QEEG
CERTIFICATION BOARD INTERNATIONAL

Scholarly Research Award

International QEEG Certification Board (IQCB)

About the Award

This award is a $1,000 (USD) award for the most outstanding paper, presentation or poster presented at the ISNR Annual Conference utilizing QEEG in some way. The goal is to encourage the use of QEEG in scientific research and clinical practice. Beginning 2022, we will offer two $1000 (USD) awards; one for the use of QEEG in scientific research and the other for use in clinical practice.

Requirements

- Must be a part-time or full-time student for the current or previous year
- Must be a current ISNR Student Affiliate member
- Must volunteer for a minimum of three (3) hours at the ISNR Annual Conference. Discretion and time of the volunteer coordinate is required.
- Attendance at the annual conference in required to receive the award.

IQCB is pleased to announce the 2021 Winner!

Kristin Williams
2021 Award Winner

Kris Williams is a doctoral candidate who earned her B.S. degree from the University of Georgia (*honors: summa cum laude).* Kris is a member of several academic honor societies which include Phi Kappa Phi, The National Society of Collegiate Scholar's and Golden Key International Honor Society. During her doctoral studies she has completed the Pharmacology certificate program via Harvard Medical School's Extension Program. Kris's research interests include mathematical algorithms for source localization and current source density according to swLORETA analyses. As a clinical neurophysiology research scientist for Quietmind Foundation, her research focuses on determining potential neuropathophysiological biomarkers that are related to symptomatic profiles associated with cognitive decline and Alzheimer's dementia. She anticipates to continue with this research, under the direction of Marvin Berman, Ph.D., as a post-doctoral fellow at Quietmind Foundation beginning in 2022.

Congratulations, Kris!

Poster Session Abstract

Saturday, June 26th
5:00 PM - 6:00 PM

TITLE: Evaluations of Algorithmic Models For Estimations of Current Source Destiny and Electrophysiological Substrates According to Loreta and swLoreta Analyses

Author: Kristin Williams

Abstract:
This research examines the mathematical algorithms utilized for electroencephalographic source imaging (ESI) and current source localization. Electrodynamic processes that are evaluated according to source localization analyses and are derived from electroencephalographic assessments are based on the inverse problem. The inverse problem does not have a unique solution as infinite interactions between neuronal generators may yield the same derivation of scalp potentials. Source localization is subject to significant estimation errors of current source density and dipolar sources. The underdetermination of the system influences the significant estimation errors that can arise from small changes in the data related to the three-dimensional montage utilized to derive the estimations of the position and direction of potential electrophysiological generators for the lead field matrix. Common mathematical algorithms proposed to solve the inverse problem include low resolution electromagnetic tomography (LORETA), standardized weighted low resolution electromagnetic tomography (swLORETA), minimum norm estimate, and the weighted minimum norm estimate. Statistical evaluations of electrophysiological signals can be applied to evaluate neurocognitive behavior as linear or nonlinear functions. This research specifically evaluates the algorithmic models utilized for source localization according to LORETA and swLORETA analyses. Thus, the proposed models will be based upon linear estimations of cortical and subcortical activity that are etiologically relevant to electrodynamic processes. Because arithmetic models that incorporate priors into estimations of source distribution include the Bayesian framework and penalty function, this research examines the calculus related to estimations of source localization according to these models. The penalty function incorporates unknown source dynamics, the number of sensors utilized in the electrophysiological recording, number of samples across time, and a weighted factor. This algorithm utilizes a least squares regression model to estimate the penalty term as a quadratic function. Estimations of EEG sources according to parametric Bayesian models utilize spatial and neural constraints, evaluations of the current, and physical principles related to wave dispersion to derive estimations of localization. The parametric Bayesian model assumes Gaussian distributions and accounts for random fluctuations of sensor and source space. These mathematical models are also included due to the ability to transform one into the other while maintaining the integrity of their core structures.

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