

HORMONAL RESPONSES FOLLOWING ECCENTRIC EXERCISE IN HUMANS

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ABSTRACT

OBJECTIVE: Mechanically overloaded muscle and its subsequent damage are strong stimuli for eliciting acute hormonal changes, and muscle adaptation which occurs following exercise-induced muscle damage may involve complex hormonal responses before the completion of muscle regeneration. The purpose of this study was to investigate systemic responses of various hormones, as well as secreted proteins that are exercise-regulated and associated with muscle adaptation, for several days after eccentric exercise-induced muscle damage in humans.

DESIGN: Nine young men volunteers performed 50 maximal eccentric muscle actions using the knee extensor muscles of both legs. Blood samples were withdrawn before and at 6, 48 and 120 hours post-exercise and serum levels of growth hormone (GH), insulin-like growth factor binding protein-3 (IGFBP-3), cortisol, prolactin, thyroid-stimulating hormone (TSH), free thyroxine (fT4), irisin, follistatin and sclerostin were measured by ELISA using commercially available kits. Myoglobin (Mb) concentration and lactate dehydrogenase (LDH) activity were also evaluated as indirect markers of muscle damage.

RESULTS: Significant alterations in Mb and LDH were observed over time after eccentric exercise ($p=0.039-0.001$), while correlational analyses revealed significant associations between GH and IGFBP3, prolactin, and sclerostin over time ($p=0.049-0.001$).

CONCLUSIONS: Significant hormonal responses observed in this study may indicate their involvement in the regenerative mechanisms following muscle damage, potentially as part of a regulatory network to support a normal adaptation process after muscle-damaging exercise.