Medical Xpress

Study finds lymphocyte trafficking is controlled by the circadian clock

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LMU researchers have shown that lymphocyte trafficking is controlled by the circadian clock. Consequently, the efficacy of immune responses to pathogens varies during the day. This has implications for the optimization of immunization.

Lymphocytes play a central role in the body's adaptive immune system,

which is vital for the recognition and elimination of bacterial and viral pathogens. Lymphocytes circulate between the bloodstream and the lymphatic system, and their movements follow a circadian rhythm, which is synchronized by the diurnal light/dark cycle and has a period of approximately 24 hours. LMU physiologists Dr. Christoph Scheiermann and David Druzd now report in the latest issue of the journal *Immunity* that the strength of the adaptive immune response varies with the time of day. The two researchers are members of Collaborative Research Center 914, which is funded by the Deutsche Forschungsgemeinschaft (DFG) and is devoted to the analysis of the patterns of migration of white blood cells (leucocytes) in the body.

With the aid of an ERC Starting Grant and further support from the DFG's Emmy Noether Program Christoph Scheiermann is investigating how these cells, to which lymphocytes belong, circulate through the body on the lookout for pathogenic intruders and malignant cells, and how lymphocyte trafficking regulates the immune response.

Using the mouse as an experimental model system, his latest work demonstrates that the distribution of lymphocytes between the lymph nodes and the circulation is dependent on the time of day, and that this in turn has long-term consequences for the quality of induced immune responses. "During the day, many lymphocytes are found in the bloodstream, and they begin to congregate in the lymph nodes at nightfall," Scheiermann explains. Furthermore, the fact that lymphocyte migration follows a circadian rhythm has a major impact on responses to immunization and pathogens. "The timing of immunization has a sustained effect on the strength of the ensuing immune response," says Scheiermann. Indeed, the effects of circadian lymphocyte migration on the antibody response are detectable for weeks after immunization.

More information: David Druzd et al. Lymphocyte Circadian Clocks Control Lymph Node Trafficking and Adaptive Immune Responses,

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