Epilepsy in children is associated with cognitive impairments that have a major impact on quality of life. Successful treatment of seizures has very little positive impact on cognition suggesting that therapeutic approaches that go beyond traditional antiepileptic medications are required. We use single unit electrophysiology to evaluate patterns of action potential firing and consider these patterns to be system level mechanisms of disease. Environmental interventions improve cognitive impairments in animals with brain malformations. This improvement is associated with normalization of action potential firing patterns, providing strong proof of concept that abnormally structured brains have capacity to functionally recover towards normal. Current work is evaluating whether similar effects can be achieved with brain stimulation.

**BIOGRAPHY**

Dr. Rod Scott MD, PhD is Division Chief on Neurology at Nemours, Professor of Neurological Sciences at the University of Vermont and Professor of Pediatric Neuroscience at Great Ormond Street Hospital NHS Trust. His research has explored the relationships between epileptic seizures, brain injury and cognitive impairments in humans and animal models using neuroimaging, epidemiological and electrophysiological methods. This work has resulted in over 100 publications and several book chapters. His recent work considers the brain as a complex adaptive system and derives novel mechanistic and treatment hypotheses within this framework.