

CASE # 9

MK

Presentation

- ▣ Jack Reacher is a 40 y.o. male
- ▣ Found unconscious at home
- ▣ 911 is called
- ▣ You are an EMS-NP in the ambulance



HPI

- ▣ Jack was last seen by his girlfriend yesterday
- ▣ He was “normal”
- ▣ He is a detective
- ▣ X-military police
- ▣ He was involved in an altercations earlier that day
- ▣ Went home, c/o dizziness, nausea



Social history

- ▣ Drinks on weekends:
5-10 shots tequila vs.
whiskey
- ▣ No smoking
- ▣ Scientologist
- ▣ Exercises occasionally



Level of arousal

- ▣ Tickling the nostrils with a cotton wisp is a moderate stimulus to arousal – all but deeply stuporous and comatose patients will move the head away and arouse to some degree
- ▣ Pressure on the knuckles or bony prominences and pinprick stimulation are humane forms of noxious stimuli
- ▣ Posturing in response to noxious stimuli indicates severe damage to the corticospinal system, whereas abduction-avoidance movement of a limb is usually purposeful and denotes an intact corticospinal system



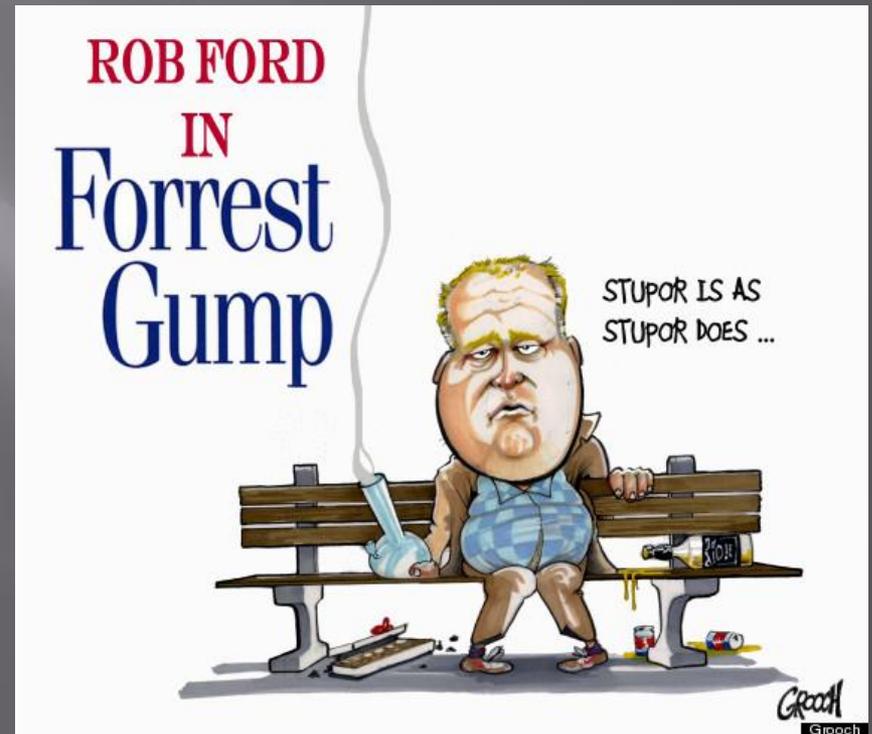
Drowsiness:

- Simulates light sleep
- Easy arousal
- Persistence of alertness for brief periods
- Light degree of confusion



Stupor:

- Transiently awakened by vigorous stimuli
- Higher degree of confusion



Coma

- ▣ Deep sleep-like state, from which a patient cannot be aroused



Vegetative state – awake coma:

- Awake, but nonresponsive
- Often seen in pt's emerging from coma
- Respiratory and autonomic functions retained: yawning, coughing, swallowing, opening eyes



Minimally conscious state:

- Rudimentary voice or motor behavior

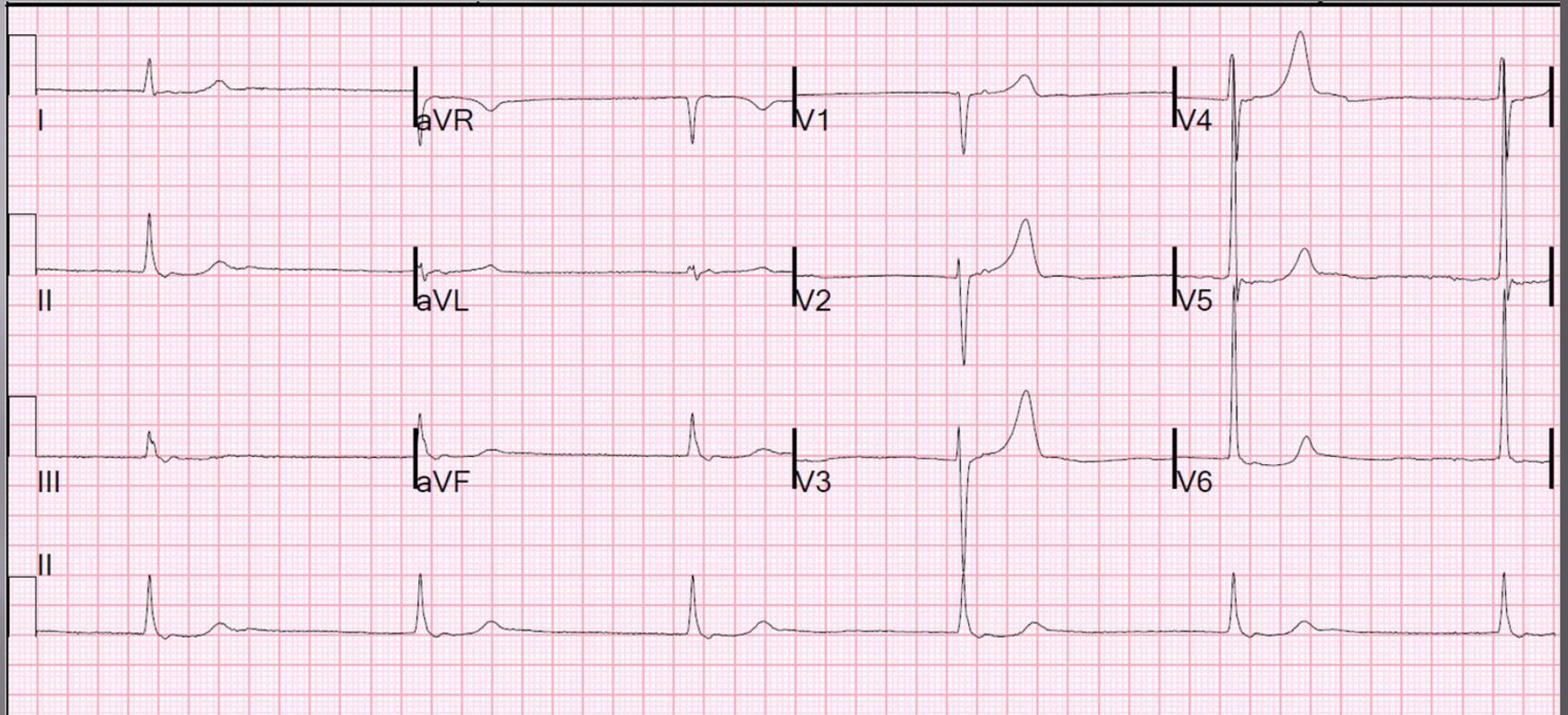


Vitals/basic labs

- ▣ HR 35-45
- ▣ RR 15
- ▣ BP 170/90
- ▣ CBG 98



Jack's EKG

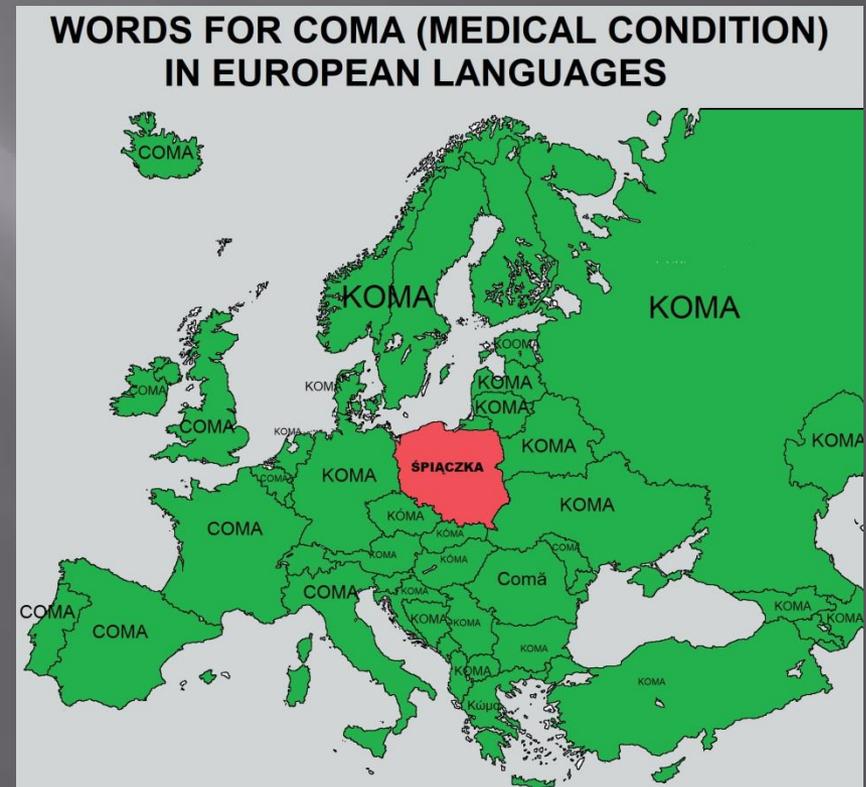


Synthesis

ONE SENTENCE:

- ▣ Jack is a 40 y.o. male with h/o EtOH abuse (binge drinking), who was recently involved in altercations with evidence of head injury, now in a state of coma

ŚPIĄCZKA... SERIOUSLY,
POLLAND?



The H's

- ▣ Correct rapidly:
 - Hypotension
 - Hypoglycemia
 - Hypercalcemia
 - Hypoxia
 - Hypercapnia
 - Hyperthermia

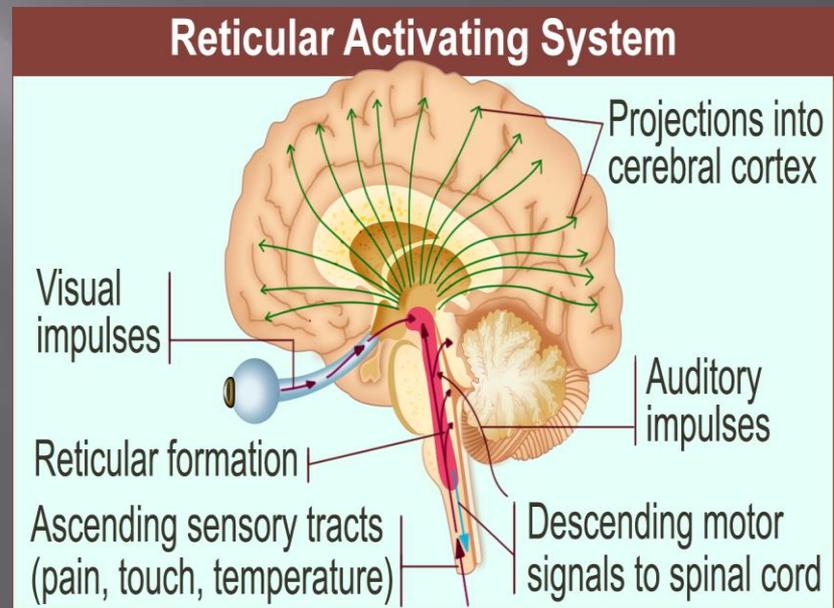


Anatomy and physiology of coma

PHYSIOLOGY

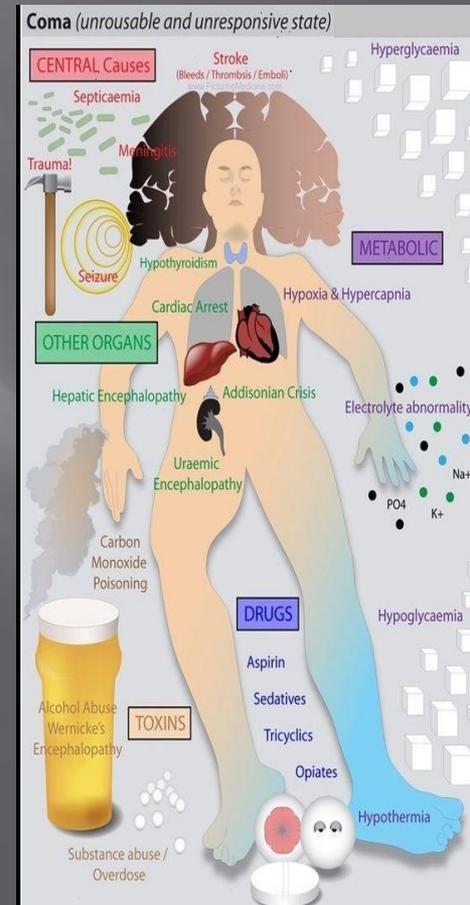
- ▣ Diminished alertness
2/2 abnormalities of the cerebral hemispheres
- ▣ OR Reduced activity of RAS

RAS



Causes of Coma

- Damage the RAS in the upper midbrain
- Destruction of large portions of both cerebral hemispheres
- Suppression of RAS
 - Drugs
 - Toxins
 - metabolic derangements such as hypoglycemia
 - Anoxia
 - Uremia
 - hepatic failure.



Fun facts about brain

CEREBRAL BLOOD FLOW

- ▣ 75 mL per 100 g/min in gray matter
- ▣ 30 mL per 100 g/min in white matter
- ▣ Oxygen consumption 3.5 mL per 100 g/min
- ▣ Glucose 5 mg per 100 g/min
- ▣ Brain stores enough
 - glucose for ~2 min
 - O₂ for 8-10 sec

THE ELECTROENCEPHALOGRAPH (EEG) RHYTHM

- ▣ diffusely slowed, typical of metabolic encephalopathies, and as conditions of substrate delivery worsen, eventually brain electrical activity ceases.

Approach to the patient: history

- In many cases the cause is evident: trauma, cardiac arrest, reported drug ingestion
- the circumstances and rapidity with which neurologic symptoms developed;
- the antecedent symptoms (confusion, weakness, headache, fever, seizures, dizziness, double vision, or vomiting);
- the use of medications, illicit drugs, or alcohol; and
- chronic liver, kidney, lung, heart, or other medical disease.



Approach: general physical exam

- ▣ Temperature:
 - Fever-infection, heat stroke, neuroleptic malignant syndrome, malignant hyperthermia, very rare – “central fever”
 - Hypothermia – EtOH, barbiturates, sedatives, hypoglycemia, extreme hypothyroidism
- ▣ RR:
 - tachypnea-acidosis/PNA, brain infiltration with lymphoma
- ▣ Elev BP:
 - Hypertensive encephalopathy
 - Maybe secondary to raised ICP
- ▣ Hypotension:
 - EtOH, barbiturates, MI, shock

Approach to exam: skin

- ▣ Cutaneous petechiae:
 - thrombotic thrombocytopenic purpura
 - Meningococemia
 - bleeding diathesis associated with an intracerebral hemorrhage.



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Back to Jack

- ▣ Admitted to ER
- ▣ What's the differential?
- ▣ What tests to order?



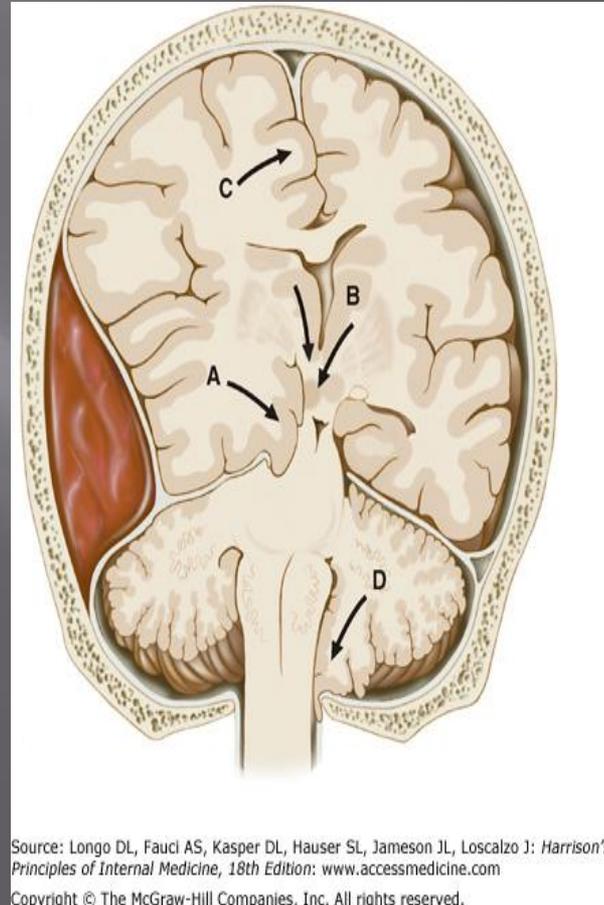
Tests and imaging

- ▣ BMP-WNL
- ▣ LFT-WNL
- ▣ CBC-WNL
- ▣ BAC~50
- ▣ Head CT



Types of Herniation

- ▣ Upper brainstem:
 - Pupillary enlargement
 - Loss of light reaction
 - Loss of vertical adduction movement
- ▣ Widespread structural lesion or metabolic suppression:
 - Preservation pupillary light reactivity and movement

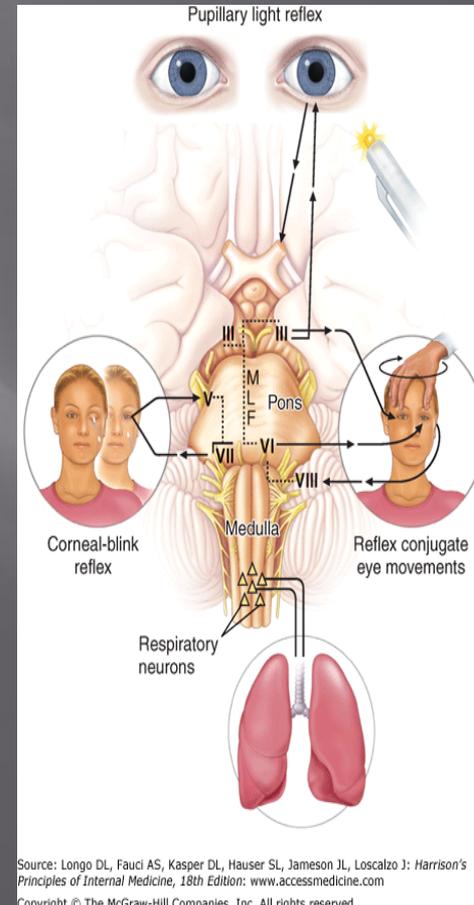


Source: Longo DL, Fauci AS, Kasper DL, Hauser SL, Jameson JL, Loscalzo J: *Harrison's Principles of Internal Medicine, 18th Edition*: www.accessmedicine.com

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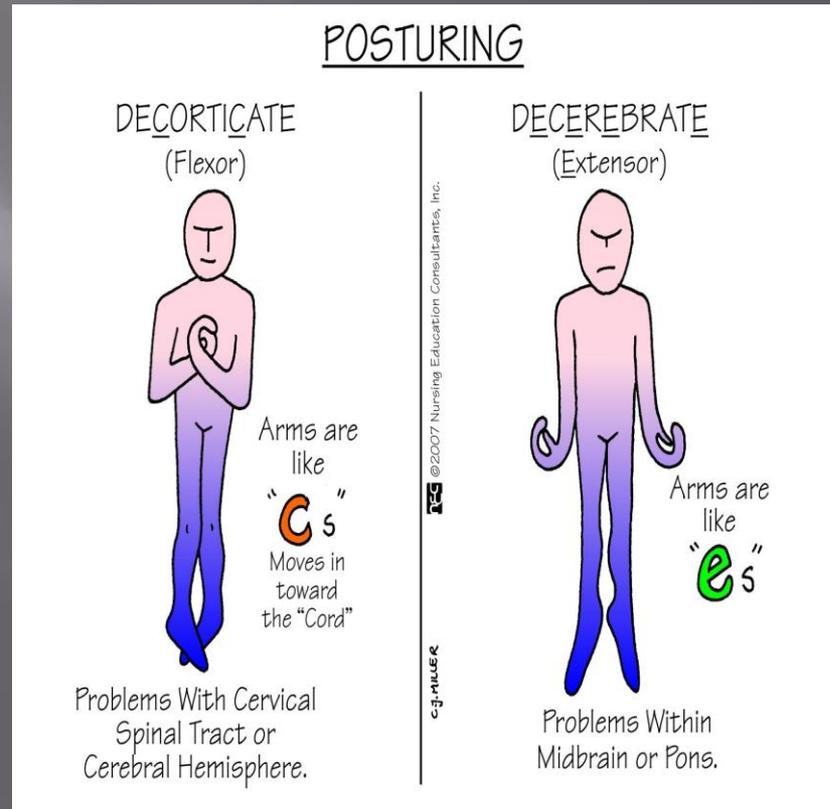
Brainstem reflexes

- ▣ Lateral displacement of the midbrain may compress the opposite cerebral peduncle, producing a Babinski's sign and hemiparesis contralateral to the original hemiparesis (the Kernohan-Woltman sign).



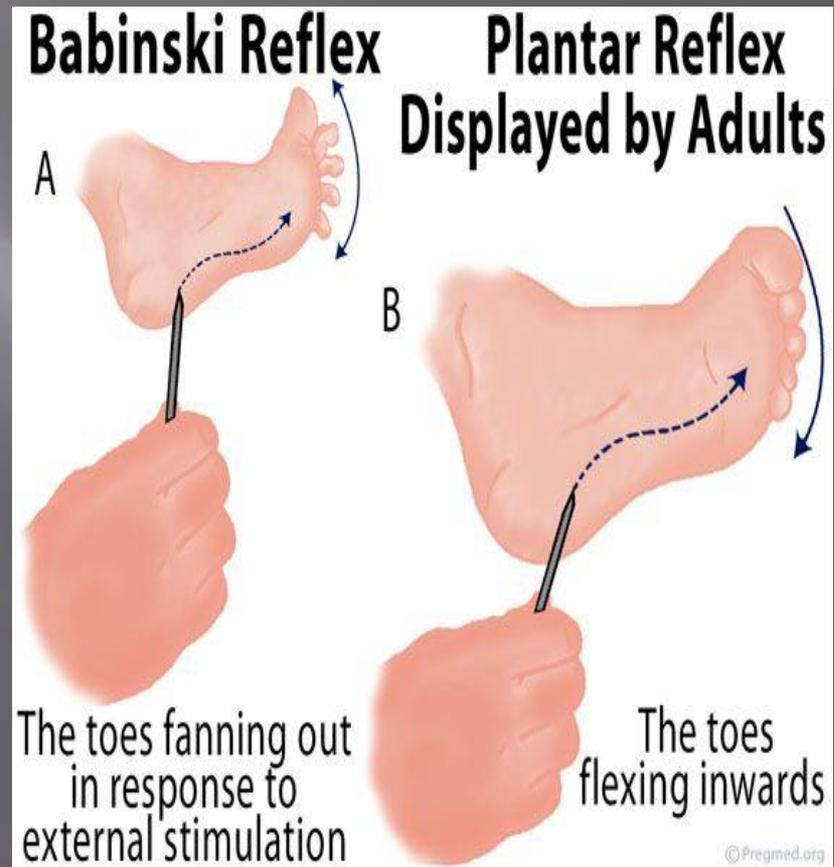
Posturing

- ▣ Decorticate rigidity
- ▣ Decerebrate rigidity



Most useful tests

- ▣ Chemical-toxicologic analysis of blood and urine
- ▣ cranial CT or MRI
- ▣ EEG – useful , but rarely diagnostic
- ▣ CSF examination
- ▣ ABG – helpful in pt with lung disease or acid-base disorders
- ▣ BUN
- ▣ NH₃-liver



Coma due to metabolic disorder

PATHO

- ▣ Interruption of delivery of energy substrates
 - Hypoxia
 - Ischemia
 - Hypoglycemia
- ▣ Altering neuronal excitability
 - drug and alcohol intoxication
 - Anesthesia
 - Epilepsy

CONTINUUM

- ▣ The same metabolic abnormalities that produce coma may, in milder forms, induce an acute confusional state.
- ▣ Thus, in metabolic encephalopathies, clouded consciousness and coma are in a continuum.