

19. Tan D. X. Ischemia/reperfusion-induced arrhythmias in the isolated rat heart: prevention by melatonin. / Tan D. X., Manchester L. C., Reiter R. J., Qi W., Kim S. J., El-Sokkary G. H. // J. Pineal Res. – 1998. – V.25. – P.184–91.
20. Заславская Р. М. Мелатонин (мелаксен) в комплексном лечении ишемической болезни сердца / Р. М. Заславская, Г. В. Лилица, Э. А. Щербань // Практикующий врач. – 2006. – № 2. – С. 14–19.
21. Чуян Е. Н. Влияние хронического гипокинетического стресса на тканевую микрогемодинамику / Е. Н. Чуян, М. Ю. Раваева // Российский физиологический журнал имени И. М. Сеченова. – 2015. – Т. 101, № 3. – С. 316–325.

THE ROLE OF MELATONIN IN THE REGULATION OF MICROGEMODYNAMICS

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A method of laser Doppler flowmetry found that when daily 10-times with administration of melatonin (1 mg / kg) was observed change oscillator indicators tissue microhemodynamics, indicating an increase in perfusion of peripheral tissues and blood flow modulation in microvessels by improving endothelium-independent vasodilation, reduced peripheral resistance, increase blood flow in the microvasculature and Nutritional improvement venular outflow. Possible mechanisms of action of melatonin on tissue microhemodynamics.

The introduction of exogenous MT led to an improvement in tissue microhemodynamics due to an increase in endothelium-independent vasodilatation, a decrease in the activity of sympathetic adrenergic vasomotors and a decrease in peripheral resistance, an increase in blood flow to the nutrient microvascular bed, and an improvement in venular outflow.

Our data are consistent with the literature data and significantly supplement them with information that the vasodilatation effect of MT is realized in its ability to influence (and / or modulate) all the links of the multilevel control of microhemodynamics in which the endothelial activity, neurogenic, myogenic, pulse and respiratory components of the oscillations are involved in the implementation of the vasodilating effect of MT.

The results of this experiment complement our previous studies, make a significant contribution to understanding the mechanisms of therapeutic efficacy of MT and demonstrate the promise of further studies of the effect of MT on microhemodynamics in various experimental models.

Keywords: laser Doppler flowmetry, tissue microhemodynamics, melatonin.

References

1. Rapoport S. I., Malinovskaya N. K. Melatonin i serdechno-sosudistaya sistema. Terapevticheskiye vozmozhnosti melatonina u bol'nykh arterial'noy gipertenziyey, *RMZH*, 18, 3, 140 (2010).
2. Portaluppi F., Montanari L., Bagni B. et al. Circadian rhythms of atrial natriuretic peptide, blood pressure and heart rate in normal subjects, *Cardiology*, 76, 428 (1989).

3. Engel B. T., Talan M. I. Diurnal variations in central venous pressure, *Acta. Physiol. Scand.*, **141**, 273 (1991).
4. Viswanathan M., Laitinen J. T., Saavedra J. M. Expression of melatonin receptors in arteries involved in thermoregulation, *Proc. Natl. Acad. Sci. U.S.A.*, **87**, 6200 (1990).
5. Stankov B., Capsoni S., Lucini V. et al. Autoradiographic localization of putative receptors in the brains of two old world primates: cercopithecus aethiops and papio ursinus, *Neuroscience*, **52**, 459 (1993).
6. Makolkina V. I., Bran'ko V. V., Bogdanova Ye. A. *Metod lazernoy dopplerovskoy floumetrii v kardiologii*, Posobiye dlya vrachev, 48 (M.: Rossel'khozakademiya, 1999).
7. Kozlov V. I. *Metod lazernoy dopplerovskoy floumetrii: posobiye dlya vrachev*, 201 (M. Meditsina. 2001).
8. Hoffman U., Yanar A., Bolinger A. The frequency histogram – A new method for the evaluation of Laser Doppler Flux Motion. *Microvascul. Res.*, **40**, 293 (1990).
9. Stefanovska A., Bracic M. Physics of the human cardiovascular system, *Contemporary Physics.*, **40**, **1**, 31 (1999).
10. Schmid-Schonbein H., Ziege S., Grebe R. Synergetic interpretation of patterned vasomotor activity in microvascular perfusion: discrete effects of myogenic and neurogenic vasoconstriction as well as arterial and venous pressure fluctuations, *Int. J. Microcir.*, **17**, 346 (1997).
11. Arushanyan E. B. *Khronofarmakologiya na rubezhe vekov*, 575 (Stavropol', 2005).
12. Weekley L. B. Pharmacological studies on the mechanism of melatonin induced vasorelaxation in rat aorta, *J. Pineal Res.*, **19**, 133 (1995).
13. Satake N., Oe H., Sawada T., Shibata S. Vasorelaxing action of melatonin in rat isolated aorta: possible endothelium dependent relaxation, *Gen. Pharmacol.*, **22**, 1127 (1991).
14. Chuang J. I., Chen S. S., Lin M. T. Melatonin decrease brain serotonin release, arterial pressure and heart rate in rats, *Pharmacology.*, **47**, 91 (1993).
15. Martin F. G., Atienza G., Aldegunde M. [et al.] Melatonin effect on serotonin uptake and release in rat platelets diurnal variation in responsiveness, *Life Sci.*, **53**, **13**, 1079 (1993).
16. Yasin S., Bojanowska E., Forsling M. L. The in vivo effect of melatonin on neurohypophyseal hormone release in the rat, *J. Physiol.*, **475**, 142 (1994).
17. Cagnacci A., Arangino S., Angiolucci M., et al. Potentially beneficial cardiovascular effects of melatonin administration in women, *J. Pineal Res.*, **22**, 16 (1997).
18. Xia C. M., Shao C. H., Xin L. [et al.] Effects of melatonin on blood pressure in stress-induced hypertension in rats, *Clin. Exp. Pharmacol. Physiol.*, **35**, **10**, 12 (2008).
19. Tan D. X., Manchester L. C., Reiter R. J., Qi W., Kim S. J., El-Sokkary G. H. Ischemia/reperfusion-induced arrhythmias in the isolated rat heart: prevention by melatonin, *J. Pineal Res.*, **25**, 184 (1998).
20. Zaslavskaya R. M., Lilita G. V., Shcherban' E. A. Melatonin (melaksen) v kompleksnom lechenii ishemicheskoy bolezni serdtsa, *Praktikuyushchiy vrach.*, **2**, 14 (2006).
21. Chuyan Ye. N., Ravayeva M. YU. Vliyaniye khronicheskogo gipokineticheskogo stressa na tkanevuyu mikrogemodinamiku, *Rossiyskiy fiziologicheskiy zhurnal imeni I.M. Sechenova.*, **101**, **3**, 316 (2015).