

Table of Contents

Article Page No.

Business III
Instructions to Authors

Announcements IV

**Quantitative EEG and the Frye
and Daubert Standards of Admissibility** 39
Robert W. Thatcher, Carl J. Biver
and Duane M. North

**Infant EEG Spectral Coherence Data During
Quiet Sleep: Unrestricted Principal Components
Analysis — Relation of Factors to Gestational Age,
Medical Risk and Neurobehavioral Status** 54
Frank H. Duffy, Heidelise Als
and Gloria B. McAnulty

**Quantitative Electroencephalography
in OCD Patients Treated with Paroxetine** 70
Elsebet S. Hansen, Leslie S. Prichep,
Tom G. Bolwig and E. Roy John

**Acute Marijuana (THC) Exposure Produces a
“Transient” Topographic Quantitative EEG Profile
Identical to the “Persistent” Profile in
Chronic Heavy Users** 75
Frederick A. Struve, Barbara R. Manno, Philip Kemp,
Gloria Patrick and Joseph E. Manno

**EEG Does Not Predict Response to
Valproate Treatment of Aggression in Patients
with Borderline and Antisocial Personality Disorders** 84
Roy R. Reeves, Frederick A. Struve
and Gloria Patrick

Quantitative EEG Effects of Topiramate 87
W. W. Wang, J C. Li and X. Wu

Quantitative EEG and the Frye and Daubert Standards of Admissibility

Robert W. Thatcher, Carl J. Biver and Duane M. North

ABSTRACT

The 70-year-old Frye standards of “general acceptance” were replaced by the Supreme Court’s 1993 Daubert criteria of the scientific method, which established the standards for admissibility of evidence in Federal Court. The four Daubert criteria were: 1- Hypothesis testing, 2- Estimates of error rates, 3- Peer reviewed publication and 4- General acceptance (Daubert v. Merrell Dow Pharmaceuticals, 61 U.S.L.W 4805 (U.S. June 29, 1993)). The present paper starts with the Daubert four factors and then matches them, step by step, to the scientific

peer reviewed literature of quantitative EEG (QEEG) in relation to different clinical evaluations. This process shows how the peer reviewed science of the Digital EEG and the Quantitative EEG (QEEG) meet all of the Daubert standards of scientific knowledge. Furthermore, the science and technical aspects of QEEG in measuring the effects of neurological and psychiatric dysfunction also match the recent Supreme Court standards of “technical” and “other specialized” knowledge (General Electric Co v. Joiner, 1997; Kumho Tire Company, Ltd. v. Carmichael, 1999) . Finally, it is shown that QEEG scientific knowledge and QEEG “technical” and “other specialized” knowledge meet the trilogy standards of the Supreme Court rulings in support of QEEG’s admissibility as a clinically valid method in the evaluation of the nature and extent of neurological and psychiatric disorders.

Infant EEG Spectral Coherence Data During Quiet Sleep: Unrestricted Principal Components Analysis – Relation of Factors to Gestational Age, Medical Risk, and Neurobehavioral Status

Frank H. Duffy, Heidelise Als and Gloria B. McAnulty

ABSTRACT

EEG spectral coherence data in quiet sleep of 312 infants were evaluated, at 42 weeks post-menstrual age. All were medically healthy and living at home by time of evaluation. The sample consisted of prematurely born infants with a wide spectrum of underlying risk factors, as well as healthy fullterm infants. Initial 3040 coherence variables were reduced by principal components analysis in an unrestricted manner, which avoided the folding of spectral and spatial information into among-subject variance. One hundred fifty factors explained 90% of the total variance; 40 Varimax rotated factors explained 65% of the variance yielding a 50:1 data reduction. Factor loading patterns ranged from multiple spectral bands for a single electrode pair to multiple electrode pairs for a single spectral band and all intermediate possibilities. Simple left-right and anterior-posterior pairings were not observed within the factor loadings. By multiple regression analysis, the 40 factors significantly predicted gestational age at birth. By canonical correlation, significant relationships were demonstrated between the coherence factors and medical risk factors as well as neurobehavioral factors. Using discriminant analysis, the coherence factors successfully discriminated between infants with high and low medical risk status and between those with the best and worst neurobehavioral status. The two factors accounting for the most variance, and chosen across several analyses, indicated increased left central-temporal coherence from 6-24 Hz, and increased frontal-occipital coherence at 10 Hz, for the infants born closest to term with lowest medical risk factors and best neurobehavioral performance.

Quantitative Electroencephalography in OCD Patients Treated with Paroxetine

Elsebet S. Hansen, Leslie S. Prichep, Tom G. Bolwig and E. Roy John

ABSTRACT

The effectiveness of drugs that have a specific effect on the activity of the serotonergic neurotransmitter system has changed the outlook for patients suffering from obsessive-compulsive disorder (OCD). With a response rate of about 70% to such compounds and the great amount of brain imaging studies conducted over the past decades, an understanding of the biochemical nature and origins of OCD is beginning to unfold. Convergent data including ethological and experimental observations, clinico-pathological findings and different imaging methods have implicated the basal ganglia along with the cortical and related thalamic structures to be involved in the pathophysiology of OCD.

In a previous study using the quantitative electroencephalographic (QEEG) method known as neurometrics, in which QEEG data from OCD patients were compared statistically with those from an age-appropriate normative population, two subtypes within a clinically homogeneous patient group were classified. Patients

with relative excess theta activity, especially in the frontal regions, were nonresponders to treatment with serotonin reuptake inhibitors (SSRI), while those with increased relative power in alpha activity were responders to pharmacological treatment. These findings suggested at least two subgroups in a patient population with similar symptoms but differential responses to treatment.

In the present study we used neurometric QEEG to subtype a group of 20 non-depressed OCD patients, fulfilling DSM-R-III criteria, treated with paroxetine, of whom 18 were responders to treatment. Of the treatment responders, 94.4% were predicted by subtype membership to be SSRI responders. In these subjects there was a strong relative alpha baseline activity; after successful treatment through at least 3 months this activity decreased, looking more normal. The group average topographic maps showed none of the characteristics seen in the nonresponder cluster (no excess relative power in theta). As in the previous investigation, baseline QEEG profile membership points to a predictive value with regard to therapeutic response.

Acute Marihuana (THC) Exposure Produces a “Transient” Topographic Quantitative EEG Profile Identical to the “Persistent” Profile Seen in Chronic Heavy Users

Frederick A. Struve, Barbara R. Manno, Philip Kemp, Gloria Patrick and Joseph E. Manno

ABSTRACT

In two published pilot studies and a controlled replication using screened normals, chronic marihuana (THC) use was associated with a unique topographic quantitative EEG profile, consisting of significant elevations of Absolute and Relative Power and Coherence of alpha activity over the bilateral frontal cortex as well as a significant decrease in alpha frequency. This report attempts to establish the causal influence of THC in the above findings by the transient production of this exact quantitative EEG profile in subjects who did not display it at the beginning. Using paced smoking of marihuana with high and low dose THC content and placebo marihuana in a counterbalanced design under double blind conditions, all four of the topographic features of chronic THC exposure were produced as transient effects by THC but not by placebo.

EEG Does Not Predict Response to Valproate Treatment of Aggression in Patients with Borderline and Antisocial Personality Disorders

Roy R. Reeves, Frederick A. Struve and Gloria Patrick

ABSTRACT

Previous investigations of the role of EEG in predicting response of aggressive patients to valproate therapy have yielded mixed results. In this study of borderline and antisocial personality disorder patients hospitalized with aggressive behavior, EEGs were obtained prior to treatment with valproate. Eight of 22 (36.4%) patients subsequently responsive to valproate had nonepileptiform EEG abnormalities, while 5 of 20 (25%) patients not responsive to valproate had nonepileptiform EEG abnormalities. Although more of the valproate responders than nonresponders had EEG abnormalities, the presence of nonepileptiform EEG abnormalities was not a statistically significant ($\chi^2 = 0.213$, $df = 1$, $p = 0.64$) predictor of valproate response in personality disorder patients with aggression.

Quantitative EEG Effects of Topiramate

W. W. Wang, J. C. Li and X. Wu

ABSTRACT

Objective: The study is to investigate the effect of topiramate (TPM) on EEG by means of quantitative pharmacoelectroencephalography (QPEEG).

Methods: One dose of TPM was administrated to epileptics and healthy adults. The EEG samples were obtained prior to and at regular intervals within the 24 hours following the administration of TPM. The EEG activity was processed with power spectral analysis.

Results: The power of slow wave, alpha 1 bands and total power increased after the administration of TPM, the power of slow wave in both occipital areas, and the total power of all scalp areas also increased. The percent of power increased at the theta band and alpha 1 band (healthy adults) or delta band, theta band (patients).

Conclusion: TPM can change the EEG background activity. These changes are different from other antiepileptic drugs.