



Editorial: Novel Aspects of Neurotransmitters

Z. G. Zhang^{1*}, L. Pavon² and H. Tu¹

¹State Key Laboratory of Oncogenes and Related Genes, Shanghai Cancer Institute, Ren Ji Hospital, School of Medicine, Shanghai Jiao Tong University, Shanghai, China., ²Laboratorio de Psicoimmunología, Dirección de Investigaciones en Neurociencias del Instituto Nacional de Psiquiatría Ramón de la Fuente Muñiz, Ciudad de México, Mexico

Keywords: neurotransmitters, cancer, evolution, novel aspects, immunoregulation, asthma, anxiety and depression

Editorial on the Research Topic

Novel Aspects of Neurotransmitters

Neurotransmitters are not the privilege of neural system and they have multiple functions in the peripheral organs. The aim of this special issue is to improve our understanding of non-canonical functions of neurotransmitters, as well as their novel aspects in neural system.

Cancer neuroscience is an emerging field and it reveals a promising future in preclinical and translational research. In this collection, there are several papers focus on the novel roles of neurotransmitters on cancer research.

Perineural invasion is a common phenomenon which indicates a poor prognosis in multiple cancers. Chen et al. made an interesting revision of perineural invasion and stress hormone in gynecological cancers (Chen et al.). More significantly, almost 100% pancreatic cancer has perineural invasion and neurotransmitters play important roles in the innate and adaptive immune responses in the pancreatic cancer microenvironment (Liang et al.).

We believe that cancer is a complicated, flexible, systemic disease encompassing multiple dysregulated processes within the neuro-endocrine-immune system, which might open a wide range of therapeutic options (Jiang et al.).

Besides in cancer, 5-Hydroxytryptamine, Glutamate, and ATP have broad biological functions on multiple types of non-neural cells (Franco et al.). Francelin et al. show in a systematized way about the participation of neurotransmitters in the maturation of T lymphocytes in the thymus (Francelin et al.). Neurotransmitters and neuropeptides are also involved in the pathological processes in asthma (Pavón-Romero et al.). In Anxiety and Depression, brain transmitters could be modulated by intestinal microbiota (Huang and Wu). The locus coeruleus (LC) tyrosine-hydroxylase (TH) neurons and the TH:LC-paraventricular thalamus circuit may be involved in regulating emergence from anesthesia (Ao et al., 2021).

Moroz leads us to explore, in an elegant dissertation, the evolutionary aspects of neurons origin. He presents the most relevant hypotheses on the aspects that have given rise to neuronal types, their organization, way of communication, and the mechanisms underlying these characteristics (Moroz). Moroz and Romanova present an interesting dissertation on the advantages of synapses in evolution in different evolutionary orders, discussing the pros and cons observed in developing this neural communication process, emphasizing the participation of lipid components and the involvement of organelles such as the endoplasmic reticulum and mitochondria (Moroz and Romanova).

Neurotransmitters are ancient molecules, e.g. acetylcholine exists in microorganisms (Whittaker, 1963). Most of neurotransmitters appeared earlier than the neural system. Besides in the neural system, neurotransmitters have a lot of basic functions to be discovered in the future, such as the serotonylation, which is a newly recognized post-translational modification (Muma and Mi, 2015; Bader, 2019) where serotonin is covalently incorporated into proteins via transamidation.

Therefore, we believe that the first step to take advantage of the full potential of the new aspects of neurotransmitters is to make them known and show their clinical, therapeutic, and research potential. With this research topic, we contribute to achieving this goal, and we are convinced

OPEN ACCESS

Edited and reviewed by:

Ana Cuenda,
Consejo Superior de Investigaciones
Científicas (CSIC), Spain

*Correspondence:

Z. G. Zhang
zzhang@shsci.org

Specialty section:

This article was submitted to
Signaling,
a section of the journal
Frontiers in Cell and Developmental
Biology

Received: 24 October 2021

Accepted: 28 October 2021

Published: 18 November 2021

Citation:

Zhang ZG, Pavon L and Tu H (2021)
Editorial: Novel Aspects
of Neurotransmitters.
Front. Cell Dev. Biol. 9:800765.
doi: 10.3389/fcell.2021.800765

that the readers of the papers that comprise it will acquire a comprehensive view of the full potential of this knowledge.

AUTHOR CONTRIBUTIONS

All authors contributed to the article and approved the submitted version.

REFERENCES

- Ao, Y., Yang, B., Zhang, C., Wu, B., Zhang, X., Xing, D., et al. (2021). Locus Coeruleus to Paraventricular Thalamus Projections Facilitate Emergence from Isoflurane Anesthesia in Mice. *Front. Pharmacol.* 12, 12. doi:10.3389/fphar.2021.643172
- Bader, M. (2019). Seronylation: Serotonin Signaling and Epigenetics. *Front. Mol. Neurosci.* 12, 12. doi:10.3389/fnmol.2019.00288
- Muma, N. A., and Mi, Z. (2015). Seronylation and Transamidation of Other Monoamines. *ACS Chem. Neurosci.* 6, 961–969. doi:10.1021/cn500329r
- Whittaker, V. P. (1963). "Identification of Acetylcholine and Related Esters of Biological Origin," in *Handbook of Experimental Pharmacology* (Springer), 1–39. doi:10.1007/978-3-642-99875-1_1

ACKNOWLEDGMENTS

We want to thank all the authors of this Research Topic for their excellent contributions, and the dedicated reviewers for their insightful comments that helped maintain the articles at the highest standards. We also gratefully acknowledge the excellent secretarial assistance of Roberta Callari, PhD and the continuous support of the Frontiers staff.

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Copyright © 2021 Zhang, Pavon and Tu. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.