

# A Link Between Circadian Rhythms and Spinal Muscular Atrophy

Some of the information below was copied verbatim from National Sleep Foundation and patientworthy.com

Your circadian rhythm is basically a 24-hour internal clock that is running in the background of your brain and cycles between sleepiness and alertness at regular intervals. It's also known as your sleep/wake cycle. A part of your hypothalamus (a portion of your brain) controls your circadian rhythm. That said, outside factors such as lightness and darkness can also impact it. When it's dark at night, your eyes send a signal to the hypothalamus that it's time to feel tired. Your brain, in turn, sends a signal to your body to release melatonin, which makes your body tired. That's why your circadian rhythm tends to coincide with the cycle of daytime and nighttime, and why it's so hard for shift workers to sleep during the day and stay awake at night. The term circadian comes from the Latin *circa*, meaning "around" and *diem*, meaning "day".

Your circadian rhythm works best when you have regular sleep habits, like going to bed at night and waking up in the morning around the same times from day to day (including weekends). When things get in the way, like jet lag or daylight savings time, you can disrupt your circadian rhythm, which makes you feel out of sorts and can make it harder to pay attention.

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Evidence shows that circadian rhythms may affect health and well-being, and that disrupting the rhythms can lead to sleep disruption and disturbances to the metabolism (the chemical reactions in the body). A group of genes known as clock genes, play an important role in regulating circadian rhythms. A recent study has found that 'clock' genes that help to regulate the body's circadian rhythm may be affected by spinal muscular atrophy.

Since metabolic and sleep disturbances have been linked to both circadian rhythm disruption and SMA, researchers carried out a study to investigate the link between the two. Using animal models of SMA, the research team looked at how the genes linked to circadian rhythms behaved in different types of metabolic tissues and in the spinal cord.

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The results showed that clock genes, responsible for regulating circadian rhythms, showed altered expression in tissues that were also affected by SMA during disease progression.

Furthermore, it was found that the daily expression of the SMN gene depended on age and body area. It was shown that controlled light exposure could alter the circadian rhythm genes and reduce some of the effects of severe SMA in the mouse models, and may improve weight and survival.

The authors of the study conclude that these results provide evidence that tissues affected metabolically by SMA, tend to also show altered expression of circadian rhythm genes. It seems as though there is a link between the SMN gene, circadian rhythms, and metabolic processes.

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