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THE EFFECTS OF DIPHENIDOL ON BRAIN COGNITIVE PROCESSING IN SPECIAL ENVIRONMENT AND SPACE FLIGHT

Abstract

Objective Diphenidol administration has been used as a preventive measures for space motion sickness in China. As diphenidol has mild anticholinergic effects, it is hypothesed that diphenidol may have some negative role in brain cognitive processing. This project focused on the effects of diphenidol on brain cognitive processing in special environment and space flight. Methods (1) Comparative study of auditory cognitive effects of diphenidol, promethazine, dimenhydrinate and placebo. (2) The effects of acute -6deg head-down tilt 3h on space and feature attention immediately after 3 days diphenidol administration. (3) The effects of 30 days -6deg head-down bed rest on space and feature attention. (4) The effects of space flight on space and feature attention after 3 days diphenidol administration. Results (1) Compare with promethazine and dimenhydrinate, the administration of diphenidol had little effects on auditory cognitive processing. (2)Blood redistribution speeded up the complete of choice attention tasks. The N1-P2 peak-peak amplitudes decreased during no response task after diphenidol administration in contrast to placebo. In the no response task, the cowork of blood redistribution and diphenidol can reduce the expectation for visual stimuli of the cognitive task that is enhanced for diphenidol. For the feature attention task the central active inhibition function was dropped,and for space attention tasks the need of mobilization of brain resources was enhanced after diphenidol administration.For the task that contained feature and space attention, the efficacy of brain updating was slowed down. (3) The mean amplitudes of P1 and N1 for target ERPs decreased in the 3rd day during bed rest and 5th day after bed rest in comparison with pre-bed rest, 15th day and 30th day during bed rest. In the combined color–direction selective response task, the P1 latencies for target ERPs on the 3rd and 30th day during bed rest were longer than on the 15th day during bed rest.The results help to clarify the effects of bed rest on different task loads and patterns of attention. (4) The perception of feature attention signal, the differentiation and judgement in space attention slowed down in the 6th to 8th days of space flight. Conclusion It was suggested that the brain activity for stimuli perception were decreased when performing no response task after diphenidol administration. The negative effects of diphenidol on brain cognitive processing were enhanced after it was combined with special environmental stimuli and higher brain workload.