'Ride the Waves Into the Next Millennium'
7th Annual Conference
AND
Advanced qEEG Workshop
Society for Neuronal Regulation
September 30 - October 3, 1999 & October 4-6, 1999
Myrtle Beach, South Carolina

The Clinical Significance of EEG Coherence

Robert W. Thatcher, Ph.D.

EEG coherence is one of the most sensitive of all EEG measures in the detection of brain disorders such as learning disabilities, traumatic brain injury and various psychiatric disorders. At the same time, however, EEG coherence is often difficult to understand and to correctly interpret. The purpose of this presentation is to review the scientific foundations of EEG coherence with special emphasis on the relations between EEG coherence and neural network dynamics. The mathematical definition of coherence will be reviewed and a two-compartmental model of EEG coherence will be presented in which coherence is interpreted in terms of short and long distance connection systems in the brain. The differential dynamics of the short and long distance compartments will be reviewed and clinical implications and interpretations will be offered based on this model. The different roles of the gray matter and the white matter in the production of EEG coherence will be discussed in both normals and traumatic brain injured individuals. Integration of EEG coherence with biophysical MRI measures will be discussed in terms of the number of connections and the strength of connections between neural networks. Implications for biofeedback of EEG coherence will be discussed in the context of the two-compartmental model with special emphasis on the need for a reference EEG database to guide the feedback process.

Bay Pines VA Medical Center and Departments of Neurology and Radiology, University of South Florida College of Medicine