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Age-dependent differences in whole-genome gene expression response to contraction-induced muscle injury

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Differential age-dependent contraction-induced muscle injury has been reported to result in soft-tissue trauma at the physiological level, but no consensus exists at the molecular level to a genomic signature accounting for these disparities. Thus, the purpose herein was to identify if a differential age-dependent genomic signature exists in skeletal muscle following contraction-induced muscle injury. The left dorsiflexor muscles of young (3 mo) and old (30 mo) male Fischer 344 x BN rats were injured using 150 stretch-shortening contractions at a velocity of 500°/s in vivo. Seventy-two hours following exposure the left tibialis anterior muscle was harvested and RNA was isolated. cRNA samples were prepared and loaded onto Sentrix Rat-Ref12 Beadchips for gene array analyses. Among the ~1000 differentially responsive genes expressed in both injured groups, there was an intense upregulation of genes related to the inflammatory response (i.e. IL-18, CCL7), cell death (ANXA2, BCL10) and muscle regeneration (i.e. TGFb1, PCNA, Myog) in young rats following injury, yet these same genes were minimally responsive in old rats. These data suggest that, at the molecular level, old rats may be desensitized to launch an appropriate response to an injury stimulus compared with young rats, and the disparity in these specific molecular signals could impact recovery kinetics following contraction-induced injury with aging.