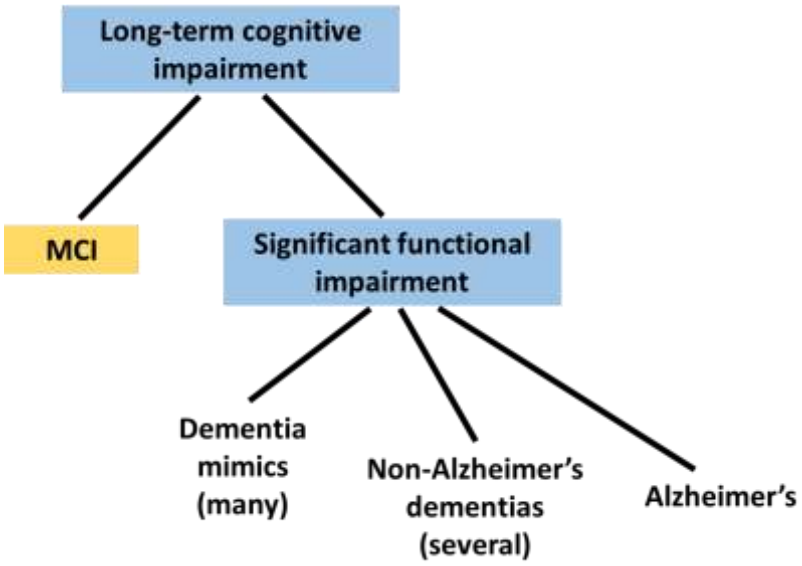
Adjourning Alzheimer's

Mild Cognitive Impairment (Day 39)



In 2001, United States neurologist **Ronald Petersen** described an intermediate clinical state between normal aging and the earliest clinical features of Alzheimer's. Petersen's goal was to identify a "prodrome" phase in Alzheimer's, allowing people to be treated at an earlier stage of the disorder.

Petersen came up with the concept of **mild cognitive impairment (MCI)**, now defined as a **decrease in cognition**, which includes a decrease in one or more of **memory**, **attention**, **concentration**, **language**, **visuospatial skills** (interpret spatial relationships), or **executive function** (plan, judge, decide), exceeding that of normal aging. Importantly, a person with MCI retains a **normal ability to function** and is able to work and socialize virtually normally.

Nowadays, a person is said to have MCI when they meet the **Petersen criteria**:

(1) Subjective cognitive complaint, preferably corroborated by an informant.

(2) Objective cognitive impairment for age.

(3) Largely intact daily function.

(4) Absence of dementia.

Petersen criteria for MCI.

Let's apply the **MCI criteria** to a person presenting to their doctor with a long-term cognitive complaint. Utilizing the **5-step approach**, the diagnosis of MCI is usually straightforward:

(1) Corroborated history

The person has a cognitive complaint, usually memory loss, but it may also relate to a complaint in attention, concentration, language, visuospatial skills, or executive function. Preferably, an informant should corroborate the cognitive complaint, but this is not essential.

(2) Focused examination

The examination will be normal, with no compelling evidence of a neurological abnormality.

(3) Cognitive and functional scales

Most cognitive scales will be slightly below normal; for example, the Montreal Cognitive Assessment (MoCA) score will usually range from 17 to 26 (out of a total of 30 points). Functional scales will be more or less normal.

(4) Laboratory tests

Blood tests will be normal. Lumbar punctures are only done in exceptional circumstances and will be normal, unless cerebrospinal biomarkers are ordered which may reveal the presence of amyloid beta (Aβ) and tau proteins in the brain.

(5) Brain imaging

CT imaging will be normal. MRI imaging will also be normal, unless a special "volumetric" analysis is done, which may reveal reduced hippocampal volume. PET scans, which measure brain glucose uptake and metabolism, are only done in exceptional circumstances and will often reveal subtle areas of impaired brain glucose uptake and metabolism.

Epidemiologically, MCI is common, affecting **10-20% of people over 65 years of age**. MCI occurs more often in men, people with a lower level of education, and people with cardiovascular risk factors (such as type 2 diabetes and hypertension).

Crucially, a diagnosis of MCI **does not mean that a person will definitely develop Alzheimer's** later in life. Roughly 50% of people with MCI will be diagnosed with Alzheimer's within the next 5 years, but

many people with MCI do not decline any further, and some even revert back to normal cognition. This is interesting, for it suggests that the pathological process underlying MCI is **heterogenous**; MCI may represent a very early, "prodrome" form of Alzheimer's as Petersen intended, but in many cases the it will be due to some other process completely unrelated to Alzheimer's.

Nonetheless, we must still realize that compared to a person with normal cognition, a diagnosis of MCI **substantially increases a person's risk of being diagnosed with Alzheimer's** later in life. The annual conversion rate of a cognitively normal person to Alzheimer's is **1-2%** per year, whereas the annual conversion rate of a person with MCI to Alzheimer's is **10-12%** per year. Thus, compared to a cognitively normal person, the chances of an eventual conversion from MCI to Alzheimer's is approximately **ten times higher**.

To sum up, when a person sees their doctor with a long-term cognitive complaint such as memory loss, it is vital to determine whether the cognitive impairment is significant enough to interfere with their normal daily function. If it does not, that person may have MCI; **this is not necessarily due to Alzheimer's**, but it does increase a person's risk of eventually being diagnosed with Alzheimer's compared to a person without MCI, by ten-fold.

Matt (Neurologist, Waikato Hospital).

References

(1) Petersen et al. 2001. Current concepts in mild cognitive impairment. Arch Neurol 58(12), 1985-1992.

(2) Petersen. 2004. Mild cognitive impairment as a diagnostic entity. J Intern Med 256, 183-194.

(3) Petersen et al. 2009. Mild Cognitive Impairment: Ten Years Later. Arch Neurol 66(12), 1447-1455).

(4) Langa and Levine. 2014. The Diagnosis and Management of Mild Cognitive Impairment: A Clinical Review. JAMA 312(23), 2551-2561.