

Age-related changes on working memory and learning in Rhesus monkeys

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Many studies have shown an age-related decline in working memory, executive function, and other cognitive abilities. However, how aging precisely impacts specific aspects of these cognitive functions remains poorly understood. Here, we examine the relationship between age, working memory, and learning. A total of 90 rhesus monkeys (with an age range of 6 to 32 years old) participated in Delayed Recognition SpanTask (DRST) and Delayed Non-Matching-to-Sample (DNMS) to examine working memory. Since monkeys were not trained on the specific tasks prior to the experiment, our data also shows the learning progress - a gradual increase in performance - of each monkey. The age effect on task performance was examined by considering age as a continuous variable as well as by categorizing the monkeys into age groups: Young (N = 22), Middle-Aged (N = 35), and Aged (N=33). We confirmed a strong negative linear relationship between age and performance. Moreover, we found a difference in the monkeys' learning abilities: learning curves were steepest in the young group and shallowest in the aged group. Electrophysiology data from the Lateral Prefrontal cortex further supports behavioral findings. Thus, both working memory and learning ability show a deterioration with age. The insights gained from the quantification of cognitive abilities in these monkeys open the door to understanding age-related changes in cognition.