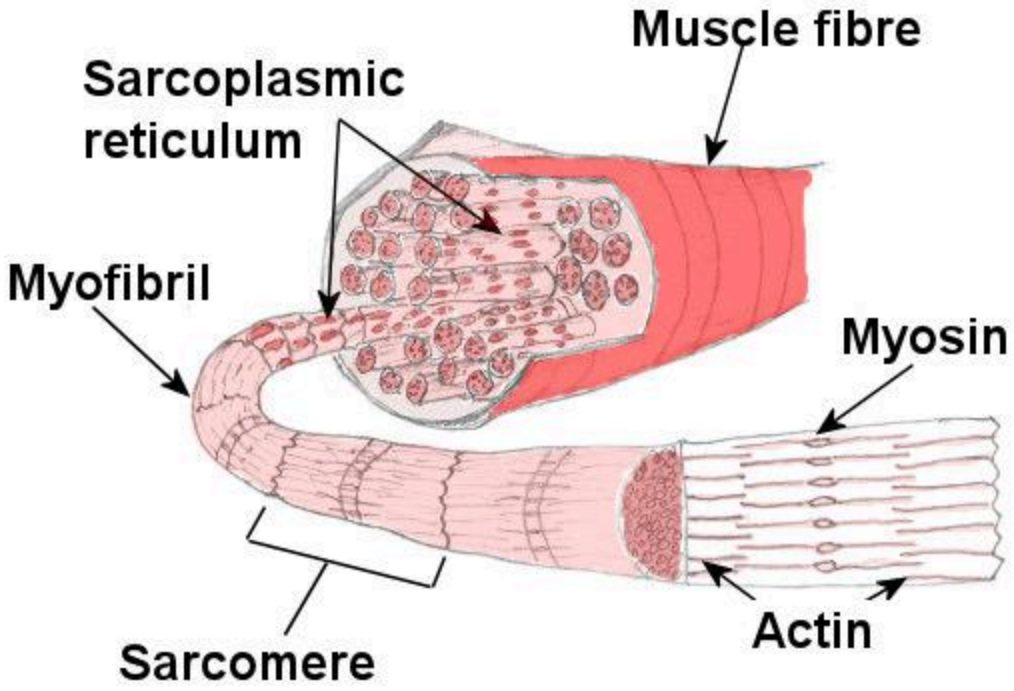
7/19 316 Stainless Wire Construction– ideal for use where a large degree of flexibility for bends is needed

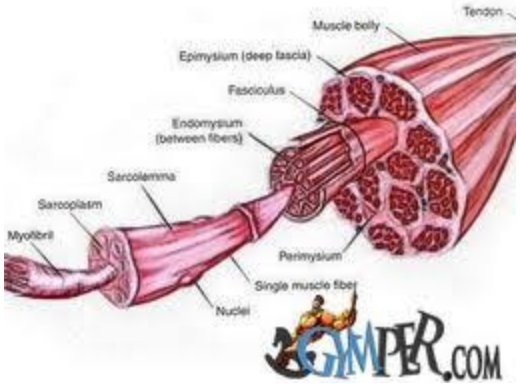


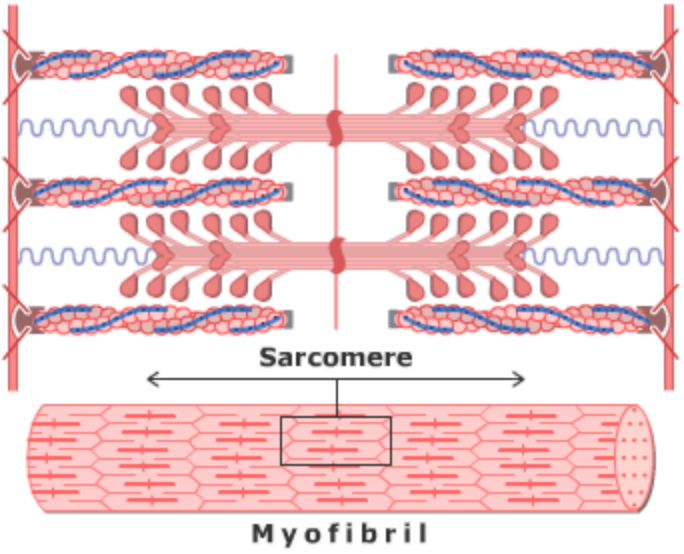
These “cable bundles” are covered in various layers of membrane to support each cell and reinforce the muscle as a whole, preventing the muscles from bursting during prolonged contractions. Skeletal Muscles have lots of nerve endings that control their contractions. Also, they are rich in blood vessels as these cells need lots of oxygen and nutrients and produce lots of waste carbon dioxide and

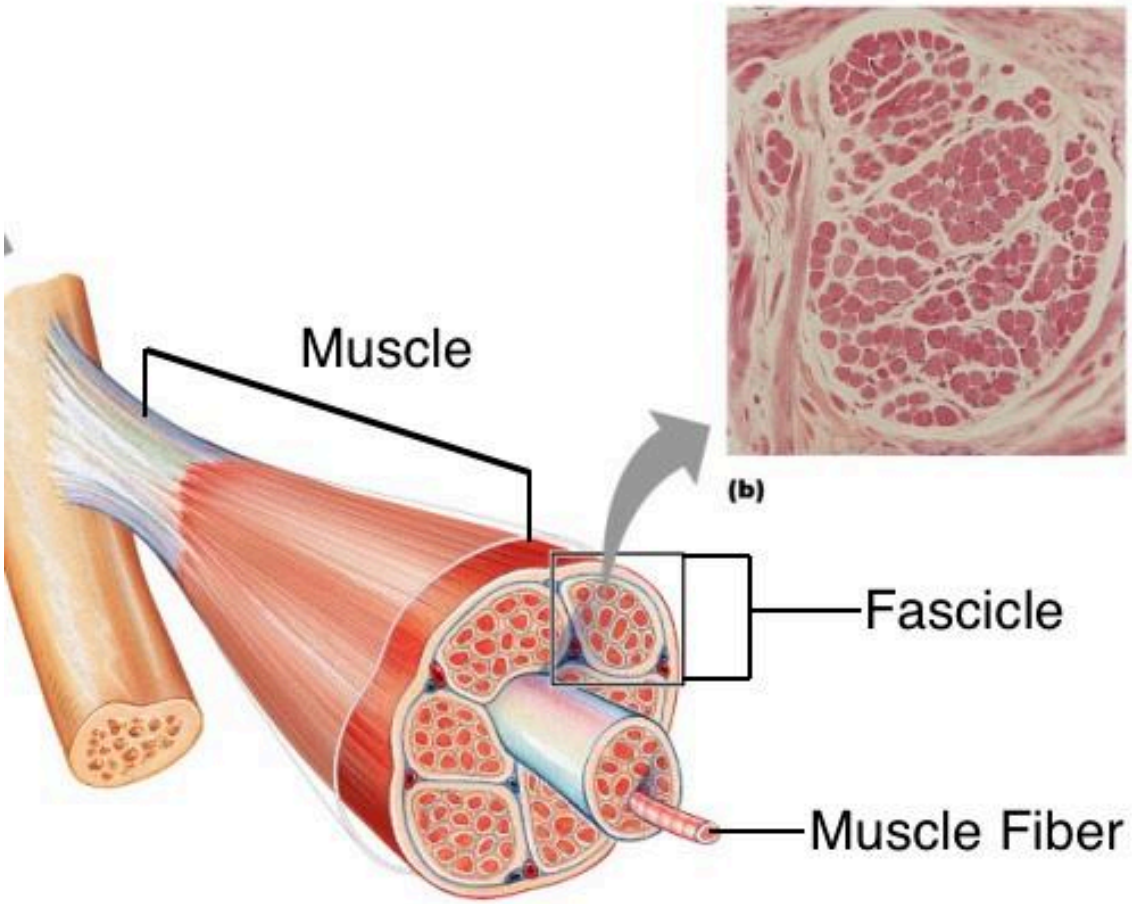
other wastes.




Muscle fibre
Sarcoplasmic reticulum
Myofibril
Myosin
Actin
Sarcomere

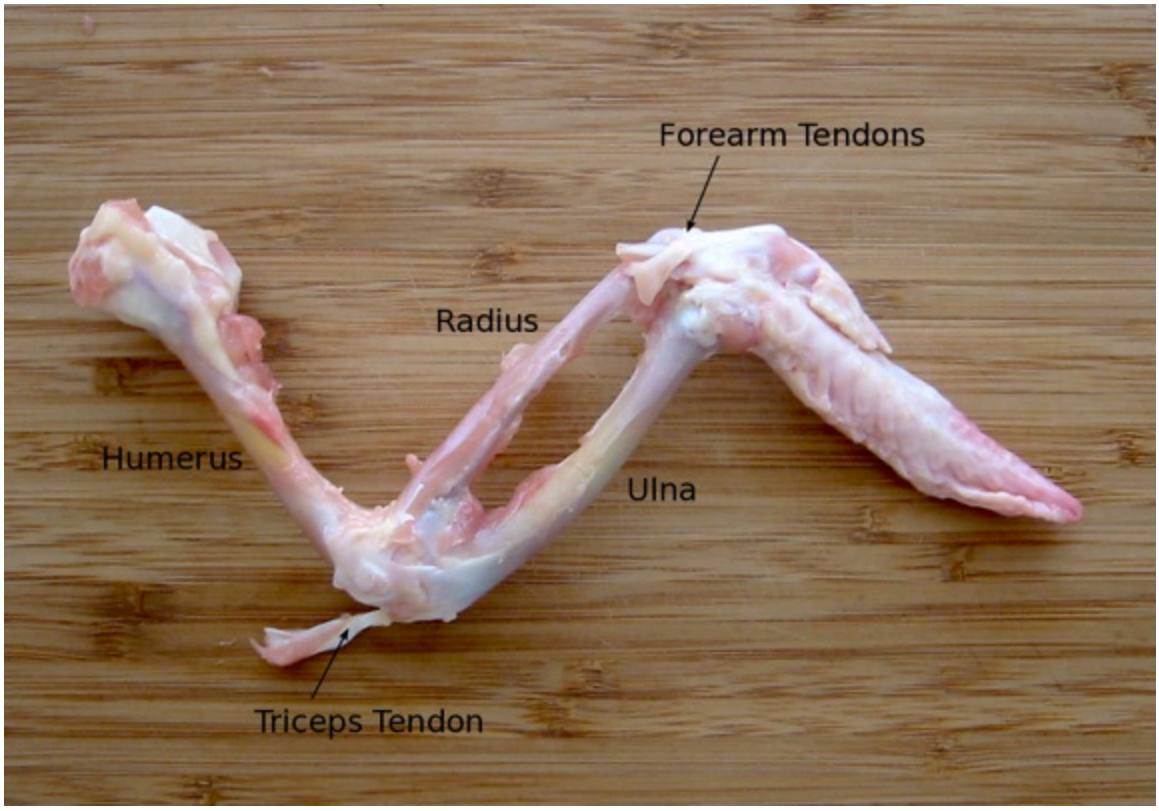

Tendon
Muscle belly
Epimysium (deep fascia)
Fasciculus
Endomysium (between fibers)
Sarcolemma
Sarcoplasm
Myofibril
Perimysium
Single muscle fiber
Nuclei
GYMPER.COM

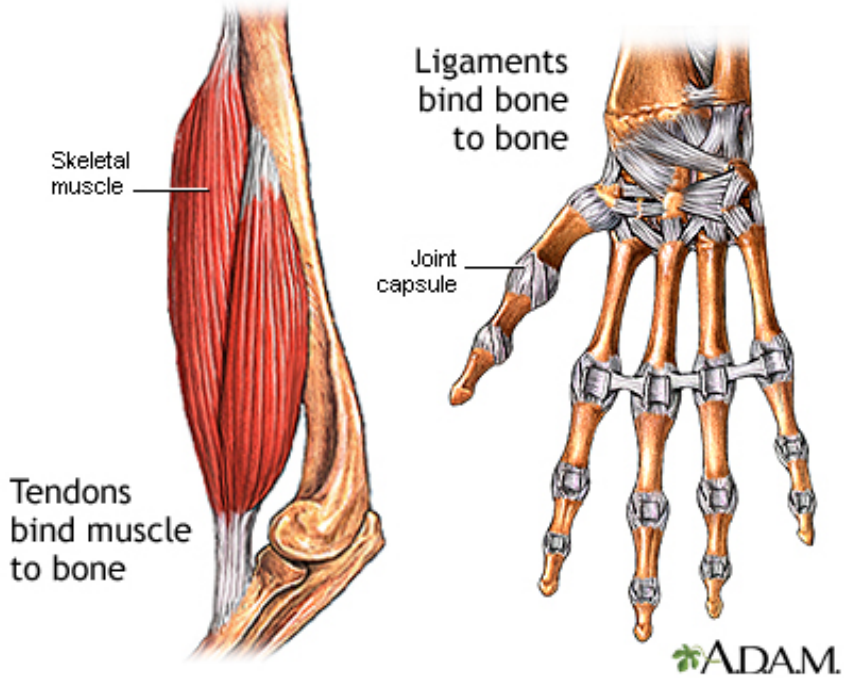

Sarcomere
Myofibril

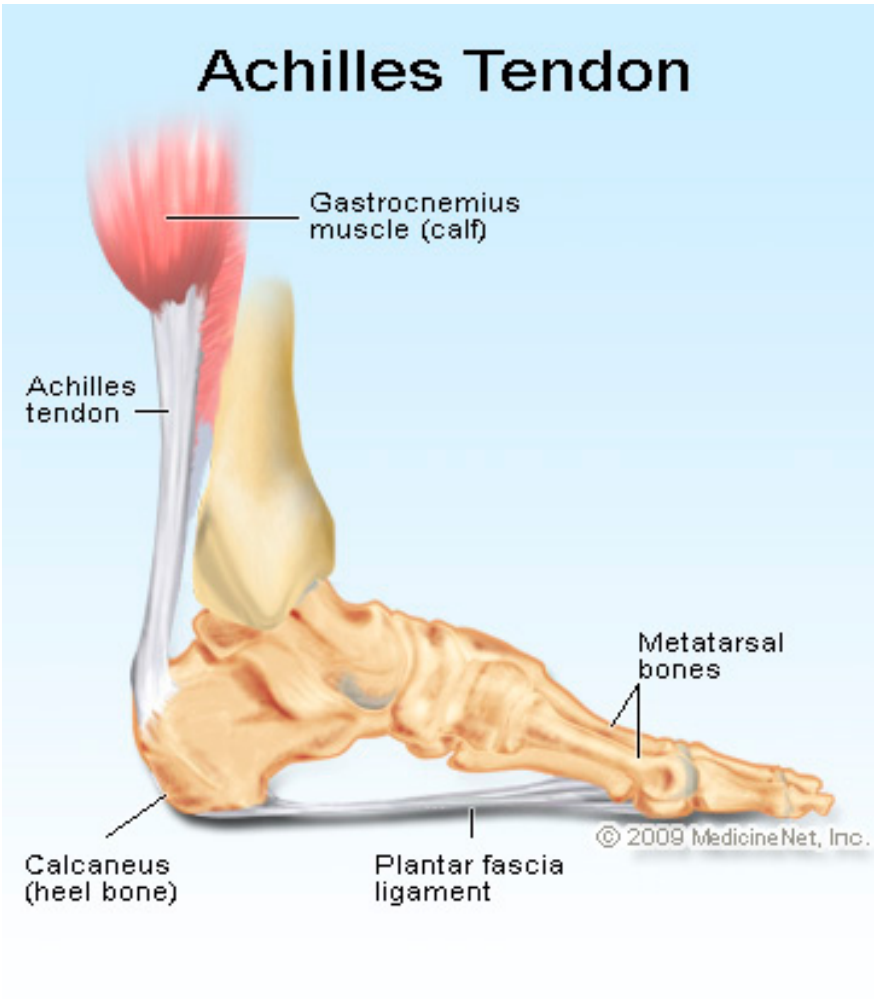


Tendons attach muscle to bone

Ligaments attach bone to bone


Forearm Tendons
Radius
Humerus
Ulna
Triceps Tendon


Skeletal muscle
Tendons bind muscle to bone
Ligaments bind bone to bone
Joint capsule
A.D.A.M.



Overview of Exercise and Body Response

Exercise is often recommended as a means of improving motor skills, fitness, muscle and bone strength, and joint function. Exercise has several effects upon muscles, connective tissue, bone, and the nerves that stimulate the muscles. One such effect is muscle hypertrophy, an increase in size. This is used in bodybuilding.
Various exercises require a predominance of certain muscle fiber utilization over another. Aerobic exercise involves long, low levels of exertion in which the muscles are used at well below their maximal contraction strength for long periods of time (the most classic example being the marathon). Aerobic events, which rely primarily on the aerobic (with oxygen) system, use a higher percentage of Type I (or slow-twitch) muscle fibers, consume a mixture of fat, protein and carbohydrates for energy, consume large amounts of oxygen and produce little lactic acid.

Anaerobic exercise involves short bursts of higher intensity contractions at a much greater percentage of their maximum contraction strength. Examples of anaerobic exercise include sprinting and weight lifting.

The anaerobic energy delivery system uses predominantly Type II or fast-twitch muscle fibers, relies mainly on ATP or glucose for fuel, consumes relatively little oxygen, protein and fat, produces large amounts of lactic acid and can not be sustained for as long a period as aerobic exercise.

Many exercises are partially aerobic and partially anaerobic; for example, soccer involves a combination of both.

The presence of lactic acid has an inhibitory effect on ATP generation within the muscle; though not producing fatigue, it can inhibit or even stop performance if the intracellular concentration becomes too high. However, long-term training causes neovascularization within the muscle, increasing the ability to move waste products out of the muscles and maintain contraction. Once moved out of muscles with high concentrations within the sarcomere, lactic acid can be used by other muscles or body tissues as a source of energy, or transported to the liver where it is converted back to pyruvate. In addition to increasing the level of lactic acid, strenuous exercise causes the loss of potassium ions in muscle and causing an increase in potassium ion concentrations close to the muscle fibres, in the interstitium. Acidification by lactic acid may allow recovery of force so that acidosis may protect against fatigue rather than being a cause of fatigue.[7]
Humans are genetically predisposed with a larger percentage of one type of muscle group over another. An individual born with a greater percentage of Type I muscle fibers would theoretically be more suited to endurance events, such as triathlons, distance running, and long cycling events, whereas a human born with a greater percentage of Type II muscle fibers would be more likely to excel at anaerobic events such as a 200 meter dash, or weightlifting.[*citation needed*]

Delayed onset muscle soreness is pain or discomfort that may be felt one to three days after exercising and subsides generally within two to three days later. Once thought to be caused by lactic acid buildup, a more recent theory is that it is caused by tiny tears in the muscle fibers caused by eccentric contraction, or unaccustomed training levels. Since lactic acid disperses fairly rapidly, it could not explain pain experienced days after exercise.[8]

Parting Thoughts:

Why do you train?
What do you train?
How do you train?
When do you train and how often?
Where do you train?

Who do you train with?