LETTER TO THE EDITOR

Muscle damage: Scientific fundamentals

Javid A. Mirzayev
Tula State University, Tula, Russia

Submitted 5 January 2017; accepted in final form 20 January 2017

TO THE EDITOR: I read the recent article by Peake et al. (4) entitled “Muscle damage and inflammation during recovery from exercise” with great interest. I would suggest adding more information about muscle damage, because in my opinion the authors talked about muscle damage minimally. The authors stated (4): “. . . Concentric muscle contractions do not cause exercise-induced muscle damage.” But it is known from Gleeson et al. (3) that the inclusion of concentric conditioning in rehabilitation programs will tend to exacerbate the severity of muscle damage in subsequent unaccustomed exercise. I completely agree with the authors that “. . . exercise-induced muscle damage is evident after isometric contractions at a long muscle length and eccentric muscle contractions—even at low intensity.” It has been established that eccentric exercise is the most damaging form of exercise and they have implemented eccentric muscle contraction models to study adaptation to intense physical training (1). Fridén and Lieber (1) predicted that a muscle that has fatigued as a result of 20 min of isometric contraction could be damaged significantly if muscle stretching was late in the treatment period. It is well known that eccentric exercise induces greater changes than comparable contractions of either isometric or concentric activity (1, 2). Although injuries are associated with eccentric contraction, which result in high stresses, stress itself may not actually induce the damage. Active strain appears to correlate better with damage. Specific fiber damage appears to be concentrated in the fast muscle fiber with low oxidative capacity. This may imply that oxidative capacity is an important factor in eccentric contraction-induced muscle damage (1). In addition, I would like to add that the immediate loss of strength after eccentric exercise has been referred to as overstretch of sarcomeres, resulting in a nonoptimal overlap between action and myosin filaments length as well as changes in excitation-contraction coupling. Fridén and Lieber (2) suggested that during eccentric exercise some sarcomeres are stretched beyond overlap and thereby injured, whereas others maintain their length. As rightly noted by the authors, “It is commonly believed that microtrauma of myofibers and subsequent inflammation cause DOMS, and the precise mechanisms responsible for DOMS remain somewhat uncertain.” Skeletal muscle soreness and injury are associated with intense exercise but are more pronounced if the individual is accustomed to the exercise performed. Thus, even individuals in excellent athletic condition may experience muscle soreness and damage when performing exercise that is new to them. Although loss of strength has been observed very soon (within minutes) after exercise, the underlying causes of the relation between DOMS and the loss of muscle strength should be clearly proved (2).

AUTHOR CONTRIBUTIONS
J.A.M. analyzed data; J.A.M. approved final version of manuscript.

DISCLOSURES
No conflicts of interest, financial or otherwise, are declared by the author(s).

REFERENCES

Address for reprint requests and other correspondence: J. A. Mirzayev, Tula State University, Tula, Russia (e-mail: dzhavidmirzev@gmail.com).