

INFLUENCE OF CHRONIC EXPOSURE TO WEAK VARIABLE MAGNETIC FIELD ON ANTIOXIDANT ACTIVITY IN RATS WITH EXPERIMENTAL INFLAMMATION. G. Cieslar¹, J. Mrowiec¹, J. Zalejska-Fiolka², E. Birkner², S. Kasperczyk², A. Sieron¹. ¹Chair and Clinic of Internal Diseases, Angiology and Physical Medicine, Silesian Medical Univ, PL-41902 Bytom, Poland, ²Chair and Dept of Biochemistry, Silesian Medical Univ, PL-41808 Zabrze, Poland.

Objectives The aim of the study was to estimate the influence of chronic exposure to weak variable magnetic field used in magneto-stimulation on activity of some antioxidant enzymes in rats with experimental inflammation. **Methods:** Experimental material consisted of 128 male Wistar rats weighting 180-200 g. Weak variable magnetic field of saw-like shape of impulse, at a frequency of basic impulse 180-195 Hz and induction of 60 μ T generated by device for magneto-stimulation Viofor JPS (Poland) basing on ion cyclotron resonance phenomenon was used. All animals were randomly divided into 4 groups (32 animals each). In first group whole body exposure to magnetic field lasting 36 minutes daily for 14 consecutive days was made. In second - control group sham-exposure without generating magnetic field inside of applicator lasting 36 minutes daily for 14 consecutive days was made. Rats in third group were injected with 50 μ l of 5% solution of formaldehyde in region of right hip and after 24 hours were subjected to the same exposure cycle as in first group. The animals in fourth - control group were also injected with 50 μ l of 5% solution of formaldehyde in region of right hip and then after 24 hours were subjected to the same sham-exposure cycle as in second group. In all groups at 7th and 14th day of repeated exposures or sham-exposures and at 7th and 14th day after the end of a cycle of exposures every time a part of animals (8 rats from each group) was exsanguinated in ether narcosis. In obtained blood and hemolysates of erythrocytes samples contents of some antioxidant activity indicators: activity of catalase (CAT), glutathione peroxidase (GPX) and superoxide dysmutase (SOD) in erythrocytes, activity of isoenzymes of superoxide dysmutase (Mn-SOD and ZnCu-SOD)) in serum as well as serum concentration of malondialdehyde (MDA) was determined by means of spectrophotometric and kinetic methods. In the statistical evaluation ANOVA analysis with subsequent post-hoc Mann-Whitney's U test were used. **Summary of results:** The activities of antioxidant enzymes as well as serum malondialdehyde concentration in particular groups of rats are presented in table 1. In magnetic field-exposed group a significant decrease in activity of most of analyzed antioxidant enzymes both in erythrocytes and serum during exposure cycle was observed as compared to a group of rats with experimental inflammation, in which these activities were significantly increased comparing to control group. Besides in both magnetic field-exposed groups a significant decrease in malondialdehyde serum concentration during exposure cycle was obtained. **Conclusion:** Chronic exposure to weak variable magnetic field used in magnetostimulation basing on magnetic resonance phenomenon causes a beneficial effect antioxidant reactions in course of experimental inflammation in living organisms.

Table 1 The activity of some antioxidant enzymes in serum and erythrocytes and serum concentration of malondialdehyde in all groups of rats in particular days of exposure cycle with statistical evaluation to control group

Parameter	Group	Day of exposure or sham-exposure			
		7 day of exposure cycle	14 day of exposure cycle	7 day after the end of exposure cycle	14 day after the end of exposure cycle
Activity of CAT in erythrocytes					

[IU/mgHb]	Control	197,3	168,9	152,0	158,4
	Inflammation	142,4**	117,8**	211,1	102,9**
	Magnetic field	178,8	112,3**	105,5*	88,0**
	Magnetic field + inflammation	177,9	118,5**	115,3**	97,6**
Activity of GPX in erythrocytes [IU/gHb]	Control	139,7	79,6	118,2	60,2
	Inflammation	271,2**	164,4**	138,3	73,2
	Magnetic field	141,3	107,0*	103,1	118,7**
	Magnetic field + inflammation	102,6	117,6**	118,2	138,2**
Activity of SOD in erythrocytes					
[NU/gHB]	Control	135,7	132,5	122,0	285,6
	Inflammation	117,3	99,6	185,9	141,4**
	Magnetic field	97,1	169,9	220,7*	172,5**
	Magnetic field + inflammation	55,9	168,6	220,9*	152,1**
Activity of Mn-SOD in serum [NU/ml]	Control	8,2	12,0	13,2	7,7
	Inflammation	5,8*	9,3	3,2**	4,4
	Magnetic field	5,4*	8,6	3,6**	4,9
	Magnetic field + inflammation	3,4*	5,7**	3,0**	4,4
Activity of ZnCu-SOD in serum [NU/ml]	Control	19,2	15,4	18,4	21,7
	Inflammation	24,3*	20,4	24,7*	22,5
	Magnetic field	21,9	21,9	26,1*	26,1*
	Magnetic field + inflammation	20,0	22,0	27,5*	28,6*
Concentration of MDA [μ mol/l]	Control	6,3	6,2	4,1	5,0
	Inflammation	4,9	4,3	3,7	3,4*
	Magnetic field	3,0**	2,9**	3,3	4,6
	Magnetic field + inflammation	3,9**	2,9**	3,5	4,6