

7.3.2

Muscle Contractures and Cramps

Muscle contracture is a term that generally refers to a muscle that has shortened and resists relaxing to its normal resting length. There are many possible causes of a contracture. Some of the reasons that tend to cause long term or even permanent contractures include prolonged immobilization, spasticity (spasm), and muscle weakness. Although rare, temporary contractures can occur with severe muscle fatigue, resulting in a condition called **physiologic contracture**.

Though not considered a "contracture" in the normal sense of the word, **rigor mortis** is muscle rigidity caused by a depletion of ATP. Rigor mortis is associated with death. It may take hours to fully develop, but cellular death results in the breakdown of the intracellular sarcoplasmic reticulum and the leakage of Ca^{2+} . The Ca^{2+} then initiates the events that allow cross bridge formation. However, cell death also results in the cessation of ATP production, and without ATP to cause the dissociation of myosin heads from actin, the muscle stays in a contracted position and cannot relax or be stretched.

Students often ask us what causes muscle cramps. It appears that there are many things that contribute, and physiologists are still puzzling this out. Most people have experienced or will experience a sudden, involuntary, and painful contraction at some point. It is very common during or after intense exercise. A characteristic that distinguishes cramps from contractures is that contractures are "electrically silent." This means that we do not see repeated action potentials coming down the motor neurons to the muscle cell. Contractures originate because of a physiological change of the muscle fiber itself and not the motor neuron that innervates it. Cramps, on the other hand, are associated with the repeated firing of action potentials in the motor neurons. Cramps are found most commonly in muscles of the leg, especially the lower leg and foot. The pathophysiology of cramps is poorly understood.



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