Univ.Prof. Igor ADAMEYKO, PhD

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Research Areas:

Neuroimmunology, Neurobiology, Developmental Biology, Tumor Biology, Regenerative Medicine

- **EDUCATION**

2006 **Doctoral degree (PhD),** Faculty of Biology, Lobachevsky University, Nizhniy Novgorod, Russian Federation.

2002 **Master degree (MsD)**, Faculty of Biology, Lobachevsky University, Nizhniy Novgorod, Russian Federation.

- **CURRENT POSITION**

2020 – now University Professor, Chair of Neuroimmunology Department at Center for Brain Research, Medical University of Vienna, Vienna, Austria

- **AWARDS**

2019 ERC Synergy Coordinator (2 300 000 EUR)

2019 Fernstrom Prize (personal, 9 000 EUR)

2017 Hans Wigzell Research Foundation Prize award (personal, 50 000 EUR)

2016 EMBO Young Investigator award

2015 Bertil Hallsten Research Foundation award

2015 ERC Consolidator

2015 Swedish Academy of Sciences Flormanska Prize (personal, 2000 EUR)

Currently, Dr. Igor Adameyko is a Professor and a Department Chair at Center for Brain Research of Medical University of Vienna, Austria. Prof. Adameyko is known for the discovery of multipotency of nerve-associated Schwann cell precursors, a population of neural crest derived cells with exceptional

plasticity and distribution in the body. These studies introduced a radically new concept for developmental biology in that defined precursor pools existing in a highly specialized niche use nerves as conduits to migrate and differentiate through temporally and spatially delineated nerve-Schwann cell communication. Can Schwann cells be genuinely multipotent? If so, this would transform the above discoveries into a global concept in which nerve-associated progenitors could generate various cell types during not only physiological development but also adulthood. Moreover, any such cell pool could be exploited to regenerate damaged tissues in tandem with regaining sensory nerve functions. This notion is plausible since nerves traverse the entire body from early embryonic development on and their in-growth coincides with the expansion of cell pools in the organs they target. For decades, the prevailing concept was that the only function of these peripheral nerves is to maintain activity patterns, thus mostly sending unidirectional information. Instead, Igor Adameyko proposed a non-canonical role in which nerve-associated glia also generates parasympathetic neurons (Science, 2014), neuroendocrine chromaffin cells (Science, 2017) and mesenchymal stem cells in tooth (Nature, 2014). These studies also showed that resident Schwann cells retain their potential to produce other cell fates in adulthood, advocating their utilization as a source of transplantable cells. At the moment, many independent research groups have by now reproduced Adameyko's original observations, and expanded the concept of multipotent nerve-associated Schwann cells building peripheral tissues. Thus, in a period spanning only a few years, the concept of peripheral nerves serving as a "niche" and migration "highways" has entered mainstream research, and led to a revision of how the parasympathetic and sympatho-adrenal systems become established at precise locations and with adequate cell numbers during fetal development.

Historically, Igor Adameyko's background is in developmental biology. Having extensive embryology-based experience, it is only natural that the lab continues on this path today by exploring the origin of norm and pathology, congenital diseases and paediatric cancers arising in the early or late embryo. "We believe that our knowledge of embryonic development is extremely helpful, as it is exactly the time when cells (i.e., different cell types) experience a diversity of phenotypic states and transitions between such states. During development, cells change enormously, and the genetic programmes that are utilised by these altering cell states are later exploited by the cancer cells as well. Many tumour types show the developmental aspects in their dynamics, partly resembling a developing organ or an assembling tissue- as they try to replay aspects of developmental processes. This is where we think our ongoing work and understanding could come in and be useful."

Most lately, Prof. Adameyko engaged into the fields of neuroimmunology and onconeuroimmunology to discover how we can take advantage of altered cell states and cell-cell interactions for coping with a plethora of major human diseases.

Recent key papers:

1. Soldatov R, Kaucka M, Kastriti ME, Petersen J, Chontorotzea T, Englmaier L, Akkuratova N, Yang Y, Häring M, Dyachuk V, Bock C, Farlik M, Piacentino M, Boismoreau F, Hilscher M, Yokota C, Nilsson M, Bronner M, Croci L, Hsiao W, Guertin D, Brunet JF, Consalez GG, Ernfors P, Fried K, Kharchenko PV, **Adameyko I**. * Spatio-temporal structure of cell fate decisions in murine neural crest. **Science** 2019.

2. Furlan A., Dyachuk V., Kastriti M., Abdo H., Hadjab S., Chontorotzea T., Akkuratova N., Usoskin D., Kamenev D., Petersen J., Sunadome K., Memic F., Marklund U., Fried K., Topilko P., Lallemend F., Kharchenko P., Ernfors P., **Adameyko I**. * Multipotent Peripheral Glial Cells Generate Neuroendocrine Cells of the Adrenal Medulla.

Science. 2017. Jul 7;357(6346).

3. Dyachuk V., Furlan A., Khatibi Shahidi M., Giovenco M., Kaukua N., Konstantinidou C., Pachnis V., Memic F., Marklund U., Müller T., Birchmeier C., Fried K., Ernfors P., **Adameyko I.** * Parasympathetic neurons originate from nerve-associated peripheral glial progenitors. **Science**, 4;345(6192):82-7, 2014.

ERC Synergy Grant

Our project grant is focusing on neuroblastoma- a devastating paediatric cancer. There is a huge unmet clinical need as almost 50% of children that are positively diagnosed die. This cancer, which arises from the sympathetic nervous system, has some type of embryonic origin starting during the neural crest differentiation stage towards the sympathoadrenal cells. Given our domain speciality (i.e., neural crest cells during embryonic development) we believe that we will have some interesting new ideas to understand the origin of neuroblastoma and ultimately fight it.

STATE-OF-THE-ART-METHODS

We extensively apply single cell transcriptomics analysis with an aim to discover the major principles of neural and immune cell type heterogeneity, stem cell regulation, evolution of novel cell types and transitions between gene regulatory networks.

At the moment, we attempt to build a MERFISH system for spatial transcriptomics as well as to establish Slide-seq protocols in house.