Early Identification of Neurodevelopmental disorders in neonates with EEG

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Premature babies are at greater risk of neurodevelopmental disorders. Early intervention can reduce their impact, but diagnosis is difficult. Complexity-driven analysis of electroencephalography (EEG) data can overcome these challenges. Physical and behavioural signs are used in conjunction with cranial ultrasound and MRI to identify structural abnormalities and the manifestation of neural deficits. However, this relies on trends and leads to later diagnoses. EEG generates functional data without reliance on clinical signs by measuring neural activity. EEG data analysis is highly variable both in protocol and interpretation. Controlling this with computer-assisted procedures minimises variability between analyses and improves reliability. Using Multiscale Entropy (MSE) to determine complexity of brain activity across temporal and spatial scales uses these benefits and combines them with a capacity to find patterns of activity across several levels of neural activity. Healthy and pathological development differ in their complexity. Greater complexity, when measured by Multi-scale Entropy (MSE) has predicted positive long-term developmental outcomes in neonates. Taken together, analysis of brain activity complexity through EEG can differentiate between healthy and pathological brain development in the high-risk group of premature babies. Several papers support these ideas, by evaluating EEG developmental biomarkers in neonates and the power of complexity analysis over traditional feature detection.

DOI: 10.21467/abstracts.8.3 ISBN: 978-81-989164-4-0 (eBook)