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RESEARCH AREA

Exposure to acute stress can lead to the emergence of behavioral disturbances that place a heavy burden on both the individual and society. Previous research indicated that the paraventricular thalamic nucleus (PVT) is a brain area that plays a key role in the modulation of fear, anxiety, and increased arousal. Calretinin-expressing neurons in the paraventricular thalamus (PVT/CR+) exhibit significant activation under acute stress. In addition, PVT/CR+ cells send selective innervation to key stress-sensitive brain regions in the forebrain, suggesting a large-scale influence on brain function and behavior. In our research, we study the neurochemical identity, topography and the functional contribution of the ascending subcortical projections targeting the PVT/CR+ neurons in stress-induced behavioral disturbances.

TECHNIQUES AVAILABLE IN THE LAB

Using optogenetics, chemogenetics, in vivo electrophysiology (EEG and EMG recordings), and state-of-the-art neuroanatomical tools (viral tracing, immunohistochemistry, confocal microscopy, electron microscopy) we investigate the cellular and molecular mechanisms underlying acute stress-induced behavioral disturbances.

SELECTED PUBLICATIONS

Jász, A., **Biro, L.,** Buday, Z., Király, B., Szalárdy, O., Horváth, K., Komlósi, G., Bódizs, R., Kovács, K.J., Diana, M.A., Hangya, B., Acsády, L. (2025) Persistently increased post-stress activity of paraventricular thalamic neurons is essential for the emergence of stress-induced alterations in behaviour. **PLOS Biol 23:** e3002962.

Bősz, E., Plattner, V.M., **Biro, L.**, Kóta, K., Diana, M.A., Acsády, L. (2025) A cortico-subcortical loop for motor control via the pontine reticular formation. **Cell Rep 44:** 115230.

Biro, L., Miskolczi, C., Szebik, H., Bruzsik, B., Varga, Z.K., Szente, L., Toth, M., Halasz, J., Mikics, E. (2023) Post-weaning social isolation in male mice leads to abnormal aggression and disrupted network organization in the prefrontal cortex: Contribution of parvalbumin interneurons with or without perineuronal nets. **Neurobiol Stress 25:** 100546.

Bruzsik, B., **Biro, L.**, Zelena, D., Sipos, E., Szebik, H., Sarosdi, K.R., Horvath, O., Farkas, I., Csillag, V., Finszter, C.K., Mikics, E., Toth, M. (2021) Somatostatin neurons of the bed nucleus of stria terminalis enhance associative fear memory consolidation in mice. **J Neurosci 41:** 1982-1995.

Biro, L., Sipos, E., Bruzsik, B., Farkas, I., Zelena, D., Balazsfi, D., Toth, M., Haller, J. (2018) Task division within the prefrontal cortex: distinct neuron populations selectively control different aspects of aggressive behavior via the hypothalamus. **J Neurosci 38:** 4065-4075.