

- **Anatomy and Physiology**
 - *Brain, spine and spinal cord, cranial nerves, pain mechanisms and pathways, dermatomes, cerebral blood flow (effects of pH, PaCO₂, and PaO₂), cerebral metabolic rate, autoregulation, cerebral perfusion pressure, molecular transport across blood-brain barrier, neural control of breathing, carotid body, temperature regulation*
 - Autonomic (sympathetic and parasympathetic) nervous system, peripheral nervous system
 - Neuromuscular junction and synaptic transmission (pre- and post-junctional components), skeletal muscle
- **Pathophysiology and Anesthetic Management**
 - Brain disorders:
 - Stroke and transient ischemic attack (TIA)
 - Seizures (clonic, tonic-clonic, focal onset, generalized onset, motor, non-motor)
 - Parkinson's disease
 - Neuroleptic malignant syndrome
 - Alzheimer's disease
- **Neurologic depression**
 - Drug intoxication
 - Evaluation of neurologic status (Glasgow Coma Scale, AVPU scale, etc.)
- **Postoperative cognitive dysfunction**
- **Spinal cord injury:**
 - Paraplegia
 - Quadriplegia
 - Autonomic hyperreflexia
 - Spinal shock
 - Neurogenic shock
- **Neuromuscular diseases:**
 - Multiple sclerosis
 - Motor neuron diseases
 - Amyotrophic lateral sclerosis
 - Spinobulbar muscular atrophy
 - Hereditary spastic quadriplegia
 - Guillain-Barre Syndrome
 - Muscular dystrophies
 - Myotonias
 - Mitochondrial myopathies
 - Myasthenic syndromes (myasthenia gravis, Lambert-Eaton Myasthenic Syndrome, congenital myasthenic syndrome)
 - Cerebral palsy
- **Electroencephalography (EEG) and bispectral index (BIS) monitoring, evoked potentials (SEEPs, MEPs, BAEPs, VEPs), cerebral oximetry, intracranial pressure (ICP)**
- **Peripheral nerve stimulators, nerve stimulator patterns, and anesthetic implications:**
 - Single twitch
 - Train of four
 - Tetanus
 - Double burst stimulation

- Post tetanic count
- Fade
- Supramaximal stimulus
- Direct muscle stimulation
- Differences in nerve monitoring sites
- Indicators of adequate reversal
- **Anesthetic considerations and management for increased ICP, herniation, cerebral ischemia, positioning, air embolism, anesthetic and ventilator effects on cerebral blood flow**
- **Anesthesia for brain and spine surgery:**
 - Craniotomy
 - Transsphenoidal approaches
 - Ventriculoperitoneal (VP) shunts)
 - Aneurysms and arteriovenous malformations
 - Cerebral vasospasm
 - Seizure focus ablation
- **Clinical application of somatosensory evoked potentials (SSEP), motor evoked potentials, brainstem auditory evoked potentials, and visual evoked potentials**
- **Cerebral and spinal cord protection:**
 - Blood pressure and end tidal CO₂ control
 - IV fluid management and selection
 - Cerebral autoregulation
 - Hypothermia
 - Pharmacologic
 - Spinal fluid drainage