

Electrophysiological variants correlated with neurodevelopmental delays: A systems biology approach

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Abstract

The impact of electrophysiological variants affecting the systemic organization of brain functions, especially perceptual, cognitive, and behavioral functions, has been largely undocumented. Health and education concerns, advanced technology, and current neuroscience research, including neuropsychological/brain-behavior studies, have afforded us an increased understanding of the cerebral organization and psychological structure of human mental processes. This article takes a Systems Biology approach to the brain as a functional system. The cerebral organization/psychological structure of intelligence and learning is discussed, encompassing a working brain relationship among attention, perception, executive function, memory, speech/language, sensory/motor, and mood/thought functions. A summary of 50 case studies revealing the clinical correlation of the functional brain-behavior impact with electrophysiological variants is examined. Patient histories reveal a variety of conditions associated with neurodevelopmental delay, including attention deficit disorders, autism, dyslexia and related learning disorders, sensory/motor disorders, mood disorders, and language disorders. This impact emphasizes the need for more specific identification and treatment of this subgroup of individuals experiencing electrophysiological disturbances affecting their development and learning. Health and education implications are discussed underscoring the importance of collaboration among neuroscience, education, and health policy professions, aiding the quality of life of those affected.

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