

Street, Suite 8130, Philadelphia, PA 19107).

COMMENT. Autonomic symptoms, including nausea, vomiting, diarrhea, pallor, flushing, and diaphoresis, are common during acute migraine headaches. Studies of autonomic nervous system (ANS) function provide variable results, some suggesting hypofunction, some hyperfunction, and some a dysregulation, the result of an imbalance of sympathetic and parasympathetic nervous systems in migraine. The present results favor a hypofunction of the ANS in adult migraineurs, and a lowering of the threshold to migraine triggers is proposed as one possible mechanism. The degree of ANS dysfunction is related to the severity and disabling nature of the headaches.

In children with migraine equivalents, recurrent abdominal pain and cyclical vomiting are symptoms of autonomic nervous system dysfunction. Typical migraine headaches may coexist and often develop in adolescence and adulthood. The degree of nausea and vomiting exacerbates the disability of migraine sufferers and influences the route of administration of medications. (see Progress in Pediatric Neurology III, PNB Publishers, 1997;pp176-178).

## SEIZURE DISORDERS

### **DRUG RESISTANCE PROTEINS AND REFRACTORY EPILEPSY**

Expression of multi-drug resistance gene-1 P-glycoprotein (MDR1) and multidrug resistance-associated protein 1 (MRP1) in refractory epilepsy was studied at the Epilepsy Research Group, Institutes of Neurology and Child Health, University College, London, and Radcliffe Infirmary, Oxford, UK. The epilepsy cases were dysembryoplastic neuroepithelial tumors (DNTs) in 8 cases, focal cortical dysplasia (FCD) in 14, and hippocampal sclerosis (HS) in 8. Lesional tissue from therapeutic resections was compared immunohistochemically with normal adjacent tissue. Reactive astrocytes in pathological tissue expressed MDR1 and MRP1 in all DNT and FCD cases, and in 5 of 8 HS cases. In 5 FCD cases, dysplastic neurons also expressed MRP1. Accentuation of reactivity was noted around lesional vessels in FCD and DNTs. MDR1 and MRP1 may transport antiepileptic drugs (AED), and the overexpression of these drug resistance proteins in lesional tissue from patients with refractory epilepsy may lower the interstitial concentration of AEDs in epileptogenic lesions, a possible explanation for the mechanism of drug resistance. (Sisodiya SM, Lin W-R, Harding BN, Squier MV, Thom M. Drug resistance in epilepsy: expression of drug resistance proteins in common causes of refractory epilepsy. Brain January 2002;125:22-31). (Respond: Dr SM Sisodiya, Epilepsy Research Group, Institute of Neurology, University College London, Queen Square, London WC1N 3BG, UK).

COMMENT. MDR1 and MRP1, known mediators of AED resistance, may be demonstrated in epileptogenic tissue glia from refractory epilepsy patients, and also in some lesional dysplastic neurons in FCD. These drug resistance proteins are absent in normal human glia and normal neurons. The overexpression of these drug resistance proteins in epileptogenic tissue is an explanation for the refractory epilepsy, and a possible target for the development of new AEDs.

The distribution of glutamate transporters (EAATs) in the hippocampus of patients with AED resistant temporal lobe epilepsy has been studied at University Medical Center, Utrecht (Proper EA et al. Brain Jan 2002;125:32-43). Decreases in EAAT1 and EAAT2-immunoreactivity (IR) were observed in CA4 and dentate gyrus of hippocampal sclerosis cases, and increased EAAT2-IR in the non-HS group.