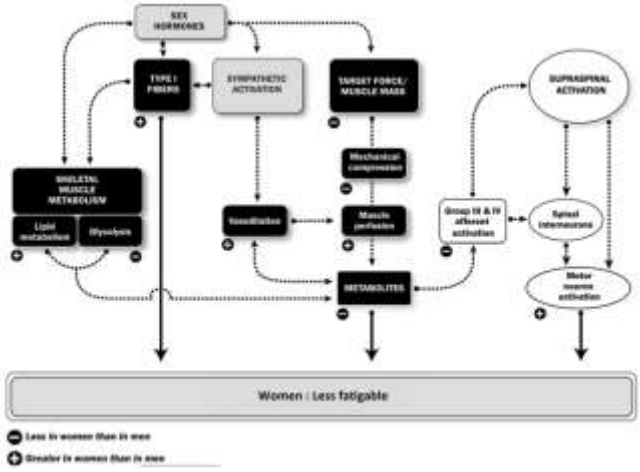
ABSTRACT

Title:
Exercise performance and gender differences - the role of individual muscle fibers properties

PI and name of the lab:
Monica Canepari – Human Physiology

Research Theme/Topic:
Gender differences, Physiology, Exercise performance, Skeletal muscle fibres structure and function and metabolism

Main Abstract:
Human performance differ for men and women because of distinct physiological and anatomical features (Hunter 2014). Indeed, men are usually stronger and more powerful than women (Ansdell et al. 2020) whereas women present a better substrate efficiency (Roepstorff et al. 2006), lower VO_{2max} values (Ansdell et al. 2020), and a lower O_2-carrying capacity than men (Ansdell et al. 2020). Recent work has also observed differences in men and women in performance fatigability, defined as a decline in an objective measure of performance (i.e. maximal voluntary isometric contraction - MVIC) over a discrete period of time due to changes within the neuromuscular system (Enoka and Duchateau 2016). Interestingly, women show a higher percentage of type I fibers (Roepstorff et al. 2006; Welle et al. 2008),



However, few studies have investigated the cellular and molecular mechanisms underlying such gender differences. The goal of this study is to assess the potential contribution of structure, contractile function and metabolism of individual muscle fibres to gender differences in performance. We will study: (i) structure and function of individual muscle fibres, their E-C coupling and their sensitivity to metabolites normally produced during fatiguing contractions; (ii) differences in the accumulation of metabolites in women and men after isometric exercise, and how this could trigger different adaptive responses in terms of performance fatigability. Classical indexes of neuromuscular function obtained in-vivo will be compared to ex-vivo parameters from permeabilized muscle fibers.

Techniques:
single muscle fibers mechanics, proteomic and quantitative electrophoresis, Western blot & RT-PCR, metabolomics, in vivo analysis of muscle and cardiovascular performance and muscle and whole-body metabolism.

References
Ansdell P, et al. Exp Physiol 105:2007–2021, 2020.
Enoka RM, Duchateau J. Med Sci Sport Exerc 48:2228–2238, 2016.
Hunter SK. Acta Physiol 210:768–789, 2014.
Roepstorff C et al. J Physiol 574:125–138, 2016.
Welle S et al. PLoS One 3:e1385, 2008.