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Press information

Exploring the Brain to Clarify the Link Between Sleep Disorders and Alzheimer's Disease



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Sleep disorders have a harmful impact on our brain and under certain conditions are thought to be linked to an increased risk of Alzheimer's disease. A link which had until now been poorly understood by the scientific community. For the first time, a study based on multiple brain imaging techniques conducted by Inserm researcher Géraldine Rauchs at two laboratories hosted at GIP CYCERON - the Physiopathology and Imaging of Neurological Disorders laboratory (Inserm/ Université de Caen-Normandie) and the Neuropsychology and Imaging of Human Memory laboratory (Inserm/Université de Caen-Normandie/Ecole Pratique des Hautes Etudes - PSL/CHU Caen) - has revealed, among other forms of impairment, the appearance of amyloid plaques characteristic of Alzheimer's disease in the brains of older adults with sleep apnea but no cognitive disorders. The results of this research were published in [JAMA Neurology](#) on March 23, 2020.

Obstructive sleep apnea syndrome is the most common sleep breathing disorder, affecting more than 30% of the population over the age of 65. It consists of uncontrolled and repeated pauses in breathing during sleep, linked to the temporary obstruction of the upper airways, in the throat, and is linked to numerous health problems – primarily cardiovascular diseases. However, given that the condition remains silent for a long time, it is probably underestimated in the general population.

In recent years, there has also been an accumulation of scientific data showing a link between sleep quality – and particularly the presence of sleep apnea – and the development of Alzheimer's disease. Nevertheless, the biological mechanisms behind this link remained to be elucidated.

In order to do this, Inserm researcher Géraldine Rauchs conducted a study at the Physiopathology and Imaging of Neurological Disorders¹ laboratory (Inserm/ Université de Caen-Normandie) in collaboration with the Neuropsychology and Imaging of Human Memory laboratory (Inserm/Université de Caen-Normandie/École Pratique des Hautes Etudes - PSL). This study², published in *JAMA Neurology*, used a variety of brain imaging techniques to map cerebral changes in people with untreated sleep apnea, on the structural, molecular and functional levels.

Changes in the brain

The researchers began by recruiting 127 participants over the age of 65, in good health and with no cognitive disorders. Using a portable home device to record their sleep and breathing overnight, the researchers detected the presence of varying degrees of sleep apnea in 75% of them.

In addition, the participants all underwent a battery of tests to evaluate their cognitive function, particularly executive functions and memory. They answered questionnaires about how they perceived their cognitive function and sleep quality. Several brain imaging examinations were then conducted in order to study their brain from every angle and detect any changes potentially linked to Alzheimer's disease. Although no differences were observed among the participants in terms of cognitive performance, the imaging did reveal several notable changes in the brains of those with sleep apnea.

In these participants, there is a more marked accumulation of beta-amyloid protein in the brain. Characteristic of Alzheimer's disease, this protein accumulates in the form of plaque which, depending on its density and distribution in the brain, may lead to the onset of clinical signs of the disease. Furthermore, the researchers observed increases in gray matter mass and glucose consumption, suggesting the presence of inflammatory processes in the brain.

"At a time when clinical trials of Alzheimer's treatments are not yet successful, identifying risk factors and protection factors to target is of interest to a growing number of researchers. Thanks to the use of multiple brain imaging methods, this study has enabled us to clarify the mechanisms explaining the links between sleep quality, risk of cognitive decline and Alzheimer's disease", explains Rauchs. "While this does not mean that these people will necessarily develop the disease, they are at higher risk. What is more, effective solutions exist to treat sleep apnea. Detecting and treating sleep disorders, particularly sleep apnea, will therefore form part of the arsenal for promoting successful aging."

¹ PhIND laboratory: <http://www.phind.fr/index.php/en/>

² This study was conducted as part of a vast European project, the Silver Santé Study (www.silversantestudy.fr), led by Dr. Gael Chételet.

To continue this research, Rauchs and her team will now look at the impact of treating apnea on changes in brain lesions and analyze the differences between the brains of male and female sleep apnea patients.

Sources

Association of sleep-disordered breathing with Alzheimer's disease biomarkers in community-dwelling older adults

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