experimental magnetic stimulator with a repetition rate close to 20 pps and with water cooling. This apparatus allows for a multi-parametric research on biological effects of rTMS. With this apparatus, we stimulated a series of rats with a unique exposure sequence consisting in 20 trains at 10 Hz for 10 s with 50 s-intervals. Rats were exposed to rTMS signals produced by a coil placed on the top of the skull but not touching the head, with the coil parallel to the skull and the coil axis passing through the bregma point, as defined in the atlas of Paxinos and Watson (1986). Magnetic pulses induced by one-sine currents (duration 340 μs), and with an amplitude reaching 80% of the hind-limb motor threshold were used (peak field around 1 T). These values are within the safety limits published by Wassermann (1998) and are close to the protocol followed by Pr Auriacombe at the Charles Perrens hospital (Bordeaux, France) in a clinical trial. A total of 2000 pulses were delivered to the animals. The starting direction of rTMS signals in the brain was clockwise. Mapping of the induced electric field, hence of the induced current density, was established for the flat 6.3 cm diameter coil used in this experiment. Eddy currents induced in the rat brain were calculated using a rat head model derived from the Brooks model constructed from MRI images in the rat. Tissue conductivities were estimated from low-frequency literature data. A software designed in the MatLab environment, based on the resolution of node and mesh equations, was used and validated. Peak current densities in the brain were estimated at around 10 A/m^2.
RESULTS: Rats exposed to rTMS or sham exposed were restrained during exposure, which necessitated a period of habituation. Different groups of four animals were evaluated: (i) animals exposed to the rTMS signal, (ii) control animals for assessing the effects of contention and noise produced by the magnetic stimulator, (iii) cage controls with free movements and unexposed to noise, and (iv) positive controls. After exposing animals in vivo, the protocol was blinded (coded animals), and the evaluation of DNA damages in isolated brain cells done using the alkaline comet assay. The analysis of the experiment is in progress.
CONCLUSION AND PERSPECTIVES: The results on the ability of a single daily sequence of rTMS signals to induce DNA damages will be presented. These are part of a set of experiments dealing with cellular toxicity of signals with a high dB/dt. The next set of experiments will assess the effects, in the rat, of a clinical paradigm (20 min/day, 5 days/week, 2 to 4 weeks). Further studies will use in vitro exposure to rTMS signals for the evaluation of the induction of micronuclei and apoptosis in nerve cells.
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INFLUENCE OF CHRONIC EXPOSURE TO WEAK VARIABLE MAGNETIC FIELD ON SERUM LIPIDS IN RATS. G. Cieslar[1], J. Zalejska-Fiolka[2], E. Birkner[2], S. Kasperczyk[2], A. Sieron[1]. [1]Chair and Clinic of Internal Diseases, Angiology and Physical Medicine, Silesian Medical Univ, PL-41902 Bytom, Poland, [2]Chair 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 serum concentration of cholesterol and triglycerides in rats. Methods: Experimental material consisted of 48 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 120μT generated by device for magneto-stimulation VIOFOR JPS (Poland) basing on ion cyclotron resonance phenomenon was used. All animals were randomly divided into 2 groups. In first group (40 animals) whole body exposure to magnetic field lasting 36 minutes daily for 14 consecutive days was made. In this group at 24 hours after first exposure, then at 7th and 14th day of repeated

exposures and at 7th and 14th day after the end of a cycle of exposures every time a part of animals (8 rats) was exsanguinated in ether narcosis. The last 8 animals made up a control group. They were exsanguinated in ether narcosis without any exposure to obtain reference values of particular lipid parameters. In obtained blood samples concentration of total cholesterol (α-diagnostics, Poland), HDL-cholesterol (α-diagnostics, Poland) and triglycerides (α-diagnostics, Poland) was determined. The concentration of LDL-cholesterol was calculated as difference between total cholesterol and HDL-cholesterol concentration. In the statistical evaluation ANOVA analysis with subsequent post-hoc Mann-Whitney's U test were used. Summary of results: The concentrations of particular serum lipids in consecutive days of exposure cycle are presented in table 1. A significant increase of total cholesterol serum concentration during exposure cycle with subsequent significant decrease at 7th day after the end of exposure cycle and normalization at 14th day after the end of exposure cycle was observed as compared to control values. Similar changes of LDL cholesterol serum concentration were also observed. On the other hand a significant decrease in HDL cholesterol serum concentration in last phase of exposure cycle and at 7th day after the end of exposure cycle with subsequent normalization at 14th day after the end of exposure cycle was obtained. Triglycerides serum concentration was significantly higher as compared to control values only at 7th day of exposure cycle. In other days no significant changes of this parameter were observed. Conclusion: Chronic exposure to weak variable magnetic field used in magneto-stimulation basing on ion cyclotron resonance phenomenon causes only transient changes of serum lipids concentration during exposure cycle.

Table 1 Serum concentration of cholesterol fractions and triglicerides in magnetic field-exposed rats and control group in particular days of exposure cycle with statistical evaluation to control values before exposure

Day of exposure cycle	Total cholesterol [mg%]	HDL cholesterol [mg%]	LDL-cholesterol [mg%]	Triglycerides [mg%]
	Mean value ± SEM	Mean value ± SEM	Mean value ± SEM	Mean value ± SEM
Before exposure	70,9±1,5	30,4±1,2	40,5±1,3	41,5±4,5
1 day of exposure	80,8±3,7*	31,0±2,4	49,8±3,0	45,0±9,2
7 day of exposure	75,3±4,3	25,4±1,1*	49,9±2,7*	79,7±7,1**
14 day of exposure	78,8±3,9**	27,6±2,4	51,2±3,2*	29,3±4,5
7 day after the end of exposure	54,8±3,7***	26,1±1,6*	28,7±2,6*	26,1±1,6
14 day after the end of exposure	69,9±5,2	28,1±2,7	41,8±3,9	28,1±2,7

*p les 0,05, **p less 0,01, ***p less 0,001

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