

Alzheimer's Dementia and predictors of Driving Cessation: Results from a 4-year Longitudinal Study

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Introduction: Patients with Alzheimer's Disease Dementia (AD) or Mild Cognitive Impairment (MCI) face increasing driving difficulties as the disease progresses and, at some point, cease driving. We sought to identify predictors of driving cessation among patients with AD or MCI.

Diagnosis	MCI	AD
N	33	28
Gender (N, %)	13 Females (39%) 20 Males (61%)	2 Females (7%) 26 Males (93%)
Age (Mean, +/-SD)	69 years (+/-10)	74 years (+/-6)
Education years (Mean, +/-SD)	12 (+/-4)	10 (+/-4)
MMSE score (Mean, +/-SD)	27 (+/-2)	22 (+/-5)

Table 1: Basic characteristics of 61 patients included in our study

Methods: We examined 28 patients with mild AD and 33 patients with MCI. **Baseline evaluation** included neurological and neuropsychological assessment and a driving simulator test. **Re-evaluation** after a mean period of 48 months included a structured interview with the patients and their caregivers. Primary endpoints were driving cessation and death. For those patients who did not reach the primary endpoints, we performed a **final evaluation** after a mean period of 84 months since the baseline evaluation. Basic characteristics of our patients are summarized in Table 1.

Diagnosis	MCI	AD
N	33	28
Death during Follow-up (N, %)	4 (12%)	10 (35%)
Time to death (Mean, min-max)	70 months (36-88)	45 months (12-82)
Cease Driving during Follow-up (N, %)	14 (42%)	25 (89%)
Time to cease (Mean, min-max)	34 months (1-72)	13 months (1-54)
Main reason to cease driving	Family's will (71%)	Family's will (64%)
Pts with dangerous driving events during Follow-up (accidents, near-accidents, disorientation)	11 (33%)	9 (32%)

Table 2: Basic results of the study

Results: 12% of patients with MCI and 35% of patients with AD died during follow up, while 42% and 89% ceased driving, respectively (Table 2 & Figure 1).

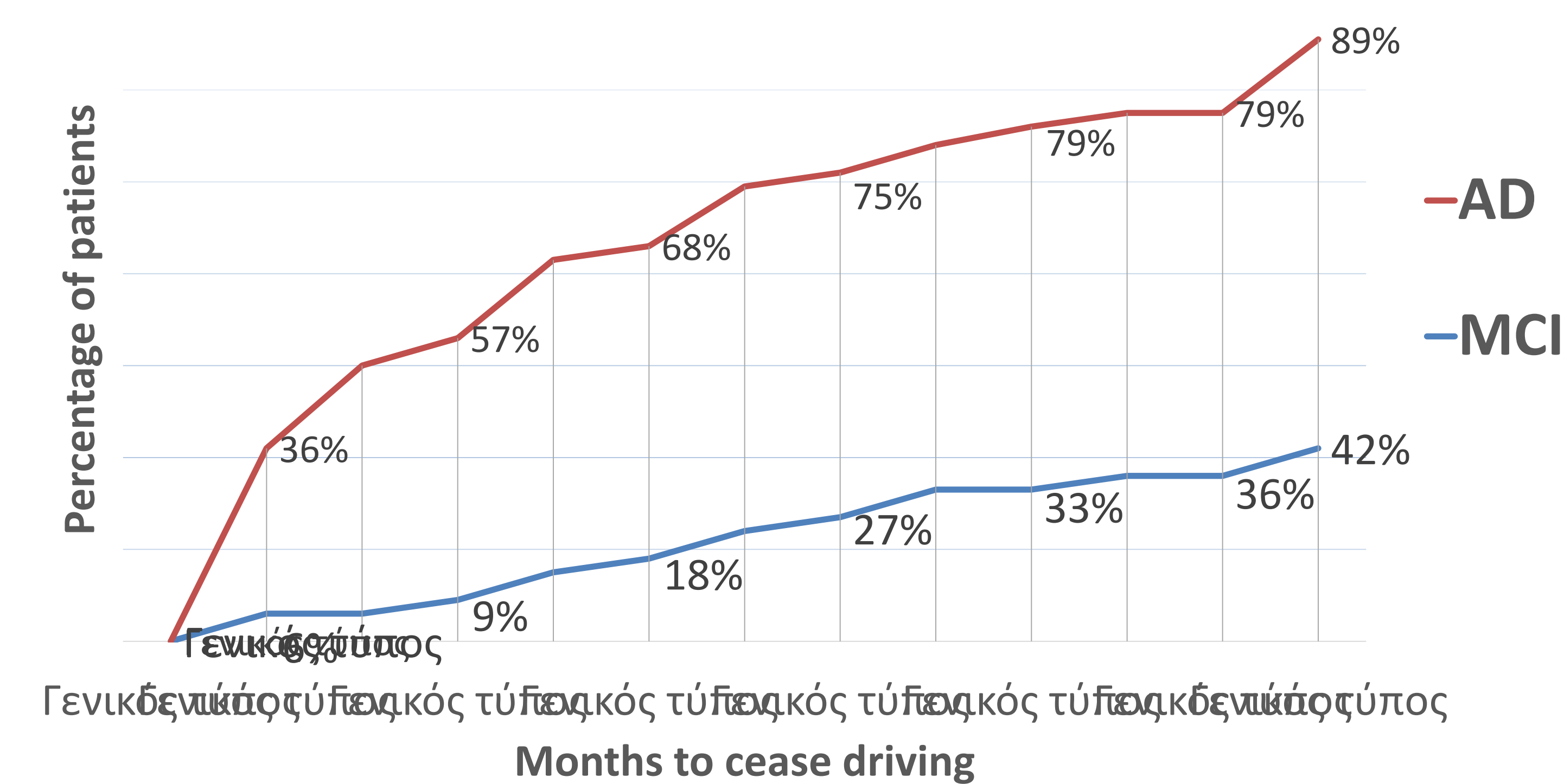


Figure 1: Percentage of patients with MCI (N=33) and AD (N=28) who ceased driving during Follow-up

Among AD patients, performance (both time and errors) on Tandem Walking Test (modified with reverse number counting-mTWT) at baseline evaluation had a strong positive correlation with death probability ($r=+0.7$, $p=0.001$, using point biserial correlation); both Instrumental Activities of Daily Living (IADL) score and Trail Making Test (TMT)-A time at baseline evaluation had a negative correlation with time to cease driving (Spearman's $\rho=-0.6$, $p=0.034$).

Among MCI patients, TMT-A time at baseline evaluation had a negative correlation with death probability ($r=+0.5$, $p=0.01$, using point biserial correlation); TMT-B time at baseline evaluation had a negative correlation with cease driving probability ($r=+0.5$, $p=0.03$, using point biserial correlation).

No statistically significant correlations were found between driving simulator measurements and primary endpoints, despite the tendency observed.

Conclusions

- 89% of patients with mild AD and 42% of patients with MCI ceased driving during Follow-up.
- Mean time to cease driving was 13 months for AD patients and 34 months for MCI patients.
- mTWT may be a promising marker of disease progression among AD patients.
- IADL, TMT-A and -B may be used as predictors of driving cessation, among drivers with MCI or AD.
- Larger samples are possibly needed to establish correlations between driving simulator measurements and primary endpoints.

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