# Mircocircuitry for Short-Term Memory and Its Relationship with Alzheimer's disease

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Alzheimer's disease (AD) is a progressive neurodegenerative disease that accounts for more than two-thirds of all cases of dementia. The most important risk factor for AD is age, followed by an APOE4 genotype. A 2007 report released by the Alzheimer's Association estimated that more than 5 million Americans are currently diagnosed with AD, while a Delphi consensus study projected that the global prevalence of AD will quadruple by the year 2040 to over 80 million cases in total. Just as this disease is often devastating at the individual and family levels are high prevalence of AD means that it is also economically and societally burdensome. Indeed, AD represented the third most costly health condition in the USA in 2000, and is of growing financial relevance for health policy planning in other industrialized and developing nations [4-6]. Perhaps due to mounting evidence regarding the gravity of the situation, there has been a crescendo of research interest in AD over the past decade, with 50% more papers published on the topic in the year 2007. Throughout this period, one major area of research in AD has focused on the cognitive impairments exhibited by patients.

A clear definition of what subjective memory impairment or subjective cognitive impairment actually mean is currently lacking. An international task force is, however, working on standard operating procedures that would enable comparable study designs. A consensus regarding naming the concept "subjective cognitive impairment" in view of previously used terminology such as "subjective memory impairment" seems to be arising. Subjective cognitive impairment is defined as the individual coming up with the mere feeling that something is not in order, without any objective parameters supporting that notion in the first place. Such a stage labeled subjective cognitive impairment may precede mild cognitive impairment in the continuum of Alzheimer disease manifestation. Using such a definition and without objective neuropsychological test alterations, the atrophy pattern of patients with subjective cognitive impairment seem to be related to the atrophy pattern seen in AD

#### Objective

Short-Term Memory (STM) is the capacity to hold information in the brain in an active, readily accessible state for a brief period of time, typically from seconds to minutes. Its coding mechanisms at the microcircuitry level remain a mystery. Performing two-photon imaging on behaving mice to monitor the activity of neuronal microcircuitry, we discovered a neuronal subpopulation in the medial prefrontal cortex (mPFC) that exhibited emergent properties in a context-dependent manner underlying a STM-like behavior paradigm. These neuronal subpopulations exclusively comprise excitatory neurons and mainly represent a group of neurons with stronger functional connections. In addition, we found the microcircuitry plasticity was maintained for minutes and was absent in an animal model of Alzheimer's disease (AD). Considering the toxicity of A $\beta$ -soluble oligomers is one of the major causes of AD, in the future, we

aim to unveil whether and how  $A\beta$ -soluble oligomers will influence the mircocircuitry plasticity for STM in AD animal models.

Loss of memory is among the principal indications revealed by patients experiencing Alzheimer's sickness (AD) and by their guardians. Working memory and long haul explanatory memory are influenced ahead of schedule throughout the illness. The individual example of hindered memory capacities connects with boundaries of auxiliary or useful cerebrum uprightness. Promotion pathology meddles with the development of recollections from the sub-atomic level to the structure of neural systems. The examination of AD memory misfortune assists with recognizing the included neural structures, for example, the default mode organize, the impact of epigenetic and hereditary variables, for example, ApoE4 status, and transformative parts of human comprehension. Clinically, the examination of memory helps the meaning of AD subtypes, malady reviewing, and prognostic expectations. Regardless of new AD standards that permit the previous conclusion of the sickness by consideration of biomarkers got from cerebrospinal liquid or hippocampal volume examination, neuropsychological testing stays at the center of AD finding

Consensus exists that AD starts clinically with memory complaints, which may affect episodic memory, speech production, with naming or semantic problems, or visual orientation. Memory can be defined as a process of encoding, storing, and retrieving information about outer and inner stimuli, or presentation of information to the nervous system of an organism that can be used to react and position the organism towards new stimuli. Different categories of memory have been defined which also have different neuroanatomical and neurophysiological correlates: short-term memory vs long-term memory or implicit versus declarative memory. Short-term memory is limited to just a few "chunks" in capacity, and lasts only seconds to minutes. It depends on regions of the frontal lobe and the parietal lobe. In contrast, long-term memory seems almost limitless regarding its storage capacities, for a potentially unlimited duration.

## Conclusion

Cognitive neuroscientists will continue to make refinements in their understanding of episodic memory in healthy individuals and in AD patients. We foresee particular advancements in delineating the neural correlates of episodic memory using electro physiological and neuroimaging techniques. Technological advances may allow multiple techniques (e.g., ERPs and fMRI) to be used simultaneously during memory tests, fostering insight into the temporal and spatial relationships of the neural regions involved. Future clinical trials may assess the efficacy of AD therapies using paradigms drawn from the cognitive neuroscience literature. Such trials may implement episodic memory tests as standalone outcome measures or time-locked with techniques that

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measure brain physiology. Finally, technologies that might aid memoryimpaired patients with activities of daily living, such as paper organizers, personal digital assistants and even neural prostheses, may be developed and offered to AD patients.

## Biography

Hao Li graduated from Capital Medical University and got the M.D and Ph.D in 2017. Currently, he is working as a neurosurgeon in the Department of Neurosurgery, Beijing Tiantan Hospital, and capital Medical University. In the past five years have mainly engaged in clinical and basic researches related to cerebral vascular diseases and Alzheimer's disease.