9.5A: Impacts of Exercise on Muscles

Sustained, repeated overload of a muscle group leads to hypertrophy and strengthening of those muscles.

Learning Objectives

• Describe the effects of exercise on muscles

Key Points

• In the short term, exercise can lead to muscle fatigue and soreness.
• In the long term, exercise can lead to muscle hypertrophy and other physiological changes.
• These physiological changes alter the muscle to make repeat exercise easier.

Key Terms

• muscle hypertrophy: Increase in muscle mass due to exercise, particularly weight training; a noticeable long-term effect of exercise.
• micro-trauma: The damage to muscle fibers that occurs during excessive eccentric contraction.

Exercise involves a series of sustained muscle contractions of either long or short duration depending on the nature of the physical activity.
Short-Term Effects

In the short term muscle can become fatigued and sore for reasons like impaired blood flow, ion imbalance within the muscle, nervous fatigue, loss of desire to continue exercising, and most importantly, the accumulation of lactic acid in the muscle.

Muscle soreness, once thought to be due to lactic acid accumulation, has more recently been attributed to small tearing, or micro-trauma, of the muscles fibers caused by eccentric contraction. With repeated cycles of eccentric contraction this soreness will be reduced.

Long-term Effects

Muscle hypertrophy, or the increase in muscle mass due to exercise, particularly weight training, is a noticeable long-term effect of exercise. Exercise of specific muscles can often result in hypertrophy in the opposite muscles as well, a phenomenon known as cross education.

Increases in muscle mass are not the only long-term effect of exercise. With sufficient training the metabolic capacity of a muscle can change, delaying the onset of muscle fatigue. Muscle specified for high intensity anaerobic exercise will synthesize more glycolytic enzymes, whereas muscle for long endurance aerobic exercise will develop more capillaries and mitochondria. Additionally, with exercise improvements to the circulatory and respiratory systems can facilitate better delivery of oxygen and glucose to the muscle.

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