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EVIDENCE OF MOTOR STEREOTYPE DESTRUCTION UNDER MICROGRAVITY CONDITIONS

Abstract

Introduction. The purpose of the study was to explore effects of weightlessness on characteristics of stereotype motor reactions registered during visual target acquisition task. Methods. The studies were provided with 7 cosmonauts members of 186-198 days Mir missions. Test sessions were performed 4 times before launch, once a month during flight, and twice after landing (R+2 and R+5). The subjects were to perform the target acquisition task with coordinated eye-head (test 1) and eye-arm (test 2) movements in the horizontal and vertical planes on targets that appeared at a distance of 16 angular degrees in a random order right- left-, up- and downwards from the center. Characteristics of eye, head and arm movements were recorded with the MONIMIR system (Austria). Results. Target acquisition tests were provided before flight by joint eye and head (for test 1) and eye and arm (for test 2) movements. All the reactions started by eye saccade toward the target with the latency of 200-230 ms. The start of the movement of the second component of complex (head or arm) delayed by 30-70 ms. During SF the latencies of head and arm movements increased on 30-60ms. As a result the organization of reaction changed considerably - in more than 60% of cases the joint complex of movements was divided into two separated following each other motor acts: the head (for test 1) or the arm (for test 2) began their movements only after accomplishing of the eye saccade, i.e. after getting the visual feedback. In some of the cosmonauts the number of the reactions with destructed motor complex reached 85-90%. The organization of the reactions recovered very fast after landing: on the 5th postflight day the number of reactions with altered coordination didn't exceed 10%. Conclusions. Changes in the characteristics of reactions under study being recorded in the course of long-duration SF point out to motor stereotype destruction and the dominance of visual input in organization of complex reactions in space. The study was supported by RFBR grant N10-04-01709.