

# Sleep disorder

Sleep [disorders](#) affect more than 10% of the population.

Sleep disordered breathing affects about 20% of community people above age 65 <sup>1)</sup>, and up to 44% of patients with [Alzheimer's disease](#) in clinic and community-based studies <sup>2) 3)</sup>

## Classification

Sleep disorders include:

[Sleep apnea](#) (periodic interruption of breathing)

Insomnia

Parasomnias

[Rapid eye movement sleep behavior disorder](#)

[Narcolepsy](#).

## Etiology

Traumatic brain injury (TBI) can cause sleep-wake disturbances and excessive daytime sleepiness. The pathobiology of sleep disorders in TBI, however, is not well understood, and animal models have been underused in studying such changes and potential underlying mechanisms.

Skopin et al. used the rat lateral fluid percussion (LFP) model to analyze sleep-wake patterns as a function of time after injury. Rapid-eye movement (REM) sleep, non-REM (NREM) sleep, and wake bouts during light and dark phases were measured with electroencephalography and electromyography at an early as well as chronic time points after LFP. Moderate TBI caused disturbances in the ability to maintain consolidated wake bouts during the active phase and chronic loss of wakefulness. Further, TBI resulted in cognitive impairments and depressive-like symptoms, and reduced the number of orexin-A-positive neurons in the lateral hypothalamus <sup>4)</sup>.

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Sleep dysfunctions, including rapid eye movement sleep behavior disorder, sleep fragmentation, excessive daytime sleepiness and various other dysfunctions, can seriously affect quality of life in patients with Parkinson's disease (PD). Emerging evidence suggests that deep brain stimulation (DBS) exerts a substantial effect when used to treat sleep dysfunctions, which are common nonmotor symptoms experienced by patients with PD. However, far less is known about the specific mechanisms underlying the effects of DBS on sleep processes and the factors that potentially influence these effects. These issues therefore need to be further clarified. Intriguingly, a number of recent studies have evaluated the effects of applying DBS to various brain targets on sleep in patients with PD. Deeper research into the efficacy of applying DBS to each brain target may help determine which region should be targeted during surgery in PD patients. Furthermore, compared with pharmacological therapy, DBS had more beneficial effects on sleep symptoms, and appropriate management involving the joint application of dopamine replacement therapy and DBS might accelerate the effects of treatment <sup>5)</sup>.

A nationwide [survey](#) confirmed sex differences in the association between various self-reported sleep disturbances and cognitive impairment in people aged 65 and older <sup>6)</sup>.

## Treatment

Effective treatments are available for some, whereas the cause and cure for others remain unknown.

<sup>1)</sup>

F.J. Nieto, T.B. Young, B.K. Lind, E. Shahar, J.M. Samet, S. Redline, R.B. D'Agostino, A.B. Newman, M.D. Lebowitz, T.G. Pickering, Association of sleep-disordered breathing, sleep apnea, and hypertension in a large community-based study, Sleep Heart Health Study, JAMA 283 (2000) 1829–1836.

<sup>2)</sup>

F. Emamian, H. Khazaie, M. Tahmasian, G.D. Leschziner, M.J. Moreell, G.-Y.R. Hsiung, I. Rosenzweig, A.A. Sepehry, The association between obstructive sleep apnea and Alzheimer's disease: A meta-analysis perspective. Front. Aging Neurosci. 8 (2016) 78.

<sup>3)</sup>

R. K. Malhotra, Neurodegenerative disorders and sleep. Sleep Med. Clin. 13 (2018) 63-70. doi: 10.1016/j.jsmc.2017.09.006

<sup>4)</sup>

Skopin MD, Kabadi SV, Viechweg SS, Mong JA, Faden AI. Chronic decrease in wakefulness and disruption of sleep-wake behavior after experimental traumatic brain injury. J Neurotrauma. 2015 Mar 1;32(5):289-96. doi: 10.1089/neu.2014.3664. Epub 2014 Dec 17. PubMed PMID: 25242371.

<sup>5)</sup>

Zou S, Lan YL, Hu YP, Yin XX, Liu WL, Li T, Liang Z. Update on the clinical application of deep brain stimulation in sleep dysfunction of Parkinson's disease. Acta Neurol Belg. 2018 Jul 9. doi: 10.1007/s13760-018-0971-3. [Epub ahead of print] Review. PubMed PMID: 29987555.

<sup>6)</sup>

Chiu HY, Lai FC, Chen PY, Tsai PS. Differences Between Men and Women Aged 65 and Older in the Relationship Between Self-Reported Sleep and Cognitive Impairment: A Nationwide Survey in Taiwan. J Am Geriatr Soc. 2016 Sep 14. doi: 10.1111/jgs.14316. [Epub ahead of print] PubMed PMID: 27627762.

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