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THE TOPICAL AND TEMPORAL CHANGES IN QUANTITATIVE ELECTROENCEPHALOGRAPHY OF HIGH QUALIFICATION ATHLETES OF DIFFERENT SPECIALIZATIONS DURING ONE YEAR TRAINING PROCESS

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The Sports Council (London) on behalf of the Open Section of the British Association of Sports Sciences commissioned a review to provide information pertinent to the formulation of a strategy that would guide fundamental sports science research in the UK and propose directions for future research. The four topics were peaking, talent identification, adherence and injuries (Burwitz L. et al., 1994). Neurobiofeedback has used since 1967 with the aim to treat some illness and with the aim to achieve the peak performance in athletes (Angelakis E. et al., 2007).

The relation between humane performance and they functional condition described as parabolic curve and carried in practice the notion of optimum functional condition. However, in spite of conspicuity of practical value of the problem of the functional condition, methods of its diagnostics and optimization remain it is not enough studied (Danilova N.N., 2003). With reference to the training process of the elite athletes there is very small number of the studies intercoupling the functional condition and electrical activities of the cerebrum, executed by method visual-logical description of electroencephalogram (EEG). Study of the quantitative factors of electroencephalogram (QEEG) will allow to get elaborating dates about relationship of QEEG with functional condition of athlete and to get new predictors to the athlete's capacity.

The purpose of this investigation was to obtain the additional dates about QEEG of high qualification athletes during the large circle of there training and competition process.

The organization and the methods of investigation

The number of athletes have took participate in the study were 81. Athletic specialization was ski racing at 17 participant, biathletes were 6, hockey were 24, volleyball were 14, football were 10, box were 4, fight were 4, swimming was 1 and billiards was 1. The sportive qualifications of participants were following: the master of sport of international class – 3; the master of sport – 12; the candidate master of sport – 34; first category – 32. The participant's age was 20 ± 1,7 years. Male persons were 57 and female persons were 24. The survey at starting-up period was performed at

August - a September. The survey at competitive period was performed at November - February. The survey at transitional period was performed at March - a May.

The electroencephalogram was carried out with 21-channels electroencephalograph on standard method. The monopolar electrodes were mounting using 10-20 scheme with separate ear's referential electrodes. The statistical analysis includes the descriptive statistics, simple linear correlation (Pearson), non-parametric methods (sign test and Wilcoxon's matched pairs test), the t-test for dependent samples.

Results

The significant changes of the EEG alpha index in sportsmen were finding under F_3, F_4, T_5, P_3, P_4, O_1, O_2 electrodes from starting-up to competitive period of training year. The alpha index increased from 0,5% to 4,3% in F_3 point and from 2,1% to 8,0% in F_4 point. On the contrary the alpha index decreased from 12,3% to 3,2% in T_5, from 21,4% to 13,5% in P_3 , from 24,0% to 3,1% in P_4, from 17,0% to 4,1% in O_1, from 24,7% to 2,5% in O_2 points. The value of alpha index returned to the former level from competitive to transitional period.

The positive correlation of alpha index had power at rate of +0,9 between the EEG electrodes in standard locations Fp_2, F_z, F_4, F_8, and in locations C_4, P_z, P_4, T_6, O_1, O_2, and in locations P_3, P_z, P_4, T_6. The negative correlation of alpha index had power at rate of -0,8 between the EEG electrodes in standard locations C_4, Fp_2, F_8, and in locations O_2, Fp_2, F_8 at the begin of the training year. The correlation of alpha index had only positive direction over the entire convex surface in the competitive period. The negative direction of correlation was not found in the competitive period.

The correlation of alpha index had both positive and negative directions again over the entire convex surface in the transitional period. Two pleiades of neuronal ensembles had formed with positive direction of correlation with power at rate of 0,6 to 0,9 in the transitional period. The largest pleiade merged occipitalis, parietalis, temporalis and some centralis neuronal ensembles (O_1, O_2, T_5, P_3, P_z, P_4, T_6, T_3, C_4). The second one merged frontalis neuronal ensembles (Fp_2, F_7, F_z, F_4, F_8). The negative correlation with power at rate of -0,6 to -0,8 had formed between rostral and caudal pleiades.

Conclusions

The EEG alpha index in sportsmen under frontal electrodes increased, and under some temporalis, parietalis and both occipitalis electrodes decreased from the starting-up to the competitive period of the training year. The value of alpha index returned to the former level from the competitive to the transitional period.

The number, direction and power of correlation between the neuronal ensembles under 19 standard electrodes had changed from starting-up to competitive period of training year. The negative correlation between rostral and caudal neuronal ensembles became small in number and cease detecting at all in some categories of athletes. The positive correlation between neuronal ensembles under 19 standard electrodes became small in number. The recovering of number and direction of correlation was finding after 2 – 4 weeks of the transitional period passed.

It is supposed that certain QEEG factors characterized functional condition of athletes. The QEEG factors changing during large circle of training process make actual searching for additional facility for the athlete's functional condition regulation.

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COMBINED ACTION OF REMOTE EFFECTS OF RADIATION IN THE DOSE OF 2 GR AND ASBEST DUST ON ACTIVITY OF ENZYMES OF PURINE NUCLEOTIDES CYCLE

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Purpose: Is a study of combined influence of gamma-radiation in the remote period in the dose of 2 Gr and chrysotile-asbest dust on activity of enzymes of the purine's nucleotides metabolism – 5'-nucleotidasae (5'-NT), adenosindesaminasae (ADA), adenilatdesaminasae (AMF-asae) in different organs and tissues in experiment.

Material and methods: For achievement of the present aim we execute experiments on 45 outbreed sexually mature white male rats, which were subdivide on 3 groups: I intact group (n=15), II groups persecute chrysotil-asbestos dust (n=15), III group – combined influence of radiation and asbest dust (n=15). In the II and III groups at animals was simulated the black-lung disease (dust disease) to methods of E.N.Gorodetskaya (1954). The animals of the III d group were irradiated 90 days up to research on the radiotherapeutic installation Teragam ^{60}Co in a dose 2 Gr unitary. We used for the research lymphocytes of peripheral blood and prepared masses from the cells of liver, spleen, thymus and lymphatic nodes of small intestine, adrenal medulla. The results of research were processed by the standard methods of variational statistics with calculation of criteria by t-Student. Estimated the activity of 5'-NT, ADA, AMF-asae.

Results: It is estimated that the activity of 5'-NT and ADA in the spleen in the animals of III group in the remote period reduces to 0,136±0,026 nmol/s mg protein ($p \leq 0,001$) and to 1,121±0,071 nmol/s mg protein ($p \leq 0,01$) accordingly. The activity of 5'-NT in the lymphatic nodes of small intestine in animals of II