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Cytotoxic brain tissue edema after traumatic brain injury - A new hypothesis to its etiology

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Cytotoxic brain tissue edema, which is found in both grey and white matter cells, is a complicated secondary consequence to ischemic injury following cerebral diseases such as traumatic brain injury (TBI) and stroke. To some extent the pathophysiological mechanisms are known, however far from complete. A new hypothesis regarding the etiology to cytotoxic brain edema is presented. The hypothesis is that external energy due to TBI and internal energy due to mechanical forces following stroke results in the disruption of non-covalent and covalent bonds in protein and nucleotide structures. The unfolded proteins attract water molecules while the disruption of nucleotides such as adenosine-tri-phosphates causes a dysfunction in ion hemostasis and which may tentatively explain the etiology to cytotoxic edema. Our studies using computer models shows that the kinetic energy following an impact to the head has the potential to break the chemical bonds in the

protein and nucleotide structures resulting in cytotoxic brain tissue edema. Since folding of mature proteins is very much dependent on normal energy supply, the protein synthesis cannot continue during the ischemic process. Under such conditions very little of the energy rich ATP can be produced and which may result in disturbance between extra- and intra-cellular ion metabolism. The present hypothesis has the potential to develop new drugs for therapeutic use.

Speaker Biography

Hans von Holst received his Medical Doctor's degree in 1976 and Specialist in Neurosurgery (1982) at Karolinska University Hospital. In 1985, he earned his PhD and Associate Professorship in Neurosurgery, Clinical Neuroscience at Karolinska Institute. During 1991-1996, he was appointed as Chairman of the Dept. of Neurosurgery and Division Manager of the Neuroclinics at Karolinska University Hospital, respectively. In 1995, he became Professor in Neuroengineering at the Royal Institute of Technology. He has published around 140 original papers in reputed journals, reviews and books and has been serving as an Editorial Board Member in several journals.

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