For a pragmatic approach to exercise studies

We are skeptical about the feasibility of defining a gold standard for exercise studies on animals with a huge variety in strain, age, gender, transgenesis or exercise paradigms (1). For example, the practical determination of exhaustion in rodents (and humans) is more difficult than implied by the simple theoretical definition. The criteria proposed by Booth et al. are invasive, disruptive, terminal or ethically difficult to justify. In contrast, electric shock stimulation, in particular in combination with computer-controlled break-off criteria, is a pragmatic, non-invasive solution for comparing endurance capacity between different experimental groups, even for longitudinal studies. Problems with running style and non-compliance can be overcome by appropriate acclimatization and group size.

Second, we certainly appreciate the historic, excellent work by our predecessors. However, novel complementary and interdisciplinary methods provide additional important details about the contractile and metabolic characterization of muscle (3). Even so, individual methods such as immunohistochemical staining of myosin heavy chains, or myosin ATPase activity staining for that matter, fail to provide a comprehensive picture. Therefore, a combination of methods, optimally less delicate than myosin ATPase activity determination, should be used and optimally combined with approaches that allow true determination of peak force generation and fatigue resistance (2, 4).

Finally, we think that instead of a dogmatic approach to exercise concepts (i.e., "no increase in type I fibers" vs. increase in (5) and other references), we should remain open to novel findings and continue to improve our animal-based exercise studies accordingly.

Christoph Handschin[*,#], Serge Summermatter[*], Nathan K. LeBrasseur[§], Jiandie Lin[@], and Bruce M. Spiegelman[£]

*Biozentrum, Department of Pharmacology/Neurobiology, University of Basel, Basel, Switzerland
[§]Pfizer Global Research and Development, Cardiovascular, Metabolic and Endocrine Diseases, Groton, CT, USA
[@]Life Sciences Institute, University of Michigan, Ann Arbor, MI, USA
[£]Dana-Farber Cancer Institute and Department of Cell Biology, Harvard Medical School, Boston, MA, USA

[#]Corresponding author: christoph.handschin@unibas.ch

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