

Name: _____

Sliding Filament Theory

The sliding filament theory explains muscle contraction based on how muscle fibers (actin and myosin) slide against each other to generate tension in the overall muscle.

Step 1: A muscle contraction starts in the brain, where signals are sent along the motor neuron (a). Color the motor neuron yellow . Within the motor neuron are vesicles that contain the neurotransmitter, acetylcholine. Color vesicles gray and the triangles that represent the acetylcholine orange . Acetylcholine reaches the receptors (b) on the muscle sarcolemma which causes an impulse.

Step 2: The impulse travels down the membrane and into the transverse tubules (c) where it causes calcium to be released from the sarcoplasmic reticulum. Color the t-tubule green and the circles that represent calcium dark blue . The sarcoplasmic reticulum is only partially pictured, shade this structure pink.

Step 3: Calcium binds to a structure on the actin that causes it to change shape. Color the actin myofilament (e) red.

Step 4: The change in shape allows myosin heads to form cross-bridges between the actin and the myosin. Color the myosin (g) blue. Color the cross bridges (f) purple.

Step 5: Energy from ATP is used to create a "power stroke" between the two filaments. Color the ATP bright orange . The actin filament then slides inward and shortens, or contracts, the whole muscle.

