

SPACE LIFE SCIENCES SYMPOSIUM (A1)  
Behaviour, Performance and Psychosocial Issues in Space (1)

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SOME PSYCHOPHYSIOLOGICAL AND BEHAVIORAL ASPECTS OF ADAPTATION TO  
SIMULATED AUTONOMOUS MISSION TO MARS

**Abstract**

In the third part of Mars-105 experiment in order to simulate autonomous flight conditions, serious restrictions were established for the crew re-supply and communication with Mission Control (MC). In accordance with our hypothesis, these restrictions could have significant impact on human adaptation to the isolation and confinement in hermetic chambers. The objective of the study was to investigate psychophysiological and behavioral aspects (communication) of adaptation during autonomous conditions.

*Content analysis of communication.* Crew communication with MC should be regarded as a part of their professional performance, as well as individual behavior. Its analysis allows of investigating astronaut's personality, needs, motivation and psycho-emotional state. In Mars-105 for the first time we made computerized analysis of the crew written daily reports. With the help of NOOJ computer software we calculated the frequencies of utilization of certain statements and words, expressing different psychological functions. *Biochemical tests.* In order to estimate the level of psychophysiological stress concentration of urinal cortisol was estimated twice a week. *Psycho-emotional state analysis.* In order to investigate this parameter the questionnaire SAN, estimating Mood, Activity and Health was used twice a week.

In previous space simulations (HUBES-94, ECOPSY-95, SFINCSS-99) two periods in crew communication with MC were detected, corresponding to the stages of adaptation to the isolation and confinement. During the first period crew communication was very intensive and emotional, that shows problems of acute period of adaptation to extreme environments. Further the scope of communication was considerably decreasing. Its content became poorer and less emotional.

In Mars-105 we again observed previously detected tendencies that were vivid until the period of autonomous flight. During the simulation of autonomous flight different tendencies of communicative behavior were found. For two subjects (B and E) we observed the increase of reports' length and the

number of statements, attributed to the categories “Needs”, “Activity”, “Negation” and “Social regulation”. That was correlated with the improvement of their mood according to SAN. Cortisol level for these two subjects was comparatively low. For the other 2 subjects (C and F) tendency of changes was opposite. We detected decrease of the report’s length and utilization of statements, attributed to categories “Needs”, “Activity” and “Negation”. At the same time, both subjects still wrote considerable amount of statements, attributed the “Social regulation” category. That was accompanied by the decrease of mood and activity according to SAN. Their cortisol level was increasing.