

ADVANCING

Heart, Lung, Blood, and Sleep Research



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National Heart, Lung,
and Blood Institute



Highlights in Sleep Health

Studying Sleep Health Across the Lifespan

- In a recent NHLBI-funded study, researchers **gathered data from wearable devices, similar to Fitbits or Apple Watches, from more than 1,000 women during pregnancy.** Feeding the data into a new artificial intelligence algorithm, the researchers were able to detect even minute changes in sleep and physical activity during pregnancy. The algorithm also used the data to build a “clock” that was able to predict how far along a pregnancy was. In typical pregnancies, as the women advanced toward later-stage pregnancy, they became less physically active and their sleep more disrupted. However, some women’s sleep and activity patterns changed on a faster timeline relative to how far along they were in their pregnancies, with those women sleeping less and becoming more sedentary earlier in their pregnancies. The study found that these individuals were more likely to have a preterm birth. The results suggest that continuous monitoring of sleep and activity throughout pregnancy may enable doctors to better support patients who could be at higher risk of preterm birth.
- Researchers recently found that surgical removal of the tonsils and adenoids in children with snoring and mild breathing problems during sleep appears to **improve their sleep, quality of life, and blood pressure a year after surgery.** The study is believed to be the first large randomized trial to address the effects of adenotonsillectomy on children with mild sleep-disordered breathing (SDB). During the trial, half the participants received an adenotonsillectomy, and the other half received supportive care without surgery, including standardized education on healthy sleep and lifestyle and referral for untreated allergies or asthma. Researchers then evaluated neurodevelopmental, behavioral, health, and sleep-related outcomes in both groups, using measurements of attention and executive function, which

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includes a set of cognitive skills that help children manage everyday activities. Sleep outcomes were measured by polysomnography, a standard sleep test that measures breathing, heart rate, eye movement, and other factors. Secondary results showed several beneficial changes in the surgery group: less daytime sleepiness, reduced SDB, less snoring, fewer behavioral problems, better quality of life, and lower blood pressure. The children treated with surgery were also less likely to show disease progression into full-blown sleep apnea.

- According to a recent study, **chronic insufficient sleep can increase insulin resistance in otherwise healthy women,** with more marked effects in postmenopausal women. Previous studies have shown that sleep restriction can elevate risk for conditions such as cardiovascular disease, hypertension, and disordered glucose metabolism, which can lead to insulin resistance and type 2 diabetes. However, many of those studies were done only in men or focused on short-term, severe sleep restriction. The current study enrolled only women and sought to determine whether a prolonged, mild restriction of sleep — a reduction of just 1.5 hours each night — increased women’s blood glucose and insulin levels. The findings highlight the importance of adequate sleep in minimizing the risk for type 2 diabetes, which can develop when the body fails to effectively use a key hormone, insulin, to maintain healthy blood sugar levels.



Developing New Diagnostic Tools

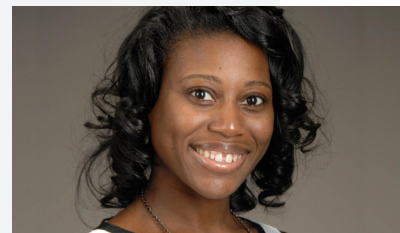
Obstructive sleep apnea (OSA) is one of the most prevalent chronic sleep disorders, estimated to affect up to 30 million people in the United States. It is associated with an increased risk for cardiovascular disease and mortality. The primary diagnostic tool for OSA is the **apnea-hypopnea index (AHI)**, which measures the average number of times per hour breathing either partially or fully stops during sleep; however, the AHI has limitations. NHLBI-funded researchers have developed a **more accurate tool for diagnosing OSA**, using a metric called ventilatory burden (VB), that effectively captures breath-by-breath reductions in airflow and isolates the purely ventilatory burden of the disorder. The researchers leveraged data from four different NIH-funded cohorts to derive the normative range of VB from analysis of more than 34 million breaths. The team then assessed the relationship between the degree of upper-airway obstruction and VB and, using a unique algorithm, the relationship between VB and mortality risks, including cardiovascular disease and hypertension. Their method effectively assessed the severity of OSA and predicted mortality associated with cardiovascular diseases,

potentially making it a more successful diagnostic tool than the AHI. The team now plans to use an artificial intelligence algorithm along with the VB measure to identify patients who will benefit from continuous positive airway pressure treatment.

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Dr. Marishka Brown

The National Center for Sleep Disorders Research (NCSDR) supports research on the causes, diagnosis, prevention, and treatment of sleep disorders. NCSDR is led by Dr. Marishka Brown, Ph.D.





This document honors the legacy of **Dr. Claude Lenfant**, NHLBI's Director from 1982 to 2003. His years of dedication to research on heart, lung, blood, and sleep health paved the way for today's advances.

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