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CENTRAL SEROTONIN AND TRYPTOPHAN LEVELS IN RATS WITH DIET-INDUCED OBESITY AT THE DIFFERENT TIME OF MELATONIN ADMINISTRATION

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Introduction. Obesity is often associated with a decreased level of brain serotonin. It was found on serotonergic neurons receptors for melatonin – a promising agent for the treatment of obesity [Ríos-Lugo M. J., 2015]. The aim was to detect changes in brain serotonin and tryptophan content on the obesity development under various (morning, evening and continuous) modes of melatonin administration.

Methods. Male rats were divided into 6 groups: 1) control – received a standard diet (C); 2) high caloric diet (HCD) group; 3) standard diet and melatonin treated group either 1 h after lights-on (M ZT01) or 4) 1 h before lights-off (M ZT11); 5) HCD and melatonin 1 h after lights-on (HCD ZT01) or 6) 1 h before lights-off (HCD ZT11). Melatonin was administered daily by gavage (M ZT01, M ZT11, HCD ZT01, HCD ZT11) or in drinking water (M W, HCD W) for 7 weeks (30 mg/kg). Both the tryptophan and serotonin content were analyzed using ion exchange chromatographic method (KM-sepharose). Hypothalamus serotonergic neurons were marked by histochemistry method of formaldehyde-induced fluorescence.

Results. The brain serotonin and tryptophan levels in the HCD were decreased by 30 and 15%, respectively, while the serum serotonin and tryptophan levels were increased by 40 and 20%. Melatonin administration increased the brain serotonin

and tryptophan level to control values (in HCD W group it was closer). Also, the quantity of serotonin-positive hypothalamic arcuate nucleus neurons after melatonin use was higher by 40% in HCD ZT01, by 63% in HCD ZT11 and by 68% in HCD W compared with HCD group. In addition the number of serotonin vesicles was calculated in each cell: the amount of vesicles in HCD group has decreased by 57%. The melatonin treatment improves the value of this parameter: its amount grew up compared with HCD – HCD ZT01 by 30% (although, its value significantly differs compared to C group), in HCD ZT11 by 47% and in HCD W by 51%. The serum serotonin level was lower by 25% (prominent status, differs compared to C group), 35% and 43% in HCD ZT01, HCD ZT11 and HCD W group, respectively; but tryptophan content was higher in all groups, which received melatonin, compared with HCD and C (HCD ZT01 – by 38%, HCD ZT11– by 35%, HCD W – by 31%).

Conclusions. Thus, the administration of melatonin (the best modes are continuous in water) can improve the state of hypothalamus serotonergic neurons in terms of the obesity development.

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