

Institute of Aerospace Medicine

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The astronaut syndrome Visual Impairment/Intracranial Pressure – Aspects on assessment and modeling of CSF and venous system?

The hydrocephalus research group at Umeå university has a specific research focus on the brain pressure (ICP) and cerebrospinal fluid (CSF) dynamics. Visual Impairment / Intracranial Pressure (VIIP), or SANS as it is named today, is a syndrome identified in astronauts who have had long duration mission on the space station. The identified visual symptoms can cause permanent problems for the astronauts and jeopardizes future planned space activities such as long duration stays at the Space Station or missions towards Mars. For the diseased astronauts the visual symptoms are often a suspicion of increased intracranial pressure (ICP).

Our multi-disciplinary research group in hydrocephalus has dedicated decades to development of measurement methods and models to analyze and understand ICP variation and CSF dynamics, since disturbed CSF dynamics are the main pathophysiological hypothesis in hydrocephalus. We also have experience in pressure measurement and biomechanics of the intraocular system. This means that we approach the VIIP problem from a different background than many other groups.

By describing the CSF system and the venous system together, in a single model, we believe that we produce a description of what controls ICP, and which components in that control that link to gravitational phenomena. In this talk I will describe our work on the modelling of the CSF dynamic system, its control with respect to the venous system, its gravitational dependence, and finally how this can contribute to understanding of VIIP.