Dementia and Driving: When Should You Put on the Brakes?
Driving and Alzheimer's disease

The risk of crashes

David A. Drachman, MD, Joan M. Swearer, PhD and Collaborative Study Group

We conclude that (1) the existing evidence suggests that AD patients who drive present a slightly increased risk for crashes compared with drivers of all ages but a lower risk than young unimpaired drivers, especially males. (2) During the first 2 to 3 years after the onset of AD, the magnitude of risk of crashes is well within the accepted risk for other registered drivers. (3) There is marked variability in the degree of disability due to AD and its rate of progression. Because of this, direct tests of driving competence—rather than the diagnosis of AD per se—should be considered as the criterion for continued licensure to drive, with sufficiently frequent retesting to anticipate the expected decline over years.

NEUROLOGY 1993;43:2448
Risk of driving with Alzheimer disease

In a route finding task on the road using an instrumented vehicle, Uc et al. found that drivers with mild Alzheimer disease (AD) made more navigational and safety errors than neurologically normal older adults. Task performance and driving safety were predicted by scores on standardized tests sensitive to visual and cognitive sensitive decline in early AD.

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OBJECTIVE: To assess navigation and safety errors during a route-following task in drivers with Alzheimer disease (AD). DESIGN/METHODS: Thirty-two subjects with probable AD (by National Institute of Neurological and Communicative Disorders criteria) of mild severity and 136 neurologically normal older adults were tested on a battery of visual and cognitive tests of abilities that are critical to safe automobile driving. Each driver also performed a route-finding task administered on the road in an instrumented vehicle. Main outcome variables were number of 1) incorrect turns; 2) times lost; and 3) at-fault safety errors. RESULTS: The drivers with mild AD made significantly more incorrect turns, got lost more often, and made more at-fault safety errors than control subjects, although their basic vehicular control abilities were normal. The navigational and safety errors were predicted using scores on standardized tests sensitive to visual and cognitive decline in early AD. CONCLUSIONS: Drivers with Alzheimer disease made more errors than neurologically normal drivers on a route-following task that placed demands on driver memory, attention, and perception. The demands of following route directions probably increased the cognitive load during driving, which might explain the higher number of safety errors.
Safe Driving: Aging and Alzheimer’s Disease
David Drachman
Editorial

1. Driving most dangerous activity

2. Accident / 10 years (dependent upon alcohol use, miles traveled, night driving, proximity to home, ? Age)

3. ? Age./ ? Alzheimer’s disease

4. Age >75 years- 20% less than 16yo

5. Vision test, cognitive tests, CDR scale, on road driving test

6. Mild Alzheimer’s V. Moderate Alzheimer’s

Neurology. 2004 Sep 14;63(5):832-7
Driving and Alzheimer’s disease
Recommendations from the
American Academy of Neurology
2000

- Explain to patients and their families that individuals with Alzheimer’s disease (AD), scoring >= 1.0 on Clinical Dementia Rating (CDR) scale, have a substantially increased accident rate and driving performance errors, and that discontinuation of driving should be strongly considered.

- Explain to patients and their families that individuals with possible AD, scoring 0.5 on the CDR scale, pose a significantly greater traffic safety problem than other older drivers.

- Consider patients for referral to a qualified examiner for a driving performance evaluation.

- Reassess dementia severity and appropriateness of continued driving every six months, because of the likelihood of progression to a CDR score of 1.0 within a few years.

Clinical Dementia Rating (CDR) Scale

Alzheimer's Disease Research Center
Washington University, St. Louis

(Six domains: Memory, orientation, judgment and problem solving, community affairs, home and hobbies, personal care)

“Cole Neuroscience-Extrapolation!”

CDR--0.0 = normal -- (MMSE mean 29)
CDR--0.5 = very mild dementia-Poss (MMSE mean 24)
CDR--1.0 = mild dementia –prob. (MMSE mean 20)
CDR--2.0 = moderate dementia -- (MMSE mean 11)
CDR--3.0= severe dementia -- (MMSE mean 5)
OBJECTIVES: To determine the validity and reliability of clinician ratings of the driving competence of patients with mild dementia. DESIGN: Observational study of a cross-section of drivers with mild dementia based on chart review by clinicians with varying types of expertise and experience. SETTING: Outpatient dementia clinic. PARTICIPANTS: Fifty dementia subjects from a longitudinal study of driving and dementia. MEASUREMENTS: Each clinician reviewed information from the clinic charts and the first study visit. The clinician then rated the drivers as safe, marginal, or unsafe. A professional driving instructor compared these ratings with total driving scores on a standardized road test and categorical ratings of driving competence. Clinicians also completed a visual analog scale assessment of variables that led to their determinations of driving competence. RESULTS: Accuracy of clinician ratings ranged from 62% to 78% for the instructor’s global rating of safe versus marginal or unsafe. In general, there was moderate accuracy and interrater reliability. Accuracy could have been improved in the least-accurate raters by greater attention to dementia duration and severity ratings, as well as less reliance on the history and physical examination. The most accurate predictors were clinicians specially trained in dementia assessment, who were not necessarily the most experienced in their years of clinical experience.

Conclusion: Although a clinician may be able to identify many potentially hazardous drivers, accuracy is insufficient to suggest that a clinicians assessment alone is adequate to determine driving competence in those with mild dementia.
To Drive or not to Drive: roles of the Physician, Patient, and State

Meador KJ

1. Regional differences of relative importance of an individual's right and public risk. (patch worth of state laws)

2. Lack of evidence based medicine. Is the patient competent or incompetent? (54% of patients with epilepsy who crashed were driving illegally-competent!)

3. No well established guidelines-how much cognitive impairment represents an unacceptable risk?

4. All relevant driving issues should be discussed with family/caregiver i.e: competency and risk of injury to Self and Society.

5. The physician should not be placed in the primary role of enforcement.
A longitudinal study of drivers with Alzheimer disease.

Ott BR, Heindel WC, Papandonatos GD, Festa EK, Davis JD, Daiello LA, Morris JC.
Department of Clinical Neurosciences, Brown University, Providence, RI, USA

OBJECTIVE: The goal of this study was to define the natural progression of driving impairment in persons who initially have very mild to mild dementia. METHODS: We studied 128 older drivers, including 84 with early Alzheimer disease (AD) and 44 age-matched control subjects without cognitive impairment. Subjects underwent repeated assessments of their cognitive, neurologic, visual, and physical function over 3 years. Self-reports of driving accidents and traffic violations were supplemented by reports from family informants and state records. Within 2 weeks of the office evaluation, subjects were examined by a professional driving instructor on a standardized road test. RESULTS: At baseline, subjects with AD had experienced more accidents and performed more poorly on the road test, compared to controls. Over time, both groups declined in driving performance on the road test, with subjects with AD declining more than controls. Survival analysis indicated that while the majority of subjects with AD passed the examination associated with higher rates of failure and marginal performance.

CONCLUSIONS: This study confirms previous reports of potentially hazardous driving in persons with early Alzheimer disease, but also indicates that some individuals with very mild dementia can continue to drive safely for extended periods of time. Regular follow-up assessments, however, are warranted in those individuals.

Investigation of Anosognosia in Alzheimer’s disease

John H. Dougherty Jr., MD
Mattea de Leonni Stanonik, PhD
Charles A. Licata, MA

Cole Neuroscience Center
Department of Radiology
University of Tennessee Graduate School of Medicine
University of Tennessee Medical Center
CAS-AD
The Cole Anosognosia Scale for Alzheimer’s disease

An Instrument for Measuring Anosognosia in Alzheimer’s disease
Anosognosia

Working Definition

Inability to recognize state of illness in one’s own organism – usually manifested as unawareness of cognitive deficits in AD patients.
Anosognosia in Alzheimer’s disease

• Present research has shown the number of AD patients suffering from anosognosia is approximately 20% (Migliorelli, Teson, and Sabe, 1995).

• Most researchers and clinicians believe the number to be higher.

• Our research show number as high as 40%.
Why the need for an Anosognosia Instrument?

- Patient Management:
  - Understanding patient limitations (anosognosia) allows improved assessment of patients with AD and limited insight. (eg: Driving).
Unawareness of cognitive deficit (cognitive anosognosia) in probable AD and control subjects.

Barrett AM, Eslinger PJ, Ballentine NH, Heilman KM.
Department of Neurology, Pennsylvania State University College of Medicine, Hershey, USA. abarrett@kmrrec.org

OBJECTIVE: To develop a quantitative method of assessing cognitive anosognosia in six cognitive and two noncognitive domains. METHODS: Control (n = 32) and probable Alzheimer disease (pAD) (n = 14) subjects self-estimated memory, attention, generative behavior, naming, visuospatial skill, limb praxis, mood, and uncorrected vision, both before and after these abilities were assessed. Based on this estimate and their performance the authors calculated an anosognosia ratio (AR) by dividing the difference between estimated and actual performance by an estimated and actual performance sum. With perfect awareness, AR = 0. Overestimating abilities would yield a positive AR (< or =1); underestimation would yield a negative AR (> or =-1). RESULTS: Relative to controls, pAD subjects demonstrated anosognosia. Pre-testing (off-line), pAD subjects overestimated their visuospatial skill; post-testing (on-line), pAD subjects overestimated their memory. Control subjects also made self-rating errors, underestimating their attention pre-testing and overestimating limb praxis and vision post-testing.

CONCLUSIONS: This anosognosia assessment method may allow more detailed examination of distorted self-awareness. These results suggest that screening for anosognosia in probable Alzheimer’s disease (pAD) should include self-estimates of visuospatial function, and memory.

Critical Questions: Driving and AD!

1. Using the “best available” criteria- does a patient with AD have a high risk for driving-related accidents.

2. Is the AD patient competent or incompetent? 
   Expressive choice beyond “yes or no”, Understand the facts relevant to the proposed decision, Appreciate the consequences of the decision, Provide rational reasons for the decision) -“parking lot accidents”

3. Does the AD patient have evidence of anosognosia?

4. Has the patient and family/caregiver been told by the physician that he should not drive?

5. If the AD patient is involved in an accident with injury and the patient –with the knowledge of the family- has been told not to drive the patient or his estate (family) can be held responsible!
Driving and Alzheimer’s Disease Summary

- **AD (moderate, mild)** patients have an increased crash rate compared to the general elderly population.

- **DOT** estimates that elderly drivers will increase from 10% to 17% of the population by the year 2020.

- 50% of AD patients have a neurological condition (Anosognosia) which actually makes self appraisal of driving ability impossible.
Driving and Alzheimer’s Disease

Summary

• There is very little research from evidence based medicine to establish parameters for sound and just determinations of driving abilities in patients with Alzheimer’s disease.

• No clear guidelines for the physician, society or the law to determine objective assessments for the balance of risks and benefits to society as well as the individual.
Driving and Alzheimer’s Disease

Summary

• Any solution must balance respect for the patient with concern for their safety and that of the families and society in general.

• Any solution should involve a clinically tested diagnostic system.

• Establish research from evidence based medicine by using objective assessment tools for driving skills.
Driving and Alzheimer’s disease
“Tips” for management

1. Take professional responsibility

2. Be factual and definitive (~ 50% of patients have excellent insight and are often willing to stop driving)

3. Write prescription! “No driving”

4. No decisions “are forever”

5. Have patients make a “follow-up” telephone call

6. Disable the car!

7. Have patient surrender drivers license!
Driving and Alzheimer’s Disease
Computer Driving Simulation System (STISIM)
• Provide critical objective data for clinical application- Is it safe for this individual with Alzheimer’s disease to drive?

• A STISIM Model driving simulator

• Provide support for PhD graduate and graduate level research
Driving and Alzheimer’s Disease
Alzheimer’s Symposium,
Dec. 8, 2011
Lecture objectives:

1. Be able to identify objective clinical features which place Alzheimer’s patients at risk when driving.

2. Understand how anosognosia may contribute to driving risk in Alzheimer’s disease

3. Have a management strategy for dealing with driving issues in impaired patients with Alzheimer’s disease
Alzheimer's Disease Symposium
Dec. 8, 2011
Disclosure
John H. Dougherty Jr.

Dr. John Dougherty Jr. is a member of the Speakers Bureau for Eisai, Forest, Novartis, and Pfizer pharmaceuticals.