Surfactant protein G

The results indicate Surfactant protein G (SP-G) as a new surfactant protein which represents an until now unknown surfactant protein class.

Rausch et al. found mRNA for SP-G to be present in kidneys, heart, testis, umbilical cord and trophoblast, [1)].

Surfactant protein G was identified by means of bioinformatics and named surfactant protein G (SP-G) or surfactant-associated protein 2 (SFTA 2) [2)].

The protein (SP-G) is encoded on the human chromosome 6, its primary theoretical translation product consist of 78 amino acid residues resulting in a molecular weight of approximately 8 kDa. This putative surfactant protein shows no sequential or structural similarities to surfactant proteins or other known proteins in general and therefore seems to represent a new group of proteins. Furthermore, there is no hard evidence or information neither on the organ or tissue distribution nor on the function of the protein. It is carrying an N-terminal signal peptide of 19 amino acid residues which is essential for protein secretion [3)].

Its presence and possible functions in the central nervous system are unknown. Therefore, a study of Krause et al., from the Department for Neurosurgery, University Hospital Leipzig, Germany, aimed to elucidate the presence of SP-G in the brain and its concentration in normal and pathologic samples of cerebrospinal fluid in order to gain first insight into its regulation and possible functions. A total of 121 samples of human cerebrospinal fluid (30 controls, 60 hydrocephalus patients, 7 central nervous system infections, and 24 brain hemorrhage patients) and 21 rat brains were included in the study.

CSF samples were quantified using a commercially available ELISA system. Results were analyzed statistically using SPSS 22, performing Spearman Rho correlation and ANOVA with Dunnett's post hoc analysis. Rat brains were investigated via immunofluorescence to determine SP-G presence and colocalization with common markers like aquaporin-4, glial fibrillary acidic protein, platelet and endothelial cell adhesion molecule 1, and neuronal nuclear antigen. SP-G occurs associated with brain vessels, comparable to other conventional SPs, and is present in a set of cortical neurons. SP-G is furthermore actively produced by ependymal and choroid plexus epithelium and secreted into the cerebrospinal fluid. Its concentrations are low in control subjects and patients suffering from aqueductal stenosis, higher in normal pressure hydrocephalus ($p < 0.01$), and highest in infections of the central nervous system and brain hemorrhage ($p < 0.001$). Interestingly, SP-G did correlate with total CSF protein in patients with CNS infections and hemorrhage, but not with cell count. Based on the changes in CSF levels of SP-G in hydrocephalus, brain hemorrhage, and CNS infections as well as its abundance at CSF flow-related anatomical structures closely associated with immunological barrier systems, importance for CSF rheology, brain waste clearance, and host defense is assumable.

Thus, SP-G is a potential new cerebrospinal fluid biomarker, possibly not only reflecting aspects of CNS innate immune responses, but also rheo-dynamically relevant changes of CSF composition, associated with CSF malabsorbtion. However, further studies are warranted to validate this findings and increase insight into the physiological importance of SP-G in the CNS [4)].

References

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