**Practical exercise on muscle forces (15/11/2021).**

There are two files in the folder. Load them individually and perform the calculations indicated below. To load the file in matlab, type load(‘filename.mat’)). The variable ref\_signal contains the force signal measured with a strain gauge at the level of the ankle. The variable SIG contains 64 EMG channels stored in a matrix cell array.

1. First, convert the signal in Newtons

FACTOR = 0.0197754; FACTOR\_newton = 9.806652;

FORCE = FORCE/FACTOR\*FACTOR\_newton

1. Calculate force steadiness (steady contraction). Load the ramp contractions and cut the signal only in the steady part, i.e. when the contraction reaches a plateau. Make sure you remove also the down-phase. Now compute the coefficient of variation which is done by taking the standard deviation of the signal divided by the mean. Multiply this value \* 100.

Why is this relevant? What does it mean physiologically? Write some hypothesis.

1. Calculate the rate of force development (ballistic contraction task). First, find the onset of the different ‘fast’ isometric contractions. You can find the onset with different methods (automatically or by visual inspection). Now, compute the rate of force development as the first derivative in timesteps of 1 ms, from time 0, up to 500 ms.

Why is this physiologically relevant?

Why is this relevant? What does it mean physiologically? Write some hypothesis.

1. Convert the cell array SIG in a 2D array. Calculate the average across 64 channels and compute a moving average with a window of 200 ms. Perform this computation for both the fast and steady movement and see how they correlate with the force output (correlate to the whole signal). Write the differences in correlation and the reason of why these are different.

**The final report should include the figures and comments. Don’t forget to add a figure caption.**