

<u>Lecture Date</u>	<u>Topic</u>	<u>Reading in Marieb, Mallatt, and Wilhelm</u>
L9	Tues 2/10	Muscle tissue
		Ch. 4, pp. 94-96; Ch. 10, pp. 239-251, Table 10.2; Ch. 18, pp. 540-542; Ch. 22, pp. 649-652

Muscle Tissue*muscle tissue**muscle cell = muscle fiber**myofibril (cellular organelle)**myofilament**actin filament**myosin filament**skeletal muscle tissue**multinucleate (each cell has many nuclei)**cardiac muscle tissue**1 or 2 nuclei per cell (see p. 541)**intercalated discs**smooth muscle tissue**1 nucleus per cell***Overview of muscle tissue*****Functions****movement**maintenance of posture**joint stabilization**heat generation****Functions that distinguish muscle tissue from other tissues****contractility**excitability**extensibility**elasticity****Types of muscle tissue****skeletal**striated**voluntary control of contraction**cardiac**striated**involuntary control of contraction**smooth**not striated**involuntary control of contraction**sarcolemma**sarcoplasm*

Skeletal muscle tissue

Each skeletal muscle is an organ

Basic features of a skeletal muscle

Connective tissue and fascicles

epimysium

dense irregular connective tissue

perimysium

fascicle

endomysium

reticular fibers

tendon

*contracting muscle cells pull on endomysium>perimysium>epimysium>
tendon>bone*

Nerves and blood vessels

Muscle attachments

*skeletal muscles extend from one bone to another, crossing at least one
moveable joint*

origin (less movable bone)

insertion (more movable bone)

biarticular muscles (multijoint muscles)

tendon

aponeurosis

Microscopic and functional anatomy of skeletal muscle tissue

The skeletal muscle fiber (muscle cell)

muscle fiber>myofibril>myofilament

Myofibrils

long, rod-shaped organelles

sarcomeres

Z discs (Z lines)

thin (actin) filaments

thick (myosin) filaments

myosin heads

Sarcoplasmic reticulum

smooth endoplasmic reticulum

Ca²⁺ ions

terminal cisternae

T tubules

continuation of sarcolemma

conduct nerve-generated impulses

triad

Mechanism of contraction

concentric contraction

eccentric contraction

Sliding filament mechanism—myosin heads of thick filaments (myosin) attach to the thin filaments (actin) at both ends of the sarcomere and pull the thin filaments toward the center of the sarcomere by swiveling inward. This ratchet-like cycle is repeated many times during a single contraction. Thick and thin

filaments themselves do not shorten. Instead, they slide past each other. Initiated by release of calcium from the sarcoplasmic reticulum and binding of calcium to thin filaments. The process is powered by ATP.

Muscle extension

Muscle fiber length and the force of contraction

The role of titin and other myofibril proteins

titin

Innervation of skeletal muscle

motor neurons

neuromuscular junction (motor end plate)

axon terminal

synaptic cleft

acetylcholine

motor unit

Types of skeletal muscle fibers

slow oxidative fibers (Type I)

thin red fibers

myoglobin

aerobic metabolism

fast glycolytic fibers (Type IIx)

thick pale fibers

anaerobic metabolism

glycosomes

fast oxidative fibers (Type IIa)

intermediate properties

satellite cells

Disorders of skeletal muscle tissue

muscular dystrophy

myofascial pain syndrome

fibromyalgia

Cardiac muscle tissue

striated

sliding filament mechanism

short, branching cell

1-2 nuclei

intercalated discs

fasciae adherens (see p. 78)

gap junctions

endomysium

sarcomeres

Smooth muscle tissue

Locations

iris of the eye

walls of the circulatory vessels

respiratory tubes

digestive tubes

urinary organs
reproductive organs
uninucleate
endomysium
longitudinal layer
circular layer
intermediate filaments
dense bodies
caveolae
gap junctions
Nerve plexuses
myenteric nerve plexus
submucosal nerve plexus
enteric nervous system