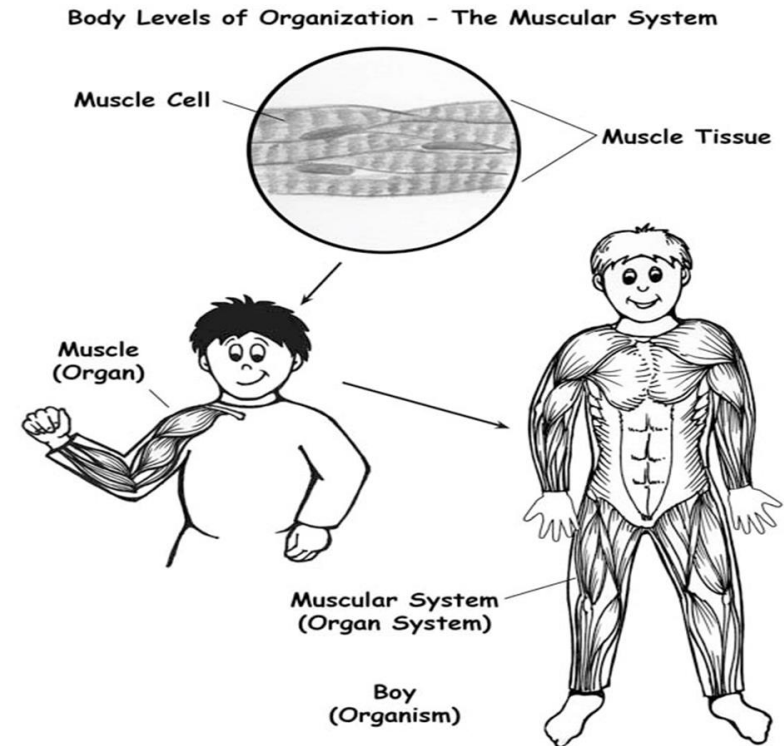


General myology

RNDr. Michaela Račanská, Ph.D.

Lecture 9 – DENTISTRY – Autumn 2016

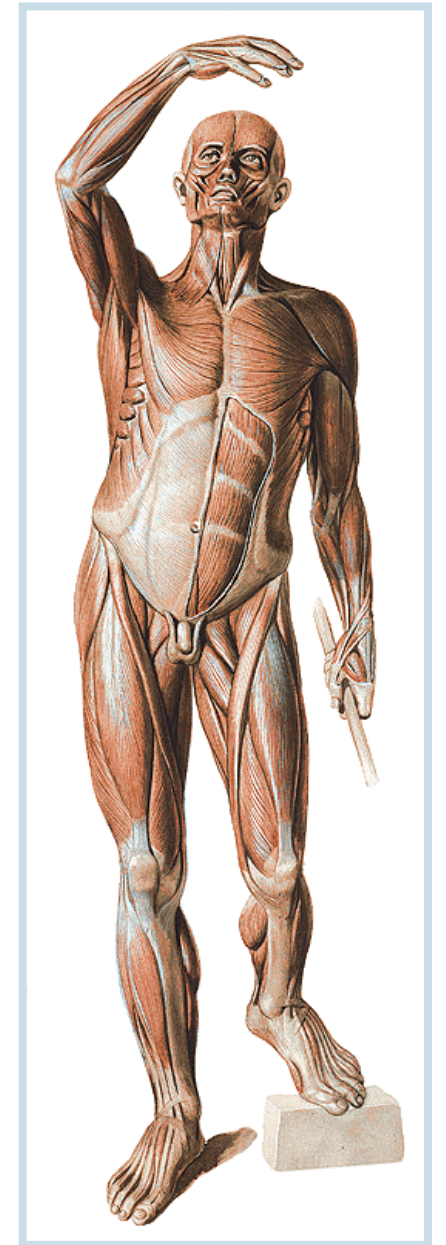


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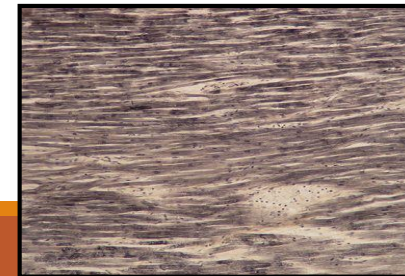
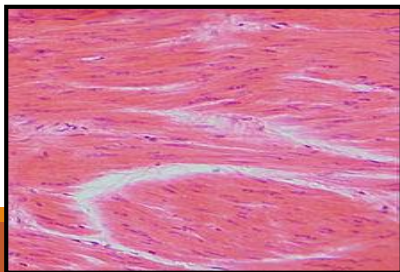
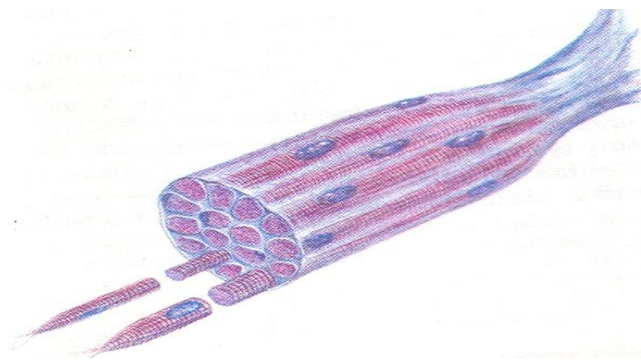
General function of muscle

- * produces movement in sites of skeletal junctions
- * changes shapes and dimensions of various body cavities and openings
- * gives important information about the body position in three-dimensional space
- * important role during thermoregulation
- * helps to blood and lymph circulation
- * verbal and non verbal communication
- * about 600 muscles (♂ 35%, ♀ 32%)
- * logistic system (supports respiration, digestion...)



There are three different types of muscle:

- 1) **Skeletal:** striated muscle fibers that are attached to bone and are responsible for movements of the skeleton (sometimes simplistically referred to as *voluntary muscle* – work under control of our will, spent a lot of energy, produce heat (*musculi sceleti* + skin muscles (*musculi cutanei*))
- 2) **Cardiac:** striated muscle fibers that make up the walls of the heart and proximal portions of the great vessels (myocardium)
- 3) **Smooth (visceral):** nonstriated muscle fibers that line various organs, attach to hair follicles, and line the walls of most blood vessels (sometimes simplistically referred to as *involuntary muscle* – *work without our will, without fatigue*)

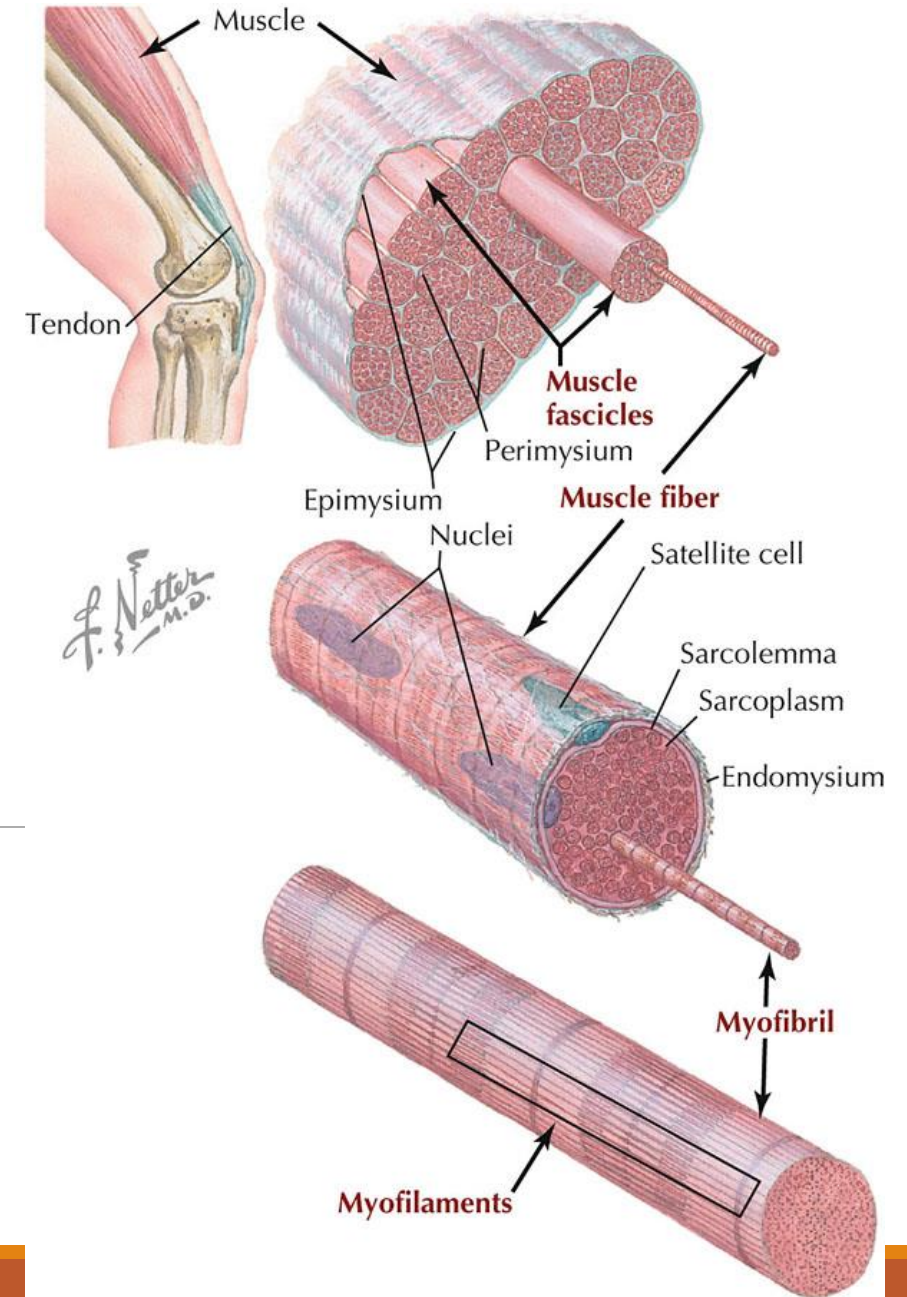
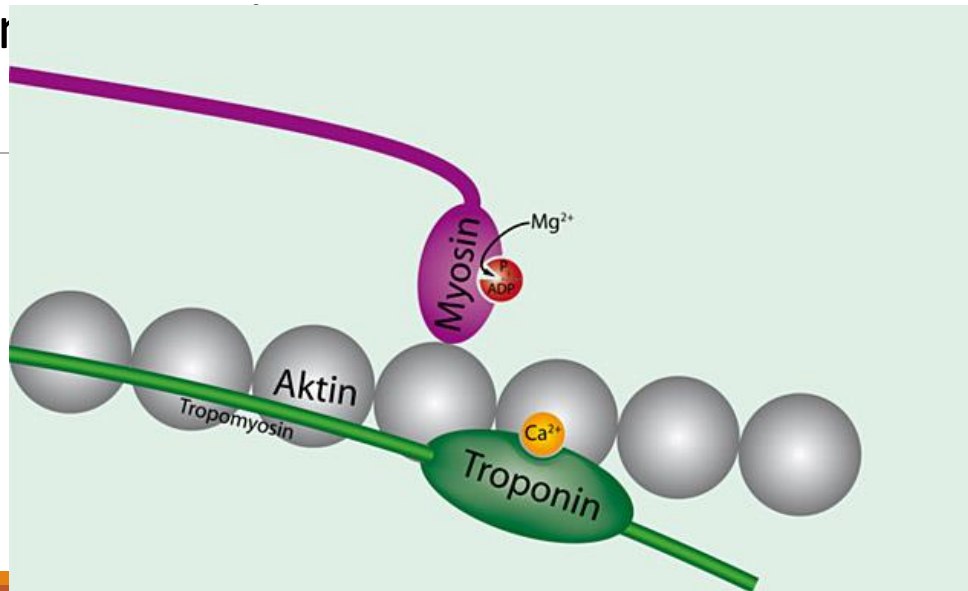


SKELETAL MUSCLES

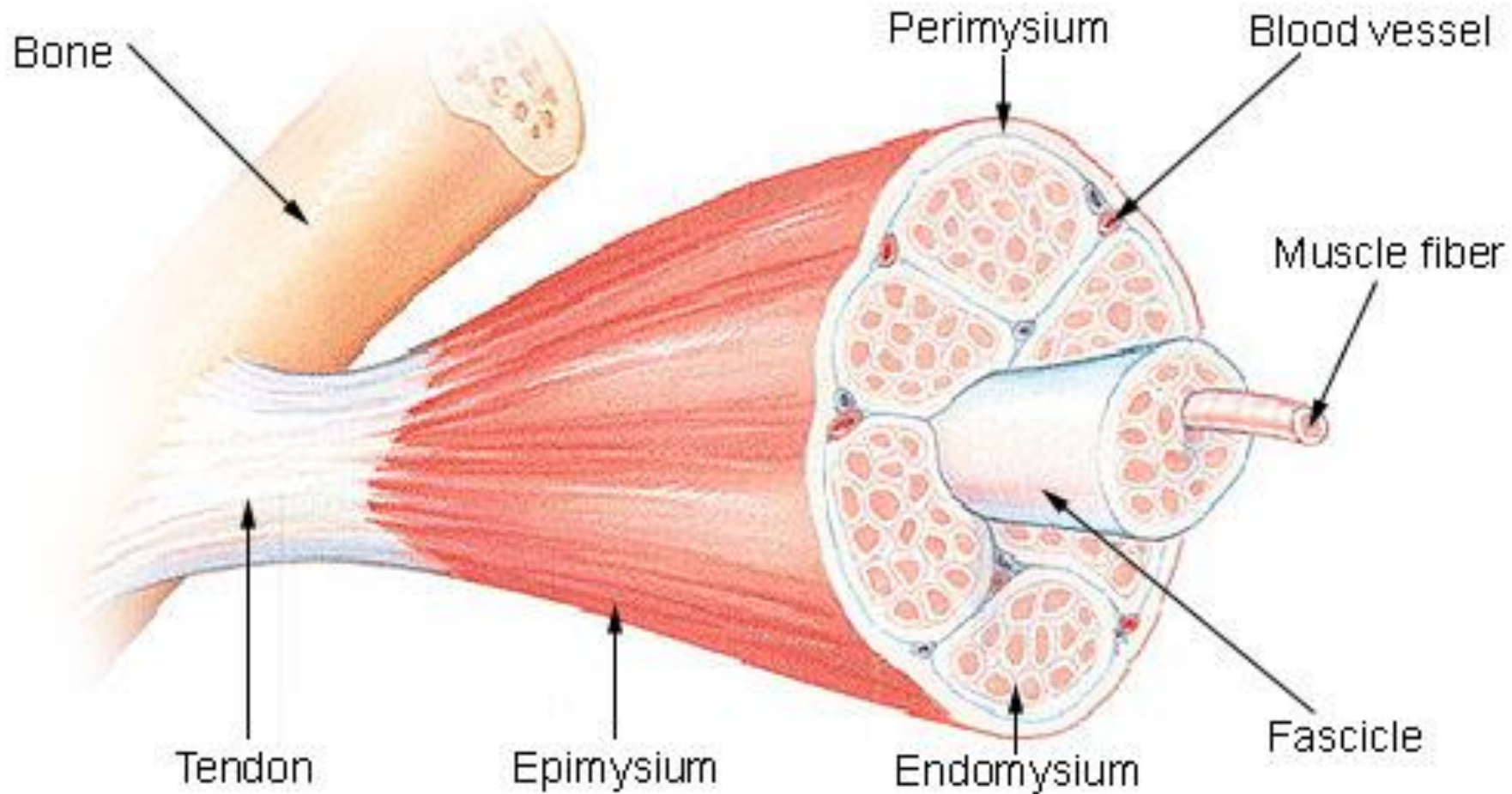
(Muscles - an active part of the locomotor system)



Skeletal muscle is divided into **fascicles** (bundles), which are composed of muscle fibers (muscle cells). The muscle fiber cells contain longitudinally oriented **myofibrils** that run the full length of the cell. Each myofibril is composed of many **myofilaments**, which are composed of individual **myosin** (thick filaments) and **actin** (thin filaments) that slide over one another during



Structure of a Skeletal Muscle



Striated fibres – endomysium

Primary and secondary muscle bundles – perimysium internum

Surface of muscle perimysium externum – fascia propria musculi

Common structure of muscle

Origo (origin)
Proximal part (more fixed)

Fascia

Tendo, aponeurosis

Insertio (insertion)
– distal part, more movable)

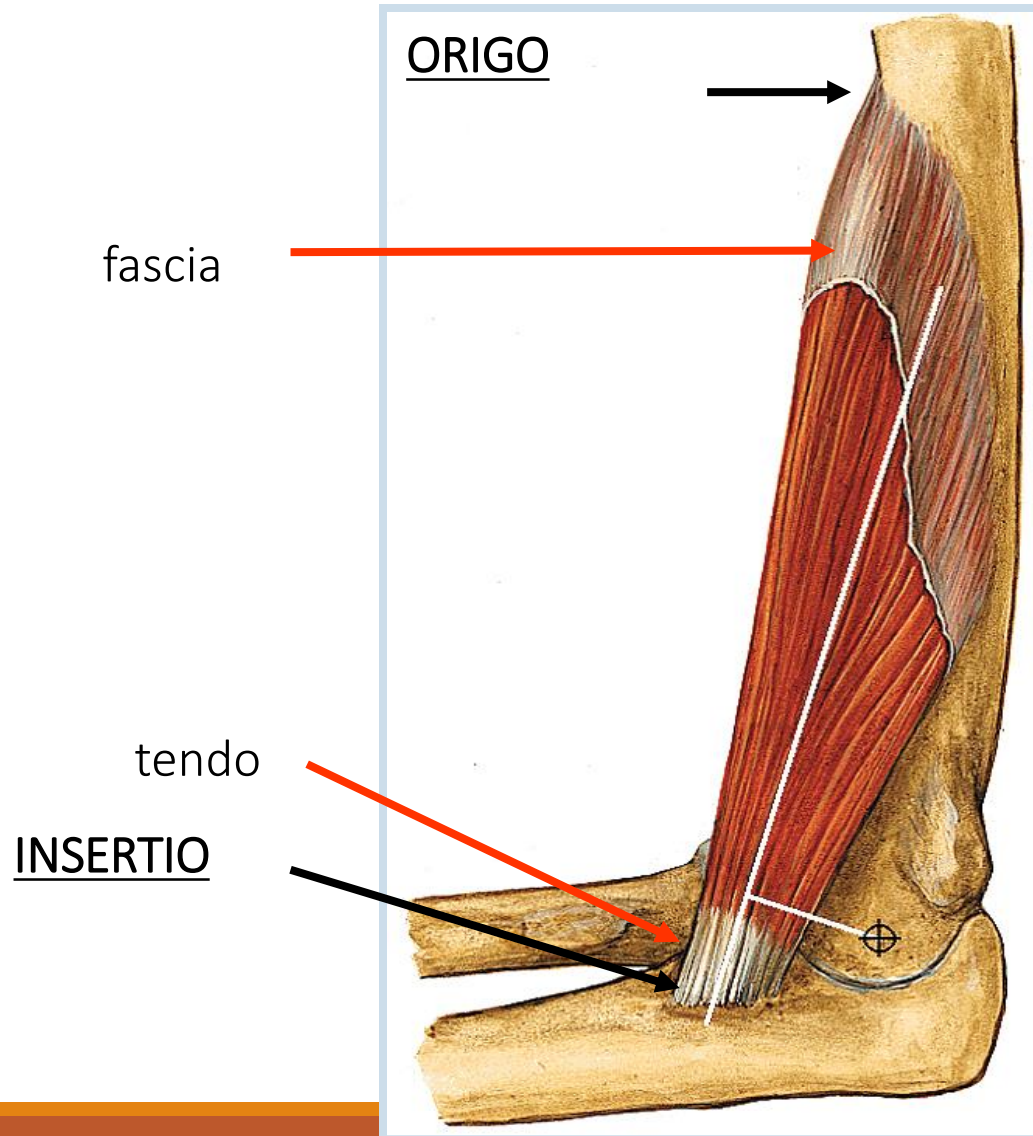


Caput (head)

Venter (belly)

Cauda (tail)

Structure of muscle



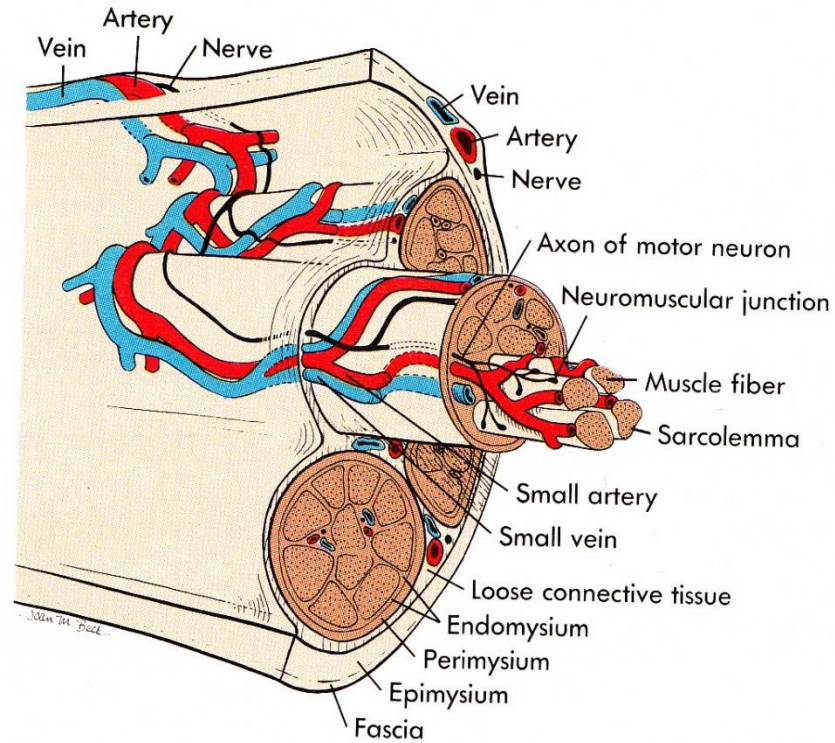
fibrous membrane – *fascia* – separates the muscles (or groups) from adjacent structures.

Vessels and nerves enter into muscle by its hilus (rich ramification)

Tendons are attached to the bones by Sharpey's fibres

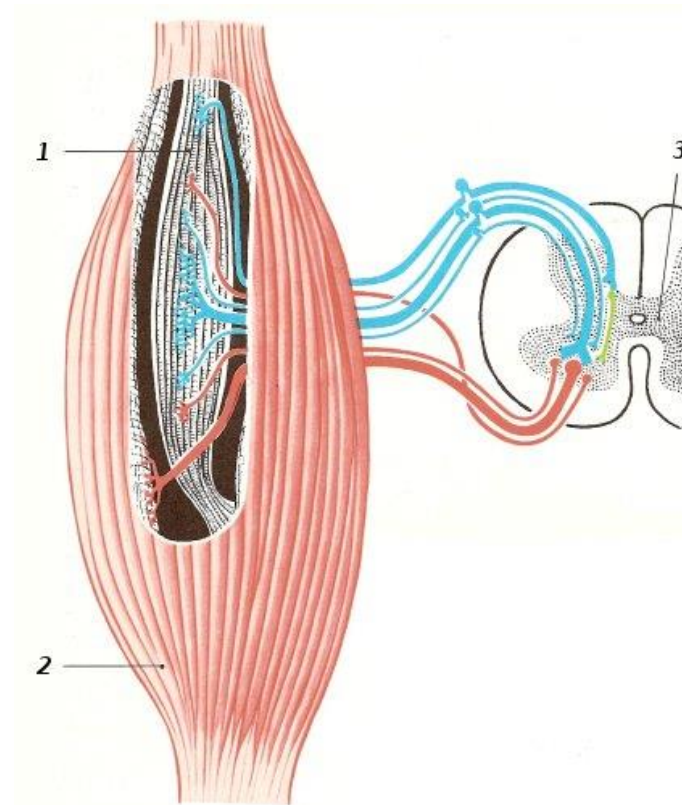
Vessels and nerves of the muscles

Hilus – vessels and nerves



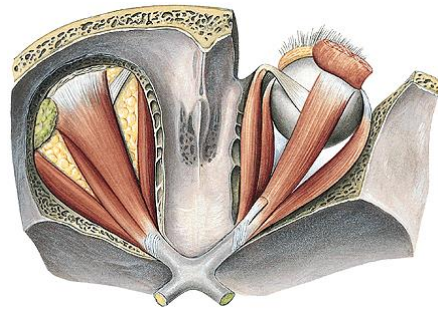
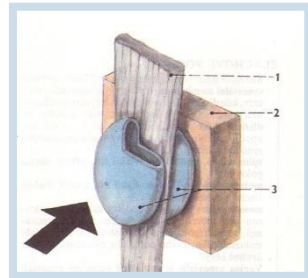
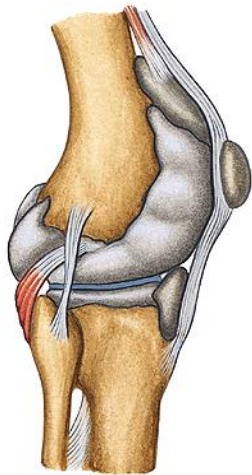
Sensory innervation – muscle and tendon spindles

Motor innervation – motor plate



Auxiliary facilities of muscles

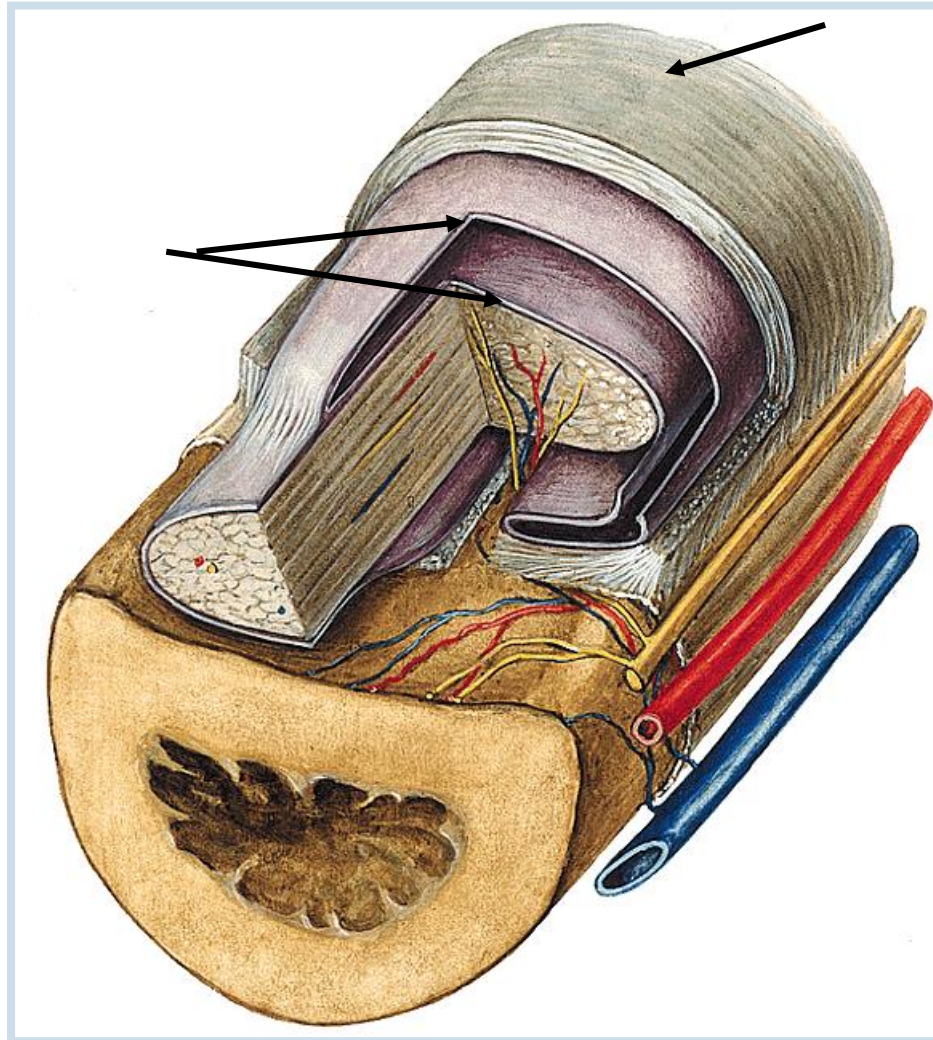
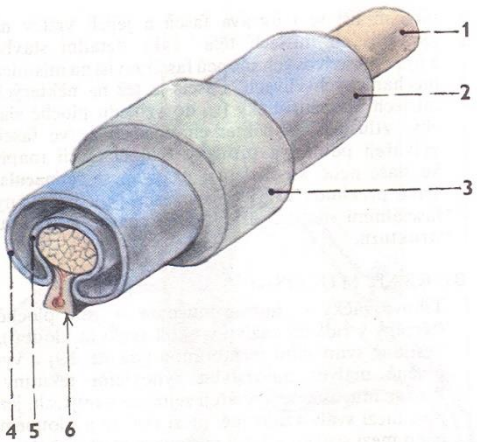
- Fascias – allow to move one muscle against the other
- Synovial bursae – protect muscle tendons against friction
- Tendons, aponeurosis
- Muscular trochleae – fibrous loops keeping tendon to bone, permit change of direction of muscle pulling
- Sesamoid bones – at the places of pressure
- Tendon sheaths – vaginae tendinum



Auxiliary facilities – tendon sheaths = vaginae tendinum

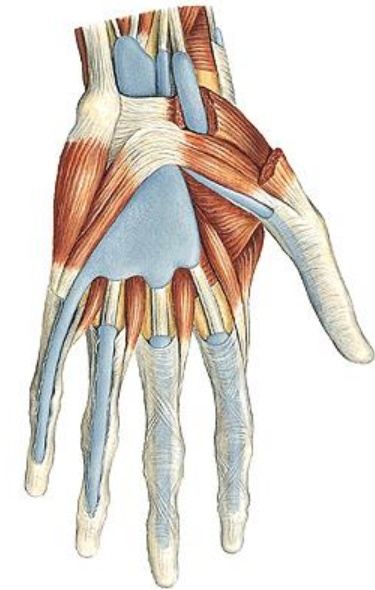
Along the tendons, closed, increasing sliding capacity of tendons

Synovial layer =
stratum synoviale (ext.
and int. layer with
mesotenonium for
penetration of vessels into
tendon)



Fibrous layer =
stratum fibrosum

(*Osteofibrous canal*)



Division of muscles according to the shape



- *long type* (predominantly limb muscles)
- *flat type of muscles* , paralel fibers, flat sheath, flat tendon – aponeurosis (abdominal wall muscles)
- *short type of muscles* (circumarticular muscles)
- Circular muscles (sphincters, around openings)
- Composed:
 - *biceps*, begins with two heads (triceps, quadriceps)
 - *digastric muscle* – *musculus digastricus* (*multi-bellied muscle*)
 - *unipennate muscles* or *multipennate* muscles – feathered apereabce

Division of muscles according to the function

synergists x antagonists

flexors x extensors

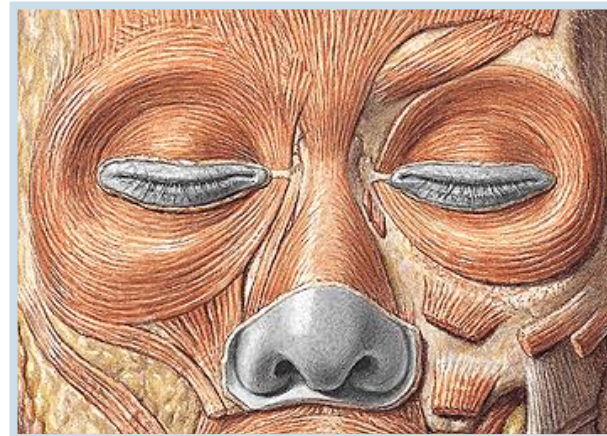
biceps of brachium x triceps of brachium

abductors x adductors

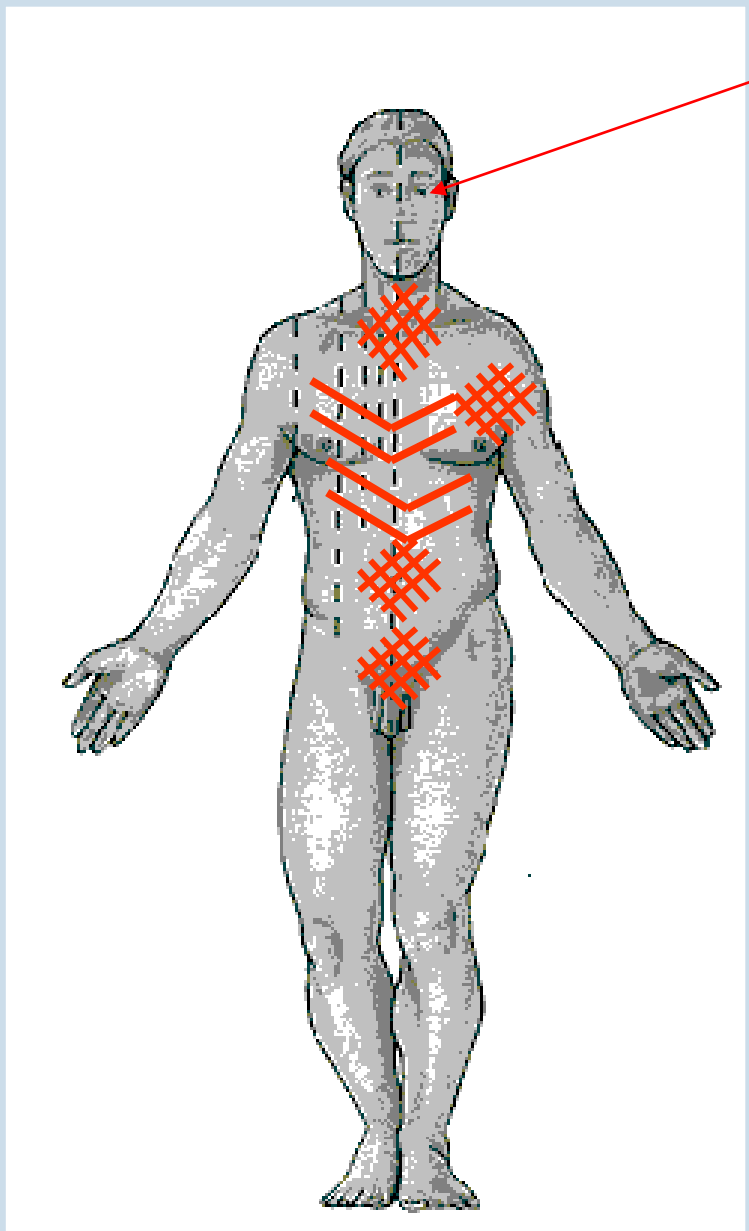
abductor pollicis brevis x adductor pollicis

dilatators x sphincters

dilatator pupillae x sphincter pupillae



Innervation of muscles (motor, sensory)



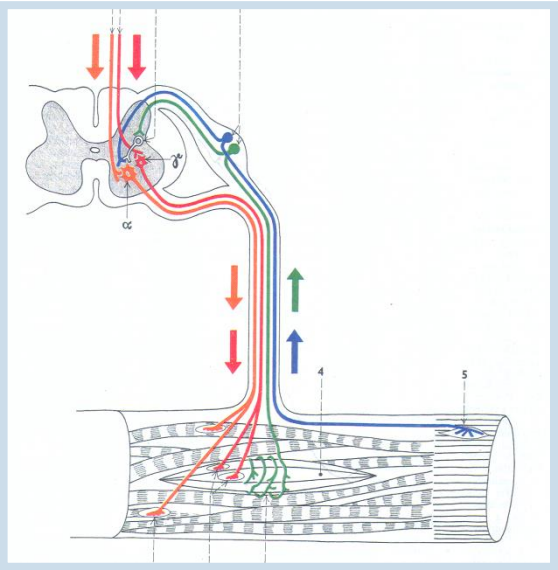
Cranial nerves (III. – XII)

Spinal nerves

(31 pairs)

Dorsal branches

Ventral branches
(form plexus)



Cervical plexus

Brachial plexus

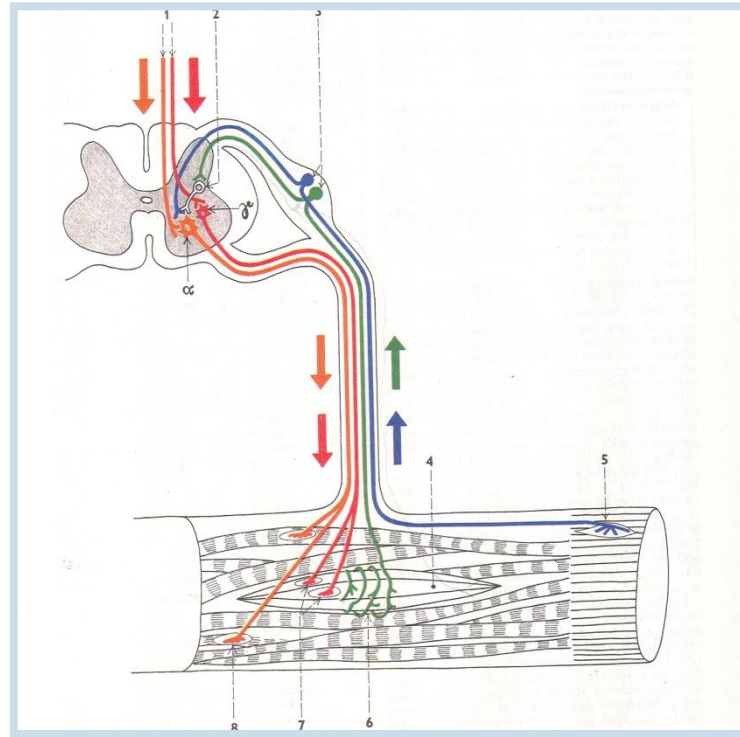
Intercostal nerves

Lumbar plexus

Sacral plexus

Muscle forms together with nerve **a functional unit** (motor fibers of α motoneurons). They finish at **motor plates in the muscle**.

Information about the stage of length and tonus of muscle give sensory tracts (nerve endings as tendon 's and muscle's corpuscles).



Tonus (tone of muscles)

is state of excitability of the nervous system controlling skeletal muscles (the continuous and passive partial contraction of the muscles).

The maintenance of tone depends upon impulses reaching brain and spinal cord from sensory endings in the muscles, tendons and joints.

It helps to maintain upright.

Tone is abolished by anesthesia (increased tone – spasticity, decreased tone – flaccidity).

Division of muscles according to topography

Muscles of head

Muscles of neck

Muscles of thorax

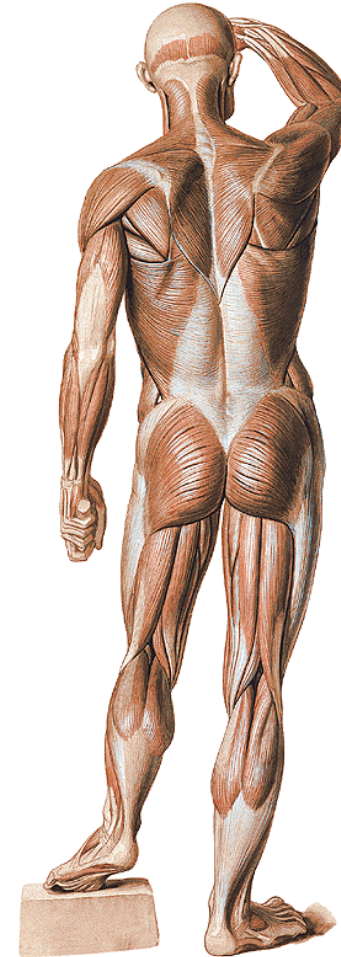
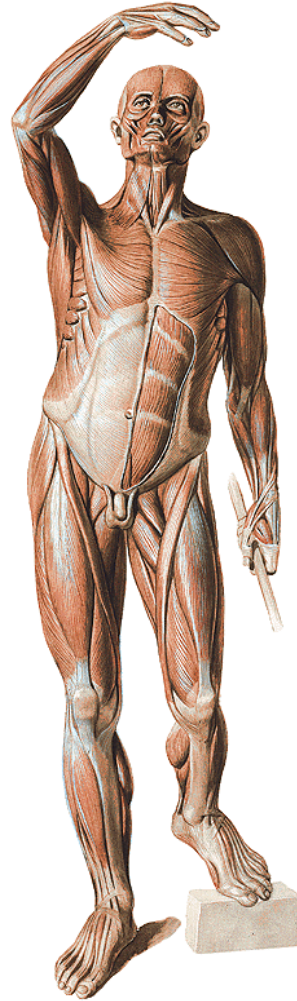
Muscles of abdomen

Muscles of diaphragm pelvis

Muscles of back

Muscles of the upper limb

Muscles of the lower limb



SPECIAL MYOLOGY

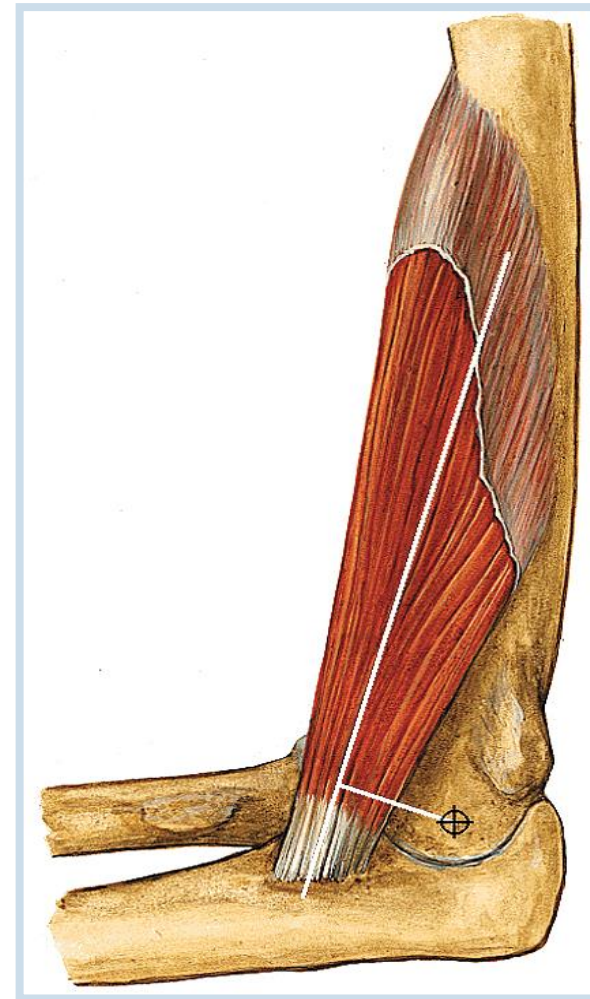
Description of the muscle:

Origo - origin

Insertio - insertion

Functio – function/action

Inervatio - innervation



Used pictures come from:

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