



PENTAGON REVIEW  
**MEDICAL-SURGICAL NURSING**

Prof. Ferdinand B. Valdez

**Members of the BOARD OF NURSING and their SPECIALIZATIONS:**

- f Chairman Carmencita Abaquin, UP
  - MS – neuro, sensory, endocrine, **BURNS, ONCOLOGY**, elderly care, **RESEARCH**
- f Hon. Marco Sto. Tomas, St. Joseph College of Nursing
  - Funda, MCN, **IMCI**
- f Hon. Leonila Faire, UP
  - renal transplant, **RENAL DISORDERS**, ENT, ophthal (cataract), OR
- f Hon. Betty Meritt, UP
  - Psych: Child psychology, stress management
- f Hon. Perla Po, UP
  - Psych: Therapeutic comm., psych drugs, nursing theories
- f Hon. Amelia Rosales, Ortañez College of Nursing
  - MS
- f Hon. Yolanda Arugay, PWU
  - CHN

What is the nursing priority for a patient with epiglottitis?

- A. administer steroids
- B. assist in endotracheal intubation
- C. assist in tracheostomy
- D. apply warm moist pack

The correct answer is C. Epiglottitis is an emergency situation requiring immediate intervention: the inflamed epiglottis is blocking the entrance to the trachea, therefore clearing the patient's AIRWAY is the priority nursing action (eliminate options A and D). Option C is better than Option B; endotracheal intubation will be difficult because the inflamed epiglottis will not permit the insertion of a laryngoscope.

The following are clinical manifestations of nontoxic goiter (hypothyroidism), EXCEPT:

- A. dry skin
- B. lethargy
- C. insomnia
- D. sensitivity to cold

The correct answer is C. Hypothyroidism causes a decrease in thyroid hormones, which in turn causes decreased metabolism. Options A, B and D are all consistent with decreased metabolism. Option C is a symptom of increased metabolism found in hyperthyroidism.

f Thyroid gland secretions ( $T_3$  and  $T_4$ ) are **metabolic hormones**

- Thyroid hormones cause **increased metabolism**: CNS stimulation, increased vital signs, and increased GI motility (diarrhea)

HYPOTHYROIDISM	HYPERTHYROIDISM
All body systems are <b>DECREASED</b> except WEIGHT and MENSTRUATION!	All body systems are <b>INCREASED</b> except WEIGHT and MENSTRUATION!
↓ decreased CNS: drowsiness, memory problems (forgetfulness)	↑ increased CNS: tremors, insomnia
↓ decreased v/s: hypotension, bradycardia, bradypnea, low body temp	↑ increased v/s: hypertension, tachycardia, tachypnea, fever
↓ decreased GI motility: <b>constipation</b>	↑ increased GI motility: <b>diarrhea</b>
↓ decreased appetite ( <b>anorexia</b> ) but with <b>WEIGHT GAIN</b> [low metabolism causes decreased burning of fats and carbs] <ul style="list-style-type: none"> <li>▫ This leads to <b>increased serum cholesterol</b> → <i>atherosclerosis</i> (hardening of arteries due to cholesterol deposits)</li> <li>▫ Because of increased cholesterol, hypothyroid patients are prone to hypertension, myocardial infarction, CHF and stroke</li> </ul>	↑ increased appetite ( <b>hyperphagia</b> ) but with <b>WEIGHT LOSS</b> [high metabolism causes increased burning of fats and carbs]
↓ decreased metabolism causes decreased perspiration → <b>DRY SKIN</b> and <b>COLD INTOLERANCE</b>	↑ increased metabolism causes increased perspiration → <b>MOIST SKIN</b> and <b>HEAT INTOLERANCE</b>
↑ <b>Menorrhagia</b> (excessive bleeding during menstruation)	↓ <b>Amenorrhea</b> (absence of menstruation)
	Pathognomic sign: <b>EXOPHTHALMOS</b> (bulging eyeballs)
f <u>Nursing Management for hypothyroidism:</u> <ul style="list-style-type: none"> <li>▫ Low calorie diet</li> <li>▫ Warm environment</li> </ul>	f <u>Nursing Management for hyperthyroidism:</u> <ul style="list-style-type: none"> <li>▫ High calorie diet</li> <li>▫ Cool environment</li> </ul>

What is the best way to prevent the spread of STDs?

- Use condoms
- Monogamous relationship
- Abstinence
- Practice Safe Sex

The correct answer is B. TEST-TAKING TIP: Pick the conservative answer. Remember the Board of Nursing is composed of older women with traditional values who do not approve of promiscuity (implied in options A and D). Telling the patient to abstain from sex (Option C) is not an acceptable response from the nurse.

What is the nursing priority if the client is suffering from 1<sup>st</sup>, 2<sup>nd</sup>, 3<sup>rd</sup> or 4<sup>th</sup> degree burns?

- fluid and electrolyte balance
- infection
- pain
- airway

The correct answer is B. Infection is a priority for all types of burns. Airway is a priority only for burns to the face and neck. Pain is a *second priority* for 1<sup>st</sup> and 2<sup>nd</sup> degree burns. Fluid and electrolyte balance is a *second priority* for 3<sup>rd</sup> and 4<sup>th</sup> degree burns [no pain because nerve endings are damaged].

What is a normal physical finding of the thyroid gland?

- A. nodular consistency
- B. asymmetry
- C. tenderness
- D. palpable upon swallowing

The correct answer is A. The thyroid gland is symmetrical, non-tender, and palpable only if the patient has goiter. The palpable mass on the neck is the thyroid cartilage. It is present in both males and females but is larger in males; it develops during puberty

What food is most appropriate for a toddler?

- A. hotdog
- B. grapes
- C. milk
- D. spaghetti

The correct answer is D. Toddlers need a high-carb diet to sustain their active play lifestyle. Toddlers are also at risk for aspiration, therefore eliminate foods that are choking hazards (options A and B). Milk is not the best food for toddlers because of its low IRON content; Milk is the primary cause of Iron-deficiency Anemia in children.  
TEST-TAKING TIP: `Di ba may hotdog ang spaghetti? No, no, no... DO NOT ADD DETAILS TO THE QUESTION. Do not justify a wrong answer.

What would the nurse include in the teaching plan for a paraplegic client?

- A. self-catheterization
- B. assisted coughing
- C. adapted feeding techniques
- D. compensatory swallowing

The correct answer is A. A paraplegic patient has lower extremity paralysis (paralyzed bladder and bowel). Therefore the nursing priority is ELIMINATION.

Review:

**Monoplegia** -- 1 limb paralysis

**Hemiplegia** -- Right or Left side paralysis

**Paraplegia** – Lower extremity paralysis (note: there is no such thing as upper extremity paralysis)

**Quadriplegia/Tetraplegia** – Paralysis from the neck down. The priority for a quadriplegic patient is AIRWAY.

## NERVOUS SYSTEM

f CNS: brain and spinal cord

f PNS: 12 cranial nerves + 31 spinal nerves

▫8 cervical nerves (C<sub>1</sub> to C<sub>8</sub>)

▫12 thoracic nerves (T<sub>1</sub> to T<sub>12</sub>)

▫5 lumbar nerves (L<sub>1</sub> to L<sub>5</sub>)

▫5 sacral nerves (S<sub>1</sub> to S<sub>5</sub>)

▫1 coccygeal nerve (Co)

f The spinal cord terminates at L<sub>1</sub> to L<sub>2</sub>, therefore a LUMBAR TAP is performed at L<sub>3</sub>, L<sub>4</sub> or L<sub>5</sub> (no risk of paralysis from spinal cord damage)

## AUTONOMIC NERVOUS SYSTEM

Sympathetic Nervous System (SNS)	Parasympathetic Nervous System (PNS)
f "Fight" or aggression response	f "Flight" or withdrawal response
f Also termed adrenergic or parasympatholytic response	f Also termed cholinergic or sympatholytic response
f The neurotransmitter for the SNS is <i>norepinephrine</i>	f The neurotransmitter for the PNS is <i>acetylcholine (Ach)</i>
<b>All body activities are INCREASED except GIT!</b>	<b>All body activities are DECREASED except GIT!</b>
↑ increased blood flow to brain, heart and skeletal muscles: These are the most important organs during times of stress	↓ normalized blood flow to vital organs
↑ increased BP, increased heart rate: To maintain perfusion to vital organs	↓ decreased BP, decreased heart rate
↑ bronchodilation and increased RR: To increase oxygen intake	↓ bronchoconstriction, decreased RR
↑ urinary retention → <b>FLUID VOLUME EXCESS</b> Fluids are withheld by the body to maintain circulating volume	↓ urinary frequency → <b>FLUID VOLUME DEFICIT</b>
↑ pupillary dilation: MYDRIASIS: To increase environmental awareness during aggression	↓ pupillary constriction: MIOSIS [this is the correct spelling, not meiosis ☺]
↓ decreased GIT activity: CONSTIPATION and DRY MOUTH: Blood flow is decreased in the GIT because it is the least important area in times of stress	↑ Increased GIT: DIARRHEA and INCREASED SALIVATION
<b>DRUGS WITH SNS effects:</b>	<b>DRUGS WITH PNS effects:</b>
f <u>Adrenergic/Parasympatholytic agents:</u> ▫ Epinephrine [Adrenalin]	f <u>Anti-hypertensives:</u> ▫ Methyldopa – for pregnancy induced hpn (PIH)
f <u>Antipsychotics:</u> ▫ Haloperidol [Haldol], Chlorpromazine [Thorazine], etc. ▫ Side effect of Thorazine: Atopic Dermatitis (eczema) and foul-smelling odor [recall: patients in NCMH are smelly] ▫ Side effect of all antipsychotics: Sx of PARKINSON'S DISEASE, therefore antipsychotics are given together with antiparkinson drugs	▫ β-blockers (-olol): ▫ Propranolol [Inderal], atenolol, metoprolol
f <u>Anti-parkinsonians:</u> ▫ Cogentin, Artane, etc.	▫ ACE inhibitors (-pril): ▫ Enalapril, Ramipril, Lisinopril, Benazepril, Captopril
f <u>Pre-operative drug:</u> ▫ Atropine Sulfate (AtSO <sub>4</sub> ) – given before surgery to decrease salivary and mucus secretions	▫ Side effect of ACE inhibitors: AGRANULOCYTOSIS and NEUTROPENIA (blood dyscracias... always asked in board!) ▫ Calcium channel blockers (Calcium antagonists) ▫ Nifedipine [Procardia], Verapamil [Isoptim], Diltiazem [Cardizem]
	▫ NURSING ALERT: Anti-hypertensives are not given to patients with CHF or cardiogenic shock (Drug will cause a further decrease in heart rate → Death)
	f <u>Rx for Myasthenia Gravis:</u> ▫ Pyridostigmine [Mestinon] ▫ Neostigmine [Prostigmin]

The nurse admits a patient with COPD. For the management of hypertension, the doctor prescribes Inderal 40 mg P.O. What is the appropriate nursing action?

- A. administer Inderal 1 hour before or 2 hours after meals
- B. withhold Inderal if the pulse is less than 60 bpm
- C. question the physician regarding the order
- D. monitor BP prior to administration

The correct answer is C. A patient with COPD has decreased respiration. Propranolol [Inderal] is contraindicated for patients with COPD because of its PNS effects (it will aggravate the patient's respiratory depression).

## NEURONS

3 characteristics of neurons:

1. Excitability – Neurons are affected by changes in the environment
2. Conductivity – Neurons transmit wave of excitations
3. Permanent cells – Once neurons are destroyed, they are not capable of regeneration.

### ☞ 3 types of cells according to regenerative capacity:

<b>Labile</b> capable of regeneration	epidermis (skin), gastrointestinal tract (GIT), genito-urinary tract (GUT), respiratory tract (stab wounds to the lungs are survivable)
<b>Stable</b> once destroyed, capable of regeneration but with limited survival time period	kidneys, liver, pancreas, salivary glands
<b>Permanent</b> once destroyed, not capable of regeneration	heart, neurons, osteocytes, retinal cells

## NEUROGLIA

f Function: support and protection of neurons

f Clinical significance: Majority of brain tumors arise from neuroglia

f Types:

- Astrocytes
- Microglia
- Oligodendrocytes
- Ependymal cells

f Note: Astrocytoma is the #1 type of brain tumor

**ASTROCYTES** – maintain the integrity of the **BLOOD-BRAIN BARRIER**

### ☞ Toxic substances that can cross the BLOOD-BRAIN BARRIER:

1. Ammonia
2. Bilirubin
3. Carbon monoxide and Lead
4. Ketones

## AMMONIA

f Ammonia is a by-product of protein metabolism

f Ammonia is a toxic substance metabolized by the liver into a non-toxic substance (urea), which is then excreted by the kidneys

f Increase in serum ammonia can cause **HEPATIC ENCEPHALOPATHY** (Liver cirrhosis)

f Normal liver is scarlet brown; liver with cirrhosis is covered by fat deposits (“fatty liver”)

f The *primary cause* of hepatic encephalopathy is MALNUTRITION

f The *major cause* of hepatic encephalopathy is ALCOHOLISM

▫Alcoholism causes Thiamine (B<sub>1</sub>) deficiency (Alcoholic beriberi)

f Ammonia is a cerebral toxin.

f Early sign of Hepatic Encephalopathy:

- **ASTERIXIS** – flapping hand tremors. This is the EARLIEST SIGN OF HEPATIC ENCEPHALOPATHY.

f Late Signs of Hepatic Encephalopathy:

- Headache
- Restlessness
- *Fetor hepaticus* (ammonia-like breath)
- Decreased level of consciousness → **HEPATIC COMA**
  - Note: The primary Nursing Intervention in hepatic coma is AIRWAY [Assist in mechanical ventilation]

## BILIRUBIN

f Review:

- Bilirubin – yellow pigment
- Biliverdin – green pigment
- Hemosiderin – golden brown pigment
- Hemoglobin – red pigment
- Melanin – black pigment

f Icteric skin and sclerae is termed *Jaundice* = a sign of HEPATITIS

- Note: Icteric skin with normal sclerae is termed *Carotinemia* = a sign of PITUITARY GLAND TUMOR, not hepatitis

f Kernicterus (Hyperbilirubinemia) can lead to irreversible brain damage

## CARBON MONOXIDE (CO) AND LEAD (Pb)

f CO and Pb can cause PARKINSON'S DISEASE and SEIZURE

- Note: The initial sign of Parkinson's disease: **PILL-ROLLING TREMORS**

f The antidote for Pb poisoning is **Calcium EDTA**

f The antidote for CO poisoning is **Hyperbaric oxygenation** (100% oxygen)

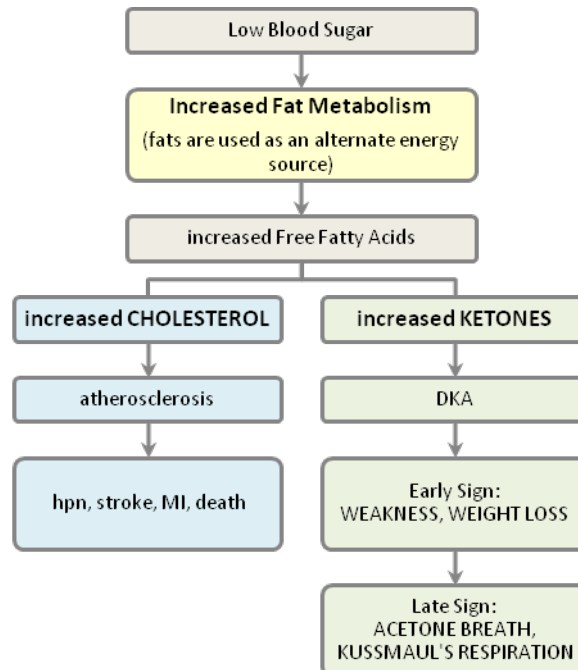
## KETONES

f Ketones are by-products of fat metabolism

f Ketones are CNS depressants

f Increased ketones can lead to *diabetic ketoacidosis (DKA)* seen in *Type I diabetes mellitus (DM)*.

f *DKA* is due to increased fat metabolism:



## DIABETES MELLITUS

Type I DM	Type II DM
f Insulin-dependent	f Non Insulin-dependent
f Juvenile onset type (common among children)	f Adult/Maturity onset type (common among 40 y.o. & above)
f Non-obese	f Obese
f "Brittle disease"	f "Non-brittle disease"
f Etiology: Hereditary	f Etiology: Obesity
f Symptomatic	f Asymptomatic
f Characterized by Weight Loss	f Characterized by Weight Gain
f Treatment: Insulin	f Treatment: Oral Hypoglycemic Agents (OHA)
f Complications: Diabetic Ketoacidosis (DKA) <ul style="list-style-type: none"> <li>▫ Sodium Bicarbonate (NaHCO<sub>3</sub>) administered to treat acidosis</li> <li>▫ Can lead to coma</li> </ul>	f Complications: Hyper-Osmolar Non-Ketotic Coma (HONCK) <ul style="list-style-type: none"> <li>▫ Non-ketotic, so no lipolysis</li> <li>▫ Can also lead to coma</li> <li>▫ Can lead to seizure</li> </ul>

## MICROGLIA

f Microglia are stationary cells that carry on *phagocytosis*

f Review:

- Brain macrophage = Microglia
- Blood macrophage = Monocyte
- Kidney/Liver macrophage = Kupffer cell
- Lung macrophage = Alveolar macrophage
- Epithelial macrophage = Histiocytes

## EPENDYMAL CELLS

f Ependymal cells secrete *chemoattractants* (glue) that concentrate bacteria

## OLIGODENDROCYTES

f Produce *myelin sheath*

f Function: For insulation and to facilitate nerve impulse transmission

f The demyelinating disorders are **MULTIPLE SCLEROSIS** and **ALZHEIMER'S DISEASE**

## ALZHEIMER'S DISEASE

f A type of dementia (degenerative disorder characterized by atrophy of the brain tissue)

f Caused by **Acetylcholine (Ach) deficiency**

f Irreversible

f Predisposing factors:

- Aging
- Aluminum toxicity
- Hereditary

f SSx of Alzheimer's (5 A's):

- **Amnesia** – partial or total loss of memory
  - The type of amnesia in Alzheimer's is **ANTEROGRADE AMNESIA**.
  - 2 types of Amnesia:
    - ✓ **Anterograde amnesia** – loss of short-term memory
    - ✓ **Retrograde amnesia** – loss of long-term memory
- **Agnosia** – inability to recognize familiar objects
- **Apraxia** – inability to perform learned purposeful movements (using objects [toothbrush] for the wrong purpose)
- **Anomia** – inability to name objects
- **Aphasia** – inability to produce or comprehend language
  - The type of aphasia in Alzheimer's is **RECEPTIVE APHASIA**.
  - 2 types of Aphasia:
    - ✓ **Expressive aphasia** (Broca's aphasia)

- inability to speak
- positive nodding
- nursing management is the use of a PICTURE BOARD
- damage to Broca's area (in frontal lobe), which is the *motor speech* center
- ✓ **Receptive aphasia** (Wernicke's aphasia)
  - inability to understand spoken words
  - positive illogical/irrational thoughts
  - can hear words but cannot put them into logical thought
  - damage to Wernicke's area (in temporal lobe), which is the *language comprehension* center

f The drugs of choice for Alzheimer's are Donepezil [Aricept] or Tacrine [Cognex]

- The drugs work by inhibiting cholinesterase (an enzyme that breaks down acetylcholine), thereby increasing the levels of acetylcholine in the brain
- Best given at bedtime

Which is the characteristic of Alzheimer's disease?

- A. transient ischemic attacks
- B. remissions and exacerbations
- C. rapid deterioration of mental functioning because of arteriosclerosis
- D. slowly progressive deficits in the intellect, which may not be noted for a long time.

The correct answer is D. Option A is a characteristic of stroke. Option B is a characteristic of Myasthenia Gravis or Multiple Sclerosis. Option C is a characteristic of Dementia (?)

What type of environment is appropriate for a client with Alzheimer's?

- A. familiar
- B. variable
- C. challenging
- D. non-stimulating

The correct answer is A. To promote the patient's safety and security, the patient needs to be in a familiar environment.

What is the best nursing action if a client with Alzheimer's begins to speak about the 1930's?

- A. orient the client to time and place
- B. distract the client by inviting him to watch TV
- C. encourage the client to talk about recent events
- D. listen to the client's anecdotes

The correct answer is D. A client with Alzheimer's disease has short-term memory loss, but has intact long-term memories. Therefore allowing the client to reminisce about the past reinforces the client's self-esteem. Option A is incorrect because the client is not disoriented. Option B is incorrect because it dismisses the client's concerns. Option C is incorrect because with short-term memory loss, the client cannot talk about recent events.

## MULTIPLE SCLEROSIS (MS)

f Chronic intermittent disorder of the CNS characterized by white patches of demyelination in the brain and spinal cord



- f Characterized by *remission* and *exacerbation*
- f Common among women 15 to 35 y.o.
- f Predisposing factors:
  - Idiopathic (unknown)
  - Slow-growing viruses
  - Autoimmune
  - Note: other autoimmune diseases: Systemic Lupus Erythematosus (SLE), hypo & hyperthyroidism, pernicious anemia, myasthenia gravis
- f There is no treatment for autoimmune diseases, only palliative or supportive care (just treat S & Sx)

Review: ANTIBODIES	
<b>IgG</b>	- can cross placenta; provides passive immunity
<b>IgA</b>	- found in body secretions (sweat, tears, saliva and colostrum)
<b>IgM</b>	- acute inflammations; the largest antibody
<b>IgE</b>	- allergic reactions
<b>IgD</b>	- chronic inflammations

### S & Sx of Multiple Sclerosis

- f Visual disturbances
  - BLURRED VISION is the INITIAL SIGN of MULTIPLE SCLEROSIS
  - Diplopia (double vision)
  - Scotoma (blind spot in the visual field)
- f Impaired sensation to touch, pain, pressure, heat and cold
  - Tingling sensations
  - Paresthesia (numbness)
    - Do not give hot packs to patients with MS. Because of decreased heat sensitivity, heat application can cause burns.
- f Mood Swings
  - Patients with MS are in a state of *euphoria*

### S & Sx of Multiple Sclerosis (continued)

- f Impaired motor activity
  - Weakness → spasticity → paralysis
- f Impaired cerebellar function
  - ATAXIA (unsteady gait)
- f Scanning speech
- f Urinary retention and incontinence
- f Constipation
- f Decrease in sexual capacity

CHARCOT'S TRIAD Sx of MULTIPLE SCLEROSIS
f Ataxia
f Nystagmus
f Intentional Tremors

### Diagnostic Procedures for Multiple Sclerosis

- f Cerebral analysis through lumbar puncture reveals increased IgG and protein
- f MRI reveals site and extent of demyelination
- f **LHERMITTE'S SIGN**
  - continuous contraction and pain in spinal cord following laminotomy
  - confirms diagnosis of MS

### Nursing Management for Multiple Sclerosis

- f Rx:

- ACTH (steroids) – to reduce swelling and edema → prevents paralysis resulting from spinal cord compression
  - Steroids are best administered AM to mimic the normal diurnal rhythm of the body
  - Give  $\frac{2}{3}$  of dose in AM,  $\frac{1}{3}$  of dose in PM
  - ACTH is also administered in Motor Vehicular Accidents leading to spinal injury → prevents inflammation that can lead to paralysis
- Muscle relaxants: **Baclofen [Liorisal]** and Dantrolene Sodium [Dantrium]
  - Can be used to treat hiccups, which is caused by irritation of the phrenic nerve.
- Interferons – to alter immune response
- Immunosuppressants
- Diuretics – to treat urinary retention
- Bethanecol Chloride [Urecholine]** – cholinergic drug used to treat urinary retention; given subQ
  - Side effects of Bethanecol: **Bronchospasm and Wheezing**, so always check breath sounds 1 hour after administration.
  - Normal breath sounds are *bronchovesicular*.
- Proprantheline Bromide [Pro-Banthine]** – antispasmodic drug to treat urinary incontinence
- f Provide relaxation techniques
  - Deep breathing, yoga, biofeedback
- f Maintain siderails – to prevent injury secondary to falls
- f Prevent complications of immobility
  - Turn to side q 2 h, q 1 h for elderly patients, q 30 minutes on the affected extremity
- f Provide catheterization
- f Avoid heat application
- f To treat constipation: Provide high fiber diet
- f To treat UTI: Provide **ACID-ASH DIET** (acidifies urine to prevent bacterial infection)
  - Acid-ash diet consists of Grape, Cranberry, Plums, Prune Juice, Pineapple
  - Women are more prone to UTI
    - Females have shorter urethra (3 to 5 cm or 1 to 1½ inches) than males (20 cm or 6 to 8 inches)
    - Poor perineal hygiene (wiping from front to back)
    - Vaginal environment is moist (more conducive to bacteria)
    - Nursing Intervention: Avoid scented tissue paper, bubble baths, and using perfume or talcum powder in the perineum, as these can irritate the vagina
  - Male UTI is often related to post-coitus
    - Male must urinate after coitus to prevent urine stagnation

What is the action of Baclofen [Liorisal]?

- A. induces sleep
- B. stimulates appetite
- C. muscle relaxant
- D. reduce bacterial urine count

The correct answer is C. Baclofen is a muscle relaxant used to treat spastic movement in multiple sclerosis, spinal cord injury, amyotrophic lateral sclerosis (Lou Gehrig's Disease) and trigeminal neuralgia.

## BRAIN

Composition:

f 80% Brain mass

f 10% Blood

f 10% Cerebrospinal Fluid (CSF)

## Cerebrum

- f Largest part of the brain
- f Composed of 2 hemispheres (Left and Right) joined by the *copus callosum*
- f Functions: sensory, motor and integrative
- f Cerebral Lobes
  - Frontal
    - controls higher cortical thinking
    - Personality development
    - Motor functions
    - Inhibits primitive reflexes
    - Broca's area, the motor speech center, is located in the frontal lobe
  - Temporal
    - controls hearing
    - Short-term memory
    - Wernicke's area, the general interpretative area, is located in the temporal lobe
  - Parietal
    - Appreciation and discrimination of sensory impulses (touch, pain, pressure, heat, cold)
  - Occipital
    - Controls vision
  - Central (Insula or "Island of Reil")
    - Controls visceral functions
  - Limbic system (rhinencephalon)
    - Controls smell
    - *Anosmia* is the absence of the sense of smell
    - Controls libido
    - Long-Term memory
  - Basal Ganglia
    - areas of gray matter located deep within each cerebral hemisphere
    - produce **DOPAMINE**, which controls gross voluntary movement

Remember:

- ✓ Dopamine deficit = **PARKINSON'S DISEASE** (Rx **antiparkinsonian drugs** to increase dopamine)
- ✓ Dopamine excess = **SCHIZOPHRENIA** (Rx **antipsychotic drugs** to decrease dopamine)
- ✓ Acetylcholine deficit = **MYASTHENIA GRAVIS** (Rx **Mestinon** to increase Ach)
- ✓ Acetylcholine excess = **BIPOLAR DISORDER** (Rx **Lithium** to decrease Ach)

Notice that...

- ✓ Neurotransmitter deficit = *MedSurg illnesses*
- ✓ Neurotransmitter excess = *Psych illnesses*

### **Diencephalon** – interbrain or “between brain”

#### f Hypothalamus

- Temperature regulation
- Controls BP
- Reticular activating system: controls sleep and wakefulness
- Controls thirst
- Satiety center: controls appetite
- Emotional responses: *fear* (from known cause) , *anxiety* (from unknown cause) and excitement
- Controls pituitary functions
  - Pituitary gland relies on stimulation from hypothalamus

#### f Thalamus

- Relay station for sensation

### **Mesencephalon** (midbrain)

f Relay station for sight and hearing:

- Controls size and response of pupil
  - Normal pupil size is 2 to 3 mm
  - *Isocoria* is equal pupil size
  - *Anisocoria* is unequal pupil size
  - Normal pupil response if *PERRLA* [Pupils equal, round, reactive to light and accommodation]
  - *Accommodation* is pupillary constriction for near vision, and pupillary dilation for far vision.
- Controls hearing acuity

## Brainstem

f Pons – pneumotaxic center ( controls depth and rhythm of respiration)

f Medulla Oblongata – lowest part of the brain

- Damage to medulla is the most life-threatening
- Controls respiration, heart rate, vomiting, swallowing, hiccups
- Vasomotor center (controls vessel constriction and dilation)
- The medulla oblongata is the termination point of spinal decussation

## Cerebellum

f Smallest part of the brain; cerebellum is also known as the “lesser brain”

f For balance, posture, equilibrium and gait

f Cerebellar tests:

### ▫ Romberg’s test

- two nurses positioned to the left and right of the patient
- patient assumes *normal position*, with both eyes closed
- tests for ATAXIA (unsteady gait)

### ▫ Finger-to-nose test

- Tests for DYMETRIA (inability of the body to stop a movement at a desired point)

### ▫ Alternate pronation and supination

- Also tests for dymetria

## MONRO-KELLIE HYPOTHESIS

f The Monro-Kellie hypothesis states the relationship between ICP and cranial components (blood, CSF and brain tissue):

▫ *The skull is a closed container, therefore any alteration in one of the intrathecal components can lead to increased intracranial pressure*

▫ The normal ICP is **0 to 15 mmHg**.



## Cerebrospinal Fluid (CSF)

f 125 to 150 mL produced per day by the *choroid plexus*

f CSF is clear, colorless, odorless

f contains glucose, protein and WBCs

f does not contain RBCs

f Function: cushions the brain (shock absorption)

f *Hydrocephalus* – obstruction of the flow of CSF leading to enlargement of the skull posteriorly

- Enlargement due to early closure of posterior fontanel

## Blood

### CEREBROVASCULAR ACCIDENT (STROKE)

f Partial or complete obstruction in the brain’s blood supply.

f Common sites of thrombotic stroke:

- Middle cerebral artery
- Internal carotid artery
- f The leading cause of CVA is **THROMBUS** formation (attached clot)
  - A dislodged thrombus becomes an EMBOLUS (free-floating clot) → very dangerous if it goes to the BRAIN, HEART or LUNGS
- f CVA causes increased ICP.

## INCREASED INTRACRANIAL PRESSURE (ICP)

f Increased intracranial bulk brought about by an increase in one of the intracranial components

f Predisposing factors:

- Head injury
- Tumor
- Localized abscess (pus)
- Hydrocephalus
- Meningitis
- Cerebral edema
- Hemorrhage (stroke)

f Note: For all causes of increased ICP, the patient should be positioned 30° to 45° (Semi-Fowler's)

What is the EARLIEST SIGN of increased ICP?

- A. headache
- B. widening pulse pressure
- C. tachycardia
- D. agitation

The correct answer is D. A change in the *level of consciousness* is the earliest sign of increased ICP. Options A and B are both LATE SIGNS. Option C is incorrect; increased ICP causes bradycardia, not tachycardia.

Describe a conscious client:

- A. Aware
- B. Coherent
- C. Awake
- D. Alert

The correct answer is C. Consciousness describes a patient's *level of wakefulness*. The terms aware, coherent and alert (Options A, B and D) are used when describing a patient's *orientation* to person, place and time.

### f **Early Signs of Increased ICP**

- *Change or decreased level of consciousness* (restlessness to confusion)
- Irritability and agitation
- Disorientation to lethargy to stupor to coma
- Remember: The 4 levels of consciousness: Conscious → Lethargy → Stupor → Coma

### f **Late Signs of Increased ICP**

- Changes in v/s
  - ↑ Increased BP:
    - ✓ *WIDENING PULSE PRESSURE* – increased systolic pressure while diastolic pressure remains the same

- ✓Note: narrowing pulse pressure is seen in SHOCK (inadequate tissue perfusion).
- ↓ Decreased Heart rate (bradycardia)
- ↓ Decreased Respiratory rate (bradypnea)
  - ✓Cheyne-Stokes respiration – hyperpnea followed by periods of apnea
- Increased Temp
  - ✓Note: Temp as a vital sign usually parallels BP

Vital signs	Increased ICP	Shock
<b>BP</b>	↑ increased	↓ decreased
<b>Heart Rate</b>	↓ decreased	↑ increased
<b>Resp Rate</b>	↓ decreased	↑ increased
<b>Temp</b>	↑ high	↓ low
<b>Pulse Pressure</b>	↑ widening	↓ narrowing

▪Notes:

- ✓Increased heart rate in shock compensates for blood loss
- ✓Decreased temp in shock is due to decreased blood causing a decrease in warmth.
- ✓Hypertension, Bradycardia and irregular RR = **CUSHING'S TRIAD** of increased ICP
- ✓Increased BP as a response to increased ICP is termed as **CUSHING REFLEX**
  - ☑Increased BP is an attempt by the body to maintain cerebral perfusion during increased ICP
- Headache, papilledema, **PROJECTILE VOMITTING**
  - Papilledema* is edema of the optic disc in the retina, leading to irreversible blindness
  - Projectile vomiting* due to compression of the medulla, which is the center for vomiting.
- Abnormal Posturing:
  - Decorticate posture* – abnormal flexion, due to damage to the corticospinal tract (spinal cord & cerebral cortex)
  - Decerebrate posture*– abnormal extension, due to damage to upper brain
  - Note: *Flaccid posture* is lost muscle tone, not found in increased ICP (found in poliomyelitis).
- Unilateral dilation of pupils
  - Uncal herniation* – herniation of uncus (in temporal lobe) puts pressure on Cranial Nerve III which controls parasympathetic input to the eye, causing unequal pupillary dilation (**ANISOCORIA**)
- Possible seizure

f **Nursing Management for increased ICP**

- Maintain patent airway and adequate ventilation
  - To prevent hypoxia (inadequate O<sub>2</sub> in tissues) and hypercarbia (increased CO<sub>2</sub> in blood)
    - ✓Note: *Hypoxemia* is inadequate O<sub>2</sub> in the blood

Which of the following is a LATE SIGN of hypoxia?

- A. Restlessness
- B. Agitation
- C. Tachycardia
- D. Bradycardia

The correct answer is D. Options A, B and C are early signs. The brain is the most sensitive organ to hypoxia, causing restlessness and agitation. Tachycardia is a compensatory mechanism to increase O<sub>2</sub> in the brain.

TEST-TAKING TIP: When there are two opposite options (Options C and D), one of them is definitely correct, so eliminate the other options (Options A and B).

Early Signs of Hypoxia

Late Signs of Hypoxia

f <b>R</b> estlessness	f <b>B</b> radycardia
f <b>A</b> gitation	f <b>C</b> yanosis
f <b>T</b> achycardia	f <b>D</b> yspnea
	f <b>E</b> xtr Restlessness

## Hypercarbia – CO<sub>2</sub> retention

Remember: increased CO<sub>2</sub> is the most potent respiratory stimulant

High CO<sub>2</sub> → stimulates medulla → increase RR (hyperventilation) → normalized O<sub>2</sub> and CO<sub>2</sub>  
(negative feedback mechanism to maintain homeostasis)

## f Nursing Management for increased ICP (continued)

- Assist in mechanical ventilation: Ambubag or Mechanical Ventilator
  - Note: Ambubag should only be pressed during inspiration
- Hyperventilate or hyper-oxygenate client to 100% before and after suctioning
  - Note: Suctioning performed for only 10 to 15 seconds; apply suction only while removing the suction catheter
  - When suctioning an endotracheal tube, insert the suction cath all the way until resistance is felt, to ensure complete removal of secretions
- Position Semi-Fowler's
  - Elevate head of bed 30 to 45° with neck in neutral position unless contraindicated to promote venous drainage.
- Limit fluid intake to 1.2 to 1.5 L per day
  - Note: Forced fluids is 2 to 3 L per day
- Monitor v/s, I&O and neurocheck (neurovital signs)
- Prevent complications of immobility (turn to side)
- Prevent further increased ICP:
  - Provide comfortable, quiet environment
    - ✓ Stress increases ICP
  - Avoid use of restraints [Jacket, wrist or elbow restraints]
    - ✓ Anxiousness increases ICP
  - Maintain siderails
  - Avoid clustering of nursing activities together
  - Instruct client to avoid activities leading to **Valsalva maneuver** (bearing down)
    - ✓ Avoid straining of stool: administer laxatives/stool softeners: Bisacodyl [Dulcolax]
    - ✓ Avoid excessive coughing: administer antitussives (cough suppressant): Dextromethorphan [Robitussin]
      - ☑ Note: common side effect of antitussives is drowsiness, so avoid driving or operating heavy machinery
    - ✓ Avoid vomiting: administer anti-emetic: Phenergan [Plasil]
    - ✓ Avoid bending, stooping, lifting heavy objects
- Administer meds:
  - **Osmotic diuretics** – Mannitol [Osmitrol]
    - ✓ Check BP before administering; mannitol can lead to low fluid volume → hypotension
    - ✓ Monitor strictly I & O and inform physician if output is less than 30 cc per hour
    - ✓ Mannitol is given as side-drip (piggy-back)
      - ☑ Regulate at FAST-DRIP to prevent crystallization [formation of precipitates in tubing] → clogged IV line
      - ☑ Note: KVO rate is 10 to 15 gtts per minute
    - ✓ Inform client that he will feel a flushing sensation as the drug is introduced.
  - **Loop Diuretics** – Furosemide [**Lasix**]
    - ✓ Nursing management for loop diuretics is the same as for Osmotic diuretics
    - ✓ Lasix is given IV Push (from ampule)
    - ✓ Best given AM to prevent sleep disturbances. Lasix given PM will prevent restful sleep due to frequent urination.
  - Corticosteroids: Dexamethasone [Decadron] to decrease cerebral edema

- ✓Side-effect of steroids: respiratory depression
- Mild analgesics: Codein Sulfate
- Anticonvulsants: Dilantin [Phenytoin]

Lasix is given at 7 AM. What is the earliest time that the nurse would expect the client to urinate?

- A. 7:10 AM
- B. 7:30 AM
- C. 12 noon
- D. 1 pm

The correct answer is A. Lasix takes effect in 10 to 15 minutes. Option D (6 hours) is the maximum therapeutic effect of Lasix.

SIDE EFFECTS OF LASIX		Normal
Values		
▣↓ K:	<b>HYPOKALEMIA</b>	3.5 to 5.5
mEq/L		
▣↓ Ca	<b>HYPOCALCEMIA</b>	8.5 to 11
mg/dL		
▣↓ Na:	<b>HYPONATREMIA</b>	135 to 145
mEq/L		
▣↑ Glucose:	<b>HYPERGLYCEMIA</b>	80 to 100
mg/dL		
▣↑ Uric Acid:	<b>HYPERURICEMIA</b>	3 to 7 mg/dL

## HYPOKALEMIA



## HYPOKALEMIA HYPERKALEMIA

- f Potassium less than 3.5 mEq/L
- f SSx of hypokalemia:
  - Weakness, fatigue
  - Decreased GI motility: *constipation*
  - **Positive U Wave on ECG** → can lead to arrhythmias
  - **Metabolic alkalosis**
  - Bradycardia (HR 60 to 100 bpm)
- f Rx for hypokalemia
  - K supplements: Oral KCl, Kalium durule
- f Foods rich in K:
  - Fruits: Apple, Banana, Cantaloupe
    - Note: Green bananas have more K
  - Vegetables: Asparagus, Broccoli, Carrots
  - Also rich in K: orange, spinach, apricot
- f Potassium greater than 5.5 mEq/L
- f SSx of hyperkalemia:
  - Irritability, excitement
  - Increased GI motility: *diarrhea, abdominal cramps*
  - **Peaked T wave** → can also lead to arrhythmia
  - **Metabolic acidosis**

## HYPOCALCEMIA

- f Tetany – involuntary muscle contraction
- f SSx of hypocalcemia:
  - **Trousseau sign** – carpal spasm when BP cuff is inflated 150 to 160 mmHg
  - **Chvostek sign** – facial twitch when facial nerve is tapped at the angle of the jaw
- f Complications of hypocalcemia: Arrhythmia and Seizure (Calcium deficiency is life-threatening!)
- f Nursing management for hypocalcemia:
  - Administer **Ca Gluconate IV**
    - Must be administered slowly to prevent cardiac arrest
    - Excess Ca Gluconate → Ca Gluconate toxicity → seizure
    - Antidote for Ca excess: **Magnesium Sulfate**
      - ✓ Monitor for signs of MgSO<sub>4</sub> toxicity (BURP):
        - ☑ **BP** low
        - ☑ **U**rine output low
        - ☑ **RR** low
        - ☑ **PATELLAR REFLEX ABSENT** – important! earliest sign of MgSO<sub>4</sub> toxicity

## HYPONATREMIA

- f Low sodium → Fluid Volume Deficit → Hypotension
- f The initial sign of dehydration is **THIRST** (adults) or **TACHYCARDIA** (infants)
- f Nursing Management: Force fluids (2 to 3 L/day), **administer isotonic IV**

## HYPERGLYCEMIA

- f SSx: 3P's (Polyuria, Polydipsia, Polyphagia)
- f Nursing Management: Monitor Fasting Blood Sugar (Normal FBS is 80 to 100 mg/dL)

## HYPERURICEMIA

- f Uric acid is a by-product of purine metabolism
- f Foods high in uric acid:
  - Organ meats, sardines, anchovies, legumes, nuts
- f *Tophi* – uric acid crystals
- f *Gout* – uric acid deposit in joints leading to joint pain & swelling, particularly affecting the great toes.
- f Nursing Management for Gout:
  - Force fluids (2 to 3 L/day)
  - Rx: Allopurinol [Zyloprim] – drug of choice for gout
    - Most common side effect: *allergic reaction* (maculopapular rash)
  - Rx: Colchicine – drug of choice for *acute gout*
- f KIDNEY STONES – tophi accumulation in kidneys
  - The pain associated with kidney stones is termed RENAL COLIC
  - Nursing Management for Kidney Stones:
    - Force fluids
    - Rx: Morphine Sulfate – narcotic analgesics are the drug of choice to relieve renal colic
      - ✓ Side-effect of narcotic analgesics: *Respiratory depression*, so always check RR before administering
      - ✓ Antidote for Morphine overdose: Naloxone [Narcan]
        - ☑ SSx of Naloxone toxicity: *tremors*
    - Strain the urine using gauze

f A *pathognomonic sign* is a definitive diagnostic sign of a disease.

PATHOGNOMONIC SIGNS	
Disease	Sign
Tetany	Trousseau and Chvostek signs
Tetanus	Risus sardonicus (abnormal sustained spasm of the facial muscles)
Liver cirrhosis	Spider angioma, due to esophageal varices
SLE	Butterfly rash
Bulimia Nervosa	Chipmunk facies (parotid gland swelling)
Leprosy	Leonine facies (thickened lion-like facial skin)
Cushing syndrome	Moon face
Measles	Koplik spots
Diphtheria	Pseudomembrane on tonsils, pharynx and nasal cavity
Down Syndrome	Protrusion of tongue, Simian crease on palm
Kawasaki's Disease	Strawberry tongue
Pernicious anemia	Red beefy tongue
Hyperthyroidism	Exophthalmos
Asthma	Wheezing on expiration
Emphysema	Barrel chest
Pneumonia	Rusty sputum
Addison's disease	Bronze-like skin
Appendicitis	Rebound tenderness
Pancreatitis	Cullen's sign (bluish discoloration of umbilicus)
Chronic hemorrhagic pancreatitis	Gray-turner's spot (ecchymosis in flank area)
Cholera	Rice-watery stool
Malaria	Chills
Typhoid fever	Rose spots in abdomen
Thrombophlebitis	Homan's sign
Meningitis	Kernig's and Brudzinski's sign
Pyloric stenosis	Olive-shaped mass

## PATHOGNOMONIC SIGNS

<b>Hyperpituitarism</b>	Carotidemia
<b>Hepatitis</b>	Jaundice
<b>Dengue</b>	Petechiae
<b>Tetralogy of Fallot</b>	Clubbing of fingers
<b>Cataract</b>	Hazy vision (loss of central vision)
<b>Glaucoma</b>	Tunnel vision (loss of peripheral vision)
<b>Retinal Detachment</b>	Curtain veil-like vision (right or left side of vision is blocked)
<b>PTB</b>	Low-grade afternoon fever
<b>Cholecystitis</b>	Murphy's sign (pain on deep inspiration when inflamed gallbladder is palpated)
<b>Angina Pectoris</b>	Levine's sign (hand clutching of chest)
<b>Patent Ductus Arteriosus</b>	Machine-like murmur
<b>Myasthenia Gravis</b>	Ptosis (drooping of eyelids)
<b>Parkinson's Disease</b>	Pill-Rolling Tremors

### < Questions about increased ICP >

A patient has increased ICP due to stroke. What is the immediate nursing action?

- A. Administer Mannitol as ordered
- B. Elevate the head of the bed 30° - 45°
- C. Restrict fluids
- D. Avoid the use of restraints

The correct answer is A. Mannitol will produce the fastest response in decreasing the patient's intracranial pressure. Option B, while correct, will not produce a fast response. Option C is incorrect; a patient with increased ICP should have fluids *limited*, not *restricted*. Option D is a nursing intervention for a patient at risk for developing increased ICP, but it will not help if the ICP is already elevated.

A patient is at risk for increased ICP. What would be the priority for the nurse to monitor?

- A. Unequal pupil size
- B. Decreased systolic BP
- C. Tachycardia
- D. Decreased body temp

The correct answer is A. Increased ICP causes anisocoria due to pressure on the oculomotor nerve. Options B, C and D are incorrect; increased ICP produces increased BP, bradycardia and hyperthermia.

Which nursing intervention is appropriate for a client with intracranial pressure of 20 mmHg?

- A. Give the client a warming blanket
- B. Administer low-dose barbiturates
- C. Encourage client to hyperventilate
- D. Restrict the patient's fluids

The correct answer is C. Increased ICP produces bradypnea, so hyperventilating will help maintain the client's oxygenation. Option A is incorrect; increased ICP produces hyperthermia, so a warming blanket will aggravate the client's temperature. Option B is incorrect; barbiturates are CNS depressants that will further decrease the client's respiratory rate. Option D is incorrect; a patient with increased ICP should have fluids *limited*, not *restricted* (*Semantics? Really?! Note: This can be a valid answer if there are no better options*).

A client who is regaining consciousness after a craniotomy attempts to pull out his IV line. Which action protects the client without increasing ICP?

- A. Jacket restraints
- B. Wrap hands in a soft mitten restraint
- C. Tuck arms and hands under the draw sheet
- D. Apply wrist restraints to each arm.

The correct answer is B. Mittens will protect the client while still allowing freedom of movement. Options A, C and D will limit the patient's movement, which will increase the patient's anxiety and consequently increase the patient's ICP.

A patient with a left frontal lobe tumor has a craniotomy. Four hours post surgery, which data indicates increased ICP?

- A. BP 160/90
- B. Patient is difficult to arouse
- C. Patient has a positive Babinski response
- D. Patient has urinary incontinence

The correct answer is B. The earliest and most sensitive sign of increased ICP is a change in the *level of consciousness*. Options A and C are both late signs (elevated BP + positive Babinski reflex due to damage to the corticospinal tract). Option D is not diagnostic of increased ICP.

A client with intracranial pressure of 20 mmHg due to multiple stroke is to be discharged while receiving oxygen at 2 L/min via cannula. What information should the nurse impart to the client regarding the use of oxygen at home?

- A. The client should limit activity at home
- B. The use of oxygen will eliminate the shortness of breath
- C. Oxygen spontaneously ignites and explodes
- D. The use of oxygen during activity will relieve the strain on the client's heart.

The correct answer is D. Option A is incorrect; it does not convey any information about the use of oxygen. Option B is incorrect; oxygen can relieve but not eliminate shortness of breath. Option C is incorrect; oxygen can spontaneously ignite but not explode.



## Drug Monitoring

f The 5 most common drugs given in the board exam: **D-L-A-D-A**

Drug	Toxicity	Therapeutic Range	Indication
<b>Digoxin</b> [Lanoxin] Cardiac Glycoside	2 ng/mL	0.5 – 1.5 ng/mL	Congestive Heart Failure
<b>Lithium</b> [Lithane, Eskalith] Anti-manic agent	2 mEq/L	0.6 – 1.2 mEq/L	Bipolar Disorder
<b>Aminophylline</b> [Theophylline] Bronchodilator	20 mg/dL	10 – 19 mg/dL	COPD
<b>Dilantin</b> [Phenytoin] Anti-convulsant	20 mg/dL	10 – 19 mg/dL	Seizure disorders
<b>Acetaminophen</b> [Tylenol] Non-narcotic analgesic	200 mg/dL	10 – 30 mg/dL	Osteoarthritis

## Digoxin

f Indicated for Congestive Heart Failure

f Mechanism of digoxin: increases force of myocardial contractions, thereby increasing cardiac output

▫The normal cardiac output is 3 to 6 L/min.

f Nursing Management when administering Digoxin:

▫Check apical pulse rate: if below 60, withhold drug and notify the physician.

f SSx of Dig toxicity:

▫**GI DISTURBANCES** (Early Sign): Anorexia (loss of appetite is the most evident sign), nausea and vomiting, diarrhea

▫Visual disturbances: photophobia, XANTOPSIA (seeing yellow spots), diplopia

▫Confusion

f The antidote for dig toxicity is DIGIBIND

## Congestive Heart Failure (CHF)

f CHF can be Left-sided or Right-sided

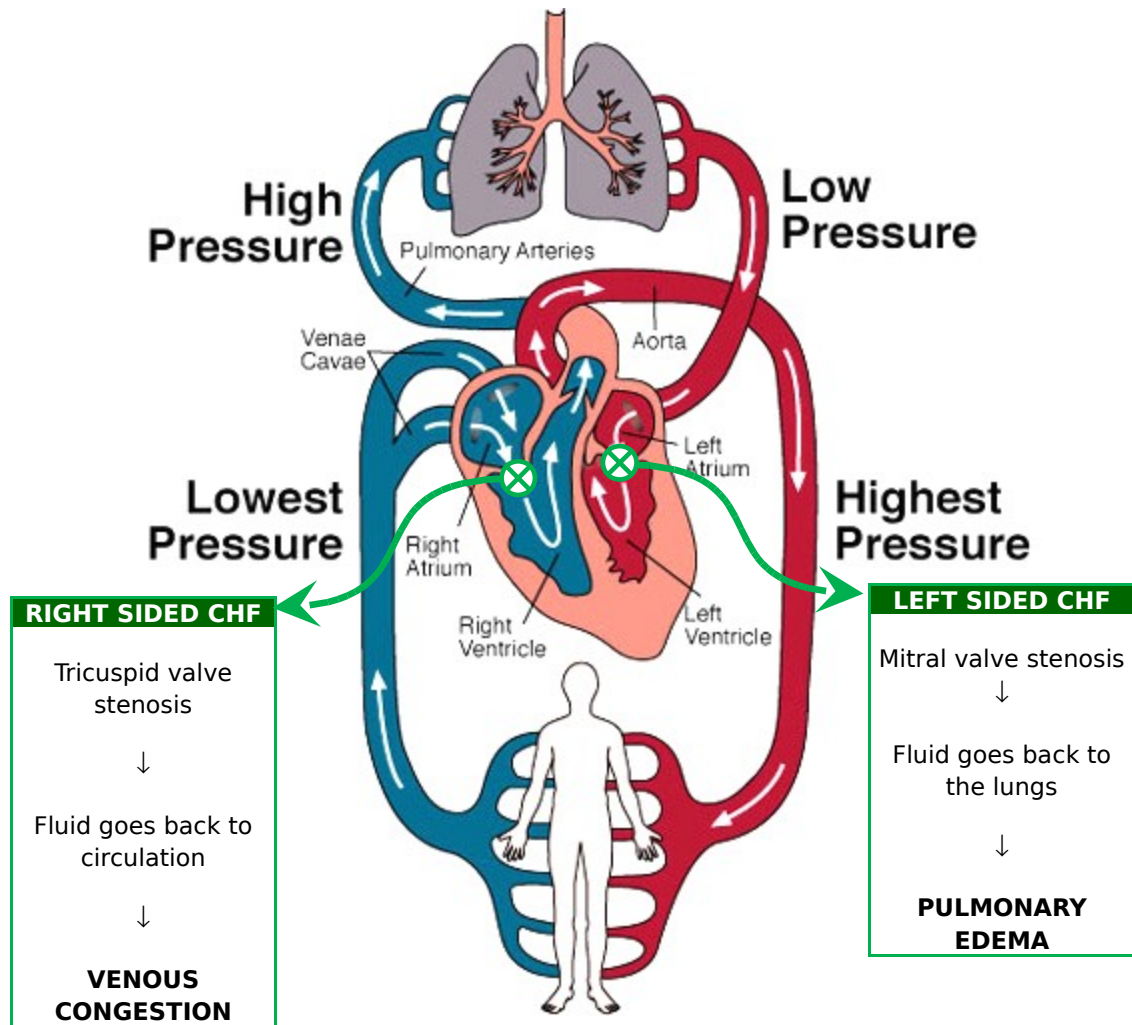
f Left-sided CHF can lead to Right-sided CHF, but Right cannot lead to Left

f Lasix is given to both types of CHF

f CHF is the inability of the heart to pump blood towards systemic circulation

f **RIGHT-SIDED CHF** – the #1 cause is **TRICUSPID VALVE STENOSIS**

f **LEFT-SIDED CHF** – the #1 cause is **MITRAL VALVE STENOSIS**



## Left-Sided Heart Failure (LSHF)

f Can be caused by Rheumatic Heart Disease:

▫Tonsillitis → strep bacteria migrate to mitral valve → RHEUMATIC HEART DISEASE → mitral stenosis → LSHF

f SSx of LSHF:

▫Most of the symptoms of LSHF are **RESPIRATORY**:

- Pulmonary edema and congestion

- Dyspnea:

- ✓ Paroxysmal nocturnal dyspnea – difficulty of breathing at nighttime

- ☑Nursing intervention: give patient 2 to 3 pillows

- ✓ Orthopnea – difficulty of breathing while lying down

- ☑Nursing intervention: Position patient High-Fowlers or Orthopneic position

- Productive cough, blood-tinged sputum

- Frothy salivation – alveolar fluid in the mouth

- Abnormal breath sounds: Rales (crackles) and bronchial wheezing

▫Cardiovascular symptoms:

- Pulsus alternans* – weak pulse followed by strong bounding pulse

- ✓ Can lead to arrhythmia

- Point of Maximal Impulse (PMI) is displaced laterally

- ✓ Fluid in the lungs pushes heart to one side

- ✓ Check apical pulse to determine the location of PMI
- ✓ Normal PMI is at the left midclavicular line between the 4<sup>th</sup> and 5<sup>th</sup> intercostals space (below the nipple).
- ☑ Note: if the PMI is displaced vertically (lower than normal) then the patient has *cardiomegaly*.

- S<sub>3</sub> extra heart sound (Ventricular gallop)
- ✓ Note: S<sub>4</sub> sound occurs in *myocardial infarction*

- Anorexia and body malaise
- Cyanosis

## Right-Sided Heart Failure (RSHF)

f SSx of RSHF:

- Venous congestion – blood goes back to superior & inferior vena cava
- **Jugular vein distention**
- Pitting edema
- Ascites – fluid in the peritoneal cavity
- Weight gain
- Hepatosplenomegaly
- Jaundice
- Pruritus and urticaria
- Esophageal varices
- Generalized body malaise and anorexia

## Lithium

f Antimanic agent – indicated for Bipolar Disorder

f Mechanism: decreases acetylcholine (Ach), norepinephrine and serotonin

f SSx of Lithium toxicity:

- Anorexia
- Diarrhea and Dehydration, therefore **force fluids**
- Hypothyroidism
- Fine tremors

f Nursing management for lithium:

- Force fluids
- Increase Sodium intake to 4 to 10 g daily

## Aminophylline

f Indicated for Chronic Obstructive Pulmonary Disease (COPD)

f Bronchodilators dilate the bronchial tree, thereby allowing more air to enter the lungs

f SSx of aminophylline toxicity:

- Tachycardia
- Palpitations
- **CNS excitability**: irritability, agitation, restlessness and tremors

f Nursing management for aminophylline:

- AVOID COFFEE – will aggravate CNS excitability

## 4 Types of COPD

Bronchitis	Asthma	Bronchiectasis	Emphysema
“blue-bloater” – cyanosis with edema			“pink-puffer” – acyanotic with compensatory purselip breathing
	Pathognomonic Sign:	Hemoptysis – blood	Pathognomonic Sign:

	Wheezing on expiration	in cough	Barrel-chest
	Reversible		Irreversible
			Terminal stage
			Can lead to pneumothorax (air in pleural space), CO <sub>2</sub> narcosis
	Caused by allergic reaction		Caused by allergic reaction
	Hereditary		Hereditary
		Surgery: Pneumonectomy (removal of 1 lung)	
		Diagnosis: Bronchoscopy	
Can lead to Cor Pulmonale (enlarged right ventricle)			Can lead to Cor Pulmonale

f For all types of COPD:

- #1 cause is **smoking**
- Expect doctor to prescribe bronchodilators
- LOW-FLOW OXYGEN only so as not to suppress the respiratory drive

## Dilantin

f Dilantin is an anticonvulsant – indicated for seizure disorders

f *Seizure* is the term for the first convulsive attack that an individual experiences

f *Epilepsy* is the term for the second or succeeding attacks

f Febrile seizures are normal for children below 5 y.o. (febrile seizures are outgrown)

f Nursing management when giving Dilantin:

- Only mixed with plain NSS to prevent formation of crystals/precipitates
- Given via “sandwich method” (give NSS → give dilantin → give NSS)
- Instruct client to avoid taking alcohol (Dilantin + alcohol can lead to severe CNS depression)

f SSx of Dilantin toxicity:

- **GINGIVAL HYPERPLASIA** (important!)
  - Remember to provide oral care to patient receiving Dilantin:
    - ✓ use soft bristle toothbrush
    - ✓ instruct client to massage gums
- Hairy tongue
- Ataxia – positive Romberg’s test
- Nystagmus (abnormal movement of the eyes)

## Acetaminophen [a.k.a Paracetamol]

f Acetaminophen is the treatment of choice for osteoarthritis

▫ Pathognomonic sign of osteoarthritis: **HEBERDEN’S NODES** (knobs on finger joints)

▫ Note: osteoarthritis is localized while rheumatoid arthritis is systemic.

f Sx of acetaminophen toxicity:

- Hepatotoxicity – therefore monitor **LIVER ENZYMES**:
  - SGPT (serum glutamic pyruvate transaminase), also called ALT (alanine transaminase)
  - SGOT (serum glutamic oxaloacetic transaminase), also called AST (aspartate transaminase)
- Nephrotoxicity – therefore monitor **Blood Urea Nitrogen (BUN)** and **Creatinine**
  - Normal BUN is 10 to 20 mg/dL
  - Normal Creatinine is 0.8 to 1.0 mg/dL



- ✓Creatinine is the most sensitive indicator of kidney function
- Hypoglycemia
  - SSx of Hypoglycemia (Remember **T-I-R-E-D**):
    - ✓Tremors, Tachycardia
    - ✓Irritability
    - ✓Restlessness
    - ✓Extreme Fatigue
    - ✓Diaphoresis, Depression

f The antidote for acetaminophen overdose is ACETYLCYSTEINE [Mucomyst]

- Note: Acetylcysteine is a *mucoytic* used for respiratory conditions with excess and thick mucus production (emphysema, bronchitis, bronchiectasis)
- Oral acetylcysteine comes in granule form and is orange-flavored (like powdered juice)
- Acetylcysteine causes outpouring secretions.
  - N.Mgt. for administering acetylcysteine: prepare suction apparatus

The following are symptoms of hypoglycemia EXCEPT:

- A. extreme thirst
- B. nightmares
- C. weakness
- D. diaphoresis

The correct answer is A. Options B, C and D are all symptoms of hypoglycemia: nightmares due to depression, weakness (extreme fatigue) and diaphoresis. Option A is one of the 3 P's of hyperglycemia: Polydipsia [excessive thirst], Polyphagia [excessive hunger], and Polyuria [excess urine output].



## Parkinson's Disease

f A chronic progressive disorder of the CNS characterized by degeneration of DOPAMINE-producing cells in the substantia nigra of the midbrain and basal ganglia.

f Parkinson's disease is *irreversible*

f Predisposing factors:

- Lead and carbon monoxide poisoning
- Arteriosclerosis – hardening of an artery
- Hypoxia
- Encephalitis
- High doses of drugs:
  - Antihypertensives: Reserpine [Serpasil] and Methyldopa [Aldomet]
  - Anti-psychotic agents: Haloperidol [Haldol] and Phenothiazines
    - ✓Recall: Anti-hypertensives have PNS effects, Anti-psychotics have SNS effects
  - Side effects of Reserpine: **DEPRESSION** and **BREAST CANCER**
  - Note: Reserpine is the only antihypertensive with a major side effect of **depression** → patient becomes SUICIDAL
  - Nursing management for suicidal patients: PROMOTE SAFETY (remove equipment that patient can use to harm himself)

### Triad causes of suicide:

1. Loss of spouse
2. Loss of job
3. Aloneness

- Nursing management for suicidal patients: DIRECT APPROACH
  - ✓Maintain patient on close supervision

In the healthcare setting, suicide attempts most commonly occur:

- A. Monday 1 – 3 am
- B. Sunday 6 – 9 am
- C. Saturday 1 – 3 am
- D. Friday 6 – 9 am

The correct answer is C. Suicide attempts most commonly occur on weekends and early mornings when the nursing staff is not around.

▪ Reserpine is also linked to the development of BREAST CANCER.

#### ONCOLOGIC NURSING

f The most frequent types of cancer in women (in order):

1. Breast
2. Cervical
3. Ovarian
4. Uterine

f The most frequent types of cancer in men (in order):

1. Bronchogenic (lung)
2. Hepatic (liver)
3. Prostate – for men 40 y.o. and above
4. Testicular – for men 30 y.o. and above
  - 3 L's of testicular cancer:
    - ✓ Large
    - ✓ Lumped
    - ✓ Loaded (heavy)

The most common preferred treatment for cancer is

- A. chemotherapy
- B. radiation therapy
- C. surgery
- D. bone marrow transplant

The correct answer is C. If the cancer is treatable by surgery, it is preferred over other treatments that have multiple side effects (Options A and B). Option D is a specific treatment for leukemia that is not applicable to other types of cancer.

Anyway, back to Parkinson's...

f SSx of **Parkinson's disease**:

- Early sign: PILL-ROLLING TREMORS – pathognomonic sign of Parkinson's
- Second sign: BRADYKINESIA (slowness of movement)
  - "cogwheel" rigidity – intermittent jerking movement
  - Stooped posture
  - Shuffling Gait, Propulsive Gait

f SSx of **Parkinson's disease** (continued):

- Overfatigue
- Mask-like facial expression
- Decreased blinking of the eyes
- Difficulty in arising from sitting position
- Monotone speech
- Mood: Lability (depressed) → prone to suicide, therefore PROMOTE SAFETY

- Increased salivation (drooling)
  - Prepare suction app at bedside
- Autonomic changes:
  - Increased sweating and lacrimation
  - Seborrhea (oversecretion of sebaceous gland)
  - Decreased sexual capacity

#### f **Stages of Parkinson's Disease**

- I. Unilateral flexion of upper extremities
- II. Shuffling gait
- III. Progressive difficulty in ambulating
- IV. Progressive weakness
- V. Disability = last stage

#### f **Nursing management for Parkinson's**

▫Rx Anti-Parkinson agents:

##### ▫Levodopa (L-dopa) [Larodopa] – **short-acting anti-parkinson**

- ✓Mechanism: increases levels of dopamine
- ✓Side effects:
  - ☑GIT irritation (nausea and vomiting)
  - ☑**ORTHOSTATIC HYPOTENSION** – always asked in the board exam!
  - ☑Arrhythmia
  - ☑Hallucination
  - ☑Confusion
- ✓Contraindications of L-dopa
  - ☑Not given to clients with glaucoma
  - ☑Not given to patients taking MAO inhibitors (tricyclic antidepressants)
    - The MAO inhibitors are Marplan, Nardil and Parnate
    - Patients taking MAO inhibitors should be instructed to avoid foods rich in Tyramine (cheese, beer, wine, avocado) because MAOIs + Tyramine = **Hypertensive crisis** (severe hpn causing organ damage)
- ✓Nursing management for L-dopa
  - ☑Best given with meals to avoid GIT irritation
  - ☑Inform client that his urine and stool may be darkened
  - ☑Instruct client to avoid foods rich in Vit B<sub>6</sub> (Pyridoxine): cereals, green leafy vegetables and organ meats
    - Pyridoxine reverses the therapeutic effect of levodopa
      - Note: Vit B<sub>6</sub> intake should be increased for patients taking Isoniazid (INH) to counter INH side-effect of *peripheral neuritis*

##### ▫Carbidopa [Sinemet] – **long-acting anti-parkinson**

- ✓Mechanism: same as levodopa
- ✓Side effects:
  - ☑Hypokinesia
  - ☑Hyperkinesias
  - ☑Psychiatric symptoms: EXTRA-PYRAMIDAL SYMPTOMS

##### ▫Amantadine HCl [Symmetrel]

- ✓Mechanism: same as levodopa
- ✓Side effects:
  - ☑Tremors
  - ☑Rigidity
  - ☑Bradykinesia

▫Rx for Parkinson's (continued):

##### ▫Anticholinergics: [Artane] and [Cogentin]

- ✓Anticholinergics are given to relieve tremors

Anti-Parkinsonians	
1.	Larodopa
2.	Sinemet
3.	Symmetrel
4.	Artane and Cogentin
5.	Benadryl
6.	Parlodel

- ✓Mechanism of action: inhibits acetylcholine
- ✓Side-effects: SNS effects
- Antihistamines:** Diphenhydramine [Benadryl]
  - ✓Antihistamines also relieve tremors
  - ✓Side effect for adults: drowsiness
    - ☑Patient should avoid driving and operating machinery
  - ✓Side effect for children: CNS excitability – hyperactivity (paradoxical effect for young children < 2 y.o.)
- Dopamine agonists:** Bromocriptine [Parlodel]
  - ✓Relieves tremors, rigidity and bradykinesia
  - ✓Side-effect: Respiratory depression, therefore CHECK RR
- Maintain siderails, to prevent injury related to falls
- Prevent complications of immobility: Turn to side q 2, q 1 if elderly
- Diet should be low-protein in AM, high-protein in PM (give milk before bedtime)
  - High-protein diet induces sleep (Tryptophan is a precursor to melatonin, the sleep hormone)
- Increase oral fluid intake and high-fiber diet to prevent constipation
  - Increase intake of bran and psyllium; use bulk-forming laxatives [Metamucil]
- Assist in ambulation
- Safety precautions: Patient should wear flat rubber shoes, and use grab bars
- Assist in surgical procedure: STEREOTAXIC THALAMOTOMY
  - A portion of the thalamus is destroyed to reduce tremors
  - Complications of the procedure:
    - ✓Subarachnoid hemorrhage
    - ✓Encephalitis
    - ✓Aneurysm

What is the goal collaboratively made by the nurse, physician, physical therapist and nutritionist for a patient with Parkinson's disease?

- A. Maintain joint flexibility
- B. Build muscle strength
- C. Improve muscle endurance
- D. Reduce ataxia

The correct answer is A. Because of the degenerative nature of Parkinson's, it is not possible for the patient to perform exercises that build muscles or increase endurance (eliminate Options B and C). Option D is irrelevant; ataxia is a symptom of Multiple Sclerosis, not Parkinson's.

The client with Parkinson's disease is being switched from levodopa to carbidopa. What complication would arise from the prescription change and dosage adjustment?

- A. euphoria
- B. jaundice
- C. v/s fluctuation
- D. symptoms of diabetes

The correct answer is C. Recall that a side-effect of levodopa is orthostatic hypotension, which is a sudden decrease in blood pressure that occurs when changing from lying position to standing.

A nursing aid is assisting a Parkinson's patient during meal time. Which of the following actions by the nursing aid is inappropriate?

- A. Allowing the patient to cut his own food
- B. Placing the patient upright
- C. Filling the coffee cup half-full
- D. Setting limits on the length of mealtime

The correct answer is D. A patient with Parkinson's has bradykinesia (slowness of movement), thus it is inappropriate to rush the patient with meals.

Note: Allowing the patient to cut his own food (Option A) does not necessarily require the use of a metal knife (remember: do not add details to the question). The patient should be allowed to perform activities that he can do independently to maintain his self-esteem.

## Meningitis

f Inflammation of the meninges

f The meninges is a three-fold membrane that covers the brain and spinal cord.

▫Function of the meninges: support and protection, nourishment and blood supply

▫3 layers of the meninges:

▪**Dura matter** – outermost

✓Subdural space – between dura and arachnoid matter

▪**Arachnoid matter** – middle

✓Subarachnoid space – between arachnoid and pia matter

☑The subarachnoid space is where CSF circulates

☑The subarachnoid space between L3 and L4 is the site for lumbar puncture.

▪**Pia matter** – innermost

f Etiologic agents for meningitis:

▫**Meningococcus** – most dangerous cause of meningitis

▫**Pneumococcus**

▫**Streptococcus** – causes adult meningitis

▫**Haemophilus influenzae** – causes pediatric meningitis

f The mode of transmission of meningitis is AIRBORNE via droplet nuclei.

▫Transmitted through coughing, talking, sneezing, kissing

▫Not transmitted through sexual contact

### Diagnostic Tests for Meningitis:

f **LUMBAR PUNCTURE** (spinal tap) – diagnostic procedure for meningitis

▫A hollow needle is inserted into the subarachnoid space to obtain a sample of cerebrospinal fluid

▫**Nursing management before LP:**

▪Secure informed consent and explain the procedure to the patient:

✓Note: All surgeries should be explained by the doctor, but all diagnostic procedures should be explained by the nurse!!!

▪Empty bladder and bowel to promote comfort.

▪Encourage client to arch his back to enable the physician to clearly visualize L<sub>3</sub> and L<sub>4</sub>.

▫**Nursing management after LP:**

▪Place client **flat on bed** for 12 to 24 hours after the procedure to prevent **spinal headache** and leakage of CSF.

✓Spinal headache is due to decreased CSF pressure (similar to orthostatic hypotension).

▪Force fluids to replace lost CSF

### SSx of Meningitis

f Headache, photophobia, fever and chills, anorexia, weight loss, generalized body malaise

f **INCREASED ICP** → projectile vomiting, decorticate & decerebrate posturing

f **Signs of meningeal irritation:**

▫**Nuchal rigidity** (stiff neck) is the initial sign of meningitis.

▫**Opisthotonus** (hyperextension of head and neck) is the second sign.

f **Pathognomonic signs of meningitis:**

▫**Kernig's sign** – leg pain (severe pain is felt upon straightening the leg when the thigh is flexed)

▫**Brudzinski's sign** – neck pain (severe)

- Check the puncture site for discomfort, discoloration and leakage to tissues
- Assess for movement and sensation of extremities to determine if the procedure caused any nerve damage.

▫**If the patient has meningitis:**

- CSF analysis would reveal elevated protein and WBC, decreased glucose, increased CSF opening pressure (normal CSF pressure is 50 – 160 mmHg), and (+) bacterial culture

f **Complete blood count** (CBC) reveals *Leukocytosis* (increased WBC)

Notes on Hematology:

	Increased	Decreased
<b>RBC</b>	<i>Polycythemia</i>	<i>Anemia</i>
<b>WBC</b>	<i>Leukocytosis</i>	<i>Leukopenia</i>
<b>Platelets</b>	<i>Thrombocytosis</i>	<i>Thrombocytopenia</i>

f NDx for patient with Anemia: Activity Intolerance; NMgt is to place the patient on complete bed rest and administer O<sub>2</sub>.

f Polycythemia → agglutination → thrombosis → HYPERTENSIVE STROKE

▫Initial sign of hpn stroke is headache.

▫Late sign is pruritus/itchiness due to abnormal histamine metabolism

f Thrombocytopenia: decreased platelets → bleeding → hemorrhage

▫Side-effects of platelet dysfunction:

- Eccymosis
- Petechiae/purpura
- Oozing of blood from puncture site.

▫NMgt for thrombocytopenia: Avoid parenteral injections

▫Note: Platelets depletion happens in Disseminated Intravascular Coagulation → treated by heparin

f Leukocytosis leads to increased susceptibility to infections, so place the patient on REVERSE ISOLATION (to protect the patient).

f Patients with infectious diseases are placed on STRICT ISOLATION (to protect other patients).

Identify the type of isolation for clients with the following conditions:

- A. Cushing's Syndrome
- B. Aplastic anemia
- C. Cancer (any type)
- D. Prolonged use of steroids
- E. AIDS
- F. Post liver transplant
- G. Typhoid fever
- H. Hepatitis A
- I. Measles
- J. Mumps
- K. Pneumonia
- L. PTB
- M. Diphtheria
- N. Meningitis
- O. Asthma

A to F: REVERSE ISOLATION, because the patient has an illness that depresses the immune system, or is receiving immunosuppressive drugs.

G to H: ENTERIC ISOLATION, because these illnesses are transmitted via a feco-oral route.

I to M: STRICT ISOLATION, because these illnesses are transmitted airborne or droplet

O: none, a patient with asthma does not need to be isolated.

### **Nursing Management for Meningitis:**

f Administer Rx:

- Broad spectrum antibiotics (Penicillin)
- Analgesics
- Antipyretics

f Institute strict respiratory isolation 24 hours after initiation of antibiotic therapy.

f Comfortable and dark environment

f Monitor v/s, I&O and neurocheck

f Maintain fluid and electrolyte balance

f Prevent complications of immobility

f Institute measures to prevent inc ICP

Review: Adrenal Gland

### **Hormones of the Adrenal Cortex:**

f **S**ugar: Glucocorticoids (e.g. cortisol) control glucose metabolism

f **S**alt: Mineralocorticoids (e.g. aldosterone) promote sodium and water reabsorption and potassium excretion

f **S**ex: Androgenic hormones (testosterone, estrogen, progesterone) promote development of secondary sexual char

### **Diseases of the Adrenal Gland:**

Addison's disease Hyposecretion of adrenal hormones	Cushing's syndrome Hypersecretion of adrenal hormones
<p>f Sugar ↓: hypoglycemia</p> <p>f Salt ↓: hyponatremia, with hyperkalemia</p> <p>f Sex ↓: decreased libido</p>	<p>f Sugar ↑: hyperglycemia</p> <p>f Salt ↑: hypernatremia, with hypokalemia</p> <p>f Sex ↑: hirsutism, acne, striae</p>
Hypoglycemia (T-I-R-E-D)	Hyperglycemia (P-P-P)
<p>f Tremors/Tachycardia</p> <p>f Irritability</p> <p>f Restlessness</p> <p>f Extreme fatigue</p> <p>f Diaphoresis/Depression</p>	<p>f Polyuria</p> <p>f Polydypsia</p> <p>f Polyphagia</p> <p>Note: DM is a complication of Cushing's</p>
f Decreased tolerance to stress due to	f Increased steroids cause decreased WBC

decreased steroids → can lead to ADDISONIAN CRISIS	(Leukopenia) → IMMUNODEFICIENCY Note: Steroids takers (athletes, body builders) experience ssx of Cushing's
<b>Hyponatremia</b> f Hypotension f Dehydration f Weight Loss	<b>Hypertremia with Fluid Volume Excess</b> f Hypertension f Edema f Weight Gain f Pathognomonic Sx of Cushings: ▫ Moon-face ▫ Buffalo hump ▫ Obese trunks ▫ Pendulous Abdomen ▫ Thin extremities
<b>Hyperkalemia</b> f Irritability, agitation f Diarrhea, abdominal cramps f Peak T waves → arrhythmia	<b>Hypokalemia</b> f Weakness, fatigue f Constipation f Prominent U wave → can also lead to arrhythmia
f Decreased sexual urge and loss of pubic and axillary hair	f Hirsutism, acne and striae due to increased sex hormones
f Pathognomonic sx: Bronze-like skin ▫ Decreased cortisol causes pituitary gland to secrete Melanocyte-stimulating hormone	f Other signs: f Depression f Easy bruising f Increased masculinity in women
Management: f Steroids ( $\frac{2}{3}$ dose in AM and $\frac{1}{3}$ dose in PM)	Management: f Potassium-sparing diuretics: Aldactone [Spironolactone] – promotes excretion of sodium while retaining potassium f DO NOT GIVE LASIX f Limit fluids f Increase potassium in the diet

### **Nursing Management for Meningitis** (continued):

- f Provide client Health teaching and discharge planning
- f Diet: High carb, high protein, high cal with small freq feedings
- f Prevent complications: HYDROCEPHALUS and NERVE DEAFNESS
  - Patient with meningitis should be referred to an audiologist for testing.
- f Rehabilitation for residual deficits: mental retardation or delay in psychomotor development

During the acute stage of meningitis, a 3-year old patient is restless and irritable. Which nursing intervention is most appropriate?

- A. Limit conversations with the child
- B. Keep extraneous noise to a minimum
- C. Allow child to play in the bathtub
- D. Perform treatments quickly

The correct answer is Option B, which will minimize the danger of increased ICP.

### **Myasthenia Gravis**

- f A neurovascular disorder characterized by a disturbance in the transmission of impulse from nerve to muscle cells at the neuromuscular junction leading to DESCENDING MUSCLE PARALYSIS.
- f More common in women aged 20 to 40.
- f Etiology: idiopathic, related to autoimmune



▫For unknown reasons, the body is producing *cholinesterase* which destroys acetylcholine, the neurotransmitter for muscle movement, leading to muscle weakness.

f SSx:

▫Initial Sign: PTOSIS (drooping of upper eyelid)

▫Diplopia

▫Masklike facial expression

▫Dysphagia

▫Hoarseness

▫Respiratory muscle weakness → respiratory arrest (Prepare tracheostomy set at bedside)

▫Extreme muscle weakness especially during activity or exertion

f Dx test:

▫TENSILON TEST

▪Tensilon (Edrophonium HCl) is a short acting anti-cholinesterase

▪Tensilon is administered via IV push

▪If patient has MG, symptoms will be temporarily relieved (for 5 to 10 minutes)

▫CSF analysis reveals elevated cholinesterase levels

▫