Commentaries on Viewpoint: ”Muscle memory” not mediated by myonuclear number? Secondary analysis of human detraining data

Julien Gondin

Muscle memory after resistance training in humans: myth or reality?

Julien GONDIN
Institut NeuroMyoGène (INMG) - CNRS 5310 – INSERM U1217 - UCBL1
Faculté de Médecine
69008 LYON, France
julien.gondin@univ-lyon1.fr
www.musclestem.com

Over the last decade, the seminal work from the Gundersen's lab demonstrated that the increased myonuclei number associated with synergist ablation- or anabolic drug-induced skeletal muscle hypertrophy is long-lasting and could favor subsequent muscle growth or prevent muscle disuse (2). However, this so-called "muscle memory" theory is still a matter of debate in the context of resistance training, inasmuch as conflicting findings emerged from animal studies (1, 3) likely due to different experimental design (specie/age of the animals, training protocol, single muscle fiber myonuclear analysis…). Psilander *et al.* (5) elegantly tried to evaluate whether muscle memory exists in heathy humans after a training/detraining protocol. Unfortunately, the training program *per se* did not increase the myonuclei number, leaving the question in abeyance. The clustering analysis of the Psilander's raw data provided by Murach and colleagues (4) seems to argue against a human muscle memory. Indeed, most of the subjects for whom myonuclei accretion was observed in the trained muscle then displayed a reduction in myonuclei number with detraining. One could argue that the repeated biopsy procedure may also affect muscle fiber homeostasis, which makes the interpretation of human studies more difficult than those conducted in animals. Although efforts have been put forward to maximize myonuclear accretion by using blood flood restriction, other training regimens known to induce muscle hypertrophy (e.g., neuromuscular electrical stimulation) should be used to determine the existence of this biological phenomenon. Overall, the absence of evidence is not the evidence of absence of a human muscle memory.

References

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