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Value of evoke functional electroencephalography in diagnosis and management of mild to moderate brain injury: case series of 150 professional football players with multiple concussions

Introduction: A history of multiple sports-related concussions has been associated with impairment ranging from a mild dementia to Alzheimer's disease to chronic traumatic encephalopathy. Quantifying such impairment is important to identifying and management.

Method: One hundred fifty retired professional American Football players with cognitive and memory loss was comprehensively evaluated including: comprehensive neuro-musculoskeletal examinations, brain MRI (concussion protocol), formal cognitive testing, and functional electroencephalography (Evoke NeuroScience).

Results: Males, ages 32 to 65 years, with professional football careers ranging from 1 to 18 years. All were ambulatory. 75% were currently employed. Physical exams included ataxia of speech and gait, word finding impairments, nystagmus, pendular reflexes, and abnormal affect. Neurocognitive testing revealed impairments from mild to marked in up to five cognitive domains. MRI (concussion protocol) revealed positive findings in 34%. Functional EEG findings included delayed P300a and P300b, slowed response times to visual and cognitive stimuli, low frontal EEG power, reduced neuronal capacity in regions associated with cognition and working memory, abnormal theta/beta ratios, abnormalities in visual, auditory processing, information processing and working memory. Abnormal midline FZ-CZ-PZ gradients and alterations in heart rate variability.

Conclusions: The physical-neurological exam provides objective findings, but is subtle. Brain MRI is abnormal in only 35%. Neurocognitive testing identified abnormalities in all cases. The functional EEG is objective, without evaluator bias. It adds confirmatory objective electrophysiological findings that correlate tightly with formal neurocognitive impairments, and correlates tightly with subjective symptoms. Additionally, identified specific abnormal physiological alterations can provide scientific clinical rationale for targeted treatment regimen, including neurofeedback.

Biography

John L Merritt graduated from the Medical University of South Carolina (MD) and did residencies at Huntington Hospital (University of Southern California) and The Mayo Clinic, Rochester Minnesota. He is an Emeritus Professor, University of South Florida, Medicine & Neurology, and has served as Professor at the Mayo Clinic, University of Southern California, Irvine, Medical College of Wisconsin and University of South Florida, Tampa. He is board certified in Brain Injury Medicine, Spinal Cord Medicine, Physical Medicine & Rehabilitation and Internal Medicine. He is Medical Advisor to Stay in Step SCI Recovery Center and President of RehabMed South.

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