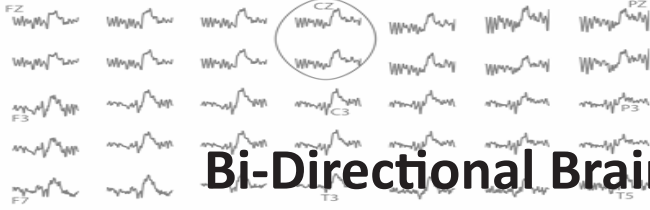


4.A: Conventional disc electrodes

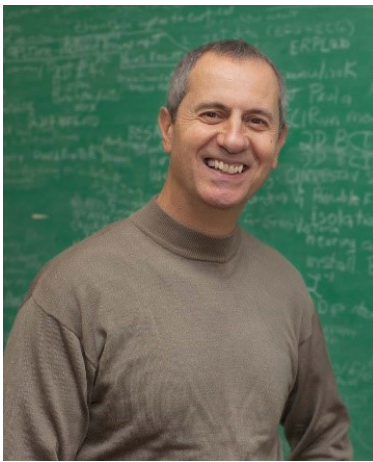


4.C: Tri-polar electrodes



Bi-Directional Brain Communication with Tripolar Concentric Ring Electrodes

Koka & Besio 2007 Neuroscience Methods



PRESENTED BY

Walter Besio

Professor

Department of Electrical, Computer
& Biomedical Engineering

Co-Founder Interdisciplinary

Neuroscience Program

University of Rhode Island

SCHEDULE

Thursday, April 29
(10:45-11:45AM)

Electroencephalography (EEG) is an essential component in the evaluation of epilepsy, the most common serious brain disorder worldwide. Misdiagnosis of epilepsy is very common and occurs in up to 50% of the patients. Artifact contamination seriously hinders the effectiveness of EEG and is a root cause of misdiagnosis. Dr. Besio has been developing a tripolar concentric ring electrode (TCRE) sensor and a t-Interface that registers tripolar EEG (tEEG, nano-volt signals) and emulated EEG (eEEG) from the same sensors concurrently. tEEG resolves the fundamental drawbacks of conventional EEG, providing significant improvement in signal fidelity, spatial resolution, and registering of higher frequency brain activities, where conventional EEG is lacking. The fundamental principles of the TCRE and t-Interface automatically cancel artifacts, such as from muscles, which are orders of magnitude larger than scalp-recorded brain signals. Dr. Besio will provide examples for comparison between tEEG and EEG for epilepsy and brain computer interfacing. Further, about 12 in 100 people worldwide, or 800 million, are suffering from neurological disorders such as epilepsy, chronic pain, Parkinson's, etc.. Around 450 million people worldwide are affected by psychiatric disorders. Despite decades of research, new drugs, and advances in surgical therapy, up to 30% of the patients with epilepsy or psychiatric disorders do not respond to medical treatment or suffer from its severe side effects. Dr. Besio has also been developing transcranial focal electrical stimulation (TFS), applied through CREs, and will show how TFS prevents epilepsy, stops seizures, alters neurotransmitters and genes, as well as enhances anti-seizure drugs.

