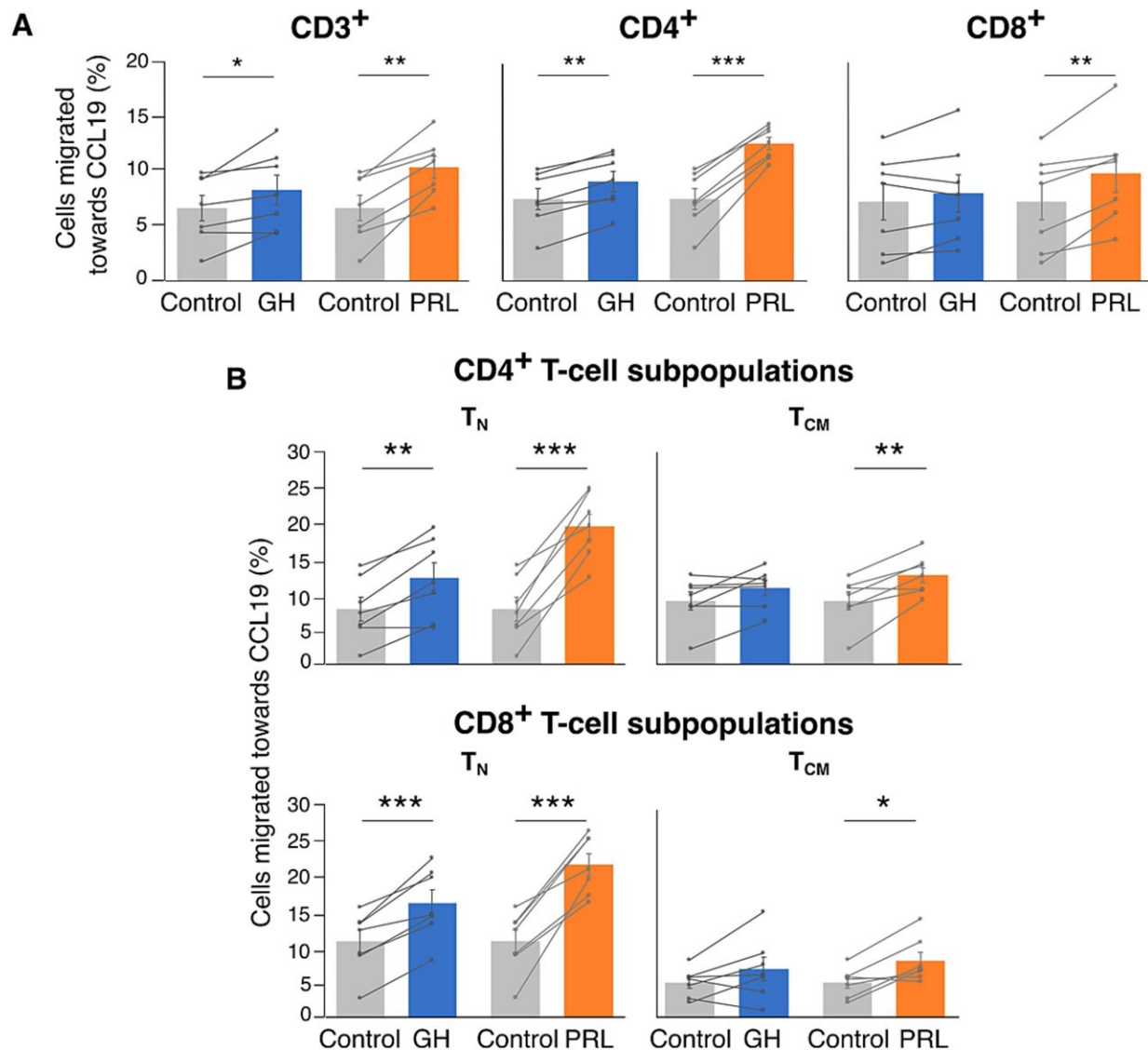


# Study shows good sleep stimulates the immune system

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Growth hormone (GH) and prolactin (PRL) increase CCL19-directed T-cell migration in vitro. (A) Means  $\pm$  SEM of the percentage of migrated CD3<sup>+</sup>,

CD4<sup>+</sup>, and CD8<sup>+</sup> T cells and (B) their TN and TCM CD4<sup>+</sup> and CD8<sup>+</sup> subsets in the presence of the chemokine CCL19 (CCL19-directed migration) after incubating the cells with GH (blue), PRL (orange), or a PBS control (gray).

Credit: *Brain, Behavior, and Immunity* (2024). DOI: 10.1016/j.bbi.2024.02.021

Researchers at LMU Munich have shown that sleep enhances the migratory potential of T cells toward lymph nodes.

Sleep is healthy—this popular knowledge is backed by science. Previous research had already shown that in people who slept after a vaccination, the [immune response](#) was twice as strong on average as in people who did not [sleep](#) during the night after the vaccination. However, the cell biological reasons for this had been little investigated before now.

A team led by Professor Luciana Besedovsky from the Institute of Medical Psychology has now demonstrated that sleep promotes the potential of immune cells—so-called T cells—to migrate toward lymph nodes. The researchers have reported [their findings](#) in the journal *Brain, Behavior, and Immunity*.

## Significant differences after sleepless night

The scientists repeatedly examined the concentration of various subgroups of T cells in the blood of a cohort of healthy men and women over the course of two 24-hour sessions. In one of the two test conditions, the participants were allowed to sleep at night for eight hours, while in the other they relaxed in bed at night but stayed awake. A forearm catheter connected to an adjacent room by means of a tube enabled blood collection without disturbing the participant's sleep.

Analysis of the blood samples revealed significant differences between

the test conditions. "Our results show that sleep promotes the migratory potential of various T-cell subpopulations," says Besedovsky.

## Migration of T cells toward lymph nodes

As the researchers demonstrated, sleep increases the directed migration of T cells toward a signaling protein, the so-called "homing" chemokine CCL19. This molecule mediates the migration of T cells, which possess the corresponding receptor for CCL19, to the [lymph nodes](#), where the T cell immune defenses are "trained" by being presented with antigens—for example, after a vaccination.

In further experiments, the researchers showed that incubating T cells with [blood plasma](#) taken from sleeping participants likewise increased the migratory potential. "This demonstrates that soluble factors that are elevated in blood plasma during sleep mediate the effect of sleep on T-cell migration. So we can in a way recreate the effect of sleep in the lab using the blood plasma of sleeping persons," reports Besedovsky.

The scientists identified [growth hormone](#) and prolactin as the decisive factors for this [migration](#) behavior. Both hormones showed sleep-dependent changes in concentration in the plasma, with higher values among the participants who slept during the night.

"Our results also have potential clinical implications," says Besedovsky. "Thus, growth hormone and prolactin could be considered as new adjuvants to promote immune responses following vaccination, especially in aged people, who typically display reduced levels of these hormones during sleep."

Overall, the authors see the study as an important step for better understanding why sleep supports immune responses—for example, after vaccination—and why vaccines are often less effective in older

people.

**More information:** Estefanía Martínez-Albert et al, Sleep promotes T-cell migration towards CCL19 via growth hormone and prolactin signaling in humans, *Brain, Behavior, and Immunity* (2024). [DOI: 10.1016/j.bbi.2024.02.021](https://doi.org/10.1016/j.bbi.2024.02.021)

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