Ask the Expert
Webinar Chat Series

Presented by the National Resource Center on ADHD
This is a presentation of the

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Ask the Expert
ADHD & Driving: Driver Safety When Coping with ADHD Symptoms

Daniel Cox, PhD
Director of the Virginia Driving Safety Laboratory
Professor of Psychiatric & Internal Medicine,
University of Virginia School of Medicine
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ADHD & Driving: Driver Safety When Coping with ADHD Symptoms

Daniel Cox, PhD
Director of the Virginia Driving Safety Laboratory
Professor of Psychiatric & Internal Medicine,
University of Virginia School of Medicine
Reducing the Risk of Driving Mishaps Among ADHD Drivers

Daniel J. Cox, PhD, ABPP
University of Virginia
Professor, Department of Psychiatry
Director, Virginia Driving Safety Laboratory
Bad News
Looking beyond the classroom
Functional Impairment in Individuals with ADHD

Core symptoms of ADHD:

1. Inattention
2. Impulsivity
3. Hyperactivity
4. (Distractable)
ADHD and Driving: A Dangerous Mix

• Motor vehicle accidents are the leading cause of death in adolescents, and ADHD is a major contributor.1

• Young drivers with ADHD are
  – 2 to 4 times more likely to have traffic accidents.2-4
  – 3 times as likely to have injuries.3
  – 4 times as likely to be at fault.2
  – 6 to 8 times more likely to have their license suspended.2,3

• This extends to females as well as males.5

Our Studies to Assess the Effect of ADHD and Interventions on Driving Safety

- **STUDY 1**: Simulated driving study of RITALIN® vs placebo among college students with and without ADHD
- **STUDY 2**: Simulated driving study of CONCERTA® vs RITALIN®
- **STUDY 3**: Simulated and on-road driving study of CONCERTA vs ADDERALL® XR vs Placebo
- **Study 4**: On-road assessment of ADHD adolescents study of CONCERTA vs ADDERALL® XR vs Placebo
- **Study 5**: On-road assessment of ADHD young adults on and off Daytrana
- **Study 6**: Simulator study- ADHD driving a manual vs automatic transmission

1Cox DJ Current Psychiatry Reports 13(5):345-50
Real World Driving Observations: DriveCam.com

- Inattention/distraction and Impulsive over correction
Virtual Reality Driving Simulator

- 165 degree visual field
- Updates every 60 msec
- Performance feedback
  - Auditory
  - Kinesthetic
  - Visual
- Tracks 120 performance variables
STUDY 1: RITALIN® vs Placebo
Impaired Driving Score

ADHD improvement, $P<0.05$.

Plasma Profiles Following Ritalin® tid and CONCERTA® XL

Swanson J et al. Arch Gen Psychiatry 2003;60:204-211
STUDY 2: CONCERTA® vs RITALIN®
Impaired Driving Score

Equivalent performance to male drivers 80+ yrs

Equivalent performance to male drivers 55-59 yrs

P<0.01 (8:00 PM).
STUDY 3: CONCERTA® vs ADDERALL® XR
Impaired Driving Score

Contrasts:
- Medication vs. placebo; \(P=0.01\)
- Concerta® vs. placebo; \(P=0.001\)
- Adderall® XR vs. placebo; \(P=0.24\)
- Concerta® vs. Adderall® XR; \(P=0.03\)

Equivalent performance to male drivers 75-79 yrs
Equivalent performance to male drivers 55-59 yrs
Subjective ratings (0-5) of driving ability post drive

5:00 PM

8:00 PM

11:00 PM

CONCERTA
Adderall XR
Placebo
**Concerta® vs Adderall® XR**

Impaired Neuro-Cognitive Score (Distractibility and Visual Memory)

**Contrasts**
- OROS® MPH vs. Placebo; $P < .001$
- Adderall® XR vs. placebo; $P = .042$

STUDY 4: CONCERTA vs. Adderall XR On-Road Driving

Inattention Composite Score = Across Midline + Running Stop Signs + No signaling ($p = .01$)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Inattention Composite Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Placebo</td>
<td>-0.4</td>
</tr>
<tr>
<td>Adderall XR</td>
<td>0.8</td>
</tr>
<tr>
<td>CONCERTA</td>
<td>-0.1</td>
</tr>
</tbody>
</table>

Cox DJ, J. Child & Adolescent Psychopharmacology, 18(1), 1-10
Study 5: Routine ADHD driving off and on long acting MPH (Daytrana)

- 20 young adult (18-25) drivers with ADHD who routinely do not take medication
- Three months off and on medication
- Two-camera DriveCam.com video system
Real World Benefits


Driving Errors

Female

Male
3 months on and off of Daytrana

Medications can be extremely helpful

1. Optimal dose
   1. Greatest symptom relief: inattention & impulsivity
   2. None to tolerable side effects
2. Driver recognizes benefits
3. Long acting
4. No rebound effects

Cox et al, J Atten Disord. 2006;10(2):212-216
What are non-Medication strategies?

Anything that enhances engagement and reduces distraction
1. Enhance engagement/attention to driving
   1. Manual transmission
   2. Back-up obstacle alert system
   3. No cruise control
   4. 
2. Minimize distractions
   1. Minimal passenger conversations
   2. No teen passengers
   3. No pets
   4. Put cellphone in trunk/deactivate cell phone
   5. ?
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