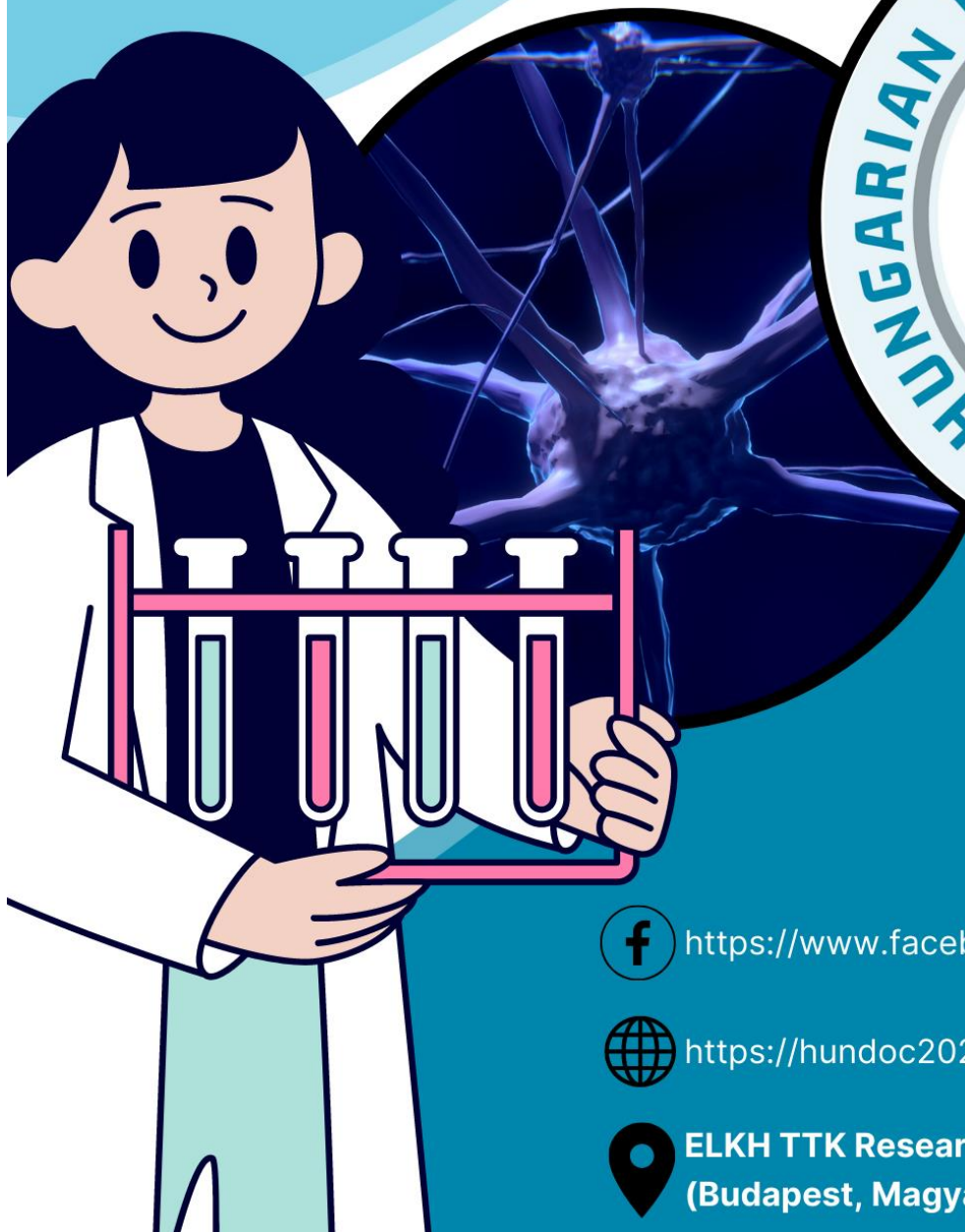


**31 JAN
2023**

HuNDoC

6th Hungarian Neuroscience
Meeting for Undergraduate
Students, Graduate students and
Young Postdocs



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ELKH TTK Research Centre for Natural Sciences
(Budapest, Magyar Tudósok Körútja 2, 1117)

**6th Hungarian Neuroscience Doctoral Conference for Undergraduate Students,
Graduate Students and Junior Postdocs
31 January 2023, Budapest**

12:45 – 13:35 – Workshop I: Career Forum featuring Dr. Balázs Hangya, Dr. Zoltán Varga, Márton Mayer and Dr. Viktor Kis

13:35 – 15:05 - Miniposter Session

15:05 – 15:35 - Coffee break

15:35 – 16:50 - Oral presentations and elevator speeches II

15:35 - Anna A. Abbas: Study the effect of Cariprazine in induced neurons directly reprogrammed from fibroblasts in Huntington's disease patients

15:50 - Anna Virág Bakacsi: Multisensory signal association by glutamatergic and GABAergic tecto-thalamic cells

16:05 - Bodó Angelika: Application of Multiple AAV Serotypes and Experimental Setups for Inhibition of Food Intake by Silencing LHA Using DREADD Technology

16: 20 - Teadora Tyler: Single cell composition and signaling in the human caudate nucleus – focus on the opioid pathway

16.35. Elevator speeches

- Olivér Nagy: Higher-order thalamic nuclei facilitate the generalization and maintenance of spike-and-wave discharges of absence seizures
- Olha Shchur: Firing statistics of neuron with autapse
- Melinda Erika Gazdik: Differential regulation of static firing responses vs. synaptic integration in physiologically distinct classes of subiculum neurons
- Adrienn Szabó: Enhanced food intake and abnormal deiodinase mRNA expression pattern in the triple transgenic Alzheimer's disease model mice

16:50 – 17:40 – Workshop II: What makes you bulletproof? - How to cope with stress using resilience? by Dr. Viktor Kis

17:40 – 18:00 - Closing remarks

20.00 – Social event at Grund

Group IV: Sensory and Motor systems

Multisensory signal association by glutamatergic and GABAergic tecto-thalamic cells

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In an ever-changing multisensory environment, the brain plays an important role in recognizing and integrating the relevant behavioural stimuli. As these are essential for survival, the underlying network level processes must be fast and precise.

During fear conditioning, an associated memory trace is formed when a conditioned stimulus (CS) appears alongside an affective (unconditioned) stimulus (US). The anatomical basis for this CS-US pairing includes a network in which these two types of information can converge on a single neuron. Our recent findings have revealed that this could occur in a tecto-thalamic circuit, at the level of the LA-projecting calretinin-expressing lateral thalamic (CR+LT) cells (Barsy B., Kocsis K. et al. 2020). The tectal part of this circuit is formed by the paired structures of the midbrain, the inferior (IC) and the superior colliculus (SC). The superficial SC neurons can convey visual, while the intermediate and deep SC cells transmit multisensory information; however, their exact role in associative learning is largely unknown.

In order to investigate these tecto-thalamic circuits, first, we used classical and viral tracing techniques in combination with immunohistochemical approaches in mice. We show that both colliculi are able to form synaptic contact on the same CR+LT cell involving glutamatergic and GABAergic collicular cells. Next, we investigated response properties of local and CR+LT-projecting SC cells driven by unimodal (visual, auditory and somatosensory-pain) and complex signals with optogenetic and electrophysiological approaches. We found that multisensory signals rather than the unimodal one altered the activity patterns of both glutamatergic and GABAergic cells; however, with different time course. While the glutamatergic cells responded faster and showed elevated firing rates for a short time, the GABAergic cells had longer latencies but for a longer timeframe. This could indicate a complex network mechanism between the different SC cell types and the CR+LT cells. In conclusion, complex synaptic transmissions by SC-LT routes can contribute to the fast signal integration during associative fear learning process and promote survival.

This work was supported by the Hungarian Scientific Research Fund NKFIH-FK 135285 (SB), FK144583 (SB), K138836 (FM) and KKP126998 (FM), by the New National Excellence Program of the Ministry for Culture and Innovation from the source of the National Research, Development and Innovation Fund ÚNKP-20-5-ÁTE-3 (FM); ÚNKP-22-2-III-ELTE-539 (AVB) and by ELKH SA-SA-48/2021 (FM).