

NEUROLOGICAL ASSESSMENT FOR NURSE PRACTITIONERS

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OBJECTIVES

At the end of this session the participant will be able to:

1. Perform an accurate neurological assessment.
2. Recognize signs and symptoms of a serious neurologic condition.(red flags)
3. Perform an accurate spinal assessment.

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"LEVEL OF CONSCIOUSNESS"

THE MOST RELIABLE INDICATOR OF NEUROLOGICAL FUNCTIONING

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LOC

- History
- Alertness
- Appearance and behavior
- Higher functions: thought, memory, understanding, perception and intellect

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HISTORY

- Age, sex, handedness, occupation
- History of present complaint
- Neurological screening questions
- Past medical history
- Drug history
- Family history
- Social history

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ALERTNESS

- ◆ Are they awake?
- ◆ Are they following commands?

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Appearance and behavior

- ◆ Are there signs of self neglect?
- ◆ Does the patient appear depressed?
- ◆ Does the patient appear anxious?
- ◆ Does the patient behave appropriately?
- ◆ Does the mood change rapidly?
- ◆ Does the patient show concern about his symptoms?

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HIGHER FUNCTIONS

- ◆ Attention and orientation
- ◆ Memory (short and long term)
- ◆ Calculation
- ◆ Abstract thought
- ◆ Spatial
- ◆ Visual and body perception
- ◆ Apraxia

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Impaired attention and orientation	Dementia, anxiety, depression
Impaired memory	Encephalopathy, bilateral temporal lobe lesions, thiamine deficiency
Impaired calculation	Diffuse encephalopathy, Parietal lobe lesion, psychiatric illness

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FINDINGS

Loss of spatial appreciation	Parietal lobe lesions
Visual and body perception alterations	Bilateral temporoparietal lesion, parietal lobe lesion
Apraxia	Dominant parietal lobe lesion, premotor cortex, or diffuse brain lesion

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SPEECH ASSESSMENT

- ◆ Assess understanding
- ◆ Assess spontaneous speech
- ◆ Assess word-finding ability
- ◆ Assess reading and writing

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SPEECH ABNORMALITIES

- ◆ Aphasia—all disorders of understanding, thought and word finding
- ◆ Dysphonia—disturbance of voice production
- ◆ Dysarthria—difficulty with word forming

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GAIT ASSESSMENT

- ◆ Ask the patient to walk
 - Symmetrical or asymmetrical
- ◆ Ask the patient to walk on a tight-rope
- ◆ Ask the walk on his toes
- ◆ Ask the patient to walk on his heels
- ◆ Romberg's test

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ROMBERG'S TEST

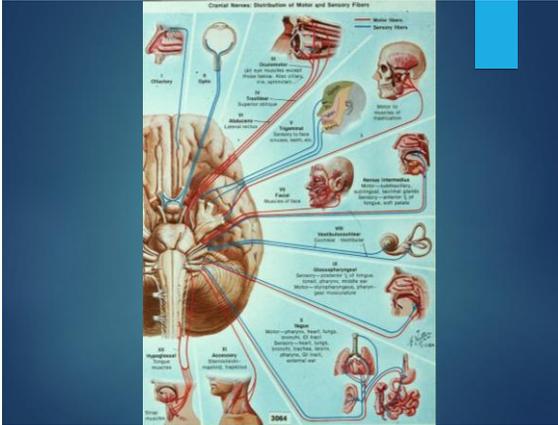
- ◆ Stand with feet together-eyes open, then ask patient to close his eyes
- ◆ Romberg is positive if unable to do this. This can occur with:
 - posterior column lesion
 - peripheral neuropathy

Unable to stand with eyes open- cerebellar disease, peripheral vestibular syndromes
Romberg test is not positive

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CRANIAL NERVES

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CRANIAL NERVES

- ◆ The eyes- CN II, III, IV and VI

- pupillary reaction
- acuity
- visual fields
- fundoscopy
- eye movements - EOM'S

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CONTROL OF EYE MOVEMENTS

This flowchart details the neural control of eye movements. It shows:

- Inputs:** Vestibular system (semicircular canals, utricle, saccule), visual system (retina, optic chiasm, optic tract), and higher brain centers (cerebral cortex, cerebellum, brainstem).
- Processing:** Signals pass through the vestibular nuclei, visual nuclei, and other brainstem nuclei.
- Output:** Motor signals are sent to the oculomotor nuclei (III, IV, VI) and the abducens nucleus (VI), which then innervate the extraocular muscles.

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EXTRA-OCULAR MOVEMENTS

Figure 9.2
Muscles involved in eye movement

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PAPILLEDEMA

Optic disc edema that results from increased intracranial pressure

KEY FEATURES:

- Blurring of the optic disc margins
- Anterior extension of the nerve head
- Venous congestion of the arcuate and peripapillary vessels
- Hyperemia of the optic nerve head

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Normal Disc

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PAPILLEDEMA

Fig. 5.1 Early papilledema. The optic disc of an 18-year-old man 2 weeks after he had completed 40 days of phlebotomy for sickle cell disease. Note the increased retinal vascular pressure. Note the minimal evidence of edema.

Fig. 5.3 Chronic papilledema. Severe and chronic disc edema in a 27-year-old, very obese woman who has pseudotumor cerebri. Note that the disc cap is observed and hard exudates are present.

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CRANIAL NERVES

- ◆ The Face- V and VII
 - V-sensory
 - V1-ophthalmic
 - V2-maxillary
 - V3-mandibular
 - V- motor
 - mastication

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CRANIAL NERVES

- ◆ The face
 - CN-VII (face,ear,taste,tear)
 - face-muscles of facial expression
 - ear- stapedius
 - taste-anterior two-thirds of tongue
 - tear-parasympathetic supply to lacrimal gland

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FACE ASSESSMENT

- ◆ Symmetry

CN VII- smile, whistle, close eyes corneal reflex	tight,
CN V- Clench teeth, light touch pinprick in all	and

Three Divisions

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CRANIAL NERVES

- ◆ Auditory nerve-VIII

test the hearing
Rhine and weber test
vestibular-gait, nystagmus, caloric
testing

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CRANIAL NERVES

- ◆ The Mouth- IX, X, XII

IX-glossopharyngeal

sensory-posterior one-third of tongue, pharynx,
middle ear

motor-stylopharyngeus

autonomic- to salivary glands

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CRANIAL NERVES

- ◆ The mouth
 - X- Vagus
 - sensory-tympanic membrane, external auditory canal and external ear
 - motor-muscles of palate, pharynx, larynx
 - autonomic-afferents from carotid baroreceptors, parasympathetic supply and from thorax and abdomen

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CRANIAL NERVES

- ◆ The mouth
 - XII- Hypoglossal
 - sensory-none
 - motor-intrinsic muscles of the tongue
- Assessment-weakness and fasciculations

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CRANIAL NERVES

- ◆ XI-Accessory
 - Motor-innervates the sternocleidomastoid and trapezius
- Assessment-push head back, turn side to side and shrug shoulders

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MOTOR ASSESSMENT

- ◆ LEGS-
 - look for wasting
 - test tone at hip
 - test power-hip adduction,quadricep
 - hamstring,
 - gastrocnemius,anterior
 - hallucis longus
 - tibialis, extensor
 - reflexes

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Patterns of muscle weakness

- ◆ Upper motor neuron (UMN)
 - increased tone
 - increased reflexes
 - proximal muscle weakness
- ◆ Lower motor neuron (LMN)
 - wasting
 - fasciculation
 - decreased tone
 - absent reflexes

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Patterns of muscle weakness

- ◆ Muscle disease: (myopathy)
 - wasting, decreased tone, absent or decreased reflexes
- ◆ Neuromuscular junction: (myasthenia gravis)
 - fatiguable weakness, normal or decreased tone, normal reflexes
- ◆ Functional weakness:
 - normal tone, reflexes, no wasting, erratic power

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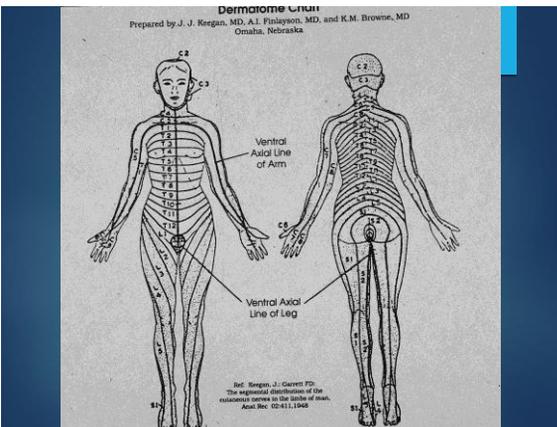


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Sensory Assessment

- ◆ Posterior column:
 - vibration sense
 - joint position sense
 - light touch
- ◆ Spinothalamic tract:
 - light touch
 - pin prick
 - temperature

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Patterns of sensory loss

- ◆ Single nerve-loss within a single nerve (median, ulnar, peroneal, lateral cutaneous)
- ◆ Roots-loss confined to one or more roots (C5, C6, C7 in the arm and L4, L5 or S1 in the leg)
- ◆ Peripheral nerve- distal glove and stocking deficits

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Patterns of sensory loss

- ◆ Spinal cord
 - complete transverse lesion
 - hemisection of the cord (brown-sequard syndrome)
 - central cord
 - posterior column loss
 - anterior spinal syndrome

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Patterns of sensory loss

- ◆ Brainstem- loss of pain and temperature on the face and the opposite side of the body(lateral medullary syndrome)
- ◆ Thalamic sensory loss- hemisensory loss of all modalities
- ◆ Cortical loss-loss of two-point discrimination, astereognosis, sensory inattention
- ◆ Functional loss-non-anatomical sensory deficits with inconsistent findings

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COORDINATION

- ◆ Cerebellar function-
 - Gait
 - finger to nose
 - heel to shin
 - trunk
 - repeated movements

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"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."

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RAPID NEUROLOGICAL ASSESSMENT

SYMMETRY

- Consciousness
- Commands
- Motor weakness(face, arm & leg)
- Speech (understands & verbalizes)
- Vision

CCMSV

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NEUROLOGICAL CONDITIONS

◆ CVA ASSESSMENT

- Smile
- Raise both arms
- Speak a simple sentence

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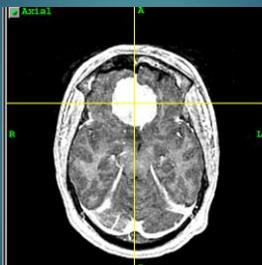
NEUROLOGICAL CONDITIONS

◆ BRAIN TUMORS

- Progressive neurological deficits (motor weakness)
- Seizures (26%)
- Headache (54%)-worse in the am
Possibly due to hypoventilation during sleep
Exacerbated by coughing, straining and bending forward
- Nausea and /or vomiting (40%)

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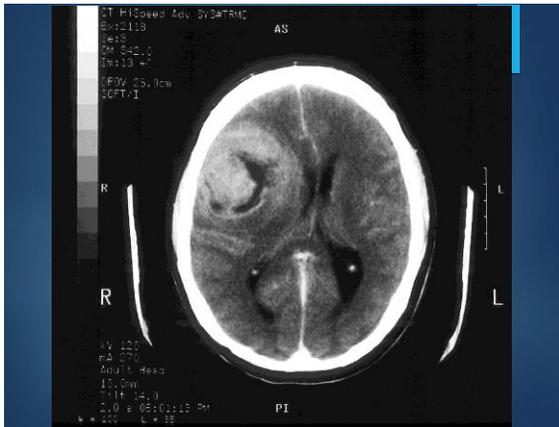
SUBFRONTAL MENINGIOMA



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GLIOBLASTOMA MULTIFORME

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59 year old
with right arm
weakness

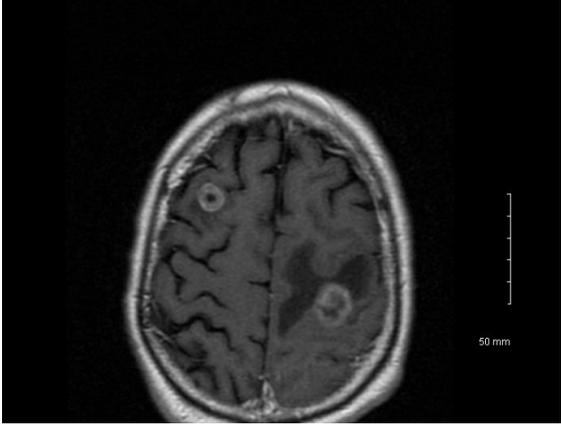
WHAT IS WRONG WITH HIM?

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One month post-op lumbar surgery

- ◆ Could not lift right arm.
- ◆ Brachial plexus vs deltoid weakness?
- ◆ Ordered- Chest CT scan
Cervical spine MRI
- ◆ I Missed it!!!!!!

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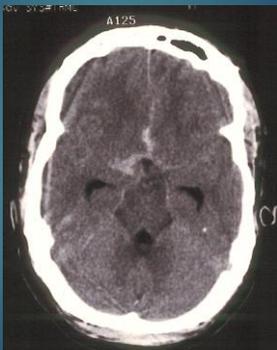
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NEUROLOGICAL CONDITIONS

- ◆ Subarachnoid Hemorrhage
 - sudden explosive H/A and/or neck pain
 - nuchal rigidity
 - photophobia
 - nausea and/or vomiting
 - neurological deficits

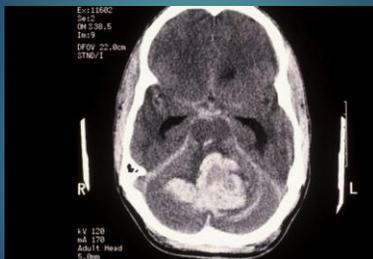
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Subarachnoid Hemorrhage



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SUBARACHNOID HEMORRHAGE



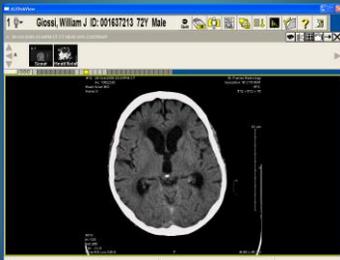
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NEUROLOGICAL CONDITIONS

- ◆ Normal pressure hydrocephalus-NPH
 - age > 60
 - male predominate
- Signs and symptoms
 - *dementia
 - *gait disturbance
 - *urinary incontinence
- Diagnosis: cisternogram
- Treatment- VP shunt

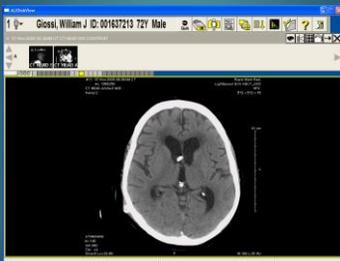
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PRE-OP CT



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POST-OP CT



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SPINE ASSESSMENT

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NEUROLOGICAL CONDITIONS

- ◆ Myelopathy
 - weakness in the hands/ legs
 - numbness in the hands/ legs
 - difficulty walking

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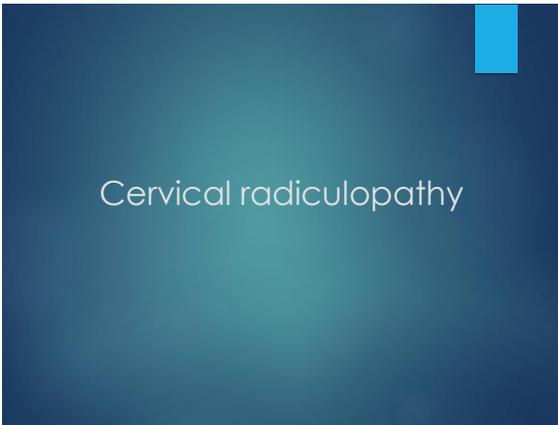
CLINICAL MANIFESTATIONS

- ◆ Weakness and wasting of the hands
- ◆ Clumsiness with fine motor skills
- ◆ Proximal lower extremity weakness
- ◆ Spasticity
- ◆ Sensory disturbances-glove distribution
- ◆ May have sensory level
- ◆ Loss of vibratory sense and diminished pinprick in the lower extremities
- ◆ Lhermitte's presence uncommon

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Cervical radiculopathy

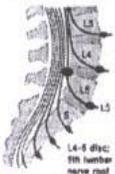
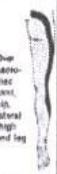
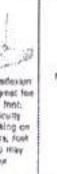
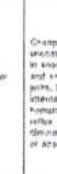
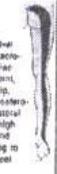
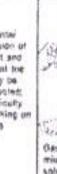
Level	Motor signs (weakness)	Reflex signs	Sensory loss
C5		0	
C6		 Weak or absent reflex	
C7		 Weak or absent reflex	
C8		 Horner's syndrome	

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LUMBAR RADICULOPATHY

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Clinical features of herniated lumbar nucleus pulposus

Level of herniation	Pain	Numbness	Weakness	Atrophy	Reflexes
 <p>L4-L5 disc: 5th lumbar nerve root</p>	 <p>Distal sacro-coccyx, joint, hip, anterior thigh and leg</p>	 <p>Lateral leg, foot 3 toes</p>	 <p>Dorsiflexion of great toe and foot; difficulty walking on heels, foot drop may occur</p>	 <p>Minor</p>	 <p>Chorea: withdrawal in knee and thigh pain, but normal; hamstring reflex diminished or absent</p>
 <p>L5-S1 disc: 1st sacral nerve root</p>	 <p>Distal sacro-coccyx, joint, hip, posterior thigh and leg to foot</p>	 <p>Foot of calf, lateral heel, heel and toe</p>	 <p>Plantar flexion of foot and great toe may be affected; difficulty walking on toes</p>	 <p>Distal</p>	 <p>Ankle jerk diminished or absent; Gastrocnemius and Achilles</p>

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SPINAL EMERGENCIES

- ◆ Acute myelopathy
- ◆ Cauda equina syndrome
- ◆ Spinal fractures and SCI
- ◆ Hematomas
- ◆ Tumors

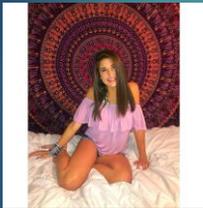
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My Grandchildren- Maggie, Yeti and Nicholas 2013



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Maggie and Nicholas 2018



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ABBY



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