FAER
Foundation for Anesthesia Education and Research

**Glorilee B. Harper, MD**
Stanford University School of Medicine, Stanford, CA
*An imaging approach to anesthesia and neurodevelopment*

**Abstract**

Concern has been growing among medical and lay communities regarding the potential neurotoxicity of early anesthesia exposure. While animal studies have shown neurotoxic effects of anesthesia during critical periods of neurodevelopment, effects in humans are not well understood. Our long-term goal is to utilize neuroimaging and neuropsychological testing to identify and characterize potential lasting effects of early anesthesia exposure on human brain structure and function. We will employ magnetic resonance imaging (MRI) and standardized cognitive-behavioral metrics to compare otherwise healthy children between 6 and 10 years of age who received general anesthesia prior to the age of 3 to case-matched controls. Data has already been collected, and the period of requested grant funding will be used for image processing and data analysis. We will build on the limited data assessing anesthesia's impact on neuroanatomical structure and examine a completely unstudied field, focusing on anesthesia's effects on both structural and functional connectivity of neural networks in developing children. Children will have undergone high-resolution T1-weighted structural MRI, diffusion tensor imaging, and resting-state functional MRI in addition to cognitive-behavioral assessments to measure behavior and neuropsychological performance in multiple cognitive domains. Our novel use of imaging to assess neuroanatomy and connectivity will provide valuable insight on changes that may not be identifiable by cognitive-behavioral metrics alone. By comparing brain structure and function of exposed and unexposed subjects, we can begin to understand the complex interaction between anesthetics and the developing brain.