

Dynamics of process of memory at influence of audio-visual stimulation

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Currently, due to the unprecedented growth of different kinds of loads on the general functional state (FS) of the organism the special attention is paid to the searching of new tools and methods of increasing the human functionality [3]. More actual is using of non-invasive and drug-free means to prevent modification and to improve the level of FS, in particular cognitive brain activity [1]. One of such approaches is the method of audio-visual stimulation (AVS), the impact that is based on targeted activation of reserve capacity of the organism [4,5,6]. It is known that the using of AVS sessions during the learning process is designed to enable a person to learn to control his inner psychological mood for expansion of memory, attention and creativity [2].

The aim of the work was to study the effects of long AVS exposure on memory processes. The objectives of the study were: to clarify the nature of the impact of AVS on memory processes, to study the dynamics of short-term and long-term memory in continuous stimulation.

Material and methods

The study involved 12 practically healthy volunteers of 23-27 years. The study took place in an isolated experimental room, in the comfortable atmosphere for tested volunteers. The modern portable device of light and sound stimulation "Photosonix Inner Pulse" was used for the procedure. This device allows selecting specifically the intensity and frequency of exposure. For stimulation was used the flashing light and pulsating sound with a stimulus frequency of 4,5-14 Hz. During 15 days any tested continuously held 30-minute session of AVS. Memory processes were investigated using a specially designed psycho-physiological test "Memory Capacity Biotester" defined the span of short-term memory and the speed of retrieval of information from long-term memory (Computerized test of quick evaluation of memory capacity). The following parameters were calculated: speed of extraction of information from long-term memory (Sp-LTM), quantity of the memorized letters (QMT), time of memorization (T-Mem), capabilities of short-term memory (Cap-SHTM), span of short-term memory (Span-SHTM).

Statistical processing of 15-days research results were averaged with three-day intervals. During the research the arterial pressure (AP) was measured three times and also was determined the heart rate (HR). Statistical analyses were performed with MS Excel 2010. The level of significance between parameters was tested by the unpaired t-test.

The results of research showed that in dynamics of 15 days there was a significant ($p < 0.05$) decrease of Sp-LTM (5.2%) and an increase of Span-SHTM (7.1%). There was a significant increase of QMT and Cap-SHTM and reduction of T-Mem.

Some changes in AP and HR in AVS were revealed. The reduction of AP and slowing of HR became apparent. However, these changes were not reliable. Most probably the AVS had a calming, relaxing effect on the FS of tested volunteers. But taking into account their age these changes were bland.

Thus, the results of conducted research allow suggesting that prolonged exposure of AVS effectively impacts to memory processes. In all probability there is an extension of neural processes that contribute the formation of new neuronal flexible connections.

We believe that this technique is promising for the study of neuro-physiological mechanisms not only of memory processes, but also of all cognitive processes.

Источники и литература

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