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SUPPLEMENTARY MATERIALS

The Biochemical Model of the Synapse in Turpaev's Studies

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Supplementary file S26

RECONSOLIDATION OF CONTEXTUAL MEMORY AFTER REMINDER IN TERRESTRIAL SNAIL DEPEND FROM SEROTONIN

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During the conversion of memory from short-form to long-term phase, it is unstable immediately after receiving new information, but it becomes stable over time. This transition (memory consolidation) requires new protein synthesis. The reminder starts the process of repetitive consolidation of memory, which also needs protein synthesis. This process was called reconsolidation. Serotonin (5-HT) is one of the widespread and well-investigated transmitters in the nervous system. It is established that 5-HT is a basic neurotransmitter for defensive behavior in mollusks and learning on the basis of defensive reflexes. The neurotoxic analogue of serotonin 5.7-dihydroxitriptamine (5.7-DHT), which depleted 5-HT, is used to study the role of serotonergic system in the evaluation of behavior. It was shown that the disruption of serotoninergic system by 5.7-DHT didn't change the original memory, however, led to a memory impairment after repeated reactivation (Balaban et al., 2016). One of the drugs that causes depletion of brain 5-HT is p-chlorophenylalanine (p-CPA), which inhibited tryptophan hydroxylase.

We set the task to study the dependence of the reconsolidation of snail's contextual memory from serotonin, using p-CPA and 5.7-DHT to disrupt the 5-HT synthesis. The conditioned situation reflex in contextual paradigm "on the ball" was developed, when animals distinguished test signals used in different situations (on a ball and a flat surface). Testing was carried out in two contexts: during the free crawling of animals on a flat surface (glass cover of the aquarium) and in the situation of learning context (on the ball). The conditioned reflex was considered to be formed if the reaction on the ball (the learning context) was significantly higher than that on a flat surface. Next day, after testing to confirm the learning, the snails were placed for 20 min on the ball for reminder, and then blocked the biosynthesis of the protein by injection of anisomycin at dose 0.4 mg/snail. The injections of p-CPA (at dose 0,2 mg/g) or 5.7-DHT (at dose 20 mg/g) were performed four days before reminding session, to study the role of 5-HT in reconsolidation and its disruption. If the development of the conditioned reflex was carried out with the presentation of 3 stimuli per day, then the next day after the reminder, accompanied by a blockade of protein synthesis and 5-HT depletion, the reaction on the conditioned stimulus on the ball decreased by 2 times, and on the 2nd day of testing - by 3 times. The received results suggest the necessity of 5-HT for the process of formation of long-term memory in the terrestrial snail.

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