

Differences in learning ability according to individuality and left-right asymmetry of the rat brain hippocampal NR1 receptor

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Recent studies have reported that glutamate receptors (GluR) left-right asymmetry in the rodent brain affects spatial cognition and working memory. However, The relationship between brain left-right asymmetry and individuality has not been studied. Therefore, in this study, we carried out an individuality judgment based on the anxiety-resistant behavior and the anxiety-non-resistant behavior for acrophobia using SD rats, and the animal according to those individuality determined learning ability. We analyzed glutamate receptors in the rat brain hippocampus and hypothalamus. In an individuality judgment, we carried out Improved Elevated Beam Walking Test that increased at height for 3 minutes. We defined the short stay type (S type) and the long stay type (L type) from the residence time on the open bridge. We carried out a two-image discrimination task using a touch screen recognition-learning device for a rat according to the individuality. The hippocampus and hypothalamus were dissected from the rat brain, and RT-qPCR analysis was performed using a specific primer of the GluR subtype. The expression level of NR1 mRNA was significantly increased in the right compared to the left in hippocampus. Western blotting could also reproduce the trend. Therefore, it may be inferred that the left-right difference of the NR1 receptor in the hippocampus has an influence on the acrophobia resistance.