MUSCLE MICROANATOMY

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

Three types of muscles:	**skeletal**	striated	voluntary
(p. 139)	**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).
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**:	formed by connective tissue as passes beyond muscle. **continuous with periosteum**
	aponeuroses:	broad thin tendon

origin and **insertions** are relative, orig does not move.

Muscle shapes: (penna: feather)

longitudinal	great range, little strength
unipennate:	fibers insert into longitudinal tendon, on one side.
bi and multipennate:	insertions on both sides or fasciculi arranged in complex convergence with several tendons.

MICROANATOMY: each muscle fiber has regular bands: (pp 296, 299)

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,	can bind to activated myosin head
Fibrous actin	thread like actin which holds G actin in place
tropomyosin	thread like along surface of chain, covers binding site on G actin
troponin:	sm protein, Ca^{++} binds, causes change in tropomyosin position

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