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MUSCLE CONTRACTION

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Diagrams of muscle fiber structure removed for copyright reasons. See, for example, Slides 32-37 in Chapter 6 of http://kinesiology.boisestate.edu/rvhp/
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(A) The myosin and actin filaments of a sarcomere overlap with the same relative polarity on either side of the midline. Recall that actin filaments are anchored by their plus ends to the Z disc and that myosin filaments are bipolar. (B) During contraction, the actin and myosin filaments slide past each other without shortening. The sliding motion is driven by the myosin heads walking toward the plus end of the adjacent actin filament.
Sliding filament model of contraction in striated muscle. In the presence of ATP and Ca+2 the myosin heads, extending from the thick filaments, pivot pulling the actin thin filaments towards the center. The thin filaments are anchored and thus the movement shortens the sarcomere length.
Figure 1
Length-tension relation for skeletal muscle

Figure 2
Experimental setup required to determine length-tension relation of muscle
LENGTH-TENSION CURVE

Tension

excessive sarcomere overlap

optimal sarcomere overlap

inadequate sarcomere overlap

Length

100% (of resting length)

100% 200%

Useful range

Failure point

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