

MUSCLE MICROANATOMY

S&M, p. 181, Martini 6th: 291-327, 7th: 284-320, 8th: 294-340, 9th: 280-284
 11/12/81, rvsd 11/14/96, 11/16/99, 7 Nov 01, 8 Nov 04, 7 Nov 05, 12Nov08, 9Nov09, 9Nov11
 (p. 139)

THREE TYPES OF MUSCLES:

skeletal	striated	voluntary
cardiac	intermediate	intrinsic (desmosomes & gaps junctions)
visceral	smooth	autonomic

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 295):

Muscle cells fuse together to form **muscle fiber** (multi nucleated).
 Cell membrane becomes **sarcolemma**
 Muscle fibers bound together by **fascia** (bandage) to form **fascicle** (bundle)

FASCIA: thin sheet of fibrous connective tissue, 3 layers:

- 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 are relative
 Origin does not move, insertion does.

MUSCLE SHAPES: (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.

MICROANATOMY: (pp 296, 299)

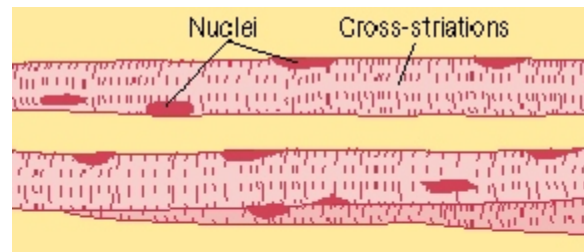
each muscle fiber has regular bands:

- A bands: dark bands, length of myosin
- I bands: light bands
- Z line: center of I band = point of attachment of actin fibers.
 (Z to Z lines = sarcomere, unit of contraction) (sarco: flesh)
- H zone: light area in middle of A band

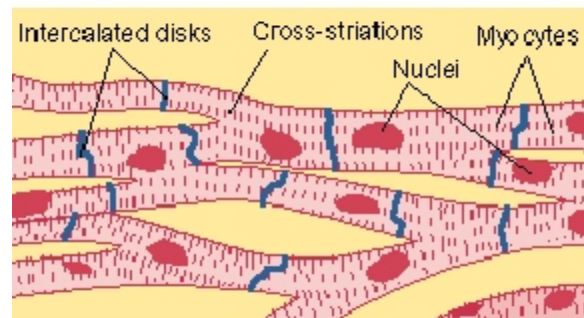
ACTIN fibers a complex of three proteins: polymerized from

- Globular actin** = G actin, can bind to activated myosin head
- Fibrous actin** thread like actin which holds G actin in place
- tropomyosin** thread like along chain surface, covers G actin binding site
- troponin** sm protein, Ca⁺⁺ binds, causes change in tropomyosin position

MYOSIN thick fibers: complex of many molecules, club like heads sticking out to form cross bridges.



Skeletal muscle



Cardiac muscle

