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Spinal fiber optic monitoring

Spinal cord ischemia results in life-changing paralysis and paraparesis after major vascular, spine and spinal cord surgery, and spine trauma. No technology is currently available to directly and immediately neither predict or detect the onset of spinal cord ischemia, nor provide feedback and guidance for interventions directed at improving flow and oxygen delivery to resolve the ischemia. Current methods employed to detect spinal cord ischemia, based upon electrophysiology, are indirect, temporally insensitive, non-specific, as only 16%–40% of patients with electrophysiological changes developed postoperative-onset paraparesis, paraplegia, or quadriplegia. The reliability of the current technology is simply not good enough. We have developed a prototypical fiber optic device based on Diffuse Correlation Spectroscopy (DCS) and Diffuse Optical Spectroscopy (DOS) principles that allows for the immediate detection and continuous monitoring of changes in spinal cord blood flow and oxygenation. The device prototype can be placed via open and percutaneous approaches. The ability to measure spinal cord blood flow and oxygenation will: 1) Facilitate expeditious diagnosis and monitoring of the progress of spinal cord ischemia; 2) enable continuous bedside monitoring in the neurocritical care setting; 3) offer an enhanced opportunity to prevent secondary injury; 4) provide critical data in the laboratory and clinic for assessment of the efficacy of therapeutic approaches to ameliorate ischemia, and 5) provide preoperative and intraoperative data to improve decision making for procedures where the spinal cord may be threatened.

Biography

Thomas F Floyd obtained his MD from the University of Pennsylvania in 1986 and completed his Residency in Anesthesiology in 1990 at the University of Minnesota. He completed a Fellowship in Magnetic Resonance Imaging as well as a Fellowship in Cardiothoracic Anesthesiology from 1999-2002 at the University of Pennsylvania where he subsequently served as a Faculty. He currently is a Professor with Tenure in the Department of Anesthesiology and maintains Adjunct Appointments in Biomedical Engineering, Neurology, and Radiology at Stony Brook University in New York. He is a Lead Investigator in the development of fiber optics for the monitoring of spinal cord ischemia.

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