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Age-dependent differential gene expression in exposure response of contraction-induced muscle injury

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A high volume of repetitions that results in contraction-induced muscle injury in young rats has been shown to have a more robust genomic response to the physiological trauma than similar paradigms in old rats. Thus, the purpose was to identify if this age-dependent genomic signature was present in skeletal muscle following lower number of muscular contractions. The left dorsiflexor muscles of young (3 mo) and old (30 mo) male Fischer 344 x BN rats were injured using 30, 80 and 150 stretch-shortening contractions (SSCs) 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. With respect to contraction number, there was a graded up-regulation in response of genes related to the inflammatory response (i.e. SPP1, MMP12, CD68), cell death (CTSS, CTSB, CTSL1) and muscle regeneration (i.e. ANXA1, S100A11, RPS6) in young rats following injurious SSCs, yet the same genes have an attenuated, and even opposite, response in old rats regardless of contraction number. These data suggest desensitization in the old rats' ability to mount a competent response to graded contraction-induced injury stimuli, which, ultimately, may adversely affect recovery kinetics following injury with increased age.