وزاره التعليم العالي والبحث العلمي

Nursing Care for Patients with endocrine system disorders

Adult Nursing I

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Lecture Outlines

- The endocrine system
- Diabetes mellitus.
- Hyperthyroidism
- Hypothyroidism

The endocrine system

- The endocrine system is a network of glands that orchestrates several vital body functions. These include:

- Transportation of chemicals across cell membranes
- Growth and development
- Metabolism
- Fluid and electrolyte balance
- Acid-base balance
- Adaptation
- Reproduction

Hormones

- The endocrine system involves the release of chemical transmitter substances known as hormones.
- These substances regulate and integrate body functions by acting on local or distant target sites.
- Hormones are generally produced by the endocrine glands but may also be produced by specialized tissues such as those found in the gastrointestinal (GI) system, the kidney, and white blood cells.

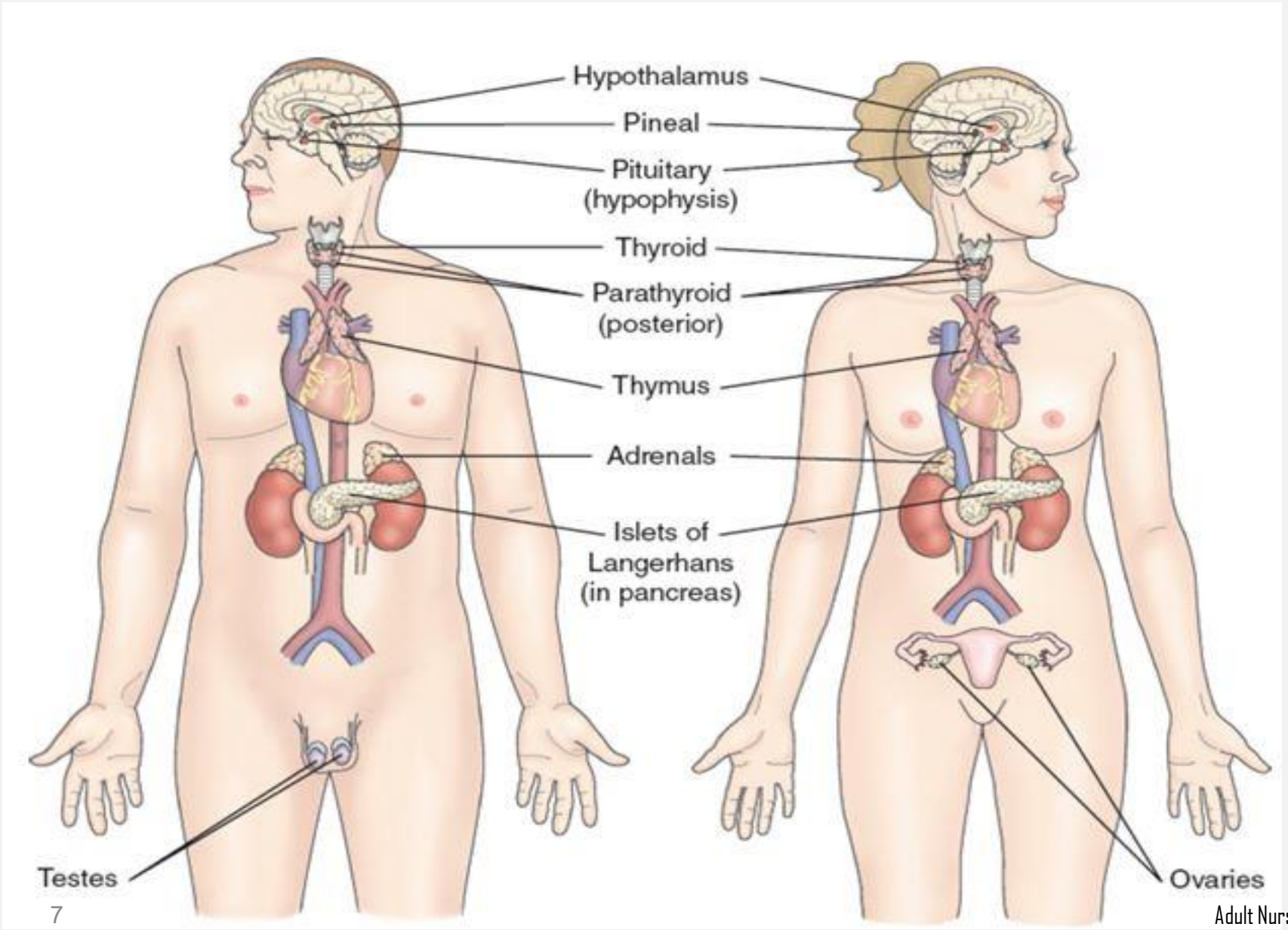
Hormones but not by endocrine gland

- The GI mucosa produces hormones (e.g., gastrin, enterogastrone, secretin, cholecystokinin) that are important in the digestive process.
- The kidneys produce erythropoietin, a hormone that stimulates the bone marrow to produce red blood cells.
- The white blood cells produce cytokines (hormone like proteins) that actively participate in inflammatory and immune responses.

Types of glands

- **Endocrine Glands:**
  - **Definition:** These are ductless glands.
  - **Method of Secretion:** They release **hormones** directly into the bloodstream. The hormones then travel through the blood to reach their specific target cells and tissues throughout the body.
  - **Examples:** Pituitary gland, thyroid gland, adrenal glands, the endocrine part of the pancreas, ovaries, and testes.
- **Exocrine Glands:**
  - **Definition:** These glands have their own ducts (channels).
  - **Method of Secretion:** They secrete their products (such as sweat, saliva, and digestive juices) through these ducts onto a body surface or into a specific cavity (like the gastrointestinal tract).
  - **Examples:** Sweat glands, salivary glands, tear glands, mammary glands, and the exocrine part of the pancreas

Glands of the Endocrine System



Diabetes mellitus

- Diabetes mellitus is a group of metabolic diseases characterized by increased levels of glucose in the blood (hyperglycemia) resulting from defects in insulin secretion, insulin action, or both.
- Diabetes mellitus occurs when the pancreas doesn't make enough or any of the hormone insulin, or when the insulin produced doesn't work effectively. In diabetes, this causes the level of glucose in the blood to be too high.

Insulin

- is a hormone secreted by beta cells, which are one of four types of cells in the islets of Langerhans in the pancreas .
- Insulin is an anabolic, or storage, hormone. When a person eats a meal, insulin secretion increases and moves glucose from the blood into muscle, liver, and fat cells. In those cells, insulin has the following actions:

- Transports and metabolizes glucose for energy
- Stimulates storage of glucose in the liver and muscle (in the form of glycogen)
- Signals the liver to stop the release of glucose
- Enhances storage of dietary fat in adipose tissue
- Accelerates transport of amino acids (derived from dietary protein) into cells
- Inhibits the breakdown of stored glucose, protein, and fat

Types of Diabetes mellitus

- **Type 1 diabetes** is a metabolic disorder characterized by the destruction of the pancreatic beta cells and an absence of insulin production.
- Formerly called insulin-dependent diabetes, or juvenile diabetes.
- Type 1 diabetes (5–10% of all patients with diabetes).
- Onset any age, but usually young (<30 yrs)
- Combined genetic, immunologic, and possibly environmental (e.g., viral) factors are thought to contribute to beta-cell destruction.

Consequences of Insulin Deficiency

- The liver produces more glucose, and glucose from food cannot be properly stored, leading to high blood sugar both when fasting and after meals (hyperglycemia)
- When blood glucose levels exceed the kidneys' ability to reabsorb it (typically 180–200 mg/dL), glucose spills into the urine. This is called glycosuria.
- The excess glucose in the urine pulls water and electrolytes with it, resulting in excessive fluid loss. This process is known as osmotic diuresis.
- In the absence of insulin, the body breaks down fat for energy, which leads to the production of acidic **ketone bodies**. High levels of these ketones can be dangerous

Types of Diabetes mellitus

- **Type 2 diabetes:** a metabolic disorder characterized by the relative deficiency of insulin production and a decreased insulin action and increased insulin resistance (formerly: non–insulin-dependent diabetes, or adult-onset diabetes)
- Type 2 (90–95% of all diabetes: patients with obesity—80% of type 2).
- Type 2 diabetes is most common in people over 30 and those with obesity.
- formerly called adult-onset diabetes, or non–insulin-dependent diabetes)
- DKA does not typically occur in type 2 diabetes. However, uncontrolled type 2 diabetes may lead to another acute problem—hyperglycemic hyperosmolar syndrome (HHS)

Types of Diabetes mellitus

- **Gestational diabetes** is a type of glucose intolerance that begins during pregnancy. It typically develops in the second and third trimesters because of placental hormones that make the body more resistant to insulin.
- Initial management involves dietary changes and monitoring blood glucose.
- Between 70% and 85% of women can manage their blood glucose with diet and lifestyle changes alone.

Types of Diabetes mellitus

- **Latent Autoimmune Diabetes of Adults (LADA)** is a subtype of diabetes in which the progression of autoimmune beta cell destruction in the pancreas is slower than in types 1 and 2 diabetes.
- Patients with LADA are at high risk of becoming insulin dependent.
- Most patients with LADA have at least two of the following:
- age of onset less than 50 years
- body mass index (BMI) less than 25 kg/m2
- history of autoimmune disease
- acute symptoms prior to
- diagnosis, or positive family history of autoimmune disease

Classic clinical manifestations of all types of diabetes include the “three P”:

Classic clinical manifestations of all types of diabetes include the “three P”:

1. polyuria (increased urination)
2. polydipsia, (increased thirst) , occur as a result of the excess loss of fluid associated with osmotic diuresis.
3. polyphagia. (increased appetite) , resulting from the catabolic state induced by insulin deficiency and the breakdown of proteins and fats.

❖ Other symptoms include:

- fatigue and weakness,
- sudden vision changes,
- tingling or numbness in hands or feet,
- dry skin, skin lesions or wounds that are slow to heal, and,
- The onset of type 1 diabetes may also be associated with sudden weight loss or nausea, vomiting, or abdominal pains, if DKA has developed.

Diagnoses

1. The fasting blood glucose (sugar) test is the preferred way to diagnose diabetes. It is done after the person has fasted overnight (at least 8 hours).

- Normal fasting plasma glucose levels are less than 100 milligrams per deciliter (mg/dl).

2. A random blood glucose test can also be used to diagnose diabetes.

- A blood glucose level of 200 mg/dl or higher indicates diabetes.

3. The oral glucose tolerance test. The person fasts overnight (at least eight but not more than 16 hours).
4. Glycohemoglobin test (HbA1c)

- A normal HbA1c is 4% to 6%.
- An HbA1c of 6.5% or higher is diagnostic for diabetes.

Normal and Target Blood Glucose Ranges

Normal Blood Glucose Levels in People Who Do Not Have Diabetes	
Upon waking-fasting	70 to 99 mg/dL
After meals	70 to 140 mg/dL
Target Blood Glucose Levels in People Who Have Diabetes	
Upon waking-fasting	70 to 130 mg/dL
1 to 2 hours after the start of a meal	below 180 mg/dL

Acute Complications of Diabetes

1. Hypoglycemia
2. Hyperglycemia
3. Diabetic Ketoacidosis
4. Hyperosmolar Hyperglycemic State

	Hyperglycemia	Hypoglycemia
Causes	1. Lack of insulin or insulin's ineffectiveness 2. eating too many carbs, illness, stress.	1. Taking too much insulin/medication 2. skipping meals 3. excessive exercise
Symptoms	✓ 3 P(Polyuria, Polydipsia, Polyphagia) ✓ Blurred vision ✓ Headache ✓ Lethargy ✓ Abdominal pain ✓ Ketonuria ✓ Coma	✓ Sweating ✓ Tremor ✓ Tachycardia. ✓ Palpitation ✓ Inability to concentrate. ✓ Headache ✓ Blurred vision ✓ Coma
Treatment	➢ Confirm hypoglycemia with glucose meter (if able). ➢ Confirm hypoglycemia with glucose meter (if able).	➢ 3-4 glucose tablets ➢ Half a cup (4 ounces) of fruit juice ➢ Severe Hypoglycemia require immediate emergency treatment with a **glucagon injection**

Long-Term Complications for of Diabetes

- Retinopathy
- Nephropathy
- Neuropathy
- People with diabetes develop atherosclerosis and arteriosclerosis faster than the general population.
- strokes, heart attacks, and poor circulation in the feet and legs.

Nursing Diagnosis

- Risk for fluid volume deficit related to polyuria and dehydration
- Risk for Unstable Blood Glucose Level
- Deficient knowledge about diabetes self-care skills/information
- Potential self-care deficit related to physical impairments or social factors
- Anxiety related to loss of control, fear of inability to manage diabetes, misinformation related to diabetes, fear of diabetes complications.

Management of Diabetes

Diabetes management has five components:

- Nutritional therapy
- Exercise
- Monitoring Glucose Levels and Ketones
- Pharmacologic Therapy
- Education

Pharmacologic Therapy

A. Short-acting insulins, called regular insulin (marked R on the bottle)

- have an onset of 30 minutes to 1 hour; peak, 2 to 3 hours; and duration, 4 to 6 hours.
- Regular insulin is a clear solution and is usually administered 20 to 30 minutes before a meal, either alone or in combination with a longer-acting insulin.
- Regular insulin is the only insulin approved for IV use. Humulin R, Iletin Regular, and Novolin R are examples of regular insulin.

Pharmacologic Therapy

B. Intermediate-acting insulins, called NPH insulin (neutral protamine Hagedorn) or Lente insulin.

- have an onset of 3 to 4 hours; peak, 4 to 12 hours; and duration, 16 to 20 hours.
- Intermediate-acting insulins, which are similar in their time course of action, appear white and cloudy.
- If NPH or Lente insulin is taken alone, it is not crucial that it be taken 30 minutes before the meal.
- However, it is important that patients eat some food around the time of the onset and peak of these insulins.
- Humulin N, Iletin NPH, and Novolin N are examples of NPH insulins, and Humulin L, Iletin L, and Novolin L are examples of Lente insulins.

Pharmacologic Therapy

C. Long-acting insulin, such as Humulin Ultralente insulin, has a long, slow, sustained action rather than sharp, definite peaks in action. The onset of long-acting insulin is 6 to 8 hours; peak, 12 to 16 hours; and duration, 20 to 30 hours.

Pharmacologic Therapy

Oral antidiabetic agents may be effective for patients who have type 2 diabetes that cannot be treated effectively with MNT and exercise alone Examples

- Sulfonylureas

The sulfonylureas exert their primary action by directly stimulating the pancreas to secrete insulin

- Thiazolidinediones
- Rosiglitazone (Avandia) and pioglitazone (Actos) are oral antidiabetic medications categorized as thiazolidinediones (TZDs). They are indicated for patients with type 2 diabetes who take insulin injections and whose blood glucose control is inadequate. These medications may impair liver function; therefore, liver function studies must be performed

THE THYROID GLAND

- The thyroid gland—the largest endocrine gland—is a butterfly-shaped organ located in the lower neck, anterior to the trachea .
- It consists of two lateral lobes connected by an isthmus.
- The blood flow to the thyroid is very high (about 5 mL/min per gram of thyroid tissue), approximately five times the blood flow to the liver.
- The thyroid gland produces three hormones: thyroxine (T4), triiodothyronine (T3), and calcitonin. Thyroxine and triiodothyronine are needed by all body cells for metabolism

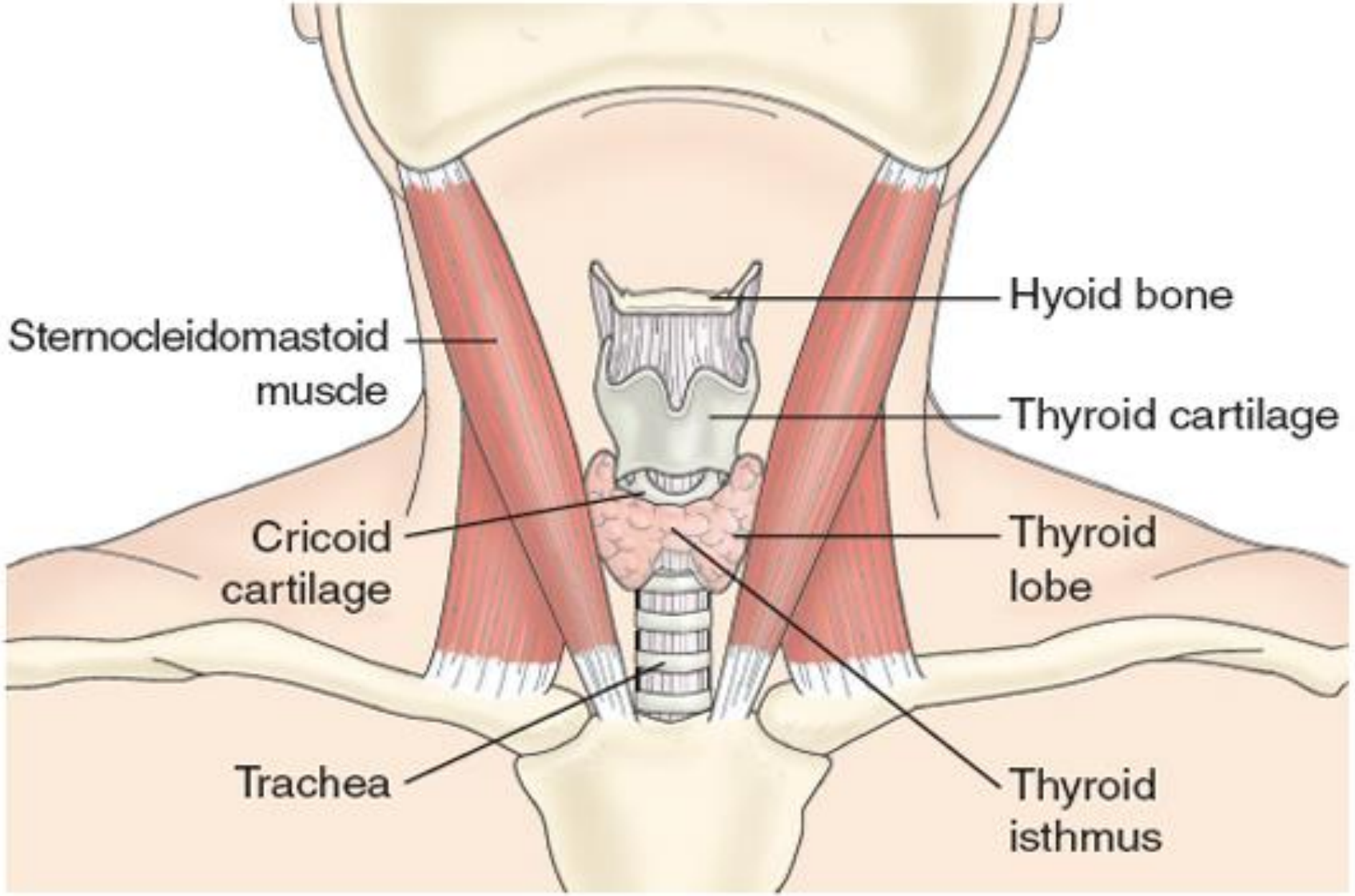
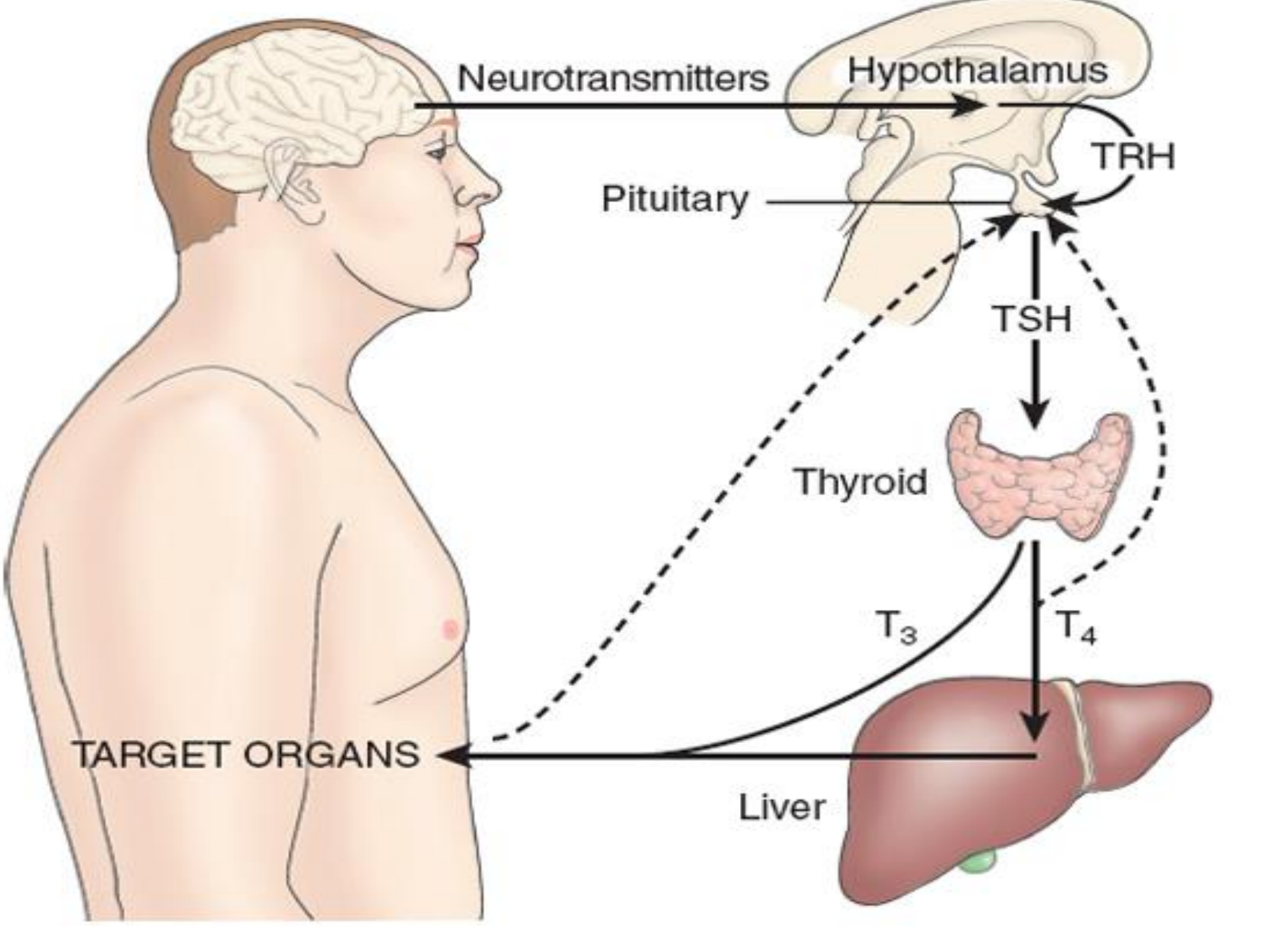


Figure 45-3 • The thyroid gland and surrounding structures.


Neurotransmitters
Hypothalamus
TRH
Pituitary
TSH
Thyroid
T_3
T_4
TARGET ORGANS
Liver

Hyperthyroidism

- Hyperthyroidism, a common endocrine disorder, is a form of thyrotoxicosis resulting from an excessive synthesis and secretion of endogenous or exogenous thyroid hormones .

Causes of hyperthyroidism

- Some common causes of hyperthyroidism include:

1. Graves ' disease.
2. Functioning adenoma ("hot nodule") and toxic multi-nodular goiter (TMNG).
3. Excessive intake of thyroid hormones.
4. Abnormal secretion of TSH.
5. Thyroiditis (inflammation of the thyroid gland).
6. Excessive iodine intake.

Graves ' disease

- Graves disease is an autoimmune disorder that results from an excessive output of thyroid hormones caused by abnormal stimulation of the thyroid gland by circulating immunoglobulins.

- This disease affects women eight times more frequently than men, with onset usually between the second and fourth decades.

- The disorder may appear after an emotional shock, stress, or an infection, but the exact significance of these relationships is not understood

Clinical Manifestations

- **Neurological and Psychological Symptoms:**

•The patient may appear anxious.
•They may seem restless and irritable.
•They can exhibit fine tremors in their hands.

- **Cardiovascular Symptoms:**

•Tachycardia or or arrhythmias,

- **General Physical Symptoms:**

•Heat intolerance with increased perspiration.
•Increased appetite.
•Diarrhea.
•Weight loss.
•Thin skin.

- **Symptoms Specific to Graves' Disease:**

•Exophthalmos (a characteristic bulging of the eyes).
•Reduced blinking and eyelid retraction.
•It's important to note that treatment may not reverse these eye-related symptoms.

- **Symptoms in Women:**

•Women may experience changes in their menstrual cycle, including **oligomenorrhea** (infrequent or light menstruation).

Assessment and Diagnostic Findings

❖ Physical Examination Findings

- ➢ Enlarged Thyroid Gland
- ➢ **Texture and Pulsation:** It feels soft and may pulsate
- ➢ Palpable Thrill
- ➢ **Bruit:** A "bruit" (a swooshing sound) can be heard through a stethoscope over the thyroid arteries

❖ Diagnostic Tests

- ➢ Decreased Serum TSH
- ➢ Increased Free T4
- ➢ Increased Radioactive Iodine Uptake

Medical Management

- **Radioactive Iodine:** This is the most common form of treatment for Graves' disease.
- **Antithyroid Agents:** These are medications, such as thionamides.
- **Surgery:** Surgical removal of all or part of the thyroid gland.

complications

- Potential complications may include the following:
  - Thyrotoxicosis or thyroid storm
  - Hypothyroidism

NURSING DIAGNOSES

- Based on the assessment data, major priority nursing diagnoses may include the following:
- Risk for impaired cardiac function associated with alteration in heart rate and rhythm.
- Impaired nutritional status associated with exaggerated metabolic rate, excessive appetite, and increased GI activity
- Difficulty coping associated with irritability, hyperexcitability, apprehension, and emotional instability
- Situational low self-esteem associated with changes in appearance, excessive appetite, and weight loss
- Risk for impaired thermoregulation

Nursing Interventions

- Maintaining Adequate Cardiac Output:
- Assess Vital Signs
- Watch for Signs of Heart Failure: The nurse must monitor the patient for any signs of heart failure, including:
  - Dyspnea (shortness of breath).
  - Jugular vein distention (swelling of neck veins).
  - Crackles
  - Peripheral edema
- Managing a Thyroid Storm

Nursing Interventions

❖Improving Nutritional Status

- ➢ Advice patient and family to several well-balanced meals of small size, even up to six meals a day.
- ➢ To reduce diarrhea, highly seasoned foods and stimulants such as coffee, tea, cola, and alcohol are discouraged.
- ➢ High-calorie, high-protein foods are encouraged.

Nursing Interventions

❖Enhancing Coping Measures

- ➢use a calm, unhurried approach with the patient.
- ➢ Stressful experiences are minimized
- ➢The environment is kept quiet and uncluttered. Noises, such as loud music, conversation, and equipment alarms, are minimized.

Hypothyroidism

Hypothyroidism is a condition that results from a **suboptimal level of thyroid hormone**. This deficiency can affect all body functions, ranging from mild forms to a severe, life-threatening condition called myxedema

Causes of Hypothyroidism

- Autoimmune disease (Hashimoto thyroiditis, post-Graves disease)
- Atrophy of thyroid gland with aging
- Infiltrative diseases of the thyroid (amyloidosis, scleroderma, lymphoma)
- Iodine deficiency, iodine excess, and iodine compounds
- Medications (e.g., Lithium)
- Radioactive iodine
- Therapy for hyperthyroidism
- Thyroidectomy
- Radiation to head and neck in treatment for head and neck cancers, lymphoma

Types of Hypothyroidism

- **Primary Hypothyroidism:** This is the most common type (over 95% of cases), caused by a dysfunction of the thyroid gland itself.
- **Central Hypothyroidism:** This results from a failure of the pituitary gland, the hypothalamus, or both.
- **Neonatal Hypothyroidism:** This is a deficiency present at birth.

Myxedema

- The term refers to the accumulation of mucopolysaccharides in subcutaneous and other interstitial tissues.
- While it occurs in long-standing hypothyroidism, the term is used specifically to describe the **extreme, severe symptoms** of the condition.
- **Myxedema coma** is an advanced and life-threatening form of severe hypothyroidism.

Clinical Manifestations

❖ General Symptoms (due to decreased metabolism):

- ➢ Fatigue and lethargy
- ➢ Weight gain
- ➢ Cold intolerance
- ➢ Dry skin
- ➢ Deepening of the voice

❖ Specific Clinical Manifestations:

❑ Cardiovascular:

- **Bradycardia:** A slow heart rate.
- **Changes in electrical conduction of the heart:** Can be seen on an electrocardiogram (ECG).
- **Pleural effusion and pericardial effusion:** Fluid accumulation around the lungs and heart.
- **Respiratory muscle weakness:** Weakness of the muscles used for breathing.

Clinical Manifestations

- Neurological/Mental:
  - Irritability and fatigue (early stages).
  - Subdued emotional responses: Apathy.
  - Dulled mental processes: Slowed thinking.
  - Personality and cognitive changes: Can mimic dementia in advanced cases.
  - Slow speech.
  - Enlarged tongue.
  - Deafness (may occur).
- Physical:
  - Subnormal body temperature and pulse rate (in severe cases).
  - Masklike, expressionless face.
  - Enlarged hands and feet.
  - Constipation: A frequent complaint.
- Other:
  - Menstrual cycle changes (in women).
  - Sleep apnea and inadequate ventilation (in severe cases)

Medical Management

- ❖ Pharmacologic Therapy
- ➢ Synthetic levothyroxine is the drug of choice for the treatment of hypothyroidism.
- ❖ Supportive Therapy
- ➢ Arterial blood gases may be measured to determine carbon dioxide retention
- ➢ Oxygen saturation levels should be monitored using pulse oximetry.
- ➢ Fluids are given cautiously because of the danger of water intoxication
- ➢ Passive rewarming with a blanket is recommended versus active rewarming such as application of external heat (e.g., heating pads).

Nursing Management

- Impaired breathing associated with depressed ventilation

- Assess respiratory rate, depth, pattern, pulse oximetry, and arterial blood gases.
- Encourage deep breathing, coughing, and the use of incentive spirometry
- medications are needed, monitor for adverse
- Maintain patient airway through suction and ventilator support if needed

Nursing Management

- Risk for impaired cardiac function associated with altered metabolism

- Assess heart rate and rhythm and blood pressure
- Monitor serum cholesterol value and complaints of anginal pain.
- Monitor ECG for the presence of any arrhythmias, especially after thyroid hormone replacement therapy is initiated.

Nursing Management

➢ Risk for impaired thermoregulation

- Provide extra layer of clothing or extra blanket.
- Avoid and discourage the use of external heat source (e.g., heating pads, electric or warming blankets).
- Monitor patient's body temperature and report decreases from patient's baseline value.
- Protect from exposure to cold and drafts.

Nursing Management

- Constipation associated with diminished gastrointestinal peristalsis

- Encourage increased fluid intake within limits of fluid restriction.
- Provide foods high in fiber.
- Instruct patient about foods with high water content.
- Monitor bowel function.
- Encourage increased mobility within patient's exercise tolerance.
- Encourage patient to use laxatives and enemas sparingly.


THANK
YOU