43: Exercise training intensity is/is not more important than volume to promote increases in human skeletal muscle mitochondrial content. *J Physiol*, 597.16, which has been published in final form as comments in the supporting information at https://doi.org/10.1113/JP278329. This article may be used for non-commercial purposes in accordance with Wiley Terms and Conditions for self-archiving.

Last Word, CrossTalk:

Exercise training intensity is more important than volume to promote increases in human skeletal muscle mitochondrial content

Journal of Physiology

Dr Andrew Kirkland
University of Stirling

Dr Brian T. Gearity

University of Denver

The debate between MacInnis et al. (2019) and Bishop *et al*. (2019) offers insight into the mechanistic basis of mitochondrial changes through exercise. However, the supporting evidence comes from highly controlled settings and is therefore limited as an ecologically valid base for exercise prescription in athletic and clinical settings. While laboratory research or experimental designs with tightly controlled and somewhat arbitrary variables can help understand the mechanistic basis of physiological adaptations, real-world experiences are inherently more holistic and unpredictable. The ARMSS model of Bishop (2008) is edifying in this regard; effectiveness trials of interventions are required to support validity in naturalistic settings.

Mitochondrial content adaptations occur in complex biopsychosocial systems in which they are exposed to multiple stimuli over time. The magnitude of change to the mitochondria will occur not simply as a function of volume and intensity, but is influenced by individual genetics, previous training, and numerous psychobiological interactions. The present debate is structured in a way that suggests the authors believe an absolute truth is knowable. However, their qualifications demonstrate they know that adaptation involves complex interactions at a multi-systems level and that knowledge shifts through a process of osmosis rather than presentation of absolute truths. To more fully appreciate the complexities of mitochondrial adaptation and its relation to exercise prescription, and human physiology and performance in general, we argue this debate would be enhanced within a broader discussion on ecological contexts. Further debate is warranted on the epistemological and ontological differences of so-called basic and applied sciences.

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- The authors declare no conflict of interest
- Both authors contributed to these comments
- No funding