

Blood leukocytes mirror insufficient sleep

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An insufficient amount of sleep and qualitatively poor sleep are common among the general population. Prior studies have indicated that prolonged insufficient sleep and poor sleep quality are associated with a heightened risk of cardiovascular diseases, dementia and psychiatric disorders, particularly depression, yet the molecular mechanisms

underlying this connection are not well known.

In a study carried out in collaboration by the University of Helsinki, the National Institute for Health and Welfare and the Finnish Institute of Occupational Health, men between 25 and 55 years of age suffering from insufficient sleep were compared to healthy men who get enough sleep. Altogether 105 men took part in the study.

DNA was extracted from blood leukocytes collected from the study subjects, to determine the methylation levels of nearly half a million CpG bases. DNA methylation is among what are known as epigenetic mechanisms, impacting [gene expression](#) and, thus, the functioning of cells and tissues.

"Based on our findings, no single DNA methylation element significantly differed between those suffering from a lack of sleep and healthy control subjects. However, the analysis of molecular networks revealed that insufficient sleep resulted in changes in DNA methylation in the gene regulatory elements belonging to the nervous system development pathway," explains Professor Tiina Paunio, who headed the study.

Changes were also observed in a genomic region that has earlier been associated with the hereditary Smith-Magenis syndrome. Inverse circadian rhythm is among the potential symptoms of this disease.

The findings indicate that lack of sleep is associated with systemic DNA alterations that affect the genome.

"We are currently looking into how permanent these changes are. In addition, we are interested in how they are linked with the long-term health risks of sleep deprivation," Paunio says.

"The findings require further studies, and they must be repeated with

other datasets," stresses Doctoral Student Alexandra Lahtinen, the first author of the article published in the *Scientific Reports* journal.

More information: Alexandra Lahtinen et al. A distinctive DNA methylation pattern in insufficient sleep, *Scientific Reports* (2019). [DOI: 10.1038/s41598-018-38009-0](https://doi.org/10.1038/s41598-018-38009-0)

Provided by University of Helsinki

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