

Prolonged sleep disturbance can lead to lower bone formation

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Insufficient sleep, a common problem that has been linked to chronic disease risk, might also be an unrecognized risk factor for bone loss. Results of a new study will be presented Saturday at the Endocrine Society's 99th annual meeting in Orlando, Fla.

The study investigators found that healthy men had reduced levels of a marker of [bone](#) formation in their blood after three weeks of cumulative sleep restriction and circadian disruption, similar to that seen in jet lag or shift work, while a biological marker of [bone resorption](#), or breakdown, was unchanged.

"This altered bone balance creates a potential [bone loss](#) window that could lead to osteoporosis and [bone fractures](#)," lead investigator Christine Swanson, M.D., an assistant professor at the University of Colorado in Aurora, Colo., said. Swanson completed the research while she was a fellow at Oregon Health & Science University in Portland, Ore., with Drs. Eric S. Orwoll and Steven A. Shea.

"If chronic sleep disturbance is identified as a new risk factor for osteoporosis, it could help explain why there is no clear cause for osteoporosis in the approximately 50 percent of the estimated 54 million Americans with low bone mass or osteoporosis," Swanson said.

Inadequate sleep is also prevalent, affecting more than 25 percent of the U.S. population occasionally and 10 percent frequently, the Centers for Disease Control and Prevention report.

The 10 men in this study were part of a larger study that some of Swanson's co-authors conducted in 2012 at Brigham and Women's Hospital in Boston, Mass. That study evaluated health consequences of sleep restriction combined with circadian disruption. Swanson defined circadian disruption as "a mismatch between your

internal body clock and the environment caused by living on a shorter or longer day than 24 hours."

Study subjects stayed in a lab, where for three weeks they went to sleep each day four hours later than the prior day, resulting in a 28-hour "day." Swanson likened this change to "flying four time zones west every day for three weeks." The men were allowed to sleep only 5.6 hours per 24-hour period, since short sleep is also common for night and shift workers. While awake, the men ate the same amounts of calories and nutrients throughout the study. Blood samples were obtained at baseline and again after the three weeks of sleep manipulation for measurement of bone biomarkers. Six of the men were ages 20 to 27, and the other four were ages 55 to 65. Limited funding prevented the examination of serum from the women in this study initially, but the group plans to investigate sex differences in the sleep-bone relationship in subsequent studies.

After three weeks, all men had significantly reduced levels of a [bone formation](#) marker called P1NP compared with baseline, the researchers reported. This decline was greater for the younger men than the older men: a 27 percent versus 18 percent decrease. She added that levels of the bone resorption marker CTX remained unchanged, an indication that old bone could break down without new bone being formed.

"These data suggest that sleep disruption may be most detrimental to bone metabolism earlier in life, when bone growth and accrual are crucial for long-term skeletal health," she said. "Further studies are needed to confirm these findings and to explore if there are differences in women."

Provided by The Endocrine Society

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