Endre Levente Marosi

Curriculum vitae

Name: Endre Levente Marosi
Nationality: Hungarian
Date of birth: 1996.03.28.
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Education

- 2014-2018 : Eötvös Loránd University, Faculty of Science – BSc in Biology
- 2010-2014: Franciscan Secondary School, Szentendre

Language

- english – complex intermermediate (B2)
- latin – complex intermermediate (B2)

Scientific awards, scholarships

- Stephen W. Kuffler Research Scholarship, *2018*
- Eötvös Loránd University, Faculty of Science – Scientific Scholarship, *2016-2018*
- Eötvös Loránd University, Faculty of Science – Studies Scholarship, *2015; 2017*
- Franciscan Scholarship Program, *2013*
- Saint Emeric Scholarship, *2013*
- Oxford Cajal Scholarship, *2013*

Research experiences

- 2013: 2 months in the Medical Research Council - Anatomical Neuropharmacology Unit at the University of Oxford in the laboratory of Péter Somogyi
- 2014- : Institute of Experimental Medicine, Hungarian Academy of Sciences, Budapest in the laboratory of János Szabadics

Scientific Students' Associations Conference

- Eötvös Loránd University, Scientific Students' Associations Conference, Neurobiology and behaviour section 2016, *participation*
- XXXIII. National Scientific Students' Associations Conference, Biology section – Neurophysiology division 2017, *2nd place*

Publications

- Scientific articles
  - MÁTÉ NEUBRANDT, VIKTOR JÁNOS OLÁH, JÁNOS BRUNNER, ENDRE LEVENTE MAROSI, IVAN SOLTESZ, JÁNOS SZABADICS: Single bursts of individual granule cells functionally rearrange feed-forward inhibition, *The Journal of Neuroscience 2018, 1711-1724.*

- Oral presentations
    - ENDRE MAROSI, JÁNOS SZABADICS: Methodical investigation for simple anatomical separation of the axo-axonic and basket cells, *Eötvös Conference, Eötvös József Collegium, Budapest 2016.*
- Posters
    - ENDRE MAROSI, JÁNOS SZABADICS; Competition between DSI and activity-dependent override of endocannabinoid-mediated inhibition during in vivo-relevant firing of CCK+ cells, *KOKI-days, Balatonfüred 2016.*
    - MÁTÉ NEUBRANDT, VIKTOR JÁNOS OLÁH, JÁNOS BRUNNER, ENDRE MAROSI, IVAN SOLTESZ, JÁNOS SZABADICS; Seconds-long, cell type-specific potentiation of mossy fiber inputs to CA3 interneurons after a single brief burst of presynaptic action potentials, *FENS Regional Meeting, Pécs 2017.*
    - MÁTÉ NEUBRANDT, VIKTOR JÁNOS OLÁH, JÁNOS BRUNNER, ENDRE MAROSI, IVAN SOLTESZ, JÁNOS SZABADICS; Seconds-long, cell type-specific potentiation of mossy fiber inputs to CA3 interneurons after a single brief burst of presynaptic action potentials, *KOKI-days, Balatonfüred 2017.*

Research interest

Neuroscience attracted my interest during my high school studies. This curiosity was extended after winning the the Oxford Cajal Scholarship in 2013, because it gave me the opportunity to join the work of Péter Somogyi's laboratory at the Anatomical Neuropharmacology Unit at Oxford University. During these two months, I gained direct insights into this scientific field through the anatomical examination of nerve cells.

After this scholarship, before starting Biology at the university, I joined János Szabadics' laboratory, where I learned in vitro electrophysiological techniques. After a long learning period, I started my own project, which allowed me to participate in the Scientific Students' Associations Conference. In this study, I used patch clamp pair recordings of CCK-containing inhibitory cells and pyramidal cells to investigate the activity-dependent regulation of their synaptic communication. Our question was whether two physiological effects, which are mediated by the same receptor, the endocannabinoid receptor (CB1-R), acts synergistically or antagonistically. Presynaptic CB1-Rs in CCK-cells are responsible for blocking the vesicle release when the postsynaptic pyramidal cell is highly active (so-called DSI phenomenon). On the other hand, strong presynaptic activity of the CCK-cells can override the CB1-R mediated inhibition via G-protein uncoupling. Because both pyramidal and CCK-cell activities can be reasonable strong in vivo, it is important to know, which of the two opposite CB1-R effect dominate. I studied the interaction of these two phenomena not only with experimentally generated activity patterns, but also with activity patterns that occur in these two cell types in physiological conditions.

Meanwhile, I joined an ongoing study that revealed a special form of synaptic plasticity between the granule cells of the dentate gyrus (DG) and inhibitory cells of the CA3 region. The granule cells are firing typical action potential packages called bursts. Between two bursts, unitary spike activity is observable. It has already been known that bursts powerfully discharge excitatory cells in the CA3, but what happens with the network within the interburst interval was unclarified. Because granule cells innervate significantly more CA3 interneurons than excitatory cells, we

focused on unitary spike responses in identified interneurons in the seconds-long postburst period, using paired recordings in rat hippocampal slices. We showed that single bursts of a few spikes in individual granule cells resulted in seconds-long potentiation of excitatory inputs to downstream interneurons. Thus, while it had been known that bursts powerfully discharged hippocampal excitatory cells, this study clarified that they also regulated inhibition during the interburst intervals. Additionally, this work has given me technical advantages too, as I have learned the technique of the axonal patch clamp. This enabled me to start working on a study that I would like to pursue during my master degree and perhaps during my PhD.

In my current project, we study the so-called giant mossy fiber terminals, which form the main synaptic output of the granule cells onto CA3 pyramidal cells. We ask the question how presynaptic ligand-gated ionic channels influence this synaptic output. Ligand-gated ionic channels are the main mediators of postsynaptic responses, but their role at the presynaptic structures are not known. In these experiments, I use a methodological skill that I learned during my previous works and allows for the direct measurement of the effects of ligand-gated ionic channels in individual mossy fiber terminals. My aim is to reveal the identity and sensitivity of these receptors and their potential physiological relevance.