Driving-Related Low Vision Rehabilitation for Individuals with Age-Related Macular Degeneration: A Pilot Study

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INTRODUCTION
• Age-related macular degeneration (AMD) is responsible for central vision loss (Figure 1).1
• AMD affects cognitive functions including visual processing, divided attention, and visual scanning.2
• AMD is progressive and impairs activities of daily living, such as driving.3
• Driving programs may be beneficial to improve on-road driving and driving-related cognitive skills.4

AIM
• To compare the effects of Driving Simulator vs. Useful Field of View (UFOV)/Dynavision training on on-road driving and driving-related cognitive functions in AMD

METHODS
• Pilot randomized-controlled trial (Figure 2)
• Two groups: Driving Simulator and Computerized Training (UFOV/Dynavision)
• Subjects: 50-75 y/o drivers with no other ocular conditions
• All participants underwent 5, 60 minute training sessions
• Each training program consistent in time spent on training, feedback, debriefing

STUDY DESIGN

Participant referred to study by a board certified Ophthalmologist n=61

Participants contacted by telephone for inclusion n=42

Total Declined n=36

Randomization

5 training sessions; 1hr/week over 5 weeks

PRE-TRAINING Simulator n=2

PRE-TRAINING Computer n=4

POST-TRAINING Simulator n=2

POST-TRAINING Computer n=4

5 training sessions; 1hr/week over 5 weeks

Driving Simulator

Dynavision

UFOV

OUTCOME MEASURES
• The Compass Test (Figure 3A) assesses visuospatial abilities
• Dot Cancellation Test (Figure 3B) assesses visual scanning abilities
• The On-Road Driving Test assesses critical driving skills including vehicle control, speed adaptations, and left turn maneuvers (Figure 3C)

RESULTS

Figure 4: Selected Outcome Measure Results
Figure 4 illustrates the following results:
• Both groups improved equally on dot cancellation errors
• Simulator group performed better on the Compass Test
• Computer group improved median on-road performance by one point while simulator group maintained scores

DISCUSSION
• Both training programs helped individuals with AMD maintain or improve driving status despite the progressive nature of the disease
• Simulator training may be more effective at improving visuospatial skills in individuals with AMD
• These intermediate results need to be confirmed

Factors limiting the study:
• Ceiling effect of on-road test
• Sample size – ongoing study (aim is n=20)
• Inclusion of individuals with no apparent driving problems

Suggestions for future studies:
• Explore effects of medications, AMD sub-type, and time since diagnosis

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References

Figure 1: Visual Field with AMD

Figure 2: Flowchart of the Randomized-Controlled Trial

Figure 3: Examples of Outcome Measures used

Figure 3A: Compass Test

Figure 3B: Dot Cancellation Test

Figure 3C: On-Road Driving Test