The food-finding test paradigm without deprivation delays the ethogram but preserves the olfactory signatures in female mice with normal and AD-pathological aging and detects their ethogram derangement due to social isolation

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Abstract

The severity of sensory involution during aging is critical for perceiving and recognizing the world. In addition, sensory deficits significantly increase the risk of older adults' biological, mental, and social decline. Conversely, loss of smell is an early biomarker of neurodegeneration in Alzheimer's (AD) and Parkinson's diseases. The worsening of these neurodegenerative diseases also involves physical deterioration, social deficits, and isolation. In the present translational work, a new food finding test (FFT) olfactory paradigm without food deprivation was used to investigate olfaction in old animals. The effects of social isolation in 12-months-old female 3xTg-AD mice, a genetic model of AD, and their age-matched wild-type counterparts, the gold-standard C57BL/6 mice were also studied. Animals were placed in a test cage and were observed until reaching the criteria for three goal-directed behaviors,'Sniffing', 'Finding' and 'Eating', towards the hidden food. Video recordings were analyzed blind to the genotype and social condition to determine the behaviors' ethogram and functional correlations. The results showed that the FFT paradigm without food deprivation elicited longer ethograms than previously reported with the standard overnight food deprivation protocol. However, it identified the genotype-dependent olfactory signatures in normal and AD-pathological aging. Social isolation slightly increased the latencies, but the olfactory signatures were preserved. However, a functional derangement was detected since the internal correlation among the three goal-directed behaviors was lost under isolation. In conclusion, the new paradigm without overnight deprivation was sensitive to genotype and isolation changes in the ethogram and function and can be used to study old animals.