HOW TO ACCESS DRIVING ABILITY IN MCI & AD

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Driving is an activity of daily life for the majority of adults, extremely important for social and practical needs (going to work, go shopping, visiting family & friends...). Nowadays driving is considered as an "equivalent" of Independence, self-reliance and adaptability to modern society.

(Mollekopf et al. 2002)

Cessation of driving increases the possibility for social isolation and depression.

(Fonda et al. 2001, Edwards et al. 2009)
Driving is a Complex activity that requires:

- Adequate Information processing
- Sustained Vigilance, Attention & Concentration
- Good Memory
- Control over Impulse and Risk-taking
- Mature Judgement
- Ability to anticipate actions-reactions of the other road users (vehicles & pedestrians)  

(Harris 2000)

Impairment of these abilities has a negative impact on driving performance and increases the possibility of getting involved in a motor vehicle accident  

(Anstey et al. 2005)
MCI have driving performance, in On-Road and Simulator studies, that in not consistently worse than their Healthy counterparts

(Frittelli 2009, Wadley 2009, Kawano 2012)
• A.D patients are 2.5 to 4.7 times more likely to be involved in a car accident or getting lost in relation to age-matched controls

• Higher CDR scores have been associated with worse driving performance
  (Reger 2004, Dubinsky 2001; Hughes 1982)

• 50% of AD drivers do not cease driving for at least 3 years after diagnosis
  (Adler 2003, Seiler 2012, Ott 2008)
What are the tools of assessing driving ability ??
What are the tools of assessing driving ability??

- On-Road evaluation
- Driving simulator evaluation
- In-Office evaluation
  - Medical examination
  - Neuropsychological assessment
On-Road evaluation

Advantages

• High degree of familiarity

• A method that is very similar everyday driving

• Quick results (Diving instructor or Oc.Therapist)

• Extend bibliographic validity

• Many driving parameters that can be studied (instrumented vehicle)
On-Road evaluation

Disadvantages

• Traffic **accident scenarios can not be applied**

• Time consuming

• **EXPENSIVE**

• Difficult to determine the exact cause of a behavior

• The experimenter cannot control outside factors

*It is necessary to create others tools (medical, neuropsychological or technological) able to provide fast, but reliable information regarding fitness to drive*
Driving Simulator evaluation

Advantages
• Collection of data which would be very difficult to collect under real traffic conditions
• Exploration of any possible driving scenario (Accidents !!)
• High reproducibility—Driving conditions are identical for all drivers

Disadvantages
• Non totally realistic simulated road environment
• Simulator sickness
Medical Evaluation

- Basic Cognitive Assessment: MMSE or MoCA or ACE-III
- Comorbidity, SLEEP Disorders, Drug Therapies, Alcohol /substances, physical disabilities
- Information from family members/caregivers regarding the MCI/dementia severity: Activities of daily living,
- Information regarding driving behavior (traffic violations, accidents and near misses,...) (interview/questionnaires)
Neuropsychological evaluation

Older Drivers
- Cerebral diseases (MCI, AD, PD)

Cognitive functions critical for driving:
- Attention - Concentration
- Executive functions
- Visuospatial skills
- Memory

Driving tasks:
- Navigation
- Left-turn decisions
- Gap selection
- Merging
- Maneuvering
- Handle critical situations

Downgrade the main cognitive functions critical for safe driving and affect driving tasks

(Reger et al. 2004)
Studies suggest that:

**Neuropsychological tests** in combination with **neurological variables** and **performance on actual or simulated road tests** could be used to make driving recommendations in patients with Cognitive Impairment

*(Frittelli et al., 2009; Ott et al., 2008; Ott et al., 2003; Rizzo et al., 1997)*
Practice Parameter update: Evaluation and management of driving risk in dementia

Report of the Quality Standards Subcommittee of the American Academy of Neurology

**CDR 0.5-1.0**

Evaluate for risk factors

<table>
<thead>
<tr>
<th>Risk factors</th>
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<tbody>
<tr>
<td><strong>Level B evidence</strong></td>
</tr>
<tr>
<td>Caregiver report of marginal or unsafe skills</td>
</tr>
<tr>
<td>History of citations</td>
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<tr>
<td>History of crashes</td>
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<tr>
<td>Driving &lt; 60 miles / week</td>
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<tr>
<td>Situational avoidance</td>
</tr>
<tr>
<td>Aggression, impulsivity</td>
</tr>
<tr>
<td>MMSE ≤24</td>
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<tr>
<td><strong>Level C evidence</strong></td>
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<tr>
<td>Alcohol, medications, sleep disorders, visual impairment, motor impairment</td>
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</tbody>
</table>

**Other**

**Risk factors:**

None

CDR 0.5 CDR 1.0

Few

CDR 0.5 CDR 1.0

Several

CDR 0.5 CDR 1.0

Multiple

CDR 0.5

Relatively low risk

Relatively high risk

**Risk Management**

- Encourage family support for alternate transportation.
- Strongly consider voluntary surrender of driving privileges.
- Consider DMV referral or professional driving evaluation, based on state guidelines.

**Intervention pursuant to state guidelines**

*Iverson et al. 2010*
Assessment of driving ability in clinical practice - Tools
Australia/New Zealand Traffic Agency Guidelines 2014

First level (Medical Assessment through GP):

- Medical status, Drug Therapies, Alcohol /substances, physical disabilities
- Basic Cognitive Assessment: MMSE or MoCA or ACE-III
- Collateral history from family members/caregivers regarding the MCI/dementia severity: Activities of daily living, Driving Questionnaire (driving behavior, traffic violations, accidents and near misses,...)
- Information about the availability of alternative forms of transport for estimate the practical impact of losing the driving license
- Car Inspection for signs of damage. (It is not uncommon to find that the car is significantly damaged.)
Australia/New Zealand Traffic Agency Guidelines 2014

First Stage

the clinician may feel that there is now sufficient extra information to allow them (or their team) to make a decision about the person’s driving safety.

- Safe to drive
- STOP driving
- Driving with restrictions

If a clinical decision cannot be made comfortably

Second Level evaluation

Notify Traffic Authorities
Australia/New Zealand Traffic Agency Guidelines 2014

Second Level: Specific Driving-Related Investigations

- Occupational Therapist Evaluation
  - In office Assessment (cognitive, behavioral & neuropsychological assessment, Evaluation of functional daily activities)
  - On-Road Assessment
- Alternatives
  - Driving Evaluation by an Authorized Driving Instructor
  - Driving in a car Simulator
  - Further neuropsychological testing

  Driving Evaluation by an Authorized Driving Instructor
  + Driving Questionnaires
  + Trails A & B
  + Car inspection

  Innes et al. 2007

After the 2nd level a definitive decision has to be made regarding the continuation or restriction of driving.
UK Driving and Vehicle Licensing Authority – DVLA

Physician

- MCI
- A.D

possibility of driving impairment

Mild Dementia

DVLA

Assessment

- Neuropsychological tests (Oc. Therapist)
- Driving assessment: On-road assessment with an experienced driving instructor & Oc. Therapist

StoP Driving & Notification DVLA

Moderate & Severe Dementia
DriveWise® (Beth Israel Deaconess Medical Center, Boston USA)

Interdisciplinary hospital-based driving assessment program developed in response to clinical concerns about the driving safety of individuals with medical conditions.

• **In office evaluation**
  • Social worker (takes a careful history and reviews the role of driving in the individual's life. Support for the individual and family members is provided)
  • Occupational Therapist (medical & neuropsychological assessment)

• **On-Road Evaluation** (Standardized on-road evaluation using the driving instructor's car. This vehicle can be adapted to meet the needs of people with disabilities.)
  • Occupational Therapist
  • Certified Driving Instructor
GREECE

Under 80 y.o

Physician & Ophthalmologist

StoP Driving & Notification T.A

Cognitive impairment

ALL DRIVERS Over 80 y.o

Neurologist

Advice: Drive or NOT

Traffic Authorities (T.A)
Which is role of the neurologist?

- ADVICE about the issue: “to drive or not to drive”
- ADVICE about the issue: “how and when to drive” (defining restrictions for safe driving in a patient)
- ADVICE for adaptations of national regulations
- ADVICE for adaptations of vehicles (e.g. reminders), adaptations of roads (e.g. frequency of road signals)
- In close collaboration with other scientists (multi disciplinary approach)