

**The influence of simulated microgravity on motor cortex activation
patterns: A f-MRI study**

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Abstract:

Dry Water Immersion (DWI) offers an excellent opportunity to simulate some of the effects of microgravity in ground-based laboratories. It modifies the organisation of afferent sensory information which is involved in neural encoding of the position of parts of the body and in programming sensorimotor activity and motor regulation.

To proof the influence of DWI on sensorimotor co-ordination, the central activation patterns of fingertapping before and after 48 hours DWI and 7 days after sensory deprivation were compared, using f-MRI.

For 48 hours four healthy male vonunteers (aged 24 to 30) were lying nearly motionless on a thin foil on the surface of water-filled tanks. The experimental setup consisted of a baseline fMRI examination before DWI, a second f-MRI investigation immediately after 48 hours DWI and a third f-MRI examination one week after. The test motor task was fingertapping.

After DWI three out of four healthy volunteers showed extensive changes of the cortical brain activity of the primary motor, primary sensory cortex and the premotor area. The supplementary motor area was activated more than 100% after sensory deprivation in all four subjects. Additionally new activation within the ipsilateral Globus Pallidus was observed. One week after, these changes could not be found anymore.

Key words: Dry Water Immersion, sensory deprivation, functional magnetic resonance imaging, fingertapping

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