

## Podcast of the *Journal of Clinical Sleep Medicine*

Stuart F. Quan, M.D., F.A.A.S.M.

*Division of Sleep Medicine, Harvard Medical School, Boston, MA*  
*Editor, Journal of Clinical Sleep Medicine*

Welcome to the regular podcast of the *Journal of Clinical Sleep Medicine*. I am Dr. Stuart Quan, editor of the *Journal*. These podcasts are a regular feature of each issue of the *Journal* and can be downloaded at the *Journal's* website. Each podcast features summaries of important articles published in the current issue of the *Journal*, as well as occasional interviews with authors of these papers.

The first paper to be discussed in this podcast is entitled, "Adolescent Crash Rates and School Start Times in Two Central Virginia Counties, 2009-2011: A Follow-up Study to a Southeastern Virginia Study, 2007-2008," by Robert Verona and colleagues from the Department of Internal Medicine, Eastern Virginia Medical School, Norfolk, VA, Community & Environmental Health, Old Dominion University, Norfolk, VA, Department of Mathematics, Texas A&M University, Kingsville, TX, South University, Richmond, VA, and Virginia Commonwealth University Center For Sleep Medicine, Virginia Commonwealth University, Richmond, VA. Substantial data indicates that adolescents do not obtain an adequate amount of sleep. There are several reasons that have been offered to explain this finding. One of these explanations is that high schools have early start times thus requiring teenagers to get up early in order to go to school. Early high school start times combined with the physiologic sleep phase delay experienced by adolescents as well as social and academic pressures to further delay their sleep times often result in many teenagers being very sleep deficient. A large number of teenagers also drive themselves to school. Therefore it could be hypothesized that teenagers who get up early to go to high school may experience an increased rate of motor vehicle accidents. A previous study published in 2011 in the *Journal* indicated that students who drove themselves to school in one Virginia county that had started high school early had a greater crash rate than those in a similar Virginia county that started school later. The present study was an attempt to replicate the previous study in southeastern Virginia in two jurisdictions in central Virginia.

Crash rates were obtained from the Motor Vehicle Department of Virginia for two counties in central Virginia, Henrico and Chesterfield. In Chesterfield County, high school started at 7:20 am. In contrast, high schools in Henrico County started at 8:45 am. The demographics of both counties were similar. The authors found in the 2009-2010 school year that teenagers in Chesterfield County, which had the earlier school start time, had a statistically higher crash rate of 48.8 per thousand licensed drivers than Henrico County which had the later high school start time and had a crash rate of 37.9 per thousand licensed

drivers. In comparison, when adult crash rates were compared, there was no difference between the two counties. Furthermore, there was no difference between the two counties in the amount of road congestion that was observed. When the time of crash was analyzed, crash peaks occurred one hour earlier in the morning and two hours earlier in the afternoon in Chesterfield County correlating with commute times to school. Of additional interest is that with limited data from the police regarding the cause of the crashes, there appeared to be more run-off-the-road crashes consistent with drowsy driving in Chesterfield County. The authors conclude that these data support their previous study demonstrating the adverse impact of earlier high school start times on crash rates amongst teenagers. In addition to data demonstrating that early high school-start times have a detrimental impact on academic performance as well as mental health, these data provide additional impetus to delay high school-start times in school districts across America as recommended by the American Academy of Pediatrics.

The next paper to be discussed in this podcast is entitled, "Armodafinil for the Treatment of Excessive Sleepiness Associated with Mild or Moderate Closed Traumatic Brain Injury: A 12-Week, Randomized, Double-Blind Study followed by a 12-Month Open-Label Extension," by Stuart J. Menn and colleagues from Pacific Sleep Medicine Services, Palm Springs, CA, Teva Pharmaceuticals, Frazer, PA, and the Sleep Disorders Center of Georgia, Atlanta, GA. Close to two million individuals in the United States experience traumatic brain injury. In a significant number of these individuals, excessive daytime sleepiness occurs and may be persistent for a number of months. In this study, Armodafinil, the longer lasting R enantiomer of racemic modafinil was used in a double-blind, randomized study to determine if it would be useful in treating excessive daytime sleepiness in people with mild or moderate traumatic brain injury. This study was a 12-week randomized, double-blind, placebo-controlled study conducted in 40 U.S. sleep centers and was followed by a 12-month, open-label extension. Patients with mild to moderate traumatic brain injury occurring one to ten years prior to screening and who also had significant daytime sleepiness were randomized either to placebo or to three doses, 50, 150 or 250 mg per day of armodafinil. Patients had a multiple-sleep latency test conducted prior to starting therapy or placebo and had an additional assessment using the Clinical Global Impression of Change Scale at weeks four, eight and twelve after randomization. 484 individuals were screened for the study, of whom 117 eventually met all entry criteria and were randomized. Mean sleep latency on the multiple-sleep

latency Test increased by 2.6, 5.0 and 7.2 minutes for the 50, 150 and 250 mg armodafinil treatment groups respectively. In comparison, there was a 2.4 minute increase for the placebo group. This was statistically significant for the 150 and 250 mg doses. For the open-label extension, improvements in the Clinical Global Impression of Change Scale were maintained over the course of one year. In general, armodafinil was well tolerated with the most common adverse effect being headache in 17% of subjects who took armodafinil in comparison to 7% of those who received placebo. No deaths or serious adverse events were recorded. The authors conclude that armodafinil, especially the 250 mg dose, significantly improved sleep latency in patients with excessive daytime sleepiness associated with mild or moderate traumatic brain injury.

The final paper to be discussed in this podcast is entitled, "Obstructive Sleep Apnea Is Associated with Impaired Exercise Capacity: A Cross-Sectional Study," by Jeremy R. Beitler and colleagues from the Division of Pulmonary & Critical Care Medicine, Division of Sleep Medicine, and the Division of Cardiovascular Medicine, Brigham & Women's Hospital, Harvard Medical School, Boston, MA, Department of Neurology, Beth Israel Deaconess Medical Center, Harvard Medical School, Boston, MA, Division of Pulmonary & Critical Care Medicine, University of California San Diego, San Diego, CA, and the Arizona Respiratory Center, University of Arizona College of Medicine, Tucson, AZ. Obstructive sleep apnea is associated with an increased risk of cardiovascular disease and hypertension. Cardiopulmonary exercise testing is frequently used as a risk stratification test for coronary artery

disease. However, it is unclear what the impact of obstructive sleep apnea is on exercise capacity. The purpose of this study was to determine whether obstructive sleep apnea is associated with a reduction in overall exercise capacity. Fifteen subjects with moderate to severe obstructive sleep apnea, having a mean apnea-hypopnea index of 37.6 events per hour of total sleep time, and 19 controls without obstructive sleep apnea having an apnea-hypopnea index of 1.5 events per hour of total sleep time were recruited for this study. Resting metabolic rate was measured using indirect calorimetry and then subjects underwent a maximum, symptom level cardiopulmonary exercise test. Percent predicted peak oxygen uptake was significantly lower in subjects with obstructive sleep apnea than in controls, 70.1% versus 83.8%. Each unit increase in the log transformed apnea-hypopnea index was associated with a decrease in percent predicted peak oxygen consumption of 3.2. These differences remained after adjustment for baseline differences between the two groups. 16.1% of the variability in percent predicted oxygen consumption was explained by variation in the apnea hypopnea index. The authors conclude that obstructive sleep apnea is associated with a reduction in exercise capacity. However, whether cardiopulmonary exercise testing will be useful in coronary heart disease risk stratification in persons with obstructive sleep apnea still remains to be determined.

This concludes the regular podcast of the *Journal of Clinical Sleep Medicine*. The listener is encouraged to read the contents of the *Journal* for additional information regarding each of the articles summarized in this podcast, as well as other papers published in this issue of the *Journal*.