

NEURO IN A NUTSHELL KEYS TO NEURO ASSESSMENT:

Nancy L. Suazo RN, BS, CCRN
Specialty Education Programs

VITALS		VITALS OBSERVATIONS																																		
TIME	TEMP	HR	RR	BP	SpO2	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
0800	36.5	72	18	120/80	98																															
0900	36.8	74	19	122/82	97																															
1000	37.0	76	20	124/84	96																															
1100	37.2	78	21	126/86	95																															
1200	37.5	80	22	128/88	94																															
1300	37.8	82	23	130/90	93																															
1400	38.0	84	24	132/92	92																															
1500	38.2	86	25	134/94	91																															
1600	38.5	88	26	136/96	90																															
1700	38.8	90	27	138/98	89																															
1800	39.0	92	28	140/100	88																															
1900	39.2	94	29	142/102	87																															
2000	39.5	96	30	144/104	86																															
2100	39.8	98	31	146/106	85																															
2200	40.0	100	32	148/108	84																															
2300	40.2	102	33	150/110	83																															
0000	40.5	104	34	152/112	82																															
0100	40.8	106	35	154/114	81																															
0200	41.0	108	36	156/116	80																															
0300	41.2	110	37	158/118	79																															
0400	41.5	112	38	160/120	78																															
0500	41.8	114	39	162/122	77																															
0600	42.0	116	40	164/124	76																															
0700	42.2	118	41	166/126	75																															
0800	42.5	120	42	168/128	74																															

NEURO IN A NUTSHELL

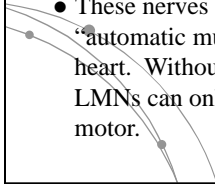
- **THE CENTRAL NERVOUS SYSTEM**
(brain and spinal cord)
- **PERIPHERAL NERVOUS SYSTEM**
(31 pairs of spinal nerves and 12 pairs of cranial nerves)
- Are designed to process in coming **SENSORY** stimuli such as visual, auditory, gustatory, tactile, pain, temperature and proprioception, etc.;
- And to respond with an appropriate outgoing **MOTOR** response (muscle contraction).

NEURO IN A NUTSHELL

- **LMNs:**

Lower Motor Neurons are found in the anterior nerves routes in the spinal cord and in some of the 12 pair of cranial nerves (the ones with motor activity).

- These nerves drive ALL skeletal muscles and “automatic muscles” e.g. pupils, GI tract, heart. Without a synapse from the UMNs, the LMNs can only perform INVOLUNTARY motor.



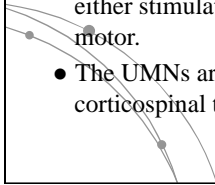
NEURO IN A NUTSHELL

- **UMNs:**

- Upper Motor Neurons are found in the motor strip, precentral gyrus, of the frontal lobe.

- These nerves (their axons) will descend the spinal cord and synapse with the LMNs to either stimulate voluntary motor or to inhibit motor.

- The UMNs are also referred to as the corticospinal tract or the pyramidal tract.



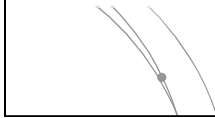
NEURO IN A NUTSHELL

SENSORY IN →

e.g. pain, temperature, touch

MOTOR OUT →

Involuntary muscle contraction;
processed at spinal cord level only
Voluntary muscle contraction;
processed in the cerebral cortex motor strip, frontal lobe
and brain stem → synapsing with the LMNs to produce
a voluntary response



NEURO IN A NUTSHELL

SENSORY IN →

e.g. pain, temperature, touch

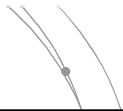
NO MOTOR OUT →

If LMNs are damaged at the cord level → NO muscle contractions
NO involuntary or voluntary motor → leading to flaccid paralysis

If UMNs are damaged in the cerebral cortex or in the spinal cord as their axons descend the cord → NO voluntary motor
NO ability to INHIBIT the LMNs → therefore, EVERY sensory in, gets a motor response out → leading to spastic paralysis

NO MOTOR OUT →

Inhibitory motor; NO response by choice (conscious or unconscious decision)



NEURO IN A NUTSHELL

NO SENSORY IN OR UP →

If peripheral neurons are damaged so route to the spinal cord

If sensory gets in to the spinal cord BUT NOT up to the sensory cortex (parietal lobe) due to a spinal cord injury there will be NO conscious awareness of sensation

If sensory gets in to the spinal cord and up to the sensory cortex but there is no response from the motor cortex

SOME OR NO MOTOR OUT →

NO motor out – NO involuntary, NO voluntary, NO inhibitory

Below the level of the spinal cord injury, involuntary muscle contraction only → processed at the spinal cord level only
NO voluntary or inhibitory motor to the LMNs below the injury leading to spastic paralysis

NO voluntary or inhibitory motor to the LMNs below the injury leading to spastic paralysis
Frontal lobe, motor strip damage (e.g. stroke) will produce spastic paralysis on the side of the body opposite the stroke.



SENSORY / MOTOR

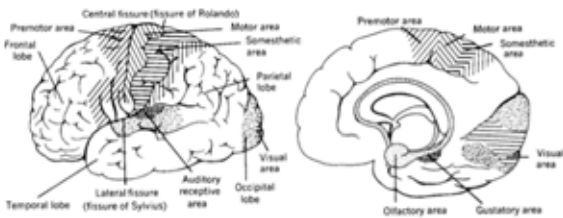
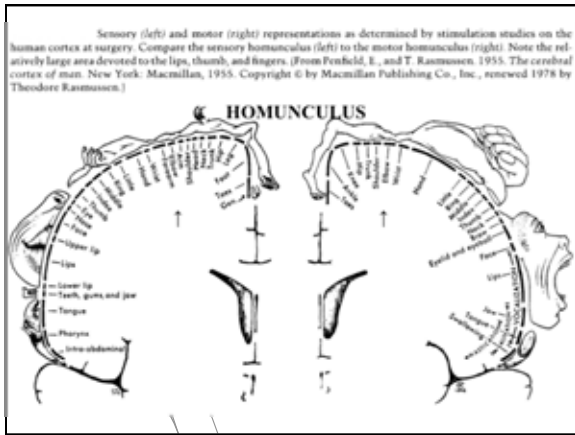
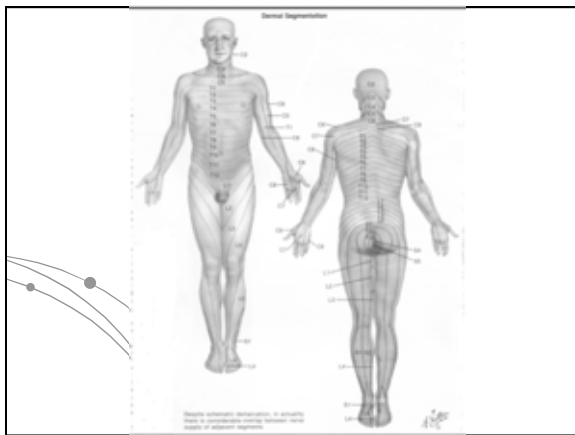
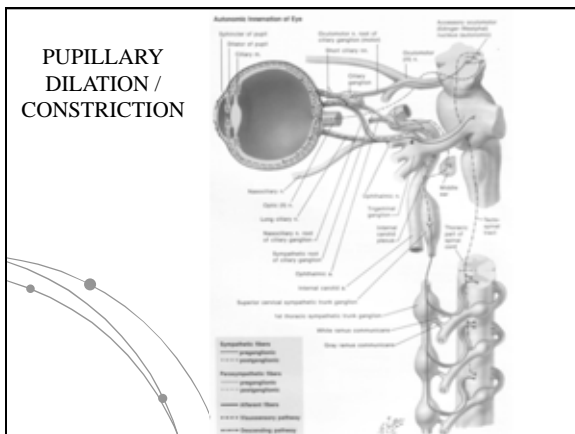


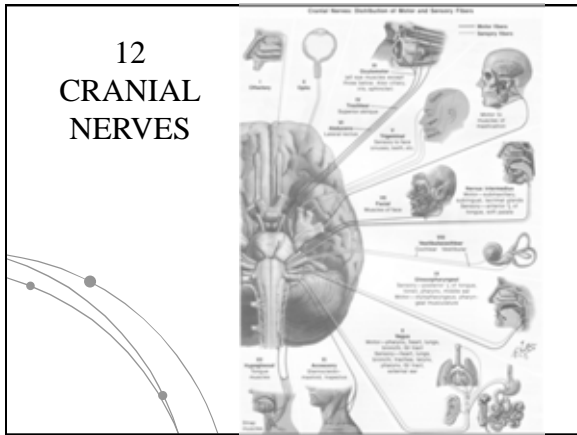
Diagram of the localization of function in the cerebral hemisphere. Various functional areas are shown in relation to the lobes and fissures—lateral view (left) and medial view (right).





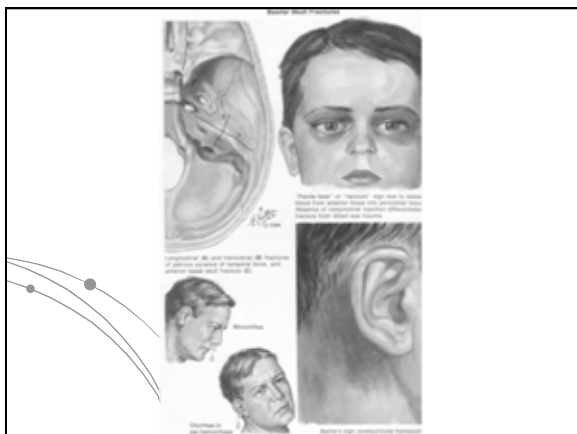






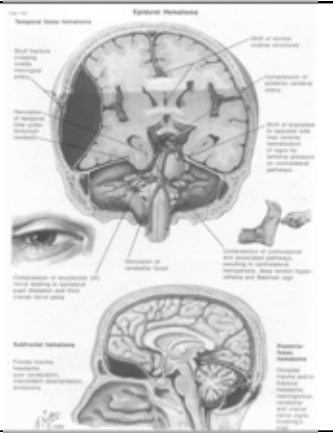
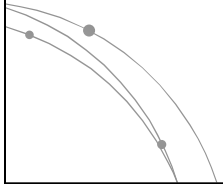
12 CRANIAL NERVES

- Oh, Oh, Oh Tommy Take A Fig And Give Vera A Half
- On Old Olympus Towering Top A Fin And German View A Hop
- Some Say Marry Money But My Brother Says Bad Business Marry Money



SIGNS OF HERNIATION

- ◆ UNCAL
- ◆ CENTRAL



“CEREBRAL” T WAVES

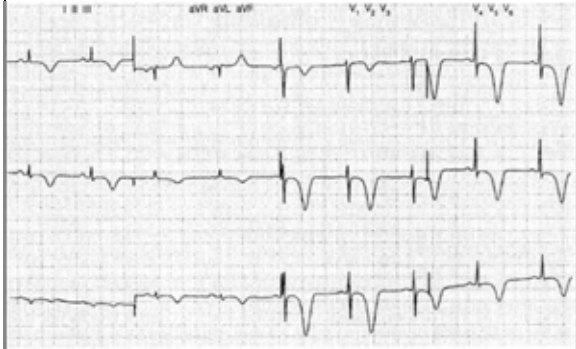
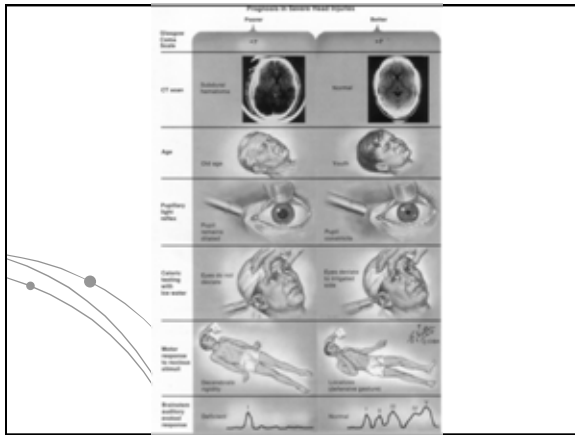


Figure 13-6. ECG tracing just before death of an elderly white female with a massive cerebral hemorrhage. Note the deep symmetrical T wave inversion, particularly across the precordial leads.

REACTION LEVEL SCALE (RLS85)

Level	Label	Operational Description of Behavior
1	Alert	Oriented, if intubated reacts quickly, if sleeping arouses quickly
2	Drowsy or confused	Responds to light stimuli; delayed reactions; may be disoriented to time and place
3	Very drowsy or confused	Responds to strong stimuli such as loud noise, shaking, or pain; may respond verbally or by attempting eye contact, warding off pain, or obeying commands
4	Unconscious, localizes	On painful stimulation of fingertips, other hand moves to push stimuli away
5	Unconscious, withdraws	On painful stimulation of fingertips, pulls stimulated hand away
6	Unconscious, flexion response	Does not localize or withdraw, flexes arms and wrists to stimuli
7	Unconscious, extension response	Does not localize or withdraw, arms and legs extend to stimuli (if both flexion and extension are noted, best response is recorded)
8	Unconscious, no response to pain	With repeated strong stimulation, no movement noted in face, arms, or legs

Adapted from Starnack, J. E., Stalhammar, D., & Holmgren, E. (1988). The Reaction Level Scale (RLS85): Manual and guidelines. *Acta Neurochirurgica*, 91, 12-20; Stewart-Amidei, C. (1991). Assessing the comatose patient in the intensive care unit. *AAON Clinical Issues in Critical Care Nursing*, 2(4), 613-622.



FOUR PURPOSES OF A NEURO EXAM

- 1. DETERMINE A PATIENT'S BASELINE NEUROLOGIC STATUS
- 2. IDENTIFY THE DEVIATIONS FROM NORMAL NERVOUS SYSTEM FUNCTIONS

FOUR PURPOSES OF A NEURO EXAM

- 3. DETERMINE THE EFFECTS OF THE DEVIATIONS ON THE FUNCTIONAL CAPABILITIES OF THE INDIVIDUAL
- 4. IDENTIFY LIFE-THREATENING EVENTS, e.g.; RESPIRATORY CHANGES, ↑ ICP etc.

NEURO ASSESSMENT

- ◆ LOC
- ◆ SENSORY/MOTOR
- ◆ PUPILS
- ◆ VS

FIVE FACTORS TO ASSESS WHEN PERFORMING A NEUROLOGIC EXAM

- 1. LOC – Level of Consciousness
Cerebral cortical functions
- 2. Motor and Sensory
Cerebral cortical functions

GLASGOW COMA SCALE

- ◆ VERBAL
- ◆ EYE OPENING



Assessing Your Patient's Level of Consciousness Using the Glasgow Coma Scale

To assess and monitor the level of consciousness of a patient with suspected or confirmed brain injury, use the Glasgow Coma Scale. You'll find this scale useful in the emergency department, at the scene of an accident, and for vital assessment of the hospitalized patient. The Glasgow Scale measures three faculties: responses to stimuli—eye opening, motor response, and verbal response. Below you'll find an expanded version of this useful—though not comprehensive—assessment technique. (The lowest a patient can score is 3, the highest 15. A patient scoring 7 or less is comatose and probably has severe neurologic damage.)

TEST	SCORE	PATIENT'S RESPONSE
Verbal re- sponse (when you ask, "What year is this?")		
Oriented	5	He tells you the current year.
Confused	4	He tells you an incorrect year.
Inappropriate words	3	He replies randomly, "somewhere" or "times."
Incomprehensible	2	He moans or screams.
None	1	He gives no response.
Eye opening re- sponse		
Spontaneously	4	He opens his eyes spontaneously.
To speech	3	He opens his eyes when you tell him so.
To pain	2	He opens his eyes only on painful stimulus (for example, application of pressure to bony ridge under eyebrow).
None	1	He doesn't open his eyes in re- sponse to any stimulus.

GLASGOW COMA SCALE

Assessing Your Patient's Level of Consciousness Using the Glasgow Coma Scale

TEST	SCORE	PATIENT'S RESPONSE
Motor Response		
Obeys	6	He shows you two fingers when you ask him to.
Localizes	5	He reaches toward the painful stimulus and tries to remove it.
Withdraws	4	He moves away from a painful stimulus.
Abnormal flexion	3	He assumes a decorticate posture (flexion).
		FLEXOR POSTURING
		
Abnormal extension	2	He assumes a decerebrate posture (extension).
		EXTENSOR POSTURING
		
None	1	He doesn't respond at all, just lies flaccid—an ominous sign.

◆ MOTOR RESPONSE

FIVE FACTORS TO ASSESS WHEN PERFORMING A NEUROLOGIC EXAM

● 3. PUPILS

Pupillary size and reaction to light

Midbrain: CN II → Optic,
CN III → Oculomotor

pupillary constriction
(sympathetic T₁, T₂, T₃ = dilation)

FIVE FACTORS TO ASSESS WHEN PERFORMING A NEUROLOGIC EXAM

● 4. EYE MOVEMENTS (? Doll's Eyes?)

Brainstem:

CN III → Oculomotor
CN IV → Trochlear
CN VI → Abducens
CN VIII → Vestibulocochlear;
involves head movement/semicircular canals

**FIVE FACTORS TO ASSESS WHEN
PERFORMING A NEUROLOGIC
EXAM**

● **5. VITAL SIGNS**

Brainstem – Medulla

cardioregulatory center

vasomotor site

respiratory control center

VS are the LAST thing to change

- Cushing's Triad

**COMATOSE / VEGETATIVE
PATIENTS**

- **TALK TO THEM**

- **PLAY MUSIC FOR THEM**

- **TELL THEM "GOOD NEWS"**

- **ENCOURAGE FAMILY TO DO THE SAME**

- **DO NOT SPEAK "BAD NEWS" IN THE
PT'S EARSHOT**
