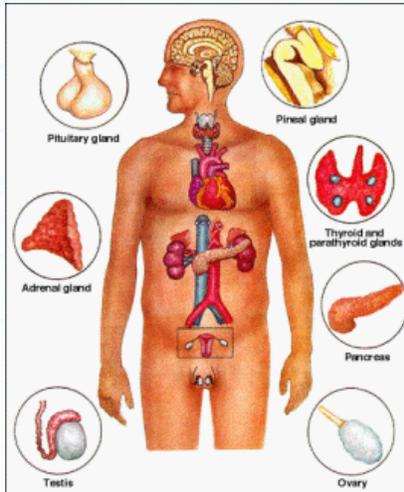


# Endocrinology



**E**ndocrinology is a specialty of medicine; some would say a sub-specialty of internal medicine, which deals with the diagnosis and treatment of diseases related to hormones. Endocrinology covers such human functions as the coordination of metabolism, respiration, reproduction, sensory perception, and movement. Endocrinology also focuses on the endocrine glands and tissues that secrete hormones.

The word "endocrinology" comes from the Greek endon meaning "within", and the Greek krinein meaning "to

separate".

## What is the endocrine system?

The human endocrine system consists of a number of glands. These glands produce and secrete hormones which control the body's metabolism, growth, sexual development and function. When the hormones leave the glands they enter the bloodstream and are transported to organs and tissues in every part of the body.

- **Below is a list of glands in the human body and what they do:**

Adrenal glands (suprarenal glands) - located atop the kidneys. Adrenal glands are divided into 2 regions, the right gland is triangular while the left one is semilunar in shape. These glands secrete corticosteroids and catecholamines, such as norepinephrine and adrenaline (epinephrine), which are hormones that are released in response to stress.

The adrenal glands also produce androgens, male sex hormones that promote the development of male characteristics. Testosterone is the major androgen. These glands produce aldosterone which affects kidney function.

- Hypothalamus - located just above the brain stem, below the thalamus. This gland activates and controls involuntary body functions, appetite, sleep, temperature, as well as the circadian cycles. The hypothalamus links the nervous system to the endocrine system via the hypophysis (pituitary gland).

- Ovaries and testicles - the ovaries, located on either side of the uterus in females, secrete the hormones estrogen and progesterone; these hormones ensure sexual development, fertility and healthy menstrual periods. The testicles, located in the scrotum below the penis in males, secrete androgens, mainly testosterone, that control sexual development, puberty, facial hair, sexual behavior, libido, erectile function, and the formation of spermatozoa (spermatogenesis).
- Pancreas - located in the abdomen. The pancreas is both an endocrine gland and a digestive organ. It produces insulin, somatostatin, glucagon, and pancreatic polypeptide. Insulin plays a key role in carbohydrate and fat metabolism in the body. Somatostatin regulates endocrine and nervous system function; it inhibits the secretion of several hormones, such as gastrin, insulin and growth hormone. Glucagon is a peptide hormone which raises blood glucose levels when they fall too low. Pancreatic polypeptide helps control the secretion of substances made by the pancreas. A peptide is a molecule that is made up of at least two amino acids.
- Parathyroid glands - small endocrine glands located in the neck. They produce parathyroid hormone, which regulates calcium and phosphorous in the blood, blood clotting, and neuromuscular excitation.
- Pineal body (pineal gland) - a small endocrine gland located in the brain. It secretes melatonin, and is probably involved in controlling the body's sleep patterns.
- Pituitary gland - an endocrine gland located just off the hypothalamus at the base of the brain (a protrusion off the hypothalamus). Known as the main endocrine master gland, because it secretes hormones that regulate the functions of other glands, as well as growth and several body functions.

The anterior pituitary secretes hormones that affect sexual development, thyroid function, growth, skin pigmentation, and adrenocortical function. If the anterior pituitary is underactive, it can lead to dwarfism in childhood and underactivity in other endocrine glands.

The posterior pituitary secretes oxytocin, a hormone that raises uterine contractions as well as ADH (antidiuretic hormone) which encourages the reabsorption of water by the kidneys.

- Thymus gland - an endocrine gland located beneath the breastbone (sternum). T lymphocytes, types of immune cells, mature and multiply in the thymus gland early in life. After puberty the gland shrinks. The thymus gland plays a role in the body's immune system.
- Thyroid gland - an endocrine gland located just below the Adam's apple in the neck; it produces hormones that play a key role in regulating blood pressure, body temperature, heart rate, metabolism, and how the body reacts to other hormones. The thyroid gland uses iodine to manufacture hormones. The two main hormones are

thyroxine and triiodothyronine. The thyroid gland also produces calcitonin, which stimulates bone cells to add calcium to bone, as well as regulating calcium metabolism.

## **Endocrine Diseases**

**There are three broad groups of endocrine disorders:**

- Endocrine gland hyposecretion - when the gland is not producing enough. It can lead to hormone deficiency.
- **Endocrine gland hypersecretion** - when the gland is overactive and produces too much. It can lead to excess levels of certain hormones.
- Tumors of endocrine glands - these may be malignant (cancerous) or benign (non-cancerous).

**Below are some examples of what may occur if a gland secretes too much or too little of its hormones:**

- Adrenal Gland hypersecretion may lead to over-nervousness, sweating, raised blood pressure, and Cushing's disease.

**Adrenal Gland hyposecretion may lead to Addison's disease, Mineralocorticoid deficiency, and diabetes.**

- Pancreas hypersecretion may lead to hyperinsulinism, too much insulin and not enough glucose gets to the brain.

**Pancreas hyposecretion may lead to diabetes.**

- Parathyroid Gland hypersecretion may lead to brittle bones that fracture easily, as well as stones in the urinary system.

**Parathyroid Gland hyposecretion may lead to muscle tetany, caused by low levels of calcium in plasma.**

- Thyroid Gland hypersecretion may lead to Graves disease, accelerated metabolism, sweating, arrhythmia (irregular heart beat), weight loss, and nervousness.

**Thyroid Gland hyposecretion may lead to tiredness, weight gain, depression, abnormal bone development, mental retardation, and stunted growth.**

- Pituitary Gland hypersecretion may lead to gigantism (excessive growth).

**Pituitary Gland hyposecretion may lead to slow bone growth (dwarfism).**

- Thymus Gland hypersecretion may lead to an overactive immune system.

**Thymus Gland hyposecretion may lead to a weakened immune system.**

- Ovary hypersecretion may lead to exaggerated female traits.

**Testicle hypersecretion may lead to exaggerated male characteristics.**

**What is an endocrinologist?**

A doctor who specializes in endocrinology is an endocrinologist. they diagnose diseases that affect the glands mentioned above. An endocrinologist is an expert is treating frequently complex conditions which involved several different systems within the human body.

If patients visit their primary care physician (GP, general practitioner, family doctor), and he/she suspects there is a problem with the endocrine system, they will be referred to an endocrinologist.

An endocrinologist diagnoses and treats hormone problems by attempting to restore hormone balance within the body's system. The following diseases or disorders are commonly treated by endocrinologists: high blood pressure (hypertension), diabetes, osteoporosis, cholesterol problems, menopause, metabolic disorders, thyroid diseases, excessive or insufficient production of hormones, some cancers, short stature, and infertility.

Diseases (in Alphabetical Order)

#### **ADRENAL GLAND**

- Addison Disease
- Adrenal Carcinoma
- Adrenal Crisis
- Adrenal Crisis in Emergency Medicine
- Adrenal Disease and Pregnancy
- Adrenal Hemorrhage
- Adrenal Incidentaloma
- C-11 Hydroxylase Deficiency
- C-17 Hydroxylase Deficiency
- Exogenous Cushing Syndrome
- Pheochromocytoma
- Primary Aldosteronism

**Pseudo-Cushing Syndrome**

## DIABETES MELLITUS

- Blood Glucose Monitors
- Bullous Disease of Diabetes
- Diabetes Mellitus and Pregnancy
- Diabetic Foot Infections
- Diabetic Ketoacidosis
- Diabetic Neuropathy
- Diabetic Retinopathy
- Diabetic Ulcers
- Glucose Intolerance
- Hypoglycemia
- Infection in Patients With Diabetes Mellitus
- Insulinoma
- Ketosis-Prone Type 2 Diabetes
- Nutrition in Patients With Diabetes
- Pediatric Diabetic Ketoacidosis
- Pseudohypoglycemia
- Somogyi Phenomenon
- Type 1 Diabetes Mellitus
- Type 2 Diabetes Mellitus

## GONADS

- Amenorrhea
- Anabolic Steroid Use and Abuse
- Androgen Excess
- Androgenetic Alopecia
- Anovulation
- Dysfunctional Uterine Bleeding
- Fallopian Tube Reconstruction
- Follicle-Stimulating Hormone Abnormalities
- Gonadotropin-Releasing Hormone Deficiency in Adults
- Gynecomastia
- Hirsutism
- Luteal Phase Dysfunction

- Luteinizing Hormone Deficiency
- Ovarian Insufficiency
- Ovotesticular Disorder of Sexual Development

### **METABOLIC BONE DISEASE**

- Bone Markers in Osteoporosis
- Osteopetrosis
- Osteoporosis in Solid Organ Transplantation

### **METABOLIC DISORDERS**

- Acquired Partial Lipodystrophy
- Alcoholic Ketoacidosis
- Beriberi (Thiamine Deficiency)
- Calcinosis Cutis
- Calciphylaxis
- Carotenemia
- Cholesterol Embolism
- Cyclooxygenase Deficiency
- Diseases of Tetrapyrrole Metabolism - Refsum Disease and the Hepatic Porphyrins
- Familial Hypercholesterolemia
- Generalized Lipodystrophy
- Glucose-6-Phosphatase Deficiency
- High HDL Cholesterol (Hyperalphalipoproteinemia)
- Hyperglucagonemia
- Hyperglycemia and Hypoglycemia in Stroke
- Hypertriglyceridemia
- Inborn Errors of Metabolism
- Insulin Resistance
- Lecithin-Cholesterol Acyltransferase Deficiency
- Localized Lipodystrophy
- Low HDL Cholesterol (Hypoalphalipoproteinemia)
- Low LDL Cholesterol (Hypobetalipoproteinemia)
- Methylmalonic Acidemia
- Necrobiosis Lipoidica
- Neonatal Hypoglycemia

- Obesity
- Ochronosis
- Osteoma Cutis
- Polygenic Hypercholesterolemia
- Porphyria Cutanea Tarda
- Pretibial Myxedema
- Propionic Acidemia
- Protein-Energy Malnutrition
- Pyridoxine Deficiency
- Pyruvate Carboxylase Deficiency
- Pyruvate Kinase Deficiency
- Respiratory Acidosis
- Respiratory Alkalosis
- Riboflavin Deficiency
- Scurvy
- Type Ia Glycogen Storage Disease
- Type Ib Glycogen Storage Disease
- Type II Glycogen Storage Disease (Pompe Disease)
- Type III Glycogen Storage Disease
- Type IV Glycogen Storage Disease
- Type V Glycogen Storage Disease
- Type VI Glycogen Storage Disease
- Type VII Glycogen Storage Disease
- Vitamin A Deficiency
- Vitamin D Deficiency and Related Disorders
- Vitamin E Deficiency
- Vitamin K Deficiency

#### **MISCELLANEOUS TOPICS IN ENDOCRINOLOGY**

- Endocannabinoids

#### **MULTIPLE ENDOCRINE DISEASE AND MISCELLANEOUS ENDOCRINE DISEASE**

- Endocrine Myopathies
- Exocrine Pancreatic Insufficiency
- Glucagonoma

- Hypercalcemia
- Hyperchloremic Acidosis
- Hyperkalemia
- Hypermagnesemia in Emergency Medicine
- Hyponatremia
- Hyperosmolar Hyperglycemic State
- Hyperphosphatemia
- Hyperuricemia
- Hypoalbuminemia
- Hypocalcemia
- Hypokalemia
- Hyponatremia
- Hypophosphatemia
- Hyporeninemic Hypoaldosteronism
- Lactic Acidosis
- Lichen Amyloidosis
- Macular Amyloidosis
- McCune-Albright Syndrome
- Multiple Endocrine Neoplasia Type 1
- Neoplasms of the Endocrine Pancreas
- Nodular Localized Cutaneous Amyloidosis
- Type 2 Multiple Endocrine Neoplasia
- Type I Polyglandular Autoimmune Syndrome
- Type II Polyglandular Autoimmune Syndrome
- Type III Polyglandular Autoimmune Syndrome
- VIPomas
- Wermer Syndrome (MEN Type 1)

#### **PARATHYROID GLAND**

- Hyperparathyroidism
- Hypoparathyroidism
- Milk-Alkali Syndrome
- Parathyroid Carcinoma
- Pseudohypoparathyroidism

#### **PITUITARY GLAND**

- Diabetes Insipidus
- Growth Hormone Deficiency
- Growth Hormone Replacement in Older Men
- Hyperprolactinemia
- Hypopituitarism (Panhypopituitarism)
- Kallmann Syndrome and Idiopathic Hypogonadotropic Hypogonadism
- Nasal and Sublabial Approaches to the Pituitary
- Pituitary Apoplexy
- Pituitary Disease and Pregnancy
- Pituitary Macroadenomas
- Pituitary Microadenomas
- Prolactin Deficiency
- Prolactinoma

## THYROID

- Anaplastic Thyroid Carcinoma
- Autoimmune Thyroid Disease and Pregnancy
- Diffuse Toxic Goiter
- Euthyroid Hyperthyroxinemia
- Euthyroid Sick Syndrome
- Follicular Thyroid Carcinoma
- Goiter
- Graves Disease
- Hashimoto Thyroiditis
- Hurthle Cell Carcinoma
- Hyperthyroidism
- Hyperthyroidism, Thyroid Storm, and Graves Disease
- Hypothyroidism
- Hypothyroidism and Myxedema Coma
- Iodine Deficiency
- Lithium-Induced Goiter
- Medullary Thyroid Carcinoma
- Myxedema Coma or Crisis
- Neurological Manifestations of Thyroid Disease
- Nontoxic Goiter
- Papillary Thyroid Carcinoma

- Riedel Thyroiditis
- Subacute Thyroiditis
- Substernal Thyroid Goiter
- Thyroid Dysfunction Induced by Amiodarone Therapy
- Thyroid Hormone Toxicity
- Thyroid Nodule
- Thyroid-Associated Orbitopathy
- Thyrotoxic Storm Following Thyroidectomy
- Thyroxine-Binding Globulin Deficiency
- Toxic Nodular Goiter

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