

Going on holiday has a restorative effect on changes in DNA of shift workers

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Going on holiday can affect shift workers on the level of gene function: a new study indicates that resting during a holiday period restored functions associated with DNA regulation in shift workers suffering from sleep deprivation.

Long-term sleep deprivation is detrimental to health, increasing the risk of psychiatric and somatic [disorders](#), such as depression and cardiovascular diseases. And yet, little is known about the molecular biological mechanisms set in motion by sleep deprivation which underlie related adverse health effects.

In a recently published study, the University of Helsinki, the Finnish Institute for Health and Welfare, the Finnish Institute of Occupational Health and the Finnair airline investigated [dynamic changes](#) to DNA methylation in [shift workers](#). DNA methylation denotes epigenetic regulation that modifies gene function and regulates gene activity without changing the sequence of bases in the DNA.

Short-term genetic changes caused by DNA methylation are not well known. While methylation is connected with our surroundings, more research is needed on how the environment affects epigenetic regulation and gene function.

The study provides researchers with new information on both DNA methylation and the [biological processes](#) that have an impact on a sleep disorder related to shift work (shift work disorder, or SWD).

The study was published in *Scientific Reports*.

Changes to DNA methylation can mediate infections caused by sleep deprivation

A total of 32 shift workers participated in the study, of whom 21 suffered from shift work disorder and 11 were in the control group. Dynamic changes to DNA methylation were investigated through a genome-wide analysis during work and after a holiday period.

Changes to DNA methylation which affected gene function were identified in study subjects suffering from a sleep disorder caused by shift work. The findings demonstrated that rest and recovery during holiday periods also resulted in the restoration of DNA methylation in cases where changes had been observed during the work period.

The study proved the dynamic nature of DNA methylation, which was particularly emphasized in the activity of NMDA glutamate receptors. The strongest evidence was gained from the GRIN2C receptor: the methylation level of a specific CpG base pair in the regulatory region was lower during the work period in subjects suffering from shift work disorder. However, this change was reversed after the holiday period.

"Based on the results, we can deduce that changes to the DNA methylation of white blood cells are associated with shift work disorder. These changes, such as low methylation levels observed during the work period, are probably linked to sleep deprivation and related inflammatory consequences which DNA changes may mediate," says doctoral student Alexandra Lahtinen, MSc, from the University of Helsinki.

"Sufficient rest and recovery are important for everyone, but especially important for people with a background of long-term [sleep deprivation](#) due to, for example, living habits or irregular working conditions. Having said that, it's positive that the subjects recovered from at least some of the changes related to shift work disorder observed in the study," says Professor Tiina Paunio from the University of Helsinki and the Finnish Institute for Health and Welfare, who was the principal investigator of the study.

More information: Alexandra Lahtinen et al. Differential DNA methylation in recovery from shift work disorder, *Scientific Reports* (2021). [DOI: 10.1038/s41598-021-82627-0](https://doi.org/10.1038/s41598-021-82627-0)

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