

Melatonin effect on the thymus cell composition in mice with functional pinealectomy

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Motivation and Aim: Prolonged continuous illumination contributes to the development of functional pinealectomy, a decrease in adaptive cellular and humoral immune response. The study aim was to investigate the melatonin effect on the content of young CD3^{low} and mature CD3^{hi} T-lymphocyte forms in the thymus of C57Bl/6j mice with a model of functional pinealectomy (FP).

Methods and Algorithms: Four animal groups were formed. "CL" – mice with the FP model, which was created by keeping animals under continuous lighting (CL) for 14 days (photoperiod light:dark 24:0 hours). "CL+MT" – animals with FP which were intragastrically injected with melatonin (MT, 0.664 g/kg body weight) in 200µl of distilled water daily against a background of CL. "CL+Placebo" – mice with FP which received water 200µl intragastrically daily. "Control" – intact mice kept under standard lighting mode (14:10 h). Immunophenotyping of CD3^{hi} and CD3^{low} thymocyte subpopulations was performed by staining using CD3-ARS antibodies and analyzed using a flow cytofluorimeter. Statistical analysis was carried out using Mann-Whitney test ("Statistica 12").

Results: In FP mice, both a decrease in the relative number of CD3^{low} and CD3^{hi} thymocytes and a significant decline in the CD3^{low}/CD3^{hi} ratio were found. Treatment of animals with melatonin under CL restored the percentage of CD3^{low} and CD3^{hi} thymocytes, as well as the CD3^{low}/CD3^{hi} ratio to control values.

Conclusion: Thus the results indicate that prolonged continuous illumination has a depressing effect on differentiation and maturation of young thymocytes into mature forms. Melatonin treatment in this model situation helps to compensate for the CL effects by triggering the process of cell proliferation in the thymus from the earliest stages. This indicates that melatonin has immunotropic properties and can be used to correct the consequences of functional pinealectomy.

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