

Breathing problems during sleep associated with calories burned at rest

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Individuals with sleep-related breathing disorders appear to burn more calories when resting as their conditions become more severe, according to a report in the December issue of *Archives of Otolaryngology–Head & Neck Surgery*.

Sleep-related breathing disorders include snoring, pauses in breathing (sleep apnea) and other conditions in which airways are partially or completely obstructed during sleep. "Obesity is a major risk factor for the development of sleep-disordered breathing, and changes in body weight are associated with changes in sleep-disordered breathing severity," the authors write as background information in the article. "It is unclear whether weight gain is simply a cause of sleep-disordered breathing or whether sleep-disordered breathing may be associated with alterations in energy metabolism that, in turn, lead to weight gain and complicate the treatment of these two disorders that often coexist."

Body weight is based on the balance between energy or calorie intake and expenditure, the authors note. Resting energy expenditure, or the number of calories burned while resting, is one component of total daily energy expenditure. Eric J. Kezirian, M.D., M.P.H., of the University of California, San Francisco, and colleagues assessed the resting energy expenditure in 212 adults with signs or symptoms of sleep-related breathing disorders. Participants' medical history was taken, and they underwent a physical examination, sleep monitoring through polysomnography and determination of resting energy expenditure using a device known as an indirect calorimeter. The calorimeter measures oxygen consumption and carbon dioxide production, which can be used to determine resting energy expenditure in calories per day.

Among the 212 participants, the average resting energy expenditure was 1,763 calories per day. Several measures of sleep-disordered breathing

severity were associated with increases in resting energy expenditure. For example, those who scored the highest on a scale of apnea and hypopnea (disruptions in breathing) had a resting energy expenditure of 1,999, while those who scored the lowest expended an average of 1,626 calories per day resting.

Resting energy expenditure may be affected by responses of the nervous system that occur during sleep-related breathing disorders and has been previously shown to increase when sleep has been disrupted.

"This study advances our knowledge concerning sleep-disordered breathing and metabolic rates, but it does not define the connection between sleep-disordered breathing and body weight," the authors write. "Body weight is determined by the balance between energy intake and expenditure. Although the findings of this study suggest that sleep-disordered breathing increases energy expenditure, it ignored two important aspects of this balance."

"First, sleep-disordered breathing often results in fatigue and other decrements in daytime functioning that can limit physical activity. Second, this work does not specifically incorporate the emerging evidence that suggests that sleep-disordered breathing may alter energy intake, whether through hormonal or other mechanisms. Future research considering the effect of sleep-disordered breathing on body weight can include the effects on energy intake and expenditure."

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