

MUSCLE MICROANATOMY

Revised 18 October 2016

S&M, p. 181, Martini 6th: 291-327, 7th: 284-320, 8th: 294-340, 9th: 280-284, 10th: 287-330

THREE TYPES OF MUSCLES [“mouse little”]: (p 291)

skeletal	striated	voluntary
cardiac	intermediate	intrinsic (note desmosomes & gaps junctions)
visceral	smooth	autonomic [“self ruling”]

EMBRYONIC ORIGIN

Skeletal muscle	develop from mesodermal somites in embryo: myotomes spread downward, form sheet
Visceral muscles	develop from mesodermal cells that migrate into place (including heart)

GROSS ANATOMY: (p 294):

Muscle cells fuse together to form **muscle fiber** (multi nucleated).

Cell membrane becomes **sarcolemma** [“flesh husk”]

Muscle fibers bound together by **fascia** [“bandage”] to form **fascicle** [“bundle little”]

FASCIA: thin sheet of fibrous connective tissue, 3 species: (p 291, 297)

- 1) endomysium **surrounds each fiber**, carries beds of capillaries, nerves very thin extension,
- 2) perimysium: **surrounds fasciculi** bundles: muscle fibers together
- 3) epimysium **surrounds entire muscle** outer covering

ATTACHMENTS: **tendons:** **continuous with periosteum**, formed by connective tissue as passes beyond muscle.
aponeuroses: broad thin tendon

ORIGIN AND INSERTIONS, LEARN:

Origin does not move, **insertion** does.

MICROANATOMY: (pp 295, 299)

each muscle fiber has regular bands:

- A bands: dark bands, length of **myosin** [“muscle agent”]
- I bands: light bands (space btwn myosin)
- Z line: center of I band = point of attachment of actin fibers.
(Z to Z lines = **sarcomere**, unit of contraction) [“flesh unit”]
- H zone: light area in middle of A band

MYOFIBRILS: (P 298)

ACTIN [“radiate agent”] complex fiber of three proteins: polymerized from

Globular actin = G actin, can bind to activated myosin head

Fibrous actin F actin, thread like polymer of G actin

tropomyosin [“turn”] threads along chain surface, covers G actin binding site

troponin [“turn agent”] sm protein, when Ca⁺⁺ binds, causes tropomyosin to sink into a position out of the reach of myosin heads

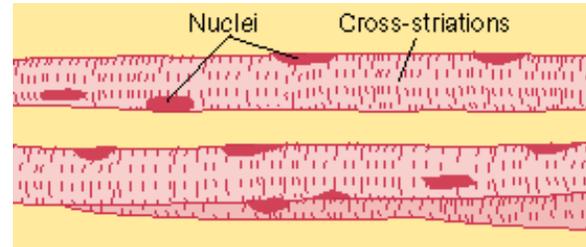
MYOSIN (thick fibers): complex of many a subunit myosin molecules.

Club like heads sticking out to form covalent cross bridges with G actin

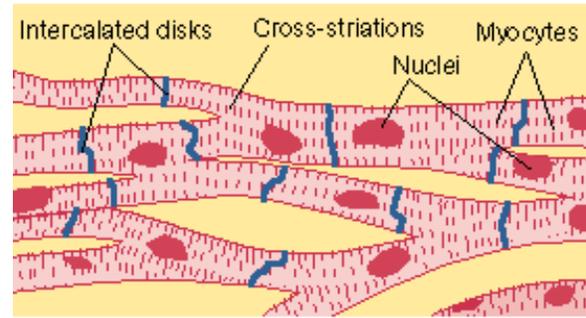
MUSCLE SHAPES: (P 334) (penna: feather)

- longitudinal: great range, little strength
- unipennate: fibers insert into one side of longitudinal tendon..
- bi and multipennate:

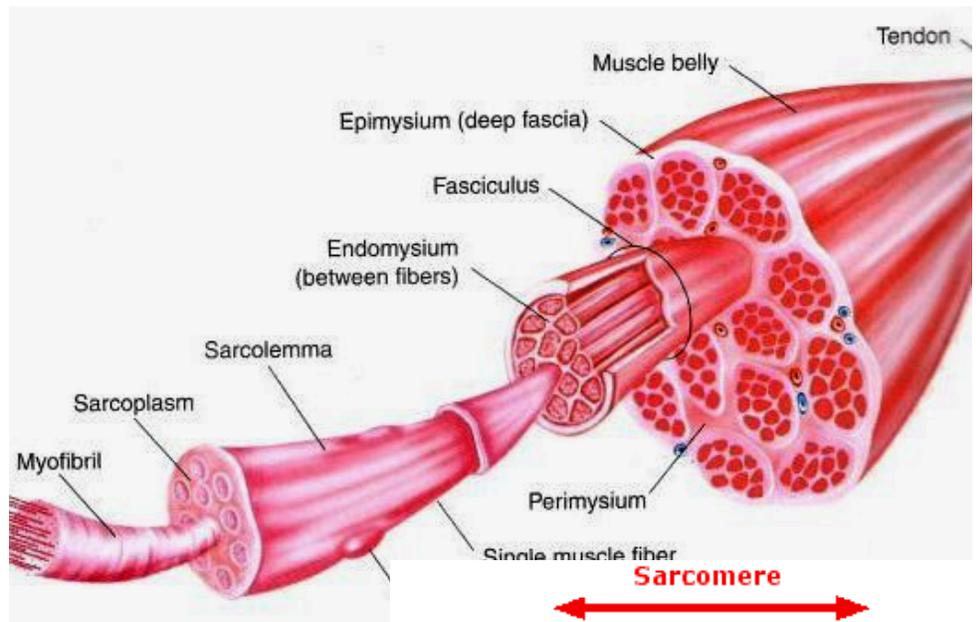
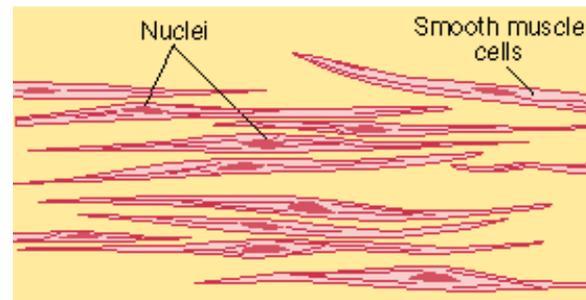
insertions on both sides or fasciculi arranged in complex convergence with several tendons.



Skeletal muscle



Cardiac muscle



Sarcomere

