PEDIATRIC NEUROLOGY BRIEFS
A MONTHLY JOURNAL REVIEW

J. GORDON MILLICHAP, M.D., F.R.C.P., EDITOR

Vol. 24, No. 6 June 2010

CEREBRAL MALFORMATIONS

HIPPOCAMPAL ABNORMALITIES WITH CORTICAL MALFORMATIONS IN EPILEPSY PATIENTS

The occurrence of various types and MRI appearance of hippocampal abnormalities in 220 patients with malformations of cortical development (MCD) were studied in various centers and large public hospital outpatient clinics in Germany and Austria. Patients' ages ranged from 2 years to 76 years, mean age 31. The data were obtained by visual analysis of MRI findings recorded by 3 independent raters. Types of hippocampal abnormalities were partially infolded/hypoplastic, sclerosis, malrotated, and enlarged. Malformations of cortical development were focal cortical dysplasia (27%), polymicrogyria (21%), developmental tumors (15%), and periventricular nodular heterotopia (14%). Hippocampal abnormalities were found in 69/220 (31%) patients. Hypoplastic hippocampus was the most common hippocampal abnormality, occurring in 34 (49%) of 69 patients. Hippocampal sclerosis, the second most frequent type, occurred in 18/69 (26%). MCD patients with hippocampal abnormalities (41/69 [52%]) had a higher rate of learning disabilities and delayed developmental milestones than those without (56/151 [37%]). Hypoplastic hippocampus was associated with symptomatic generalized epilepsies (West and Lennox-Gastaut syndromes) (11/34 [32%]) and a high rate of learning disability (27/34 [79%]), neurologic deficits (25/34 [73%]), and delayed developmental milestones (23/34 [68%]). Family history of epilepsy, febrile seizures, and response to antiepileptic drugs did not differ with type of hippocampal abnormality. A history of febrile seizures was present in 5/69 (7%) patients. (Kuchukhidze G, Koppelstaetter F, Unterberger I, et al. Hippocampal abnormalities in malformations of cortical development: MRI study. **Neurology** May 18, 2010;74:1575-1582). (Reprints: Dr Eugen Trinka, Department of Neurology, Paracelsus Medical University, Christian

PEDIATRIC NEUROLOGY BRIEFS (ISSN 1043-3155) © 2010 covers selected articles from the world literature and is published monthly. Send subscription requests ($68 US; $72 Canada; $75 airmail outside N America) to **Pediatric Neurology Briefs - J. Gordon Millichap, M.D., F.R.C.P.-Editor,** P.O. Box 11391, Chicago, Illinois, 60611, USA. The editor is Pediatric Neurologist at Children's Memorial Hospital and Professor Emeritus, Northwestern University Medical School, Chicago, Illinois.

PNB is a continuing education service designed to expedite and facilitate review of current scientific information for physicians and other health professionals. Fax: 312-943-0123.

Doppler Clinic, Ignaz Harrer Strasse 79, A-5020 Salzburg, Austria. E-mail: e.trinka@salk.at).

COMMENT. One third of patients with malformations of cortical development have hippocampal abnormalities, and approximately one half have temporal lobe epilepsy. Hypoplasia, the most common hippocampal abnormality, is associated with the most severe neurological, developmental, and cognitive abnormalities. In preterm infants, small hippocampal volume is correlated with white matter injury, exposure to postnatal steroids, treatment with indomethacin, and impairment of cognitive and psychomotor development. (Thompson DK et al. **Ann Neurol** 2008;63:642-651; **Ped Neur Briefs** 2008;22:42-43).

Hippocampal sclerosis is often regarded as an acquired abnormality, but its precise etiology as a sequela of a prolonged febrile seizure or febrile status epilepticus is debated. (Scott RC et al. **Brain** 2003;126:2551-2557; Provenzale JM et al. **AJR Am J Roentgenol** 2008;190(4):976-983) One theory favors hippocampal sclerosis as a developmental abnormality that facilitates febrile seizures in predisposed families and leads to subsequent typical mesial temporal sclerosis. A long-term study of 200 patients with prolonged febrile seizures should clarify the relation of the febrile seizure to mesial temporal sclerosis and temporal lobe epilepsy (Shinnar S, Hesdorffer DC, Nordli DR Jr, et al. Phenomenology of prolonged febrile seizures. Results of the FEBSTAT study. **Neurology** 2008;71(3):170-176)..

SYNAPTOPHYSIN IMMUNOREACTIVITY AS MARKER FOR FETAL HIPPOCAMPAL AND CORTICAL DEVELOPMENT

Researchers at University of Calgary Faculty of Medicine and Alberta Children's Hospital, Canada, have studied synaptophysin immunoreactivity (sIR) in postmortem sections of 162 normal human fetal and neonatal brains of both sexes from 6 to 41 weeks' gestational age. A consistent temporal and spatial pattern of sIR was apparent in the hippocampus and cerebral neocortex. In the hippocampus, sIR first developed in the molecular zone of the dentate gyrus at 12 weeks and successively in CA2, 3, 4, and CA1, until complete at 26 weeks. In frontal neocortex, sIR developed in a laminar pattern starting at 12 weeks, and was complete at 38 weeks. The sIR was preserved for >96 hours postmortem, even in autolytic brain. Synaptophysin is a reliable marker of synaptic vesicle formation in axonal terminals and hippocampal and neocortical maturation or immaturity. (Sarnat HB, Flores-Sarnat L, Trevenen CL. Synaptophysin immunoreactivity in the human hippocampus and neocortex from 6 to 41 weeks of gestation. **J Neuropathol Exp Neurol** 2010;69(3):234-245). (Reprints: Harvey B Sarnat MS, MD, FRCPC, Alberta Children's Hospital, 2888 Shaganappi Trail NW, Calgary, Alberta, Canada T3B 6A8;E-mail: Harvey.sarnat@albertahealthservices.ca).

COMMENT. The reader is referred to the excellent colored sections of fetal and term neonate hippocampus and cortex in the original article. The authors add that synaptogenesis is concerned with maintenance of a resting membrane potential and excitability and synthesis of chemical neurotransmitters. The fetal EEG (Anders T et al, 1971) and magnetoencephalography may correlate with brain development, but