

Referenced EEG® (rEEG®)

A New Tool for Psychiatry

WHAT IS REFERENCED-EEG® (rEEG®)

Referenced-EEG® (rEEG®) is a fundamentally, new electroencephalographic technology that assists physician's in selecting specific medications appropriate to the specific physiologic abnormalities found in neurobehaviorally disordered patients. Simply put, *rEEG® is the first neurophysiologic assessment tool that helps physicians provide more effective medication management.*

THE NEED FOR rEEG®

The modern medical model is based upon symptom-based medical practice and pathophysiologic measurement. Psychiatry is unfortunately unique among medical specialties in its lack of such measurement. This has hindered both the advancement of psychiatry in general and clinical practice in particular. In the current therapeutic model, psychiatrists choose medications based on patient reported symptoms and behaviors. Significant limitations result since these illness features do not have a simple relationship with medication response. Without a defined pathologic abnormality to treat and a physiologic marker to guide treatment, psychiatrists have been forced into the position of choosing between hundreds of psychotropic medications in a somewhat trial and error fashion.

THE SEARCH FOR A PATHOPHYSIOLOGIC MARKER

Over the last fifty years, many neuroscientists have worked at adapting the medical model to neurobehavioral disorders. Researchers have sought a biomarker to identify differences in brain function and better correlate medical treatment. This prompted assessment of various quantitative technologies, including those that depend on blood flow (PET, SPECT and fMRI) and those that measure brain electrical activity (EEG and QEEG).

Pioneering work resulted in the development of quantitative, age specific values for the resting EEG in asymptomatic individuals. Researchers have also documented the temporal constancy of the background resting EEG in clinical settings through stability and reproducibility studies. In addition, automated signal analytic capacity increased dramatically and ultimately instrument manufacturers produced digital EEG equipment suitable for clinical use.

The principle result of this work was the use of baseline, age adjusted normative values to identify abnormalities to assist in the diagnosis of major disorders or adjunctive characteristics. The hypothesis was that a refined physiologic assisted diagnosis would lead to better-defined treatment alternatives. This hypothesis is known as brain mapping and, to date, has generally failed to show meaningful assistance to diagnosis or improvement in clinical outcomes.

THE THEORETICAL BASIS FOR rEEG®

The hypothesis behind rEEG® is radically different: Are there physiological markers of abnormality

that associate with effectiveness of specific pharmacotherapies *independent of diagnosis*? Testing this hypothesis required an additional dataset of symptomatic patients responsive to pharmacotherapy. rEEG® has been used commercially since the early 2000's and was piloted with two managed behavioral healthcare organizations as well as a large staff model MCO, and a Veterans Administration (VA) hospital. To date, over 300 psychiatrists have used rEEG® for guidance in more than 7,500 pharmacotherapy interventions. The developers used an exhaustive procedure to qualify data points for inclusion in the database, as validity of clinical assessments in the database was crucial.

The resulting dataset enabled the definition of mathematical relationships for different medications and made possible a report of the likelihood that a patient with a given abnormality will respond to different medications.

THE USE OF rEEG®

rEEG® is a proprietary technique provided by CNS Response, Inc. It utilizes standard 21-lead digital EEG equipment to measure the patient in a resting but awake state. The recording generally takes 30 to 60 minutes and is then sent to CNS Response. The patient must be medication free for five half-lives of all agents known to affect the CNS. The company essentially acts as a reference laboratory providing reports to help psychiatrists determine the most effective medication management for their patients. These reports classify patients based on the 1142 variables calculated in the recording (the FDA – approved neurometric system) and then reports on outcome history in treating patients with similar neurophysiologic lesions.

Reports may indicate single or multiple medications based on the nature of the physiologic abnormality discovered. They may also indicate that brain function is within normal range, suggesting that pharmacotherapy is not indicated or possibly contraindicated. The entire procedure is rapid, non-invasive, devoid of radiation or high strength magnetic fields, and results in a report that is easily used by clinicians given its similarity in format to antibiotic sensitivity testing.

TYPES OF rEEG® TESTING

The initial rEEG® test is called a Type I test and generates pharmacological correlations with known medication responses. The Type I test is appropriate for refractory patients who have not responded well to previous medication trials. These patients often pose a significant treatment dilemma for which any assistance is welcome. However, after success using rEEG® on the most difficult patients many psychiatrists have begun to use rEEG® on new, medication-naïve patients to ensure effectiveness of initial treatment.

The Type II rEEG® test occurs about four to six weeks after achieving therapeutic dosage. It assesses the effect of medication on brain features and helps to assess the adequacy of treatment. The Type II report comments on brain activity and medication dosing. The Type II is analogous to a bioassay as used in other fields. A patient is a candidate for Type II testing when the physician has followed original pharmacological recommendations and a sufficient time on those agents has elapsed.

CNS Response recommends and coordinates training with an experienced medical director for the physician's initial interpretation and application of these reports.

THE DEVELOPERS OF rEEG®

Stephen Suffin, M.D. and W. Hamlin Emory, M.D. developed rEEG® over a period of nearly twenty years. They developed the hypothesis of rEEG® and the ability to put this theoretical framework into effect based upon Dr. Suffin's unique background in pathology and Dr. Emory's interest in finding a physiologic basis for pharmacologic treatment. Originally a mathematician and a programmer on the initial IBM 360 operating system, Dr. Suffin subsequently trained as a pathologist. He later became a faculty member in the Department of Pathology at UCLA, an immunopathologist at the Laboratory of Infectious Diseases at the National Institutes of Health, and Medical Director of the Upjohn, Smithkline Beecham and Quest clinical laboratories in Los Angeles.

Dr. Suffin subsequently developed the insight that he could make a more valuable contribution by applying his quantitative skills to a more qualitative area of medicine. While never discontinuing his pathology practice, he became a psychiatrist at UCLA where he had a faculty appointment. Originally pursuing an academic career in psychiatry, Dr. Suffin realized that the development of a symptomatic EEG and pharmacotherapeutic database would be a long and painstaking process that would be best accomplished in a private clinic setting in which long term patient follow-up would be possible. By partnering with Dr. Emory, who desired to find a physiologic basis with which to apply the modern medical model to psychiatry, the two physicians were able to accumulate the necessary empirical data and then test the model prospectively.

Dr. Suffin is currently a Corporate Clinical Pathologist and the Interim Chief Laboratory Officer for Quest Diagnostics.

CONTACT CNS RESPONSE

2755 Bristol Street, Suite 285
Costa Mesa, CA 92626
Phone: (714) 545-3288
Fax: (866) 294-2611
www.cnsresponse.com