ACOEM Commercial Driver Medical Examiner Training Program

Module 6: Neurological

Neurological — 49 CFR 391.41(b)(7)(8)(9)

49 CFR 391.41(b)(7) - "A person is physically qualified to drive a commercial motor vehicle if that person —
Has no established medical history or clinical diagnosis of rheumatic, arthritic, orthopedic, muscular, neuromuscular, or vascular disease which interferes with his/her ability to control and operate a commercial motor vehicle safely."

49 CFR 391.41(b)(8)
"Has no established medical history or clinical diagnosis of epilepsy or any other condition which is likely to cause loss of consciousness or any loss of ability to control a commercial motor vehicle."

49 CFR 391.41(b)(9)
"Has no mental, nervous, organic, or functional disease or psychiatric disorder likely to interfere with his/her ability to drive a commercial motor vehicle safely."

Relevance to Driving
Commercial motor vehicle (CMV) drivers must be able to sustain vigilance and attention for extended periods in all types of traffic, road, and weather conditions. Neurological demands of driving include:

- Cognitive demands:
  - Sustained vigilance and attention.
  - Quick reactions.
  - Communication skills.
  - Appropriate behavior.

- Physical demands:
  - Coordination.

Risk from Headaches
Most individuals have experienced the symptoms of headaches, vertigo, and dizziness. While generally inconsequential, these symptoms may constitute a problem for the driver of a CMV.

Headache and chronic "nagging" pain may be present to such a degree that certification for driving a CMV is inadvisable and the medication used to treat headaches may further interfere with safe driving. Complaints should be thoroughly examined when determining the overall fitness of the driver. Disorders with incapacitating symptoms, even if periodic or in the early stages of disease, warrant the decision to not certify the driver.

Risk from Vertigo and Dizziness
Multiple conditions may affect equilibrium or balance resulting in acute incapacitation or varying degrees of chronic spatial disorientation. Types of vertigo and dizziness with incapacitating symptoms, even if periodic or in the early stages of disease, warrant the decision to not certify the driver when symptoms interfere with one or more of the following:

- Cognitive abilities.
- Judgment.
- Attention.
• Concentration.
• Sensory or motor function.

**Risk from Seizures and Epilepsy**

Safety is the major reason the driver with epilepsy or seizures is restricted from commercial driving. Loss of consciousness endangers the driver and the public.

The physical and mental demands of commercial driving expose seizure prone individuals to conditions that may increase the risk for seizures and may interfere with management of seizures, including:

• Inconsistent access to medical evaluation and care for acute problems.
• Delays in replacement of anticonvulsant medication if lost or forgotten.

The length of time an individual is seizure free and off anticonvulsant medication is considered the best predictor of future risk for seizures. Other considerations include:

• The underlying cause of the seizure.
• The area of the brain affected by disease or injury.

Many driver tasks, from shifting to securing loads, require coordinated voluntary movements. You should consider the following safety implications when evaluating a driver:

• What is the nature and severity of the dysfunction?
• What is the degree of limitation?
• Is the limitation likely to get worse?
• How predictable is the degeneration?
• What is the probability of the dysfunction happening without warning versus progressing over the span of months or years?
• What is the potential for gradual or sudden incapacitation?

**Health History and Physical Examination**

As the medical examiner, your fundamental obligation during the neurological assessment is to establish whether a driver has a neurological disease or disorder that increases the risk for sudden death or incapacitation, thus endangering public safety.

The examination is based on information provided by the driver (history), objective data (physical examination), and additional testing requested by the medical examiner. Your assessment should reflect physical, psychological, and environmental factors.

Medical certification depends on a comprehensive medical assessment of overall health and informed medical judgment about the impact of single or multiple conditions on the whole person.

During the physical examination, you should ask the same questions as you would any individual who is being assessed for neurological concerns. The FMCSA Medical Examination Report form includes health history questions and physical examination checklists. Additional questions about neurological symptoms should be asked and documented to supplement information requested on the form.

The examiner must review and discuss with the driver any "yes" answers

Does the driver have:

• Seizures, epilepsy, and/or use anticonvulsant medication?
• History of head/brain injuries, disorders, or illnesses?
• Episodes of loss of or altered consciousness?
• Episodes of fainting or dizziness?
• History of stroke with residual paralysis?
• Spinal injury or disease with residual effects?

The examiner may ask if the driver:
• Has current limitations resulting from any neuromuscular, nervous, organic, or functional disorder?
• Has symptoms related to or caused by neurological diseases?
• Uses medication to treat neurological disorders, including:
  o Anticonvulsants (anticonvulsant therapy recommendations).
  o Anticoagulants (anticoagulant therapy recommendations).
  o Antiplatelet drugs.
  o Central nervous system stimulants and depressants.

Does history of seizures include:
• Childhood febrile seizures?
• Provoked seizures (e.g., induced by anesthesia, hypoglycemia, medications, or fever)?
• Unprovoked seizures:
  o Single episode?
  o Two or more unprovoked seizures (epilepsy)?

Does the driver have signs of undiagnosed neurological disease? Consider:
• Is the information correct and complete?
• Are instructions followed and the responses appropriate and relevant?
• Is the appearance:
  o Reasonable for the situation?
  o Reflective of good personal hygiene?
• Do questions and responses demonstrate alertness, comprehension, appropriateness, and relevance?
• Is behavior appropriate to the neurological functioning required to drive safely?

The examiner must evaluate whether driver has:
• Compromised equilibrium, coordination, and/or speech pattern?
• Asymmetrical deep tendon reflexes?
• Abnormal patellar and Babinski reflexes?
• Sensory abnormalities?
• Positional abnormalities?
• Ataxia?

The examiner must document discussion with the driver about
• Any affirmative history, including if available:
  o Onset date and diagnosis.
  o Medication(s), dose, and frequency.
  o Any current limitation(s).
• Potential negative effects of medication use, including over-the-counter medications, while driving.
• Any abnormal finding(s), noting:
  o Effect on driver ability to operate a CMV safely.
  o Necessary steps to correct the condition as soon as possible, particularly if the untreated condition could result in more serious illness that might affect driving.
• Any additional neurological tests and evaluation.
Medical fitness for duty includes the ability to perform strenuous labor. Medical fitness for duty also requires the driver to be free of any neurological residual limitations sufficiently severe to interfere with:

- Cognitive abilities.
- Judgment.
- Attention.
- Concentration.
- Vision.
- Physical strength.
- Agility.
- Reaction time.

Overall requirements for commercial drivers, as well as the specific requirements in the job description of the driver, should be deciding factors in the certification process.

**Neurological Topics**

**Episodic Neurological Conditions**

*Acute Seizures — Structural Insult to the Brain*

Individuals may have a seizure at the time of a brain insult. In many situations, the occurrence of seizures is a reflection of the site of injury but may also be a surrogate for severity. Nonetheless, most neurological conditions in which acute or early seizures may occur are also risk factors for later unprovoked seizures. In fact, the occurrence of early seizures adds a significant increment of risk for later epilepsy to that associated with the primary condition. In general, the risk for subsequent unprovoked seizures is greatest in the first 2 years following the acute insult.

Approximately 12% of individuals suffering an occlusive cerebrovascular insult resulting in a fixed neurological deficit will experience a seizure at the time of the insult. Unprovoked seizures will occur within the next 5 years in 16% of all individuals with an occlusive vascular insult. This rate seems not to be modified significantly by the occurrence of early seizures. The risk is increased primarily in individuals with lesions associated with cerebral cortical or subcortical deficits. The same risk of seizure and recommendations are applicable for intracerebral or subarachnoid hemorrhage.

The length of time an individual is seizure free and off anticonvulsant medication is considered the best predictor of future risk for seizures. Therefore, according to medical guidelines, for the entire waiting period before being considered for certification, the driver should be both:

- Seizure free.
- Off anticonvulsant medication prescribed for control of seizures.

For those individuals who survive severe head injury, the risk for developing unprovoked seizures does not decrease significantly over time. Based upon the risk for unprovoked seizures alone, the driver should not be considered for certification.

**NOTE:** Surgical procedures involving dural penetration have a risk for subsequent epilepsy similar to that of severe head trauma. Individuals who have undergone such procedures, including those who have had surgery for epilepsy, should not be considered eligible for certification.

*Acute Seizures — Systemic Metabolic Illness*
Seizures are the normal reaction of a properly functioning nervous system to adverse events. In the presence of systemic metabolic illness, seizures are generally related to the consequences of a general systemic alteration of biochemical homeostasis and are not known to be associated with any inherent tendency to have further seizures. The risk for recurrence of seizures is related to the likelihood of recurrence of the inciting condition.

*Childhood Febrile Seizures*

Febrile seizures occur in from 2% to 5% of the children in the United States before 5 years of age and seldom occur after 5 years of age. From a practical standpoint, most individuals who have experienced a febrile seizure in infancy are unaware of the event and the condition would not be readily identified through routine screening. Most of the increased risk for unprovoked seizure is appreciated in the first 10 years of life.

*Epilepsy*

The advisory criteria for 49 CFR 391.41(b)(8) says, "Epilepsy is a chronic functional disease characterized by seizures or episodes that occur without warning, resulting in loss of voluntary control which may lead to loss of consciousness and/or seizures. Therefore, the following drivers cannot be qualified: (1) a driver who has a medical history of epilepsy; (2) a driver who has a current clinical diagnosis of epilepsy; or (3) a driver who is taking antiseizure medication."

Following an initial unprovoked seizure, the commercial motor vehicle (CMV) driver should be seizure free and off anticonvulsant medication for at least 5 years to distinguish between a medical history of a single instance of seizure and epilepsy. A second unprovoked seizure, regardless of the elapsed time between seizures, would constitute a medical history of epilepsy and the driver would no longer meet the physical requirements for 49 CFR 391.41(b)(8).

**NOTE:** Epilepsy medical guidelines are currently under review by the Federal Motor Carrier Safety Administration. While there have been no changes through the rulemaking process to the wording of 49 CFR 391.41(b)(8), current advisory criteria allow that some "drivers with a history of epilepsy/seizures off antiseizure medication and seizure-free for 10 years may be qualified to drive a CMV in interstate commerce."

*Single Unprovoked Seizure*

An unprovoked seizure occurs in the absence of an identifiable acute alteration of systemic metabolic function or acute insult to the structural integrity of the brain. There may be a known or distant cause of the seizure.

While individuals who experience a single unprovoked seizure do not have a diagnosis of epilepsy, they are clearly at a higher risk for having further seizures. The overall rate occurrence is estimated to be 36% within the first 5 years following the seizure. After 5 years, the risk for recurrence is down to 2% to 3% per year for the total group.

Following an initial unprovoked seizure, the driver should be seizure free and off anticonvulsant medication for at least 5 years to distinguish between a medical history of a single unprovoked seizure and epilepsy (two or more unprovoked seizures). A second unprovoked seizure, regardless of the elapsed time between seizures, would constitute a medical history of epilepsy, and the driver would no longer meet the physical requirements for 49 CFR 391.41(b)(8).
The length of time an individual is seizure free and off anticonvulsant medication is considered the best predictor of future risk for seizures. Therefore, for the entire waiting period before being considered for certification, the driver should be both:

- Seizure free.
- Off anticonvulsant medication prescribed for control of seizures.

**Headaches**

Chronic or chronic-recurring headache syndromes can potentially interact with other neurological diagnostic categories in two ways:

- Through complications (e.g., stroke in relation to migraine).
- As a result of associated features of a particular syndrome (e.g., the visual distortion or disequilibrium associated with a migraine attack).

The following types of headaches may interfere with the ability to drive a commercial motor vehicle safely:

- Migraines.
- Tension-type headaches.
- Cluster headaches.
- Post-traumatic head injury syndrome.
- Headaches associated with substances or withdrawal.
- Cranial neuralgias.
- Atypical facial pain.

Consider headache frequency and severity when evaluating a driver whose history includes headaches. In addition to pain, inquire about other symptoms caused by headaches, such as visual disturbances, that may interfere with safe driving.

Consider the treatment used to relieve headaches. Do the effects or side effects of treatment interfere with safe driving?

**Vertigo and Dizziness**

The normal ability to maintain balance and orientation while operating a commercial motor vehicle (CMV) depends upon peripheral nervous system (PNS) sensory input from three major systems and the appropriate motor integration in the central nervous system (CNS). The three PNS sensory systems are vestibular, visual, and proprioception. Inappropriate interactions of these systems or interactions within the CNS may produce an unsafe degree of vertigo or dizziness that endangers the health and safety of the driver and the public.

The most common medications used to treat vertigo are antihistamines, benzodiazepines, and phenothiazines. Use of either benzodiazepines or phenothiazines for the treatment of vertigo would render the driver medically unqualified. Special consideration should be given to the possible sedative side effects of antihistamines. The medical examiner should determine if these drugs produce sedation in the individual driver.

**Infections of the Central Nervous System**
The guidelines for central nervous system (CNS) infection consider diagnosis and whether or not the driver has a history of early seizures with the condition. Aseptic meningitis is not associated with any increase in risk for subsequent unprovoked seizures; therefore, no restrictions should be considered for such individuals, and they should be considered qualified to obtain a license to operate a commercial vehicle.

A driver with a current clinical CNS diagnosis or signs and symptoms of a CNS infection should not be considered for certification until the etiology is confirmed and treatment has been shown to be adequate/effective, safe, and stable.

**Progressive Neurological Conditions**

Guidelines recommend that any driver having neurological signs or symptoms be referred to a neurologist for more detailed and qualified evaluation of neurological status in relation to certification for driving a commercial motor vehicle.

When requesting additional evaluation from a specialist, the specialist must understand the role and function of a driver; therefore, it is helpful if you include a copy of the Medical Examination Report form description of the driver role and a copy of the applicable medical standards (page 4) and guidelines with the request.

**Central Nervous System Tumors**

The central nervous system (CNS) is the seat of our intelligence and emotions, and an affliction of the CNS impacts everyday functioning in a direct and visible manner. Brain tumors may alter cognitive abilities and judgment, and these symptoms may occur early in the course of the condition. Sensory and motor abnormalities may be produced both by brain tumors and by spinal cord tumors, depending on the location.

For some benign tumors, certification may be possible after successful surgical treatment. The length of time an individual is seizure free and off of anticonvulsant medication is considered the best predictor of future risk for seizures. Therefore, for the entire waiting period before being considered for certification, the driver must be both:

- Seizure free.
- Off anticonvulsant medication prescribed for control of seizures.

**Dementia**

Dementia is a progressive decline in mental functioning that can interfere with memory, language, spatial functions, higher order perceptual functions, problem solving, judgment, behavior, and emotional functions. Alzheimer's and Pick's diseases both cause dementia and have symptoms that are incompatible with the safe driving. Neither disease has a specific diagnostic test, with mild symptoms typically present for years before the diagnosis is made. Alzheimer's is the most common degenerative disease.

The rationale for making a decision not to certify when a diagnosis of dementia is present includes:

- There are no current data providing evidence that a driver with diagnosed dementia can drive a commercial motor vehicle safely.
- The disease rate of progression is variable.
**Static Neurological Conditions**

Static neurological conditions include common cerebrovascular disease, as well as head and spinal cord injuries.

Cerebrovascular events may cause cognitive, judgment, attention, concentration, and/or motor and sensory impairments that can interfere with normal operation of a commercial motor vehicle (CMV). Drivers with several types of cerebrovascular disease are also at risk for recurring events that can happen without warning. Drivers with ischemic cerebrovascular disease are also at high risk for acute cardiac events, including myocardial infarction or sudden cardiac death. Recurrent cerebrovascular symptoms or cardiac events can occur with sufficient frequency to cause concern about the safe operation of a CMV.

The common types of cerebrovascular disease are:
- Transient ischemic attack/minor stroke with minimal or no residual impairment.
- Embolic or thrombotic cerebral infarction with moderate to major residual impairment.
- Intracerebral or subarachnoid hemorrhage.

Head injury recommendations include complete physical examination, neurological examination, and neuropsychological testing with normal results and the use of the seizure guidelines to determine certification status. Spinal cord injury resulting in paraplegia is disqualifying. Any weakness should be evaluated to determine whether the deficit interferes with the job requirements of a commercial driver.

Any driver with a neurological deficit that requires special evaluation and screening should have annual medical examinations.

**Embolic and Thrombotic Strokes**

More than 3 million individuals have survived a stroke, and it is a major cause of long-term disability. Embolic and thrombotic cerebral infarctions are the most common forms of cardiovascular disease. Risk for complicating seizures is associated with the location of the lesions.
- Cerebellum and brainstem vascular lesions are not associated with an increased risk for seizures.
- Cortical and subcortical deficits are associated with an increased risk for seizures.
- Evaluation by a neurologist is necessary to confirm the area of involvement.

Drivers with embolic or thrombotic cerebral infarctions will have residual intellectual or physical impairments. Fatigue, prolonged work, and stress may exaggerate the neurological residuals from a stroke. Most recovery from a stroke will occur within 1 year of the event.

The neurological examination should include assessment of:
- Cognitive abilities.
- Judgment.
- Attention.
- Concentration.
- Vision.
- Physical strength and agility.
- Reaction time.

**Intracerebral and Subarachnoid Hemorrhages**
Intracerebral hemorrhage results from bleeding into the substance of the brain and subarachnoid hemorrhage reflects bleeding primarily into the spaces around the brain. Bleeding occurs as a result of a number of conditions including hypertension, hemorrhagic disorders, trauma, cerebral aneurysms, neoplasms, arteriovenous malformations, and degenerative or inflammatory vasculopathies.

Subarachnoid and intracerebral hemorrhages can cause serious residual neurological deficits in:
- Cognitive abilities.
- Judgment.
- Attention.
- Physical skills.

The risk for seizures following intracerebral and subarachnoid hemorrhages is associated with the location of the hemorrhage:
- Cerebellum and brainstem vascular hemorrhages are not associated with an increased risk for seizures.
- Cortical and subcortical hemorrhages are associated with an increased risk for seizures.
- Appropriate evaluation by a neurologist is required to confirm the area of involvement.

The recommendations for intracranial and subarachnoid hemorrhages parallel recommendations for strokes.

*Transient Ischemic Attack*

A transient ischemic attack (TIA) is an episode of focal neurological dysfunction reflecting inadequate blood supply to one portion of the brain. The attack usually lasts more than a few seconds but less than 20 minutes. In exceptional cases, the symptoms can persist up to 24 hours. Resolution of symptoms is complete.

At the time of physical examination, the driver is usually normal; however, a TIA episode is an important warning for a potentially severe stroke or other vascular event. The risk of recurrent events is highest during the first few weeks and months following the TIA, declining by year 1 to less than 5% per year. The risk of recurrent strokes may be lowered by medical or surgical interventions.

The medical examiner determines certification on a case-by-case basis considering the interval history, general health, neurological examination, and compliance with the treatment program.

*Traumatic Brain Injury*

Traumatic brain injury (TBI) is an insult to the brain caused by an external physical force, which may produce a diminished or altered state of consciousness, including coma, resulting in long-term impairment of cognitive or physical function.

Disturbances of behavioral or emotional functioning may result in total or partial disability and/or psychological maladjustment. Many people with TBI suffer loss of memory and reasoning ability, experience speech and/or language problems, and exhibit emotional and behavioral changes that are medically disqualifying for commercial driving.

TBI is classified by depth of dural penetration and duration of loss of consciousness. The three classes are:
- Severe head injury penetrates the dura and causes a loss of consciousness lasting longer than 24 hours. There is a high risk for unprovoked seizures, and the risk does not diminish over time.
• Moderate head injury does not penetrate the dura but causes a loss of consciousness lasting longer than 30 minutes, but less than 24 hours.
• Mild head injury has no dural penetration or loss of consciousness and lasts for fewer than 30 minutes. Be sure to distinguish between mild TBI with or without early seizures.

The length of time an individual is seizure free and off anticonvulsant medication is considered the best predictor of future risk for seizures. Therefore, for the entire waiting period before being considered for certification, the driver must be both:
  • Seizure free.
  • Off anticonvulsant medication prescribed for control of seizure.

NOTE: Surgical procedures involving dural penetration have a risk for subsequent epilepsy similar to that of severe head trauma. Individuals who have undergone such procedures, including those who have had surgery for epilepsy, should not be considered eligible for certification.

**Neuromuscular Disorders – See Module 5 – Musculoskeletal, Other Diseases**