

Muscle Physiology Testing: Functional muscle testing and simulated exercise (forced muscle lengthening) in mice can be performed in the Integrative Muscle Physiology Lab under direction of Dr. Gretchen Meyer (<https://pt.wustl.edu/research/integrative-muscle-physiology/> 314-286-1425; meyerg@wustl.edu).

Dr. Meyer's lab is equipped with Aurora Scientific testing equipment for both *in vitro* and *in vivo* studies. The *in vitro* setup can test muscles (up to 100 mg mass) with distinct origin and insertion tendons (although it might be modified to accommodate a small bony insertion with a clamp). It has been validated on the extensor digitorum longus (EDL), supraspinatus and soleus muscles of the mouse. It can be used to measure the following outcomes: twitch dynamics, peak tetanic force, fatigue dynamics, eccentric and concentric contractile forces, and passive properties. The *in vivo* setup is designed to stimulate contraction of the dorsiflexor muscle group of the mouse hindlimb. This is done (mostly) non-invasively with subcutaneous needle electrodes, allowing longitudinal measurements in the same mouse. The footplate measures ankle torque produced by the dorsiflexors and can give maximum tetanic torque and fatigue measures, similar to the *in vitro* setup. The footplate can also induce ankle rotation to impose an eccentric contraction. This is used as a "physiological" experimental injury since it is similar to damage (soreness) caused by exercise (such as downhill running).

References:

Peak tetanic force and fatigue measures on whole EDL and 5th toe EDL using the *in vitro* setup.

Chao et al., J Lipid Res. 2012. <https://www.ncbi.nlm.nih.gov/pubmed/23028113>

Philp et al, JBC 2011. <https://www.ncbi.nlm.nih.gov/pubmed/21757760>

Isometric and Eccentric contractions of the mouse 5th toe EDL using the *in vitro* setup.

Palmisano et al., JCS 2015, <https://www.ncbi.nlm.nih.gov/pubmed/25413344>

Eccentric contraction induced injury using the *in vivo* setup.

Meyer et al. Physiol Genom, 2013. <https://www.ncbi.nlm.nih.gov/pubmed/23444318>