

# Study explores how immune system functions during sleep

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Credit: Vera Kratochvil/public domain

A new study sheds light on how the immune system replenishes itself

during sleep. Researchers found that some subsets of T cells are reduced from the bloodstream during sleep when risk of infection is low. The article is published in the *American Journal of Physiology—Regulatory, Integrative and Comparative Physiology*.

T cells are a type of [white blood cells](#) and are the foundation of the [human body](#)'s immune system. Large quantities of T cells are present in the [bloodstream](#) and are ready to attack viruses and other pathogens that invade the body. Even during a deep resting phase, the body is able to release T cells, [growth hormones](#) and epinephrine back into circulation to fight pathogens when needed. Researchers conducted a "[sleep-wake](#)" study to determine how lack of sleep affects the immune system.

Fourteen young male volunteers with an average age of 25 participated in two 24-hour (8 p.m. to 8 p.m.) studies. In one study, the volunteers were allowed to sleep between 11 p.m. and 7 a.m. During the other study, the men were kept awake for 24 hours. Blood samples were taken from each volunteer at varying intervals (90 minutes to three hours) throughout each 24-hour period.

Among the sleeping group, all measured T cell subsets were reduced within three hours of falling asleep. However, T cell numbers remained high in subjects who were not allowed to sleep. While the research showed that the T cells left the bloodstream, where they went is a mystery. "It is an unsolved question as to where the cells are redistributed during sleep since we cannot follow their migratory route in healthy humans. ... There are some hints from previous studies that these cells accumulate in lymph nodes during sleep," the researchers wrote.

The rapid drop in circulating T cells during sleep "show[s] that even one night without sleep affects the adaptive [immune system](#)," says first author Luciana Besedovsky. "This ... might be one reason why regular

sleep is so important for general health."

**More information:** Luciana Besedovsky et al. Nocturnal sleep uniformly reduces numbers of different T-cell subsets in the blood of healthy men, *American Journal of Physiology - Regulatory, Integrative and Comparative Physiology* (2016). [DOI: 10.1152/ajpregu.00149.2016](https://doi.org/10.1152/ajpregu.00149.2016)

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