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SEIZURE DISORDERS

NOVEL TISSUE MARKER OF EPILEPTIC FOCI IN RESECTIONS

The neurosurgeon relies on the expertise of the neurologist, electoencephalographer and neuroradiologist to determine the extent of resection of brain tissue in the treatment of medically refractive childhood seizures. Electroencephalographic telemetry (EEG), intraoperative electrocorticography (ECoG) and MRI are effective in the localization of epileptic structural foci associated with cortical dysplasias and other brain anomalies. Neuropathologists at the Alberta Children's Hospital and University of Calgary have demonstrated a novel immunocytochemical tissue marker of epileptic foci in a study of 45 surgical patients, ages 16 months to 23 years, the majority having histological diagnoses of focal cortical dysplasia or tuberous sclerosis. Balloon cells and giant atypical cells in tuberous sclerosis were intensely reactive. In every surgical resection, the heat shock protein, a-B-crystallin was isolated and upregulated at or near to the epileptic focus identified by preoperative EEG monitoring and intraoperative ECoG. In some cases with extensive resections that involved mesial temporal sclerosis, absence of epileptiform activity on ECoG correlated with negative crystalline reactivity. a-B-crystallin reactivity involved glial cells of white matter underlying epileptogenic cortex, astrocytes and oligodendrocytes, including some cases with no demonstrable histological lesion. Presence or absence of histological structural lesions was independent of a-B-crystallin expression. A gradient of reactivity occurred over a 3cm diameter in some cases, with highest intensity at center of the EEG- and ECoG-identified foci. No correlation was noted with microglial activation, inflammation or gliosis. Hippocampal gliosis and focal neuronal loss in Ammon's horn and dentate gyrus did not predict a more intense immunoreactivity of a-B-crystallin. Autopsy brain tissue of children with no epilepsy or neurological disease and fetal brain tissue as controls were non-reactive. Immunoreactive a-B-crystallin is considered a reliable tissue marker of epileptic

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foci, even in the absence of a structural lesion. (Sarnat HB, Flores-Sarnat L. a-B-crystallin as a tissue marker of epileptic foci in paediatric resections. **Can J Neurol Sci** September 2009;36:566-574). (Respond: Harvey B Sarnat, Alberta Children's Hospital, 2888 Shaganappi Trail NW, Calgary, Alberta, T3B 6A8, Canada. E-mail: Harvey.sarnat@albertahealthservices.ca).

COMMENT. Chemistry of the brain research dates back to 1884, with the publication in London of a book by JLW Thudichum, the father of the specialty. Recognition of *Neurochemistry* as a specific field of research was delayed until 1955, when Elliott. Page, and Quastel, aided by many contributors, edited their classic volume, published by Charles C Thomas, and dedicated to the memory of Thudichum. The "chemistry of human epilepsy" was covered in a chapter by Elliott KAC of the Montreal Neurological Institute, Canada. It is fitting that the present advance in our understanding of the subject reported by the Drs Sarnat also emanates from Canada. Elliott and his co-worker, Tower, were interested in acetylcholine and the epileptic focus. Focal tissue failed to store acetylcholine in the bound, inactive form. They postulated that the abnormal activity of an epileptic focus might be a response of normal neurons to an abnormal local chemical environment. Impairments of local circulatory control around epileptogenic foci, as reported by Penfield and associates, could cause variations in local concentration of oxygen, glucose, carbon dioxide and other products of metabolism, and pH. (Penfield WP, Erickson TC. *Epilepsy and Cerebral Localization,* Springfield, IL, Thomas, 1941). The present report advances our understanding of the epileptic process and demonstrates a novel immunocytochemical test for epileptogenic brain tissue, independent of the histological findings. Intense a-B-crystallin reactivity at the periphery of resected brain tissue might indicate incomplete removal of a focus and an increased risk of seizure recurrence.

CT AND MRI GUIDELINES IN RECENT-ONSET EPILEPSY

The International League Against Epilepsy (ILAE) Subcommittee for Pediatric Neuroimaging examined the value of, and indications for, neuroimaging in the evaluation of children with newly diagnosed epilepsy. Retrospective and prospective published series with 30 or more subjects receiving CT and MRI to evaluate new-onset seizures were reviewed. Imaging studies were abnormal in nearly 50% of children with localization-related new-onset seizures, 15-20% of imaging studies provided information on etiology and/or seizure focus, and 2-4% potentially altered immediate management. A significant imaging abnormality was almost always associated with a history of a localization-related seizure, abnormal neurologic examination, or focal EEG. Childhood absence epilepsy, juvenile absence epilepsy, juvenile myoclonic epilepsy, and benign childhood epilepsy with centrotemporal spikes were not associated with a structural imaging abnormality. Imaging is helpful in establishing seizure etiology, predicting prognosis, and in treatment. Imaging is recommended in children with new-onset localization-related epilepsy, when epilepsy classification is in doubt, and when an epilepsy syndrome with remore symptomatic cause is suspected. MRI is preferred to CT because of superior resolution, and lack of radiation. (Gaillard WD, Chiron C, Cross JH et al. for the ILAE. Guidelines for imaging infants and children with recent-onset epilepsy. **Epilepsia** Sept 2009;50:2147-2153). (Respond: WD Gaillard MD, Department of