Muscular tissue

Muscle is a soft tissue that is highly specialized for the production of tension which results in the generation of force. Muscle cells, or myocytes, contain myofibrils comprised of actin and myosin myofilaments. Numerous myocytes make up muscle tissue.

Terms to know and identify

- Sarcolemma - plasma membrane covering each muscle cell.
- Sarcoplasm - muscle cell cytoplasm.
- Thick filaments – contractile protein myosin molecules. Thin filaments slide over thick filaments
- Thin filaments – contractile protein actin molecules
  (f and G actin) also contains the regulatory proteins tropomyosin and troponin.
- Elastic filaments - keep thick and thin filaments aligned over one another for proper contraction to occur

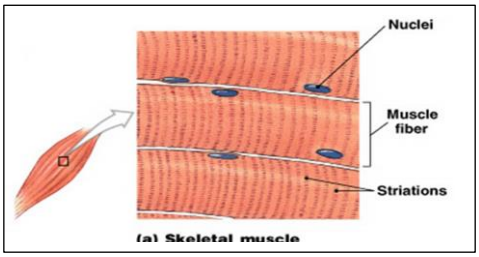
Types of Muscle Tissue

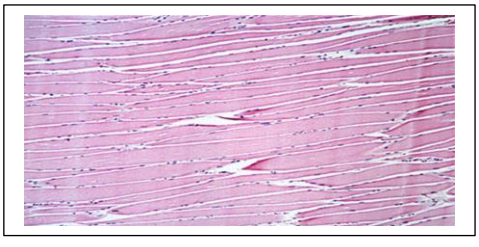
Muscle tissue can be classified functionally, voluntary or involuntary and morphologically, striated or non-striated and number of nuclei. Voluntary refers to whether the muscle is under conscious control, striation refers to the presence of visible banding within myocytes which occurs due to organization of myofibrils to produce a constant direction of tension.

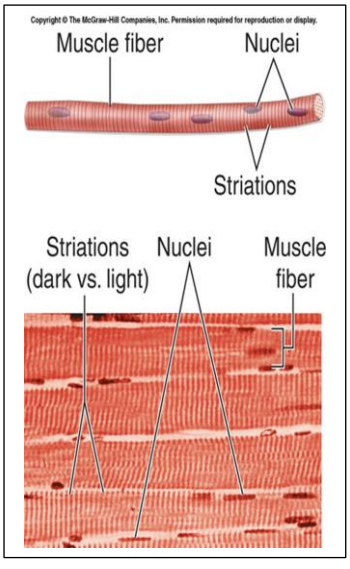
By applying the above classifications it is possible to describe three forms of muscle tissue which perform the wide range of functions described.

Skeletal Muscle

Skeletal muscle mainly attaches to the skeletal system via tendons to maintain posture and control movement. Skeletal muscle is under voluntary control. Morphologically skeletal myocytes are elongated and tubular and appear striated with multiple peripheral nuclei.

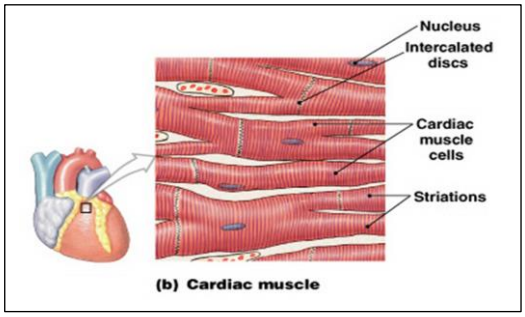


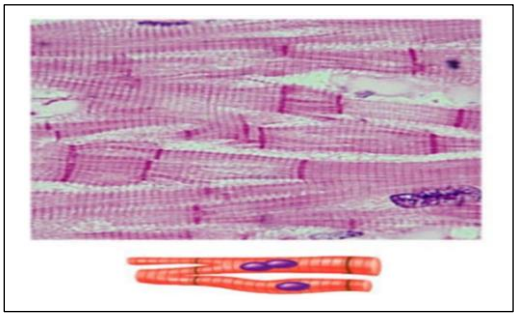


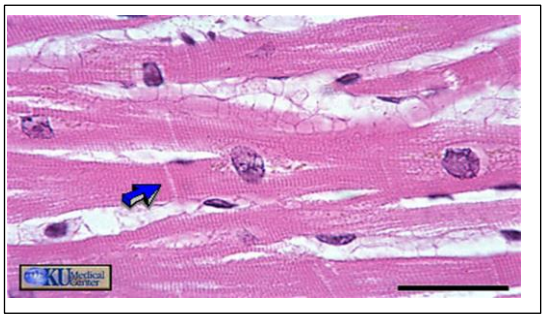


Cardiac Muscle Tissue

Cardiac muscle tissue is found only in the heart where cardiac contractions pump blood throughout the body and maintain blood pressure. As with skeletal muscle cardiac muscle is striated, however it is not consciously controlled and so is involuntary. Cardiac muscle can be further differentiated from skeletal muscle by the presence of intercalated discs which control the synchronized contraction of cardiac tissues. Cardiac myocytes (cardiocytes) are shorter than skeletal equivalents and contain only one or two centrally located nuclei.



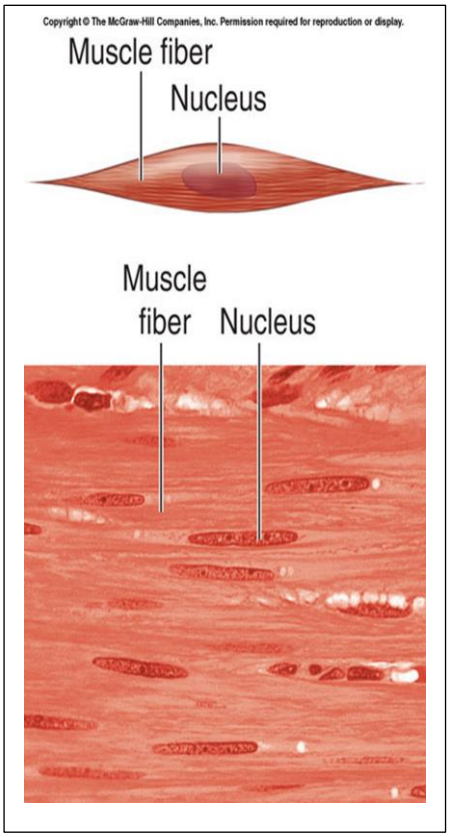


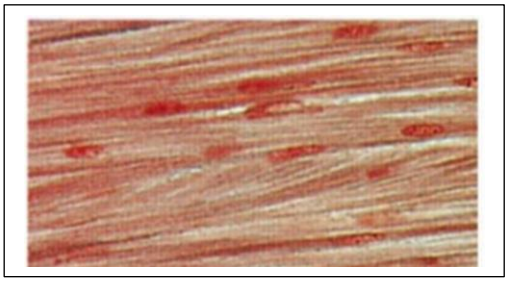


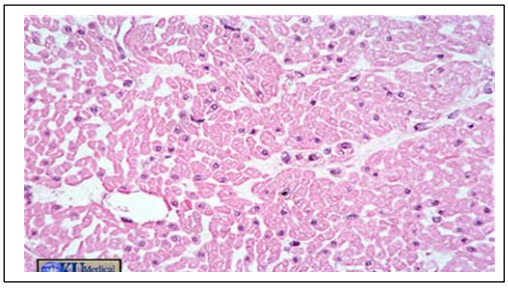
Smooth Muscle Tissue

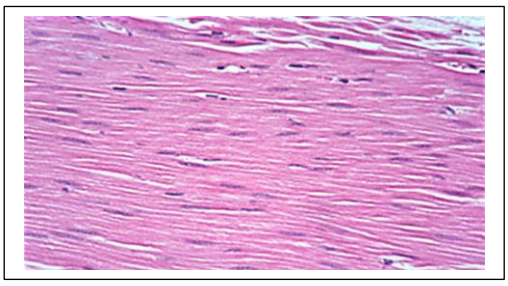
Smooth muscle tissue is found associated with numerous hollow organs and tissue systems such as the digestive system or respiratory system. It plays an important role in the regulation of flow in such tissues for example aiding the movement of food through the digestive system via peristalsis.

Smooth muscle is non-striated, although it contains the same myofilaments they are just organized differently, and involuntary. Smooth muscle myocytes are spindle shaped with a single centrally located nucleus.









Muscle Type	Striated?	# of nuclei	Voluntary or Involuntary
Skeletal	Yes	Multi-nucleated	Voluntary
Cardiac	Yes	One or two	Involuntary
Smooth	No	Single Nucleus	Involuntary