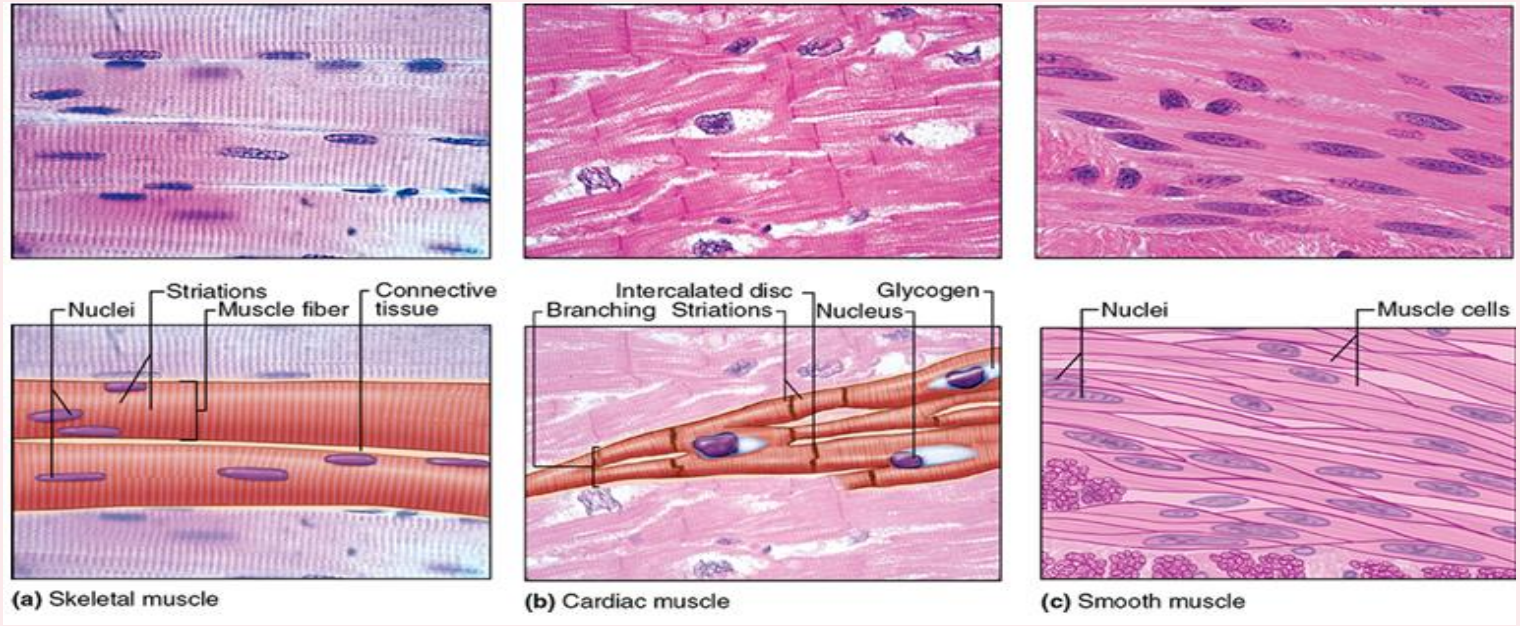
Muscle tissue

Muscle tissue

- Consists of cells that optimize the universal cell property of contractility.
- As in all cells, actin microfilaments and associated proteins generate the forces necessary for muscle contraction, which drives movement within organ systems, and of the body as a whole.
- All muscle cells originate from embryonic mesoderm.
- Special names ,the cytoplasm of muscle cells often becomes sarcoplasm ,smooth ER is the sarcoplasmic reticulum, and the muscle cell membrane is called the sarcolemma.

Three generally different types of muscle tissue develop based on their morphologic and functional characteristics

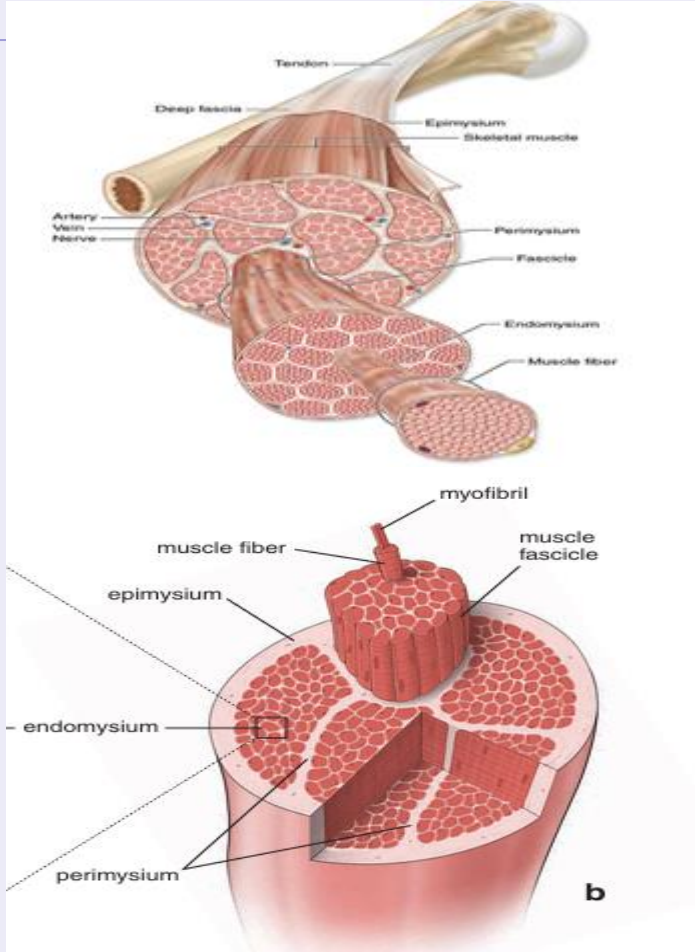


Skeletal (or striated) muscle

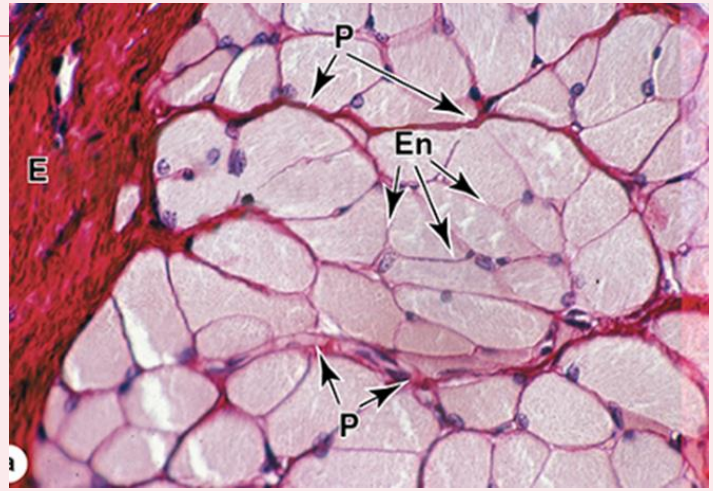
- Skeletal muscle contains bundles of very long, multinucleated cells with cross-striations and produces quick, forceful contractions, usually under voluntary control.
- Consists of muscle fibers, which are long, cylindrical multinucleated cells with diameters of 10–100 μm and lengths up to several centimeters.
- Skeletal muscle begins to differentiate from mesenchymal cells, called myoblasts.

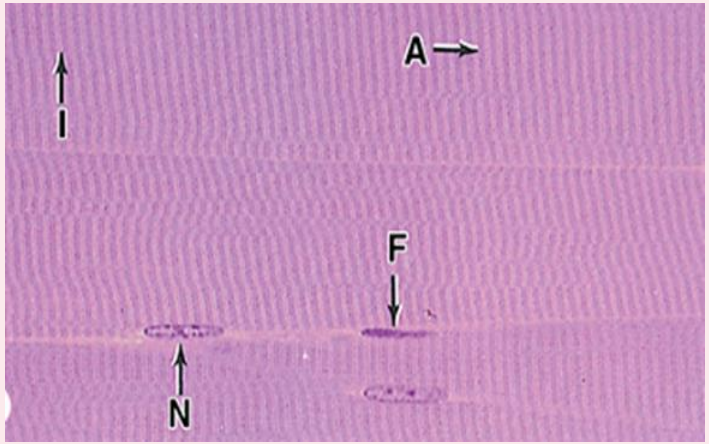
Organization of a Skeletal Muscle

- The epimysium, an external sheath of dense irregular connective tissue, surrounds the entire muscle.
- The perimysium occurs as a thin connective tissue layer immediately surrounding each bundle of muscle fibers termed a fascicle.
- A fascicle of muscle fibers makes up a functional unit in which the fibers work together most efficiently.
- Nerves, blood vessels, and lymphatics penetrate the perimysium to supply each fascicle



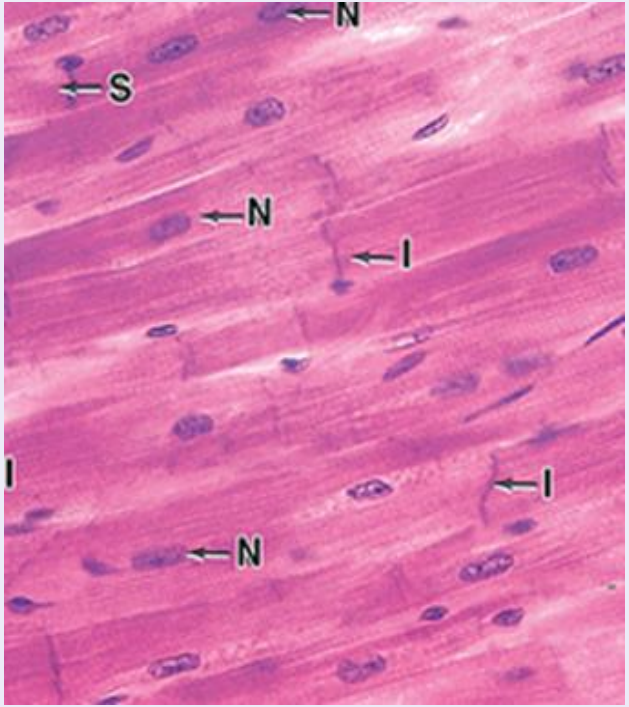
- The endomysium, envelops the external lamina of individual muscle fibers.
- All three of these tissues contain collagen types I and III (reticulin)
- Longitudinally sectioned skeletal muscle fibers display striations of alternating light and dark bands.
- The highly organized sarcoplasm consists largely of long cylindrical filament bundles called myofibrils running parallel to the fiber’s long axis .
- The dark stripes on the myofibrils comprise the A bands (anisotropic) ,the light ones are the I bands (isotropic)





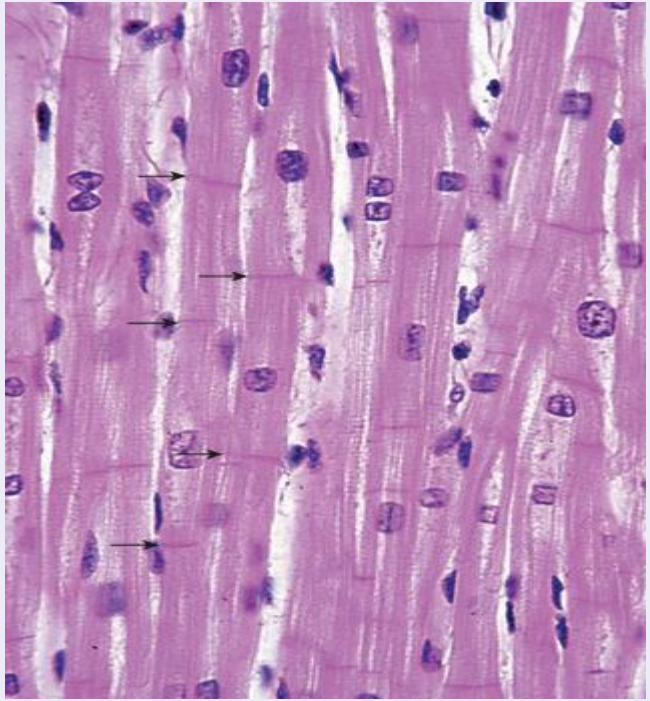
CARDIAC MUSCLE

- Cardiac myocytes are short cylindrical cells
- Cross-striations
- Central nuclei
- Branched cells with complex cell-cell junctions by intercalated discs.
- Intercalated discs seen as transverse lines crossing the fibers at irregular intervals where the myocardial cells join.
- A delicate sheath of endomysium ,
- Thick perimysium .



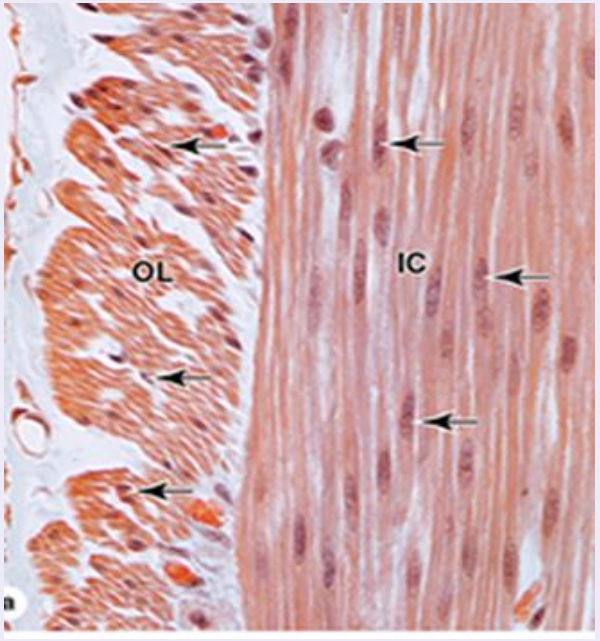
CARDIAC MUSCLE

- Contraction is involuntary, vigorous, and rhythmic.
- Cardiac muscle fiber contraction occurs intrinsically and spontaneously, under autonomic innervation
- The heart consists of tightly knit interwoven bundles of cells, that provide for a characteristic wave of contraction that resembles wringing out of the heart ventricles...

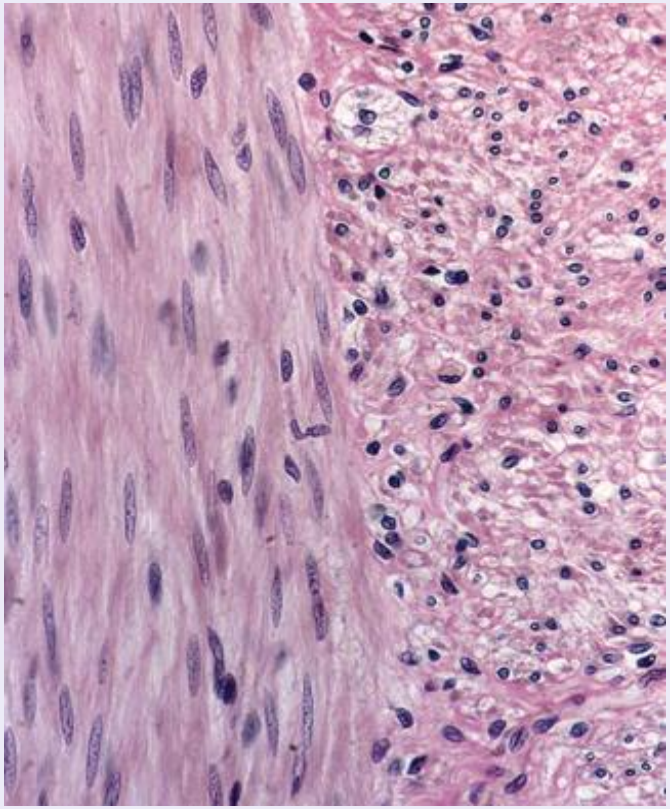


SMOOTH MUSCLE

- Comprise of fusiform cells.
- Lack striations and generate slow, prolonged involuntary contractions under the influence of autonomic nerves .
- Location: blood vessels and of the digestive, respiratory, urinary, and reproductive systems.
- Fibers of smooth muscle (visceral muscle) are elongated and nonstriated cells, each enclosed by endomysium



- In most of the digestive tract and other similar structures smooth muscle becomes organized into two layers which contract in a coordinated manner to produce a wave that moves the tract’s contents in a process termed peristalsis.
- In smooth muscle of the small intestine wall cut in cross section, cells of the inner layer are circular and cells of the outer layer are longitudinal .



Regeneration of Muscle Tissue

■ Repair and regeneration can occur in skeletal muscle because of a population of reserve muscle satellite cells that can proliferate, fuse, and form new muscle fibers.
■ Cardiac muscle lacks satellite cells and has little capacity for regeneration.
■ Regeneration is rapid in smooth muscle because the cells/fibers are small and relatively less differentiated, which allow renewed mitotic activity after injury.

SLEEP
IS GOOD…
BOOKS
ARE BETTER

WORK
HARD
DREAM
BIG

DO WHAT
YOU LOVE
AND DO IT
OFTEN

TRAVEL
THE WORLD
READ
A BOOK