Age-related differences in pre-movement antagonist muscle co-activation and reaction-time performance.

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Abstract

Multiple causes contribute to the prolonged reaction-times (RT) observed in elderly persons. The involvement of antagonist muscle co-activation remains unclear. Here the Mm. Biceps and Triceps Brachii activation in 64 apparently healthy elderly (80 ± 6 years) and 60 young (26 ± 3 years) subjects were studied during a simple RT-test (moving a finger using standardized elbow-extension from one pushbutton to another following a visual stimulus). RT was divided in pre-movement-time (PMT, time for stimulus processing) and movement-time (MT, time for motor response completion). RT-performance was significantly worse in elderly compared to young; the slowing was more pronounced for MT than PMT (respectively 101 ± 10 ms and 41 ± 6 ms slower, p<0.01). Elderly subjects showed significantly higher (p<0.01) antagonist muscle co-activation during the PMT-phase, which was significantly related to worse MT and RT (p<0.01). During the MT-phase, antagonist muscle co-activation was similar for both groups. It can be concluded that increased antagonist muscle co-activation in elderly persons occurs in an early phase, already before the start of the movement. These findings provide further understanding of the underlying mechanisms of age-related slowing of human motor performance.

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