Space neurology and the use of its scientific results in neurorehabilitation

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The research goal of space neurology is to get new information about the influence of the microgravity (weightlessness) on the nervous system using the results in basic research as well as in application in the routine neurology. A spin-off effect of the experiments is the development new methods for neurodiagnostics and neurorehabilitation. Only a minimal part of the research programme in space medicine takes place under the condition of the real microgravity during space flights or in the orbit station (ISS). Most experiments are performed in ground based laboratories by using the methods of simulated microgravity (head down tilt system – HDT, dry water immersion model – DWI). In the real microgravity as well as in the simulated micro gravity disturbances of the function of nervous system occur, caused by diminished or changed stimulation of the receptors in the foot sole, the vertebral spine joints etc., with changed information through the afferent system to the brain, the proprioceptive system. The proprioceptive system is responsible for the control of the position of the human body and for the human movements in the gravity field of the Earth. During long-term stay in real micro gravity, like it happened in the situation of the crew in the ISS space station, complex musculosceletal failures as well a disturbance in postural controlling occur. Without appropriate countermeasures during the training of astronauts/cosmonauts, the "cosmonaut syndrome" is developing (polyneuropathy, primary muscle atrophies, posterior column disturbances, thalamic sensations, reduction of cognitive functions and of the vigilance. Rapid restoration after return to the Earth's atmosphere is normal. In the situation like a simulated microgravity during long-term bed fastness, the "bed-rest-syndrome" can be observed (long lasting coma state, Apallic syndrome, other long-term bed stay). A bed rest syndrome can occur in elderly people with motion deficits. The symptoms are similar to cosmonaut syndrome (polyneuropathy, primary muscle atrophy, posterior column disturbances, cognitive failures, declining in vigilance and a vegetative dysbalance). For neurodiagnostic and neurorehabilitation the scientific results in the real and simulated micro gravity can be used for new diagnostic methods and for the development of new medical equipment. The observation of experiments in the simulated micro gravity showing an intensifying of minimal neurological failures can be used for new neurodiagnostic methods applied for early diagnosis in Parkinson Syndrome, Spasticity, Frontal Lobe Signs, etc. In neurorehabilitation different methods to stimulate the proprioceptive system are developed (Pressure Shoe, Cosmonaut Trousers, etc.). Parkinson symptoms, spasticity, cerebellare disturbances and Apallic patients can be influenced in its course. Additionally, in the development of a bed rest syndrome the Pressure Shoe can show a positive effect.

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V WARSZTATY SZKOLENIOWO-NAUKOWE
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PROGRAM NAUKOWY / SCIENTIFIC PROGRAMME

6 maja 2009 (środa) / May 6, 2009 (Wednesday)

15.00 – 18.00 NEUROSONOLOGIA / NEUROSONOLOGY
Przewodniczący / Chairpersons: Z. Stelmasiak, J. Wojczal

M. Pawlak – Optymalizacja obrazowania przepływu krwi przez mózg za pomocą przezczaszkowej ultrasonografii dopplerowskiej z obrazowaniem w kolorze oraz angiografii MRI
Optimized assessment of cerebral blood flow using transcranial color-coded ultrasound and magnetic resonance angiography

G. Kozera – Autoregulacja naczyń mózgowych a mikroangiopatie mózgowe
Cerebral autoregulation and cerebral microangiopathy

M. Wawrzyńczyk – Ultrasonograficzna diagnostyka choroby Takayasu
Assessment of Takayasu arteritis with sonography

J. Wojczal – Krwiaki śródścienne pourazowe naczyń domózgowych
Posttraumatic intramural hematoma of extracranial brain supplying arteries

D.Russell – Embolus detection and differentiation: Now and the future

WARSZTATY SZKOLENIOWE

18.30 – 20.00 OTWARCIE / OPENING CEREMONY

18.30 – 19.00 Powitanie gości

19.00 – 20.00 Danube lectures:

***Przewodniczący / Chairpersons*: F. Gerstenbrandt, L. Vécsei, Z. Stelmasiak**

F. Gerstenbrandt – Space neurology and the use of its scientific results in neurorehabilitation

A. Korczyn – Vascular contribution to dementia in parkinsonism

20.30 – 22.00 Kolacja w restauracji hotelowej / Supper at the hotel restaurant

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