Sensorimotor Test in 48 Hours Dry Water Immersion (Arm Matching Test)

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Abstract

Results previously obtained in Dry water immersion (DWI) experiments suggest that changes in proprioceptive input due to sensory deprivation can disturb the usual patterns of body scheme and modify movement sense as well as position awareness. Sensorimotor performance (arm matching tests) was compared pre, in and post Dry Water Immersion. To simulate microgravity a water-filled pool was covered with a thin foil on which the subjects were lying in supine position as motionless as possible. Experiments were performed with four healthy volunteers (age ranged from 24 –30 years) pre-, during (12 hrs, 24 hrs, 36 hrs) and post -immersion (48 hrs, 49 hrs). ZEBRIS CMS-50, an ultrasonic distance measuring system, recorded the absolute co-ordinates of the moved arms (setting arm, matching arm). Every 12 hours in DWI the subject was blindfolded and got in touch with a platform which was lifted. Immediately the setting arm was passively and slowly moved by the experimenter into one of three arm positions (45°, 90°, 135°). The Radial Error represents the absolute deviation of the matched arm from the position of the setting arm in the moment of matching. It depended significantly on position and phase (pre-, in-, post-immersion) but not on subject or setting arm and it was significantly largest in the post-immersion phase. It was shown that matchings in-immersion and post-immersion are more variable than those pre-immersion, especially in position 135°.

The arm matching test, a neurological functional test, can be performed without difficulty under normal conditions. The results in- and post-immersion showed a remarkable impairment due to the lack of necessary proprioceptive information. In the post-immersion phase more than one hour of recalibration and updating of the sensorimotor system was necessary to reduce the errors in matching the arms.

5th INTERNATIONAL HEAD-OUT WATER IMMERSION SYM RESEARCH SIMULATIONS TO MODEL MIC

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Wednesday, October 9, 2002

10:30 - 12:15 Lecture Hall	Session 6 – Dry Immersion	I. Kozlovskaya, M.D, Ph.D. and C. Sawin, Ph.D., Co-Chairs
10:30 - 10:45	Dry Immersion as a Powerful Tool in Studies of Sensory-Motor Effects of Microgravity	I.B. Kozlovskaya
10:45 – 11:00	Changes of Reflex Amplitude in Dry Water Immersion	W. Struhal, M. Berger, F. Gerstenbrand, S. Golaszewski, S. Lechner-Steinleitner
11:00 – 11:15	Sensorimotor Test in 48 Hours Dry Water Immersion (Arm Matching Test)	M. Saling, S. Lechner-Steinleithner, F. Gerstenbrand, W. Struhal, M. Berger
11:15 – 11:30 Great Room	Break	
11:30 – 11:45	Cerebral Activation Pattern Before and After Dry Water Immersion	S.M. Golaszewski, F. Gerstenbrand, W. Struhal, E. Gallasch, M. Berger, S. Lechner-Steinleithner, C.M. Siedentopf, S.R. Felber
11:45 – 12:00	Effect of Foot Support Zones Stimulation on Muscle Transverse Stiffness and Venous Compliance Under Conditions of Dry Immersion	O.L. Vinogradova, D.V. Popov, I.V. Saenko, I.B. Kozlovskaya
12:00 – 12:15	Effects of Three Days of Dry Immersion on Muscle Sympathetic Nerve Activity and Arterial Blood Pressure in Humans	S. Iwase, Y. Sugiyama, C. Miwa, A. Kamiya, T. Mano, Y. Ohira, B. Shenkman, A.I. Egorov, I,B. Kozlovskaya
12:30 – 13:30 Berkner Rooms	Lunch	