

# Sleep loss precedes Alzheimer's symptoms

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Sleep is disrupted in people who likely have early Alzheimer's disease but do not yet have the memory loss or other cognitive problems characteristic of full-blown disease, researchers at Washington University School of Medicine in St. Louis report March 11 in *JAMA Neurology*.

The finding confirms earlier observations by some of the same researchers. Those studies showed a link in mice between [sleep loss](#) and [brain plaques](#), a hallmark of Alzheimer's disease. Early evidence tentatively suggests the connection may work in both directions: Alzheimer's plaques disrupt sleep, and [lack of sleep](#) promotes Alzheimer's plaques.

"This link may provide us with an easily detectable sign of Alzheimer's pathology," says senior author David M. Holtzman, MD, the Andrew B. and Gretchen P. Jones Professor and head of Washington University's Department of Neurology. "As we start to treat people who have markers of early Alzheimer's, changes in sleep in response to treatments may serve as an indicator of whether the new treatments are succeeding."

[Sleep problems](#) are common in people who have symptomatic Alzheimer's disease, but scientists recently have begun to suspect that they also may be an indicator of early disease. The new paper is among the first to connect early Alzheimer's disease and sleep disruption in humans.

For the new study, researchers recruited 145 volunteers from the University's Charles F. and Joanne Knight Alzheimer's Disease Research Center. All of the volunteers were 45 to 75 years old and cognitively normal when they enrolled.

As a part of other research at the center, scientists already had analyzed samples of the volunteers' spinal fluids for markers of Alzheimer's disease. The samples showed that 32 participants had preclinical Alzheimer's disease, meaning they were likely to have [amyloid plaques](#) present in their brains but were not yet cognitively impaired.

Participants kept daily sleep diaries for two weeks, noting the time they went to bed and got up, the number of naps taken on the previous day, and other sleep-related information.

The researchers tracked the participants' activity levels using sensors worn on the wrist that detected the wearer's movements.

"Most people don't move when they're asleep, and we developed a way to use the data we collected as a marker for whether a person was asleep or awake," says first author Yo-El Ju, MD, assistant professor of neurology. "This let us assess [sleep efficiency](#), which is a measure of how much time in bed is spent asleep."

Participants who had preclinical Alzheimer's disease had poorer sleep efficiency (80.4 percent) than people without markers of Alzheimer's (83.7 percent). On average, those with preclinical disease were in bed as long as other participants, but they spent less time asleep. They also napped more often.

"When we looked specifically at the worst sleepers, those with a sleep efficiency lower than 75 percent, they were more than five times more likely to have preclinical Alzheimer's disease than good sleepers," Ju

says.

Ju and her colleagues are following up with studies in younger participants who have sleep disorders.

"We think this may help us get a better feel for the way this connection flows—does sleep loss drive Alzheimer's, does Alzheimer's lead to sleep loss, or is it a combination?" Ju says. "That will help us determine whether we can change the course of disease with pharmaceuticals or other treatments."

**More information:** Ju Y-E S, McLeland JS, Toedebusch CD, Xiong C, Fagan AM, Duntley SP, Morris JC, Holtzman DM. *Sleep* quality and preclinical Alzheimer disease. *JAMA Neurology*, online March 11.

Provided by Washington University School of Medicine

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