NEUROLOGY

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Web site: http://courses.washington.edu/neural/

NEUROLOGICAL EXAMINATION
A. Mental and communication status
   1. Education level
   2. Level of consciousness
      Alert Delirium Obtunded Stupor Coma
   3. Mood and psychomotor activity
   4. Orientation (time, place, person, body parts, left-right, awareness of illness)
   5. Calculation, spelling
   6. Speech function (fluency, comprehension, repetition, naming, reading, writing)
   7. Memory (immediate, short term, long term)
   8. Ability to follow complex commands
   9. Mini-mental status examination (MMSE)

B. Cranial nerve functions
   1. Olfactory (aromatic smell)
   2. Optic
      a. Acuity (Snellen card) Here are a few examples:
         acuity (near, corrected) 20/20 OU [normal vision in both eyes]
         acuity (near, uncorrected) 20/100 OD, 20/50 -2 OS [left eye, 2/6 missed on 20/50 line]
      b. Fundi (vessels, disc border, cup/disc ratio), visual fields
   3, 4, 6. Oculomotor, Trochlear, Abducens
      a. Pupillary reaction (light, accommodation, afferent pupillary defect), extraocular movements, nystagmus
   5. Trigeminal
      a. Muscles of mastication
      b. Sensation of face (test all 3 divisions) and cornea
      c. Sensation of mucous membranes and noxious smell
      d. Jaw jerk
   7. Facial
      a. Muscles of facial expression, palpebral fissures
      b. Taste anterior 2/3
   8. Acoustic
      a. Cochlear (finger rub, tuning fork)
      b. Vestibular (nystagmus, past pointing)
   9, 10. Glossopharyngeal, Vagus
      a. Palate rise to phonation (say “ah”) and gag
      b. Voice and articulation
      c. Taste posterior 1/3
   11. Spinal accessory
      a. Sternoceleidomastoid
      b. Upper trapezius
   12. Hypoglossal
      a. Tongue movement

1
b. Bulk

C. Motor function
1. Strength
   a. Direct testing
      Grades:
      | Grade | Description                                      |
      |-------|-------------------------------------------------|
      | 0     | No muscle contraction                          |
      | 1     | Trace visual or palpable movement              |
      | 2     | Movement with gravity eliminated               |
      | 3     | Movement against gravity but not resistance    |
      | 4     | Movement against resistance but can be overcome|
      | 5     | Normal                                          |
   b. Functional testing
      i. Walking on toes and heels
      ii. Deep knee bend
      iii. Hopping on one foot
      iv. Arm drift

2. Tone
   a. Spasticity
   b. Rigidity (lead-pipe, cogwheel)
   c. Hypotonic or flaccid

3. Bulk

D. Reflexes
1. Deep tendon Grades: 0 No response
   - Tr Reinforcement required
<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diminished</td>
</tr>
<tr>
<td>2</td>
<td>Normal, average</td>
</tr>
<tr>
<td>3</td>
<td>Brisker than normal</td>
</tr>
<tr>
<td>4</td>
<td>Clonus</td>
</tr>
</tbody>
</table>
   Use “+ or -” to indicate smaller differences

2. Abdominal
3. Babinski – use up or down arrow to indicate
4. Hoffman
5. Frontal lobe (glabellar, snout, palmomental)
6. Other (cremasteric, bulbocavernous)

E. Sensory function (use sensory maps and draw pictures as needed)
1. Primary (thalamic) sensation
   a. Light touch
   b. Pain
   c. Temperature
   d. Vibration
   e. Proprioception
2. Discriminative (cortical) sensation
   a. Stereognosis
   b. Graphesthesia
   c. Two-point discrimination
   d. Point localization
   e. Extinction with double simultaneous stimulation (DSS)
3. Romberg - evaluation of balance with eyes closed and feet together reflects
   proprioceptive and touch function in the legs and feet
F. Cerebellar function, station, and gait
   1. Balance on one foot with eyes open
   2. Walking
      a. Wide or narrow base
      b. Normal or reduced arm swing
      c. Tandem gait (heel-to-toe)
      d. Ataxia
   3. Rapid alternating movements (RAM)
   4. Finger-nose-finger (FNF) and heel-knee-shin (HKS) tests

G. Abnormal movements
   1. Tremor (note predominant component)
      a. Rest (Parkinsonian)
      b. Postural
      c. Kinetic (action)
   2. Involuntary movements (dystonia, chorea, tic)
   3. Bradykinesia

H. Meningeal and mechanical signs
   1. Neck stiffness
   2. Brudzinski’s sign
   3. Kernig’s sign
   4. Straight leg raise
   5. Pressure tenderness of bone, muscle, and nerves

I. Vascular status
   1. Auscultation of head and neck
   2. Auscultation of heart
   3. Palpate extremity vessels

MINI-MENTAL STATUS EXAMINATION (MMSE)
(See Psychiatry section for complete MMSE.)

SELECTED TOPICS IN NEUROLOGY

Stroke Syndromes
- **Anterior cerebral artery** – contralateral leg weakness, grasp reflex, gegenhalten, abulia, gait disorder, perseveration, urinary incontinence.
- **Middle cerebral artery**
  - Superior division: contralateral arm/face greater than leg weakness, Broca’s aphasia (left MCA stroke).
  - Inferior division: mild or transient motor/sensory deficit, Wernicke’s aphasia (left MCA stroke), neglect, sometimes visual field cut.
- **Posterior cerebral artery** – contralateral visual field cut; sometimes memory loss, color anomia, alexia without agraphia, hemisensory loss, mild hemiparesis.
- **Lacunar** – hypertensive lipohyalinosis; four types: (1) pure motor hemiparesis with face, arm, leg equally affected; (2) pure hemisensory loss; (3) dysarthria-clumsy hand syndrome; (4) ataxic hemiparesis with ipsilateral incoordination out of proportion to degree of weakness.

Spinal Cord Syndromes
- **Central Cord**: mid- to lower cervical spine injury leading to bilateral arm greater than leg motor paresis, dysesthesias, areflexia, patchy sensory involvement.
• **Brown-Sequard**: hemisection of the spinal cord causing ipsilateral motor paralysis and spasticity; ipsilateral loss of tactile/vibratory sensation and proprioception; contralateral pain/temp loss; and ipsilateral loss of all sensation at the level of the lesion.

• **Anterior Cord**: injury to the anterior portion of the spinal cord, usually secondary to anterior spinal artery stroke; characterized by complete paralysis and hypalgesia (pain/temp) at the level of injury with preservation of posterior column sensory modalities (fine touch, vibration, proprioception) at and below lesion.

• **Conus Medullaris**: injury at T12/L1 leading to both upper and lower motor neuron deficits (muscle atrophy, weakness, spasticity, neurogenic bladder) with variable sensory loss.

• **Cauda Equina**: injury to the nerve roots inferior to the conus medullaris causing weak or flaccid lower extremities with partially preserved sensation; absent knee/ankle jerks; asymmetric saddle anesthesia; and loss of bowel/bladder/sexual function.

**Mnemonics:**

• **Altered Mental Status**: **TIPS AEIOU**
  - Trauma, Temperature
  - Infection
  - Psychiatric
  - Space Occupying, Stroke, Subarachnoid Hemorrhage, Shock
  - Alcohol, other drugs, Ammonia
  - Endocrine, Electrolytes
  - Insulin
  - Oxygen (lack of), Opiates
  - Uremia

• **Peripheral polyneuropathy**: **DANG THERAPIST**
  - Diabetes
  - Alcohol
  - Nutritional (vit B12, B1, B6, E)
  - Guillain-Barre
  - Toxic (lead, arsenic, other metals, meds)
  - HEReditary (Charcot-Marie-Tooth)
  - Recurrent (chronic inflammatory demyelinating Polyradiculoneuropathy - CIDP)
  - Amyloid
  - Porphyria
  - Infectious (leprosy, HIV, Lyme, diphtheria, mononucleosis)
  - Systemic (uremia, hypothyroidism, lupus, Sjogren’s, Wegener’s)
  - Tumors (paraneoplastic, CIDP assoc with myeloma)
<table>
<thead>
<tr>
<th>Level</th>
<th>Motor Function</th>
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<tbody>
<tr>
<td>C4</td>
<td>Spontaneous breathing</td>
</tr>
<tr>
<td>C5</td>
<td>Shoulder shrug / deltoid</td>
</tr>
<tr>
<td>C6</td>
<td>Biceps reflex / elbow flexion / wrist extension</td>
</tr>
<tr>
<td>C7</td>
<td>Triceps reflex / elbow extension / wrist flexion</td>
</tr>
<tr>
<td>C8/T1</td>
<td>Finger abduction / opposition of thumb</td>
</tr>
<tr>
<td>T12</td>
<td>Cremasteric reflex</td>
</tr>
<tr>
<td>L1/L2</td>
<td>Hip flexion</td>
</tr>
<tr>
<td>L2/L3/L4</td>
<td>Hip adduction / quadriceps</td>
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<tr>
<td>L4</td>
<td>Patellar reflex</td>
</tr>
<tr>
<td>L5</td>
<td>Great toe dorsiflexion</td>
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<tr>
<td>S1/S2</td>
<td>Ankle jerk reflex / foot plantar flexion</td>
</tr>
<tr>
<td>S2-S4</td>
<td>Anal wink / rectal tone</td>
</tr>
</tbody>
</table>

Do you like my dermatomes?