10-3
Skeletal muscle fibers have distinctive features

Muscle fiber cells are enormous. They are also *multinucleate:* each contains 100s just internal to the plasma membrane. Skeletal muscle fibers are banded or striated.

Striations are due to precise arrangements of thin *(actin)* and thick *myosin)* filaments.

Myoblasts) embryonic stem cells, that fuse forming individual multinucleate skeletal muscle fibers.

The Sarcolemma and Tranverse Tubules

Sarcolemma) or plasma membrane of a muscle fiber, surrounds the **sarcoplasm**, or cytoplasm of the muscle fiber. **All fibers of a muscle must contract simultaneously.**

Transverse tubules or T tubules) where the contraction signal is conducted through quickly so all muscle fibers contract simultaneously. Their surfaces are continuous with the sarcolemma, extend deep into the sarcoplasm.

Myofibrils

Myofibrils) hundreds to thousands of cylindrical structures in each muscle fiber. T tubules encircles each myofibril.

Myofilaments) bundles of protein filaments contained in each myofibril.

Myofibrils contain 2 types of myofilaments:

- **thin filaments** composed primarily of actin
- **thick filaments** composed primarily of myosin

In addition, myofibrils contain ***titin)*** elastic myofilaments associated with thick filaments.

The Sarcoplasmic Reticulum

Sarcoplasmic Reticulum) a membrane complex in skeletal muscles, that forms a tubular network around each individual myofibril, fitting over it like lacy shirtsleeves. It is similar to the smooth endoplasmic reticulum of other cells.

Intercalated discs---

At the intercalated discs, the sarcolemmas of 2 adjacent cardiac muscle cells are extensively intertwined and bound together by gap junctions and desmosomes.

These junctions create a direct electrical connection between 2 muscle cells.

Functional syncytium) the term given to cardiac muscle cells because they are physically, chemically, and electrically connected to one another, and the entire tissue resembles a single, enormous muscle cell.

Functional Characteristics of Cardiac Muscle Tissue

The 4 major specialties of cardiac muscle:

1. It contracts without neural stimulation. This property is known as **automaticity**. Specialized cardiac muscle cells called **pacemaker cells** normally determine the timing of contractions
2. The nervous system can alter the pace or rate set by the pacemaker cells and adjust the amount of tension produced during a contraction.
3. Cardiac muscle cell contractions last about 10x as long as do those of skeletal muscle fibers. They also have longer refractory periods and do not readily fatigue
4. The properties of cardiac muscle sarcolemmas differ from those of skeletal muscle fibers.

10-9
Smooth muscle tissue differs structurally and functionally from skeletal and cardiac muscle tissue

Smooth muscle tissue) forms sheets, bundles, or sheaths around other tissues in almost every organ.

Varieties of roles of smooth muscle in various body systems:

- ***Integumentary system:*** smooth muscle around blood vessels regulate the flow of blood
- ***Cardiovascular system:*** smooth muscles regulate BP
- ***Respiratory system:*** smooth muscles contract or relax to alter the diameters of respiratory passageways
- ***Digestive system:*** extensive layers of smooth muscle move materials along the tract. In the gallbladder bile is ejected into the digestive tract
- ***Urinary system:*** smooth muscle tissue alters the rate of filtration in the kidneys. In the ureters they transport urine to the bladder, and from there to out of the body
- ***Reproductive system:*** smooth muscle helps move sperm along the reproductive tract of males. In females, it moves the oocytes (and possibly sperm) along the reproductive tract. Also expel the fetus from the uterus at delivery.