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A new hypothesis on the etiology to dementia in traumatic brain injury and stroke

Increased intracellular water content defined as cytotoxic brain tissue edema is a serious secondary clinical complication to traumatic brain injury (TBI) and stroke and without knowledge to the etiology. Recently, a hypothesis to the nervous tissue edema was presented suggesting that external dynamic and internal mechanical static impact forces caused protein unfolding resulting in an increased brain tissue water content and what happens with the metabolism in the long run. The hypothesis was confirmed by computer simulation tests. In this laboratory study, we further evaluated the hypothesis by using the mature protein laminin LN521 upon the effects of both dynamic as well as static impact forces, respectively. The treated laminin solutions were then analyzed with denatured electrophoresis and electron microscopy showing aggregation and fragmentation of the laminin structures. The present laboratory results confirm earlier hypothesis and computer simulation suggest for the first time that dynamic impact force in an accident and increased mechanical static force in stroke unfold mature proteins having the potential to increase the intracellular water content defined as cytotoxic brain tissue edema. The clinical condition resembles the phenomenon when elasmobranchs including white sharks prevent their cells from too high hydrostatic pressure in the deep sea. Thus, the present laboratory study results and knowledge from marine physics may be considered to improve the clinical treatment and outcome of TBI and stroke patients. This opens up new perspectives how vascular dementia in TBI and stroke should be looked upon when it comes to clinical treatment.

Biography

Hans von Holst has received his MD degree in 1976 and Specialist in Neurosurgery in 1982, at Karolinska University Hospital. In 1985, he earned his PhD and Associate Professorship in Neurosurgery, Clinical Neuroscience from Karolinska Institutet and has been appointed as Senior Neurosurgeon from 1988-2015. During 1991-1996, he was Chairman of the Department of Neurosurgery and Division Manager of the Neuro Clinics at Karolinska University Hospital, respectively. In between 1994-2014, he was appointed as Professor in Neuro Engineering at KTH Royal Institute of Technology and visiting Professor at Karolinska Institutet from 2006-2012. He has published over 150 original papers in reputed journals, published reviews and books and served as Editorial Board Member for several journals.

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