

The protection conferred by isometric pre-conditioning is dependent on the magnitude of subsequent eccentric exercise-induced muscle damage

¹Barreto, R.V.; ^{1,2}Lima, L.C.R.; ¹Greco, C.C.; ¹Denadai, B.S.;

¹Universidade Estadual Paulista “Júlio de Mesquita Filho”, Rio Claro, Brasil

²Centro Universitário Salesiano São Paulo, Campus Liceu Salesiano, Campinas, Brasil

Exercise-induced muscle damage (EIMD) often occurs after unaccustomed exercises, especially those involving eccentric contractions. Some of the most frequently assessed symptoms of EIMD are muscle swelling, soreness and compromised force production capacity. Recent studies have demonstrated that EIMD symptoms are attenuated when maximal isometric contractions are performed a few days prior to damaging exercises. However, it is still not established if the protective effect conferred by an isometric pre-conditioning protocol (IPP) is the same for different magnitudes of EIMD, induced by different muscle efforts. Therefore, the purpose of this study was to investigate if the same IPP attenuates the magnitude of EIMD induced by different maximal eccentric contractions (MaxECC) protocols in the elbow flexors. Sixty-four untrained men were assigned to one of two experimental or two control groups ($n = 16$ each group). Subjects in the experimental groups performed 10 maximal isometric contractions of the elbow flexors, 2 days prior to either slow ($60^\circ \cdot s^{-1}$ – ISO-S) or fast ($180^\circ \cdot s^{-1}$ – ISO-F) MaxECC of the elbow flexors. Subjects in the control groups performed either slow (CON-S) or fast (CON-F) MaxECC without IPP. Maximal voluntary isokinetic concentric force (MVC), muscle soreness (SOR) and muscle thickness (MT) were assessed before, immediately after, and 1-4 days following the eccentric exercise bout. Changes over time and between groups for these variables were tested by two-way ANOVAs with Bonferroni’s post-hoc tests. MVC was compromised ($p < 0.05$) following MaxECC for all groups with faster recovery for experimental groups (ISO-S: 72h, and ISO-F: 48h) than control groups (CON-S: 96h, and CON-F: after 96h). MVC was different ($p < 0.05$) between CON-F and ISO-F at 48h and 72h post-MaxECC. SOR developed following MaxECC for all groups with full recovery reached at 72h for ISO-S, and 96h for ISO-F. SOR remained increased until 96h following MaxECC for control groups, with greater manifestation for CON-F. SOR was different ($p < 0.05$) between CON-F and ISO-F at 48h, 72h, and 96h post-MaxECC. MT increased immediately after MaxECC for CON-S, CON-F and ISO-S, and remained so until 96h for CON-F. The IPP accelerated recovery of MVC and SOR for the slow-eccentric exercise condition and attenuated force loss and muscle soreness in addition to faster recovery of all assessed variables for the fast-eccentric exercise condition. Therefore, isometric preconditioning can be used as a strategy to attenuate and accelerate recovery of muscle damage induced by different eccentric exercises, with greater protection against muscle damage of greater magnitude. Funding: FAPESP (Process: 2017/14632-0).

E-mail: reenanvb@gmail.com