Cerebrospinal Fluid Research

Oral presentation

Open Access

Comparison of key interhemispheric connections and the posterior commissure in normal and hydrocephalic rat fetuses

Swapna Vaddi*, Sajida Rasul, Sarah Cains, Andrew Shepherd and Carys Bannister

Address: Faculty of Life Sciences, The University of Manchester, Stopford Building, Oxford Road, Manchester, M13 9PT, UK
* Corresponding author

from 52nd Annual Meeting of the Society for Research into Hydrocephalus and Spina Bifida
Providence, RI, USA. 11–14 June 2008

Published: 3 February 2009

Cerebrospinal Fluid Research 2009, **6**(Suppl 1):S8 doi:10.1186/1743-8454-6-S1-S8

This abstract is available from: http://www.cerebrospinalfluidresearch.com/content/6/S1/S8

Background

There are a surprising number of interconnecting fibre tracts linking the two cerebral hemispheres, the largest of these being the corpus callosum, but the hippocampal and anterior commissures are also sizable structures. The posterior commissure bridges the upper part of the midbrain and lies adjacent to the posterior end of the third ventricle. Hydrocephalus is known to cause thinning of the corpus callosum but its effect on the other interconnections has not been extensively investigated. On day E18 at the onset of hydrocephalus in the HTx rat development of the corpus callosum is incomplete. The observed thinning of the corpus callosum in fetal onset hydrocephalus is likely to deprive the hemispheres of interconnections. This study was carried out to investigate the effect of hydrocephalus on the other interconnecting fibre tracts and in particular whether adaptive changes occur in any of them.

Materials and methods

Timed matings were performed to obtain Sprague Dawley and HTx rat fetuses at gestational ages E17, 18, 19 and 20 days. Fetuses were fixed in 4% paraformaldehyde, cryoprotected in sucrose and sectioned at 25 um. Coronal sections of the brain were stained with haematoxylin and eosin. Photomicrographs were taken with a Coolsnap digital camera on a Leica DMLB microscope and analysed using Metaview or Image-J software. Measurements were made of the midline thickness of the corpus callosum, hippocampal, anterior and posterior commissures.

Results

We found that both the corpus callosum and hippocampal commissures were similar in size, but were larger in the unaffected and affected HTx rats when compared to the Sprague Dawley rats. The anterior and posterior commissures were also similar in size but were larger in the Sprague Dawley rats when compared to the unaffected and affected HTx rats.

Conclusion

The major interhemispheric commissures of the Sprague Dawley and HTx rat fetuses have a different pattern of development. Significantly the large size of the corpus callosum in the HTx rat fetus suggests it may contain a super abundance of axons. However this may not be advantageous as these axons may not target the correct cells in the opposite hemisphere, leading to a disrupted pattern of connection between the neurons of the two cerebral hemispheres. Thinning of the corpus callosum postnatally in hydrocephalic HTx fetuses seems to be a secondary phenomenon caused by ventricular enlargement and cortical thinning.