

2011 | ADVANCED  
**ANATOMY & PHYSIOLOGY**  
for ICD-10-CM/PCS

An essential resource for diagnostic and procedural coding.



**ICD-10**  
Will Change Everything



**AAPC**  
Credentiaing the Business Side of Medicine

# INTRODUCTION

The *Advanced Anatomy and Physiology for ICD-10-CM/PCS* is designed to introduce medical coders to the new ICD-10-CM/PCS system, the differences between ICD-9-CM and ICD-10-CM, and additionally to provide a more advanced understanding of body systems, diseases/disease processes, and anatomy.

Each chapter in this book contains a systemized approach to learning. Course objectives begin each chapter followed by an overview of the given chapter topic. A thorough discussion provides the reader with the specifics of advanced coding in ICD-10-CM and how it relates to the ICD-9-CM system. Official Coding Guidelines for both coding systems are listed side-by-side to allow easy comparison of similarities and changes. Questions are provided to evoke thoughtful consideration of effective coding. Additionally, chapter-specific terminology are defined to foster greater learning. A quiz ends each chapter allowing the reader to test their knowledge. Quiz answers can be found on the following web site: [www.contextodata.com/API10/](http://www.contextodata.com/API10/)

Refer to the end of this chapter for a detailed summary of the organization of this book.

## Course Objectives

This course is designed to provide:

- A solid foundation in basic human anatomy and physiology
- A review of each body system with in-depth information on cells, tissues, and organs that comprise each body system
- In-depth information on the function of cells, tissues, organs, and body systems and the roles they play in maintaining homeostasis and health
- An overview of diseases and disease processes specific to each body system
- A discussion of the effects of diseases and disease processes on multiple body systems
- Information on multi-system diseases and disease processes
- Advanced medical terminology specific to each body system
- The relations between anatomy and physiology and code capture in diagnosis and procedure coding
- New anatomical and physiological documentation requirements for code capture in ICD-10-CM and ICD-10-PCS

## Overview

Developing an understanding of anatomy and physiology from a coding perspective is one challenge coders face. Most anatomy and physiology courses begin with general information on structural organization and function beginning with an overview of the chemical level (atoms and molecules), cellular level, tissue level, organ level, and proceed to the body system level. Even after taking introductory anatomy and physiology courses, many coders have difficulty identifying the correct diagnosis or procedure code. This difficulty is due to a number of factors, not the least of which is the organization of the coding systems themselves.

Diagnostic and procedural coding systems are not organized in the same fashion as most anatomy and physiology texts. Instead, diagnostic coding systems are organized by the disease or disease process which may sometimes be found under a body system but may also be found under different designations such as neoplasms, infections, or signs and symptoms. CPT procedure codes are organized by type of service or procedure (e.g., evaluation and management, surgical, radiological, etc) and then depending on the section may be organized by body system (surgical section), physician specialty (medicine section), or more specific types of service (radiology section). ICD-9-CM Volume 3 was organized by the body system on which the procedure was performed, but because the available code numbers in some body systems were exhausted years ago, some new procedures on specific body systems are listed in the tabular sections under *Procedures and Interventions Not Elsewhere Classified* or *Miscellaneous Procedures*. ICD-10-PCS is organized in sections for the general type of procedure performed (e.g., Medical/Surgical, Obstetrics, Placement, Administration, etc.), then by body system, root operation, body part, approach, device, and qualifier.

In this course, each body system will be covered in a separate chapter with the chapter objectives identified at the beginning. The chapters will first discuss pertinent information starting at the chemical level and then progress through each level to the body system level. Both structure and function will be discussed. Within each chapter, the diseases, disease processes, conditions, and symptoms related to the body system will be discussed.

Specific medical terminology required to identify diagnosis and procedure codes correctly will be reviewed. New documentation requirements needed to capture codes in ICD-10-CM and ICD-10-PCS will also be covered. Each chapter will end with a

## Section I

# ANATOMY AND PHYSIOLOGY FOR ICD-10-CM

In order to use ICD-10-CM effectively, the *ICD-10-CM Official Guidelines for Coding and Reporting* must be reviewed and compared with the current ICD-9-CM Guidelines. The ICD-10-CM and ICD-9-CM Guidelines specific to each body system are included in the chapter related to that body system. They are displayed side-by-side so that any changes to the guidelines are readily apparent. Here in the introduction to Section I, two tables are provided with the conventions and general guidelines in ICD-9-CM and ICD-10-CM displayed side-by-side. See Appendix A for complete guidelines for both ICD-9-CM and ICD-10-CM.

Coding conventions for ICD-10-CM contain many of the conventions found in ICD-9-CM. However, because the format and structure of the ICD-10-CM has undergone a number of changes, ICD-10-CM contains some additional information on coding conventions and also some changes when compared to ICD-9-CM. It is suggested that the Conventions Table below be carefully reviewed prior to doing the coding in each chapter.

**Table 1. Conventions Table**

A. Conventions for the ICD-9-CM	A. Conventions for the ICD-10-CM
The conventions for the ICD-9-CM are the general rules for use of the classification independent of the guidelines. These conventions are incorporated within the index and tabular of the ICD-9-CM as instructional notes. The conventions are as follows:	The conventions for the ICD-10-CM are the general rules for use of the classification independent of the guidelines. These conventions are incorporated within the Index and Tabular of the ICD-10-CM as instructional notes.
	<b>1. The Alphabetic Index and Tabular List</b>
	The ICD-10-CM is divided into the Index, an alphabetical list of terms and their corresponding code, and the Tabular List, a chronological list of codes divided into chapters based on body system or condition. The Index is divided into two parts, the Index to Diseases and Injury, and the Index to External Causes of Injury. Within the Index of Diseases and Injury there is a Neoplasm Table and a Table of Drugs and Chemicals.

A. Conventions for the ICD-9-CM	A. Conventions for the ICD-10-CM
	See Section I.C2. General guidelines. See Section I.C.19. Adverse effects, poisoning, underdosing and toxic effects.
<b>1. Format:</b>	<b>2. Format and Structure:</b>
The ICD-9-CM uses an indented format for ease in reference.	The ICD-10-CM Tabular List contains categories, subcategories and codes. Characters for categories, subcategories and codes may be either a letter or a number. All categories are 3 characters. A three-character category that has no further subdivision is equivalent to a code. Subcategories are either 4 or 5 characters. Codes may be 4, 5, 6 or 7 characters. That is, each level of subdivision after a category is a subcategory. The final level of subdivision is a code. All codes in the Tabular List of the official version of the ICD-10-CM are in bold. Codes that have applicable 7th characters are still referred to as codes, not subcategories. A code that has an applicable 7th character is considered invalid without the 7th character. The ICD-10-CM uses an indented format for ease in reference.
	<b>3. Use of codes for reporting purposes</b> For reporting purposes only codes are permissible, not categories or subcategories, and any applicable 7th character is required.

building blocks for all blood cell types. Each type of blood cell goes through a maturation process of two or more stages as follows:

Primitive reticular cell ->

Hemocytoblast ->

Rubriblast -> Prorubricyte -> Rubricyte -> Normoblast ->  
Reticulocyte -> Erythrocyte

Myeloblast ->

Basophil

Eosinophil

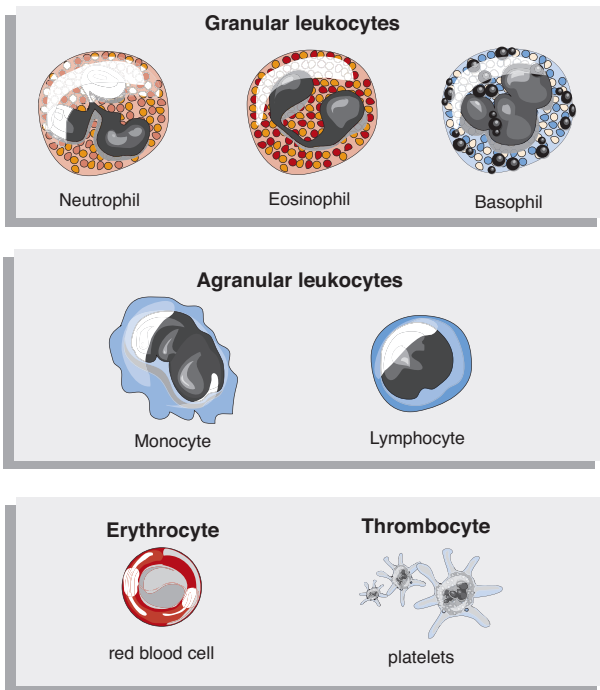
Neutrophil

Megakaryoblast -> Megakaryocyte ->  
Thrombocytes (platelets)

Lymphoblast -> Lymphocytes

Monoblast -> Monocytes

### Blood cells



### Erythrocytes

Erythrocytes, more commonly referred to as red blood cells, are shaped like a biconcave disc. They are simple in structure, lack a nucleus, and cannot reproduce or carry on complex metabolic activities. The interior of the cells is composed of cytoplasm, protein, lipids, and hemoglobin. Hemoglobin constitutes approximately 33 percent of the total cell volume. This is the red pigment that gives blood its red color.

The function of erythrocytes is to carry oxygen from the lungs to body tissues. The hemoglobin molecule is composed of a protein called globin and a pigment called heme that contains iron. Erythrocytes circulate through the lungs and the four iron atoms in the hemoglobin each combine with a

molecule of oxygen. The oxygen is then transported from the lungs to other tissues where the iron atoms release the oxygen which is diffused into interstitial fluid. The globin portion of hemoglobin then combines with a molecule of carbon dioxide which is transported from the tissue and released in the lungs.

Red blood cells have a short life span, becoming nonfunctional in about 120 days. This means that red blood cells must continually be produced. This process occurs in the bone marrow. Any disease of the bone marrow can affect the number of circulating red blood cells. Any time the number of functional red blood cells is reduced, or the hemoglobin content of the red blood cell is below normal, a condition called anemia results. Anemia has many causes including lack of iron intake in food, amino acid deficiencies, or vitamin B<sub>12</sub> deficiencies.

### Leukocytes

Leukocytes, more commonly referred to as white blood cells, differ from red blood cells in a number of respects. These differences are as follows:

- The cell has a nucleus
- The cell does not contain hemoglobin
- There is more than one type of leukocyte
- Only granular leukocytes are produced in the bone marrow
- Agranular leukocytes are produced in lymphatic tissue
- There are three types of granular leukocytes – neutrophils, eosinophils, and basophils
- There are two types of agranular leukocytes – lymphocytes and monocytes
- Each type of leukocyte performs specific functions

The primary function of leukocytes is to fight infection and inflammation. Most leukocytes are able to move through small spaces between the cells that form blood vessels and through connective and epithelial tissues to reach the site of an injury or the site where a pathogenic microorganism has invaded the body causing an infection. This type of movement, called diapedesis, is the same type of movement exhibited by amoebas.

Some leukocytes are phagocytic which means that they can ingest bacteria and dispose of dead matter. Other leukocytes, specifically lymphocytes, fight infection by producing antibodies. Antibodies are proteins that inactivate antigens. Antigens are any type of protein that the body cannot synthesize or make on its own. This means that antigens are a type of foreign substance. Lymphocytes respond to antigens by making antibodies that deactivate the antigen so that it is incapable of harming the body. This is called an antigen-antibody response.

## Diseases, Disorders, Injuries, and Other Conditions of the Blood, Blood Forming Organs, and Immune Mechanism

This section looks at a variety of diseases, disorders, injuries, and other conditions involving the blood and blood forming organs, and certain conditions of the immune mechanism. The information presented in the anatomy and physiology section is expanded here to provide a better understanding regarding the cells, tissues, and organs that are affected and how these conditions alter their function. Specific information is provided for more commonly encountered conditions involving the blood, blood forming organs, and the immune mechanism.

Following the discussion of the various diseases, disease processes, disorders, injuries, etc., some diagnostic statements are provided with examples of coding in both ICD-9-CM and ICD-10-CM. The coding practice is followed by questions to help reinforce the student's knowledge of anatomy, physiology, and coding concepts. Answers to the coding questions can be found by reviewing the text or referring to the ICD-9-CM and/or ICD-10-CM coding books.

### Infectious/Parasitic Diseases

Infections and parasitic diseases of the blood alone are rare. One parasite that directly affects red blood cells is malaria. Typically, infections or pathogenic organisms originating at one site spread via the blood stream to other sites or become a generalized systemic infection that involves the blood. Sepsis is the term for a generalized systemic infection that meets certain criteria.

#### Section 1.1 – Sepsis

Sepsis, sometimes referred to as septicemia or bacteremia, is actually a complication of an infection at a site outside the blood stream. However, because the bacteria or other pathogenic organism is carried through the blood stream to other sites, it is discussed here under blood, blood forming organs, and disorders of the immune system.

Sepsis is diagnosed based on certain signs and symptoms associated with systemic inflammatory response syndrome (SIRS), which include:

- Elevated heart rate (tachycardia) > 90 beats per minute at rest
- Elevated (> 100.4 F or 38 C) or lowered (< 96.8 F or 36 C) body temperature
- Increased respiratory rate (> 20 breaths per minute) or decreased PaCO<sub>2</sub> (partial pressure carbon dioxide in arterial blood) (< 32 mm Hg)
- Elevated (>12,000), lowered (<4,000), or abnormal (> 10% bands) white blood cell count. (Bands are an immature type of white blood cell.)

The following table compares ICD-9-CM to ICD-10-CM for the above-noted conditions.

ICD-9-CM – Chapter 4: Septicemia, Systemic Inflammatory Response Syndrome (SIRS), Sepsis, Severe Sepsis, and Septic Shock	ICD-10-CM – Chapter 3: Sepsis, Severe Sepsis, and Septic Shock
<p><b>1. SIRS, Septicemia, and Sepsis</b></p> <p>a. The terms septicemia and sepsis are often used interchangeably by providers; however, they are not considered synonymous terms. The following descriptions are provided for reference but do not preclude querying the provider for clarification about terms used in the documentation:</p> <ol style="list-style-type: none"> <li>Septicemia generally refers to a systemic disease associated with the presence of pathological microorganisms or toxins in the blood, which can include bacteria, viruses, fungi or other organisms.</li> <li>Systemic inflammatory response syndrome (SIRS) generally refers to the systemic response to infection, trauma/ burns, or other insult (such as cancer) with symptoms including fever, tachycardia, tachypnea, and leukocytosis.</li> <li>Sepsis generally refers to SIRS due to infection.</li> <li>Severe sepsis generally refers to sepsis with associated acute organ dysfunction.</li> </ol>	
<p>b. The coding of SIRS, sepsis and severe sepsis requires a minimum of 2 codes: a code for the underlying cause (such as infection or trauma) and a code from subcategory 995.9 Systemic inflammatory response syndrome (SIRS).</p>	<p><b>1) Coding of Sepsis and Severe Sepsis</b></p> <p><b>a. Sepsis</b></p> <p>For a diagnosis of sepsis, assign the appropriate code for the underlying systemic infection. If the type of infection or causal organism is not further specified, assign code A41.9, Sepsis, unspecified.</p> <p>A code from subcategory R65.2, Severe sepsis, should not be assigned unless severe sepsis or an associated acute organ dysfunction is documented.</p>

1. Diseases of Blood/ Immune System

receptor site for that hormone, it is not affected. This is sometimes described as a lock and key mechanism. If the hormone (key) does not fit the lock (receptor) on the cell, then the hormone cannot modify cellular activity in that cell.

Hormones are classified as either proteins, amines (protein derivatives), or steroids. All hormones in the body except sex hormones and those secreted by the adrenal cortex are protein or protein derivatives.

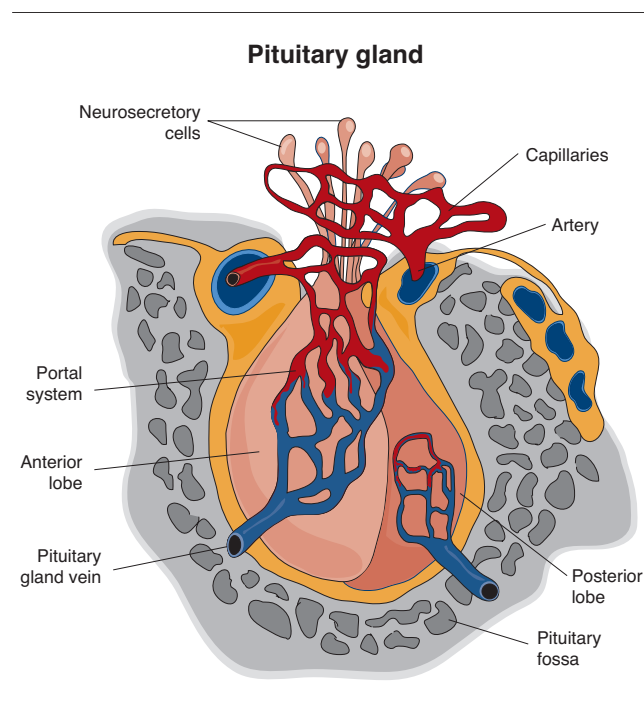
Protein and protein derivative hormones react with receptors on the surface of the cell and the changes these proteins set in motion are relatively rapid. Steroid hormones react with receptors inside the cells and this process generally requires protein synthesis which results in slower changes in cellular activity.

Hormones are potent substances that require regulation to maintain them within the very narrow parameters necessary to maintain homeostasis. When regulatory mechanisms fail, hormone imbalances can occur causing a variety of disorders.

## The Pituitary

The pituitary gland, also called the hypophysis, is a small gland, about 1 cm in size. It is located in the sella turcica, which is a depression in the sphenoid bone. It is attached to the hypothalamus of the brain by a slender stalk called the infundibulum. The infundibulum penetrates the dura mater.

The pituitary gland is divided into anterior and posterior lobes, called the adenohypophysis and the neurohypophysis respectively, which are different structurally and functionally.



## Adenohypophysis

The adenohypophysis is the glandular part of the pituitary containing glandular epithelial cells. It is connected to the hypothalamus by blood vessels and releases hormones that regulate many bodily activities. Release of hormones from the adenohypophysis is controlled by chemical secretions from the hypothalamus. The hypothalamus lies just above the infundibulum and receives blood from the superior hypophyseal arteries that form a network of capillaries in the infundibulum. Secretions from the hypothalamus are delivered to and stimulate the adenohypophysis as follows:

1. Chemicals released from the hypothalamus diffuse across the capillary membranes and enter the blood.
2. The capillaries unite to form portal veins that carry blood and the chemical secretions from the hypothalamus to the anterior lobe of the pituitary gland.
3. When the anterior lobe receives the chemicals, the pituitary gland then secretes one of six hormones from three types of glandular cells called acidophils, basophils, and chromophobes.
4. Hormones secreted from the different glandular cells are as follows:
  - Growth hormone
  - Thyroid stimulating hormone
  - Adrenocorticotropic hormone
  - Follicle stimulating hormone
  - Leuteinizing hormone
  - Prolactin

**Growth hormone** is also referred to as somatotropin or somatotrophic hormone (STH). It is a protein hormone that stimulates the growth of hard and soft tissues including bones, muscles, and body organs. Once full growth is attained, growth hormone helps to maintain the size of the hard and soft tissues. Too little growth hormone in a child can cause pituitary dwarfism. Too much growth hormone may result in gigantism. Growth hormone has two other important functions. It causes cells to switch from burning carbohydrates to burning fats and it accelerates the rate at which glycogen stored in the liver is converted to glucose and released into the blood thereby increasing blood sugar.

**Thyroid stimulating hormone (TSH)**, also referred to as thyrotropin, stimulates the synthesis and secretion of hormones from the thyroid gland.

**Adrenocorticotropic hormone (ACTH)** has two functions. Its primary function is to regulate the adrenal glands which produce and secrete adrenal cortex hormones. A second function is to stimulate the liver to remove glucose from the blood thereby decreasing blood sugar.

**Follicle stimulating hormone (FSH)** affects ovarian and testicular function. In females, it stimulates ova to develop and cells in the ovaries to secrete estrogens. In males, it stimulates the testes to produce sperm and cells in the testes to secrete testosterone.

While polyglandular dysfunction is rare, two of the more common forms include:

- Autoimmune polyglandular dysfunction
- Multiple endocrine neoplasia (MEN) syndromes

**Autoimmune polyglandular dysfunction** involves adrenal insufficiency, thyroid disease, and Type 1 diabetes mellitus with all three conditions occurring due to an autoimmune response.

**MEN syndromes** are a group of conditions that result in hyperplasia and over-production of hormones in certain endocrine glands. These syndromes are usually caused by genetic mutations and so are inherited disorders. There are three primary types, MEN I, MEN IIa, and MEN IIb.

**MEN I** is characterized by hyperplasia or tumors of the parathyroid glands, endocrine portion of the pancreas, and pituitary gland. The tumors are usually benign and cause the glands to secrete high levels of hormones, inducing multiple other medical problems, including kidney stones, infertility, and severe peptic ulcers from hypersecretion of gastric acid. Patients also show an increased incidence of disease or tumors of the adrenal cortex and thyroid along with the parathyroid. Tumors inside the pancreas may become cancerous. Multiple soft tissue lipomas and tumors of the bronchus, gastrointestinal tract, and mediastinum are also associated with MEN I, which is also known as Werner’s syndrome.

**MEN IIa** is characterized by medullary thyroid cancer, pheochromocytoma, and parathyroid tumors. Pheochromocytoma is an adrenal gland tumor that causes epinephrine and norepinephrine to be released in excessive amounts, resulting in severely raised blood pressure, palpitations, and tachycardia. Calcitonin and catecholamine levels are also elevated and patients sometimes have glioblastomas and meningiomas. Hyperparathyroidism results due to increased secretion from the adenomatous parathyroid gland. MEN type IIa is also referred to as Sipple’s syndrome.

**MEN IIb** is characterized by medullary thyroid cancer with pheochromocytoma, and mucosal neuromas. Type IIb is similar to type IIa, but without parathyroid involvement. The medullary thyroid cancers occurring with type IIb tend to develop at an earlier age and have been reported in infants as young as 3 months of age. The cancer tends to grow more rapidly and spread faster than in type IIa. MEN type IIb has also been found in people who had no known family history of MEN.

**Coding Practice 2.3f**

Condition	ICD-9-CM	ICD-10-CM
Werner’s syndrome with benign neoplasms of parathyroid glands, endocrine portion of pancreas, and pituitary gland	258.01	E31.21
MEN IIa with thyroid cancer	258.02, 193	E31.22, C73

**Questions 2.3f**

What instructions related to coding of neoplasms for MEN syndrome is listed under code 258.0 in ICD-9-CM? Does ICD-10-CM contain the same instruction under E31.2?

Is it necessary to code the benign neoplasms associated with the Werner’s syndrome?

Why is a code for malignant neoplasm used with the code for MEN IIa?

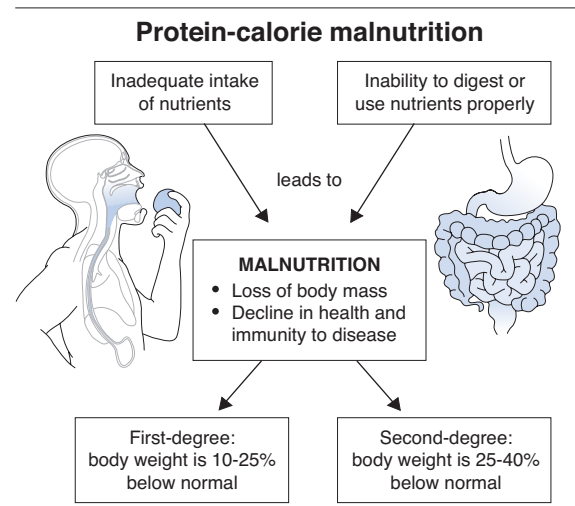
**Section 2.4 – Nutritional Disorders**

Conditions listed under nutritional disorders include:

- Malnutrition
- Vitamin, mineral, and other nutritional deficiencies
- Overweight and obesity
- Disorders related to complications of hyperalimentation

**Malnutrition**

Malnutrition is caused by an insufficient amount of protein and calorie intake in the diet. It may be mild, moderate, or severe. In countries where there is widespread famine, kwashiorkor or marasmus, which are severe life-threatening forms of malnutrition, may affect large numbers of individuals.



**Vitamin, Mineral and Other Nutritional Deficiencies**

A deficiency of any essential vitamin or mineral has an adverse effect on health. The specific adverse effect is dependent on which vitamin or mineral is deficient. Vitamin A deficiency has an adverse effect on the eyes and eyesight; Vitamin C deficiency causes scurvy; and Vitamin D deficiency causes rickets. Mineral

### Integration

The sensory input is then converted into nerve impulses which are electrical signals that are transmitted to the central nervous system. These nerve impulses create sensations, produce thoughts, or add to memory. Conscious and unconscious decisions are then made in the central nervous system, which is the integrative function of the nervous system.

### Motor

Once the central nervous system has integrated the sensory input, the nervous system initiates a response by sending signals to tissues, organs, or glands which elicit a response such as muscle contraction or gland secretion. Tissues, organs, and glands are called effectors because they cause an effect in response to directions received from the central nervous system. This response is referred to as motor output or motor function.

### Nerve Impulses

Nerve cells respond to stimuli and convert them into nerve impulses. This is called irritability. Once the stimuli are converted into a nerve impulse, the nerve cells have the ability to transmit that impulse to another nerve cell or to another tissue. This is called conductivity.

### Irritability

Any stimulus that is strong enough to initiate transmission of a nerve impulse is referred to as a threshold impulse. A stimulus that is too weak to initiate a response is called a subthreshold stimulus. However, a series of subthreshold stimuli that are applied quickly to a neuron can have a cumulative effect that may initiate a nerve impulse. This is called summation of inadequate stimuli.

The speed with which an impulse is transmitted depends on the size, type, and condition of the nerve fiber. Myelinated fibers with larger diameters transmit nerve impulses faster than mid-sized and small fibers or unmyelinated fibers. Sensory and motor fibers that detect and respond to potentially dangerous situations in the outside environment are generally larger in diameter than those that control or respond to less critical stimuli.

### Conductivity

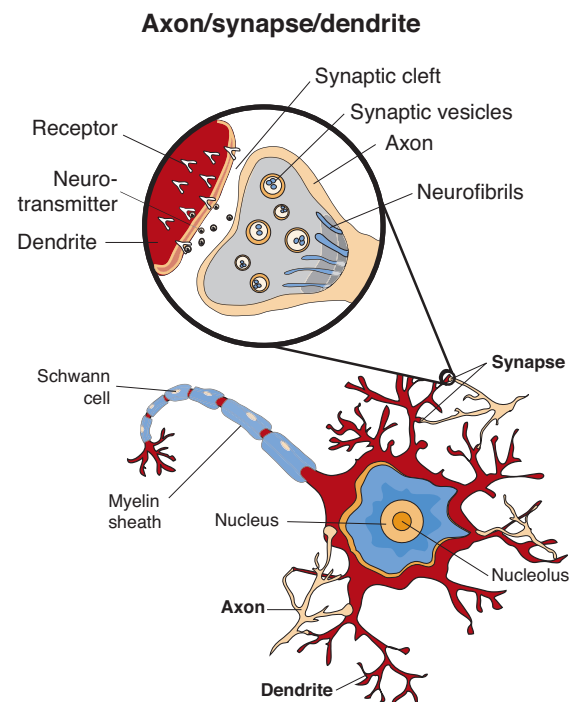
Conductivity is the ability of the nerve cell to transmit an impulse to another nerve cell or another tissue via a conduction pathway. The reflex arc is the most basic type of conduction pathway. There are five basic components to a reflex arc that are required to transmit an impulse.

1. A receptor consisting of the distal end of a dendrite of a sensory neuron responds to a stimulus in the internal or external environment and produces a nerve impulse.
2. The impulse is passed by the receptor to the CNS.
3. The incoming impulse is directed to a center usually within the CNS where it is blocked, transmitted, or rerouted. This

is usually accomplished with an association neuron that lies between the sensory neuron and the motor neuron.

4. The motor neuron transmits the impulse to the tissue, organ, or gland that must respond to the stimulus.
5. The tissue, organ, or gland, called an effector, responds to the stimulus.

The axons of neurons in a reflex arc do not ever touch the dendrites of the adjacent neuron in the nerve conduction pathway. The impulse must travel across a minute gap called a synapse. In addition, impulses can travel in only one direction from axon to synapse to dendrite.



### Nervous Tissue Injury

Unlike other tissues, nervous tissue has a very limited ability to regenerate. Specifically, if the cell body of a neuron is destroyed, the neuron cannot regenerate nor can other neurons reproduce and replace the damaged neuron. However, the human body is able to repair damaged nerve cells in which the cell body is intact and the axon has a neurilemma. Nerve cells in the peripheral nervous system generally have axons with a neurilemma while those in the brain and spinal cord do not. This means that a nerve injury of the hand has a good chance of healing while an injury of the brain or spinal cord is more often permanent.



### Section 3.19 – Mental and Behavioral Disorders

Mental and behavioral disorders have a dedicated chapter in ICD-10-CM. However, because mental and behavioral disorders are clearly related to, or are an integral part of nervous system function, mental and behavioral disorders are discussed here in the nervous system section of this course. There are several broad classifications of mental and behavioral disorders including:

**Disorders Due to Physiological Condition** – Mental disorders in this section are all caused by some type of physiological condition such as cerebral disease, brain injury, or some other type of cerebral dysfunction. Many codes in this section require that the underlying physiological condition be coded first.

**Disorders Due to Psychoactive Substance Use and Dependence** – Codes in this section include alcohol, drug, and inhalant use, abuse, and dependence; nicotine dependence; and other psychoactive substance related disorders. Note that nicotine use is not coded from this section but is instead reported with a code from Chapter 21 as a factor influencing health status.

**Psychotic Disorders** – Some of the more common types of psychotic disorders include schizophrenia, bipolar disorder, and major depressive disorders.

**Non-Psychotic Disorders** – Anxiety and dissociative and stress-related mental disorders are types of non-psychotic disorders.

**Other Disorders** – Other disorders and conditions reported with codes from Chapter 5 include: eating disorders, sleep disorders, sexual dysfunction not due to a substance or physiological condition, personality disorders, mental retardation, some developmental disorders, and behavioral and emotional disorders of childhood and adolescence.

#### Coding Practice 3.19

Condition	ICD-9-CM	ICD-10-CM
Late onset Alzheimer's disease with dementia and combative behavior	331.0, 294.11	G30.1, F02.81
Parkinson's disease with dementia	331.82, 294.10	G31.83, F02.80
Post concussion syndrome following concussion three weeks ago with loss of consciousness less than 30 minutes.	310.2	S06.0x1S, F07.81
Acute alcohol intoxication with blood alcohol level 22 mg/100 ml	305.00	F10.920, Y90.1
Recurrent major depression of moderate severity	296.32	F33.1
Chronic posttraumatic stress syndrome	309.81	F43.12
Developmental dyslexia	315.02	F81.0

#### Questions 3.19

Are codes 294.10 and F02.80 ever reported as the primary (first listed) diagnosis code?

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Why are two codes required to report post-concussion syndrome in ICD-10-CM but not in ICD-9-CM?

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Why is code Y90.1 used in conjunction with F10.920 in the example above?

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### Terminology

**Arachnoid** – One of the three membranes that protect the brain and spinal cord. The arachnoid is the middle membrane and is composed of delicate fibrous tissue.

**Autonomic nervous system** – The part of the nervous system that controls the smooth muscle, cardiac muscle, and glands. It functions automatically and involuntarily being regulated by several centers in the brain, including the cerebral cortex, hypothalamus, and the medulla oblongata. The autonomic system consists entirely of motor fibers that transmit impulses from the CNS to smooth muscle, cardiac muscle, and glandular epithelium and affects visceral functions.

**Central nervous system (CNS)** – One of two primary divisions of the nervous system, the CNS is composed of two organs, the brain and spinal cord.

**Dura mater** – One of three membranes that protect the brain and spinal cord. The dura mater is the outer membrane and is composed of a tough fibrous tissue.

**Encephalon** – The brain.

**Extradural** – Lying outside of the dura mater.

**Extracranial** – Lying outside the cranial cavity or skull.

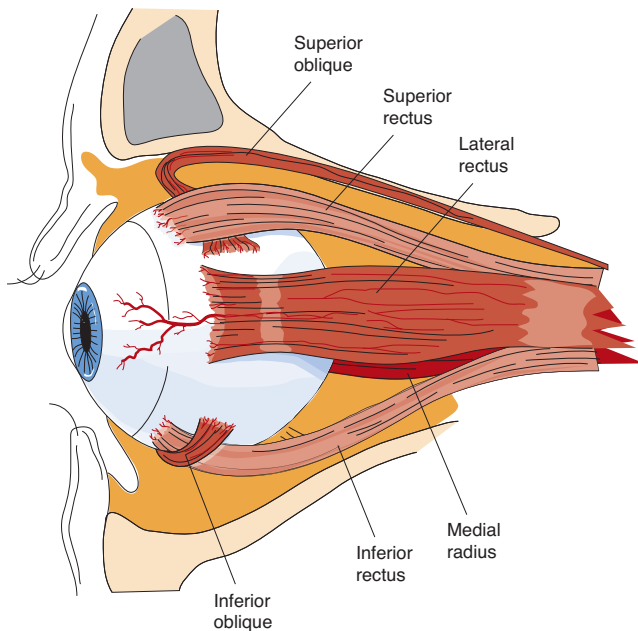
**Ganglion** – A group of nerve cell bodies; a term usually used to refer to a group of nerve cell bodies located in the peripheral nervous system.

**Intracranial** – Lying within the cranial cavity or skull.

**Intraspinal** – Lying within the vertebral canal.

**Meninges** – The three membranes that cover the brain and spinal cord which include an outer membrane called the dura mater, a middle membrane called the arachnoid, and an inner membrane called the pia mater.

### Ocular muscles



The extraocular muscles are contained within the orbit and with the exception of the inferior oblique form a cone around the eye. The apex of the cone is located at the posterior aspect of the orbit with the base of the cone being formed at the attachment of each muscle at the midline of the globe. The apex of the cone is formed by a tendinous ring-like structure called the annulus of Zinn. The optic nerve and ophthalmic artery and vein exit the eye through the annulus of Zinn.

The superior and inferior oblique muscles differ in configuration from other eye muscles. The superior oblique, although part of the cone, must pass through another ring-like tendon called the trochlea at the nasal portion of the orbit before attaching to the posterior aspect (apex) of the cone. The trochlea acts as a pulley for the superior oblique muscle. The inferior oblique does not form part of the cone. It arises from the lacrimal fossa in the nasal portion bony orbit and attaches to the inferior aspect of the eye.

Movement of the eyes is complex because in order to look in a specific direction the muscles of one eye must coordinate with the other. For example in order to look up and to the right, the lateral rectus and superior rectus of the right eye must coordinate with the medial rectus and superior rectus of the left eye. Any lack of coordination or weakness of a specific extraocular muscle can prevent the eyes from moving together which causes vision impairment.

## Comparison of ICD-9-CM and ICD-10-CM Eye and Adnexa Coding Guidelines

In ICD-10-CM, a new chapter, Chapter 7, has been added specifically for diseases of the eye and adnexa. In ICD-9-CM, diseases of the eye and adnexa are included in a single chapter, Chapter 6, Diseases of the Nervous System and Sense Organs.

In the general guidelines, there is an instruction related to the use of combination codes. While combination codes do exist in ICD-9-CM, these types of codes have been expanded to include additional coding scenarios related to eye and adnexa coding. For example, in ICD-10-CM, only one code is required to identify diabetic retinopathy, with or without macular edema (E08.3-), while in ICD-9-CM, there are three codes: one for the diabetes (250.5x), one for the diabetic retinopathy (362.01-362.06), and one diabetic macular edema (362.07).

**Note:** There are no guidelines in either ICD-9-CM or ICD-10-CM specific to reporting diseases of the eye and adnexa.

## ICD-10-CM Documentation Elements of Eye and Adnexa

Key documentation elements for the eye and adnexa include the following:

- Laterality, meaning the side of the body affected, must be documented as right, left, or bilateral for most diseases and conditions located in this section.

## Diseases, Disorders, Injuries and Other Conditions of Eye and Adnexa

This section of the chapter looks at a variety of diseases, disorders, injuries, and other conditions involving the eye and adnexa. The information presented in the anatomy and physiology section is expanded here to provide a better understanding regarding the part of the eye or adnexa affected and how these conditions affect function. Specific information is provided for more commonly encountered conditions involving the eye and adnexa.

Following the discussion of the various diseases, disease processes, disorders, injuries, and conditions, some diagnostic statements are provided with examples of coding in both ICD-9-CM and ICD-10-CM. The coding practice is followed by questions to help reinforce the student's knowledge of anatomy, physiology, and coding concepts. Answers to the coding questions can be found by reviewing the text or referring to ICD-9-CM and/or ICD-10-CM coding books.

Answers to all coding practice questions are also provided at the end of the chapter.

no greater than 5 around central fixation should be placed in category 4, even if the central acuity is not impaired.

Category of visual impairment		Visual acuity with best possible correction	
		Maximum less than:	Minimum equal to or better than:
Low Vision (WHO)	1	6/18 3/10 (0.3) 20/70	6/60 1/10 (0.1) 20/200
	2	6/60 1/10 (0.1) 20/200	3/60 1/20 (0.05) 20/400
Blindness (WHO)	3	3/60 1/20 (0.05) 20/400	1/60 (finger counting at 1 meter) 1/50 (0.02) 5/300 (20/1200)
	4	1/60 (finger counting at 1 meter) 1/50 (0.02) 5/300	Light perception
	5	No light perception	
	9	Undetermined or unspecified	

**Coding Practice 4.14**

Condition	ICD-9-CM	ICD-10-CM
Bilateral blindness, no light perception, right and left eyes	369.01	H54.0
Left eye blindness, no light perception, right eye, 20/200	369.10	H54.12

**Questions 4.14**

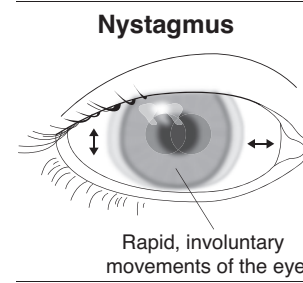
How has identification of visual impairment changed from ICD-9-CM to ICD-10-CM? How has this affected coding in ICD-10-CM?

**Section 4.15 – Other Disorders**

There are two categories in the other disorders block of codes, nystagmus and other irregular eye movements and intraoperative and postoperative complications.

**Nystagmus**

Nystagmus is abnormal eye movement that usually results in blurred vision. There are a variety of types of nystagmus and the type of abnormal eye movement depends on the underlying cause.



**Horizontal nystagmus** is a jerking movement that goes side to side. This condition is often associated with poor vision although by itself is not the cause.

**Vertical nystagmus** refers to up and down movement of the eye and typically indicates a problem with the central nervous system.

**Childhood nystagmus** is typically associated with eye defects, such as retinal disorders, although most are familial and not a symptom of a disease process. In adults, nystagmus can be a symptom of an underlying disease, such as multiple sclerosis or head trauma.

**Intraoperative and Postoperative Complications**

There are a number of intraoperative and postoperative complications that can affect the eye and ocular adnexa. As with all types of surgery there is always a possibility of intraoperative or postoperative hemorrhage or hematoma of the eye and surrounding structures and accidental puncture or laceration. Keratopathy and lens fragments are postoperative complications specific to cataract surgery. Chorioretinal scarring is a complication specific to surgery for retinal detachment.

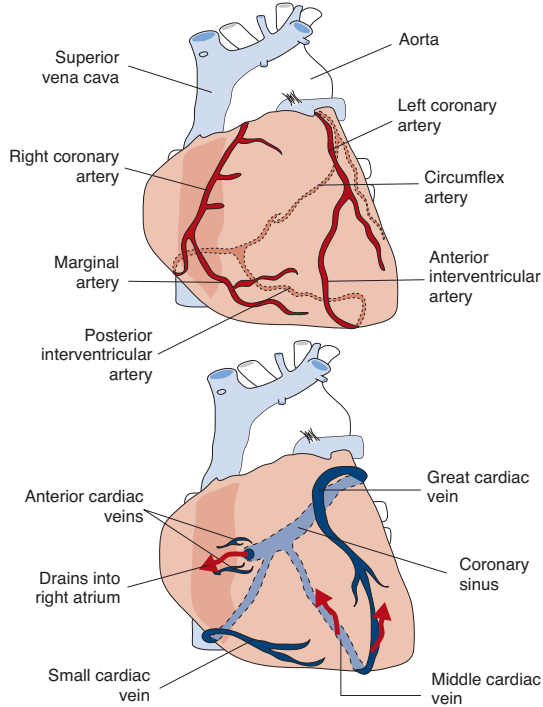
**Keratopathy Following Cataract Surgery**

This complication may also be referred to as bullous aphakic keratopathy if the lens has been removed but not replaced with an intraocular lens implant or bullous pseudophakic keratopathy if an intraocular lens implant is present. In some individuals surgical trauma from the cataract extraction damages the corneal endothelium causing corneal edema and subepithelial bulla formation on the surface of the cornea. Bulla are fluid filled blisters. When the endothelial cells are damaged, the remaining cells rearrange themselves to cover the posterior corneal surface. The remaining endothelial cells become irregularly shaped and enlarged. The endothelium becomes unable to act as a pump to the cornea and the stroma begins to swell. The cornea thickens and folds are seen in the Descemet membrane.

**Lens Fragments Following Cataract Surgery**

If all lens material is not retrieved during cataract surgery, it is retained and may cause other complications, such as corneal edema or uveitis.

**Coronary circulation**



The internal conduction system of the heart is regulated by the sinoatrial node. Because it regulates heart beat, it is also sometimes called the pacemaker of the heart. Other parts of the conduction system include:

- Atrioventricular node
- Atrioventricular bundle
- Bundle branches
- Conduction muscle fibers (myofibers)

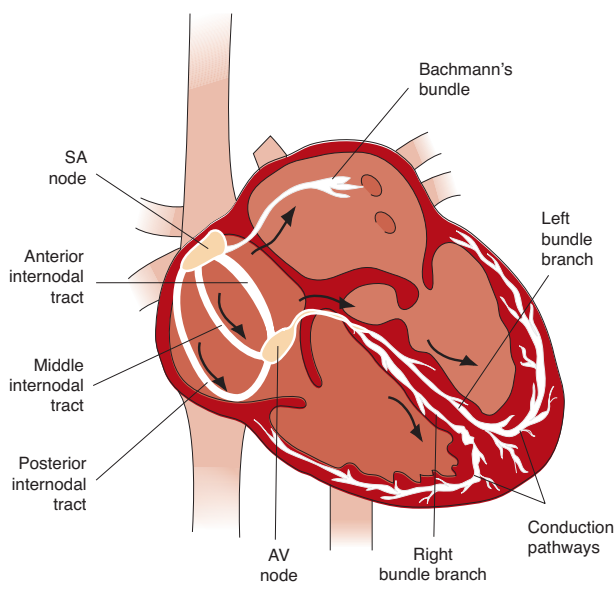
While the sinoatrial node is solely responsible for maintaining the constant rhythmic resting heart rate, the atrioventricular node is responsible for modifying heart rate and adjusting cardiac output in response to body requirements when prompted by the cardiac center in the medulla oblongata. The cardiac center has both sympathetic and parasympathetic components that stimulate the atrioventricular node in response to a number of factors such as physical activity, emotional changes, changes in ion concentration, and changes in body temperature.

The conduction system coordinates the cardiac cycle which refers to the alternating contraction and relaxation of the heart muscle during each heart beat. The contraction phase is referred to as systole and the relaxation phase is referred to as diastole.

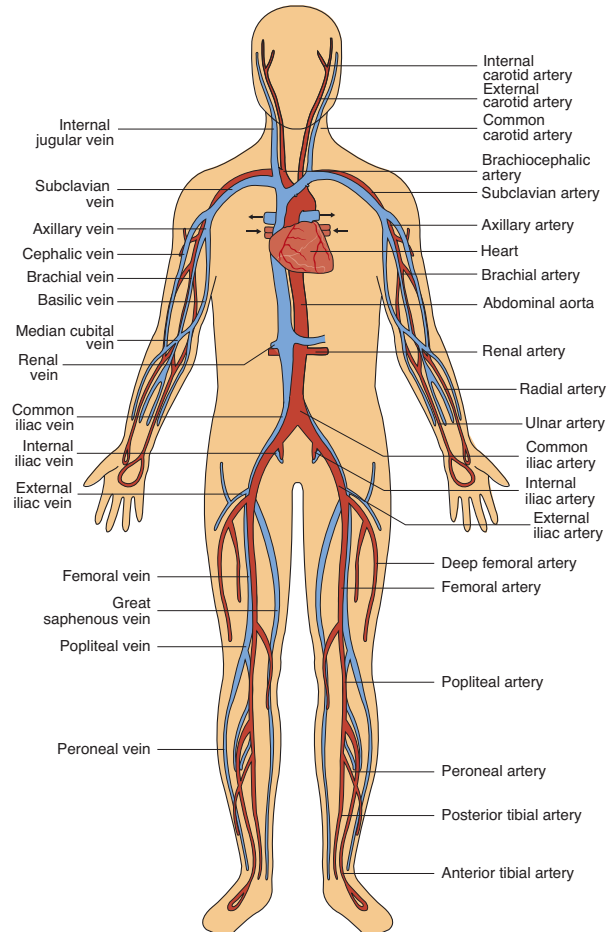
**Heart Function**

Heart function is regulated by an internal conduction system that when working properly maintains a constant rhythmic resting heart beat of 70 to 80 beats per minute. Heart rate may be modified in response to changing body needs by the cardiac center which is located in the brain in the medulla oblongata.

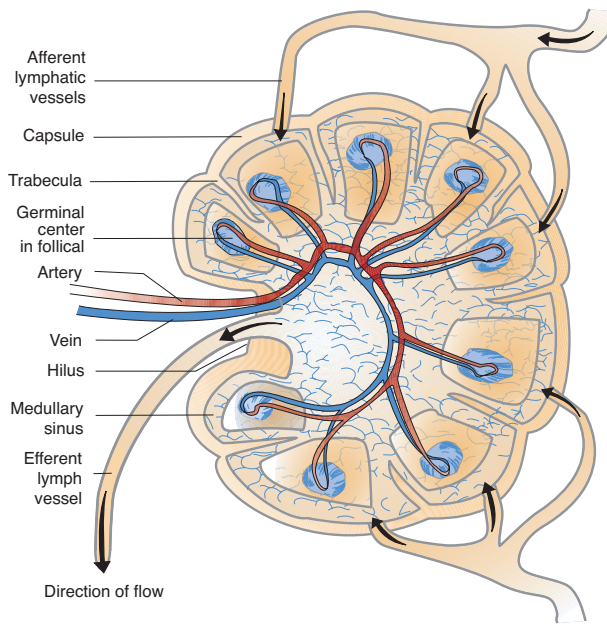
**Heart conduction system**



**Major veins and arteries**



### Structure of lymph node

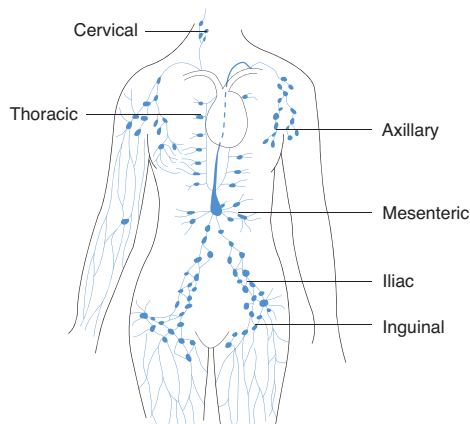


Lymph nodes typically appear in groups or chains that are concentrated in certain parts of the body. These groups of lymph nodes are described by their location. Examples include:

- Cervical
- Axillary
- Iliac
- Inguinal

Lymph nodes may also be identified as deep or superficial.

### Lymph node groups



### Other Lymphatic Organs

The other lymphatic organs include the tonsils, thymus, and spleen. These organs are discussed in other chapters. For information on the tonsils, see Chapter 7 – Respiratory System; on the thymus, see Chapter 2 – Endocrine, Nutritional, and Metabolic Disease; on the Spleen, see Chapter 1 – Blood and Blood Forming Organs.

### Physiology of the Lymphatic Circulatory System

The lymphatic system has three primary functions which include:

- Returning interstitial fluid to the blood
- Absorption of fat and fat soluble vitamins from the digestive system and transportation of these substances to the venous circulation.
- Defending the body against microorganisms and toxins by filtering the lymph and responding to pathogens through the production of antibodies

### Interstitial Fluid and Lymph

Interstitial fluid and lymph were discussed in Chapter 1 – Blood, Blood Forming Organs, and Immune System. Some of the information is being repeated here because it is integral to understanding the lymphatic system's circulatory and immune functions.

Interstitial fluid, also called extracellular or intracellular fluid, is composed of certain blood plasma constituents that move across the blood vessel walls and into the body tissues. As arterial blood moves from the heart to larger blood vessels, arterioles, and then on to the capillary bed, blood flow slows down. This allows plasma constituents to move across the arteriole walls. Interstitial fluid moves by osmosis and diffusion from the blood into body tissues. It remains outside of the cells and bathes them providing nourishment and removing debris.

Functions of interstitial fluid include:

- Delivery of nutrients, oxygen, and hormones to the cells
- Removal of cellular waste products and protein cells

Approximately 90 percent of interstitial fluid crosses back into the blood through the venules. The remaining 10% is left behind and becomes lymph. Lymph enters lymphatic capillaries contained within the tissues and then moves into larger lymphatic vessels, then into the two lymphatic ducts. The lymphatic ducts drain into the right and left subclavian veins where the lymph re-enters the blood circulatory system.

### Lymph Capillaries and Digestion

The mucosa that lines the small bowel is covered by villi which are fingerlike projections that contain blood capillaries and special lymph capillaries called lacteals. The blood capillaries absorb most nutrients, but are unable to absorb the larger fat molecules and fat soluble vitamins. Fat molecules and fat soluble vitamins

What conditions reported in ICD-9-CM under sub-category 747.6 now have more specific codes in ICD-10-CM?

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## Section 6.11 – Signs, Symptoms, and Abnormal Findings

There are only a limited number of codes specific to the cardiovascular system in the signs, symptoms, and abnormal findings chapter of ICD-10-CM. Some signs and symptoms that are included in this section include:

- Chest pain
- Cardiogenic shock
- Enlarged lymph nodes

### Chest Pain

Many emergency room encounters are the result of a complaint of chest pain. When a specific cause for the chest pain is not identified, a code from the signs and symptoms chapter must be used.

### Cardiogenic Shock

Cardiogenic shock is characterized by a combination of decreased pumping ability of the heart and shock symptoms, which include decreased urine output, altered mental status, and hypotension. Cardiogenic shock is typically caused by an acute condition such as an acute myocardial infarction, but a diagnosis of cardiogenic shock may be reported until the condition that has caused the cardiogenic shock is determined.

### Enlarged Lymph Nodes

Local or generalized enlargement of the lymph nodes without a diagnosis of inflammation or lymphangitis is reported with codes from the signs and symptoms chapter of ICD-10-CM.

### Abnormal Findings

Nonspecific abnormal findings that do not result in the diagnosis of a more specific cardiovascular condition include:

- Abnormal echocardiogram
- Abnormal heart shadow on diagnostic imaging
- Abnormal electrocardiogram (ECG)
- Abnormal electrophysiological intracardiac study (EPS)
- Abnormal phonocardiogram
- Abnormal vectorcardiogram

### Coding Practice 6.11

Condition	ICD-9-CM	ICD-10-CM
Atypical chest pain	786.59	R07.89
Precordial chest pain	786.51	R07.2
Ischemic chest pain	413.9	I20.9
Abnormal ECG	794.31	R94.31

### Questions 6.11

Why is ischemic chest pain reported with a code from the circulatory system chapter while atypical and precordial chest pain are reported with a code from the signs and symptoms section of ICD-10-CM?

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Would a diagnosis of long QT syndrome be reported with the code for abnormal ECG in ICD-10-CM?

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## Section 6.12 – Injuries

Injuries to the circulatory system are defined as those conditions that are due to some type of trauma. Some circulatory system conditions, such as a subarachnoid hemorrhage, may be of traumatic or nontraumatic origin. Documentation is of paramount importance in determining whether to select a code from the chapter for nervous system diseases or from the chapter for injuries, poisoning, and certain other consequences of external causes.

One significant difference between ICD-9-CM and ICD-10-CM is the addition of a seventh character extension for episode of care for injuries, poisonings, and other external causes. Episode of care must be specified as:

- A Initial encounter
- D Subsequent encounter
- S Sequela

Injuries of the circulatory system include:

- Laceration or traumatic transection of a blood vessel
- Traumatic rupture of a blood vessel
- Hemopericardium
- Traumatic contusion or laceration of the heart

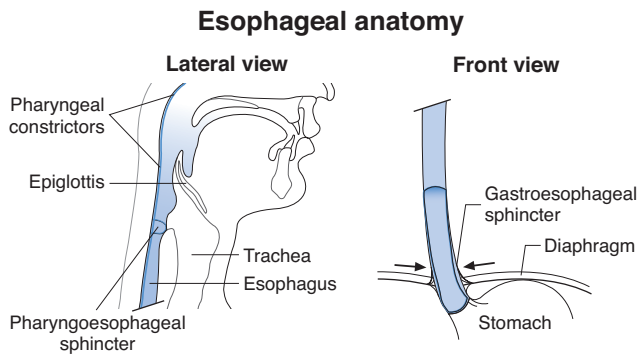
Poisonings from drugs, chemicals, or other substances include toxic and adverse effects of drugs as well as a new underdosing category. The correct poisoning code is initially identified in the Table of Drugs and Chemicals and then verified in the Tabular list. Poisonings, toxic and adverse effects, and underdosing usually require the use of multiple codes to identify the drug or chemical as well as the specific cardiac or circulatory manifestations associated with the poisoning.

Other consequences of external causes cover a wide variety of conditions. Examples of conditions related to the circulatory system include:

- Traumatic air or fat embolism
- Cardiac or circulatory complications related to medical or surgical procedures

Abnormalities of the salivary glands may appear as obstruction of the flow of saliva, inflammation, infection, or tumors. The formation of stones or constrictions blocking the ducts occurs most commonly in the parotid and submandibular glands. Inflammation occurs when saliva is blocked, causing swelling and severe pain, particularly while eating or with the involvement of autoimmune disorders. Infection or abscess may develop from pooled saliva or secondarily from infected adjacent lymph nodes. Mumps is the most common salivary gland infection, involving the parotid glands. Tumors also appear most commonly in the parotid gland.

## Esophagus



### Basic Structure and Function

The esophagus is a hollow, muscular tube about 25 cm long that moves food particles from the oral cavity down to the stomach for further digestion. Peristalsis is the muscular action that moves the swallowed food into the stomach by a series of contractions and relaxations of the outer longitudinal and inner circular layers of muscle. Peristalsis occurs when stretch receptors in the esophageal wall are stimulated by an increase in wall tension as food passes, which causes an increase in impulses from the brain. Each end of the esophagus is opened and closed by a sphincter. The upper esophageal sphincter prevents air from entering the esophagus during respiration and the lower esophageal sphincter, also called the cardiac sphincter, prevents food in the stomach from re-entering the esophagus.

### Swallowing

Swallowing is more complex than appears at first and occurs in two stages – the voluntary, or oropharyngeal phase, and the involuntary, or esophageal phase. In the voluntary phase, a bolus of food is moved toward the pharynx by the tongue pushing up on the hard palate. The pharyngeal muscle then contracts, preventing the food from entering the nasopharynx. Food is propelled into the esophagus, while respiration is inhibited, through a series of coordinated events. The second, involuntary phase of swallowing begins after the food bolus enters the esophagus. Primary peristalsis begins. The waves of relaxation first allow food to pass while the following contraction waves

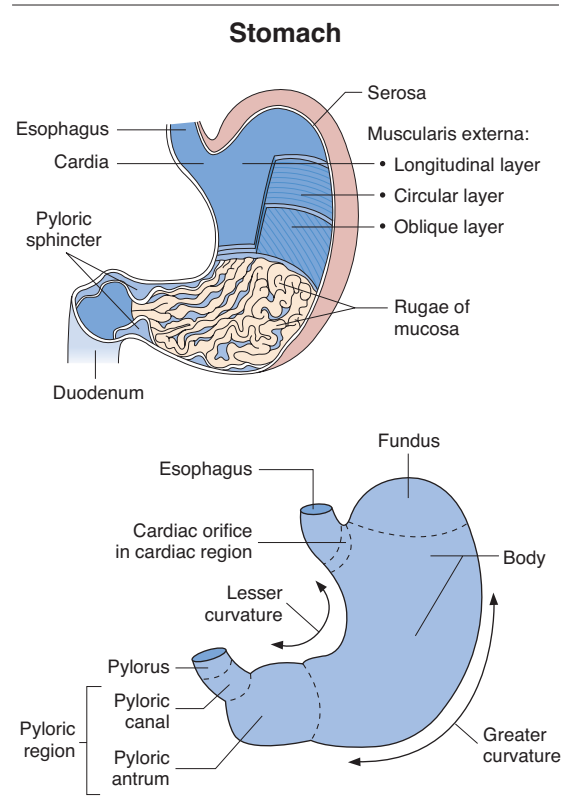
push the food farther along. The lower sphincter relaxes just before the arrival of a peristaltic wave. After the bolus of food passes into the stomach, the sphincter muscles return to their resting muscle tone. Both neural and hormonal stimulation can change the muscle tone of the lower sphincter.

The faulty coordination of muscle action resulting from another disorder that impairs motility causes many esophageal disorders. For instance, neural and muscular dysfunctions cause achalasia and dysphagia. Obstructions, such as tumors, also cause dysphagia. Gastric esophageal reflux occurs when the sphincter relaxes, allowing gastric contents to regurgitate back into the esophagus.

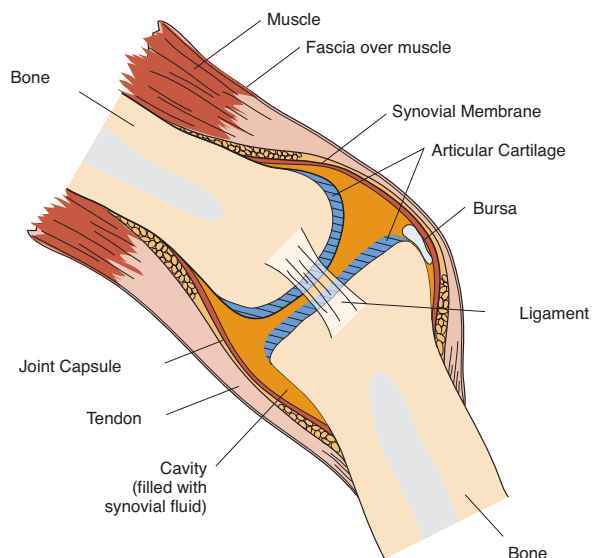
## Stomach

### Basic Structure and Function

The stomach is the muscular, bag-like structure that holds food during eating, secretes the digestive juices that are mixed with the food, and then moves the liquefied, partially digested food, called chyme, into the duodenum in the small intestine for further digestion and absorption by the body. Food enters the stomach through the lower esophageal sphincter into the fundus, through the body, and down to the antrum, or lower third portion. Chyme is moved out into the duodenum through the pyloric sphincter, the ring of muscle that controls this action within the pyloric canal.



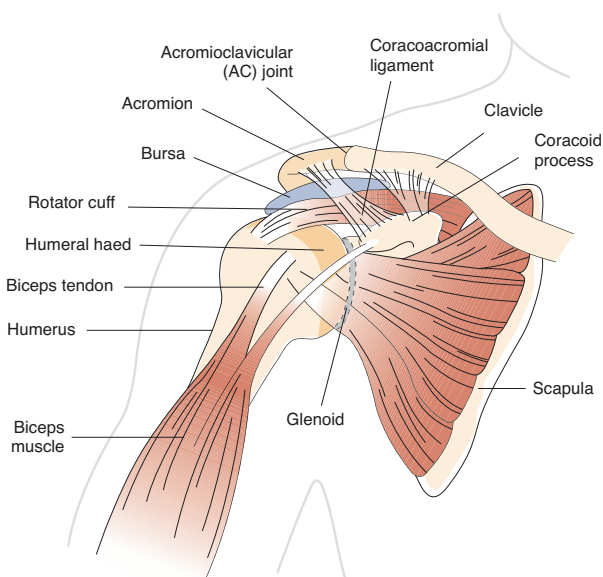
### Synovial joint



Synovial joints are subdivided into six types based primarily on the type of movement the joint allows. The six types are

- Ball and socket
- Condyloid, also called ellipsoid
- Gliding
- Hinge
- Pivot
- Saddle

### Shoulder joint anatomy



## Muscular System

Motion is an essential function that is made possible by the muscles of the body. Muscles work together with bones that form the framework of the body and joints that provide leverage for movement. Motion is accomplished by contraction of the muscles.

Muscles provide the body with the ability to move in obvious ways, such as walking or grasping a knife and fork, as well as less obvious ways which include beating of the heart and movement of food through the digestive tract. In addition to movement, muscles also maintain posture, provide the ability to sit or stand, stabilize joints, produce heat, and protect underlying structures.

### Cells

Muscles are composed of highly specialized cells called fibers with four characteristics:

- Irritability which provides muscle tissue with the ability to respond to stimuli
- Contractility which provides muscles with the ability to shorten and thicken causing contraction of muscle tissue when a sufficient stimulus is received
- Extensibility which provides muscles with the ability to stretch when pulled
- Elasticity which provides muscles with the ability to return to their original shape after contraction or extension

There are three types of muscle fibers:

- Skeletal – cylindrical, multinucleated, striated fibers under voluntary control
- Smooth – spindle-shaped fibers with a single, centrally-located nucleus that lack striations
- Cardiac – branching fibers with a single nucleus, striations, and intercalated discs

Skeletal and cardiac muscle fibers are covered by a plasma membrane called the sarcolemma.

### Tissue

The three types of muscle tissue are all characterized by the ability of the tissue to contract. Two proteins present in muscle, actin and myosin, are contractile proteins that provide muscle with this ability. Muscle tissue is composed of tightly packed fibers. The fibers are usually arranged in bundles that are surrounded by connective tissue. Muscle tissue is also well supplied with nerves and blood vessels.

### Skeletal Muscle Tissue

Skeletal muscle is attached to bone and is named for its location.

Skeletal muscles are wrapped in a fibrous connective tissue called epimysium. Extensions of the epimysium called perimysium divide the muscle tissue into bundles. Extensions of the perimysium called endomysium separate each muscle fiber. The epimysium, perimysium, and endomysium are



## Section II

# ANATOMY AND PHYSIOLOGY FOR ICD-10-PCS

## Introduction

Section II provides an overview of ICD-10-PCS and identifies some of the basic coding principles related to this entirely new inpatient procedural coding system.

During the development of ICD-10-PCS the goal was to incorporate four major attributes into the coding system – completeness, expandability, multiaxial, and standard terminology. Each of these goals are defined as follows:

**Completeness** – The ability to assign a unique code for all substantially different procedures, including unique codes for procedures that can be performed using different approaches

**Expandability** – The ability to add new unique codes to the coding system in the section and body system where they should reside

**Multiaxial** – The ability to assign codes using independent characters around each individual axis or component of the procedure. For example, if a new surgical approach is used for one of the root operations on a specific body part, the new surgical approach can be added to the approach character without a need to add or change other code characters.

In addition, in the 2011 update to this book information we have introduced some of the additional anatomy and physiology components that are part of the procedure codes in this new coding system.

Key elements of ICD-10-PCS include:

- Multiaxial seven character alphanumeric code structure
- Unique code for all substantially different procedures
- Easy incorporation of new codes for new procedures

Key elements related to code content include:

- Diagnostic information is not included in the procedure description. For example, there are no codes used exclusively for aneurysm, cleft lip, neoplasms, or hernias. Diagnostic information is provided by the corresponding ICD-10-CM diagnosis code
- Limited use of “not otherwise specified” (NOS) procedure codes. All existing and new procedures can be reported with at least some level of specificity
- Limited use of “not elsewhere classified” (NEC) procedure codes. All significant components of a procedure can be

reported using ICD-10-PCS, so NEC procedure codes or values are generally not needed. The exception is the device character. New devices that are not described by any of the existing device values are reported with a value for “other device.” However in this instance only the device value is specified as “not elsewhere classified.” Other characters still contain precise values for the procedure performed.

- All currently performed procedures can be specified in ICD-10-PCS. The frequency with which a procedure is performed is not a deciding factor in whether or not a precise code can be assigned.

As was stated earlier, the ICD-10-PCS section is intended to provide only an overview of this new inpatient coding system. Medicare currently has a 238 page manual developed to provide additional guidance on the use of ICD-10-PCS for reporting of inpatient procedures, and other payers will likely provide additional input into reporting guidelines once this coding system is in use.

As you study Section II, remember that this coding system replaces only ICD-9-CM Volume 3. CPT codes will still be used for physician coding and facility coding of outpatient services, and HCPCS Level II codes will continue to be used for supplies and other items or services that cannot be captured using CPT.

**Standardized Terminology** – The ability to assign a specific meaning to each term. Even though many medical terms have multiple meanings in everyday usage, in ICD-10-PCS each term has been specifically defined and the definition provided for that term is the only definition used in ICD-10-PCS. For example, the term ‘excision’ is defined in most medical dictionaries as the surgical removal of part or all of a structure or organ. However, in ICD-10-PCS excision is defined as “cutting out or off, without replacement, a portion of a body part.” If all of a body part is surgically removed without replacement, the procedure is defined as a ‘resection’ in ICD-10-PCS.

## New for 2011

A new chapter has been added with more detailed information on Medical and Surgical Section coding by body system. This chapter expands on the information in previous chapters providing more detailed anatomy and physiology information as it relates to ICD-10-PCS. The following information is included in Chapter 6:

Body Part	Approach	Device	Qualifier
F – Aortic Valve	Ø – Open		Z – No Qualifier
G – Mitral Valve	3 – Percutaneous		
H – Pulmonary Valve	4 – Percutaneous Endoscopic		
J – Tricuspid Valve			
K – Ventricle, Right			
P – Pulmonary Trunk			
Q – Pulmonary Artery, Right			
S – Pulmonary Vein, Right			
T – Pulmonary Vein, Left			
V – Superior Vena Cava			
W – Thoracic Aorta			
R – Pulmonary Artery, Left	Ø – Open 3 – Percutaneous 4 – Percutaneous Endoscopic	4 – Drug-Eluting Stent D – Intraminal Device Z – No device	T – Ductus Arteriosus Z – No Qualifier

4. Percutaneous transluminal coronary artery angioplasty, left anterior descending artery?
  - a. 02703DZ
  - b. 02700DZ
  - c. 02703ZZ
  - d. 02704ZZ
  
5. Percutaneous balloon dilation pulmonary trunk and left pulmonary artery with placement of a stent in the left pulmonary artery:
  - a. 027P0ZZ, 027R0DT
  - b. 027P3DZ
  - c. 027P3DZ, 027R3DZ
  - d. 027P3ZZ, 027R3DZ
  
6. An open mitral valvotomy involving sharp dissection of the mitral valve commissures followed by dissection of the chordae with extension of the incision into the papillary would be reported with code 027G0ZZ. True or false?
  - a. True
  - b. False

Use the table below for question 7:

- 0 Section – Medical and Surgical
- Q Body System – Lower Bones
- H Root Operation – Insertion – Putting in a nonbiological appliance that monitors, assists, performs, or prevents a physiological function, but does not physically take the place of a body part

Body Part	Approach	Device	Qualifier
6 – Upper Femur, Right	Ø – Open 3 – Percutaneous	4 – Internal Fixation Device	Z – No Qualifier
7 – Upper Femur, Left	4 – Percutaneous Endoscopic	6 – Intramedullary Fixation Device	
8 – Femoral Shaft, Right			
9 – Femoral Shaft, Left			
B – Lower Femur, Right			
C – Lower Femur, Left			
6 – Upper Femur, Right	Ø – Open 3 – Percutaneous	5 – External Fixation Device	3 – Monoplanar 4 – Ring 5 – Hybrid 9 – Limb Lengthening Device Z – No Qualifier
7 – Upper Femur, Left	4 – Percutaneous Endoscopic		
8 – Femoral Shaft, Right			
9 – Femoral Shaft, Left			
B – Lower Femur, Right			
C – Lower Femur, Left			
Y – Lower Bone	Ø – Open 3 – Percutaneous 4 – Percutaneous Endoscopic	M – Electrode	Z – No Qualifier

7. Placement of bone stimulating electrodes on the right femur following open reduction and internal fixation of a severely comminuted femoral fracture in a patient with osteoporosis. Assign the code for the bone stimulating electrodes only.
  - a. 0QH60MZ
  - b. 0QH80MZ
  - c. 0QHC0MZ
  - d. 0QHY0MZ

# MEDICAL AND SURGICAL SECTION CODING

## Chapter Objectives

After studying the chapter, you should be able to:

- Identify all 31 ICD-10-PCS body systems
- Identify the corresponding body parts in each body system
- Identify common root operations performed on each body system
- Describe these common root operations
- Identify examples of these common root operations as well as more commonly applied procedural terms used to describe these root operations
- Use the body part tables to identify the correct body part for the root operation
- Assign the 7 character ICD-10-PCS code that describes the procedure
- Identify the corresponding ICD-9-CM procedure code
- Answer questions related to the coding practice by reviewing the text and using the ICD-10-PCS coding reference

## Overview

The medical and surgical section consists of 31 designated body systems. As discussed in Chapter 2, these body systems are subdivided into smaller components normally considered to be a body system as defined in anatomy and physiology texts. In this chapter, the ICD-10-PCS body systems are grouped into 10 body systems that more closely resemble those found in traditional texts. The ICD-10-PCS body systems within these larger body system groupings are then discussed along with the body parts in each of these systems. Tables of the body parts that include the ICD-10-PCS body part value, body part description, structures or branches included in the body part designation, and synonymous terms for the body part have been developed for each ICD-10-PCS body system and the corresponding body parts. These tables can be used to gain familiarity with the anatomy and physiology of the body part and body system and to assign the correct ICD-10-PCS body part value within each body system.

The body part designations include branches or portions of the body part that do not have a more specific designation. In order to identify the correct body part value when a branch or portion of the body part is identified, ICD-10-PCS provides a table in the Appendix that identifies all body part branches or portions included in the designated body part. The table in ICD-10-PCS

does not contain the corresponding values because the values are specific to each body system. For example, in the body system of central nervous system (0), the body part value 0 refers to the brain. However, in the peripheral nervous system (1), the body part value 0 refers to the cervical plexus. In this reference, the values for the body parts found in each body system as defined in ICD-10-PCS have been added so that the body part value can be referenced.

Once a basic understanding of the ICD-10-PCS body systems and their corresponding body parts has been attained, some of the more common root operations for each body system are discussed. Alternative terms for these root operations are provided and some characteristics of the root operations are discussed. The ICD-10-PCS term describing the root operation is often not the procedural term used by the physician, so some examples of more commonly used procedural terms are provided to help the coder identify the types of procedures included in the root operation. A coding practice is then provided for the body system and the commonly performed root operations. The coding practice is followed by questions to help reinforce understanding of ICD-10-PCS codes and code components.

## Medical and Surgical Section

ICD-10-PCS Body Systems within the Medical and Surgical System are arranged as follows:

- Nervous system
  - Central nervous system
  - Peripheral nervous system
- Circulatory System
  - Heart and great vessels
  - Upper arteries
  - Lower arteries
  - Upper veins
  - Lower veins
- Blood and blood forming organs and immune system
  - Lymphatic and hemic system
- Eye
- Respiratory System
  - Ear, nose, sinus
  - Respiratory
  - Mouth and throat

- Gastrointestinal system
  - Gastrointestinal
  - Hepatobiliary and pancreas
- Endocrine
- Integumentary
  - Skin and breast
  - Subcutaneous tissue and fascia
- Musculoskeletal System
  - Muscles
  - Tendons
  - Bursa and ligaments
  - Head and facial bones
  - Upper bones
  - Lower bones
  - Upper joints
  - Lower joints
- Genitourinary system
  - Urinary system
  - Female reproductive system
  - Male reproductive system
- Anatomical Regions
  - General
  - Upper Extremities
  - Lower Extremities

**Nervous System**

In ICD-10-PCS, nervous system medical and surgical procedures are those performed on the central nervous system (0) and the peripheral nervous system (1). Each of these body systems are then subdivided into body parts. The body part designations include branches or portions of the body part that do not have a more specific designation. The tables in this section include all body part values for the designated ICD-10-PCS body system being discussed. These tables can be referenced along with an ICD-10-PCS coding reference to identify the correct code for medical and surgical procedures described in this section.

**Central Nervous System**

The central nervous system contains the following body parts as defined in ICD-10-PCS:

Value	Body Part	Included Structures/ Synonymous Terms
0	Brain	Cerebrum Corpus callosum Encephalon
1	Cerebral meninges	Arachnoid mater Leptomeninges Pia Mater

Value	Body Part	Included Structures/ Synonymous Terms
2	Dura mater	Cranial dura mater Dentate ligament Diaphragma sellae Falx cerebri Spinal dura mater Tentorium cerebelli
3	Epidural space	Cranial epidural space Extradural space Spinal epidural space
4	Subdural space	Cranial subdural space Spinal subdural space
5	Subarachnoid space	Cranial subarachnoid space Spinal subarachnoid space
6	Cerebral ventricle	Aqueduct of Sylvius Cerebral aqueduct (sylvius) Choroid plexus Ependyma Foramen of Munro (intraventricular) Fourth ventricle Interventricular foramen (Munro) Left lateral ventricle Right lateral ventricle Third ventricle
7	Cerebral hemisphere	Frontal lobe Occipital lobe Parietal lobe Temporal lobe
8	Basal ganglia	Basal nuclei Claustrum Corpus striatum Globus pallidus Substantia nigra Subthalamic nucleus
9	Thalamus	Epithalamus Geniculate nucleus Metathalamus Pulvinar
A	Hypothalamus	Mammillary body
B	Pons	Apneustic center Basis pontis Locus ceruleus Pneumotaxic center Pontine tegmentum Superior olivary nucleus
C	Cerebellum	Culmen
D	Medulla Oblongata	Myelencephalon
E	Cranial Nerve	N/A