Study explores how immune system functions during sleep

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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

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