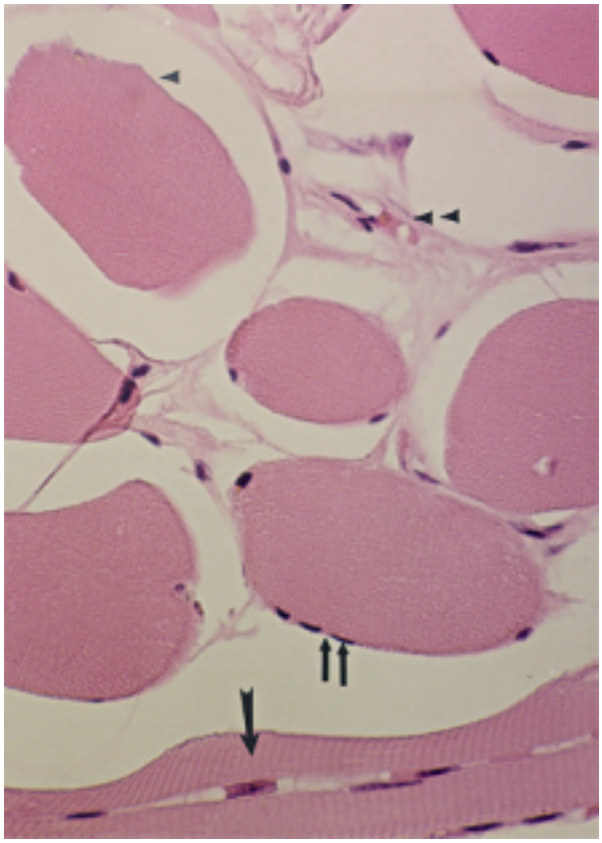
MUSCLE

Skeletal or striated or voluntary muscle is composed of very long, contractal cells with multiple nuclei bound together by collagenous tissue. Striated muscle gets its name from prominent cross striations seen in some histological preparations. Muscle fibers are grouped together in fascicles with spaces between the fascicles filled with loose collagenous tissue called perimysium which is continuous with a more delicate tissue, the endomysium, which separates the individual muscle fibers in each fascicle. There is a rich network of capillaries as well as lymphatics and nerves in the endomysium and perimysium.

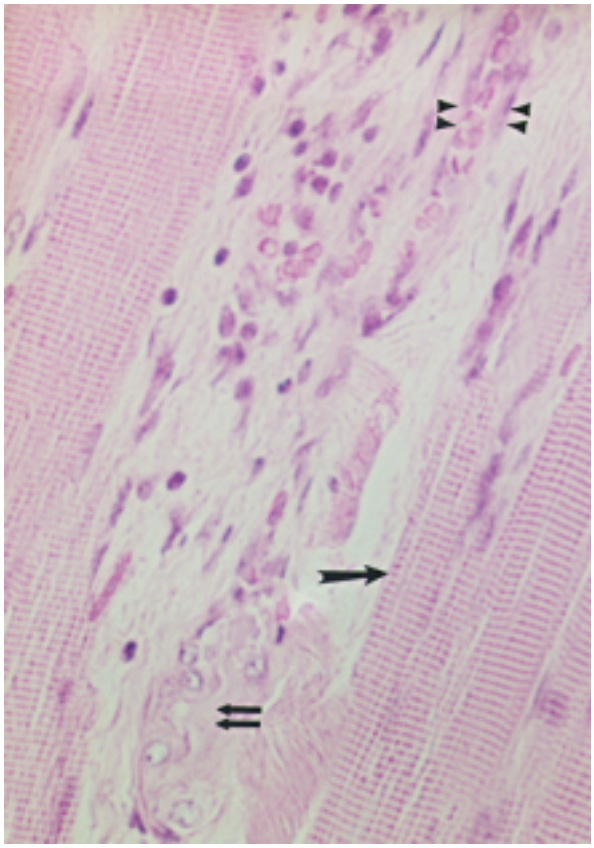
Smooth muscle is derived from the mesoderm except the iridic muscle of the eye and modified muscle cells in the walls of sweat glands in which muscle is derived from ectoderm. The cells of smooth muscle are spindle-shaped but differ according to the organ, e.g., long and slender in the intestinal wall, short and thick in the walls of small arteries. The nuclei are not arranged along the periphery of the muscle fiber as is the case with skeletal muscle, but rest in the cytoplasm at the widest part of the cell. There are no striations, hence the name smooth muscle. Smooth muscle fibers contain only one nucleus and are less complex and much shorter than skeletal muscle fibers which may be 4 cm. in length. The outline of the smooth muscle fiber is difficult to make out in a longitudinal section but is readily appreciated in cross section.

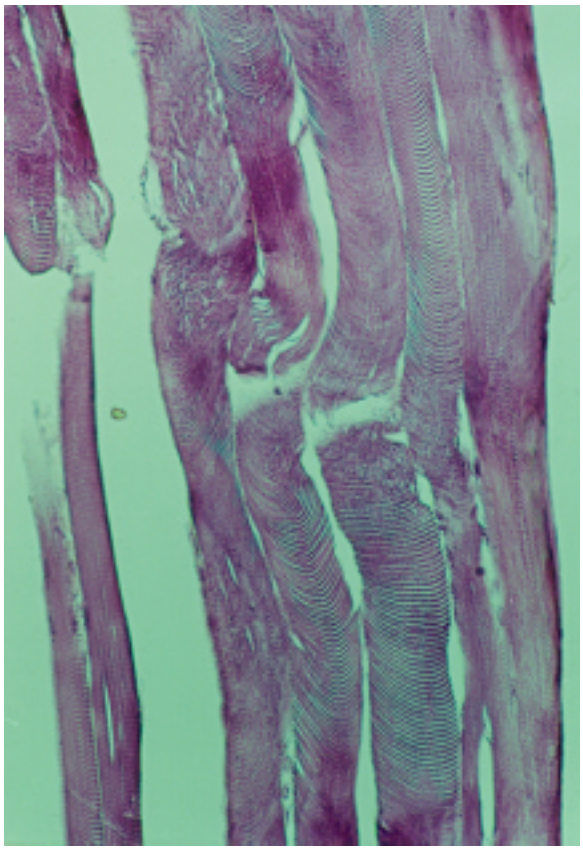
Smooth or involuntary muscle is specialized for continuous contractions of low force to contract the entire muscle mass in contrast to the individual motor units activated in skeletal muscle which emphasize forceful contraction of short duration under fine control.

Striated or skeletal muscle seen in cross-section showing nuclei situated in extreme peripheral location (double arrows). There is a capillary (triangles) in the endomysial space. The wide spaces between the muscle fascicles are due to shrinkage artifact. Endomysium lines the muscle fascicles closely. Also seen is a muscle fiber in longitudinal section showing cross striations (single arrow) as well as peripherally placed nuclei spaced at fairly regular intervals just beneath the sarcolemma plasma membrane.

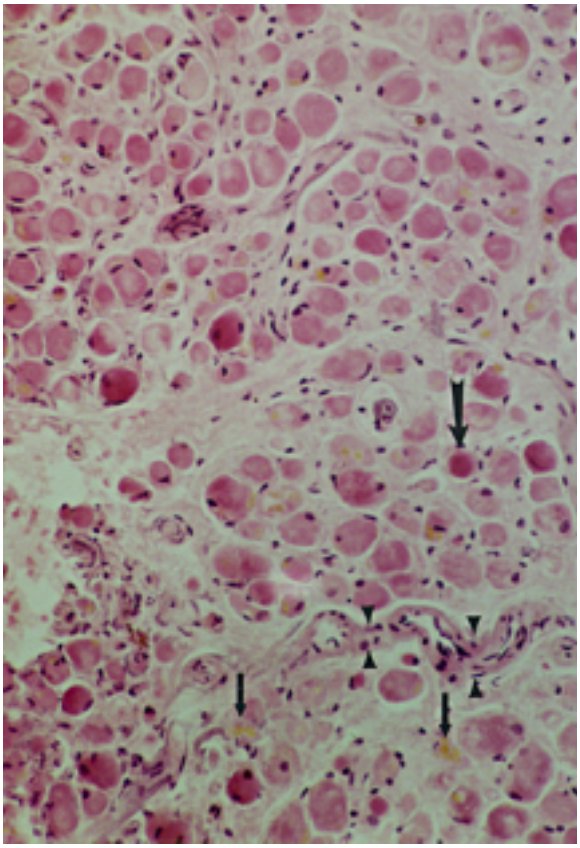


Striated muscle in longitudinal section demonstrating the striations (large arrow) that are the chief characteristic of skeletal muscle. Skeletal muscle fibers are extremely elongated, unbranched cylindrical cells with numerous flattened nuclei located at fairly regular intervals just beneath the sarcolemma. Neural ganglion (double arrows) and blood vessels (triangles) are seen between the muscle fibers.



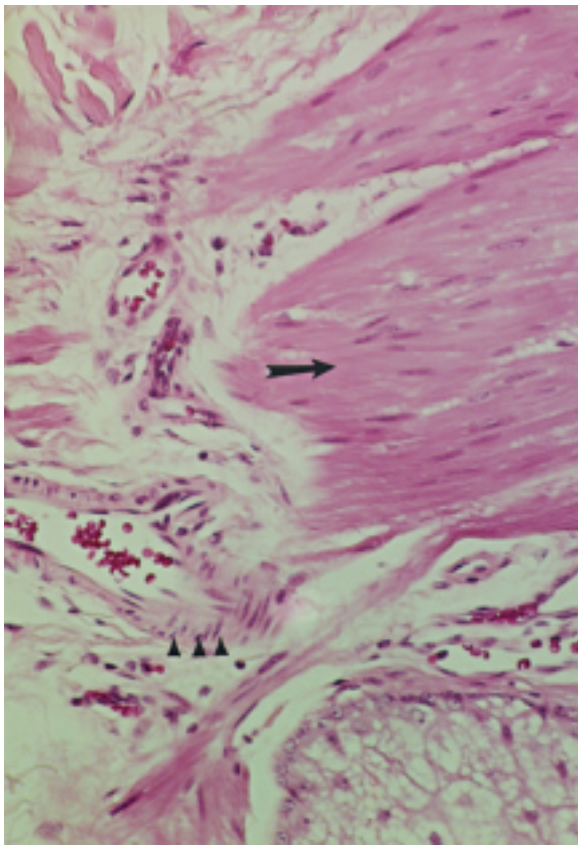


Striated muscle. Trichrome stain. Compare with smooth muscle.



Skeletal muscle, extraocular. These fibers (large arrow) are smaller than other skeletal muscle fibers and have a greater profusion of nerves and vascular fibroelastic tissue (triangles). This is to accommodate the need for rapidity and fine modulation of contraction for binocularity. The minute amounts of yellow pigment is probably lipofuchsin (small arrows).

Smooth muscle, skin. Arrector pilae muscle (large arrow) in dermis with a sebaceous gland in one corner. This muscle will attach to a hair follicle.



Smooth muscle. Cut in longitudinal sections the fibers are regular and packed tightly making it somewhat difficult to discern individual fibers. Nuclei (arrow) are central and elongated.