thin and is located near the edge of a gyrus. Ammon's horn is displaced and meandering. Subicular-like clusters are profuse. Complex gyri resemble microgyria. White matter forms a subpial border in some gyri. In summary: medial temporal lobe dysgenesis.

This individual also had many autistic features including stereotypies and head banging. The latter could explain another surprising set of brain abnormalities unrelated to the presumed FGFR3-related syndrome.

LEARNING OBJECTIVES

This presentation will enable the learner to:

1. Summarize current theories on the pathogenesis of FGFR3-related cortical malformation
2. Describe the brain abnormalities in hypochondroplasia
3. Identify the neuropathology resulting from head banging

Abstract 9

Area postrema: fetal maturation, tumours, vomiting centre, somatic growth and role in neuromyelitis optica

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The area postrema (AP) in the caudal 4th ventricular floor is unique, highly vascular without blood/brain or /CSF barrier. In addition to its function as the vomiting centre, several other important functions are: part of the circumventricular organs for vasomotor and angiotensin II regulation; a role in neuromyelitis optica related to aquaporin-4; contributor to fetal and postnatal somatic growth. Functions are immature at birth.

The purpose of this study was to demonstrate AP neuronal/synaptic/glial maturation in normal fetuses and 3 AP tumours. Transverse sections of the caudal 4th ventricle of 18 normal human fetal brains at autopsy, 6 to 40 weeks were examined; also 3 infants 3-18mos; 2 children. A battery of immunocytochemical neuronal and glial markers: MAP2; calretinin; synaptophysin; vimentin; nestin; GFAP; S-100β protein; were applied to paraffin sections. Two children with AP tumours and one with neurocutaneous melanocytosis, all with pernicious vomiting, were studied. In normal fetuses, AP neurons exhibited cytological maturity and well-formed synaptic circuitry by 14wk gestation. Size/volume increase was disproportionately greater than brainstem growth in 2nd and 3rd trimesters and postnatally. Astrocytes co-expressed vimentin/GFAP but glia were best demonstrated by S-100β protein. Ependyma over the AP in fetuses is simple cuboidal, adjacent to pseudostratified columnar of the 4th ventricular floor. Melanocytes infiltrated AP in the toddler with pernicious vomiting; 2 children had primary AP pilocytic astrocytomas. Though AP is cytologically mature by 14wk, growth increases and functions mature into the postnatal months. We recommend that AP neuropathology include synaptophysin and S-100β at autopsy if AP dysfunction suspected.

LEARNING OBJECTIVES

This presentation will enable the learner to:

1. Explain the maturation of neurons, synaptic circuits and glial elements of the AP
2. List and recognize tumours that can affect the area postrema
3. Describe functions of the area postrema

Abstract 10

Human brain atlas: miRNA version

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Human brain is a complex organ comprising multiple cell types of differing function. Although histological evaluation remains the mainstay approach for evaluating tissue, comprehensive molecular characterization is now possible due to advanced -omic approaches. microRNAs (miRNAs) are small (~22 nt) RNA molecules that regulate gene expression and mediate cellular differentiation in normal brain development. miRNAs also make excellent tissue markers due to their abundance, cell-type and disease-stage specificity, and stability in solid/liquid clinical samples. To advance our knowledge of miRNA-mediated gene regulation in human brain, we generated comprehensive miRNA expression profiles from 117 fresh normal brain samples through barcoded small RNA sequencing; tissues included neocortex, allocortex, white matter, cerebellum, olfactory bulb, optic nerve, pineal gland and spinal cord. FASTQ sequence files were annotated using state-of-the-art sequence annotation available through the Renwick lab. Following data pre-processing, high expression analysis of miRNA profiles showed that miR-9 was the highest expressed miRNA in neocortex, cerebellum and olfactory bulb, whereas miR-22 was highest expressed in cingulate cortex, optic nerve and spinal cord; interestingly, miR-29 was the highest expressed miRNA in hippocampus. Our analyses showed a trend towards unique miRNA signatures in different anatomical areas of the brain. Our next step is to perform miRNA fluorescence *in situ* hybridization on formalin-fixed paraffin-embedded tissues using a novel method developed in the Renwick lab. Accurate miRNA characterization of normal tissues will provide a firm basis for understanding miRNA changes in neurological diseases.

LEARNING OBJECTIVES

This presentation will enable the learner to:

1. Describe the function of miRNAs and their suitability as tissue/cell specific signatures
2. Describe the miRNA expression trends in profiling various anatomical regions of the central nervous system