1. **Research Question:** What are the effects of electrical stimulation frequency and intensity on skeletal muscle force of contraction and fatigue?
   Objective: The purpose of this study is to determine the effects of electrical stimulation frequency on skeletal muscle force of contraction and fatigue in order to implement appropriate sports training and clinical rehabilitation programs.
   Hypothesis: Electrical stimulation frequency and intensity will have a significant impact on the magnitude of muscle contraction with higher frequencies and intensities eliciting stronger muscle contractions while lower frequencies and intensities induce weaker muscle contractions.
   Summary: This study compares the magnitude of muscle contraction in response to various stimulation intensities and frequencies of 100, 50 and 20 Hz, with the muscle fatigue generated from each treatment. Contractions in skeletal muscle were induced during three electrical stimulation sessions each generating 60 five-second contractions in 26 healthy individuals. The data shows significant differences in muscle contraction and fatigue following the different treatments with higher frequencies and intensities eliciting stronger muscle contractions, but also showing faster muscle fatigue and decline in force of contraction. Electrical stimulation at 100 Hz showed the quickest onset of fatigue while 20 Hz showed the slowest onset of fatigue. This information generated the conclusion that lower frequency stimulations are more beneficial for use in clinical rehabilitation programs.

2. **Research Question:** What are the effects of fatigue on the skeletal muscle contractile apparatus and sarcoplasmic reticulum?
   Objective: The purpose of this study is to determine the effects of fatigue on muscle contractile force by examining values obtained from rested and fatigued muscle fibers such as relative calcium levels and isometric force production.
   Hypothesis: Skeletal muscle fatigue reduces contractile force, calcium sensitivity and cross-bridge cycling.
   Summary: This study shows the relationship between skeletal muscle fatigue and the functional properties of the contractile apparatus and sarcoplasmic reticulum by examining both rested and fatigued muscle fibers obtained from male grass frogs. Skeletal muscle fatigue was induced by repeated tetanic contractions delivered at different frequencies. The results indicated that the contractile force generated was significantly lower in fatigued muscle fibers resulting from decreases in calcium sensitivity and cross-bridge cycling kinetics. Additional changes to sarcoplasmic reticulum function included lower levels of calcium uptake, release, and ATP hydrolysis.

3. **Research Question:** What are the effects of stimulus and contraction frequency on the magnitude of contraction-induced vasodilation in skeletal muscle?

Objective: The purpose of this study is to determine the effects of stimulation parameters on skeletal muscle contraction by examining the magnitude of arteriolar dilation in response to various stimulus and contraction frequencies.
Hypothesis: The magnitude of skeletal muscle contraction-induced vasodilation depends on both stimulus and contraction frequency.
Summary: This study shows the effects of stimulus and contraction frequency on skeletal muscle contraction by measuring the magnitude of arteriolar dilation in response to treatments with a range of stimulus and contraction frequencies. Skeletal muscle contraction was induced by using a microelectrode to stimulate skeletal muscle fiber bundles in anesthetized hamsters. Dilations at lower stimulus and contraction frequencies produced a different complement of vasodilators than dilations at higher stimulus and contraction frequencies. The magnitude of vasodilation increased with higher stimulation and contraction frequencies showing larger, more prolonged dilations. The data supports the hypothesis showing that changes in both stimulus and contraction frequency results in different complements of vasodilators, indicating the importance of stimulation parameters on skeletal muscle contraction.

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