

**AMERICAN ACADEMY OF NEUROLOGY
EPILEPSY
FELLOWSHIP CORE CURRICULUM**

1. Introduction

This curriculum is designed for an epilepsy fellowship. Training in electroencephalography (EEG) should be understood to include that defined in the outline of the AAN Neurophysiology Fellowship curriculum; additional material specific to the Epilepsy Fellowship is given here.

2. Goals and objectives

The graduate should be able to diagnose and care for patients with epilepsy, including those with complications and diagnostic uncertainties. The graduate should be able to apply outpatient and inpatient EEG facilities, including ambulatory and video/EEG monitoring units, to the management of patients with seizure disorders; and to provide or organize appropriate treatment, including surgery, vagus nerve stimulation, and investigational drugs.

3. Definitions

A *trainer* is the program director or faculty appointed by the program director. An *epileptologist* is a neurologist who has had a fellowship in epilepsy and/or for whom epilepsy comprises more than 60% of his/her clinical or research activities.

4. Content of subjects to be learned

- I. Epileptology: Basic science
 - A. Pathophysiology, including excitotoxicity and inhibitory mechanisms
 - B. Animal models: kainic acid, kindling, pilocarpine, perforant pathway stimulation, iron deposition, genetic epilepsies in rats/mice; models of cerebral dysgenesis
 - C. Pharmacology of antiepileptic drugs (AEDs)
 - i. principles of pharmacokinetics and pharmacodynamics
 - ii. protein binding of AEDs
 - iii. metabolism of AEDs; steady state
 - iv. drug interactions
 - v. mechanisms of action of AEDs, including effects on activity of GABA, sodium channels, glutamate activity, T-type calcium channels, GABA/benzodiazepine receptors, carbonic anhydrase
- II. Clinical epileptology
 - A. Epidemiology of epilepsy
 - i. Incidence and prevalence

- ii. Risk factors: family history, febrile seizures, stroke, CNS infection, trauma, cerebral neoplasms, neurocutaneous syndromes, neurodegenerative disorders, cerebral dysgenesis, arteriovenous malformations, cerebral palsy
- B. Diagnosis of seizures and epilepsy
 - i. Knowledge of semiology of seizures, relating seizure type to epilepsy syndromes
 - ii. Differentiation of seizures from other paroxysmal phenomena, including pseudoepileptic attacks
- C. Classification of seizures
 - i. partial seizures
 - a. simple partial seizures
 - b. complex partial seizures
 - c. secondarily generalized tonic-clonic seizures
 - ii. generalized seizures
 - a. absence seizures
 - b. myoclonic seizures
 - c. tonic seizures
 - d. clonic seizures
 - e. tonic-clonic seizures
 - f. unclassified seizures
 - g. infantile spasms
 - iii. unclassifiable seizures
- D. Epilepsy syndromes
 - i. localization-related versus generalized epilepsies; symptomatic vs idiopathic epilepsies; cryptogenic epilepsies
 - ii. age-related syndromes: neonatal convulsions; neonatal myoclonic epilepsy; childhood and juvenile absences; juvenile myoclonic epilepsy; awakening grand mal epilepsy; West syndrome; Lennox-Gastaut syndrome
 - iii. genetics of epilepsy, including genetic counseling
- E. Diagnostic evaluation
 - i. electroencephalography (EEG): routine EEG, ambulatory EEG, video-EEG monitoring, electrocorticography, chronic intracranial EEG monitoring, intraoperative/extraoperative cortical functional mapping
 - ii. neuroimaging: structural and functional magnetic resonance imaging; positron emission tomography, single photon emission computed tomography, magnetic resonance spectroscopy, magnetoencephalography
- F. Special issues in epilepsy
 - i. Psychosocial: employment, schooling, quality of life; psychiatric complications
 - ii. Driving: knowledge of state regulations, medical guidelines
 - iii. Pregnancy and epilepsy: assessment of appropriate therapy before and after pregnancy, serum AED levels, role of folic acid; risk assessment; breastfeeding and AEDs
 - iv. Contraception: role of enzyme-inducing drugs on hormonal contraception

- v. Economics of care
- vi. The single seizure: treatment options
- vii. Patient and family education; appropriate referral for psychosocial support
- viii. Prognosis of epilepsy: relation to various epilepsy syndromes

III. Pharmacologic Therapy of epilepsy

- A. Antiepileptic drug therapy: uses of AEDs including phenytoin, carbamazepine, valproate, phenobarbital, lamotrigine, primidone, gabapentin, tiagabine, topiramate, levetiracetam, zonisamide, felbamate, oxcarbazepine
 - i. choosing the appropriate AED: considerations of age, sex, child-bearing plans, co-existing conditions, cognitive level, expected duration of treatment, co-mediations
 - ii. techniques of initiating and maintaining drug therapy
 - iii. knowledge of side effect profile of each AED
 - iv. absorption, metabolism, clearance of AEDs; steady state; zero-order and first-order kinetics
 - v. drug interactions: effects of protein binding, enzyme induction
 - vi. dose-related and idiosyncratic side effects: recognition & management
 - vii. use of serum levels including free levels
- B. Monotherapy vs polytherapy
- C. Withdrawal of AED therapy: selection of appropriate time, and method of tapering
- D. Special issues
 - i. Treatment of status epilepticus: diagnosis and treatment of convulsive and non-convulsive status epilepticus; use of EEG; relative advantages of various AEDs; criteria for selection and management of drug-induced coma
 - ii. Use of AEDs in special populations: children, pregnant women, renal failure, hepatic failure, the elderly
 - iii. pharmacoeconomics of AEDs

IV. Surgical therapy of epilepsy

- A. Definition of intractable epilepsy
- B. Identification of surgical candidates
- C. Preoperative diagnostic evaluation: supervision & interpretation of EEG/video monitoring, interictal and ictal brain imaging, coregistration and subtraction imaging, intracarotid amytal test, neurocognitive function tests, sphenoidal electrode placement
- D. Management of AED withdrawal for diagnostic and presurgical EEG monitoring
- E. Selecting patients for invasive EEG monitoring
 - i. Electrode placement: subdural, epidural, intracerebral
 - ii. selecting placement site according to clinical and EEG findings
- F. Selection of operative strategies including temporal lobectomy, extratemporal topectomy or lobectomy, amygdalohippocampectomy, hemispherectomy, corpus

- callosotomy, subpial transection
- G. Recognition of seizure semiology and its relation to localization of seizure onset
- H. Assessment of operative outcome
- I. Choosing patients for reoperation
- V. Other therapies for epilepsy
 - A. Vagus nerve stimulation (VNS)
 - i. Choosing patients for VNS
 - ii. Initiating and adjusting stimulation parameters
pseudoseizures
 - B. Ketogenic diet: selection of patients, understanding principles of initiating and maintenance of the diet, and adverse effects
 - C. Familiarity with other non-pharmacologic treatments, including behavioral techniques, stress management