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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

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. **Journal of Neuroscience** **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. **Journal of Neuroscience** **38**: 4065-4075.

Mikics, E., Guirado, R., Umemori, J., Toth, M., **Biro, L.**, Miskolczi, C., Balazsfi, D., Zelena, D., Castren, E., Haller, J., Karpova, NN. (2018) Social Learning Requires Plasticity Enhanced by Fluoxetine Through Prefrontal Bdnf- TrkB Signaling to Limit Aggression Induced by Post-Weaning Social Isolation. **Neuropsychopharmacology**. **43**:235-245.

Biro, L., Toth, M., Sipos, E., Bruzsik, B., Tulogdi, A., Tulogdi, A., Bendahan, S., Sandi, C., Haller, J. (2017). Structural and functional alterations in the prefrontal cortex after post-weaning social isolation: relationship with species-typical and deviant aggression. **Brain structure and function** **222**: 1861-1875.