ABSTRACT

TITLE:	EMG Activity in Muscle Due to Varying Resistance Loads When Controlling for Movement Velocity
AUTHOR(S):	McGrath, Patrick ; Brooks, Robert
PRESENTED AT:	4th Annual Natural & Behavioral Sciences Undergraduate Research Symposium, Fort Lewis College

ABSTRACT: The purpose of this study was to examine EMG activity in the quadriceps at varying speeds when different weights are used as resistance. The two hypotheses tested state that there will be no difference in the EMG readings between tests of constant velocity when the resistance due to increased mass is high versus when the resistance is at a low level of mass and that there will be no difference in EMG readings or torque exhibited at each velocity. Ten subjects aged 18 to 30 had EMG leads attached to their right quadriceps. Subjects then moved against resistances of 0, 5, and 10 lbs, each at velocities of 45, 75, and 210 degrees per second. Patterns were found for EMG levels as well as force, measured in torque, when plotted against the velocity of the movement. This leads to the interpretation that velocity is the primary determining factor in a movement's stimulation and force. ANOVA and HSD tests showed significance differences in the force (torque) across the different velocities ($p=0.0001$), resulting in the rejection of the second null hypothesis. Within that group, values between the 45 deg/sec and 210 deg/sec speeds and between the 75 deg/sec and the 210 deg/sec velocities provide the significant differences. The significant data shows that a movement's force is determined by its velocity. Though not significantly different, with increased loads from there was greater EMG at each speed which shows that motor units were being activated to accommodate for the increased resistance and maintain the velocity for any given muscle force. With a greater range of loads, from 0 to 75 pounds EMG data may change.