

Effects of Aging on Visual Memory: Neuroimaging Studies

<https://www.neurodegenerationresearch.eu/survey/effects-of-aging-on-visual-memory-neuroimaging-studies/>

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Country

USA

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Effects of Aging on Visual Memory: Neuroimaging Studies

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The project/programme is most relevant to:

Alzheimer's disease & other dementias

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Research Abstract

DESCRIPTION (provided by applicant): Aging is associated with substantial deterioration of the visual system and associated sensory-perceptual processes. This decline in visual processing is a strong predictor of cognitive decline in healthy aging and of Alzheimer's disease. Yet, the effects of aging on visual processing and cognitive functions, such as memory, have typically been investigated independently of each other. Filling this void, the proposed neuroimaging studies focus on the interactions between age effects on visual and memory processes, and the brain regions mediating these processes. This significant goal is combined with an innovative multi-measure methodological approach which assesses age effects (1) on visual and memory performance using behavioral tests; (2) on brain activity in occipito-temporal, medial temporal, prefrontal regions using functional MRI (fMRI); (3) on the interactions among these regions using functional connectivity (fCON); and (4) on the integrity of the white-matter fiber tracts connecting these regions using diffusion tensor imaging (DTI). Most importantly, these different measures are directly linked to each other. The multi-measure approach is applied to three specific aims. Specific Aim 1 is to investigate the role of peripheral and top-down modulation deficits in visual memory impairments in older adults. Older adults show reduced activity and selectivity (dedifferentiation) in occipito-temporal cortex, which may reflect peripheral or top-down modulation deficits. Study 1 compares the effects of divided attention, which interferes with top-down modulation, and stimulus degradation, which mimics age-related peripheral visual deficits. Study 2 employs overlapping face-house stimuli to examine selective attention deficits. Specific Aim 2 is to investigate the role of perceptual and conceptual processing deficits in visual memory impairments in older adults. Conceptual processing enhances memory for meaningful visual stimuli such as objects but, when combined with perceptual processing deficits, can lead to false memories. Study 3 investigates age effects on conceptual vs. perceptual processing during the encoding of meaningful objects. Study 4 examines age effects on encoding leading to true vs. false memory for objects. Specific Aim 3 is to investigate the role of retrieval reactivation deficits in visual memory impairments in older adults. Visual memory depends not only on visual cortex activations during learning but also on visual cortex reactivations when visual events are remembered. Study 5 investigates age effects on the reactivation of memories for familiar faces and objects. Linking with Specific Aim 2, Study 6 investigates the reactivation of perceptual and conceptual representations. The proposed studies will be the first to systematically investigate the neural mechanisms of age-related visual memory decline. Their results will have direct implications for the development of treatments for memory decline in healthy aging. Moreover, given that visual memory decline predicts Alzheimer's disease a decade before diagnosis, the results will also have implications for the early detection and treatment of this disease.

Lay Summary

The results of the proposed studies will clarify the neural correlates of age-related deficits in visual memory, and will have important implications for the promotion of health. They will help develop cognitive training methods and will provide an essential baseline for research on Alzheimer's disease.

Further information available at:

Types:

Investments > €500k

Member States:

United States of America

Diseases:

Alzheimer's disease & other dementias

Years:

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