

**Session Six**  
**Screening Neuro Exam Part I: Mental Status, Cranial Nerves, Sensory Exam**

(Session 7 next week will cover Screening Neuro Exam Part II, including Motor Exam, Reflexes, Coordination and Gait, and Musculoskeletal Exam)

**1. Learning Objectives**

To review the basic neuroanatomy needed to perform neurological assessment, particularly pathways relevant to the Mental Status, Cranial Nerves, and Sensory Exam.

To understand the main components of the neuro exam and what is being tested To practice techniques of examining mental status, cranial nerves, and sensory function. To develop a flow for the head to toe exam.

**2. Student Prep**

**Read** Neuroanatomy handout (see below)  
(or pp. 650-658 in Chapter 21 The Nervous System)

**Read** and view videos at: <http://www.neuroexam.com/>

**OVERVIEW (Sessions 6 & 7):**

**TABLE 3.10 Minimal Screening Neurologic Exam<sup>a</sup>**

PART OF EXAM	TESTS
Mental status	Level of alertness and orientation. Assess attention using months forward/backward. Immediate registration and delayed recall of 3 objects for 4 minutes (timed). Naming of watch parts. Note behavior, language, affect, etc., while taking history.
Cranial nerves	Pupil light reflexes. Ophthalmoscopic exam. Visual fields, including extinction testing. Horizontal and vertical smooth pursuit eye movements. Facial sensation to light touch including extinction testing. Facial symmetry during emotional smile. Hearing of finger rub bilaterally. Palate elevation. Note quality of voice during remainder of exam. Head turning and shoulder shrug against resistance. Tongue protrusion.
Motor exam	Drift. Rapid hand and foot tapping. Upper and lower extremity tone. Strength in several proximal and distal muscles in the upper and lower extremities bilaterally (e.g., finger extensors, finger abductors, wrist extensors, biceps, triceps, deltoids, iliopsoas, quadriceps, foot and toe dorsiflexors, and knee flexors).
Reflexes	Bilateral biceps, brachioradialis, patellar, Achilles tendon, and plantar reflexes.
Coordination and gait	Finger–nose–finger and heel–shin tests bilaterally. Gait and tandem gait.
Sensory exam	Light touch in hands and feet, including extinction testing. Pin prick or temperature testing in feet bilaterally. Vibration and joint position sense in feet bilaterally.

<sup>a</sup>Duration = 5 to 10 minutes

© 2002 Sinauer Associates, Inc.

**Student Prep (contd):**

**View** online videos at: <http://www.neuroexam.com/> especially those listed below for this week.

Go to neuroexam.com and use the “Video menu” on the home page to view the following:

<b>INTRODUCTION</b>	Video 1: Introduction
<b>MENTAL STATUS</b>	Video 3: Mental Status Intro Video 4: Attention Video 5: Orientation Video 6: Recent Memory Video 10: Naming

**CRANIAL NERVES**      Video 25: Ophthalmoscopic Exam  
Video 27: Visual Fields  
Video 29: Pupil Light Reflex  
Video 32: Smooth Pursuit  
Video 36: Facial Sensation  
Video 40: Facial Muscles  
Video 42: Hearing  
Video 44: Palate Elevation  
Video 46: CN XI Testing  
Video 47: Tongue Protrusion

**SENSORY EXAM**      Video 70: Pin Prick  
Video 71: Temperature  
Video 72: Vibration Sense  
Video 73: Joint Position Sense

### **Practice Exercises**

On a partner practice the following:

**Visual fields:** See neuroexam.com Video 27. Test partner's visual fields by having them sit facing you at eye level so that you can be sure that you test your own visual fields simultaneously. Test each quadrant. Test right and left upper quadrants separately, then together. Test right and left lower quadrants separately, then together. Test visual fields by finger wiggle, and by counting fingers.

**Eye movements:** See neuroexam.com Video 32. Ask partner to follow your finger with their eyes without moving their head. Move your fingers back and forth horizontally. Then move your fingers up and down vertically in the midline. Watch your partners' eyes closely and practice looking for smooth movements, lack of nystagmus at end-gaze, and for conjugate eye movements (eyes should move together).

**Position sense:** See neuroexam.com Video 73. Ask partner to close eyes, and practice grasping a single digit on the hand or foot by the sides of the digit, to avoid providing tactile cues. Move the digit very slightly (~2mm) up or down, and ask partner to report whether you are moving it up or down. Randomly vary whether you move the digit up or down, and note how sensitive position sense normally is.

### 3. Relevant Neuroanatomy for Session Six

#### Nervous System Overview

<b>Central nervous system (CNS)</b>
Brain
Spinal cord
<b>Peripheral nervous system (PNS)</b>
Cranial nerves and ganglia
Spinal nerves and dorsal root ganglia
Sympathetic and parasympathetic nerves and ganglia
Enteric nervous system

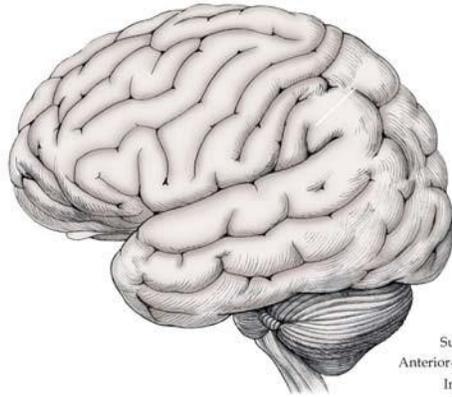
The diagram illustrates the human nervous system. The central nervous system (CNS) is highlighted in yellow and includes the brain and spinal cord. The peripheral nervous system (PNS) is highlighted in blue and includes cranial nerves, spinal nerves, and ganglia. Labels with leader lines point to the brain, spinal cord, cranial nerves, and spinal nerves. A copyright notice for © 2002 Sinauer Associates, Inc. is visible at the bottom right of the diagram.

**Parts of the Neuro**

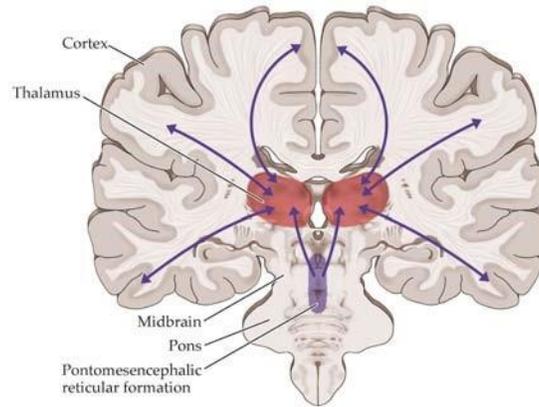
**exam:**

- 1. Mental Status**
- 2. Cranial Nerves**
- 3. Motor Exam**
- 4. Reflexes**
- 5. Coordination and  
Gait**
- 6. Sensory Exam**

**1. Mental Status:  
Testing cerebral function**

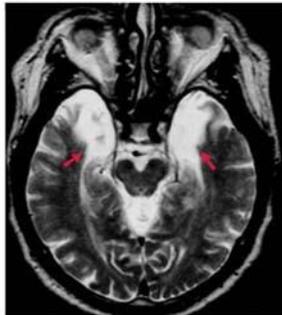


## 1. Mental Status: Alertness & Attention

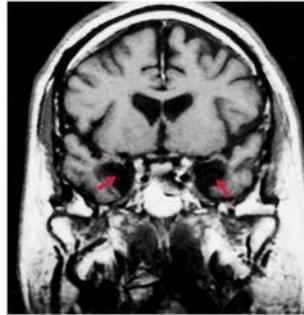


## 1. Mental Status: Medial temporal memory systems

(A)



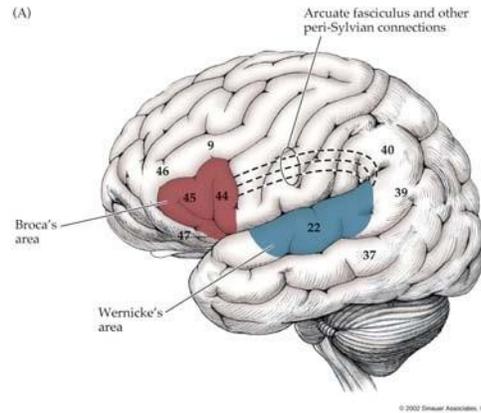
(B)



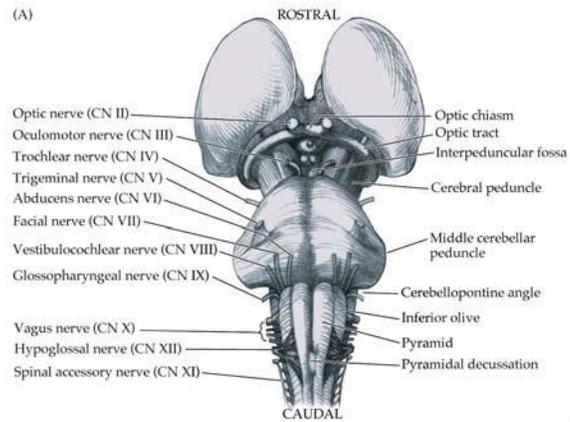
(From Corkin S, Amaral DG, Gonzalez RG, Johnson KA, Hyman BT. 1997. H.M.'s medial temporal lesion: findings from magnetic resonance imaging. *J Neurosci* 17(10): 3954-3979.)

© 2002 Snauver Associates, Inc.

## 1. Mental Status: Language



## 2. Cranial Nerves



**TABLE 2.5 Overview of the Cranial Nerves (Part 1)**

NERVE	NAME	FUNCTIONS
CN I	Olfactory nerve	Olfaction
CN II	Optic nerve	Vision
CN III	Oculomotor nerve	Extraocular muscles, except those innervated by CN IV and VI; parasympathetics to pupil constrictor and ciliary muscles of lens for near vision
CN IV	Trochlear nerve	Superior oblique muscle; causes the eye to move downward and to rotate inward (depression and intorsion)
CN V	Trigeminal nerve	Sensations of touch, pain, temperature, vibration, and joint position for the face, mouth, nasal sinuses, and meninges; muscles of mastication; tensor tympani muscle
CN VI	Abducens nerve	Lateral rectus muscle; causes abduction (outward movement) of the eye
CN VII	Facial nerve	Muscles of facial expression; also stapedius muscle and part of digastric; taste from anterior two-thirds of tongue; sensation from a region near the ear; parasympathetics causing lacrimation and supplying the submandibular and sublingual salivary glands

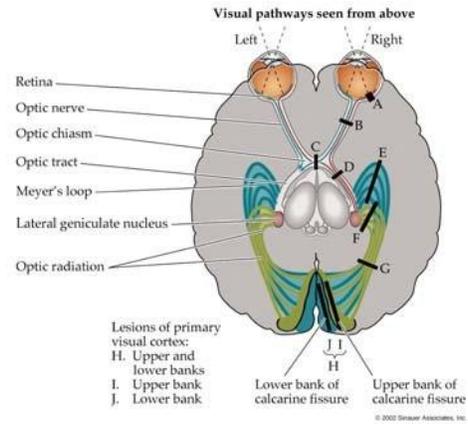
© 2002 Sinauer Associates, Inc.

**TABLE 2.5 Overview of the Cranial Nerves (Part 2)**

NERVE	NAME	FUNCTIONS
CN VIII	Vestibulocochlear nerve	Hearing; vestibular sensation
CN IX	Glossopharyngeal nerve	Stylopharyngeus muscle; taste from posterior one-third of tongue; sensation from posterior pharynx, and from a region near the ear; chemo- and baroreceptors of the carotid body; parasympathetics to the parotid gland
CN X	Vagus nerve	Pharyngeal muscles (swallowing); laryngeal muscles (voicebox); parasympathetics to the heart, lungs, and digestive tract up to the splenic flexure; taste from epiglottis and pharynx; sensation from the pharynx, posterior meninges, and a region near the ear; aortic arch chemo- and baroreceptors
CN XI	Spinal accessory nerve	Sternomastoid muscle; upper part of the trapezius muscle
CN XII	Hypoglossal nerve	Intrinsic muscles of the tongue

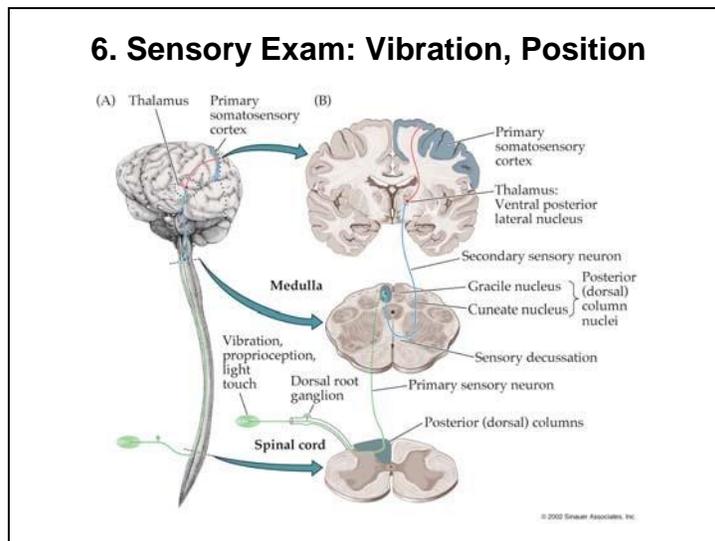
© 2002 Sinauer Associates, Inc.

## 2. Cranial Nerves: CN II, Vision

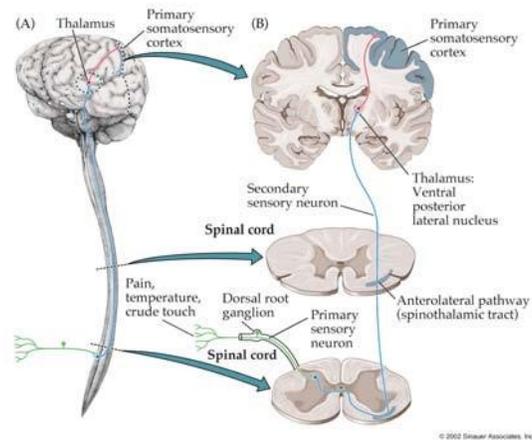


<b>TABLE 7.1 Main Long Tracts of the Nervous System</b>		
<b>PATHWAY(S)</b>	<b>FUNCTION</b>	<b>NAME (AND LEVEL) OF DECUSSATION</b>
Lateral corticospinal tract	Motor	Pyramidal decussation (cervico-medullary junction)
Posterior column–medial lemniscal pathway	Sensory (vibration, joint position, fine touch)	Internal arcuate fibers (lower medulla)
Anterolateral pathways	Sensory (pain, temperature, crude touch)	Anterior commissure (spinal cord)

© 2002 Sinauer Associates, Inc.



## 6. Sensory Exam: Pain, Temperature



**4. Lists of Maneuvers to be Demo/Practiced:**

Mental Status – Level of alertness and orientation. Assess attention using months forward/backward. Immediate registration and delayed recall of 3 objects for 4 minutes (timed). Naming of watch parts. Note behavior, language, affect, etc. while taking history.

CN II, III - Pupil light reflexes.

Ophthalmoscopic exam.

CN II - Visual fields, including extinction testing.

CN III, IV, VI – Horizontal and vertical smooth pursuit eye movements.

CN V – Facial sensation to light touch, including extinction testing.

CV VII – Facial symmetry during emotional smile.

CN VIII – Hearing of finger rub bilaterally.

CN IX – Palate elevation. Note quality of voice during remainder of exam.

CN XI – Head turning and shoulder shrug against resistance.

CN XII – Tongue protrusion.

Sensory Exam – Light touch in hands and feet, including extinction testing. Pin prick or temperature testing in feet bilaterally. Vibration and joint position sense in feet bilaterally.

Note: When clinically appropriate, more detailed testing should be performed for specific parts of the exam.

See video demonstrations listed above (at <http://www.neuroexam.com/>) for examples of how to perform these maneuvers.

## **5. Procedural Tips**

**Memory Testing** Ask patient to recall three words. Establish their ability to repeat them back immediately to ensure there is no problem with initial registration. Wait 3-5 minutes, while distracting patient with other tests. To avoid forgetting (!) to ask them the words, and to ensure sufficient time has past, it is best to use a timer (stopwatch/alarm on digital watch). If this is not available, always ask for the words at a consistent interval later in the exam—e.g. after completing the cranial nerve examination (mnemonic: tongue exam reminds you to ask for the words).

## **6. Perceptual Tips**

### **Pupil light reflex**

- Observe the shape of the pupils, whether or not they are round, and of equal size in the right and left eye.
- Practice estimating the size of the pupils and reporting them in millimeters.
- Report the size of the pupils before and after they constrict in response to light.
- Observe whether the contralateral pupil constricts in response to light.



**7. Description of Key Features will be covered in a separate session on the write-up of the neurologic exam and musculoskeletal exam.**