epileptic seizures and show locations for language, auditory and visual processing. Unlike the EEG which is crude and looks at ripples in the water, biomagnetometry shows the stone and the source of the ripples (Dr. Harwood-Nash, Toronto). EEG signals travel through many types of tissue with varying degrees of electrical resistance and consequent distortion. The magnetic flux generated by neurons are not distorted by bone or other biologic tissues, they are picked up and converted to electrical signals by detection coils, amplified, filtered and processed for display on a computer screen to show spatial distribution and time evolution of the electrical activity being scanned. The information is presented graphically superimposed over a single plane MRI image so that correlations with the anatomical structures can be made. In 15 of 40 patients with epilepsy who received biomagnetic scans and underwent surgery for the removal of epileptic foci, there was good correlation between EEG and biomagnetometry mapping of the epileptic foci. (Sato S. Bethesda, MD). (Skolnick A. Biomagnetometry provides a new compass for exploring the brain and heart. JAMA Feb 2, 1990; 263:623-627).

COMMENT. Biomagnetic Technologies (BTi), a San Diego company, has installed more than 50 seven channel machines and announced the availability of a 37 channel biomagnetometer at the RSNA November 1989 meeting. Siemen's expects to install its first 37 channel system (Krenikon) in West Germany and three at research centers in the U.S. A large area, 7-channel, magnetometer (SQUID) was used to preoperatively determine the sites of epileptic foci in two patients with intractable temporal lobe seizures and results are reported from the Department of Neurosurgery, Kuopio University Hospital, Finland. Preop localization agreed with electrocorticogram and depth electrode operative recordings. (Tiihonen J et al. Ann Neurol March 1990; 27:283-290).

EFFECTS OF BRIEF SEIZURES ON LEARNING

The effects of frequent brief seizures on learning, memory, and behavior in the young animal were studied at the Department of Neurology, Children's Hospital, Harvard Medical School, Boston, MA; and Veterans Administration Medical Center and Medical College of Georgia, Augusta, GA. Three groups of animals were used: Group 1 immature genetically epilepsy prone rats (GEPRs) subjected to 66 audiogenic stimulations; Group 2 GEPR littermates handled and placed in the sound chamber but not stimulated; Group 3 genetically epilepsy resistant rats (GERRs) who received audiogenic stimulations but had no seizures. Tests for learning, memory and behavior, using the T-maze, water maze, open field activity test, home cage intruder test and handling test, were investigated after three weeks of stimulations. Compared with GERRs and control GEPRs, experimental GEPRs performed less well in the T-maze and water maze tests of learning and memory. They also differed in behavior and activity level. The study demonstrated that frequent brief seizures in immature animals results in significant detrimental changes in learning, memory, activity level,

and behavior. (Holmes GL et al. Effects of seizures on learning, memory, and behavior in the genetically epilepsy-prone rat. Ann Neurol Jan 1990; 27:24-32).

COMMENT. Some children with poorly controlled epilepsy have a progressive decline of IQ on serial intelligence tests (Bourgeois BF et al. Ann Neurol 1983; 14:438-444 and Rodin EA et al. Dev Med Child Neurol 1986; 28:25-33). The cause of this epileptic dementia in children is not always clearly understood. The underlying disease process may be degenerative in nature and sometimes the adverse side effects of anticonvulsant medications have been implicated. In the present paper the potential cognitive depressant effects of repeated generalized seizures are emphasized and age of onset of the seizure disorder may be a critical factor in determining whether deficits in learning and behavior occur.

COGNITIVE EFFECTS OF ANTICONVULSANTS

The neuropsychological effects of carbamazepine, phenobarbital, and phenytoin in 15 patients with partial complex epilepsy were investigated at the Department of Neurology, Medical College of Georgia, Augusta, GA. Patients were treated with each drug for three months, using a randomized double-blind, triple crossover design. Neuropsychological tests included digit span, selective reminding test, digit symbol, finger tapping, grooved pegboard, choice reaction time, P3 evoked potential, and profile of mood states. Anticonvulsant blood levels were converted to a percentage of the standard therapeutic ranges. Separate analyses of covariance using percentage blood levels and seizure frequency were performed for each of the cognitive variables. Digit symbol performance with phenobarbital was significantly worse than with the other two anticonvulsants but otherwise the neuropsychological performance was comparable during treatment with each of the drugs. (Meador KJ et al. Comparative cognitive effects of anticonvulsants. Neurology March 1990; 40:391-394).

COMMENT. All major anticonvulsant drugs may produce cognitive deficits. The effects are dose dependent and may occur even when anticonvulsant blood levels are well within the established therapeutic ranges. Cognitive deficits are particularly prominent with polypharmacy (Trimble MR. Epilepsia 1987; 28 (suppl 3):S37-S45). The present study conducted in adults has shown that any differential cognitive effects of anticonvulsants must be subtle. Neuropsychological deficits commonly associated with anticonvulsant drugs include impairments in attention and concentration, memory, information processing and motor speed. A double-blind crossover study of phenobarbital and valproic acid treatment in 21 epileptic children has shown that neuropsychological functioning was significantly worse during phenobarbital treatment (Vining et al. Pediatrics 1987; 80:165).