

Oral Presentation

## Nerve growth factor level in the cerebrospinal fluid in hydrocephalus

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### Background

There is a significant body of evidence to suggest a physiological role for cerebrospinal fluid (CSF) in both the developing and adult brain. We have previously shown that this fluid has an important role in the developing brain of hydrocephalus Texas (H-Tx) rat. CSF flows through the ventricular system passing over all regions of germinal activity. In congenital hydrocephalus there is a build up of CSF and decrease in the thickness of the cerebral cortex. CSF might be important as a signalling pathway linking the germinal epithelium and the top of the cerebral cortex, which involves coordinating the activity of the germinal epithelium and the migration of cells into the cortex. CSF has the potential to act as a signalling pathway for physiological control since it has been demonstrated to contain molecules such as interleukins, leukoterins, neuropeptides, growth transforming factor-beta (TGF- $\alpha$ ), nerve growth factor (NGF) and brain derived neurotrophic factor (BDNF), which are present at specific times during development and under specific physiological conditions. Thus it is probable that CSF contains growth regulators, which can affect the function of the fetal germinal epithelium.

### Materials and Methods

In this study CSF from hydrocephalic and normal infants were analysed using SDS-PAGE followed by silver staining. In order to obtain semi-quantitative estimates of the relative amounts of 13 kDa protein, an image analyzer was used to determine the intensities of the band in the respective lanes in silver stained gels. Quantification of the silver stained gels from repeated experiments ( $n = 10$ ) showed that the amount of 13 kDa protein was clearly increases in the hydrocephalic CSF when compared to the normal CSF. A western blot analysis using anti-NGF antibody as a probe confirmed the presence of NGF. In order

to show the relationship of the elevated NGF and hydrocephalus, NGF was injected into the lateral ventricles of chick embryos 3 days after incubation. The embryos were collected 2 days after injection, fixed and 10 micrometer coronal sections were cut ( $n = 10$ ). The sections were analyzed and photographed.

### Results

The results from SDS-PAGE and immunoblotting showed an increase in the NGF level in the CSF of hydrocephalic when compared to normal group. The results from chick embryo experiments showed a significant increase in the area of the lateral ventricles and a decrease in the thickness of the cerebral cortex in the NGF injected fetuses when compared to the control group.

### Conclusion

It is concluded that the elevation of NGF concentration in CSF is one of the factors that could induce hydrocephalus.