

# Electroencephalography

Electroencephalography (EEG), which measures electrical activity in the brain, remains a powerful tool in neurology care. Evoked potential (EP) tests measure brain or nerve activity provoked by sensory stimulations — either visual, auditory or sensory — to evaluate the integrity of brain systems. The robust program at UVA Health System harnesses the impressive capabilities of these technologies to help monitor and diagnose a range of illnesses and disorders in pediatric and adult patients.

In addition to electroencephalography studies available in an outpatient setting at UVA Medical Center, EEG stations and technologists are available around the clock for patients admitted to the hospital. Our portable EEG stations monitor and assist in the diagnosis of patients throughout our hospital, including the intensive care unit and neuro-neonatal intensive care unit. Every EEG station is equipped with wireless networking, allowing our neurologists to carefully monitor EEG readings on any patient in the hospital at any time.

We expand our expertise beyond UVA Health System through consultative partnerships with community hospitals, interpreting EEGs performed at our partner hospitals. This service leverages our dedicated specialization and experience to assist these clients in providing the best care possible for their patients. Our laboratory has been fully accredited by the American Board of Registration of Electroencephalographic and Evoked Potential Technologists (ABRET), the nation's main neurophysiology accreditation organization.

## Equipment

Current equipment at UVA Medical Center consists of:

- 12 systems dedicated for use in the Epilepsy and Pediatric Epilepsy Monitoring Units (eight mixed age, four pediatric)
- Brain mapping hardware and software for analyzing brain function in neurosurgery patients
- Equipment suitable for recording intracranial and intraoperative brain activities
- 10 portable EEG units for patients in intensive care and other inpatient units
- Software for real-time or retrospective mathematical analysis of brain signals to help in seizure detection, prognosis and treatment of patients with severe brain disorders
- Four ambulatory EEG systems — with and without simultaneous video — that patients may take home for up to three days
- Six EEG units available for outpatients to perform routine or longer outpatient studies
- One EP machine with equipment suitable for measurement of visual brainstem auditory and somatosensory EP

## Technologist Availability

- Outpatient studies performed weekdays, 8 a.m.-4 p.m.
- Inpatient studies available seven days a week; in-house technologists available 6:30 a.m.-midnight
- Take-home ambulatory studies can be ordered for over-weekend or holiday recordings at home
- Studies available for review remotely, allowing quick and reliable interpretation

## Conditions Treated

**At UVA, our electroencephalography program is equipped to assist in the treatment of patients of all ages, from neonates through advanced age.**

### Epilepsy

A vital tool in the treatment of both pediatric and adult-onset epilepsy, our utilization of EEG helps us choose the most clinically robust classification for a patient's epilepsy diagnosis. This, in turn, allows us to pursue medical interventions tailored to each patient's needs. For example, EEG assists us in determining if a patient with medically intractable epilepsy is a candidate for surgical intervention.

### Nonepileptic Seizures

For nonepileptic seizure, EEGs allow us to classify various types of physiological events, including limited blood flow to the brain, metabolic conditions or psychogenic nonepileptic seizures (PNES).

### Encephalopathy

Cerebral monitoring in the ICU is an important pillar of our EEG program. Our around-the-clock, in-house capabilities allow us not only to monitor patients with acute illness, but to provide prognoses as well. Our work provides a more complete picture of a patient's health status, allowing physicians to correlate their neurologic diagnoses with our underlying EEG findings.

### Hypoxic Injuries

EEG aids our neurology teams in the aggressive treatment of common but very dangerous brain disorders, such as hypoxic injuries. Our EEG technologists work in tandem with neurologists using hypothermic therapy to treat patients with recent cardiac arrest or other hypoxic injuries. EEG is also an essential component for neonates in the NICU, in which hypothermic care works in concert with EEG monitoring to treat birth-related hypoxic ischemic encephalopathy (HIE). EEG and EP are also important in the determination of prognosis after severe brain injury.

### Sleep Disorders

At UVA Sleep Disorders Center, EEG is a crucial component of our augmented sleep studies. Our team evaluates EEGs in patients monitored overnight for certain suspected sleep disorders, including seizures and pseudoseizures.

### Multiple Sclerosis and Demyelinating Disorders

Expertise in EP is an important component in augmenting history and neurological examination in the diagnosis of multifocal neurological disorders.

## Research

**In addition to expanding the use of electroencephalogram technology in our inpatient and outpatient settings, UVA is pioneering new applications.**

### Quantitative EEG

Our electroencephalographers stand at the forefront of a new era in the use of this technology: the development of quantitative EEG to aid in patient evaluation and prognosis assessment. As part of this effort, our team is partnering with UVA neonatologists to develop EEG mathematical analyses that can be used to predict long-term outcomes in neonates treated with hypothermia for birth-related hypoxic injury.

### Prognostic EEG

UVA is a member of the Critical Care EEG Monitoring Research Consortium, a group of academic electroencephalography labs exploring the use of EEG technology in monitoring applications within the ICU. Mark Quigg, MD, is overseeing a study examining the use of EEG as a prognostic marker in patients with acute brain disorders, such as brain trauma, hypoxic injury, ischemic stroke and hemorrhagic stroke.

## Our Team

**Our faculty have all undergone formal training in neurophysiology and are board-certified in clinical neurophysiology through either the American Clinical Neurophysiology Society or the American Board of Psychiatry or Neurology. We have an active teaching program with participation of neurology residents and epilepsy and clinical neurophysiology fellows. This team provides comprehensive support for electroencephalography at UVA Medical Center, with the capacity and training to assist other medical institutions as well.**

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**Edward Bertram, MD**  
Adult Neurology

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**Jennifer Langer, MD**  
Adolescent Epileptology

**Mark Quigg, MD**  
Adult Neurology and Sleep Medicine

**Andrew Schomer, MD, PhD**  
Adult Neurocritical Care

## Become a Partner Hospital

For more information about becoming an EEG partner hospital, contact us:

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