An Assessment of Cognitive Disorder of Drosophila melanogaster by Chemical Substances in Food

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The human brain could be affected by various kinds of surrounding factors, including nutrition. However, it has not yet clearly understood how daily-encountered substances affect brain functions, such as behavioral control and learning ability. This study was designed to assess the cumulative effects of chemical intake on the memory-related learning ability. This study used the Drosophila melanogaster, due to mushroom bodies that control olfactory learning and memory, and their similar digestive system to that of a human. The study subject (Drosophila melanogaster) was reared in a feed media containing one of the test substances; sucralose (known as low-carb sugar), caffeine or alcohol. Sucrose (i.e. sugar) was used as a control substance in this study. Prior to the T-maze test, two weeks of training were conducted. In the first week, the subjects were trained to reach target points at the ends of T-maze (n=30/group). At the second week, they were trained after a fast to distinguish the effects between sucrose and sucralose. This is to confirm the ability to distinguish between sucrose and sucralose in an empty state. After the training, the memory function and learning ability were measured by T-maze test everyday for14 days. The effects of caffeine intake in memory function and learning ability were analyzed using the same protocol with different doses of caffeine (40.9mg/ml, 55mg/ml,77.2mg/ml). It should be noted that this study examined the brain damage not by the single-exposure to chemical substances, but by the small but chronic exposure. The data provides statistically significant evidence that the T-maze arrival speed due to the cognitive impairment is not the same for chemical substances.

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