

## Comparative analysis of the influence of sertraline and fluoxetine on the behavior of *Danio rerio* in experimental simulated depression

*Качанов Дмитрий Александрович*

*Студент (специалист)*

Северо-Западный государственный медицинский университет имени И.И.Мечникова,  
Санкт-Петербург, Россия

*E-mail: kachanov.dima@yandex.ru*

Relevance of research. Depression is a common form of mental pathology, which is common in different age groups, including among young people. Laboratory animals as experimental models are an invaluable tool for studying the pathogenesis of depressive disorders and creating potential treatment. A promising direction in pharmacology was the use of an experimental model of depression aquarium fish *Danio rerio*, which has a high throughput, genetic and physiological similarities with man, low cost and quick reproductive cycle.

The aim of the study was to create an experimental model of depression on *Danio rerio* and to identify further differences in their behavior when exposed to selective serotonin reuptake inhibitors (fluoxetine and sertraline).

Materials and methods of research. In fish, leading a secret lifestyle (forming shoals), when separated in pairs manifests disturbing and aggressive behavior to each other, which contributes to the formation of dominant-subordinate relations. The study was carried out on males *Danio rerio* natural color (n=20). Previously, the fish were kept in one pack. Two males were transplanted into separate vessels to simulate depression, while the conditions of detention remained standard, as in the case of stay in the pack. The monitoring group and two pilot groups with sertraline (500 µg/l) and fluoxetine (500 µg/l) were then formed.

Research result. Before adding drugs in all the study groups had lower level of swimming fish, they were hyperactive, aggression against each other was not observed. On the 3rd day of the study in groups with fluoxetine and sertraline fish behavior varied: with sertraline 25% of individuals rose to the middle level, in the group with fluoxetine fish remained at the lower level. On the 5th day of the study in the group with sertraline in 25% of fish craniocaudal position of the body in space was violated. To the 8-day experimental specimen, which in the course of the experiment it was a violation of the craniocaudal position of the body died.

Summary. The study showed that *Danio rerio* can be used as a model object to study the effects of antidepressants on the body. Model *Danio rerio* was not expensive, and the experiment took only seven days. Fish, subjected to stress in the form of separation of the basement and restrictions in the swimming space and receiving sertraline, used to come out of a state of depression. Perhaps the slower onset of fluoxetine is due to the fact that even in clinical practice, to achieve therapeutic concentrations of beets in blood plasma, the drug should be taken for a longer time. Pathogenetic mechanisms of disorders of body position (craniocaudal provision

was violated) of the fish taking the dose of sertraline equal to 500  $\mu\text{g}/\text{l}$ , as well as subsequent their death have not been revealed. This is of particular scientific interest for further research.

### Источники и литература

- 1) Язуина Н. А., Комлева Ю. К., Салмина А. Б., Петрова М. М., Морозова Г. А., Малиновская Н. А., Герцог Г. Е. Современные экспериментальные модели депрессии // Биомедицина. 2013. №1. С.61-71
- 2) Качанов Д. А. , Прошин С. Н. Использование *Danio rerio* в системе доклинических исследований / SCIENCE4HEALTH2017: Материалы VIII Международной научной конференции. Москва, РУДН, 13 - 15 апреля 2017. - Москва: РУДН, 2017 - С.24
- 3) Abreu M.S., Giacomini A.C., Koakoski G., Piato A.L., Barcellos L.J. (2017) Divergent effect of fluoxetine on the response to physical or chemical stressors in zebrafish. PeerJ 5:e3330
- 4) Abreu M.S., Giacomini A.C., Koakoski G., Oliveira T.A., Gusso D., Baldisserotto B., Barcellos L.J. Effects of waterborne fluoxetine on stress response and osmoregulation in zebrafish. Environmental Toxicology and Pharmacology. 2015. - 40(30): 704-707.
- 5) Fonseca, T. M., Wen, X.-Y., Foster, J. A. and Kennedy, S. H. (2016), Zebrafish models of major depressive disorders. Journal of Neuroscience Research. 94: 3–14. doi:10.1002/jnr.23639.
- 6) Westerfield M. Zebrafish Book: A Guide for the Laboratory Use of Zebrafish. The University of Oregon Press, Eugene, OR (1993).