

# Mild cognitive impairment: still a controversial stage between normal cognitive aging and dementia

## Abstract

Mild Cognitive Impairment (MCI) is nowadays a broad acronym that encompasses several subtypes of mild cognitive dysfunction. The construct of MCI has influenced the field of aging and dementia in several significant spheres, from epidemiological studies to investigation of the mechanisms of neurocognitive diseases. The purpose of this paper is to highlight several issues of Mild Cognitive Impairment, still considered a controversial stage between normal cognitive aging and dementia.

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## Introduction

One of the most challenging target for clinicians is to describe the boundary area between normal aging and dementia. In this context, the term “aging associated cognitive decline”, introduced by Levy in 1994<sup>1</sup> portrays a performance on a standardized cognitive test that is at least one standard deviation below age-adjusted norms in at least one of any of the following cognitive domains: memory and learning, attention and cognitive speed, language, or visuoconstructional abilities.

In the light of this perspective there also should be no medical, psychiatric or neurological disorder that could cause cognitive impairment (including dementia) and normal activities of daily living should be preserved. Mild Cognitive Impairment (MCI) is nowadays a broad acronym that encompasses several subtypes of mild cognitive dysfunction. The term Mild Cognitive Impairment was early introduced into the literature in 1988 by Reisberg et al.<sup>2</sup> however it was still supposed to refer to stage-3 of the Global Deterioration Scale (GDS).

A remarkable contribution was afterwards provided by the Mayo Clinic research group, led by Petersen<sup>3</sup> describing MCI as a period in the course of neurodegenerative disease where cognition is no longer normal relative to age expectations, but also where daily functions are not sufficiently disrupted yet to correlate with the diagnosis of dementia.<sup>4</sup> For these reasons the authors concluded that patients meeting criteria for MCI should have been differentiated from healthy control subjects and those with very mild Alzheimer's Disease (AD).

The construct of MCI has influenced the field of aging and dementia in several significant spheres, from epidemiological studies to investigation of the mechanisms of neurocognitive diseases. During last decades the focus of this progressively raising interest has been to determine whether MCI should be considered just a transitory prodromal state of dementia or otherwise it should be labeled as an early but abnormal state of cognitive impairment.

The purpose of this paper is to highlight several controversial issues of Mild Cognitive Impairment. We are inclined to discuss MCI as an early pathological condition, rather than just a clinical entity, which affects both cognitive and functional aspects. Furthermore, to consider this condition simply as a cognitive limbo could conjugate in a reductionist approach to the diagnosis and to the best treatment choice.

## Diagnostic criteria

Petersen & Morris<sup>5</sup> have initially distinguished two forms of MCI, amnesic (a-MCI) and non-amnesic (na-MCI), on the basis of the presence or not of memory impairment. However the authors later also clarified that cognitive complaint could involve not only a single domain (sd-MCI) but several functions instead, as language, executive functions or visuo-spatial skills (multi-domain MCI).

The diagnostic core to distinguish MCI from dementia has commonly been that cognitive changes should be serious enough to be noticed by the patient or by other people, however not severe enough to interfere with performance of basic or instrumental activities of daily living (BADL-IADL).

BADL are generally described as self-maintenance skills such as bathing, feeding, dressing or toileting. IADL conversely involve more complex activities such as handling finances, managing medications or preparing a meal. These instrumental activities require a greater complexity of neuropsychological organization therefore are more likely to be vulnerable even in early stage of cognitive decline. Compared to the initial criterion<sup>6</sup> in fact recent evidences suggest that subtle changes or preclinical disability in IADL may be already present even in individuals with MCI.<sup>7,8</sup>

Scales of more complexes both BADL and IADL are needed to better capture individuals with preclinical AD before they start to progress to MCI.<sup>9</sup> It is proposed that even more sensitive scales focused exclusively on complex ADL will allow us the detection of the earliest alterations in daily functioning in minimally symptomatic individuals at the stage of preclinical AD and at the transition to MCI. Therefore, there should be assessments that are capable of detecting changes in ADL as soon as changes in cognition and behaviour are detected.

## Epidemiology and prognosis

What have generated, in the last decades, lack of consensus and controversial discussions regards the epidemiological impact of MCI in population, with a peculiar focus in its conversion rate to dementia. This heterogeneity substantially depends on the variety of tools used to fulfil the diagnostic criteria for MCI. To date, a reliable landmark appears to be the Mayo Clinic Study of Aging<sup>10</sup> which was designed as a population-based study in Olmsted County, Minnesota, involving a random sample of nearly 3,000 subjects aged 70 through 89 years

who were cognitively normal. The prevalence of MCI from this study was estimated at approximately 15% of the non-demented population with a 2:1 ratio of aMCI to na-MCI.

### MCI, hearing loss and cognitive decline

Scientific evidences have broadly shown that hearing impairment (HI) is associated with increased risk of developing dementia in older adults. Changes in anatomy have been documented, such as brain volume shrinkage, synaptic degeneration and subsequent compensatory mechanisms (with greater neural activity).<sup>11</sup>

However, whether hearing loss has a causative role in cognitive decline, or it should be described as a risk factor for the development of dementia, or if both hearing loss and cognitive decline are parts of a common age-related degeneration still remains unclear.<sup>12</sup>

Given the important connection between auditory and cognitive aging, health care services should be improved by taking into account both hearing and brain changes over the life span.

### Discussion and conclusion

As the literature of MCI has expanded there has been confusion concerning the specific boundaries of the condition, and controversies regarding its definition, assessment, management and intervention strategies. A greater consensus and standardization of definitions and research methodology for MCI is needed to make further studies more comparable and useful for designing intervention strategies.<sup>13,14</sup>

Furthermore we should not forget that as we age, we not only lose our physical capacity but, above all, our cognitive skills. Just as physical exercises prove to be essential for a healthy old age, mental exercises are even more important. IADL and BADL should be more than tests, but guides for the development of exercises capable of preventing MCI and its developments.

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### Conflict of interest

Authors declare there is no conflict of interest in composing this manuscript.

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