

Warman, G., Humphries, B., and Purton, J. The effects of timing and application of vibration on muscular contractions. *Aviat Space Environ Med* 2002; **73**(2): 119-27.

BACKGROUND: The effect of vibration stimulation on muscular strength is an emerging field of research and very little comprehensive work has been conducted at this stage. **HYPOTHESIS:** There will be no effects of timing or application of vibration stimulation on muscular strength and activation across isometric, isokinetic and concentric isotonic contractions. **METHODS:** There were 28 recreational athletes who participated in this study. Their characteristics were: (mean +/- SD) age, 22.8 +/- 5.6 yr; height, 174.1 +/- 8.8 cm; and body mass, 78.0 +/- 13.6 kg. The vibration stimulation was delivered at 50.42 +/- 1.16 Hz with an acceleration of 13.24 +/- 0.18 ms⁻². **RESULTS:** A series of one-way ANOVAs revealed significant ($p < 0.05$) improvements of 14.7 +/- 2.9% and 15.3 +/- 3.1% above normal contraction levels for concentric isotonic strength during and after the vibration stimulation, respectively. No significant improvements in isometric and isokinetic strength were evident. Concurrent measurement of electromyography (EMG) presented significant improvements during stimulation of 30.1 +/- 14.6%, 43.0 +/- 13.0%, and 107.1 +/- 44.4% in mean activation of rectus femoris (RF) for the isometric, isokinetic, and concentric isotonic contractions, respectively. Synchronous collection of vibromyography (VMG) during stimulation displayed a significant decrease of -6.4 +/- 1.5%, -5.1 +/- 1.2%, and -4.1 +/- 1.7% in mean VMG activity of RF for the isometric, isokinetic, and concentric isotonic contractions, respectively. **CONCLUSIONS:** Significant improvements in muscular strength and activation for concentric isotonic contractions performed during an applied vibration suggest that the optimal timing of a vibratory stimulation would be while the participant is contracting isotonicly. However, further research needs to be conducted to establish the exact mechanism behind these improvements.