doi 10.18699/bgrs2024-7.3-11

Phospholipid supplementation inhibits social odor discrimination in mice

Morozova M.[1], Andrejeva J.[2]*, Snytnikova O.[3], Boldyreva L.[1], Tsentalovich Yu.[3], Kozhevnikova E.[2, 4]

[1] *Scientific Research Institute of Neurosciences and Medicine, Novosibirsk, Russia*

[2] *Institute of Molecular and Cellular Biology, SB RAS, Novosibirsk, Russia*

[3] *International Tomography Center, SB RAS, Novosibirsk, Russia*

[4] *Novosibirsk State Agrarian University, Novosibirsk, Russia*

* *andreeva.e@mcb.nsc.ru*

Key words: phospholipids; diet; metabolism; odor discrimination; social behavior

Motivation and Aim: The dietary phospholipids (PLs) are the promising supplements are that are commonly found as natural food ingredients and as emulsifier additives. There is a broad consensus that supports the beneficial impact of dietary PL supplementation on human health and the management of various diseases, including neurological disorders. The present study aimed at evaluating the effect of major PLs found as food supplements on social behavior in mice. Here, the effect of short-term high dietary PLs content was studied in terms of social odor discrimination and social interactions with male and female intruders in male mice.

Methods: The open field test is utilized to evaluate both the locomotor and exploratory behavior of the test animals, and it can also measure the overall anxiety levels. The odor preference assay enables the assessment of an animal's attraction/aversion to different scents without direct contact with the source of the odor. This experiment aimed at exploring aspects of social behavior in mice, such as social interaction, aggression, and mating. Brain metabolomic analysis was performed to assess changes in intermediary metabolism and neurotransmitter biosynthesis.

Results: PLs-fed male mice tend to lose preference toward female odor and fail to discriminate socially relevant odors. At the same time, test animals recognize non-social odors. We also found that PLs affected the social behavior of the test males, rendering them indiscriminative of male and female intruders during direct contact. Brain metabolomic profiling revealed no major changes in the intermediary metabolism and neurotransmitter biosynthesis. At the same time, intranasal PLs application resembled the same effects as dietary supplementation.

Conclusion: The findings presented here might be important to understand the physiological relevance of PLs as modulators of signal transduction in sensory organs and other systems. Here we provide in vivo data that could inspire studies on the molecular interactions of PLs with transmembrane receptors and second messenger signal transducers and reevaluate their role in ligand sensing.

Funding: This research and the APC was funded by the Russian Science Foundation, grant number 20-74-10022-П.