**Endocrine System**

**Study Guide (QUIZ # 2)**

**Prof Notes Quiz 2**

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**Terms**

**euthyroid -** When the thyroid is functioning appropriately

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1. Describe the pathophysiology**, clinical manifestations (signs and symptoms)**, **diagnostic/lab** tests, medications, nursing diagnoses, and nursing interventions for the following endocrine disorders:
   **Info for hyper/hypothyroid is so much!! I suggest you watch this video:**
   Hyperthyroidism vs. Hypothyroid RN LPN NCLEX
   **a. Hyperthyroidism**
      a. Pathophysiology:
         i. A clinical syndrome caused by excessive circulating thyroid hormones. Results in an increased production of T3 and T4, which leads to exaggerated metabolic processes.
      b. Signs and Symptoms:
         i. Symptoms include weight loss, nervousness, shortness of breath
         ii. Objective data includes VS changes, increased BP, tachycardia, hair becomes fine and brittle, diarrhea
         iii. irritability, hyperactivity, emotional lability, decreased attention span, change in mental or emotional status, Weakness, easy fatigability, exercise intolerance ,Muscle weakness, Heat intolerance, Weight change (usually loss) and increased appetite, Insomnia and interrupted sleep, Frequent stools, Menstrual irregularities (amenorrhea or decreased

menstrual flow) and decreased fertility, Libido decreases as the condition progresses

iv. Hair thins and develops a fine, soft, silky texture

v. Tremor, hyperkinesia, hyperreflexia, Excessive tearing and bloodshot appearance of eyes, Vision changes, Goiter.

**c. NURSING CARE**

i. Minimize the client's energy expenditure by assisting with activities as necessary and by encouraging the client to alternate periods of activity with rest.

ii. Promote a calm environment.

iii. Monitor mental status and decision-making ability. Intervene as needed to ensure safety.

iv. Monitor nutritional status. Provide increased calories, protein, and other nutritional support as necessary.

v. Monitor I&O and the client's weight.

vi. Provide eye protection (patches, eye lubricant, tape to close eyelids) for a client who has exophthalmos.

vii. Monitor vital signs and hemodynamic parameters.

viii. Reduce room temperature.

ix. Provide cool shower/sponge bath to promote comfort.

x. Provide linen changes as necessary.

xi. Report a temperature increase of 1° F or more to the provider immediately, because this is indicative of an impending thyroid crisis.

xii. Monitor ECG for dysrhythmias.

xiii. Reinforce with the family that any abrupt changes in the client's behavior are likely disease related and should subside with antithyroid therapy.

xiv. Avoid excessive palpation of the thyroid gland.

xv. Administer antithyroid medications.

**d. Diagnostic/Labs:**

i. T3 and T4 levels are measured to diagnose

**ii. LABORATORY TESTS**

iii. **Blood TSH level:** ***Decreased*** in the presence of Graves' disease

iv. **Free T4 index, T4 (total), T3 :** ***Elevated*** in the presence of disease

v. **Thyroid-stimulating immunoglobulins:** ***Elevated*** in Graves' disease, normal in other types of hyperthyroidism

vi.

**vii. DIAGNOSTIC PROCEDURES**

viii. **Ultrasound:** Used to produce images of the thyroid gland and surrounding tissue

ix. **Electrocardiogram:** Used to evaluate the effects of excessive thyroid hormone on the heart (tachycardia, dysrhythmias); ECG changes include atrial fibrillation and changes in the P and T waveforms.

x. **Thyroid scan:** Nuclear medicine test

xi. This test clarifies size and function of the gland.

xii. The uptake of a radioactive isotope, administered orally 6 to 24 hr prior to the test, is measured.

xiii. An elevated uptake is indicative of hyperthyroidism.

**xiv. NURSING ACTIONS**

xv. Confirm that the client is not pregnant prior to the scan.

xvi. Take a medication history to determine the use of iodides or medications that could affect results (oral contraceptives, vitamins).

xvii. Inform the provider if the client received any iodine contrast recently or had other radiography testing.

**xviii. CLIENT EDUCATION:**

xix. Some foods and medications need to be avoided before testing, sometimes up to 6 weeks.

xx. Follow directions from the provider.

**e. Medications:**

***i. Thionamides***

ii. Methimazole and propylthiouracil inhibit the production of thyroid hormone.

iii. Thionamides are used to treat Graves' disease, as an adjunct to radioactive iodine therapy, to decrease hormone levels in preparation for surgery and to

iv. treat thyrotoxicosis.

**v. NURSING ACTIONS**

vi. Monitor for manifestations of hypothyroidism (intolerance to cold, edema, bradycardia, increase in weight, depression).

vii. Monitor CBC for leukopenia or thrombocytopenia.

viii. Monitor for indications of hepatotoxicity.

ix. Monitor T3 and T4 levels prior to and during therapy.

x. CLIENT EDUCATION

xi. Take the medication with meals in divided doses at regular intervals to maintain an even therapeutic medication level. Do not stop taking abruptly.

xii. Report fever, sore throat, jaundice, or bruising to the provider.

xiii. Follow the provider's instructions about dietary intake of iodine.

xiv. Methimazole should be stopped (under guidance from the provider) if pregnancy occurs.

***xv. Beta adrenergic blockers***

xvi. Propranolol, atenolol, and metoprolol treat sympathetic nervous system effects (tachycardia, palpitations).

**xvii. NURSING ACTIONS**

xviii. Monitor blood pressure, heart rate, and ECG.

xix. Monitor for hypoglycemia in clients who have diabetes mellitus.

**xx. CLIENT EDUCATION**

xxi. Change positions slowly, because the medication can cause dizziness.

xxii. Check pulse prior to taking each dose. Notify the provider if heart rate falls below 60/min.

xxiii. Discontinue the medication only on the advice of the provider.

***xxiv. Iodine solutions***

xxv. Lugol's solution is a nonradioactive 5% elemental iodine in 10% potassium iodine that inhibits the release of thyroid hormone. These medications are for short-term use only (taken for 10 days prior to surgery).

**xxvi. CLIENT EDUCATION**

xxvii. Take iodine solution 1 hr after an antithyroid medication.

xxviii. These medications should not be used during pregnancy.

xxix. Mix the medication solution with juice or other liquid to mask the taste. Use a straw to avoid staining teeth. Take with food.

xxx. These medications pass into breast milk and can have undesirable effects on a nursing infant.

xxxi. Notify the provider of fever, sore throat, metallic taste, and mouth ulcers.

**b. Hypothyroidism**

a. Pathophysiology:

i. A state that occurs when the thyroid fails to secrete sufficient

hormones

ii. A condition in which there is an inadequate amount of circulating thyroid hormones triiodothyronine (T3) and thyroxine (T4), causing a decrease in metabolic rate that affects all body systems

iii. **Thyroid function can decline slowly or rapidly (myxedema).**

iv. Often undiagnosed in older adult clients

v. **Primary hypothyroidism** stems from dysfunction of the thyroid gland. This is the most common type of hypothyroidism and is caused by the following.

vi. Disease: autoimmune thyroiditis

vii. Use of medications that decrease the synthesis of thyroid hormone

viii. Loss of the thyroid gland: iodine deficiency, radioactive iodine or radiation treatment, surgical removal of the gland

ix. **Congenital hypothyroidism** is a severe lack of TH in utero, leading to growth failure (**cretinism**).

b. **RISK FACTORS**

i. Females 30 to 60 years old are affected 7 to 10 times more often than males

ii. Use of certain medications (lithium, amiodarone)

iii. Inadequate intake of iodine

iv. Radiation therapy to the head and neck

c. **Signs and Symptoms**

i. Fatigue, lethargy (sleeping up to 16 hr/day)

ii. Irritability

iii. Intolerance to cold

iv. Constipation

v. Weight gain without an increase in caloric intake

vi. Pallor

vii. Thick, brittle fingernails

viii. Depression and apathy

ix. Joint or muscle pain

x. Bradycardia, hypotension, dysrhythmias

xi. Slow thought processes and speech

xii. Hypoventilation, pleural effusion

xiii. Thickening of the skin

xiv. Hair loss

xv. Thinning of hair on the eyebrows

xvi. Dry, flaky skin, brittle nails

xvii. Swelling in face and tongue, hands, and feet (myxedema [non-pitting, mucinous edema])

xviii. Decreased acuity of taste and smell

xix. Hoarse, raspy speech due to myxedema affecting the larynx

xx. GI symptoms resulting from decreased peristalsis, possibly leading to paralytic ileus

xxi. Abnormal menstrual periods (menorrhagia/amenorrhea)

xxii. Many individuals who have mild hypothyroidism are frequently undiagnosed, but the hormone disturbance can contribute to an acceleration of atherosclerosis or complications of medical treatment (intraoperative hypotension, cardiac complications following surgery)

xxiii. Delayed physical and mental growth in children

**d. LABORATORY TESTS**

i. **T3, T4:** Decreased

ii. **Blood thyroid-stimulating hormone (TSH)**

iii. Increased with primary hypothyroidism

iv. Decreased or within the expected reference range in secondary hypothyroidism

v. **Blood cholesterol:** Increased

vi. **Antithyroid antibodies:** Present in some cases

e. **DIAGNOSTIC PROCEDURES**

i. **Thyroid scan:** Clients who have hypothyroidism have a low uptake of the radioactive preparation.

ii. **ECG:** Sinus bradycardia, dysrhythmias

f. **NURSING CARE**

i. Monitor for cardiovascular changes (low blood pressure, bradycardia, dysrhythmias). Monitor for chest pain for clients who have chronic hypothyroidism because it can lead to cardiovascular disease. Check for peripheral edema.

ii. Monitor the client's weight.

iii. If mental status is compromised, orient the client periodically, and provide safety measures.

iv. Increase the client's activity level gradually and provide frequent rest periods to avoid fatigue and decrease myocardial oxygen demands.

v. Apply anti-embolism stockings, and elevate the client's legs to assist venous return

vi. Monitor respiratory status including rate, depth, pattern, oximetry, and arterial blood gases. Encourage the client to cough and breathe deeply to prevent pulmonary complications.

vii. Consult with a dietitian. Provide a low-calorie, high-bulk diet, and encourage fluids and activity to prevent constipation and

promote weight loss.

viii. Administer cathartics and stool softeners as needed. Avoid fiber laxatives, which interfere with absorption of levothyroxine.

ix. Provide meticulous skin care. Turn and reposition the client every 2 hr as prescribed bed rest. Use alcohol-free skin care products and an emollient lotion after bathing

x. Provide extra clothing and blankets for clients who have decreased cold tolerance. Dress the client in layers, adjust room temperature, and encourage intake of warm liquids if possible.

xi. Caution the client against using electric blankets or other heating devices because the combination of vasodilation, decreased sensation, and decreased alertness can result in unrecognized burns.

xii. Encourage the client to verbalize feelings and fears about changes in body image. Return to the euthyroid (normal thyroid gland function) state takes time. Reassure the client that most physical manifestations are reversible.

xiii. Use caution with medications due to alteration in metabolism.

xiv. CNS depressants (barbiturates or sedatives) are used with caution due to the risk of respiratory depression. If prescribed, the dose should be significantly decreased.

xv. Hypothyroidism alters metabolism and excretion of medications. The provider uses caution in prescribing medications to clients who have this condition.

## g. MEDICATIONS

### i. Thyr*oid hormone replacement therapy*

### ii. Levothyroxine

iii. A synthetic thyroid hormone replacement, the most common medication prescribed.

iv. Levothyroxine increases the effects of warfarin and can increase the need for insulin and digoxin.

v. Many other medications can affect the therapeutic effectiveness of levothyroxine.

vi. Use caution when starting thyroid hormone replacement with older adult clients and those who have coronary artery disease to avoid coronary ischemia because of increased oxygen demands of the heart. It is preferable to start with much lower doses and increase gradually.

vii. **NURSING ACTIONS**

viii. Monitor for cardiovascular compromise (chest pain, palpitations, rapid heart rate, shortness of breath).

ix. Inform the client that fiber supplements, calcium, iron, and antacids interfere with absorption. Before taking any over-the-counter medications, the client must consult with the provider.

x. CLIENT EDUCATION

xi. Treatment begins slowly and the dosage will be increased every 2 to 3 weeks until the desired response is obtained. Blood TSH is monitored at scheduled times to ensure correct dosage.

xii. Take the dose prescribed. Do not stop taking the medication or change the dose or brand name.

xiii. Take the medication on an empty stomach, typically 30 to 60 min before breakfast.

xiv. Monitor for and report manifestations of hyperthyroidism (irritability, tremors, tachycardia, palpitations, heat intolerance, rapid weight loss).

xv. Treatment is considered to be lifelong, requiring ongoing medical assessment of thyroid function.

**c. Myxedema**

a. swelling of the skin and underlying tissues giving a waxy consistency, typical of patients with underactive thyroid glands.
b.
c. Myxedema coma
d.
e. Myxedema coma is a life-threatening condition that occurs when hypothyroidism is untreated, poorly managed, or when a stressor (acute illness, surgery, chemotherapy, discontinuing thyroid replacement therapy, use of sedatives/opioids) affects a client who has hypothyroidism.
f.
g. MANIFESTATIONS
    i. Respiratory failure
    ii. Hypotension
    iii. Hypothermia
    iv. Hyponatremia
    v. Hypoglycemia
    vi. Coma
h. NURSING ACTIONS
    i. Treat hypoglycemia with glucose.
    ii. Assist with the administration of corticosteroids.
    iii. Adhere to aspiration precautions.
    iv. Check for possible sources of infection (blood, sputum, urine) that might have precipitated the coma. Treat any underlying illness.

d. Hyperparathyroidism
    a. Overactivity of the parathyroid glands, which increases production of PTH
    b.
    c. The primary clinical manifestation is hypercalcemia
    d.
    e. Assessment findings include skeletal pain, fatigue, weakness, drowsiness, pathologic fractures, dysrhythmias
    f.
    g. Assessed via radiography, lab levels, and history
    h.

i. Usually treated via surgical intervention
j.
k. Nursing interventions are aimed at restoring and maintaining fluid and electrolyte balance
l.
m.

e. Hypoparathyroidism
    a. Occurs when PTH is decreased
    b. Characterized by a decreased serum calcium level and increased serum phosphorus level
    c. May be characterized by
        i. Laryngeal stridor
        ii. Muscle spasms
        iii. Chvostek's sign
        iv. Hypocalcemic tetany
        v. Diagnosis is made by assessing laboratory calcium, PTH, and phosphorus levels
        vi. Medical management is aimed at replacing calcium
        vii. Vitamin D is also given orally
        viii. Patient should be provided education about eating foods that are high in calcium

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2. Discuss the indications/actions, side/adverse effects, and nursing considerations of the following medications:
    a. Levothyroxine

    b. PTU (prophylthiuracil)

**Levothyroxine:**

- For hypothyroidism
    - Thyroid synthetic
- Nursing Considerations
    - Take it in the morning
    - Take the medication on an empty stomach ( 30 - 60 mins before breakfast )

- Monitor for effects of hyperthyroidism | Signs and Symptoms
    - Tachycardia
    - Diarrhea
    - Vision changes
    - Increase in Blood pressure
    - Heat intolerance
    - SOB
    - palpitations

**PTU:**

- For Hyperthyroid
    - Inhibits production of thyroid hormone
- Nursing consideration:
    - Report
        - Fever
        - Sore throat
    - Monitor for hepatotoxicity
        - Damage to the liver
        - Liver filters
    - Signs and symptoms for hepatotoxicity
        - Jaundice
        - Nausea  and Vomiting ( N/V )
- Monitor for effects of hyperthyroidism | Signs and Symptoms
    - Bradycardia
    - Cold intolerance
    - Constipation
- Works if:
    - Bp goes to normal
    - Heart rate goes to normal
    - EVERYTHING GOES BACK TO NORMAL

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3. Discuss the health teaching after a thyroidectomy
    a.

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4. List the complications associated post thyroidectomy.
    a. Hemorrhage
    b. Respiratory distress
    c. Tetany
    d. Laryngeal nerve damage
    e. Thyrotoxicosis (thyroid storm)