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THE ACTIVITY OF GLYCOLYTIC AND ANTIGLYCATIVE ENZYMES IN MOUSE BRAIN UNDER INTERMITTENT FASTING

L. O. SISHCHUK, A. O. SEMCHUK

*Vassyl Stefanyk Precarpathian National University, Ivano-Frankivsk, Ukraine;
e-mail: sishchuklesia@ukr.net*

Introduction. Metabolic processes in brain occurring under normal food conditions and when food availability is experimentally reduced are usually close as possible. Such effect is not observed for other organs and can be explained by paramount importance of preservation of cognitive functions for survival. However, the effects of intermittent fasting may differ for various age groups. Our goal was to investigate the influence of intermittent fasting on the activity of glycolytic and antiglycative enzymes in order to find out how intermittent fasting influences glucose metabolism and level of carbonyl stress in brain of 12- and 18-month old mice.

Methods. For experiments, the animals were divided into two groups: (i) control – fed ad libitum and (ii) experimental – provided access to food every other day over 6-month period. Water was available ad libitum. The activities of hexokinase, phosphofructokinase, pyruvate kinase, glyoxalase 1 and glyoxalase 2 were measured spectrophotometrically in brain cortex.

Results. Generally, the activity of key glycolytic enzymes was significantly lower or demonstrated

tendency to reduction in experimental males and females if compared to respective control values. The effect observed was more pronounced in 18- than 12- month animals. The activity of glyoxalase 1 and 2 was not significantly different in control and experimental animals in both age groups studied.

Discussion. Decrease in the activity of key glycolytic regulatory enzymes in the brain cortex under conditions of limited food availability is suggested to be associated with reduced glucose level, since these enzymes are most sensitive to any changes in glucose level. Despite the fact that glycolytic and antiglycative enzymes are often closely related, the activity of glyoxalases 1 and 2 was virtually the same in all animal groups investigated, suggesting a little effect of intermittent fasting on carbonyl stress markers.

Conclusions. Intermittent fasting affects the brain more strongly than it was supposed, especially in old organisms.

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