

Module 6: Assignment

LEARNING THE SUBJECT:

- Read the below. For each paper, write a ~1 paragraph summary (in your own words, don't just copy the abstract) of what you found most interesting.
 - Hoppols.gatech.edu/pages/Resources/Papers/cowansponbergrothcomparative2014.pdf
 - Hoppols.gatech.edu/pages/Resources/Papers/Komi_Tesch%201979%20EJAP%20EMG%20spectra.pdf
 - Hoppols.gatech.edu/pages/Resources/Papers/sponbergfullcockroachneuro.pdf
- Review my lecture notes. Also write a ~1 paragraph discussion of differences in vertebrate and invertebrate muscle activity patterns.

MEASURING MUSCLE ACTIVITY:

- Using your EMG circuit, record muscle activity from your vertebrate muscle of choice (a different one for each group member) under a given activity (holding a heavy weight, lifting on your toes, etc). Note if the activation occurs during flexion or tension, and if this is in accord with your electrode placement.
- For a given muscle and activity (I suggest holding a weight), perform a fatigue test (see Komi & Tesch paper); record EMG at initiation of test and then some time after.

ANALYZING THE SIGNAL:

- We will analyze the data with Fast Fourier Transforms (FFT). Learn about Fourier transforms and perform an analytic calculation for the function of your choice.
- Then learn about the FFT; this was a major advance computation and signal processing (hint, see Numerical Recipes). Write a few paragraphs about these useful tools. In MATLAB, take the FFT of your data and plot the power spectral density (PSD) vs frequency for the muscle activity in your different situations. Plot PSD for fatigued and nonfatigued muscle. Compare your data to that of Fig. 2 in Komi and Tesch (1979).
- Using recordings from the cockroach running on flat terrain, plot the data in MATLAB and compare to Fig. 2A in Sponberg and Full (2007).
- BONUS: Use your high speed videos (taken with phone cameras) to compare steps taken to spikes and discuss (as done in Sponberg and Full (2007)).