

Genetic cause for shift work fatigue discovered

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Some people adapt easily to shift work, but not everyone can handle constant disruptions to their daily rhythm. Finnish researchers have now found that a melatonin receptor gene influences tolerance to shift work.

Published in the journal *Sleep*, the new study is the first time the genetic factors underlying poor tolerance to shift work were systematically examined. Covering the [entire genome](#), the study discovered that a common variation in the melatonin receptor 1A (MTNR1A) gene is linked to the job-related exhaustion experienced by shift workers.

Shift work often disrupts the circadian rhythm, which can lead to sleep disorders and daytime fatigue.

The study was led by Professor Tiina Paunio, University of Helsinki, and involved Finnish shift workers from many different lines of work. The differences in the job-related exhaustion reported by employees were contrasted with genetic differences in their entire genome.

The link to the melatonin receptor gene was discovered in a group of 176 shift workers included in the national Health 2000 survey. The connection was also found in a group of 577 shift workers covering rest of the shift workers from the Health 2000 survey as well as shift workers in care work and aviation.

The study also established that the risk variation of the melatonin receptor 1A (MTNR1A) gene is probably related to the methylation of

DNA in the regulatory sequence of the MTNR1A gene as well as the weaker expression of the MTNR1A gene. The methylation of DNA is one of the epigenetic mechanisms regulating the functioning of the genome, influenced by not only by variations in DNA sequence, but also environmental factors such as fluctuations in the circadian rhythm.

As it results in a smaller number of melatonin receptors, the risk variant of the gene can cause weaker natural melatonin signalling, one of the regulatory mechanisms in stabilising the circadian rhythm.

The influence of the risk variant of the MTNR1A gene may explain the degree to which light exposure at night disrupts the circadian rhythm of [shift workers](#). "The variant we have now discovered can only explain a small part of the variation between individuals, and it cannot be used as a basis to determine a person's tolerance to shift work," Paunio points out.

Provided by University of Helsinki

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