Driving and the Aging Brain

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2015 TzD

Photo courtesy Kristi Haertl
The Brain and Driving

Conscious
“Cognitive Brain” = Association Cortex
Planning, information processing, decision-making, conscious memory

Unconscious
“Automatic Brain” and “Emotional Brain”
Procedural, skill memory
Driving is Both Complex and Automatic

- Driving requires efficient memory, divided attention, decision-making, judgment and speed of information processing
  - For example: Changing lanes in traffic
- With age, all those cognitive functions become less efficient
- Driving is also an automatic skill, potentially giving a false sense of competence
Age Changes in Visual Information Processing

- Visual Information processing is also called Useful field of View” (UFOV)
- It is not a vision problem (in eye) but a visual attention problem (in brain)
- UFOV limitations include problems with divided attention
- Visual information processing limitations increase with age
- Worsening UFOV linked to MVC risk
- Information processing training results in reduction in MVC (Ball et al 2010)

http://www.visualawareness.com/Pages/C_meancrash.html
Normal Brain Aging and Driving

Driving Changes

• Greater need to concentrate and focus on task at hand while driving.
• May take longer to make decisions and react to unexpected situations on the road.
• Older drivers are generally good at compensating for age changes in cognitive abilities by adjusting where and how they drive (Andrews and Westerman)

Maintaining Driving Safety

• Self Assessments:
  • Roadwise Online
  • SAFER Driver Decision Workbook online
• Adopt brain healthy lifestyle
• Speed of processing training (UFOV) i.e. DriveSharp, racket sports etc
• Driver safety classes (classroom)
• Refresher lessons (BTW)
• Multimodal community mobility
Minor Neurocognitive Disorders and Driving

Driving Safety Unclear

- Includes Mild Cognitive Impairment (MCI) and early stage dementia (old term) – (slide)
- No clear consensus on MVC risk
- Important to weigh risk of driving with risk of not driving
- Drivers with MCI could be stable or even improve
- Drivers with Alzheimer’s (AD) may drive in early stages but will be progressively worse

Maintaining Safe Mobility

- Functions may be maintained with training and practicing if MCI.
- Essential to assess and reassess (slide)
- Resources aota.org/olderdriver
- Proxy assessments: i.e. Fitness to Drive Screening for caregivers http://fitnesstodrive.phhp.ufl.edu/
- Caregivers play key role in process: At the Crossroads (Hardford)
- If AD: Driving Advanced Directives
- Practice transportation alternatives
# Classifications of Cognitive Disorders and Link to Function

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<th>New Term</th>
<th>Normal Age changes</th>
<th>Minor Neurocognitive Disorder</th>
<th>Major Neurocognitive Disorder</th>
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<tr>
<td>Old Term</td>
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<td>Early stage Dementia</td>
<td>Mid stage Dementia</td>
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<td>Functional Level</td>
<td>Normal ADL and IADL</td>
<td>Greater effort with IADL</td>
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<td>Implications</td>
<td>Driving safety worsens</td>
<td>Educate, retrain, reassess</td>
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<td>Use alternatives</td>
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**IADL:** Instrumental, complex activities of daily living including driving

**ADL:** Activities of daily living such as self-care

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Assessments

- Screening tools are available to determine need for further testing
- Cognitive screening tools that predict risk of crash include:
  - Trails Making B (picture)
  - Clock drawing
  - Maze
  - UFOV (esp. divided attention subtest)
- No single tool should be used to determine driving cessation.
- Several batteries of tools exist for professionals. i.e. ADRs, OTDORA
- On-road assessment in traffic is best way to determine driving safety
Major Neurocognitive Disorder and Driving

Driving Risks

• Corresponds to mid-stage to late stage dementia in old terminology
• Huge increase of people with Alzheimer’s disease (AD) (slide).
• 1/3 of drivers with AD will have an MVC in the mid-stage of the disease
• Consensus that should not be driving
• Often little insight about limitations.
• Skill memory may hide true deficits

Not “if” should stop, but “when”

• Caregivers should discuss warning signs
• Dementia and driving resource center from the Alzheimer’s association
• Communicate with MD
• Professional driving assessment
• May need to hide key or car
• Honor Driving Advanced Directives
• Arrange alternative transportation appropriate to cognitive level
• DVS, law enforcement and MD roles
figure 5
Projected Number of People Age 65 and Older (Total and by Age Group) in the U.S. Population With Alzheimer’s Disease, 2010 to 2050

Millions of people with Alzheimer’s

- Ages 65-74
- Ages 75-84
- Ages 85+

Year
2010
2020
2030
2040
2050

4.7
5.8
8.4
11.6
13.8

Created from data from Hebert et al. [116, 411]
Neurocognitive Disorders and Licensing Laws

• Mandatory reporting laws for health professionals helps identify drivers at risk
  • In California health professional has to report to DVS if they have MCI
  • In the UK, if MCI diagnosis affects driving, MD needs to notify DVS. License is then renewed only for limited time (6 - 36 months) so can reassess
• States and countries vary in use of cognitive screens in DVS. In the US, DVS in many states require vision screen but not cognitive screen
• DVS in some countries use computerized cognitive tests. i.e. DriveAble (in Alberta, BC), and Clock Drawing test in (Ontario). Controversial if only criteria.
• Many states, encourage families to report drivers they consider unsafe to DVS
• Law enforcement role in screening for cognitive problems varies. (next slide)
California Initiative:  
Law Enforcement Screening for Cognition

[Image of a law enforcement officer and a person]

**DOCI screen** Types of questions and scoring:

- What is your date of birth? (Month, day, and year must match documents, 1 pt)
- What is your full home address? (Address must match documents, 1 pt)
- What state are we in now? (1 pt)

[Source: TREDS – Training, Research and Education for Driving Safety, University of California, San Diego]

[Link: http://safety.fhwa.dot.gov/older_users/noteworthy/ch2.cfm]
Conclusions

• Since many neurocognitive disorders are progressive, screening, testing, and periodic reassessments are essential in determining continued driving safety.

• Best options for implementing cognitive screens and reassessments should be discussed and adopted (DVS? Rehab? MD? other?)

• Awareness of the current assessment and referral process would be enhanced by a decision tree. (slide: UK).

• MMAP is in the process of developing such a decision tree for Minnesota drivers.

THANK YOU!
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INITIAL CONTACT WITH DRIVER WITH DEMENTIA

Do the 10 minute Office Dementia and Driving Checklist - page 10

Clearly unsafe
- Inform the patient to stop driving (give patient/family written notification and document in chart) (page 17)
- Notify the Provincial Registrar, if required (page 10)
- Follow up regarding:
  - Confirmation of driving cessation
  - Isolation
  - Depression
  - Use of alternative transportation
  - Page 16

Driving risk is uncertain
- IF there are dementia-related issues other than driving which require assessment and treatment (or if patient truly cannot afford on-road test).
- Refer to local multidisciplinary dementia assessment site (could include occupational therapy or neuropsychology evaluation)
- If still unsure re: fitness to drive

Appears safe
- IF driving is the only dementia-related issue to assess.
- Refer to health professional led comprehensive driving evaluation - on/off road (see end of Toolkit)

Follow Up
- (every 6 – 12 months) (page 13)