



**CALIFORNIA STATE SCIENCE FAIR
2011 PROJECT SUMMARY**

Name(s) Kendall E. Hayden	Project Number S1205
Project Title The Effects of Age and Gender on Skeletal Muscle Contraction	
Abstract Objectives/Goals The objective was to learn if people of varying ages and genders produce muscle force differently, by using measures of muscle sound. Methods/Materials Subject 1 was instructed to sit in the dynamometer and an electrode was placed on the subject's vastus lateralis muscle on the thigh. The subject then contracted their leg with their maximum force and this was recorded. The subject was allowed to rest for two minutes, then asked to contract at an interval of 10%. After this number was recorded in a table, the process was repeated eight more times, at intervals of 20, 30, 40, 50, 60, 70, 80, and 90% in relation to their maximum force. Other numbers were extrapolated, if needed, to find the numbers that were not measured due to the subject's inability to contract close to the desired number. This entire process was repeated on subjects 2-5. Results There were different patterns of response for amplitude and frequency of sound. The adults had a much larger increase in muscle sound than the adolescents as the percentage of maximum force increased. Both of the groups, adolescents and adults, steadily increased the frequency of their waves as the intervals increased. The female and male subjects had a similar increase in the sound of their vibrations as the interval increased. The female group's frequency of muscle vibration decreased whereas the male group's frequency of vibration increased at each interval. Conclusions/Discussion In conclusion, adults rely more on motor unit recruitment to contract their muscles than adolescents. Also, adolescents rely slightly more on the frequency of their muscle vibration to contract harder, possibly due to underdevelopment in their nervous systems. Females and males have almost the same reliance on amplitude, as well as motor unit recruitment, despite their gender differences. Females increase vibration frequency to contract their muscles harder, while the males decrease their vibration.	
Summary Statement My project investigated the differences in muscle activation between adolescents and adults, using measures of muscle sound.	
Help Received Used lab equipment at Cal State Fullerton under the supervision of Dr. Jared Coburn; Mom helped by driving me to the lab	