

# FREQUENCY OF EEG ABNORMALITIES IN A LARGE DISSOCIATIVE POPULATION

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## ABSTRACT

*A retrospective chart review was conducted to determine the frequency of electroencephalographic abnormalities, particularly those suggesting temporal lobe epilepsy (TLE), among patients with dissociative disorders. Electroencephalograms (EEGs) from 160 inpatients with dissociative disorders who were treated at either of two sites specializing in the diagnosis and treatment of dissociative disorders were reviewed. EEGs were categorized as normal, possible drug effect, or abnormal. Overall, 7.5% of patients had EEGs that were interpreted as abnormal but only two (1.25%) of the entire sample had findings that suggested TLE. The two sites differed significantly in the percentage read as abnormal (30.9% versus 10.5%;  $\chi^2=19.4$ ,  $df=2$ ,  $p<.0001$ ). According to these results, a small minority of patients with dissociative disorders have non-specific EEG abnormalities as well as more specific temporal lobe dysrhythmias. However, the population and context in which the dissociation-epilepsy association is explored will influence the outcome of any attempt to resolve the question regarding the relationship.*

## INTRODUCTION

Dissociative symptoms have been reported in 20-33% of patients with seizure disorders (Mesulam, 1981; Schenk & Bear, 1981), and seizures or seizure-like behaviors have been described in 10-21% of patients with dissociative disorders (Putnam, 1989). However, it remains an unanswered clinical question, whether these dissociative phenomena are associated with electroencephalographic (EEG) evidence for temporal lobe epilepsy (TLE) or any other specific electrophysiologic dysrhythmia. Conflicting results have been

reported, which can be divided into three groups. The first group of studies suggests that dissociatives have normal EEGs (Devinsky, Putnam, Grafman, Bromfield, & Theodore, 1989; Coons, Milstein, & Marley, 1982; Cocores, Bender, & McBride, 1984; Thigpen & Clecky, 1954; Ludwig, Brandsma, Wilbur, Bendfeldt, & Jameson, 1972; Coryell, 1983). The second group indicates that there is a relationship between epilepsy and dissociation (Mesulam, 1981; Schenk & Bear, 1981; Benson, Miller, & Signer, 1986; Benson, 1986). The third group demonstrates abnormal EEG patterns that appear unrelated to dissociation (Devinsky et al., 1989; Brende & Rinsley, 1981).

We report on a retrospective chart review of 160 dissociative disorder patients administered EEGs. EEG reports were reviewed for evidence of TLE or other neurologic abnormalities.

## METHODS

### Subjects

To be included in the sample, a patient had to have both 1) a discharge diagnosis of a dissociative disorder, either multiple personality disorder (MPD) or dissociative disorder not otherwise specified (DDNOS) by *DSM-III-R* (American Psychiatric Association, 1987) criteria, and 2) an EEG performed during the admission. If a patient was admitted more than once or to more than one of the units, data from only the first admission that met the criteria were included in the analysis. This study was approved by the Human Investigation Committees of the involved medical centers.

We reviewed the clinical records of 262 consecutive admissions to the Dissociative Disorders Program (DDP) of an urban tertiary care academic medical center or to two of its community affiliate hospitals. We divided our sample into two groups. Group 1 patients were admitted to the academic medical center or its community affiliate, and Group 2 patients were admitted to the second affiliate, a suburban community teaching hospital. To avoid double-counting of cases, 14 (5%) Group 1 cases that subsequently were readmitted to the second facility were excluded from Group 2. We also excluded 47 (18%) cases that did not have a discharge diagnosis of a dissociative disorder. Forty-one dissociative disorder cases (16%) were excluded because an EEG

TABLE 1  
Demographic and Clinical Characteristics of Dissociative Disorder Patients

Characteristic	Group 1	Group 2	P value
Data collection period	2/1/87 - 7/8/89	7/8/89 - 1/10/93	
Total 1st admissions (n, %)	82	166 <sup>a</sup>	NS
DD <sup>b</sup> /EEG <sup>c</sup>	55 (67.1%)	105 (63.3%)	
DD/no EEG	14 (17.1%)	27 (16.3%)	
EEG/no DD	10 (12.2%)	30 (18.1%)	
no DD/no EEG	3 (3.7%)	4 (2.4%)	
Final DD diagnosis (n, %)	55	105	NS
MPD <sup>d</sup>	32 (58.2%)	58 (55.2%)	
DDNOS <sup>e</sup>	23 (41.8%)	47 (44.8%)	
Age, years (mean±sd)	35.6 ± 5.2	34.2 ± 8.0	NS
Gender (n, %)			NS
Female	51 (92.7%)	96 (91.4%)	
Male	4 (7.3%)	9 (8.6%)	
Caucasian race (n, %)	53 (96.4%)	101 (96.2%)	NS
Geographic diversity of referral (n states)	21	23 <sup>f</sup>	

<sup>a</sup> 14 readmitted Group 1 patients were excluded from Group 2 total

<sup>b</sup> DD, dissociative disorder

<sup>c</sup> EEG, electroencephalogram

<sup>d</sup> MPD, multiple personality disorder

<sup>e</sup> DDNOS, dissociative disorder not otherwise specified

<sup>f</sup> including Canada (5 patients)

had not been done. The inclusion/exclusion breakdown by group is shown in Table 1.

A total of 160 (61%) of the inpatient records were reviewed. Group 1 included 55 patients who were admitted between February 1, 1987, and July 8, 1989, and Group 2 included 105 patients who were admitted between July 8, 1989 (after the DDP was relocated), and January 10, 1993. We present demographic and clinical characteristics of the two groups in Table 1. The two groups do not differ significantly on any of these characteristics. The preponderance of women in our study is not unusual for a dissociative disorder

sample. Others (Ross, 1997; Putnam, Guroff, Silberman, Barban, & Post, 1986; Bliss & Jepson, 1985) also have reported female/male ratios approximating nine to one.

Each case was assessed by at least two clinicians who were experienced in the diagnosis and treatment of dissociative disorders, either two board-certified psychiatrists or a board-certified psychiatrist and a psychologist. Psychiatric diagnoses were made using *DSM-III-R* criteria (American Psychiatric Association, 1987).

Patients underwent electroencephalography as part of a comprehensive admission diagnostic screening battery. At

TABLE 2  
Electroencephalogram (EEG) Interpretations

	Group 1	Group 2
EEG finding	(n, %)	(n, %)
Normal	38 (69.1%)	94 (89.5%)
Drug effect	6 (10.9%)	10 ( 9.5%)
Abnormal	11 (20.0%)	1 ( 1.0%)

$X^2 = 19.36, df = 2, p = .00006$

the time they were admitted, it was accepted practice to administer EEGs routinely to screen for neurological abnormalities among psychiatric inpatients (Struve, 1985; Struve, 1984; Bridgers, 1987; Warner, Boutros, & Peabody, 1990).

### Procedure

Recordings on Group 1 were made on a Grass EEG machine and recordings on Group 2 were made on a Nihon Kodan Neurofax Model 4418A Electroencephalograph. Surface electrodes and the standard 10-20 lead placement, including nasopharyngeal or T1 and T2 leads, were used at both institutions. Activation was performed with photic and/or other stimulation (e.g., hyperventilation). Sphenoidal leads or depth electrodes were not used in this screening procedure. All EEGs performed on patients in Group 1 were read by the same electroencephalographers and are considered as one site. EEGs for patients in Group 2 were read by different neurologists and are considered as a separate site.

EEG reports were divided into three groups: normal, possible drug effect, and abnormal. Ambiguous reports were reviewed by a consulting neurologist (J.W.). He categorized them based on the following criteria. A "normal" report described standard criteria for background activity and symmetry, and abnormal slowing or epileptic activity was absent. A "drug effect" report cited characteristics of medications, either fast activity or slowing. An "abnormal" report was determined by the practice criteria set forth in Daly and Pedley (1990).

### Data Analysis

Because EEGs for the two groups were read by different neurologists and were considered as separate sites, their data were analyzed separately. Continuous variables were compared by independent t-tests or, if the data were not normally distributed, by Mann-Whitney tests. Categorical variables were compared by chi-square. The alpha level was set

at  $p \leq .05$  (two-tailed) for statistical significance. Data were analyzed using the Statistical Package for the Social Sciences (SPSS/PC+ Version 5.0, Nourisis, 1992).

### RESULTS

We present the EEG data comparison in Table 2. Combining the two groups, 7.5% ( $n=12$ ) of the EEGs were read as abnormal and not a result of drug effect on the recording. All four EEG reports that the consulting neurologist reviewed because of ambiguity were read as "abnormal." However, there were significant differences between the two sites in the proportion of EEGs read as abnormal ( $X^2 = 19.36, df = 2, p = .00006$ ). By way of comparison, 7.5% (3 of 40) of the EEGs of the non-dissociative disorder patients also were read as abnormal (dissociative vs. non-dissociative:  $X^2 = 1.79, df = 2, p = .41$ ).

Nine (75%) of the twelve abnormal reports on dissociative disorder patients indicated either a unilateral or bilateral temporal lobe abnormality. The possibility of epileptiform activity was suggested in two of the nine. In one, a single left temporal spike and slow wave was observed that was potentially epileptiform. The other was interpreted as showing "rare suspiciously sharply contoured but not definitely epileptiform transients over the left temporal region." Dissociative phenomena were the only symptoms suggesting TLE that were elicited from either patient.

Two non-dissociative patients also had reports of abnormalities suggesting possible TLE. One report was interpreted as showing bilateral temporal slow and sharp activity, and the other as showing a left temporal irritable focus in a patient ultimately diagnosed with a brain tumor.

### DISCUSSION

The major statistically significant feature of our data is the different prevalences of EEG abnormalities in the two subsamples. Whereas a substantial minority (20%) of the patients who were referred to the DDP in 1987-89 (Group 1) had EEG abnormalities, there was a very low percentage of EEG abnormalities (1%) among those referred in more recent years (Group 2). EEG screening revealed only two instances of abnormalities that were suggestive of TLE, and both were found in Group 1.

The data we presented here are from patients admitted to a specialized program for dissociative disorders. It is unlikely that the difference we observed is due to the geographic area from which the patients were recruited. Also, because the two DDPs were in operation sequentially, patients could not be referred to one facility instead of the other. Although the geographic location of the program moved from a large medical center to a suburban hospital, all referrals continued to be made to the first author and there were no observable changes in the referral pattern.

However, other temporally-related changes might have

occurred in the criteria for referral and admission to the DDP. The types of patients admitted may have been modified by changes in decisions about which cases to accept and which to refer (selection bias). In part, these changes were necessitated by managed care. For example, to shorten length of stay patients may have had their medical screening including EEG conducted as outpatients prior to referral. Hence, fewer patients with abnormal EEGs may be referred to the DDP. Changes in the program and in its reputation also could produce differences in the available study population.

We have considered other possible explanations for the difference between Groups 1 and 2. Besides being examined at different sites and at different points in time, two different EEG recording instruments were used and there may have been variance in the examination procedures conducted by different examiners. We cannot rule out the possibility that different recording equipment could have biased the outcome. The 1% prevalence of EEG abnormalities in our second group may be considered low, and could suggest a different threshold for reporting abnormalities among neurologists at the two sites. Another limitation of the study is that the EEG tracings were read in an unblinded fashion by varying raters. Thus, findings of slow activity may have been attributed to medication effects rather than to possible underlying (deep) sharper activity summed at surface sites.

Although we cannot exclude the possibility of unreliable and/or inaccurate EEG interpretation, we tried to control for possible inter-rater unreliability as well as for time- and site-related influences by having a consultant review any potentially ambiguous EEG reports. As noted, all ambiguous reports were reclassified as abnormal. We do not believe that unreliability of the data and a bias towards false negative reporting of abnormalities could fully explain the different prevalences between the two sites.

Routine clinical EEG may be an inadequate screening procedure for detecting clinically important epileptiform dysrhythmias among dissociative patients. First, the recordings are made from surface electrodes, not from sphenoidal leads or depth electrodes. Second, the patients were studied for only a brief recording period rather than over extended sessions or with ambulatory/telemetry techniques. Third, there was no regard for the presence or absence of active dissociative symptoms during the EEG recording periods. Personality states may change during the course of the EEG and cognitive shifts may impact on the EEG recording. Fourth, only single EEG recordings were assessed, not repeated measures.

None of our 160 dissociative disorder patients received a clinical diagnosis of TLE. On the other hand, Schenk and Bear (1981) reported that 33% (13 of 40) of their patients with EEG-confirmed TLE experienced recurrent dissociative episodes. The differences between our prevalence rates and those of Schenk and Bear (1981) may be due, at least in part, to potential bias in the referral of patients to specialized pro-

grams. Schenk and Bear's (1981) patients were referred to a behavioral neurology program.

What, then, is the relationship between epilepsy and dissociation? Seizures may play a role in the manifestation of dissociative states (Devinsky et al., 1989), but the absence of EEG findings in epileptics of all types is widely recognized. Thus, epilepsy remains a clinical diagnosis, and dissociation is a clinical symptom that may be sufficient to suggest consideration of the diagnosis. We emphasize that dissociative experiences, which are *symptoms* associated with some cases of TLE, should be distinguished from dissociative *disorders*, which are more specific diagnostic entities. Thus the absence of EEG findings cannot absolutely exclude the possibility that some dissociative patients may have had epilepsy.

However, dissociation also can be a symptom of a psychiatric disorder. Also, abnormal EEGs were found more frequently in our dissociative patients (7.5%) than in the general population of developed countries (0.05%) (Hauser, 1995), but less frequently than in general psychiatric populations (8.8 - 15.0%) (Struve, 1984) or in adult normal control subjects (17.8%) (Struve, 1985). We obtained EEGs routinely in part to assess patients with symptoms of a dissociative disorder and to determine whether they had other manifestations of TLE. Importantly, the population and the context in which the dissociation-epilepsy association is explored will influence the outcome of any attempt to resolve the question regarding the relationship.

Thus, in our earlier sample (Group 1) our 20% rate of abnormalities (excluding "drug effect") is similar to the rates of abnormalities that have been reported in other psychiatric populations (Struve, 1985; Struve, 1984). More puzzling is the significantly lower rates in our later sample (Group 2). As we explained, there may be a variety of factors that could contribute to these differences.

Our findings highlight the problems associated with a study of this type. Patients with dissociative disorders have non-specific EEG abnormalities as well as more specific temporal lobe dysrhythmias. However, our results suggest that it is not necessary to obtain EEGs routinely for patients with dissociative disorders because they may not be sufficiently informative and their interpretation vis-a-vis dissociative symptoms may be suspect. ■

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