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Upper limb movement degradation with performance of repetitive reaching in a rat model

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Abstract

We examined the induction of upper limb behavioral changes with performance of a high repetition reaching task in both aged and young rats. 15 young (12–24 weeks) and 4 aged (15–18 months) female Sprague-Dawley rats were used (preliminary analysis). The protocol was approved by the Temple University IACUC in accordance with NIH Guidelines. Rats performed a reaching task over 9 weeks. Young rats were cued every 15 sec. to retrieve a food pellet (high repetition negligible force). Aged rats were cued every 15 sec. to exert an isometric handle pull at 15% maximum voluntary force (high repetition low force). Rats were videotaped at the end of weeks 1 and 9; representative reaches were quantified with video motion analysis (PeakMotus, Englewood, CO). Reach time (RT), grasp time (GT), and movement reversals (MR) were analyzed with repeated measures ANOVA within groups. Because the target's vertical and horizontal requirements were identical for both groups, shoulder girdle angle (SGA) was compared within groups and between groups. Young adult rats showed a significant ($p<0.05$) increase in RT, GT, and MR. Aged rats showed a significant increase in MR. The increases in RT, GT, and MR are indicative of movement degradation. There was a trend ($p=.059$) for a smaller SGA in aged rats compared to young rats that may be due to age-related changes in the rotator cuff.

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