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RESEARCH AREA

The circadian time-keeping system enhances the adaptive ability of the organism by preparing it to the periodical changes in the environment, and on the other hand, allows temporal separation of otherwise conflicting biochemical activities. Endogenous time measuring is organized at the cellular level and almost all mammalian cells harbour self-sustained circadian oscillators. In mammals, the suprachiasmatic nucleus is considered as the master pacemaker, that drives and synchronizes peripheral oscillators by neuronal and humoral mechanisms. Circadian rhythm disturbances are associated with an increased risk of severe health problems, including cardiovascular diseases, metabolic syndrome, diabetes mellitus, various malignancies and psychiatric diseases such as mood disorders. In the modern society the risk for circadian misalignment is increasing due to the growing demand of shift work and intense exposure to artificial light during the late evening hours. Our research group is interested in a broad field of chronobiology research including the examination of molecular clock functions, studying circadian control of the immune system and exploring human behavioral rhythms.

TECHNIQUES AVAILABLE IN THE LAB

Genotyping and crossing of mouse strains, bone marrow transplantation in mice, isolation of human and mouse leukocytes, investigation of leukocyte functions, microscopic techniques, RNA isolation, analysis of gene expression with real-time PCR, culturing genetic modification of cell lines, flow cytometry, ELISA, genetic modification of Neurospora crassa, analysis of the conidiation rhythm, following promoter activity by in vivo luciferase assay, protein analysis with Western blot, examination of protein-protein interactions, analysis of the sleep rhythm in human.

SELECTED PUBLICATIONS

Szőke, A., Sárkány, O., Schermann, G., Kapuy, O., Diernfellner, ACR., Brunner, M., Gyöngyösi, N., **Káldi. K.** (2023) Adaptation to glucose starvation is associated with molecular reorganization of the circadian clock in Neurospora crassa. **eLife 12:** e79765.

Ella, K., Sűdy, Á., Búr, Z., Koós, B., Kisiczki, Á., Mócsai, A., **Káldi, K.** (2022) Time restricted feeding modifies leukocyte responsiveness and improves inflammation outcome. **Front Immunol 13:** 924541.

Sűdy, Á.R., Ella, K., Bódizs, R., **Káldi, K.** (2019) Association of Social Jetlag With Sleep Quality and Autonomic Cardiac Control During Sleep in Young Healthy Men. **Front Neurosci 13:** 950.

Ella, K., Csépányi-Kömi, R., **Káldi, K.** (2016) Circadian regulation of human peripheral neutrophils. **Brain Behav Immun 57:** 209-221.

Haraszti, R.Á., Ella, K., Gyöngyösi, N., Roenneberg, T., **Káldi, K.** (2014) Social jetlag negatively correlates with academic performance in undergraduates. **Chronobiol Int 31:** 603-12.

Gyöngyösi, N., Nagy, D., Makara, K., Ella, K., **Káldi, K.** (2013) Reactive oxygen species can modulate circadian phase and period in Neurospora crassa. **Free Radic Biol Med 58**: 134-143.

Malzahn, E., * Ciprianidis, S., * **Káldi, K.** (*joint first authors), Schafmeier, T., Brunner, M. (2010) Photoadaptation in Neurospora by Competitive Interaction of Activating and Inhibitory LOV Domains. **Cell 142:** 762-772.