

RN.com's Assessment Series: Focused Endocrine Assessment

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Purpose and Objectives

The purpose of this course is to offer the healthcare provider an overview of basic endocrine assessment including normal and abnormal findings.

After successful completion of this course, you should be able to:

1. Discuss the components of a focused endocrine assessment.
2. Discuss history questions which will help you focus your assessment.

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3. Identify common endocrine disorders.

Glossary

Definitions from Tabers® dictionary (Venes, 2013) and Mosby's (2012)

Acromegaly

A disorder marked by progressive enlargement of the head, face, hands, feet, and chest due to excessive secretion of growth hormone by the anterior lobe of the pituitary gland.

Addison's disease

A disorder involving disrupted functioning of the part of the adrenal gland called the cortex, resulting in decreased production of cortisol and aldosterone.

Adenomas

A benign epithelial tumor in which the cells form recognizable glandular structures or in which the cells are derived from glandular epithelium.

Adrenal glands

Triangle-shaped glands located on top of the kidneys.

Adrenalectomy

The surgical removal of one or both of the adrenal glands.

Anasarca

An accumulation of serous fluid in various tissues and cavities of the body.

Cushing's syndrome

A relatively rare endocrine disorder resulting from excessive exposure to the hormone cortisol, which leads to a variety of symptoms and physical abnormalities.

Diabetes Insipidus

A disorder that causes the patient to produce tremendous quantities of urine. The massively increased urine output is usually accompanied by intense thirst.

Dwarfism

A pathological condition of arrested growth having various causes.

Homeostasis

The ability or tendency of an organism or a cell to maintain internal equilibrium by adjusting its physiological processes.

Hypothalamus

Brain structure that monitors internal environment and attempts to maintain balance of these systems. Controls the pituitary gland.

Insulin

A protein hormone formed from proinsulin in the beta cells of the pancreatic islets of Langerhans. The major fuel-regulating hormone, it is secreted into the blood in response to a rise in concentration of blood glucose or amino acids. Insulin promotes the storage of glucose and the uptake of amino acids, increases protein and lipid synthesis, and inhibits lipolysis and gluconeogenesis.

Islets of Langerhans

Irregular microscopic structures scattered throughout the pancreas and comprising its endocrine portion.

Medulla

The innermost part.

Nelson's syndrome

The development of an ACTH-producing pituitary tumor after bilateral adrenalectomy in Cushing's syndrome; it is characterized by aggressive growth of the tumor and hyperpigmentation of the skin.

Nocturia

Excessive urinating at night.

Osmolality

The concentration of a solution in terms of osmoles of solute per kilogram of solvent.

Pancreas

A large, elongated gland lying transversely behind the stomach, between the spleen and duodenum. Its external secretion contains digestive enzymes. One internal secretion, insulin, is produced by the beta cells, and another, glucagon, is produced by the alpha cells.

Pheochromocytoma

A tumor of special cells, most often found in the middle of the adrenal gland.

Pituitary

"Master" gland attached to the base of the brain that secretes hormones for regulation of many body functions.

Polydipsia

Excessive or abnormal thirst.

Polyuria

Excessive or abnormal urination.

Syndrome of Inappropriate ADH Secretion

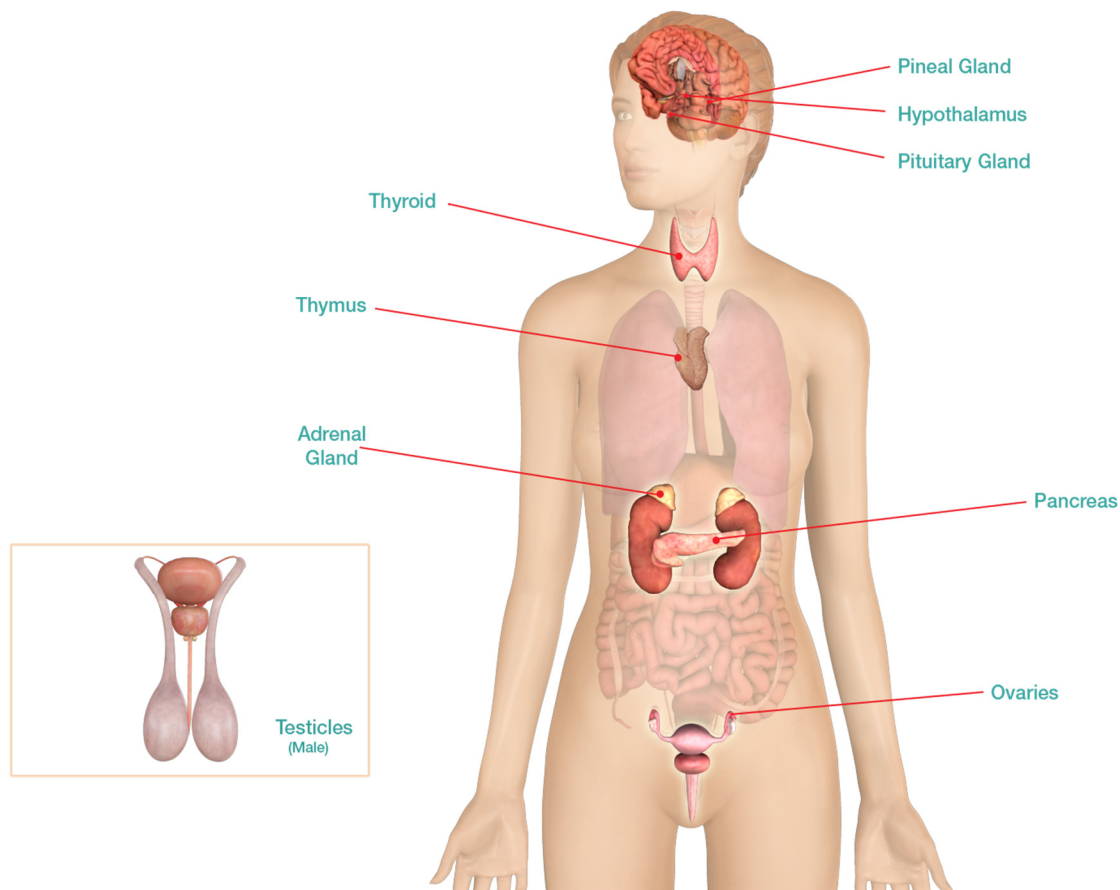
A syndrome characterized by excessive release of antidiuretic hormone (ADH or vasopressin), resulting in hyponatremia, and sometimes fluid overload.

Thyroid gland

An endocrine gland consisting of two lobes, one on each side of the trachea, joined by a narrow isthmus, producing hormones (thyroxine and triiodothyronine), which require iodine for their elaboration and which are concerned in regulating metabolic rate; it also secretes calcitonin.

Introduction

Every cell in our body is influenced by our endocrine system. The endocrine system acts to maintain equilibrium at the cellular level and is a vital link in homeostasis. When abnormalities occur, illness or death can result. Treatment usually requires managing a deviant hormone by either reducing or increasing its production or secretion from its associated endocrine gland. A thorough understanding of the endocrine system and how it functions is necessary in accurately assessing and treating endocrine disorders.



Assessing Common Endocrine Abnormalities

When conducting a focused endocrine assessment on your patient, begin with a thorough history of their chief complaints. You will need to elicit information about any experienced signs or symptoms of endocrine disease or disorders. Endocrine disorders and diseases usually manifest according to which endocrine hormone is being overproduced and secreted, or under-produced, at any given age (Moshier, 2007; Jarvis, 2008). The key to discovering the nature of the symptoms lies in your understanding of the functions of the endocrine hormones.

The Problem-Focused Endocrine Assessment

When assessing the endocrine system you most likely will perform a problem-focused assessment. The problem-focused endocrine assessment is necessary after a comprehensive assessment indicates a potential endocrine abnormality. This assessment may also be necessary when an interval or abbreviated assessment shows a change in status from your last assessment or report you received. When a new symptom emerges or the patient develops any distress, consider a focused endocrine assessment. The advantage of this assessment is that it allows you to ask about symptoms and move quickly to conducting a focused physical exam (Jarvis, 2011; Shaw, 2012).

Focused Endocrine Assessment

When conducting a focused endocrine assessment on your patient, both subjective and objective data are needed. Components may include:

- Chief complaint
- Present health status
- Past health history
- Current lifestyle
- Psychological status
- Family history
- Physical assessment

Communication during the history and physical must be respectful and performed in a culturally-sensitive manner. Privacy is vital, and the healthcare professional needs to be aware of posture, body language, and tone of voice while interviewing the patient (Jarvis, 2011; Caple, 2011). Take into consideration that a patient's ethnicity and culture may affect the history that the patient provides.

Physical Exam Techniques

Inspection & Auscultation

Physical exam techniques used in a focused endocrine assessment are the same techniques used in a general exam:

- Inspection
- Auscultation
- Percussion
- Palpation

During inspection, you are looking for conditions you can observe with your eyes, ears or nose. Examples of what to inspect related to endocrine abnormalities are:

- Generalized appearance
- Skin color
- Location of lesions
- Bruises or rashes
- Symmetry
- Size of body parts
- Abnormal sounds or odors

Physical Exam Techniques

Auscultation is used in your focused endocrine assessment before percussion or palpation. Examples of exam findings you will auscultate during your focused endocrine assessment include:

- Murmurs
- Cardiac irregularities
- Adventitious breath sounds
- Alterations in bowel sounds

Physical Exam Techniques

Palpation & Percussion

Palpation is another physical exam technique you will use in your focused endocrine assessment. During light palpation, compress the skin about ½ inch to ¾ inch with the pads of your fingers. When using deep palpation, use your finger pads and compress the skin about 1½ inches to 2 inches. Palpation allows you to assess for texture, tenderness, temperature, moisture, pulsations, masses, and internal organs (Jarvis, 2011; Shaw, 2012).

Physical Exam Techniques

Percussion is used in your focused endocrine assessment to allow you to elicit tenderness or sounds that point to underlying problems. When percussing directly over suspected areas of tenderness, monitor the patient for signs of discomfort. Examples of endocrine abnormalities you may percuss are an enlarged pancreas, a pleural effusion associated with specific endocrine abnormalities, or a hormone-secreting tumor (Jarvis, 2011; Shaw, 2012).

Subjective Data

It is important to begin by obtaining a thorough history of complaints related to the endocrine system. You will need to elicit information about any complaints of endocrine disease or disorders.

Endocrine disease usually manifests as the presence of one or more of the following:

- Fatigue or lethargy
- Weight gain or loss
- Dizziness
- Feelings of depression, irritability, or anxiety
- Pain
- Decreased libido
- Nausea and vomiting
- Changes in urinary or bowel habits
- Changes in vision
- Intolerance to heat or cold
- Change in appetite

(Jarvis, 2011)

Test Yourself

The key to discovering the nature of the symptoms found during your assessment is in your understanding of the functions of the endocrine hormones.

- A. True
- B. False

The correct answer is: A- True.

Overview of Endocrine System

Introduction

Endocrine disorders and diseases usually manifest according to which endocrine hormone is being overproduced or under-produced, at any given age (Jarvis, 2011; Shawn, 2012).

Knowledge of the major endocrine glands and the hormones they secrete, as well as the symptomology associated with over- and under-production of these hormones will give the healthcare professional the ability to identify endocrine disorders.

Adrenals

Review of Endocrine Glands, Hormones & Symptomology			
Endocrine Gland	Hormone Name	Symptoms Deficiency	Symptoms Overproduction
Adrenals	Cortisol	Fatigue, weight loss, inability to fight stress, poor immunity	Weight gain, stretch marks, fatigue
	Aldosterone	Fatigue, dizziness on standing	High blood pressure
	DHEA (Dehydroepiandrosterone)	Fatigue, depression, decreased libido	Excess hair growth (women), breast enlargement (men)

Adrenals/ovaries (women)

Review of Endocrine Glands, Hormones & Symptomology			
Endocrine Gland	Hormone Name	Symptoms Deficiency	Symptoms Overproduction

Adrenals/ovaries (women)	Testosterone	Fatigue, decreased libido, decreased muscle mass	Excess hair growth
	Estrogens – E1 (estrone), E2 (estradiol), E3 (estriol)	Fatigue, decreased libido, hair loss, osteoporosis, heart disease	Irritability

Adrenals/testes (men)

Review of Endocrine Glands, Hormones & Symptomology			
Endocrine Gland	Hormone Name	Symptoms Deficiency	Symptoms Overproduction
Adrenals/testes (men)	Testosterone	Fatigue, decreased libido, decreased muscle mass, difficulty with erections	Balding, prostate enlargement
	Estrogens	Fatigue, osteoporosis	Breast enlargement, infertility

Pancreas

Review of Endocrine Glands, Hormones & Symptomology			
Endocrine Gland	Hormone Name	Symptoms Deficiency	Symptoms Overproduction
Pancreas	Insulin	Diabetes	Weight gain, fatigue
	Glucagon	Hypoglycemia, weight gain	Diabetes
	GLP-1	Diabetes	Weight gain

Thyroid

Review of Endocrine Glands, Hormones & Symptomology			
Endocrine Gland	Hormone Name	Symptoms Deficiency	Symptoms Overproduction
Thyroid	T4 (thyroxine), T3 (triiodothyronine)	Fatigue, depression, weight gain	Fatigue, anxiety, sweating

Parathyroids/Kidneys

Review of Endocrine Glands, Hormones & Symptomology			
Endocrine Gland	Hormone Name	Symptoms Deficiency	Symptoms Overproduction
Parathyroids	PTH (parathyroid hormone)	Tingling, depression	Abdominal pain, fatigue, depression
Kidneys	Vitamin D	Muscle pain, fatigue	Fatigue, depression, bone pain

Pituitary Disorders

Introduction

The endocrine system is comprised of a number of different glands, each linked in a unique manner to the hypothalamus.

The pituitary gland, also known as the hypophysis, is a pea-sized gland located at the base of the brain. It is actually comprised of two very different glands; the anterior pituitary and posterior pituitary.

- The anterior pituitary produces growth hormone (GR), thyroid stimulating hormone (TSH), and adrenocorticotropin (ACTH) hormone.
- The posterior pituitary produces anti-diuretic hormone (ADH), also known as vasopressin (Jarvis, 2011; Shaw, 2012).

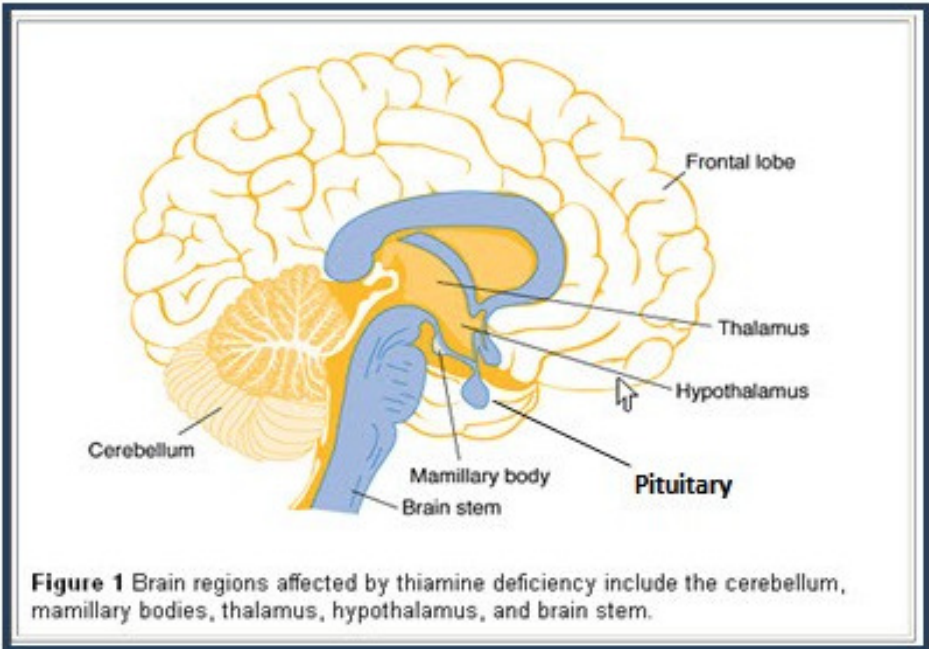


Figure 1 Brain regions affected by thiamine deficiency include the cerebellum, mamillary bodies, thalamus, hypothalamus, and brain stem.

The hypothalamus, known as the "master" gland, produces and releases hormones that stimulate the pituitary gland, namely:

- Growth hormone releasing hormone (GRH)
- Thyrotropic-releasing hormone (TRH)
- Corticotropin releasing hormone (CRH)

(Jarvis, 2011; Shaw, 2012)

Syndrome of Inappropriate ADH (SIADH)

Syndrome of inappropriate antidiuretic hormone secretion (SIADH) occurs with above normal ADH release, which causes impaired water excretion. Possible causes include:

- ADH secreting tumor
- Chemotherapy
- Oat cell carcinoma

Key *subjective* assessment findings are:

- Anorexia
- Nausea
- Headache
- Fatigue
- Irritability

Key *objective* assessment findings are:

- Weight gain
- Vomiting
- Muscle weakness
- Muscle spasms or cramps
- Hallucinations
- Decreased level of consciousness (LOC)
- Confusion
- Low serum sodium
- Low serum osmolarity
- High urine osmolarity
- Normal urine sodium excretion
- Low edema
- Possible coma

(Jarvis, 2011; Shaw, 2012; Thomas, 2014)

Diabetes Insipidus (DI)

Below normal ADH release or under-production of ADH can result in diabetes insipidus (ID). Possible causes include:

- Cerebral vascular accident (CVA)
- Hypothalamic-pituitary tumors
- Cranial trauma or surgeries
- Hereditary
- Drugs (lithium and phenytoin [Dilantin])
- Alcohol (transient DI)

Key *subjective* assessment findings are:

- Abrupt onset of polydipsia and polyuria
- Nocturia
- Sleep disturbances related to nocturia
- Fatigue
- Headache
- Visual disturbances

Key *objective* assessment findings are:

- Fluid intake 5-20 L/day
- Urine output of 2-20 L/day of dilute urine
- Urine specific gravity < 1.006
- Fever
- Changes in LOC
- Hypotension
- Tachycardia

(Jarvis, 2011; Shaw, 2012)

Thyroid Disorders

Introduction

The thyroid gland lies in the anterior portion of the neck and straddles the trachea. It secretes two hormones that play a major role in the body's metabolism

- Thyroxine (T4)
- Triiodothyronine (T3)

Absence of these hormones may decrease the body's basal metabolic rate by 60% and an excess of these hormones may increase the body's basal metabolic rate by 100% (Jarvis, 2011; Shaw, 2012).

Hypothyroidism - Chronic deficiency of T4 & T3

Hypothyroidism is a chronic deficiency of T4 & T3. Possible causes include:

- Thyroid gland dysfunction
- Inadequate release of TRH or TSH from the hypothalamic-pituitary axis (hypophysectomy or pituitary radiation)
- Surgical removal or radioiodine ablation with hyperthyroidism
- Hashimoto's thyroiditis (chronic inflammation of the thyroid)

Key *subjective* assessment findings are:

- Diminished hearing
- Cold intolerance
- Fatigue
- Lethargy
- Complaints of constipation

Key *objective* assessment findings are:

- Bradycardia
- Decreased LOC
- Hypothermia
- Hypoventilation
- Hypoactive bowel sounds
- Weight gain
- Elevated TSH
- Decreased T3, T4, free T4
- Elevated CK-MB
- Increased pCO₂
- Decreased P_{O2}, pH
- Hypoglycemia

(Jarvis, 2011; Shaw, 2012)

Myxedema Coma - Acute deficiency of T4 & T3

Insufficient thyroid hormone or supplementation, together with an acute stressor, can lead to a myxedema coma, or acute deficiency of T4 and T3. Possible causes include:

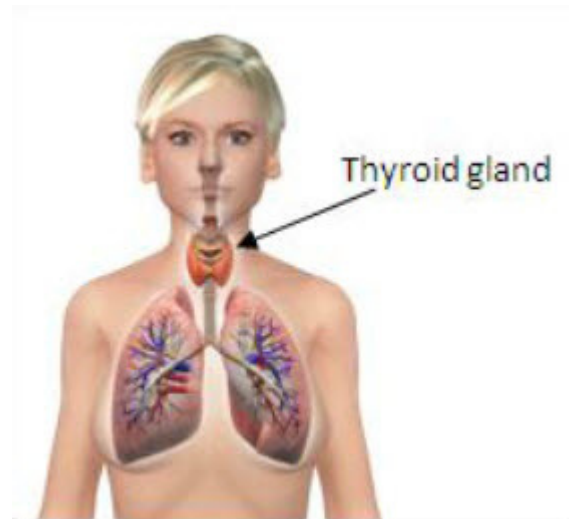
- Insufficient thyroid supplementation
- Increased stressors in patients with hypothyroidism (e.g. trauma, cold, anesthesia, infection)

Key *subjective* assessment findings are:

- Diminished hearing
- Cold intolerance
- Fatigue
- Lethargy
- Complaints of constipation

Key *objective* assessment findings are similar to signs & symptoms of hypothyroidism but even more pronounced:

- Anasarca
- Hoarseness
- Pericardial & pleural effusions
- Diminished hearing
- Paralytic ileus
- Unresponsiveness
- Decreased breathing
- Hypotension
- Hypoglycemia
- Hypothermia



ACUTE SITUATION

(Jarvis, 2011; Shaw, 2012)

Hyperthyroidism - Chronic increase in T4 & T3

Hyperthyroidism is a chronic increase in T4 and T3 levels. Possible causes include:

- Adenoma
- Thyroiditis
- Over treatment of hypothyroidism
- Discontinuation of thyroid supplements
- Stress
- Iodine load with pre-existing hyperthyroid state
- Pituitary tumor

Key *subjective* assessment findings are:

- Irritability
- Restlessness
- Heat intolerance
- Complaints of diarrhea
- Insomnia

Key *objective* assessment findings are:

- Tachycardia
- Atrial arrhythmias
- Premature atrial contractions (PACs)
- Premature ventricular contractions (PVCs)
- Dyspnea
- Palpitations
- Weight loss
- Hyperthermia
- Elevated T4 and T3
- Decreased TSH
- Increased TSH if from a TSH secreting tumor (in pituitary)
- Positive test for thyroid antibodies (Grave's Disease)
- Hyperglycemia
- Diaphoresis

(Jarvis, 2011; Shaw, 2012)

Thyrotoxicosis or Thyroid Storm

An acute increase in T4 and T3 can cause thyrotoxicosis or an acute thyroid storm. The possible cause is decompensation of a pre-existing hyperthyroid state after stressor (e.g. surgery, anesthesia, infection, trauma).

Key *subjective* assessment findings are:

- Restlessness
- Agitation
- Changes in LOC

Key *objective* assessment findings are similar to signs and symptoms of hyperthyroidism but even more pronounced:

- Tachycardia
- Diaphoresis
- Fever
- Diarrhea
- Confusion
- Signs and symptoms associated with CHF and pulmonary edema

CRITICAL SITUATION

(Jarvis, 2011; Shaw, 2012)

Sick Euthyroid Syndrome

Underproduction of TSH from the anterior pituitary (which stimulates the production and release of T4 and T3) can result in sick euthyroid syndrome, in which low thyroid levels are evident on blood testing but the patient only presents with non-thyroid illness (NTI). Possible causes include:

- Acute illness

- Abnormalities in thyroid function occur in patients with serious illness not caused by primary thyroid or pituitary dysfunction

Key *subjective* assessment findings may be absent.

Key *objective* assessment findings are:

- Normal or low TSH
- Abnormal T4 (low or high)
- Low T3
- Absence of thyroid symptoms

The degree of reduction in thyroid hormone levels appears to be correlated with the severity of non-thyroidal illness.

(Jarvis, 2011; Shaw, 2012)

Test Yourself

A 55 year male has a hypothalamic-pituitary tumor, and is demonstrating signs and symptoms of polydipsia, polyuria, low urine specific gravity, and hypotension. The most likely disorder this patient has is:

- Hypothyroidism
- Diabetes insipidus
- Myxedema

The correct answer is: B- Diabetes insipidus.

Test Yourself

A 63 year old female is admitted for a total knee replacement. After surgery, she becomes confused, tachycardic, and diaphoretic. Her blood work shows elevated blood glucose, T3 and T4. She is most likely experiencing:

- Hypothyroidism
- Sick Euthyroid Syndrome
- Thyrotoxicosis

The correct answer is: C- Thyrotoxicosis.

Adrenal Disorders

Introduction

The adrenal glands are two organs located atop of each kidney, which are responsible for the secretion of:

- Mineralocorticoids
- Glucocorticoids
- Corticosteroids: Epinephrine and Norepinephrine.

Aldosterone accounts for 95% of all mineralocorticoids produced and is secreted by the adrenal cortex. Cortisol is the primary glucocorticoid secreted by the adrenal cortex. Epinephrine and norepinephrine are hormones secreted from the adrenal medulla (Jarvis, 2011; Shaw, 2012).

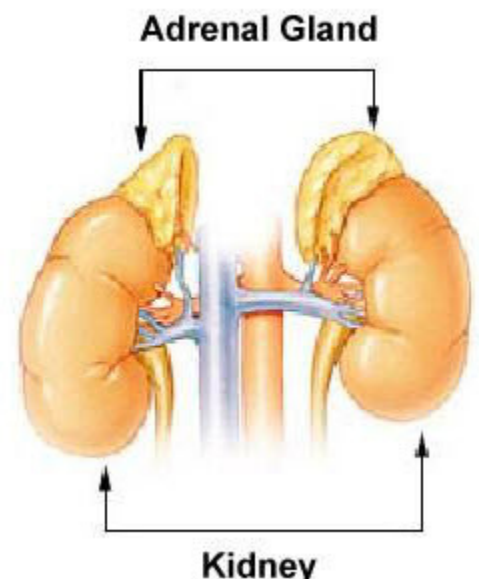


Image courtesy of the National Cancer Institute

Primary Adrenal Insufficiency or Addison's Disease

Addison's disease is the chronic deficiency or secretion of cortisol from the adrenal cortex. Aldosterone is usually unaffected.

Secondary Adrenal Insufficiency

Secondary adrenal insufficiency is the chronic deficiency of ACTH from the anterior pituitary, which stimulates cortisol release from the adrenal cortex. Possible causes of adrenal insufficiency include:

- Autoimmune destruction of the adrenal gland
- Adrenal destruction from surgery, trauma, sepsis, infection, tuberculosis, hemorrhage, or bilateral adrenalectomy
- Suppression of gland related to medications (see Did You Know? below)
- Pituitary hypofunction (surgery, trauma, ischemia)

Key *subjective* assessment findings are:

- Nausea Abdominal pain
- Fatigue
- Malaise
- Weakness

Key *objective* assessment findings are:

- Hyperpigmentation (only in primary adrenal insufficiency)
- Orthostatic hypotension
- Decreased cardiac size and output
- Weak & irregular pulse
- X-rays may show adrenal calcification (only in primary adrenal insufficiency)
- Decreased cortisol levels
- Elevated plasma ACTH levels (in primary adrenal insufficiency due to disorder of the adrenal gland)
- Decreased plasma ACTH (when dysfunction is a result of the hypothalamic-pituitary axis)
- Other endocrine abnormalities (in secondary adrenal insufficiency due to pituitary abnormality)

(Jarvis, 2011; Shaw, 2012)

Did You Know?

The most common reason for ACTH suppression is the use of glucocorticoid medications. These include cortisone, hydrocortisone, prednisone, prednisolone, and dexamethasone. Other medications which can suppress the anterior pituitary include ketoconazole (Nizoral), rifampin (Rifadin), and phenytoin (Dilantin) (National Adrenal Diseases Foundation, 2014).

Adrenal Crisis

Adrenal crisis is an acute decrease in aldosterone and cortisol from the adrenal cortex or an acute deficiency of ACTH from the anterior pituitary which stimulates cortisol release from the adrenal cortex. Possible causes include:

Decompensation in a patient with chronic adrenal insufficiency

Abrupt cessation of chronic steroid administration

Key *subjective* assessment findings are:

- Nausea
- Abdominal pain
- Fatigue
- Malaise
- Weakness

Key *objective* assessment findings are:

- Hypoglycemia
- Hyponatremia

- Hypovolemia
- Hypotension
- Tachycardia
- Hyperkalemia
- Hypercalcemia
- Vomiting
- Decreased cortisol levels
- Elevated plasma ACTH levels
- Increased BUN
- Metabolic acidosis (in primary adrenal insufficiency due to disorder of the adrenal gland)
- Decreased plasma ACTH (when dysfunction is a result of the hypothalamic-pituitary axis)
- X-Rays may show adrenal calcification

(Jarvis, 2011; Shaw, 2012)

Cushing's Syndrome

Cushing's Syndrome is the overproduction or oversecretion of cortisol from the adrenal cortex.

Cushing's Disease

Cushing's disease is the overproduction or secretion of ACTH from the anterior pituitary, which stimulates cortisol release from the adrenal cortex. Possible causes include:

- Cortisol secreting tumor (20% of cases), such as oat cell carcinoma of the lung with destruction of the adrenal gland
- Adrenal carcinoma
- Pituitary cortisol-secreting adrenal tumor (usually benign)

Key *subjective* assessment findings are:

- Weakness
- Increased appetite
- Irritability
- Emotional lability
- Headache
- Complaints of easy bruising
- Reports symptoms associated with decreased stress and immunologic response

Key *objective* assessment findings are:

- Pathologic fractures
- Purple striae
- Facial edema
- Acne
- Buffalo hump
- Poor wound healing
- Peptic ulcers
- Hypertension
- Left ventricular hypertrophy
- Dyslipidemia
- Renal calculi (from bone demineralization)
- Urinary free cortisol levels >150 mcg in 24 hours, hyperglycemia
- Hyponatremia
- Hypokalemia
- Hypocalcemia
- Metabolic alkalosis
- Increased lymphocytes

(Jarvis, 2011; Shaw, 2012)

Pheochromocytoma (Adrenal Neoplasm)

Pheochromocytoma is an adrenal neoplasm resulted by the increase epinephrine and norepinephrine from the adrenal medulla. The possible cause of this disorder is a tumor of the adrenal medulla.

Key *subjective* assessment findings are:

- Headache
- Palpitations
- Dizziness
- Complaints of constipation
- Anxiety

Key *objective* assessment findings are:

- Hypertension
- Hyperglycemia

- Dyslipidemia
- Irregular heart rate
- Diaphoresis
- Syncope

(Jarvis, 2011; Shaw, 2012)

Primary Aldosteronism

Primary aldosteronism is the result of an increase in production and secretion of aldosterone from adrenal cortex. The possible cause of this is from a benign tumor of the adrenal gland, which occurs in people between 30 and 50 years of age.

Key *subjective* assessment findings are:

- Headache
- Muscle weakness
- Fatigue
- Numbness

Key *objective* assessment findings are:

- Hypernatremia
- Hypokalemia
- Hypervolemia
- Elevated plasma
- Hypertension
- Elevated urinary aldosteronism

(Jarvis, 2011; Shaw, 2012)

Test Yourself

A 46 year old female presents to her doctor, complaining of headache, weakness, and easy bruising. Upon examination, it is noted that she has hypertension, facial edema, and a fat pad on her back the doctor describes as a "buffalo hump". Her blood work shows low sodium, potassium, and calcium levels, and elevated cortisol. This patient most likely has:

- A. Pheochromocytoma
- B. Cushing's syndrome
- C. Addison's disease

The correct answer is: B- Cushing's syndrome.

Pancreatic Disorders

Introduction

The pancreas is an oblong, flattened gland located deep in the abdomen, and plays a major role in both the digestive and endocrine systems.

As an endocrine gland, the pancreas produces several important hormones, including:

- Insulin
- Glucagon
- Somatostatin

All three of these hormones play a significant role in carbohydrate, fat, and protein metabolism (Jarvis, 2011; Shaw, 2012). As a digestive organ, the pancreas secretes pancreatic juice containing digestive enzymes that assist the absorption of nutrients and the digestion in the small intestine.

Diabetes Mellitus

Diabetes mellitus (DM) is the result of the absolute decreased production of insulin (Type I) or resistance of cells to circulating insulin (Type II). Possible causes include:

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- Type I: genetics, autoimmune disease, viral infections
- Type II: genetic factors, obesity
- Gestational: pregnancy induced

Key *subjective* assessment findings are:

- Headache
- Fatigue
- Lethargy
- Reduced energy levels
- Irritability
- Emotional lability
- Vision changes
- Numbness
- Tingling

Key *objective* assessment findings are:

- Hyperglycemia
- Polyuria
- Polydipsia
- Polyphagia
- Anorexia
- Muscle cramps
- Type I presents usually emergently
- Type II presents insidiously

(Jarvis, 2011; Shaw, 2012).

Did You Know?

The Centers for Disease Control and Prevention (CDC) estimate that approximately 27.8% of the population with diabetes is undiagnosed. There are 21 million people in the United States diagnosed with diabetes (both types), with an estimated 8.1 million people who don't even know they have diabetes (CDC, 2014).

Pancreatic Neoplasms

Pancreatic neoplasms are benign or malignant tumors of the pancreas that may impair insulin production and secretion.

Key *subjective* assessment findings are:

- Anorexia
- Nausea
- Malaise
- Abdominal or back pain

Key *objective* assessment findings are:

- Jaundice
- Clay-colored stool
- Vomiting
- Weight loss
- Blood in stool
- Hypoglycemia or hyperglycemia

(Jarvis, 2011; Shaw, 2012).

Pancreatitis

Pancreatitis may cause impairment of insulin production and secretion. Inflammation of the pancreas occurs due to edema, hemorrhage, or necrosis. Possible causes include:

- Alcoholism
- Trauma
- Peptic ulcer disease
- Biliary tract disease
- Pancreatic cysts or tumors
- Drugs (sulfonamides, thiazides, birth control pills, NSAIDs)
- Kidney failure
- Organ transplantation
- Endoscopic exam of the biliary tree

Key *subjective* findings are:

- Anorexia
- Nausea
- Malaise

- Severe, knife-like mid-epigastric abdominal pain, which can radiate to the back

Key *objective* assessment findings are:

- Mottled skin
- Tachycardia
- Dehydration
- Hypovolemia
- Hemodynamic instability
- Abdominal distention
- Crackles in lung bases
- Pleural effusions
- Increased serum amylase, lipase, and glucose

(Jarvis, 2011; Shaw, 2012)

Hypoglycemia

Hypoglycemia (low blood glucose levels) may be caused by increased insulin production, secretion, and/or administration.

Key *subjective* assessment findings are:

- Dizziness
- Weakness
- Nervousness
- Agitation
- Headache
- Mental dullness

Key *objective* assessment findings are:

- Pallor
- Cool, clammy skin
- Diaphoretic
- Polyphagia
- Tachycardia
- Palpitations
- Confusion
- Blurred vision
- Paresthesias
- Seizures
- Coma
- Decreased blood glucose level (<60-80 mg/dL)

(Jarvis, 2011; Shaw, 2012)

Diabetic Ketoacidosis (DKA)

Hyperglycemia (high blood glucose levels) may be caused by decreased insulin administration in Type I diabetics.

Diabetic ketoacidosis (DKA) is a potentially life-threatening complication in patients with diabetes mellitus. DKA results from a shortage of insulin; in response the body burns fatty acids for energy and produces acidic ketone bodies that cause most of the symptoms and complications. Possible causes include:

- Lack of circulating insulin in Type I diabetics leading to a hyperosmolar and hyperglycemic state with ketone production
- New onset diabetes
- Inadequate insulin use in a known diabetic patient
- Stress (MI, CVA, trauma, surgery, emotional upset) in a known Type I diabetic
- Medications (steroids, beta blockers, thiazide diuretics)
- Alcohol use

Key *subjective* assessment findings are:

- Myalgias
- Flu-like signs and symptoms
- Lethargy
- Nausea
- Decreased level of consciousness
- Coma

Key *objective* assessment findings are:

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- Warm, dry skin
- Increased blood glucose levels (approximately 300-700mg/dL)
- Polydipsia
- Polyuria (due to osmotic diuresis)
- Dehydration
- Increased BUN, Hct, Hgb, acetone breath (exhalation of ketones)
- Positive urine and serum ketones
- Metabolic acidosis
- Kussmaul's respirations
- Increased serum osmolarity

(Jarvis, 2011; Shaw, 2012)

Hyperglycemia and HHS

Hyperosmolar hyperglycemic state (HHS) is a serious condition most frequently seen in older persons. HHS is usually brought on by illness or infection.

In HHS, blood sugar levels rise, and the body attempts to lower blood glucose levels by increasing glucose excretion in the urine. If this state continues, severe dehydration can result, causing seizures, coma and eventually death. The possible cause is a lack of circulating insulin in Type II diabetics, leading to a hyperosmolar and hyperglycemic state without ketone production.

Key *subjective* assessment findings are:

- Myalgias
- Flu-like signs and symptoms
- Lethargy
- Nausea
- Decreased level of consciousness
- Coma

Key *objective* assessment findings are:

- Warm, dry skin
- Increased blood glucose levels (approximately 400-2,000mg/dL)
- Polydipsia, polyuria (due to osmotic diuresis)
- Severe dehydration
- Increased BUN, Hct, Hgb
- Negative urine and serum ketones
- Absence of acetone breath (no ketones, no acidosis)
- Increased serum osmolarity (>315 mOsm/kg)
- Wider variety of mental status changes including hallucinations, seizures, aphasia

(Jarvis, 2011; Shaw, 2012).

Overall Assessment Findings

Introduction

Assessment findings can be divided into subjective (patient's report of symptoms) and objective (concrete facts) findings, which the clinician must put together to obtain a clear clinical picture of what is occurring in the body.

A subjective assessment includes assessment of four main ideas:

- Family history
- Mood and memory
- Neuromuscular status
- Nutrition, energy and gastrointestinal (GI) or gastrourinary (GU)

An objective assessment includes an assessment of vital signs, mood, neuromuscular abnormalities, nutrition and fluid status, and assessment of the integumentary system.

Overall Assessment Findings: Subjective

Area of Assessment	Key Questions for Assessments	Rationale
<ul style="list-style-type: none"> Family history 	<ul style="list-style-type: none"> Does anyone in your family have diabetes, thyroid problems, or another endocrine disorder? 	<ul style="list-style-type: none"> Some disorders are hereditary
<ul style="list-style-type: none"> Mood & memory 	<ul style="list-style-type: none"> Have you noticed a change in your mood or memory? 	<ul style="list-style-type: none"> Hypoglycemia can cause agitation or confusion; may or may not be related to undiagnosed diabetes Hypothyroidism can dull mental function Mood swings may occur with Cushing's syndrome.

Area of Assessment	Key Questions for Assessments	Rationale
<ul style="list-style-type: none"> Neuromuscular 	<ul style="list-style-type: none"> Have you noticed any twitching or muscle spasms? Do you have numbness, tingling, or pain in your feet, legs, or hands? 	<ul style="list-style-type: none"> Excessive secretion of antidiuretic hormone (SIADH) or hypoparathyroidism can cause twitching and muscle spasms from calcium depletion Numbness and tingling can be neuropathy from diabetes, or low calcium from hypoparathyroidism
<ul style="list-style-type: none"> Nutrition, energy, GI/GU 	<ul style="list-style-type: none"> Have you unintentionally gained or lost weight? Have you noticed excessive thirst or urination? Have you noticed a change in your energy level? 	<ul style="list-style-type: none"> Weight gain may be associated with hypothyroidism, water retention (could be from Cushing's syndrome, or SIADH) Weight loss may result from uncontrolled diabetes, hyperthyroidism, or dehydration (may be related to Addison's disease.) Excessive thirst and urination can indicate diabetes mellitus and diabetes insipidus. Diabetes, hypothyroidism, hyperthyroidism, Addison's disease, or pituitary disorders can be associated with a lack of energy.

Overall Assessment Findings: Objective

Area of Assessment	Assessment Finding	Possible Causes
<ul style="list-style-type: none"> Vital signs 	<ul style="list-style-type: none"> Change in pulse or temperature Elevated blood pressure Decreased blood pressure 	<ul style="list-style-type: none"> Elevated due to increased metabolic rate in hyperthyroidism; decreased due to slowed metabolic rate in hypothyroidism

		<ul style="list-style-type: none"> Increased catecholamine release in pheochromocytoma or fluid retention in Cushing's syndrome can elevate blood pressure Sodium and water loss in Addison's disease can lower blood pressure
<ul style="list-style-type: none"> Mood 	<ul style="list-style-type: none"> Depressed mood or affect Nervousness 	<ul style="list-style-type: none"> Hypothyroidism can cause depression Hyperthyroidism, pheochromocytoma can cause nervous behavior

Area of Assessment	Assessment Finding	Possible Causes
<ul style="list-style-type: none"> Neuromuscular, Head and Neck 	<ul style="list-style-type: none"> Tremor Exophthalmos (bulging eyes) Fat pads on neck and shoulders ("buffalo hump"), round "moon" face Enlarged thyroid gland 	<ul style="list-style-type: none"> Tremor can be seen with hyperthyroidism, hypoglycemia, or pheochromocytoma Fat deposits and edema behind the eyes is a sign of Graves' disease Cushing's syndrome causes accumulation of fat deposits Thyroid gland enlarges with TSH stimulation in hypothyroidism or hyperthyroidism
<ul style="list-style-type: none"> Nutrition, fluid balance 	<ul style="list-style-type: none"> Weight loss Weight gain Poor skin turgor 	<ul style="list-style-type: none"> Weight loss may be caused by increased metabolic rate in hyperthyroidism, uncontrolled diabetes, or dehydration Weight gain may be from excess fluid or decreased metabolic rate in hypothyroidism Skin turgor is affected by dehydration from water loss in Addison's disease, diabetes

Area of Assessment	Assessment Finding	Possible Causes
<ul style="list-style-type: none"> Integumentary 	<ul style="list-style-type: none"> Hyperpigmentation of skin Dry, scaly skin Dusky lower extremities with weak peripheral pulses 	<ul style="list-style-type: none"> Addison's disease results in skin hyperpigmentation Dry skin can be a sign of hypothyroidism Circulatory changes in are seen in diabetes mellitus

Test Yourself

A 15 year-old male presents in the ICU after a motor vehicle accident where he was thrown out of the car. He had a ventriculostomy from day one to day five. The physician asks if you think it is time to remove the urinary catheter. You reply the patient has had a urine output of 300 mLs/hr for the last three hours with a specific gravity of 1.001.

You anticipate orders for which endocrine disorder?

The correct answer is: Diabetes Insipidus.

Test Yourself

A 55 year old male presents to the emergency department with decreased level of consciousness. His wife says he has been complaining of nausea and flu-like symptoms today. His medication list shows that he takes Metformin. A blood glucose is done, which comes back at 530 mg/dL, and his urine is negative for ketones. He is most likely suffering from:

- A. Hyperosmolar hyperglycemic state (HHS)
- B. Diabetic ketoacidosis (DKA)
- C. Pancreatitis

The correct answer is: A- Hyperosmolar hyperglycemic state (HHS).

Conclusion

Integrating the health history and physical exam in a focused endocrine assessment takes experience, and more importantly, practice. It is not enough to simply ask the right questions and perform the physical exam. As the nurse, you must critically analyze all of the data you obtain, synthesize the data into a relevant problem focus, and then identify a plan of care for your patient based upon this synthesis. As the plan of care is being carried out, reassessments must occur on a periodic basis. How often these reassessments occur is unique to each patient, based upon their specific endocrine disorder.

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