

# Anatomy and Pathophysiology for ICD-10

## Module 8



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# Content

## Module 8

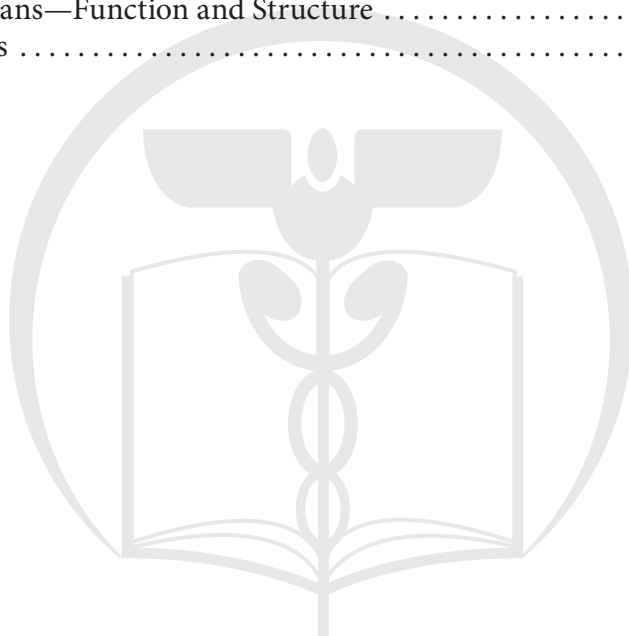
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## Terminology

**Glands**—Organ in body that synthesizes a substance for release.

**Hypoglycemia**—State produced by a lower than normal level of blood glucose.

**Hyperthyroidism**—Overactive tissue within the thyroid gland causing an overproduction of thyroid hormones.

**Hypothyroidism**—Deficiency of thyroid hormone.

**Thyrototoxicosis**—Clinical condition of increased thyroid hormones in the blood.

**Thyrototoxic crisis**—Rare but severe complication of hyperthyroidism, which may occur when a thyrototoxic patient becomes very sick or physically stressed.

## Introduction

The endocrine system consists of a series of ductless glands: pituitary, thyroid, pineal, parathyroid, thymus, adrenal, pancreas, ovaries, and testes. The system secretes hormones into the blood via the endocrine glands. It is an information signal system like the nervous system. The endocrine system works with the nervous system to regulate body functions. Hormones are grouped into three classes based on their structures—steroids, peptides, and amines.

The glands are located throughout the body. In this section we will discuss the following:

- Pituitary gland
- Thyroid gland
- Parathyroid gland
- Pineal gland
- Thymus
- Adrenal glands
- Pancreas
- Ovaries/Testes

## Endocrine System Organs—Function and Structure

### Pituitary Gland

The pituitary gland, also called the hypophysis, is a gland about the size of a pea and weighs 0.5 g (0.02 oz.). It is a protrusion off the bottom of the hypothalamus at the base of the brain, and rests in the sella turcica, a small, bony cavity, covered by the diaphragma sellae, a dural fold. The pituitary is functionally connected to the hypothalamus by the median eminence via the infundibular stem (pituitary stalk). The pituitary fossa, in which the pituitary gland sits, is situated in the sphenoid bone in the middle cranial fossa at the base of the brain. The pituitary gland secretes six hormones that regulate homeostasis.

The pituitary gland consists of two components—the anterior pituitary (adenohypophysis) and the posterior pituitary (neurohypophysis)—and is functionally linked to the hypothalamus by the pituitary stalk (the “infundibular stem,” or “infundibulum”). It is from the hypothalamus that hypothalamic factors are released to descend down the pituitary stalk to the pituitary gland where they stimulate the release of pituitary hormones. While the pituitary gland is known as the ‘master’ endocrine gland, both of the lobes are under the control of the hypothalamus; the anterior pituitary receives its signals from the parvocellular neurons and the posterior pituitary receives its signals from magnocellular neurons.

Some of the hormones secreted by the anterior pituitary include:

**Adrenocorticotrophic hormone (ACTH)**—released under influence of hypothalamic Corticotropin Releasing Hormone (CRH)

**Thyroid-stimulating hormone (TSH)**—released under influence of hypothalamic Thyrotropin Releasing Hormone (TRH)

**Growth hormone** (also referred to as ‘Human Growth Hormone’, ‘HGH’ or simply, ‘GH’)—released under influence of hypothalamic Growth Hormone Releasing Hormone (GHRH); inhibited by hypothalamic Somatostatin

The posterior pituitary stores and releases:

**Oxytocin**, most of which is released from the paraventricular nucleus in the hypothalamus

**Antidiuretic hormone** (ADH, also known as vasopressin and AVP, arginine vasopressin), the majority of which is released from the supraoptic nucleus in the hypothalamus

Oxytocin is one of the few hormones to create a positive feedback loop. For example, uterine contractions stimulate the release of oxytocin from the posterior pituitary, which, in turn, increases uterine contractions. This positive feedback loop continues throughout labor.

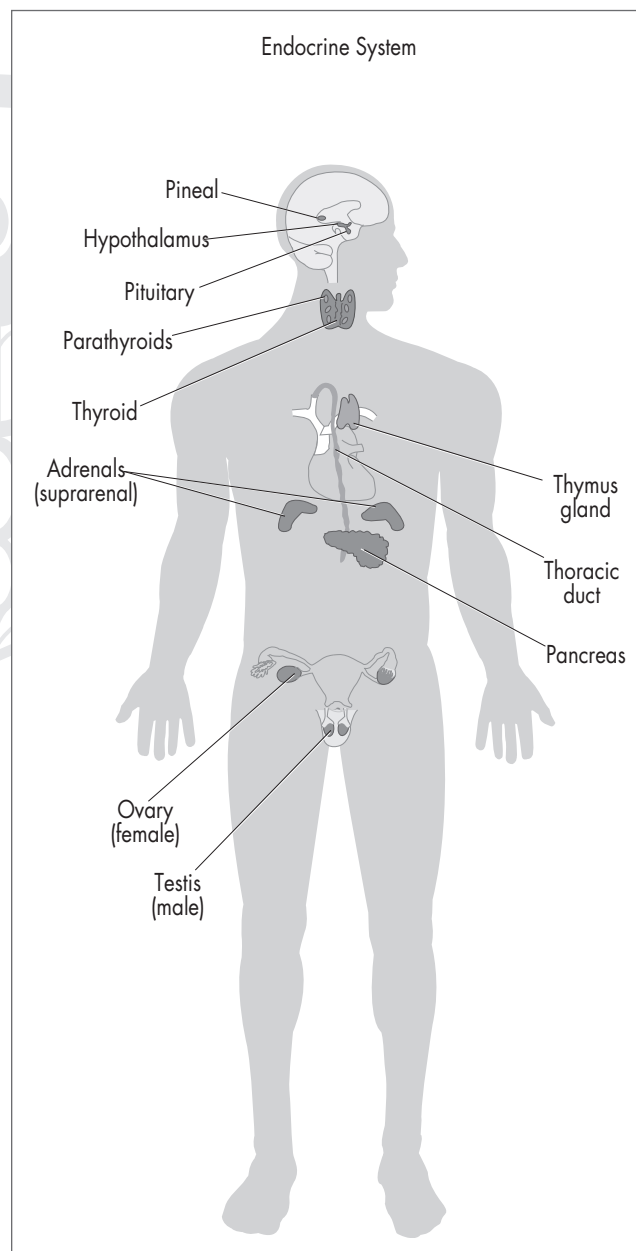
Hormones secreted from the pituitary gland help control the following body processes:

- Blood pressure
- Some aspects of pregnancy and childbirth including stimulation of uterine contractions during childbirth
- Breast milk production
- Sex organ functions in both men and women
- Thyroid gland function
- Conversion of food into energy (metabolism)
- Water and osmolarity regulation in the body
- Temperature regulation

## Thyroid Gland

The thyroid gland is one of the largest endocrine glands and regulates metabolism, therefore body temperature and weight. It is a butterfly-shaped organ located in the anterior side of the neck, inferior to the thyroid cartilage, about at the level of the cricoid cartilage. It is composed of two cone-like lobes, the lobus dexter (right lobe), and the lobus sinister (left lobe), which are connected by the isthmus. The thyroid gland gets its name from the Greek word for “shield,” after the shape of the related thyroid cartilage.

The thyroid hormones contain iodine, which the thyroid needs to manufacture these hormones. If a person lacks iodine in his or her diet, the thyroid cannot make the hormones, causing a deficiency. In response to the body’s feedback loops calling for more thyroid hormones, the thyroid gland then enlarges to attempt to compensate. This disorder is called goiter.



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The thyroid gland produces thyroid hormones, the principal ones being triiodothyronine ( $T_3$ ) and thyroxine

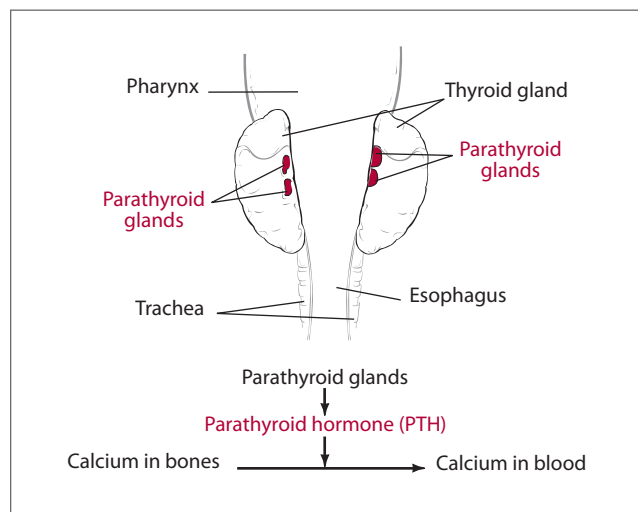
( $T_4$ ). These hormones regulate the rate of metabolism and affect the growth and rate of function of many other systems in the body.  $T_3$  and  $T_4$  are synthesized utilizing both iodine and tyrosine. The thyroid gland also produces calcitonin, which plays a role in calcium homeostasis.

The thyroid gland is controlled by thyroid-stimulating hormone (TSH) produced by the pituitary (to be specific, the anterior pituitary) and thyrotropin-releasing hormone (TRH) produced by the hypothalamus.

## Parathyroid Glands

The parathyroid glands are small endocrine glands in the neck that produce parathyroid hormone (PTH or parathormone). There are four parathyroid glands, which are usually located on the posterior surface of the thyroid gland, and are about the size of a grain of rice. They weigh about 25 mg–40 mg. Parathyroid glands control the amount of calcium in the blood and within the bones.

The parathyroid glands have two types of cells: parathyroid chief cells, which manufacture PTH, and oxyphil cells. The main function of the parathyroid glands is to maintain the body's calcium level within a very narrow range, so that the nervous and muscular systems can function properly. When blood calcium levels drop below a certain point, calcium-sensing receptors in the parathyroid gland are activated to release hormone into the blood.



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## Pineal Gland

The pineal gland (also called the pineal body, epiphysis cerebri, epiphysis or the third eye) is a small (about the size of a grain of rice) endocrine gland located near the center of the brain, between the two hemispheres. It resembles a pine cone (hence its name) and is reddish-grey in color. The pineal gland is stimulated by nerves from the eyes. It produces the serotonin derivative melatonin, a hormone that affects the modulation of wake/sleep patterns and seasonal functions. Melatonin also affects thyroid and adrenal cortex functions. The human pineal gland grows in size until about 1–2 years of age, remaining stable thereafter, although its weight increases gradually from puberty onwards. When puberty arrives, melatonin production is reduced. Calcification of the pineal gland is typical in adults.

## Thymus Gland

The thymus gland sits in the middle of the pleural cavity and aids in developing the immune system. The only known function of the thymus is the production and “education” of T-lymphocytes (T cells), which are critical cells of the adaptive immune system. The thymus is composed of two identical lobes and is located anatomically in the anterior superior mediastinum, in front of the heart and behind the sternum.

The thymus is divided into a central medulla and a peripheral cortex, which is surrounded by an outer capsule. Cells in the thymus can be divided into thymic stromal cells and cells of hematopoietic origin. Developing T-cells are referred to as thymocytes and are of hematopoietic origin. Stromal cells include thymic cortical epithelial cells, thymic medullary epithelial cells, and dendritic cells.

The thymus continues to grow between birth and puberty, as it is largest and most active during the neonatal and pre-adolescent periods. The thymus is of a pinkish-gray color, soft, and lobulated on its surfaces in children. By the early teens, the thymus begins to atrophy due to high levels of circulating hormones and thymic stroma is replaced by adipose tissue. The thymus of older people is scarcely distinguishable from surrounding fatty tissue. As one ages the thymus slowly shrinks and becomes yellow in color, eventually degenerating into tiny islands of fatty tissue.

Nevertheless, residual T lymphopoiesis continues throughout adult life.

## Adrenal Glands

The adrenal glands, or suprarenal glands, sit on top of each kidney and are divided into two parts. The right adrenal is triangular shaped and the left is semilunar shaped. They are mainly responsible for releasing hormones in conjunction with stress through the synthesis of corticosteroids, like cortisol and catecholamines, like epinephrine. Adrenal glands also affect kidney function by secreting aldosterone. Each adrenal gland is separated into two distinct structures, the adrenal cortex and medulla, both of which produce hormones. The cortex mainly produces cortisol, aldosterone, and androgens, while the medulla chiefly produces epinephrine and norepinephrine.

The adrenal cortex is devoted to the synthesis of corticosteroid hormones from cholesterol. Specific cortical cells produce particular hormones including cortisol, corticosterone, androgens such as testosterone, and aldosterone. Under normal unstressed conditions, the human adrenal glands produce the equivalent of 35–40 mg of cortisone acetate per day. In contrast to the direct innervation of the medulla, the cortex is regulated by neuroendocrine hormones secreted by the pituitary gland and hypothalamus, as well as by the renin-angiotensin system.

The adrenal cortex comprises three zones, or layers. This anatomic zonation can be appreciated at the microscopic level, where each zone can be recognized and distinguished from one another based on structural and anatomic characteristics. The adrenal cortex exhibits functional zonation as well: by virtue of the characteristic enzymes present in each zone, the zones produce and secrete distinct hormones.

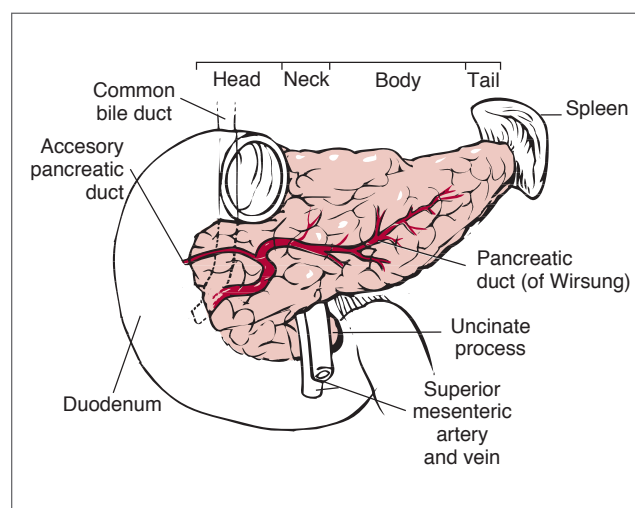
The adrenal medulla is the core of the adrenal gland, and is surrounded by the adrenal cortex. The chromaffin cells of the medulla, named for their characteristic brown staining with chromic acid salts, are the body's main source of the circulating catecholamines adrenaline (epinephrine) and noradrenaline (norepinephrine). Derived from the amino acid tyrosine, these water-soluble hormones are major hormones underlying the fight-or-flight response.

To carry out its part of this response, the adrenal medulla receives input from the sympathetic nervous system through preganglionic fibers originating in the thoracic spinal cord from T5–T11. Because it is innervated by preganglionic nerve fibers, the adrenal medulla can be considered as a specialized sympathetic ganglion. Unlike other sympathetic ganglia, however, the adrenal medulla lacks distinct synapses and releases its secretions directly into the blood.

Cortisol also promotes epinephrin synthesis in the medulla. Produced in the cortex, cortisol reaches the adrenal medulla and at high levels, the hormone can promote the upregulation of phenylethanolamine N-methyltransferase (PNMT), increasing epinephrine synthesis and secretion.

## Pancreas

The pancreas sits in the upper left quadrant of the abdomen under the stomach. The head of the pancreas lies within the concavity of the duodenum. The uncinate process emerges from the lower part of the head, and lies deep to the superior mesenteric vessels. The neck is the constricted part between the head and the body. The body lies behind the stomach. The tail is the left end of the pancreas, and it lies in contact with the spleen.



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The pancreas produces insulin and glucagon, which are responsible for regulating glucose levels in the blood. Insulin decreases blood glucose levels and glucagon increases blood glucose levels. They work together to



maintain optimal glucose levels in the body to ensure that the body's needs are being met.

It is both an endocrine gland producing several important hormones—including insulin, glucagon, and somatostatin—as well as an exocrine gland, secreting pancreatic juice containing digestive enzymes that pass to the small intestine. These enzymes help to further break down the carbohydrates, proteins, and fats in the chyme.

The part of the pancreas with endocrine function is made up of approximately a million cell clusters called islets of Langerhans. Four main cell types exist in the islets. They are relatively difficult to distinguish using standard staining techniques, but they can be classified by their secretion:  $\alpha$  cells secrete glucagon (increase glucose in blood),  $\beta$  cells secrete insulin (decrease glucose in blood),  $\delta$  cells secrete somatostatin (regulates/stops  $\alpha$  and  $\beta$  cells), and PP cells secrete pancreatic polypeptide.

The islets are a compact collection of endocrine cells arranged in clusters and cords and are crisscrossed by a dense network of capillaries. The capillaries of the islets are lined by layers of endocrine cells in direct contact with vessels, and most endocrine cells are in direct contact with blood vessels, by either cytoplasmic processes or by direct apposition.

The pancreas as an exocrine gland helps out the digestive system. It secretes pancreatic juice that contains digestive enzymes that pass to the small intestine. These enzymes help to further break down the carbohydrates, proteins, and lipids (fats) in the chyme.

## Ovaries and Testes

The ovaries are the female sex glands and produce estrogen and progesterone. The testes are the male sex glands and produce testosterone.

The ovary is an ovum-producing reproductive organ, often found in pairs as part of the female reproductive system. Ovaries in females are homologous to testes in males, in that they are both gonads and endocrine glands. They lie within the pelvic cavity on either side of the uterus. There are two extremities to the ovary: the tubal extremity, the end to which the uterine tube attaches, and the uterine extremity, the end that is attached to the uterus via the ovarian ligament. The

ovaries aren't attached to the fallopian tubes but to the outer layer of the uterus via the ovarian ligaments. Usually each ovary takes turns releasing eggs every month, unless one ovary is dysfunctional or absent. In such a case, the sole ovary would continue to provide eggs to be released.

Ovaries are oval shaped and measure approximately 3 cm x 1.5 cm x 1.5 cm (about the size of a Greek olive). The ovary is located in the lateral wall of the pelvis in a region called the ovarian fossa. The fossa usually lies beneath the external iliac artery and in front of the ureter and the internal iliac artery.

Ovaries secrete both estrogen and progesterone. Estrogen is responsible for the appearance of secondary sex characteristics of females at puberty and for the maturation and maintenance of the reproductive organs in their mature functional state. Progesterone functions with estrogen by promoting cyclic changes in the endometrium to prepare it for pregnancy, as well as by helping maintain the endometrium in a healthy state during pregnancy.

Like the ovaries, testes are components of both the reproductive system (being gonads) and the endocrine system (being endocrine glands). They are located behind the penis in the scrotum. The respective functions of the testes are to produce and store spermatozoa and to produce male sex hormones, like testosterone. These hormones control the development of the reproductive organs and other male characteristics, such as body and facial hair, low voice, and wide shoulders.

Both functions of the testicle, sperm-forming and endocrine, are under control of gonadotropic hormones produced by the anterior pituitary, luteinizing hormone (LH), and follicle-stimulating hormone (FSH). They are located behind the penis in a pouch of skin called the scrotum.

The adult testes made up largely of a series of tubules with a central cavity. Sperm cells are continuously maturing as they move from the outer edge of the tubule into the central lumen. In the most primitive forms, called spermatogonia, the cells differentiate first into spermatocytes and then spermatids. They eventually mature into spermatozoa and are released into the lumen. Spermatozoa travel through the tubular



network to be stored in seminal vesicles and, finally, to be ejaculated with the semen. Among the seminiferous tubules are Sertoli cells, and in the area between tubules (interstitium) are located the hormone-secreting Leydig cells. Sertoli cells are critical for the support of germ cell development into spermatozoa. Sertoli cells secrete inhibin. Leydig cells produce and secrete testosterone and other androgens important for sexual development and puberty, secondary sexual characteristics like facial hair, sexual behavior and libido, supporting spermatogenesis and erectile function. Testosterone also controls testicular volume.

## Diseases and Disorders

### Hyperthyroidism and Hypothyroidism

Hyperthyroidism occurs when the thyroid releases too much of its hormones thyroxine ( $T_4$ ) and/or triiodothyronine ( $T_3$ ) over a short or long period of time. Many diseases and conditions can cause this problem, including Graves disease, thyroiditis, tumors of the testes or ovaries, and getting too much iodine. Thyroid crisis (storm), also called thyrotoxicosis, is a sudden worsening of hyperthyroidism symptoms that may occur with infection or stress. Fever, decreased mental alertness, and abdominal pain may occur. Immediate hospitalization is needed.

The rate of thyroid hormone production is controlled by the pituitary gland. If there is an insufficient amount of thyroid hormone circulating in the body to allow for normal functioning, the release of TSH is increased by the pituitary in an attempt to stimulate the thyroid to produce more thyroid hormone. In contrast, when there is an excessive amount of circulating thyroid hormone, the release of TSH is reduced as the pituitary attempts to decrease the production of thyroid hormone.

Hypothyroidism occurs when the thyroid releases too little of its hormones thyroxine ( $T_4$ ) and/or triiodothyronine ( $T_3$ ). About 3 percent of the population suffers from this condition. There are a number of causes for hypothyroidism. Iodine deficiency is the most common cause of hypothyroidism worldwide. In iodine-replete individuals hypothyroidism is generally caused by Hashimoto's thyroiditis or otherwise as a result of either an absent thyroid gland or a deficiency

in stimulating hormones from the hypothalamus or pituitary.

Hypothyroidism is often classified by association with the indicated organ dysfunction. In primary hypothyroidism, the organ of origin is the thyroid gland. The most common forms of primary hypothyroidism are Hashimoto's thyroiditis and radioiodine therapy for hyperthyroidism. In secondary hypothyroidism, the organ of origin is the pituitary gland. Secondary hypothyroidism occurs if the pituitary gland does not create enough TSH to induce the thyroid gland to produce enough thyroxine and triiodothyronine. There is no clear-cut cause for secondary hypothyroidism, but it is usually caused by damage to the pituitary gland. In tertiary hypothyroidism, the organ of origin is the hypothalamus. This type results when the hypothalamus fails to produce sufficient TRH.

Most ICD-10-CM codes for hyperthyroidism and hypothyroidism can be found in the E03-E05 code range. To code these conditions in ICD-10-CM the following is necessary:

- Hyperthyroidism or hypothyroidism
  - Cause of condition
  - With or without goiter
  - With or without thyrotoxicosis crisis or storm

Following are examples of ICD-10-CM codes for the above conditions.

Congenital hypothyroidism with diffuse goiter	E03.0	Thyrotoxicosis with toxic single thyroid nodule without thyrotoxic crisis or storm	E05.10
Congenital hypothyroidism without goiter	E03.1	Thyrotoxicosis with toxic multinodular goiter with thyrotoxic crisis or storm	E05.21

Atrophy of thyroid (acquired)	E03.4	Thyrotoxicosis from ectopic thyroid tissue without thyrotoxic crisis or storm	E05.30
Hypothyroidism, unspecified	E03.9	Thyrotoxicosis, unspecified with thyrotoxic crisis or storm	E05.91

## Diabetes Mellitus

Diabetes mellitus is also called hyperglycemia. It is a disease of the endocrine system in which either the beta cells fail to secrete insulin or target cells fail to respond to insulin. When there is no insulin, glucose cannot enter the cells and the glucose levels in the blood greatly increase. Diabetes can be caused by too little insulin, resistance to insulin, or both. Diabetics have high blood sugar because their pancreas does not make enough insulin; their muscle, fat, and liver cells do not respond to insulin normally; or both. This high blood sugar produces the classical symptoms of polyuria, polydipsia, and polyphagia.



Source: AAPC

There are three main types of diabetes:

- **Type 1 diabetes:** Usually diagnosed in childhood and results from the body's failure to produce insulin and requires the person to inject insulin. The exact cause is unknown. Genetics, viruses, and autoimmune problems may play a role. (Also referred to as insulin-dependent diabetes mellitus, IDDM for short, and juvenile diabetes).
- **Type 2 diabetes:** Results from insulin resistance, a condition in which cells fail to use insulin properly, sometimes combined with an absolute insulin deficiency. This makes up most diabetic cases. The pancreas does not make enough insulin to keep blood glucose levels normal. This is often because the body does not respond well to insulin. (Formerly referred to as non-insulin-dependent diabetes mellitus, NIDDM for short, and adult-onset diabetes).
- **Gestational diabetes:** This is high blood glucose that develops any time during pregnancy in a woman who does not have diabetes. It may precede development of type 2 diabetes mellitus (DM) and cardiovascular disease later in life.

Type 1 diabetes mellitus is characterized by loss of the insulin-producing beta cells of the islets of Langerhans in the pancreas leading to insulin deficiency. This type of diabetes can be further classified as immune-mediated or idiopathic. The majority of type 1 diabetes is of the immune-mediated nature, where beta cell loss is a T-cell mediated autoimmune attack. There is no known preventive measure against type 1 diabetes. Approximately 10 percent of diabetes mellitus cases in North America and Europe are type 1. Sensitivity and responsiveness to insulin are usually normal, especially in the early stages. Type 1 diabetes can affect children or adults but was traditionally termed "juvenile diabetes" because it represents a majority of the diabetes cases in children.

Type 2 diabetes mellitus is characterized by insulin resistance, which may be combined with relatively reduced insulin secretion. The defective responsiveness of body tissues to insulin is believed to involve the insulin receptor. However, the specific defects are not known. Diabetes mellitus due to a known defect are classified separately. Type 2 diabetes is the most common type.

In the early stage of type 2 diabetes, the predominant abnormality is reduced insulin sensitivity. At this stage hyperglycemia can be reversed by a variety of measures and medications that improve insulin sensitivity or reduce glucose production by the liver.

There are many risk factors for type 2 diabetes, including:

- Age over 45 years
  - Parent/brother/sister with diabetes
  - Gestational diabetes or delivering a baby weighing more than 9 pounds
  - Heart disease
  - High blood cholesterol level
  - Obesity
  - Lack of/too little exercise
  - Polycystic ovary disease
  - Previous impaired glucose tolerance
- Some ethnic groups (particularly African Americans, Native Americans, Asians, Pacific Islanders, and Hispanic Americans)

Gestational diabetes mellitus (GDM) resembles type 2 diabetes in several respects, involving a combination of relatively inadequate insulin secretion and responsiveness. It occurs in about 2 percent–5 percent of all pregnancies and may improve or disappear after delivery. Gestational diabetes is fully treatable but requires careful medical supervision throughout the pregnancy. About 20 percent to 50 percent of affected women develop type 2 diabetes later in life.

Even though it may be transient, untreated gestational diabetes can damage the health of the fetus or mother. Risks to the baby include macrosomia (high birth weight), congenital cardiac and central nervous system anomalies, and skeletal muscle malformations. Increased fetal insulin may inhibit fetal surfactant production and cause respiratory distress syndrome. Hyperbilirubinemia may result from red blood cell destruction. In severe cases, perinatal death may occur, most commonly as a result of poor placental perfusion due to vascular impairment. Labor induction may be indicated with decreased placental function. A cesarean section may be performed if there is marked fetal

distress or an increased risk of injury associated with macrosomia, such as shoulder dystocia.

Diabetes that develops as a result of factors such as disease or hormonal problems is called secondary diabetes.

Secondary diabetes is rare, accounting for less than 2 percent of reported cases of diabetes. Outside factors that may cause secondary diabetes include hyperthyroidism, Cushing's syndrome, cystic fibrosis, hemochromatosis or any other damage done to the pancreas, hepatitis C, fatty liver disease, celiac disease, alcoholism and cancer of the pancreas, liver, lungs, intestines or stomach.

Other forms of diabetes mellitus include congenital diabetes, which is due to genetic defects of insulin secretion, cystic fibrosis-related diabetes, steroid diabetes induced by high doses of glucocorticoids, and several forms of monogenic diabetes.

The ICD-10-CM code range for diabetes mellitus is E08.00–E13.9. To code diabetes mellitus in ICD-10-CM the following is necessary:

- Type of diabetes
  - Body system affected
  - Use of insulin
  - Complication(s)
  - Manifestation(s)
  - Reason for secondary diabetes mellitus

Following is a sample of ICD-10-CM codes for diabetes mellitus

Type 1 diabetes mellitus with unspecified complications	E10.8
Type 1 diabetes mellitus without complications	E10.9
Type 2 diabetes mellitus with unspecified complications	E11.8
Type 2 diabetes mellitus without complications	E11.9

Other specified diabetes mellitus with unspecified complications	E13.8
Other specified diabetes mellitus without complications	E13.9

Diabetes mellitus due to underlying condition with diabetic nephropathy	E08.21
Diabetes mellitus due to underlying condition with diabetic chronic kidney disease	E08.22
Diabetes mellitus due to underlying condition with other diabetic kidney complication	E08.29
Diabetes mellitus due to underlying condition with moderate nonproliferative diabetic retinopathy with macular edema	E08.331
Diabetes mellitus due to underlying condition with severe nonproliferative diabetic retinopathy with macular edema	E08.341
Drug or chemical induced diabetes mellitus with diabetic peripheral angiopathy without gangrene	E09.51
Drug or chemical induced diabetes mellitus with diabetic peripheral angiopathy with gangrene	E09.52
Drug or chemical induced diabetes mellitus with other circulatory complications	E09.59

Type 1 diabetes mellitus with proliferative diabetic retinopathy with macular edema	E10.351
Type 1 diabetes mellitus with proliferative diabetic retinopathy without macular edema	E10.359
Type 1 diabetes mellitus with diabetic cataract	E10.36

Type 1 diabetes mellitus with other diabetic ophthalmic complication	E10.39
Type 1 diabetes mellitus with diabetic dermatitis	E10.620
Type 1 diabetes mellitus with foot ulcer	E10.621
Type 1 diabetes mellitus with other skin ulcer	E10.622
Type 1 diabetes mellitus with other skin complication	E10.628

Type 2 diabetes mellitus with diabetic nephropathy	E11.21
Type 2 diabetes mellitus with chronic kidney disease	E11.22
Type 2 diabetes mellitus with other diabetic kidney complication	E11.29
Type 2 diabetes mellitus with diabetic peripheral angiopathy without gangrene	E11.51
Type 2 diabetes mellitus with diabetic peripheral angiopathy with gangrene	E11.52
Type 2 diabetes mellitus with other circulatory complications	E11.59
Type 2 diabetes mellitus with hypoglycemia with coma	E11.641
Type 2 diabetes mellitus with hypoglycemia without coma	E11.649

Many codes for diabetes mellitus are combination codes. A combination code is a single code used to classify:

- Two diagnoses, or
- A diagnosis with an associated secondary process (manifestation)
- A diagnosis with an associated complication

- There are many ICD-10-CM guidelines for diabetes mellitus, including:

The ICD-10-CM guidelines for diabetes mellitus state:

Use as many codes within a particular category as are necessary to describe all of the complications of the diseases may be used. Codes should be sequenced based on the reason for a particular encounter. As many codes from categories E08–E13 should be used as needed to identify all of the associated conditions that the patient has. If the type of diabetes is not documented in the medical record, then type 2 is the default.

If a patient is a type 2 diabetic that routinely uses insulin, code Z79.4 *Long-term (current) use of insulin* should also be assigned to indicate that the patient uses insulin. Code Z79.4 should not be assigned if insulin is given temporarily to bring a type 2 patient's blood sugar under control during an encounter.

Codes under category E08, Diabetes mellitus due to underlying condition, and E09, Drug or chemical induced diabetes mellitus, identify complications/manifestations associated with secondary diabetes mellitus. Secondary diabetes is always caused by another condition or event.

In many cases, more than one code will be necessary to report the patient's condition. For example, if a type 1 diabetic patient has a diabetic left heel ulcer with muscle necrosis, it would be necessary to code E10.622, L97.423. Another example is a patient with diabetes and chronic kidney disease (CKD). If a type 2 diabetic has stage II chronic kidney disease, it would be necessary to code E11.22, N18.2. Not all conditions require multiple codes in ICD-10-CM, though. For example, a type 1 diabetic patient with diabetic cataracts, E10.36 is the only code necessary. A second example is a type 2 diabetic patient with diabetic neuropathic arthropathy is coded solely in ICD-10-CM with E11.610.

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