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Title: Physiological responses at critical load on resistance exercise – Effects of aging process

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Body: Background: Critical load (CL) is a theoretical analysis derived from a series of constant load repetitions until concentric failure during resistance exercise (RE), which indicates the transition of moderate to intense exercise. However, it appears the influence of age on differences in CL remains to be investigated. Aims: The objectives of the study were to; 1) determine the intensity of CL during RE, and 2) evaluate the behavior of cardiorespiratory and metabolic responses during RE at the CL in young and older subjects. Methods: We evaluated 12 young (23±3 years) and 10 elderly (70±2 years) apparently healthy males, who underwent: 1) a 1 repetition maximum (1RM) test on Leg Press and, 2) on different days, three high-intensity resistance exercise constant load tests (60%, 75% and 90% 1RM) in order to obtain CL by linear regression: load X reverse of time (Tlim = duration of exercise until fatigue). Results: Absolute values of both the CL asymptote and curvature constant (kg) were significantly lower in elderly subjects (p<0.05). In contrast, both groups have the same value for CL ~ 52%RM. As expected, actual oxygen consumption (VO₂) and heart rate (HR) values obtained during CL exercise testing were significantly reduced in older subjects. However, percent-predicted aerobic capacity values were significantly higher in older subjects (P<0.05). In addition, blood lactate ([La⁻]) corrected to Tlim were greater in younger subjects at all intensities (p <0.05). Conclusion: These findings suggest that the despite reduced force production in older subjects, endurance-related parameters are well preserved according to age-adjusted percent-predicted values in apparently healthy males. Financial support: FAPESP No. 2009/01842-0.