Medical Claims and Billing Specialist

Instruction Pack 2 Lessons **8-13**

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Medical Claims and Billing Specialist

Instruction Pack 2

Lesson 8: Medical Terminology—Dividing and Combining Terms

Lesson 9: Abbreviations, Symbols and Special Terms

Lesson 10: Introduction to Anatomy

Lesson 11: The Anatomy of the Human Body

Lesson 12: Organ Systems I

Lesson 13: Organ Systems II

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Lesson 8

Medical Terminology—Dividing and Combining Terms

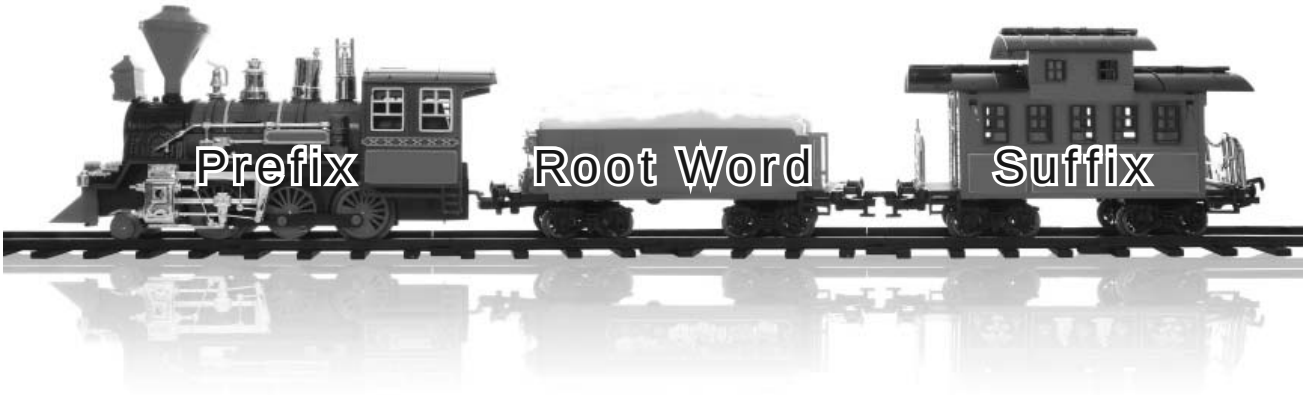
Step 1 Learning Objectives for Lesson 8

- ❑ When you have completed the instruction in this lesson, you will be trained to do the following:
  - ➤ Divide medical terms into parts and then give the meaning of each part.
  - ➤ Properly combine prefixes, root words and/or suffixes to form medical terms that describe certain diagnoses and procedures.

Step 2 Lesson Preview

- ❑ Previously, you learned that word parts fit together to form medical terms: prefixes, root words and suffixes. This lesson shows you how to take complete terms and divide them. You'll also learn how to combine word parts correctly to create new terms.

  You may recall the train example in the last lesson—the root word is the boxcar, the prefix is the engine, and the caboose is the suffix. When you divide medical terms, you can look at the entire train and determine the prefix, suffix and root word. This is important because you sometimes will be faced with unfamiliar terms. If you can look at an unfamiliar word and divide it properly, you then can determine its meaning based on the word parts.



As a medical claims and billing specialist, you might receive bills that don't have the correct medical term spelled out for you. The doctor might have written the procedure or diagnosis in a sentence, but the insurance company needs a key term. *You* are the link between the healthcare provider and her salary! This lesson shows you how to take these "plain English" descriptions and combine word parts to form the correct medical term. As you read this lesson, keep in mind that you are learning both the meanings of and how to assemble words. However, if you find yourself getting confused when dividing and combining terms, remember that as a medical claims and billing specialist, it is more important that you be able to determine the meanings of medical terms than divide and combine the words. Throughout the lesson, be sure to have your flashcards and medical dictionary handy as you will need to consult them as you study the following material, do the Practice Exercises and take the quiz. Your knowledge of medical terms will make you a valuable resource in the medical field—you will be able to communicate effectively with health care providers and insurance companies. Keep up the good work and move on to Step 3!

🕮 Step 3 Dividing Medical Terms

❑ You have learned about word parts—the building blocks of medical terms—and now you can identify these building blocks in medical terms. By dividing medical terms into their word parts, you will be able to recognize new or complicated medical terms. Then you will be able to look them up in a dictionary more easily and spell them correctly.

Facts About Dividing Words

✓ When you look for the word parts in a medical term, read from the end of the term to the beginning. This simple technique lets you "see" word parts more easily.

Look at this example.

thermometer

If you read from the end of the word, the first word part you see is the suffix *meter*. Draw a slash to the left of *meter*.

thermo/meter

Continue reading from right to left. Next you see an *o*. This may be a combining vowel. Put in another slash. Continue reading from right to left. You see the root word *therm*.

therm/o/meter

➤ Now give the meaning of thermometer starting with the suffix.

Word Part Starting with End of Word	Meaning
/meter	instrument to measure
o	(combining vowels have no meaning)
therm/	heat

A thermometer is an instrument to measure heat.

The following three examples further show you how to divide a medical term, reading from end to beginning, to find the meaning.

Word Part Starting with End of Word	Meaning
/genesis	creating
o	(combining vowels have no meaning)
carcin/	cancer of gland tissue

Carcinogenesis means creating cancer of gland tissue.

Word Part Starting with End of Word	Meaning
/partum	labor (delivery)
post/	after

Postpartum means after labor or delivery.

Word Part Starting with End of Word	Meaning
/plasty	restore through surgery
o	(combining vowels have no meaning)
maxill/o	upper jaw

Maxillaoplasty means restoring the upper jaw through surgery.

Of course, whenever you are pronouncing a term, you should read from the beginning of the term to the end, just as you would read any new word in English.

Here is an important point you need to know when you divide medical terms. (It helps to remember that a *consonant* is any letter of the alphabet except *a*, *e*, *i*, *o, u* and, for the purposes of working with medical terms, *y*.)

Facts About Dividing Medical Terms

✓ When a suffix begins with a consonant, there is a combining vowel between the root word and the suffix.

➤ Look at these examples.

Term with Suffix Beginning with Consonant	Meaning
cardi/o/ + **gram**	tracing of the heart
thromb/o/ + **plasty**	surgical repair of blood clot
thorac/o/ + **centesis**	withdrawing fluid from the chest
gastr/o/ + **megaly**	enlargement of the stomach

Because all the suffixes in these examples begin with a consonant, the combining vowel is used. (Did you notice in these examples that dividing slashes (/) were placed between each word part?)

Facts About Dividing Words

✓ When the suffix begins with a vowel, there is no combining vowel between the root word and the suffix.

Vowels are the letters *a*, *e*, *i*, *o* and *u*; as previously mentioned, *y* also is considered a vowel when working with medical terms.

➤ Here are some examples.

Term with Suffix Beginning with Vowel	Meaning
arthr/ + **algia**	pain in joints
bi/ + **opsy**	look at living (tissue)
cardi/ + **ac**	relating to the heart
hemat/ + **oma**	blood tumor (lump)
cardi/o/path/ + **y**	disease of the heart

As you can see, the combining vowel was not used in the terms above before the suffix. The last term, *cardiopathy*, ends with the suffix /*y*. The suffix /*y* follows this vowel rule because it acts like a vowel here.

Facts About Dividing Words

✓ There is a combining vowel between two root words in a compound word.

As you learned in Lesson 7, a compound word has two or more root words in it. Look at these examples. Notice the combining vowel between the root words. Also notice that the combining vowel remains even if the second root word begins with a vowel.

Compound Word with Combining Vowel	Meaning
cardi/o/**log**/ist	heart specialist
gastr/o/**enter**/o/**logy**	study of the stomach and bowels
therm/o/**meter**	instrument to measure heat

➤ Let's try a few more "dissections" of medical terms. Look for word parts in the examples below. Read each term from the end of the term—from right to left. Put in slashes between word parts. Pay special attention to whether or not a combining vowel is present. Be careful. Not every o is a combining vowel, so use your flashcards if you need help.

perirenal

hemostasis

neuritis

hepatitis

cranium

pararenal

appendectomy

paraneural

cardiology

hepatomegaly

Here is how you should divide these terms. Either way is correct as the combined suffix does not always need to be divided.

peri/ren/al		
hem/o/stasis		
neur/itis		
hepat/itis		
crani/um		
para/ren/al		
append/ectomy	or	append/ec/tom/y
para/neur/al		
cardi/o/logy	or	cardi/o/log/y
hepat/o/megaly	or	hepat/o/megal/y

➤ Now give the meaning of these terms. Start at the end of the term and work to the left. Write the meaning in the blank lines. (The meaning you give doesn't have to be exactly the same as ours. We will use the meanings from your flashcards.)

peri/ren/al _____

hem/o/stasis _____

neur/itis _____

hepat/itis _____

crani/um _____

para/ren/al _____

append/ectomy _____

para/neur/al _____

cardi/o/logy _____

hepat/o/megaly _____

➤ The meanings for each of the above terms are listed here:

peri/ren/al	relating to around (surrounding) the kidney
hem/o/stasis	control (hold in) blood
neur/itis	inflammation of nerve(s)
hepat/itis	inflammation of the liver
crani/um	(structure of the) skull
para/ren/al	relating to beside (beyond) the kidney
append/ectomy	(the process of) removal of the appendix
para/neur/al	relating to beside a nerve
cardi/o/logy	(the process of) the study of the heart
hepat/o/megaly	(the process of) enlargement of the liver

The words *the process of* are enclosed in parentheses because they usually are left off when the word is defined in common speech. For example, *hepatomegaly* commonly is defined as *enlargement of the liver*, not the *process of enlargement of the liver*.

People who work in the medical field often use shorter and simpler meanings of words to save time. As you become more familiar with medical terms, you probably will use simpler meanings also. Sometimes a simpler meaning of a word can be formed by reading the word from beginning to end.

Compare these simpler meanings that were given by an experienced claims specialist to the meanings derived from word parts.

Term	Meaning Derived from Word Parts	Simpler Meaning
thermometer	instrument to measure heat	heat-measuring instrument
paraneural	relating to beside a nerve	next to a nerve
cardiology	(the process of) the study of the heart	heart specialty
hepatomegaly	(the process of) enlargement of the liver	liver enlargement

For now, start at the end of a word that is new to you to help you look for word parts that you recognize and to help you give meanings for word parts. This is the easiest way to find word parts and give meanings. As you become more familiar with various word parts, feel free to use simpler meanings.

Now let's examine a few word parts and their meanings. Remember, you may use your flashcards to find word part meanings, and as you learn more word parts, dividing medical terms will become easier!

Word Part	Meaning
bi/	two
/malacia	softening
syn/, sym/	together with
gynec/o	female
sarc/o	nongland tissue, flesh
vit/o	living, alive
chem/o	chemical, drug
meta/	change, beyond
maxill/o	upper jaw
nect/o	bind
/oma	tumor, mass

Before we move on to our first Practice Exercise, examine the following two boxes. The boxes list common prefixes and suffixes and their meanings. These boxes will help you as you divide and combine terms.

Prefix	Meaning
a-, an-	absence of, without, no, not
ante	before
con	with
contra	opposite, against
dia-	across, apart, complete knowledge, through
endo-	within, in, inner
post	after
pro-, pros-	before, forward, in front of
re-	back, behind
sub-	under, below
trans-	across, through, over, beyond

Suffix	Meaning
-al	relating to, pertaining to
-algia	pain
-ectomy	removal, excision
-gnosis	about the patient's condition
-gram	recording, picture
-ic	relating to, pertaining to
-itis	inflammation
-logy	study of
-osis	abnormal condition
-scopy	process of visual examination

✍ Step 4 Practice Exercise 8-1

❑ Follow the instructions below to complete Parts I and II of the Practice Exercise.

Part I

Divide each medical term listed below by putting slashes between the word parts, including between root words and combining vowels. Remember, you don't have to divide a combined suffix. For example, cardi/o/logy and cardi/o/log/y both are correct. Do all the items you know first. Then use your flashcards for items that you don't know. Circle the items you had to look up on the flashcards. The first word is divided for you.

Part II

For each medical term listed below, write the meaning. Do all the items you know first. Then use your flashcards for items that you don't know. Circle the items you had to look up on the flashcards. We have given you the first answer to get you started.

Divide	Meaning
1. **cardi/o/megaly**	enlargement of the heart
2. **acromegaly**	_____
3. **macroglossia**	_____
4. **histology**	_____
5. **arthritis**	_____
6. **splenomegaly**	_____
7. **aleukocytosis**	_____
8. **thoracocentesis**	_____
9. **gastrectomy**	_____
10. **pulmonary**	_____

Step 5 Answers to Practice Exercise 8-1

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made. Pay particular attention to any items you have circled.

Step 6 Pronounce Word Parts

- ❑ Now that you know the basics about dividing medical terms, practice pronouncing word parts using the following exercise. Pronouncing the terms will help you become familiar with them.

  a. Take your Quick-learn Tutor and your Set 4 flashcards out of your Quick-learn Kit. Insert the first flashcard for Set 4 into Side A of the Tutor.

  b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 4.

  c. Listen to a word part as it is pronounced on the CD. After you hear a word part, put the CD player on pause.

  d. Look at the word part in the left window of your Quick-learn Tutor and practice pronouncing it out loud several times to familiarize yourself with the term. Push the flashcard up and read the meaning of the word part.

  e. Continue this process for all the flashcards for this set.

  f. Next, put the flashcards in order and play the CD again. This time, pronounce each word part in order but do not stop the CD player.

  g. As you pronounce each word part, look at it on the flashcard.

Step 7 Write Word Parts

- ❑ The next step in your lesson is to practice writing the terms you have just learned. Follow these instructions:

  a. Insert the first flashcard for Set 4 into Side A of your Quick-learn Tutor.

  b. Look at each word part as it appears in the window and say it out loud. Write each word part on blank paper. Remember to include the slash.

  c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the word part.

  d. Do this for each flashterm for this set.

Step 8 Meanings of Word Parts

- ❑ Follow these steps to familiarize yourself with the meanings of the terms you have pronounced and written.

  a. Again insert the first flashcard for Set 4 into Side A of your Quick-learn Tutor. Pronounce each word part out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

  b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud. Before you look, see if you can remember the word part that goes with that meaning. Check yourself by pushing the flashcard up until you can see the word part in the left window. Do this for each flashterm for this set.

  c. Practice with the flashcards several times until you are familiar with the word parts and their meanings. You may use the flashcards for Practice Exercises and quizzes.

Step 9 Practice Exercise 8-2

- ❑ Follow the instructions below to complete Parts I and II of the Practice Exercise.

Part I

For each word part listed below, write the meaning. Do all the items you know first. Then use your flashcards for items that you don't know. Circle the items you had to look up on the flashcards.

Word Part	Meaning
1. **carcin/o**	_____
2. **ox/o**	_____
3. **laryng/o**	_____
4. **cerebr/o**	_____
5. **/genesis**	_____
6. **axill/o**	_____
7. **/penia**	_____

8. **/tome** _____

9. **/tomy** _____

10. **/oma** _____

Part II

For each meaning below, give the proper word part. Be sure to include the slash. Do all the items you know first. Then use your flashcards for items that you don't know. Circle the items you looked up on the flashcards.

Meaning	Word Part
11. **self**	_____
12. **run**	_____
13. **chemical, drug**	_____
14. **with**	_____
15. **change, beyond**	_____
16. **rib**	_____
17. **female**	_____
18. **lower jaw**	_____
19. **brain**	_____
20. **many**	_____

Step 10 Answers to Practice Exercise 8-2

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made. Pay particular attention to any items you have circled.

✍ Step 11 Practice Exercise 8-3

❑ Follow the instructions below to complete Parts I and II of the Practice Exercise.

Part I

Divide each medical term listed below by putting slashes between the word parts, including between root words and combining vowels. Remember, you don't have to divide a combined suffix. For example, cardi/o/logy and cardi/o/log/y both are correct. Do all the items you know first. Then use your flashcards for items that you don't know. Circle the items you had to look up on the flashcards. The first word is divided for you.

Part II

For each medical term listed below, write the meaning. Do all the items you know first. Then use your flashcards for items that you don't know. Circle the items you had to look up on the flashcards. We gave you the first answer to get you started.

Divide	Meaning
1. **oste/o/malacia**	softening of bone
2. **sarcoma**	_____
3. **carcinoma**	_____
4. **connect**	_____
5. **maxillary**	_____
6. **laryngitis**	_____
7. **vital**	_____
8. **costal**	_____
9. **craniotome**	_____
10. **chemotherapy**	_____

🗝 Step 12 Answers to Practice Exercise 8-3

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made. Pay particular attention to any items you have circled.

Step 13 Combining Medical Terms

- Combining word parts to form medical terms is just the reverse of dividing medical terms into word parts.

  When you learned to divide medical terms, you gained the skill of recognizing long or complicated terms by dividing them into their word parts. Sometimes when doctors fill out bills and charts, they may use a term unclearly or incorrectly. If you know how to combine word parts, you can put together the correct medical term from its everyday English meaning. This is the reason for learning how to combine medical terms.

  Knowing just a few word parts allows you to combine them into many different medical terms. Look at this example of the number of new terms you can form each time you add a new word part to your list.

Word Parts Learned		**Terms You Can Form**		
Root Words:	gastr/o	cyst/o	splen/o	
Suffixes:				
/ic	gastric	cystic	splenic	gastrosplenic
/itis	gastritis	cystitis	splenitis	
/ectomy	gastrectomy	cystectomy	splenectomy	
Prefixes:				
epi/	epigastric	epicystitis	episplenitis	
peri/	perigastric	pericystic	perisplenitis	
		pericystitis		

Let's see now. You only needed to learn eight word parts to build 17 medical terms! Not bad. Just stick to the steps and before you know it, you will have learned many word parts the easy way. Word parts, like nickels and dimes, add up fast.

Let's go over the important things to remember when combining medical terms. These rules will help you when combining most Latin terms.

Facts About Combining Word Parts

✓ Use a combining vowel between a root word and a suffix that begins with a consonant.

➤ Look at these examples of terms built from their English meanings. Each suffix begins with a consonant. That's why the combining vowel was used.

Meaning	Term with Suffix Beginning with Consonant	Combined Term
tracing of the heart	cardi/o/ + **gram**	cardi/o/gram
surgical repair of a blood clot	thromb/o/ + **plasty**	thromb/o/plasty
to cut into the stomach	gastr/o/ + **tomy**	gastr/o/tomy

Facts About Combining Word Parts

✓ Do not use a combining vowel between a root word and a suffix that begins with a vowel.

✓ Do not use a combining vowel between a prefix and a root word.

➤ Look at these examples. The combining vowel is not used.

Meaning	Term with Suffix Beginning with Vowel	Combined Term
blood tumor (lump)	hemat/o/ + **oma**	hemat/oma
look at living (tissue)	bi/o/ + **opsy**	bi/opsy
relating to the heart	cardi/o/ + **ac**	cardi/ac

Facts About Combining Word Parts

✓ Use a combining vowel between two root words in a compound word even when the second root word begins with a vowel.

➤ Look at these examples. The combining vowel is used between two root words. All of the root words below are in boldface type.

Meaning	Compound Word	Combined Term
heart specialist	**cardi**/o/**log**/ist	cardiologist
instrument to measure heat	**therm**/o/**meter**	thermometer
study of the stomach and intestines	**gastr**/o/**enter**/o/**log**/y	gastroenterology
relating to water electrical activity	**hydr**/o/**electr**/ic	hydroelectric

When dividing and combining terms in this course, it's helpful to identify the prefixes and suffixes in addition to the root words. For example:

Meaning	Prefix	Root(s)	Suffix	Medical Term
control blood		hem/o	/stasis	hemostasis
relating to around kidney	peri/	ren/o	/al	perirenal
enlargement of the liver		hepat/o	/megaly	hepatomegaly
inflammation of vessels		angi/o	/itis	angiitis
removal of the spleen		splen/o	/ectomy	splenectomy

Read from the beginning of the term to the end when you are pronouncing a term you have created.

And remember, read from the end of the term to the beginning when you check the meaning of a term you have created.

Combining word parts can be more difficult than dividing terms because there are many suffixes that mean the same thing. You must know which one to use. To learn this, you will use the combined suffixes you learned in Lesson 7. This way you will learn which suffixes go with which root words.

In everyday practice, medical claims and billing specialists look up new terms in a medical dictionary to be sure they are using the correct suffix. At this point in the course, you do not need a medical dictionary—your flashcards contain the word parts you need.

✍ Step 14 Practice Exercise 8-4

❑ For each set of word parts, combine the parts into a medical term using the rules you learned in this lesson. Write the medical term and the meaning in the blank spaces below.

Word Parts	Medical Term	Meaning
1. **gastr/o enter/o /logy**	_____	_____
2. **oste/o /malacia**	_____	_____
3. **laryng/o /scope**	_____	_____
4. **carcin/o /oma**	_____	_____
5. **sarc/o /oid**	_____	_____
6. **muc/o /ous**	_____	_____
7. **thromb/o /osis**	_____	_____
8. **hepat/o /ic**	_____	_____
9. **peri/ col/o /itis**	_____	_____
10. **pulmon/o /ic**	_____	_____

🗝 Step 15 Answers to Practice Exercise 8-4

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

✍ Step 16 Practice Exericse 8-5

❑ In this Practice Exercise, you will divide the terms and give their meanings. Follow these steps:

a. Using a pencil, make slashes to divide the terms into word parts.
Like this: cardi/o/log/ist

b. Write the meaning of the word in the blank space on the right.
Like this: cardi/o/log/ist one who specializes in studying the heart

c. You may refer to your flashcards if you need to.

Divide	Meaning
1. chemist	_____
2. craniotomy	_____
3. laryngectomy	_____
4. endoderm	_____
5. perihepatic	_____
6. polygastria	_____
7. thrombitis	_____
8. subhepatic	_____
9. retrogastric	_____
10. myeloid	_____
11. myopathy	_____
12. venous	_____
13. natal	_____
14. kleptomania	_____
15. neurosis	_____
16. electric	_____
17. arterial	_____
18. cystic	_____

Step 17 Answers to Practice Exercise 8-5

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

Step 18 Pronounce Word Parts

- ❑ Follow these steps to familiarize yourself with additional word parts you'll encounter in your new career:

  a. Take your Quick-learn Tutor and your Set 5 flashcards out of your Quick-learn Kit. Insert the first flashcard for Set 5 into Side A of the Tutor.

  b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 5.

  c. Listen to a word part as it is pronounced on the CD. After you hear a word part, put the CD player on pause.

  d. Look at the word part in the left window of your Quick-learn Tutor and practice pronouncing it out loud several times. Push the flashcard up and read the meaning of the word part. Continue this process for all the flashcards for this set.

  e. Next, put the flashcards in order and play the CD again. This time, pronounce each word part in order but do not stop the CD player.

  f. As you pronounce each word part, look at it on the flashcard.

Step 19 Write Word Parts

- ❑ These are the steps to follow:

  a. Insert the first flashcard for Set 5 into Side A of your Quick-learn Tutor.

  b. Look at each word part as it appears in the window and say it out loud. Write each word part on blank paper. Be sure to include the slash.

  c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside each word part.

  d. Do this for each flashterm for this set.

Step 20 Meanings of Word Parts

❑ Follow these steps:

a. Again insert the first flashcard for Set 5 into Side A of your Quick-learn Tutor. Pronounce each word part and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the word part. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the words and their meanings.

d. When you feel comfortable with the spelling, pronunciation, and meaning of each word part, go on to the next step.

Step 21 Practice Exercise 8-6

❑ Follow the instructions below to complete Parts I, II and III of the Practice Exercise.

Part I

Write the meaning for each word part listed below. Use your flashcards for items that you don't know. Circle any items you looked up on the flashcards.

Word Part	Meaning
1. lapar/o	_____
2. pneum/o	_____
3. ana/	_____
4. /physis	_____
5. /pnea	_____
6. bronch/o	_____
7. cutane/o	_____
8. mort/o	_____
9. psych/o	_____
10. phob/o	_____

Part II

❑ Write the correct word part for each meaning given below. Be sure to include the slash. Use your flashcards for items that you don't know. Circle any items you looked up on the flashcards.

Meaning	Word Part
11. break down, dissolve	_____
12. bad, labored	_____
13. nose	_____
14. bear	_____
15. secrete	_____
16. ear	_____
17. eye	_____
18. kidney	_____
19. tonsils	_____
20. flow	_____

Part III

Write the correct meaning for each term below. Use your flashcards for items that you don't know. Circle any items you looked up on the flashcards.

21. Thermogram

_____

22. Postpartum

_____

23. Intracutaneous

_____

24. Epidermal

_____

25. Nephrectomy

_____

Step 22 Answers to Practice Exercise 8-6

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made. Review your flashterms again, giving extra attention to any items circled in the Practice Excercise.

Step 23 Lesson Summary

- ❑ Medical terms are constructed of root words, prefixes and suffixes. By learning these word parts, you can divide a medical term into its word parts and derive its meaning. You can take an unfamiliar medical term, separate its root word from any prefixes or suffixes and determine what that word means. This is important because you cannot possibly memorize every single medical term healthcare providers use. But you can learn to divide and combine medical terms, and this skill will enable you to become a competent, professional medical claims specialist. You'll be able to break up unfamiliar medical terms so that you can look them up in your medical dictionary to determine the correct spelling and meaning.

  Now don't get discouraged if you found this lesson a little challenging. As you read in the preview of this lesson, keep in mind that as a medical claims and billing specialist, it is more important that you be able to determine the meanings of medical terms than divide and combine the words. However, this doesn't mean that the Practice Exercises in this lesson aren't important. If you skipped any or struggled to complete some of them, go back and work on them again. Doing so only will help you with the upcoming quiz. U.S. Career Institute successfully has graduated thousands of men and women from its program, and we want you to be one of these success stories! If you need a helping hand, call your instructor. And remember that U.S. Career Institute offers support even after you graduate and as you advance in your new career.

✉ Step 24 Mail-in Quiz 8

❑ Follow the steps to complete the quiz.

a. Be sure you've mastered the instruction and the Practice Exercises that this quiz covers.

b. Mark your answers on your quiz. Remember to check your answers with the lesson content.

c. When you've finished, transfer your answers to the Scanner Answer Sheet included. Use only blue or black ink on your Scanner Answer Sheet.

d. **Important!** Please fill in all information requested on your Scanner Answer Sheet or when submitting your quiz online.

e. Submit your answers to the school via mail, e-mail, fax or, to receive your grade immediately, submit your answers online at www.uscareerinstitute.edu.

Mail-in Quiz 8

For items 1 through 15, choose the correct definition for each term. Each question is worth 4 points.

1. crani/o _____

a. head
b. skull
c. structure
d. self

2. tens/o _____

a. relating to
b. structure
c. through
d. pressure

3. para/ _____

a. beside, beyond
b. relating to
c. through
d. surrounding

4. dia/ _____

a. beside, beyond
b. relating to
c. through
d. surrounding

5. /emia _____

a. throughout the blood
b. disease
c. withdrawing fluid
d. water, fluid

6. /ium _____

a. situation, process, condition
b. structure
c. condition
d. relating to

7. /tic _____

a. situation, process condition
b. structure
c. condition
d. relating to

8. adip/o _____

a. vessel containing fluid
b. armpit
c. sudden, sharp
d. fat tissue

9. laryngo/o _____

a. jugular, throat or neck vein
b. esophagus
c. mouth
d. voicebox, larynx

10. auto/ _____

a. immunity
b. disease
c. self
d. structure

11. /malacia _____

a. excessive preoccupation
b. softening
c. lack of
d. hardening

12. /plasty _____

a. restore by surgery
b. development, growth
c. breathing
d. attach into place

13. cephal/o _____

a. head
b. skull
c. spine
d. nose

14. rhin/o _____

a. head
b. skull
c. spine
d. nose

15. /pnea _____

a. nose
b. growth
c. breathing
d. formation

For items 16 through 25, use your flashcard sets 1 through 5 and the information you have learned about dividing terms to choose the appropriate definition for each term. Each question is worth 4 points.

16. Hyperdactylia _____

a. A condition of having a decreased number of fingers or toes
b. A condition of having an increased number of fingers or toes
c. A procedure to remove an infected toe
d. A condition in which toes grow faster than usual

17. Adenocarcinoma _____

a. A cancerous tumor of gland tissue
b. Near or within a cancerous gland tissue
c. Tissue affected by adenoma
d. A disease of the lymph nodes

18. Gastroenteritis _____

a. Relating to the stomach and intestines
b. One who studies the stomach and small intestine
c. Inflammation of the stomach and small intestine
d. Excision of part or all of the stomach

19. Antepartum _____

a. Before delivery
b. After delivery
c. Against or beside a structure
d. Before meals

20. Lithocystotomy _____

a. To remove cells from the bladder
b. To cut into a sac of fluid
c. Surgically remove (cut into or slice) a stone from the bladder
d. To surgically remove the bladder

21. Osteopathy _____

a. Atrophy of the bone
b. The study of bone disease
c. To restore the bone by surgery
d. Disease process of the bone

22. Erythrodermia _____

a. Relating to inflammatory redness of the skin
b. Condition of red skin
c. Condition of red cells throughout the blood
d. Relating to skin

23. Bradycardia _____

a. Through the upper part of the stomach
b. Infarction of the heart muscle
c. Condition of a slower than usual heart beat
d. Relating to the cavity of the heart

24. Nephrography _____

a. An instrument used to trace kidney activity
b. Process of creating a picture of the kidney
c. An instrument used to support the kidney
d. The study of surgical instruments

25. Chemotherapy _____

a. Drug rehabilitation
b. Chemical treatment
c. The study of chemical reactions
d. Treatment of cancer

Congratulations

You've completed Lesson 8.

Don't wait for your quiz results to continue with Lesson 9.

Lesson 9

Abbreviations, Symbols and Special Terms

Step 1 Learning Objectives for Lesson 9

- ❑ When you have completed the instruction in this lesson, you will be trained to do the following:
  - ➤ Determine common medical abbreviations.
  - ➤ Explain common symbols.
  - ➤ Describe eponyms and acronyms.
  - ➤ Describe sound-alikes and opposites.
  - ➤ Convert singular medical terms to plurals and recognize medical plurals.

Step 2 Lesson Preview

- ❑ How many people have you talked to today? Imagine you ran into a good friend who was very bad about keeping in touch with his family. If you asked him, "Did you write that letter to your brother?" he probably would shake his head no. To him, keeping in touch is very complicated.

  Now look closely at the question you asked. The sentence, "Did you write that letter to your brother?" illustrates how the English language can be complex. Your question contained three *sound-alikes*—the words *you*, *write* and *to* sound the same as other words (*ewe*, *right* or *rite* and *too* or *two*). Sound-alikes, medical plurals and opposites are just three of the types of terms we'll cover in Lesson 9. *You* (not *ewe*) will also learn some common medical abbreviations and symbols.

To some people, keeping in touch is very complicated.

It's amazing how much you have learned already about medical terminology. This knowledge will allow you to understand all the facets of your new career in medical claims and billing. Medical care providers will appreciate your knowledge. So let's move on to this lesson about special terms.

🕮 Step 3 Abbreviations

- ❑ Doctors frequently use shortened versions of longer words or phrases. These shortened versions of words and phrases are called **abbreviations**. Abbreviations are extremely useful to a doctor because they save valuable time. However, abbreviations are not helpful unless you, the medical claims specialist, can determine the names for the procedures the doctor performed. Because it is important to be completely accurate, doctors and hospitals get together and produce lists of approved abbreviations—abbreviations they all agree on and understand.

Abbreviations in Hospitals

Hospitals are required by the Joint Commission on Accreditation of Healthcare Organizations (also known as The Joint Commission) to keep a list of acceptable abbreviations. Only the accepted abbreviations may be used in the medical records for that hospital.

Office Records

The rules for abbreviations are more relaxed for the records in individual offices. However, any bills or insurance forms typed up must follow the hospital's list of abbreviations.

Doctors

Doctors sometimes have their own personal abbreviations. As a medical claims specialist, you will need to learn these personal abbreviations. This will help you communicate more effectively with your clients or employer.

Pharmacies

Lists of medications and treatments prepared by a pharmacy are included in the medical bill and they appear on the insurance forms filed by the doctor's office or hospital. Usually Latin abbreviations are used for these medications and treatments.

On your flashcards, beside each Latin lower case abbreviation you will see the full Latin phrase. You will not need to learn the Latin words—just the punctuation and the everyday meaning.

🕮 Step 4 Learn Abbreviations

- ❑ It's important to be familiar with common medical abbreviations, so take some time to practice saying and writing medical abbreviations using the following easy exercise. Because pronunciation is not an issue with abbreviations, there is no CD to go with this flashcard set.

  a. Take your Quick-learn Tutor and your Set 6 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

  b. Look at each abbreviation as it appears in the window and say it out loud. Write each abbreviation on blank paper.

  c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside each abbreviation.

  d. Do this for each flashterm for this set.

🕮 Step 5 Meanings of Abbreviations

- ❑ Follow these steps:

  a. Again insert the first flashcard for Set 6 into Side A of your Quick-learn Tutor. Pronounce each abbreviation and look at how it is spelled. Then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

  b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud and then say the abbreviation. Again, check yourself by pushing the flashcard up until you can see the meaning in the left window.

  c. Practice with the flashcards several times until you are familiar with the abbreviations and their meanings. Don't struggle to memorize them. You may always look up abbreviations.

✍ Step 6 Practice Exercise 9-1

❑ For each abbreviation listed below, write the meaning. Do all the items you know first. Then use your flashcards for items that you don't know. Circle the items you had to look up on the flashcards.

Abbreviation	Meaning
1. CO_2	_____
2. mg	_____
3. O_2	_____
4. n.p.o.	_____
5. NBS	_____
6. EBV	_____
7. kg	_____
8. TPR	_____
9. IM	_____
10. q.n.s.	_____
11. b.i.d.	_____
12. DOB	_____
13. Dx	_____
14. IV	_____
15. stat.	_____
16. q.a.m.	_____
17. GB	_____
18. Sx	_____
19. Rx	_____
20. FUO	_____

Step 7 Answers to Practice Exercise 9-1

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made. Pay particular attention to any items you have circled.

Step 8 Slang

- ❑ There are two types of slang you may encounter in the medical field—medical slang and English slang.

Medical Slang

Medical slang words are informal abbreviations for longer medical terms. For example *sedimentation rate* is called *sed rate*. The *laboratory* is the *lab*. Doctors use medical slang frequently for the same reason they use abbreviations—to save time.

Facts About Medical Slang

✓ If you encounter slang on a medical form, do not copy it onto the bill. Use the full term the slang represents. For example:

If the doctor wrote, "The patient was prepped for appy," you would type, "The patient was prepped for appendectomy."

✓ And then you enter the correct code on the form. (You will learn more about coding procedures later in this course.)

Some medical slang terms are used so frequently that they become accepted medical terms. *Exam* and *prep* are two examples of this.

English Slang

English slang words are highly informal words not usually used in professional writing.

Facts About English Slang

✓ Obscene or offensive statements are never put in any medical report, including patient files, insurance forms and patient charts, unless the patient is being quoted (in this case, use quotation marks around the quoted statement). If the patient is not being quoted, delete the offensive or obscene statement.

- ❖ Correct: The patient said, "I fell down and hurt my ass."
- ❖ Incorrect: The patient is a pain in the ass. (Leave out this whole sentence.)

🕮 Step 9 Slang Terms

❑ Follow these steps:

a. Take out your Quick-learn Tutor and your Set 7 flashcards. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each slang term as it appears in the window and say it out loud. Write the slang term on blank paper.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside each slang term.

d. Do this for each flashterm for this set.

🕮 Step 10 Meanings of Slang Terms

❑ Follow these steps:

a. Again insert the first flashcard for Set 7 into Side A of your Quick-learn Tutor. Pronounce each slang term and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud and then say the slang term. Again, check yourself by pushing the flashcard up until you can see the meaning in the left window.

c. Practice with the flashcards several times until you are familiar with the words and their meanings.

✍ Step 11 Practice Exercise 9-2

❑ Match the slang words with the medical terms they stand for.

1. ___ **sibs**	a.	Medications
2. ___ **prep**	b.	Nullipara, woman with no deliveries
3. ___ **meds**	c.	Pathology
4. ___ **ab**	d.	Siblings, brothers and sisters
5. ___ **exam**	e.	Abortion
6. ___ **path**	f.	Primipara, woman with one previous birth
7. ___ **appy**	g.	Temperature
8. ___ **primip**	h.	Prepare, preparation
9. ___ **nullip**	i.	Appendectomy, appendicitis
10. ___ **temp**	j.	Examination

🗝 Step 12 Answers to Practice Exercise 9-2

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 13 Symbols

❑ The symbols used in medicine are no different from those used in everyday life. When you use symbols, you must be sure the symbol is well known. To give you a better understanding of which symbols are acceptable, we will go through the main rules you need to remember.

Facts About Using Symbols

✓ When you use symbols, do not leave a space between the symbol and the numeral.

✓ However, *do* leave a space between a numeral and the symbol x. This symbol means *by* in dimensions, as in *6 x 9*.

➤ Look at the list of symbols below, what they mean and how they are used.

Symbol	Meaning	Example
°C	degrees Celsius	32° C
°F	degrees Fahrenheit	98.6° F
&	and (between capital letters only)	D&C
X	times, by	x 3 days, 2 x 3 x 5
+	plus (urine; reflexes)	3+
:	ratio; __ to __	1:2
/	per, vision test	2/day; 20/20
/	over (blood pressure)	120/80
__	minus, __ to __ (range), through	–2, 4–5, II–XII
-	suture size	3-0 (000) silk
#	number	#16 Fr, #3-0 silk

✍ Step 14 Practice Exercise 9-3

❑ Fill in the appropriate symbol used with each term below. You may refer to the list of symbols in Step 13.

1. _____ **temperature (Celsius or Fahrenheit)**
2. _____ **number**
3. _____ **suture size**
4. _____ **over (blood pressure)**
5. _____ **and (between capitals)**
6. _____ **minus**
7. _____ **vision**
8. _____ **ratio**

🗝 Step 15 Answers to Practice Exercise 9-3

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 16 Special Terms

❑ In medical terminology, as in the rest of the English language, there are special terms that have specific rules. These terms include proper nouns and other capitalized words, sound-alikes and opposites. You will learn to determine which words require special treatment, such as capitalization. You will also learn about two special classes of terms: *eponyms* and *acronyms*.

Eponyms

In addition to the medical terms you learned to combine and divide in an earlier lesson, medical reports contain other information, such as laboratory test results, special medical abbreviations and the names of medical equipment and procedures. Often these words include **proper names**—that is, brand names or the names of people. You must capitalize proper names. Frequently, a person's name or a brand name is included in a medical term when that term is an *eponym*.

It was the custom in the past to use a person's name to identify his or her medical inventions or discoveries. The kinds of things named for people include:

➤ a new disease; a symptom or sign of disease

➤ an anatomical structure

➤ a new instrument, test or examination method

An **eponym** is a term that is formed from a person's name. The person's name is given to the name of his or her discovery or invention to indicate that person did the research and made the discovery. One example is *Bell's palsy*.

Facts About Eponyms

✓ An eponym has two parts:

1. The person's name as an adjective.
2. The type of invention or discovery as a noun.

Eponym Adjective	Eponym Noun	Meaning
Bell's	palsy	facial paralysis
Pott's	clamp	surgical instrument
Chiba	needle	long biopsy needle
McBurney's	point	examination location for the appendix
Kaposi's	sarcoma	unusual skin cancer

Because an eponym includes a person's name, you won't be able to divide it into medical word parts. You do, however, capitalize the proper name in the term, but not the noun.

If you use an eponym frequently enough, you will probably memorize how it is spelled. Otherwise, you will have to look in your medical dictionary for the proper spelling of eponyms.

Luckily, most eponyms can be found quite easily in the dictionary because they are listed under the noun part of the phrase. Look at these examples of some medical dictionary listings.

Eponym	Listed in Medical Dictionary Under
Bell's palsy	palsy
Kaposi's sarcoma	sarcoma
McBurney's point	point

Because it is difficult to remember the meanings of eponyms, their use is becoming less common. In fact, it is now considered more professional to use a properly combined medical term rather than an eponym. Even so, eponyms are still frequently used by doctors.

Brand names are another category of terms that require capitalization.

Brand Names

In the past, an eponym told you the name of the person who took credit for a discovery or an invention. Some names of medical products indicate that a company owns the patent for an invention or discovery. **Brand names** are like eponyms because they demonstrate who discovered the procedure, diagnosis or disease. The kinds of new brand name eponyms you will see today will be for the following:

- a genetic cell line or tissue culture product
- equipment or instruments
- drugs or therapy methods

Look at these examples: General Electric CT scanner, Pen.Vee K penicillin and Phillips' milk of magnesia.

Don't worry if you can't pronounce some eponyms. Like your own name, there are usually a number of different ways to pronounce them. All you need to be able to do is to find the correct spelling in the dictionary.

Common Eponyms

Babkin reflex	Hodgkin's disease
Cantor tube	Hodgkin's sarcoma
Charcot's syndrome	Kaposi's sarcoma
Colles fracture	Laennec's cirrhosis
Cooley's anemia	Legg's disease
Epstein-Barr virus	McBurney's point
Erb's palsy	Miller-Abbott tube
Gordon's reflex	Pauley's point
Halsted suture	West Nile virus

Acronyms

An **acronym** is a word that is formed by using the initials from a group of words or from word parts. Here are some acronyms you are probably already familiar with:

Acronym	Stands for
IRS	Internal Revenue Service
USA	United States of America
DMV	Department of Motor Vehicles

Acronyms are a special kind of abbreviation. Doctors like to use acronyms because they save time. Instead of having to write the very long names of some diseases and procedures, the doctor can simply use the acronym. Here are some examples of some common medical term acronyms.

Medical Term or Phrase	Acronym
Cardiopulmonary resuscitation	CPR
Complete blood count	CBC

Acronyms are formed by taking the first letter of each word in a phrase or by taking the first letter of the word parts:

FTD=**F**lorist **T**elegraph **D**elivery

NG=**n**aso**g**astric

Not every word in the phrase has to be represented in the acronym. Small, nonessential words in a phrase are usually omitted:

EENT=eye, ear, nose *and* throat

Acronyms are usually pronounced by saying the letters one by one. However, if the letters of the acronym spell a word or can be pronounced as a word, then the acronym may be pronounced as if it were a word. Look at these examples:

Acronym	Pronounced
EEG	Say the letters—Ee-ee-gee
ELISA	Pronounce the word—El-ee-sah

In fact, some acronyms that can be pronounced like words actually become words if they are used often enough. The word *laser* began as an acronym for the phrase *Light Amplification by Stimulated Emission of Radiation*. No one bothers to say the whole phrase any more because *laser* is an accepted word. The same is true of the word *scuba*, which stands for *self-contained underwater breathing apparatus*.

Facts About Acronyms

✓ Write acronyms in capital letters with no periods or spaces between the letters. For example:

CBC = complete blood count

NSVD = normal spontaneous vaginal delivery

When you hear a new acronym, be sure to look it up and find out what it stands for. This will help you write, type and spell acronyms correctly. Most common acronyms can be found in a medical dictionary along with their meanings.

Step 17 Pronounce Acronyms

- ❑ Follow these steps:

  a. Put the pronunciation CD in the CD player. Advance the CD to Flashcard Set 8.

  b. Put the first flashcard for Set 8 into Side A of your Quick-learn Tutor.

  c. Listen to each acronym as it is pronounced. Put the CD player on pause after each acronym.

  d. Practice pronouncing each acronym until you can pronounce it clearly and easily. You do not need to memorize the meaning of an acronym—only be able to form it and look up its meaning on the flashcard.

  e. Do this for each flashcard for this set.

Step 18 Practice Exercise 9-4

- ❑ Let's practice forming acronyms. Listed below are complete medical phrases. Write the correct acronym for each phrase. Notice how the acronym is formed by taking the initials of the words or word parts in the phrase.

Medical Phrase	Acronym
1. blood urea nitrogen	_____
2. white blood count	_____
3. Venereal Disease Research Laboratory	_____
4. rheumatoid arthritis	_____
5. human immunodeficiency virus	_____
6. Physicians' Desk Reference	_____
7. (The) pupils (are) equal, round (and) reactive (to) light (and) accommodation	_____
8. electr/o/encephal/o/gram	_____
9. eye, ear, nose (and) throat	_____
10. intra/muscular	_____

Step 19 Answers to Practice Exercise 9-4

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

Step 20 Sound-alikes and Opposites

- ❑ Two types of word pairs may occasionally present challenges for the medical claims and billing specialist: homophones and antonyms.

Homophones (Sound-alikes)

Terms that sound alike are known as **homophones**. They are not spelled alike, and they have different meanings, but when homophones are pronounced, they sound the same. The English language is full of homophones. Look at these examples:

principle	—	principal
seen	—	scene
two	—	too
meddle	—	metal

As you can see, each of these four pairs of words look different, but sound alike. As you work with medical records and with doctors, insurance companies and others, be careful that you distinguish between homophones when you are hearing information. You certainly wouldn't want to meddle in the business's principle scene when you really needed to know if the principal had seen the metal. Okay, so that's a stretch, but you get the idea!

Antonyms (Opposites)

Antonyms are words or word parts that are opposite in meaning to each other. Sometimes these words can sound very similar to each other, which can cause problems for someone with no training. Look at these two antonyms:

- ➤ hypotension (low blood pressure)
- ➤ hypertension (high blood pressure)

When you review claims and bills, make sure the terms used make sense. Did the doctor mean what he or she wrote? If you have a question, call the doctor's office and double-check. Insurance companies will deny claims for inaccurate forms!

Look at this situation. You know that normal blood pressure is 120/80.

Which term below is correct?

- ➤ The patient has *hypertension* with a blood pressure of 90/60.
- ➤ The patient has *hypotension* with a blood pressure of 90/60.

In this context, *hypotension* is correct because 90/60 is lower than 120/80.

✍ Step 21 Practice Exercise 9-5

❑ Some of the more common antonym pairs are listed below. You have already practiced their meanings with your flashcards. Write the meaning of each term in the blank space. Refer back to your flashcards if you need to.

1. **micro/** _____

   macro/ _____

2. **ante/** _____

   retro/ _____

3. **pre/** _____

   post/ _____

4. **hypo/** _____

   hyper/ _____

5. **eu/** _____

   dys/ _____

6. **inter/** _____

   intra/ _____

7. **con/** _____

   contra/ _____

8. **tachy/** _____

   brady/ _____

9. **ana/** _____

   cata/ _____

10. **ab/** _____

    ad/ _____

11. **infra/** _____

    supra/ _____

12. **/malacia** _____

    /sclerosis _____

13. **a/** _____

    (not using this prefix is the antonym)

14. **endo/** _____

    ecto/ _____

Step 22 Answers to Practice Exercise 9-5

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

Step 23 Medical Plurals

- ❑ Many medical terms follow special medical plural rules. Some medical words can even have two plural forms, one that follows the normal English rule and one that follows the medical rule.

  When there are two ways to make a medical term plural, generally doctors will use English rules when dictating reports for patients or other nonmedical people, and then they will use medical rules when reports are going to other doctors or into the medical chart.

  Since medical plurals and English plurals sound very different, it will be easy for you to tell which rule the doctor is following.

Medical Rules for Plurals

In some cases, medical plurals are formed by changing suffixes. In other cases, letters in the root word must be changed in addition to changes in the suffix. The following chart shows you how to form medical plurals.

Rule: Follow this chart to form medical plurals.

Ending With	Change To	Example
/um	/a	medi/um—medi/a (mee-dee-uh)
/us	/i	calcul/us—calcul/i (cal-cue-lie)
/a	/ae	lamin/a—lamin/ae (lam-in-ee)
/is	/es	diagnos/is—diagnos/es (dy-ag-no-seez)
/itis	/itid/es	arthr/itis—arthr/itid/es (ar-thrit-a-deez)
i/on	i/a	criteri/on—criteri/a (cry-teer-ee-ah)
ax	ac/es	thorax—thorac/es (thore-a-seez)
ix	ic/es	cervix—cervic/es (serv-eh-seez)
ex	ic/es	index—indic/es (in-deh-seez)
yx	yc/es	calyx—calyc/es (kay-luh-seez)

✍ Step 24 Practice Exercise 9-6

❑ In this exercise, let's practice forming plurals using the medical rules you have just learned and some of the terms you have already used in this course.

All of the terms in this Practice Exercise follow the medical plural rules we have given you. You do not need a dictionary to do this exercise.

Look at each word, then write the medical plural of each word in the blank space on the right.

Singular	Medical Plural
1. synthesis	_____
2. centrum	_____
3. vena	_____
4. nervus	_____
5. ganglion	_____

🗝 Step 25 Answers to Practice Exercise 9-6

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 26 Lesson Summary

❑ This is the last of three lessons that have introduced you to the language of medicine—the medical terminology you will need to perform your job as a medical claims specialist effectively and professionally. You have learned about word parts (root words, prefixes and suffixes), and how to divide and combine a medical term and derive its meaning by using its word parts. In this lesson, you learned how to use abbreviations and symbols when you complete medical claims and bills. This lesson also presented information about such special medical terms as eponyms, acronyms, homophones (sound-alikes), antonyms (opposites) and plurals.

✉ Step 27 Mail-in Quiz 9

❑ Follow the steps to complete the quiz.

a. Be sure you've mastered the instruction and the Practice Exercises that this quiz covers.

b. Mark your answers on your quiz. Remember to check your answers with the lesson content.

c. When you've finished, transfer your answers to the Scanner Answer Sheet included. Use only blue or black ink on your Scanner Answer Sheet.

d. **Important!** Please fill in all information requested on your Scanner Answer Sheet or when submitting your quiz online.

e. Submit your answers to the school via mail, e-mail, fax or, to receive your grade immediately, submit your answers online at www.uscareerinstitute.edu.

Mail-in Quiz 9

For questions 1 through 8, select the best answers from the choices provided. Each question is worth 5 points.

1. Shortened versions of phrases are called _____.

a. eponyms
b. abbreviations
c. antonyms
d. opposites

2. _____ are required to keep a list of acceptable abbreviations.

a. Hospitals
b. Insurance forms
c. Billing services
d. None of the above

3. DOB is the abbreviation for _____.

a. date of billing
b. doctor of birthing
c. date of birth
d. two times a day

4. The correct abbreviation for "diagnosis" is _____.

a. dg
b. Dx
c. Dgs
d. ds

5. There are two types of slang you may encounter: _____ slang and English slang.

a. uncommon
b. insurance
c. medical
d. offensive

6. What medical slang terms are now accepted as medical terms? _____

a. Exam
b. Prep
c. Hypo
d. Both a and b are accepted.

7. When using the *times* or *by* symbol (×), you _____ leave a space between the symbol and the numeral.

a. do
b. do not

8. *Primip* is slang for _____.

a. a premature infant
b. premenopausal
c. primipara, woman with one previous birth
d. premenstrual

For items 9 through 12, match the symbol with its meaning. Each question is worth 5 points.

9. _____ °C
10. _____ °F
11. _____ X
12. _____ &

a. degrees Fahrenheit
b. times, by
c. and
d. degrees Celsius

For items 13 through 16, match the symbol with its meaning. Each question is worth 5 points.

13. _____ **/**

14. _____ **:**

15. _____ **#**

16. _____ **+**

a. per; over
b. number
c. ratio
d. plus

For questions 17 through 20, select the best answers from the choices provided. Each question is worth 5 points.

17. When a person's name or a brand name is included in a medical term, that term is called an _____.

a. egonym
b. eponym
c. acronym
d. imposter

18. _____ are formed by taking the first letter of each word in a phrase or by taking the first letter of the word parts.

a. Acronyms
b. Eponyms
c. Opposites
d. Homonyms

19. Which of the following acronyms is not paired correctly with its term? _____

a. IRS—Internal Revenue Service
b. ECG—electrocardiogram
c. CBC—complete brain cortex
d. USA—United States of America

20. You _____ capitalize the proper name part of an eponym.

a. do
b. do not

Just for Fun

Here are some acronyms used for computers. They are used so much that most people who use them don't know what they mean.

PC This stands for **p**ersonal **c**omputer. This acronym was developed by IBM® (International Business Machines) for the microcomputers it invented for everyday people to use. It means the same thing as personal computer, a computer with a microchip to hold its memory. Originally, PC was just an IBM brand name. Now PC is used to mean a personal computer of any brand, the same way many people use Kleenex® to mean facial tissue of any brand.

CRT This stands for **c**athode **r**ay **t**ube. A cathode ray tube is a television picture tube. Let's divide the term cathode.

cat/ = negative /ode = electrical pole

The tube is a vacuum tube. Inside, in the back, the cathode (negative pole) sends out a stream of electrons called the cathode ray, like water from a hose. The cathode ray sprays across the inside surface of the tube to make the picture on the tube.

Every picture tube you see—whether it is in a TV, an x-ray machine or a computer monitor—is a CRT.

CPU This stands for **c**entral **p**rocessing **u**nit. The memory chip is here. This is the brain of a computer—where the computer does its work.

The CPU does the computing and is the "computer." Some ads for low-priced "computers" only quote the price of the CPU. The CRT, keyboard, and disk drives are extra.

Look up any acronyms you don't know. If you can't find an acronym, ask the person who used it what it means. An expert will know what it means or how to find it.

Congratulations

You've completed Lesson 9.

Don't wait for your quiz results to continue with Lesson 10.

Lesson 10

Introduction to Anatomy

Step 1 Learning Objectives for Lesson 10

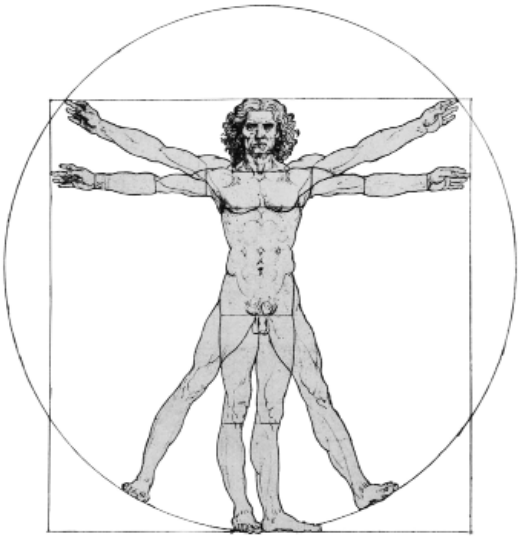
- ❑ When you have completed the instruction in this lesson, you will be trained to do the following:
  - ➤ Explain the basic components of human biology.
  - ➤ Describe the human body, including how it works and how it is put together.
  - ➤ Define the terms used to locate parts of the body.

Step 2 Lesson Preview

- ❑ When Leonardo da Vinci drew his sketches of the human body back in the fifteenth century, he probably didn't anticipate just how important the study of the human body would become.

  Today many people use anatomy daily in their professions. Athletic coaches must be well versed in anatomy because their knowledge of muscles and bones will help their players achieve top performance. Doctors must know vast amounts of anatomy, from the top of the human head down to the little toe and all the nerves, blood vessels and organs in between. In this lesson, you will begin to understand how anatomy affects our everyday lives.

  We begin this journey with an introduction to the science of life—*biology*. After you have learned about basic human biology, we will move into the more specific science of *anatomy*, including *physiology*—the study of how the body works. Don't worry! We will move at a comfortable pace, and we'll carefully cover each detail you must know. Let's go!



Leonardo da Vinci's human form

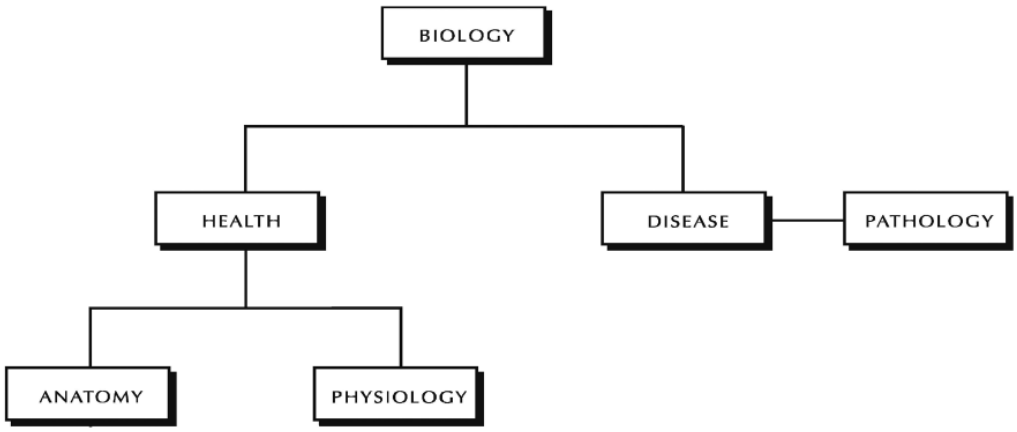
Step 3 Human Biology

- ❑ For the next several lessons, you will learn about the study of human living things. Because you are a human, you'll be learning a lot about yourself. You'll grow in your understanding of the human body and the specialized terms doctors use to talk about the body. You'll be surprised at how much you learn about this fascinating subject just by reading the instruction, completing the Practice Exercises and studying your flashterms.

What is Human Biology?

Human biology is the study of how the body is put together and how it works in health and disease. We do not expect you to become an expert in biology, but understanding the basics of biology will give you a good background for the terms doctors use. This will help you become a better medical claims and billing specialist.

Human biology in the healthy state covers two basic concepts: anatomy and physiology. Human biology in disease deals with pathology. Look at how these concepts are related:



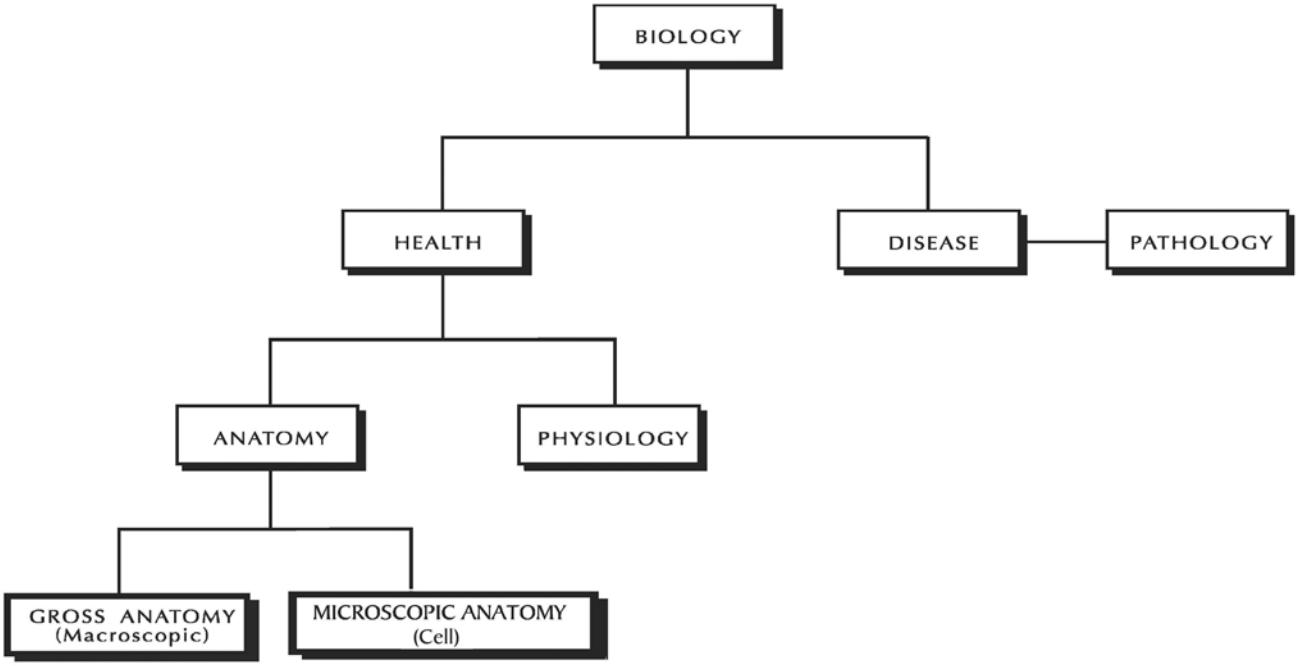
Biology deals with health and disease.

We will discuss each of these topics in more detail. Remember, the idea is not to become an expert in biology, but to understand the context of the terms you might see on a claim or bill.

Anatomy

Anatomy is the science of the structure of the body—the appearance and relationships of body parts. The two kinds of anatomy are *gross anatomy* and *microscopic anatomy*.

- ➤ **Gross anatomy** includes parts of the body that we can see with our eyes. It is also called macroscopic anatomy.
- ➤ **Microscopic anatomy**, or **cell anatomy**, includes parts of the body that are too small to be seen with the naked eye.



Two kinds of anatomy are gross anatomy and microscopic anatomy.

Gross Anatomy

In **gross** (**macroscopic**) **anatomy**, we are concerned with the presence and appearance of a body part.

The study of the form of body parts is called **morphology**. The form of a body part includes its size, shape, color, contour and texture. For example, when a kidney is normal in size, shape, color, contour and texture, we say it has *normal morphology*.

A basketball player and a jockey both have the same *anatomic structure*. For example, they both have five fingers on each hand. However, there is a *morphologic* difference between them. For example, the hand of the basketball player is larger than the hand of the jockey.

Gross anatomy also deals with the location and position of the organs and body parts. For example, not only should the heart be in the chest, but it should be in the left side of the chest.

Facts About Gross Anatomy

The terms used to describe gross anatomy include:

- ✓ The names of the body parts.
- ✓ Where the body parts are located.
- ✓ How the locations of two body parts are related.

Microscopic Anatomy

Microscopic (cell) anatomy is the science of the body's individual cells and tissues. This kind of study is done with a microscope. The microscopic study of cells is called **cytology**. The microscopic study of tissues is called **histology**.

Facts About Microscopic Anatomy

The terms used to describe microscopic anatomy include:

- ✓ The names of different cell parts and cell types.
- ✓ The colors cells become when they are dyed for microscopic examination.
- ✓ The ways cells are arranged in different types of tissue.

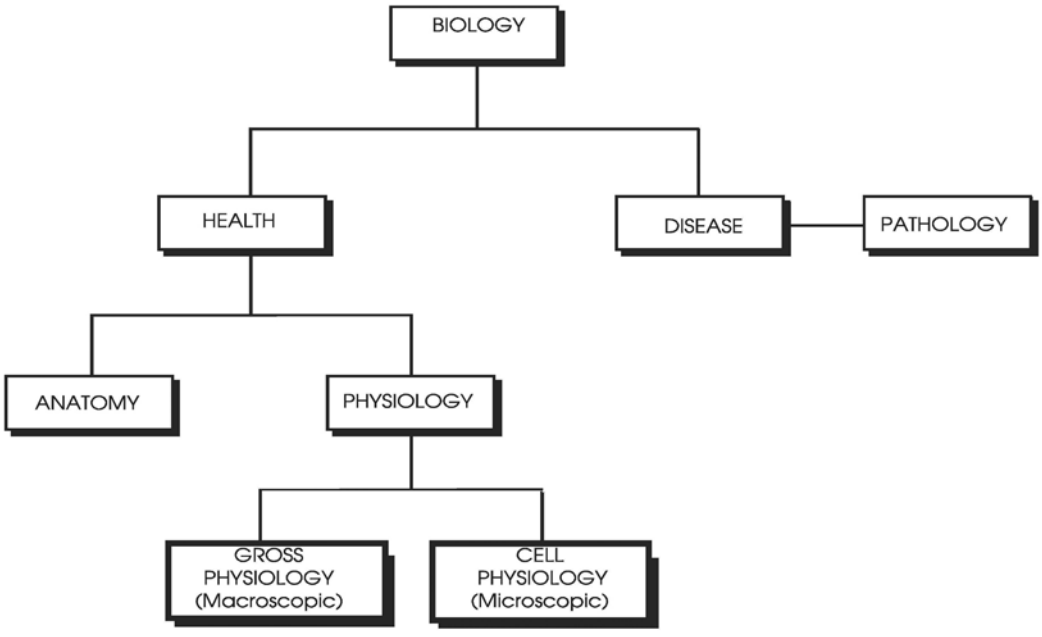
Physiology

Physiology is the study of how the body works—it describes the function of the body, and its organs, tissues and cells.

Each organ, cell or tissue has its own special physiologic function. For example, kidneys make urine, but they cannot think. The brain thinks, but it cannot make urine.

Physiology can also be divided into macroscopic physiology and microscopic physiology.

- ➤ ***Macroscopic physiology*** is usually called **gross physiology**.
- ➤ ***Microscopic physiology*** is usually called **cell physiology**.



Physiology can be broken into gross physiology and cell physiology.

Step 4 Pathology

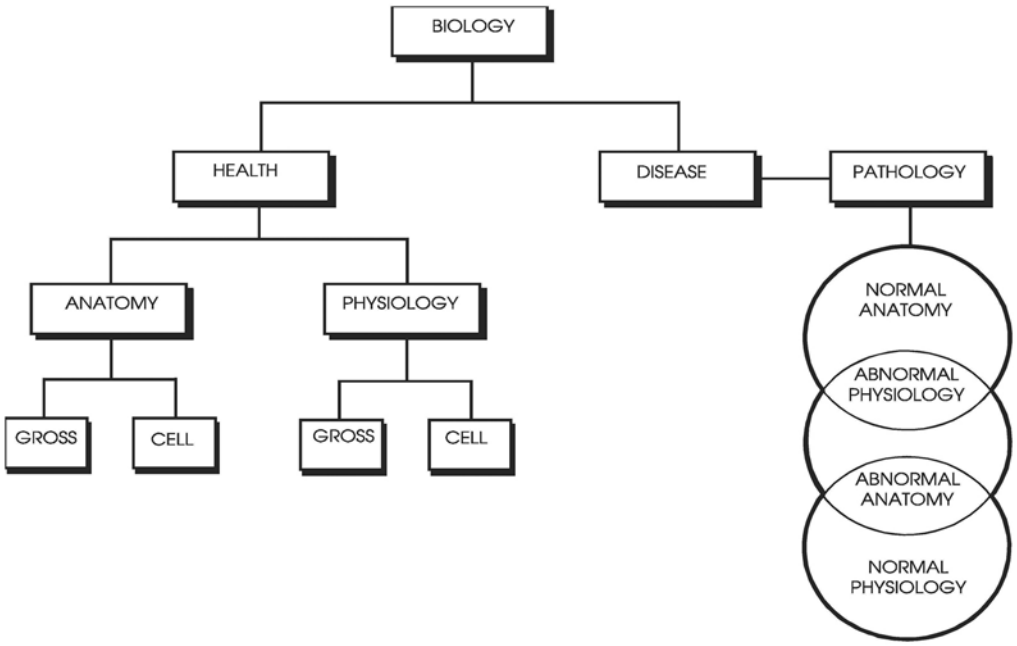
❑ **Pathology** is the study of human biology when anatomy and/or physiology are abnormal.

Facts About Pathology

✓ ***Abnormal physiology*** is sometimes called **pathophysiology**.

✓ ***Abnormal anatomy*** is called **pathology** or **pathologic anatomy**.

Look at the relationships below.



Pathology deals with abnormal anatomy and abnormal physiology.

How do Anatomy, Physiology and Pathology Relate to One Another?

In this section, we'll examine normal anatomy and physiology.

Normal Anatomy/Abnormal Physiology

A person can have abnormal physiology (pathophysiology) but normal anatomy. For example, a diabetic has abnormal physiology—the person cannot make insulin—but the diabetic may have normal anatomy. The insulin-making function is abnormal but the appearance and location of the organ that makes the insulin is normal.

Abnormal Anatomy/Normal Physiology

A person can have abnormal anatomy (pathology) but normal physiology. For example, a healthy dwarf has abnormal anatomy but normal physiology. The anatomy is abnormal but it functions normally.

Abnormal Anatomy/Abnormal Physiology

When an anatomic abnormality (anatomic pathology) lasts long enough, it may lead to a physiologic abnormality. For example, in early alcoholism, the liver changes by containing more fat and enlarging. These are anatomic abnormalities. The function is normal. If alcoholism continues long enough, the liver slowly stops functioning. This is a physiologic abnormality.

On the other hand, when a physiologic abnormality (pathophysiology) lasts long enough, it may lead to an anatomic abnormality. For example, at the start of a cold, you will have sniffles and a loss of smell. These are physiologic abnormalities. The function of the nose is abnormal. The anatomy of the nose, its size and color, is normal. Later, you may have a swollen, red nose from the cold. Swelling and redness are pathologic changes in anatomy. Because swelling and redness are changes in size and color, they can also be called morphologic changes.

For most disease processes, anatomy and physiology have both become abnormal (pathologic) by the time a diagnosis is made. For example, in the early stages of alcoholism, the liver functions well and the liver function tests are normal. The diagnosis of alcoholic liver disease is not usually made. The patient feels fine and cannot believe that the liver is abnormal. When both the anatomy and physiology are pathologic, the patient feels sick, there is hepatomegaly, and the liver function tests are abnormal. So you can see that the diagnosis is not usually made until both the anatomy and physiology are pathologic.

Likewise, in the early stages of a cold, when you just have sniffles, you will probably say, "I think I'm getting a cold." When your nose is red, swollen, stuffy and runny, you'll say, "I have a cold." Again, the diagnosis isn't usually made until both anatomy and physiology are abnormal. Of course, it's hard to get a day off work with just abnormal anatomy or just abnormal physiology, but some people try!

So even though diseases can be divided into anatomic pathology and pathophysiology, most of the time medicine deals with both anatomic and physiologic pathology at the same time.

At the start of a cold, you will have sniffles and a loss of smell.

✍ Step 5 Practice Exercise 10-1

❑ Using words from the following list, fill in the blanks in the sentences below. Choose the term that fits the context of the sentence. Use your flashcards if you need help.

anatomic	histology	morphology
anatomy	microscope	pathologic
biologic	macroscopic	pathology
biology	microscopic	physiologic
gross anatomy	microscopic anatomy	physiology
histologic	morphologic	

1. **Anatomy, physiology and pathology are included in the study of life called human _____.**
2. **When there are changes in the form of an organ, such as size, shape or color, they are called _____ changes.**
3. **The science of the appearance and relationships of body parts is called _____.**
4. **The study of the function of body parts is called _____.**
5. **The study of disease is called _____.**
6. **The study of tissues is called _____.**
7. **The science of the appearance of cells and tissues is called _____.**
8. **To see a cell, you would use an instrument called a _____.**
9. **Changes in the function of an organ are called _____ changes.**
10. **The disease changes you see in an organ are called _____ changes.**

🔑 Step 6 Answers to Practice Exercise 10-1

❑ Check your answers with the Answer Key at the end of this book. Correct any mistakes you have made.

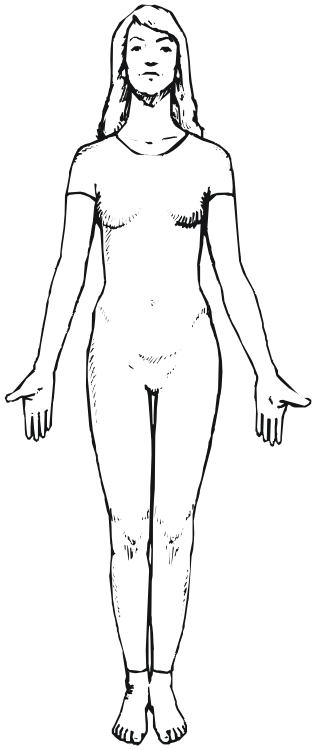
Step 7 Beginning Anatomy and Physiology Concepts

- Now that you have a basic understanding of human biology, you are ready to move on into the more specific science of anatomy and physiology. Anatomy and physiology are two key components in the medical world.
  - **Anatomy** refers to the structure of the body—the appearance and relationships of body parts, such as muscles, bones, organs and other systems.
  - **Physiology** is the study of how these body parts work together to sustain life—the functions of the body and its organs, tissues and cells.

The Anatomic Position

Doctors use a system to describe the location of anatomical parts. This system assures that there is no confusion about the location of any parts, even if the patient is hanging by the feet doing yoga.

The location of body parts is always described as if the patient were in the position shown in the following figure. This body position is called the **anatomic position**.



The anatomic position

Notice the position of the hands in the figure. The palms are facing forward and the thumbs are facing outward. No matter what the position of the patient, the doctor will describe the location of anatomic parts as if the patient were always in this position. Stand up and put your body in the anatomic position. That's right.

Be sure you can remember the anatomic position. All the terms you will learn in this lesson are based on the relationships of body parts when the body is in this position.

Planes and Sections of the Human Body

The human body has three dimensions: height, width and depth.

Facts About Dividing the Body

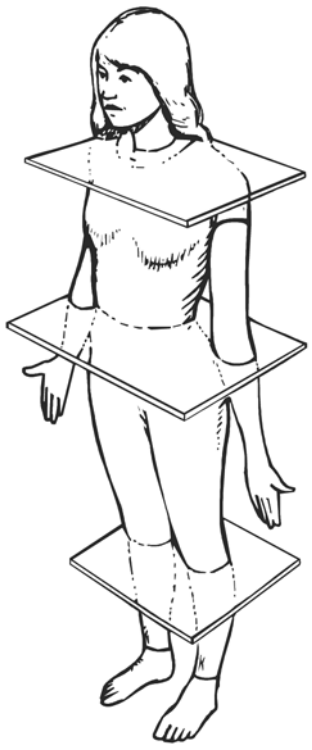
The body can be divided in three different ways:

- ✓ Superior and inferior (top and bottom) sections.
- ✓ Right and left sections.
- ✓ Anterior and posterior (front and back) sections.

Dividing the body like this can help you understand where organs or parts are located. You can divide the body into these sections by making a mental "slice" or "cut."

Transverse Planes and Sections

The **transverse** or **horizontal** plane divides the body into superior (above) and inferior (below) sections. A transverse plane can be made anywhere in the body from the feet to the head.

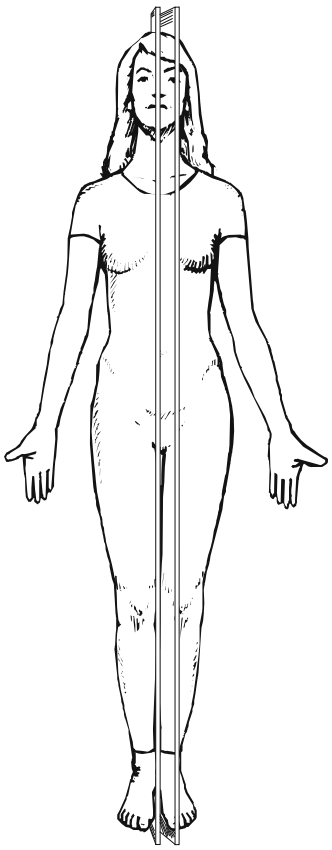


Transverse sections

- A transverse plane made at the neck divides the body into superior and inferior sections. The head is superior to the plane. The chest, arms, abdomen and legs lie inferior to the plane.
- A transverse plane made at the waist also divides the body into superior and inferior portions. The head, chest and arms are superior to the plane. The pelvis and legs are inferior to the plane.
- A transverse plane made at the level of the knees divides the body into superior and inferior sections, too. The thighs, abdomen, chest, arms and head are superior to the plane. The calves and toes are inferior to the plane.

Sagittal Planes and Sections

A **sagittal** or **longitudinal** plane divides the body into right and left sections. A **midsagittal** or **median** plane divides the body into equal right and left sections. A midsagittal plane is the midline of the body. A **parasagittal** plane divides the body into unequal right and left sections. A sagittal plane can be made at any point of the body from the right side to left side.



Sagittal sections

Coronal Planes and Sections

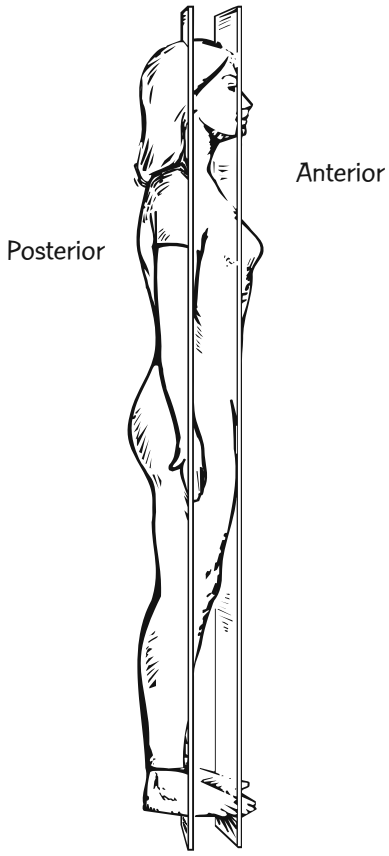
A **coronal** or **frontal** plane divides the body into anterior (front) and posterior (back) sections. A coronal plane can be made at any point from the front of the body to the back of the body.

- A coronal plane at the level of the ears divides the body into anterior and posterior sections. The face, abdomen and knees are anterior to the plane. The back, buttocks and ankles are posterior to the plane.

- A coronal plane at the level of the nose divides the body into anterior and posterior sections. The nose is anterior to the plane. Everything else is posterior to the plane.

You can divide the body and each organ using planes. For example, a midsagittal plane of the liver would divide the liver into equal left and right sections.

Study the definitions of these planes until you can form a mental image of them. You can remember these concepts more easily if you picture the planes using your own body.



Coronal sections

✍ Step 8 Practice Exercise 10-2

❑ Using words from the following list, fill in the blanks in the sentences below. Choose the term that fits the context of the sentence.

anatomic	midsagittal
anatomic position	parasagittal
coronal	horizontal
frontal	sagittal
longitudinal	sections
median	transverse

1. **When the arms are at the side, the palms of the hands face forward and the thumbs point outward, the body is in the _____.**
2. **A(n) _____ plane is also called a horizontal plane.**
3. **A(n) _____ plane divides the body into unequal left and right sections.**
4. **A frontal plane is also called a(n) _____ plane.**
5. **A(n) _____ plane divides the body into superior and inferior sections.**
6. **A longitudinal plane is also called a(n) _____ plane.**
7. **A(n) _____ plane divides the body into anterior and posterior sections.**
8. **A(n) _____ plane divides the body into equal left and right sections.**
9. **A midsagittal plane is also called a(n) _____ plane.**
10. **A plane divides the body or organ into _____.**

Step 9 Answers to Practice Exercise 10-2

❑ Check your answers with the Answer Key at the end of this book. Correct any mistakes you have made.

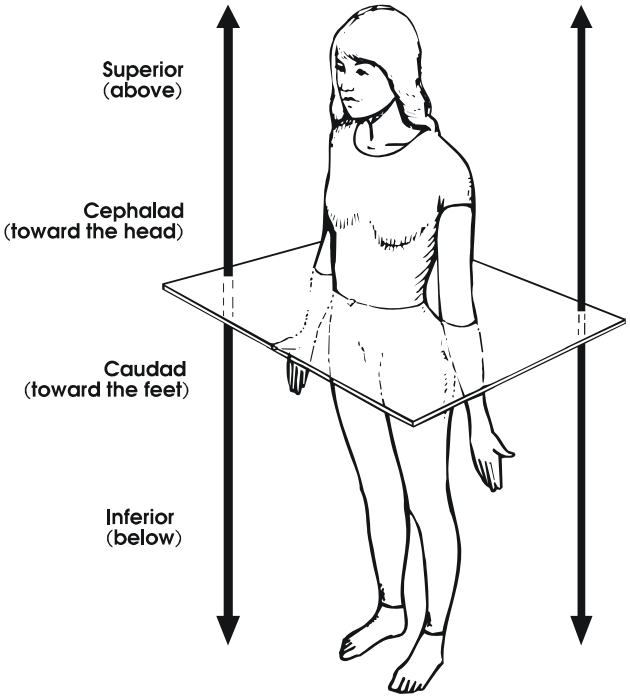
Step 10 Location Terms

- ❑ The location terms you will learn in this lesson are very important. Doctors use them to describe what they see when they examine a patient. You will learn how to pronounce the terms later in this lesson.

  When doctors describe the location of anatomic parts, they use terms that compare the location of one part to another part. There are a number of terms used to describe the relative location of body parts and organs. These terms rely on the anatomical position and the anatomic sections you have just learned.

Facts About Location Terms

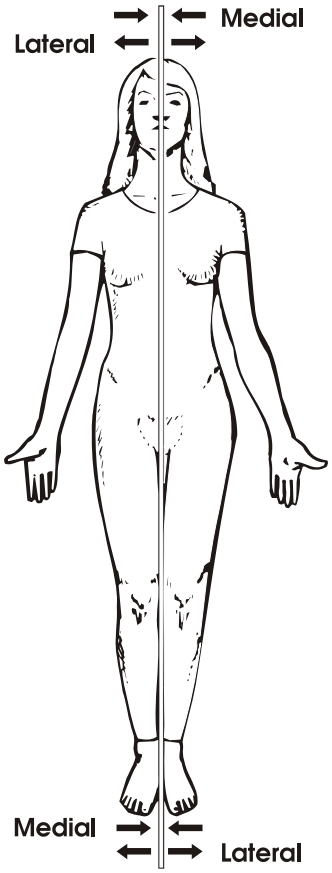
✓ These terms usually come in antonym pairs. Each word of an antonym pair means the opposite of the other word, such as the antonym pairs above and below or left and right.



Transverse plane

If you draw a transverse plane through the body or an organ, these words describe anything above or below that plane.

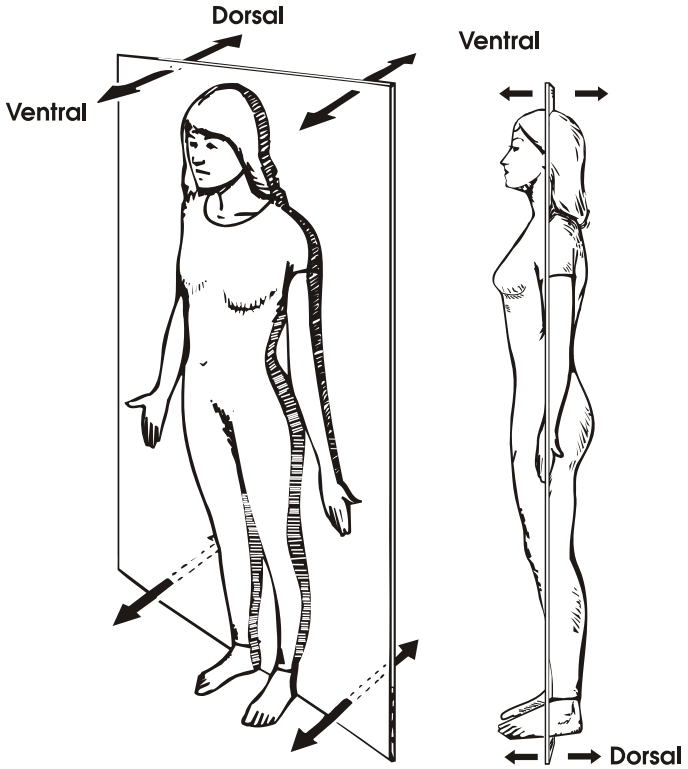
- ➤ **Superior** means above.
- ➤ **Inferior** means below.
- ➤ **Cephalad** means toward the top of the head.
- ➤ **Caudad** means toward the soles of the feet.



Sagittal plane

If you draw a midsagittal plane through the body or an organ, these words describe anything closer to or farther away from that plane.

- **Medial** means closer to the midsagittal plane or middle.
- **Lateral** means farther away from the midsagittal plane or middle.

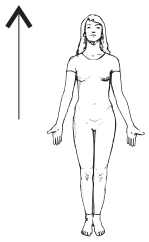
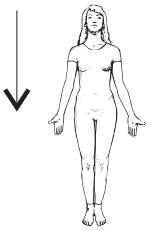
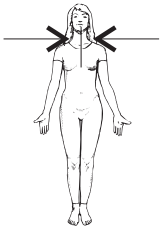
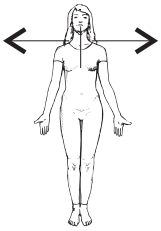
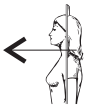
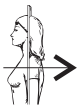


Coronal plane

If you draw a coronal plane through the body or an organ, these words describe anything in front of or behind that plane.

- **Anterior** means in front of.
- **Posterior** means in back of.
- **Ventral** means on the belly side.
- **Dorsal** means on the back side.

On the next page is a chart summarizing these location terms and how they are used.

Location Term	Definition	Location Illustration	Example
Superior	Above		The nose is superior to the chin.
Inferior	Below		The pelvis is inferior to the abdomen.
Medial	Closer to the middle		The groin is medial to the thigh.
Lateral	Farther away from the middle		The ear is lateral to the nose.
Anterior	In front of		The heart is anterior to the spine.
Posterior	In back of		The lungs are posterior to the sternum.

Look at some sentences showing how these words are used. Compare these statements to your own body. Be sure your body is in the anatomic position when you do.

The lungs are **superior** to the liver.

The liver is **inferior** to the heart.

The incision was made in a **cephalad** direction.

The arteries for the lower extremities travel in a **caudad** direction.

The nose is **medial** to the eye.

The right thumb is **lateral** to the right index finger.

The sternum is **anterior** to the heart.

The lungs are **posterior** to the sternum.

The **ventral** hernia was repaired.

The patient was placed in the **dorsal** position for surgery.

The following terms are used for the body or an organ as a whole. They describe parts that are nearer the center or parts that are nearer the surface of the body or an organ. Examples of how these words are used follow the terms.

- **Proximal** means nearer to the center of the body or organ.
  The knee is proximal to the foot.

- **Distal** means farther away from the center of the body or organ.
  The foot is distal to the knee.

- **Superficial** means on or closer to the skin or surface of an organ.
  The wound was superficial, not involving the muscles, and did not require sutures.

- **Deep** means under or farther away from the skin or surface of an organ.
  The wound was deep and penetrated the liver.

- **Central** means within or near the center.
  The heart is central within the rib cage.

- **Peripheral** means at or near the rim or edge.
  The peripheral veins of the arms and hands can easily be seen.

- **Parietal** means the outer wall of a body cavity.
  The parietal pleura forms the outer layer that surrounds the lungs.

- **Visceral** means the covering of an organ.
  The visceral pleura covers the lungs.

➤ **External** means outside or closer to the skin or surface of an organ.
The pericardium is external to the heart.

➤ **Internal** means inside or farther away from the skin or surface of an organ.
The lungs are internal to the ribs.

➤ **Ipsilateral** means situated on or affecting the same side of the body.
The left leg and left arm are ipsilateral.

➤ **Contralateral** means situated on or affecting the opposite side of the body.
The right leg and left arm are contralateral.

Some things in the body, like blood cells, fluid or nerve messages, can move. The next two terms describe body parts that carry things which move.

➤ **Afferent** means carrying toward a body part or the center of an organ.
An afferent neuron is a nerve that carries nerve messages to the brain from a muscle.

➤ **Efferent** means carrying away from a body part or the center of an organ.
An efferent neuron is a nerve that carries nerve messages away from the brain to a muscle.

🕮 Step 11 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 9 flashcards out of your Quick-learn Kit. Insert the first flashcard for Set 9 into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 9.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each term in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 12 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard for this set into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each term.

🕮 Step 13 Meanings of New Terms

❑ Do the following steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each word part or term and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the flashterms and their meanings. You may use the flashcards for the Practice Exercises and Quizzes.

d. When you feel comfortable with the spelling, pronunciation and meaning of each flashterm, go on to the next step.

✍ Step 14 Practice Exercise 10-3

❑ For each sentence, circle the bracketed term that will make the sentence true. You may refer to the drawings in the text and your flashcards, if you wish. Answer all questions as they pertain to the anatomic position.

1. **The hand is** [caudad cephalad] **to the elbow.**

2. **Separating the body into right and left halves is called a** [sagittal coronal] **plane.**

3. **The knee is** [superior inferior] **or** [caudad cephalad] **to the chest.**

4. **The bellybutton is** ___[anterior posterior]___ **to the spine.**

5. **A blood vessel that carries blood away from the heart is called an** ___[efferent afferent]___ **vessel.**

6. **In the anatomic position, the palms of the hands are** ___[posterior anterior]___ **to the backs of the hands.**

7. **The nose is** ___[lateral medial]___ **to the eyes.**

8. **The buttocks are** ___[ventral dorsal]___ **and** ___[cephalad caudad]___ **to the breastbone.**

Step 15 Answers to Practice Exercise 10-3

- ❑ Check your answers with the Answer Key at the end of this book. Correct any mistakes you have made.

Step 16 Lesson Summary

- ❑ This lesson brings you further along in your journey to become an effective and professional medical claims specialist. Anatomy is an integral part of every aspect of medicine, so the ability to recognize terms and their medical context will make you a valuable member of the healthcare team.

  This lesson explained the basics of *human biology*—the study of how the body is put together and how it works in health and disease. Human biology in the healthy state includes anatomy and physiology. Human biology in disease deals with pathology. *Anatomy* is the science of the structure of the body—the appearance and relationships of body parts. The two kinds of anatomy are *macroscopic (gross) anatomy* and *microscopic (or cell) anatomy*. *Physiology* is the study of how the body works—it describes the function of the body and its organs, tissues and cells. Physiology can also be divided into *macroscopic physiology* (usually called *gross physiology*) and *microscopic physiology* (usually called *cell physiology*). *Pathology* is the study of human biology when anatomy and/or physiology are abnormal. *Abnormal physiology* is sometimes called *pathophysiology*. *Abnormal anatomy* is called *pathology* or *pathologic anatomy*.

  When doctors describe the location of anatomic parts, they refer to the anatomic position and the anatomic sections (transverse, sagittal and coronal) with the corresponding anatomic planes. There are also specific *location terms* used by doctors to describe the relative locations of body parts and organs.

✉ Step 17 Mail-in Quiz 10

❑ Follow the steps to complete the quiz.

a. Be sure you've mastered the instruction and the Practice Exercises that this quiz covers.

b. Mark your answers on your quiz. Remember to check your answers with the lesson content.

c. When you've finished, transfer your answers to the Scanner Answer Sheet included. Use only blue or black ink on your Scanner Answer Sheet.

d. **Important!** Please fill in all information requested on your Scanner Answer Sheet or when submitting your quiz online.

e. Submit your answers to the school via mail, e-mail, fax or, to receive your grade immediately, submit your answers online at www.uscareerinstitute.edu.

Mail-in Quiz 10

For questions 1 through 20, select the best single answer for each of the following items. Each question is worth 5 points.

1. The study of how the body is put together and how it works in health and disease is called _____.

a. animal anatomy
b. zoology
c. veterinary science
d. human biology

2. The science of the structure of the body is called _____.

a. anatomy
b. physiology
c. zoology
d. oncology

3. There are two kinds of anatomy: _____ anatomy and microscopic anatomy.

a. general
b. gross
c. historical
d. hybrid

4. Microscopic anatomy includes parts of the body that are _____.

a. larger than a microscope
b. too large to fit on an exam table
c. in perfect shape
d. too small to be seen by the naked eye

5. The study of the form of body parts is called _____.

a. xenology
b. morphology
c. xenomorphology
d. monumentology

6. The names of body parts, the location of body parts, and the relationship of two or more body parts are all included in _____.

a. gross anatomy
b. microscopic anatomy
c. xenology
d. zoology

7. _____ is the study of how the body works.

a. Anatomy
b. Physiology
c. Zoology
d. None of the above

8. The study of human biology when anatomy and/or physiology is abnormal is called _____.

a. xenology
b. zoology
c. pathology
d. morphology

9. A person _____ have abnormal physiology and normal anatomy.

a. can
b. cannot
c. should
d. none of the above

10. Most of the time, medicine deals with _____ at the same time.

a. xenology and morphology
b. anatomic pathology and pathophysiology
c. xenomorph and zoology
d. healthy people and animals

11. The _____ branch of a nerve carries a message to the brain from a muscle.

a. inferior
b. ascending
c. efferent
d. afferent

12. A(n) _____ artery carries blood away from the heart.

a. efferent
b. exferent
c. afferent
d. superior

13. A sagittal plane made slightly to one side or the other of the midline is called a(n) _____ plane.

a. sagittal
b. longitudinal
c. off-sided
d. parasagittal

14. When a doctor studies the structure of the body that he can see with his own eyes, he is studying _____ anatomy.

a. microscopic
b. macroscopic
c. abnormal
d. monumental

15. If a doctor describes the size, shape, color, contour and texture of a body part, he is talking about _____.

a. pathology
b. physiology
c. morphology
d. parasagittal sections

16. In the anatomic position, the chin is anterior and _____ to the heel.

a. posterior
b. caudad
c. superior
d. inferior

17. The antonym of *superficial* is _____.

a. deep
b. inferior
c. anterior
d. caudad

18. A _____ plane divides the body into superior and inferior sections.

a. sagittal
b. transverse
c. coronal
d. none of the above

19. The opposite of ventral is _____.

a. caudal
b. coronal
c. lateral
d. dorsal

20. In the anatomic position, the palms of the hands are facing _____.

a. backward
b. forward
c. sideways
d. none of the above

Congratulations

You've completed Lesson 10.

Don't wait for your quiz results to continue with Lesson 11.

Lesson 11

The Anatomy of the Human Body

Step 1 Learning Objectives for Lesson 11

- ❑ When you have completed the instruction in this lesson, you will be trained to do the following:
  - ➤ Discuss landmarks and divisions as they apply to anatomy.
  - ➤ Discuss the basic body cavities and membranes.
  - ➤ Explain how the body is organized.
  - ➤ Discuss how a basic understanding of anatomy relates to medical claims processing.

Step 2 Lesson Preview

- ❑ In previous lessons, you've learned some of the language that goes along with the medical field. In this lesson, you will learn about the body—how it works, how it is organized and how its systems are connected.

  Don't worry if you don't remember everything about this lesson. It is meant only as an introduction and to give you a knowledge base. This base enables you to understand what medical providers are faced with every day. As a medical claims specialist, you need to have this basic understanding to communicate with doctors on a daily basis.

This lesson will serve as an introduction to the human body.

Step 3 Gross Anatomy

- ❑ Contrary to what you might have thought earlier, *gross anatomy* does not mean *nasty* or *disgusting* anatomy! Instead, as you know, it refers to the study of body parts and systems that can be seen without the aid of a microscope. In this context, the word *gross* means *large*.

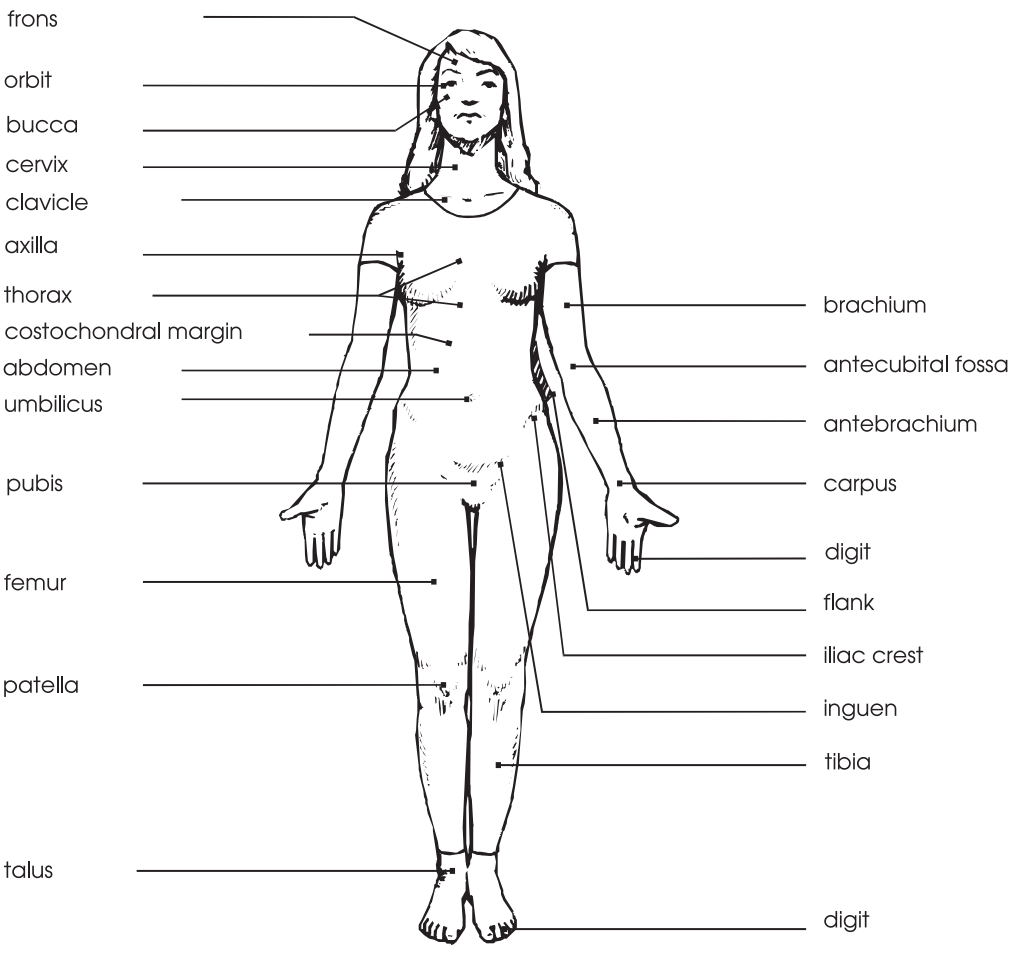
Landmarks and Divisions

When a doctor examines the surface of the body, the doctor will use several gross anatomy terms to describe location. The study of the surface of the body is often called *superficial anatomy*. These location terms, or **landmarks**, have been used for hundreds of years, long before we could see inside the body with x-ray or ultrasound machines. These terms are used every day in physical examinations, medical histories and surgery reports. As a medical claims specialist, you're likely to encounter these terms often.

Superficial (Surface) Landmarks, Face Up

When the body is **supine**, which means lying flat on the back, the doctor can see the anterior or ventral side of the body. Let's look at the terms used for superficial landmarks on the anterior surface.

This figure shows the surface landmarks in the *supine* position. The surface landmarks are labeled. Can you find these parts on your own body? Check off each landmark after you have found it. If you are not sure what a new term means, consult the list of meanings that follows the picture.



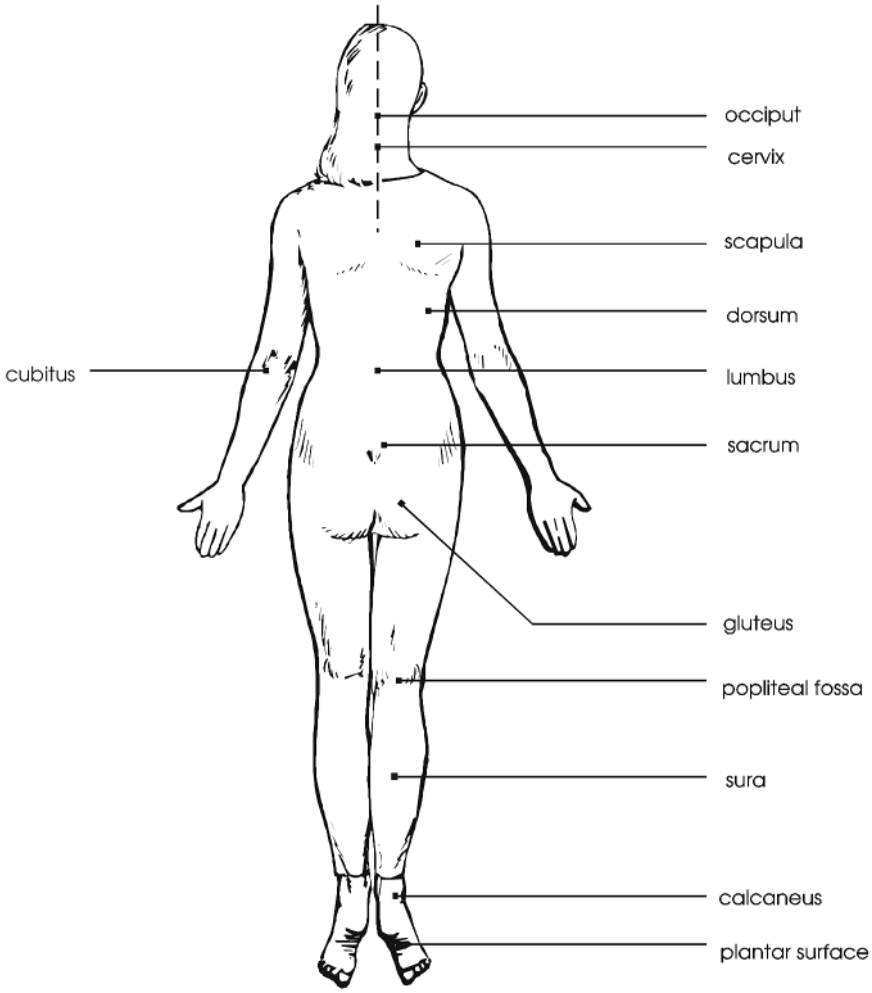
Surface landmarks, supine

Surface Landmarks, Supine	Meaning
frons	forehead
orbit	eye
bucca	cheek
cervix	neck
clavicle	collarbone
axilla	armpit
thorax	chest
costochondral margin	rib and cartilage
abdomen	trunk
umbilicus	navel, bellybutton
pubis	front pelvic bone
femur	thigh
patella	kneecap
talus	ankle
brachium	upper arm
antecubital fossa	front of elbow
antebrachium	forearm
carpus	wrist
digit	finger/toe
flank	side from ribs to hip bone
iliac crest	hip bone
inguen	groin
tibia	leg
digit	toe/finger

Superficial (Surface) Landmarks, Face Down

When the body is lying **prone**, or face down, the doctor can see the posterior or dorsal side of the body.

The following drawing shows the surface landmarks in the prone position. The surface landmarks are labeled. Can you find these parts on your own body? You may not be able to reach all of them. Check off each landmark after you have found it. If you need help, you can find the meaning of each surface landmark on the next page.



Surface landmarks, prone

Surface Landmarks, Prone	Meaning
cubitus	elbow
occiput	back of head
cervix	neck
scapula	shoulder blade
dorsum	upper back
lumbus	lower back
sacrum	spinal bones located between the buttocks
gluteus	buttock
popliteal fossa	back of knee
sura	calf
calcaneus	heel
plantar surface	sole of foot

Step 4 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 10 flashcards out of your Quick-learn Kit. Insert the first flashcard for this set into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 10.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each term in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a checkmark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 5 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each term in this set.

🕮 Step 6 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each word part or term and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times, until you are familiar with the word parts and terms and their meanings. You may use the flashcards for your Practice Exercises and Quizzes.

d. When you feel comfortable with the spelling, pronunciation and meaning of each flashterm, go on to the next step.

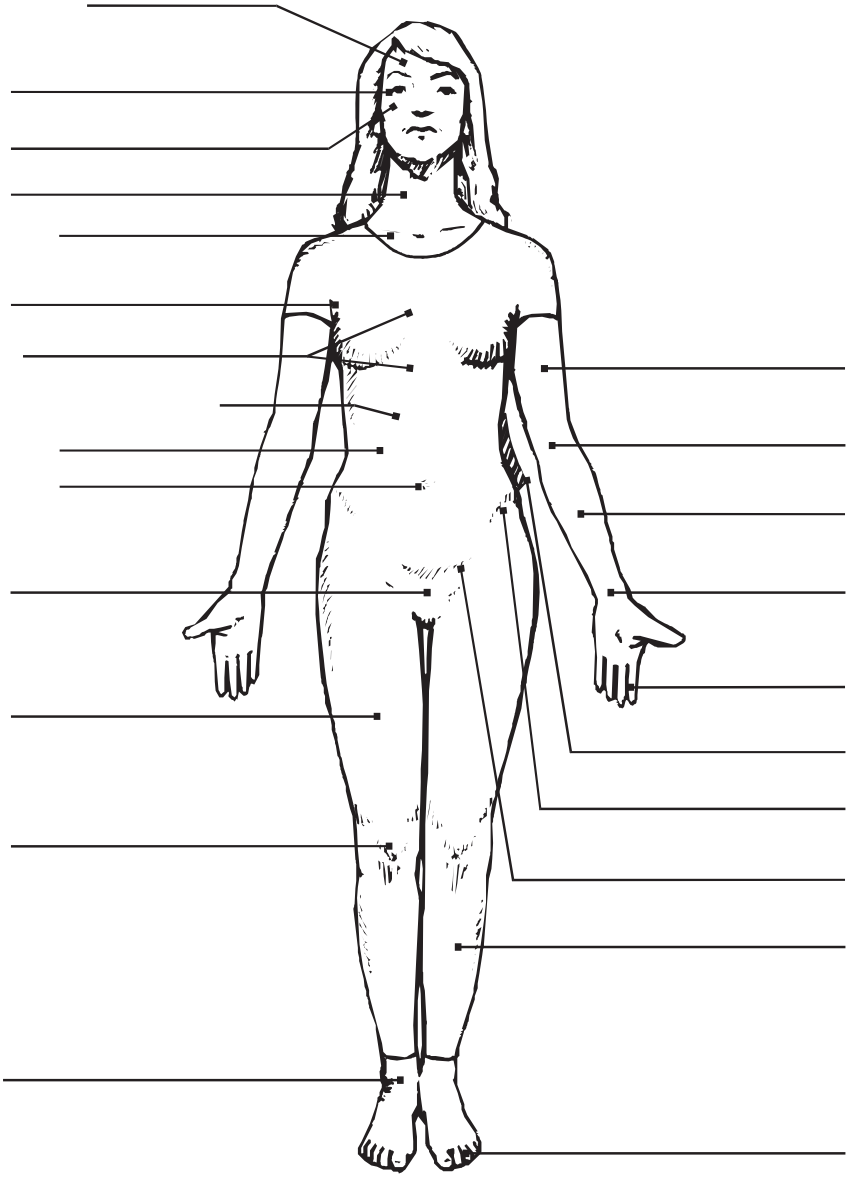
Step 7 Adjective Forms for Landmark Names

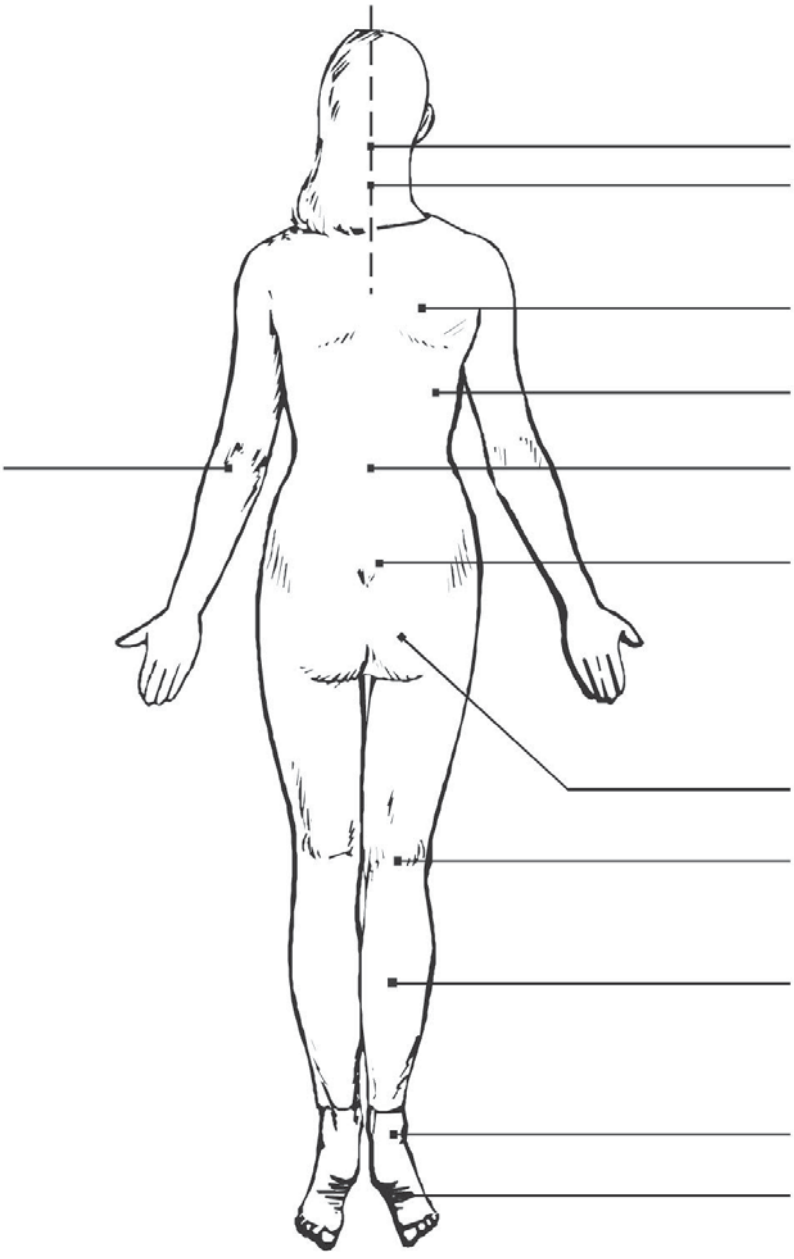
❑ Some of the landmark names you have just learned probably were unfamiliar to you, but you may have heard these terms in their adjective form. Read the following chart:

Landmark Name (Noun Form)	Meaning	Root Word	Adjective Form
frons	forehead	front/o	frontal
orbit	eye	orbit/o	orbital
bucca	cheek	bucc/o	buccal
cervix	neck	cervic/o	cervical
clavicle	collarbone	clavicul/o	clavicular
axilla	armpit	axill/o	axillary
thorax	chest	thorac/o	thoracic
brachium	upper arm	brachi/o	brachial
carpus	wrist	carp/o	carpal
digit	finger or toe	digit/o	digital
abdomen	trunk	abdomin/o	abdominal
umbilicus	navel, bellybutton	umbilic/o	umbilical
inguen	groin	inguin/o	inguinal
pubis	front pelvic bone	pub/o	pubic
femur	thigh	femor/o	femoral
tibia	leg	tibi/o	tibial
patella	kneecap	patell/o	patellar
talus	ankle	tal/o	talar
cubitus	elbow	cubit/o	cubital
occiput	back of head	occipit/o	occipital
scapula	shoulder blade	scapul/o	scapular
dorsum	upper back	dors/o	dorsal
lumbus	lower back	lumb/o	lumbar
sacrum	spine between buttocks	sacr/o	sacral
gluteus	buttock	glute/o	gluteal
sura	calf	sur/o	sural
calcaneus	back of ankle	calcane/o	calcaneal

✍ Step 8 Practice Exercise 11-1

❑ Look at these drawings and fill in the correct term for each landmark indicated.





Step 9 Answers to Practice Exercise 11-1

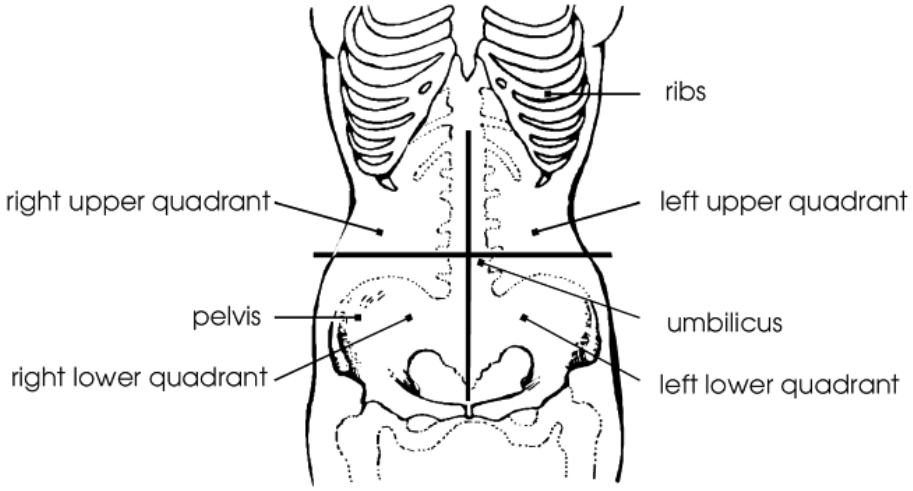
- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

Step 10 Divisions of the Abdomen

- Many doctors and surgeons mentally divide the abdomen into nine areas or regions, each referring to certain organs in the abdominal cavity of each region.

  However, younger doctors and those who aren't surgeons will usually use a simpler way to divide the abdomen. The abdomen is divided into fourths. Each of these areas is called a **quadrant**, which means a one-fourth section.

  The divisions are made by drawing a line along the **midsagittal plane** (dividing left and right) and a line along the **transverse plane** (dividing top and bottom) at the level of the umbilicus. An illustration of the division of the abdomen into four quadrants follows.



The four abdominal quadrants

Facts About Abdominal Quadrants

The four abdominal quadrants are named using the following words. The acronym for each quadrant is also listed.

- ✓ Right upper quadrant: RUQ
- ✓ Left upper quadrant: LUQ
- ✓ Right lower quadrant: RLQ
- ✓ Left lower quadrant: LLQ

✍ Step 11 Practice Exercise 11-2

❑ Using words from the following list, fill in the blanks in the sentences below. Choose the term that fits the context of the sentence. Use your flashcards or the previous drawings if you need help.

ankle	digit	orbit	antecubital	elbow
patellar	cubitus	midsagittal	tibial	axillary
femoral	RLQ	brachial	transverse	scapular
calf	sagittal	tarsal	carpal	iliac crest
thoracic	cheek	inguinal	thorax	clavicle
LLQ	umbilical	quadrants	lumbar	wrist

1. **The line dividing the body into equal left and right areas is called the _____ plane.**
2. **The abdomen may be divided into four _____.**
3. **The carpal bones are in the _____.**
4. **A finger is also called a(n) _____.**
5. **A break in the kneecap is called a(n) _____ fracture.**
6. **A buccal smear is a tissue sample taken from the inside of the _____.**
7. **The major vein in the thigh is the _____ vein.**
8. **A person who does not have a collarbone does not have a(n) _____.**
9. **Lymphadenopathy in the armpit is called _____ lymphadenopathy.**
10. **Lymphadenopathy in the groin is called _____ lymphadenopathy.**
11. **You can feel a pulse in the fossa anterior to the elbow, called the _____ fossa.**
12. **The quadrant where the appendix can cause pain is on the right below the umbilicus and is called the _____.**
13. **The line dividing the body into top and bottom regions is called the _____ plane.**

14. **Pain in the lower back or flank is called _____ pain.**

15. **When you put your hands on your hips, the bone you feel is the _____.**

Step 12 Answers to Practice Exercise 11-2

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

Step 13 Internal Landmarks: The Body Cavities

❑ The spaces within the body that contain the various internal organs are called **body cavities**.

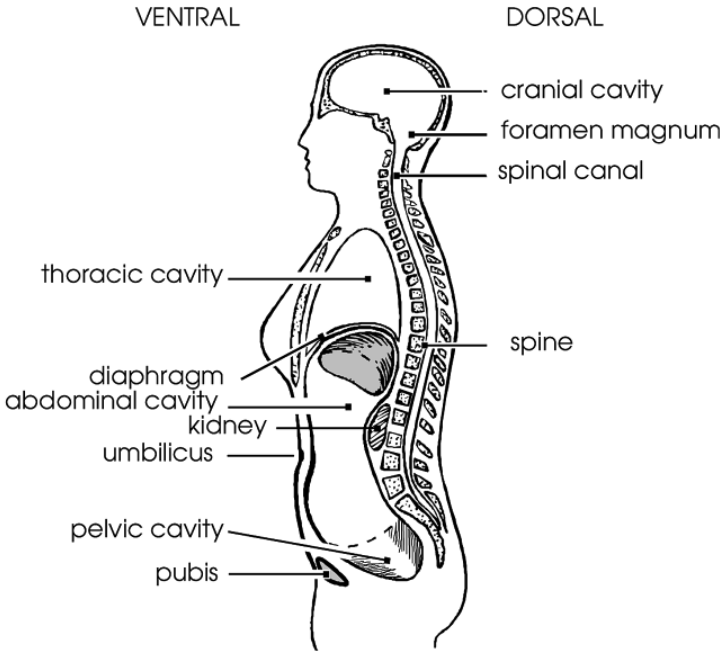
Facts About Body Cavities

Body cavities have two functions:

✓ Body cavities protect the organs they contain.

✓ Body cavities keep the organs in a fairly constant location.

The two principal body cavities are the dorsal body cavity and the ventral body cavity. The major body cavities are shown in this drawing.



Body cavities

The dorsal body cavity is subdivided into two cavities—the cranial cavity and the spinal canal. The **cranial cavity** is the space inside the skull that contains the brain. The **spinal canal** is the cavity formed by the vertebrae. The spinal canal contains the spinal cord and the beginning of the spinal nerves. There is no real boundary between the cranial cavity and the spinal canal. The **foramen magnum** is the opening of the *occipital bone* that interconnects the two cavities.

The ventral body cavity is also subdivided into two major cavities—the thoracic cavity and the abdominopelvic cavity. The **thoracic cavity** contains smaller cavities and subdivisions. The **mediastinum** is a mass of tissue between the lungs extending from the sternum to the vertebral column. Included in the mediastinum is the **pericardial cavity**, which encloses the heart. The two **pleural cavities** each contain a lung. The boundary between the thoracic cavity and the abdominopelvic cavity is the **muscular diaphragm**, a dome-shaped muscle.

The **abdominopelvic cavity** consists of an upper portion and a lower portion. The upper portion is called the **abdominal cavity**. It contains the gallbladder, liver, spleen, stomach, small intestine, most of the large intestine, kidneys, pancreas and the ureters. The lower portion, called the **pelvic cavity**, contains the bladder, colon, rectum and the internal reproductive organs. There is no physical boundary between the abdominal cavity and the pelvic cavity. The imaginary boundary lies at the level of the rim of the pelvic bone.

🕮 Step 14 Membranes That Line the Body Cavities

- ❑ Membranes are layers of tissue that cover organ surfaces, line body cavities and form tubes. Body membranes come from two basic tissue groups:
  - ➤ epithelial tissue
  - ➤ connective tissue

Epithelial Tissue Membranes

Epithelial membranes are classified by where they are located in the body. **Epithelial membranes** include cutaneous membrane, mucous membrane and serous membrane.

Cutaneous Membrane

The outer layer of the skin is a **cutaneous membrane**. It is made of stratified squamous epithelium. The surface of the skin, the outer layer of the stratified squamous epithelium, dries to a tough, nonliving, keratinized layer of squamous cells that waterproofs the skin.

Mucous Membrane

Mucous membranes (**mucosa**) line every tube or cavity that connects to the surface of the body. The mucous membranes often secrete mucus, which prevents body cavities from drying out. The digestive, respiratory, reproductive and urinary tracts are all covered with mucous membranes.

Serous Membrane

Serous membranes (**serosa**) line the major body cavities that do not connect to the surface of the body. Serous membranes occur in pairs— the ***visceral layer*** lines the organ and the **parietal layer** lines the cavity. The serous membranes secrete **serous fluid** (**serum**), which lubricates the organs and reduces friction as they glide across each other and the cavity walls.

The Thoracic Cavity Membranes

The **thoracic cavity** is protected by a serous membrane lining called the **pleura**. The serous membrane lining the pericardial cavity is the *parietal pericardium*. The *visceral pericardium* is the thin, transparent serous membrane covering the heart itself. The lungs are protected by two layers of serous membranes—the *parietal pleura* lines the pleural cavities and the *visceral pleura* covers the lungs themselves.

The Abdominopelvic Cavity Membrane

The **abdominopelvic cavity** is protected by the largest serous membrane of the body, called the *peritoneum*. Unlike other membranes, the peritoneum contains large folds that bind organs to each other and to the cavity wall. The *parietal peritoneum* lines the cavity wall. The *visceral peritoneum* covers some of the organs within the cavity.

Connective Tissue Membranes

Synovial Membrane

Synovial membrane is composed of a gel-like material. It usually contains different types of connective tissue elements. The **synovial membranes** line the joints of the shoulders, knees, hips, fingers and toes. The synovial membranes secrete a fluid to cushion the motion of these joints so that the bone surfaces do not rub against each other.

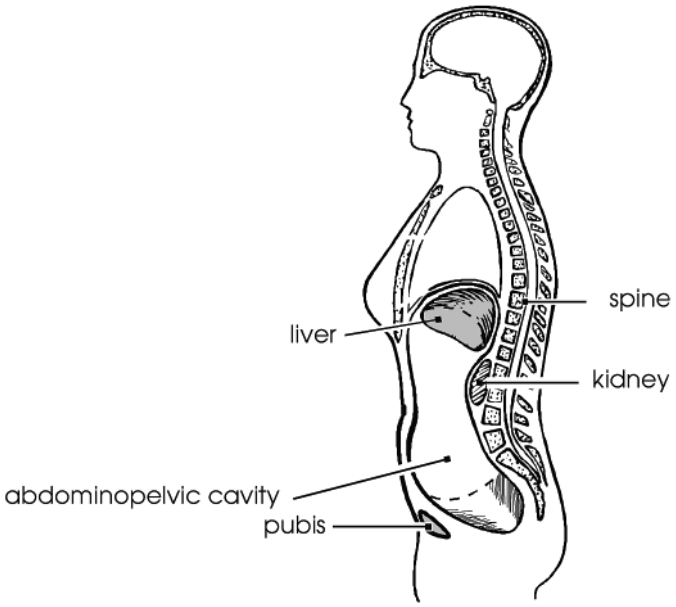
The Cranial and Spinal Canal Membranes

The brain and spinal cord are protected by meninges. The **cranial meninges** line the cranial cavity and are continuous with the **spinal meninges** that line the spinal canal. The meninges consist of three layers, each called a **meninx**. The outer meninx is called the *dura mater*. The middle meninx is the *arachnoid*, and the inner meninx is the *pia mater*.

Step 15 Retroperitoneal Organs

- ❑ Sometimes an organ lies outside a cavity. When you look at this type of organ from inside the cavity, its location is considered to be behind the parietal serosa. For example, in the following graphic, you can see that the kidney is outside the abdominal cavity.

  Viewed from inside the abdomen, this kidney is behind the peritoneal serosa. Organs in this location are called **retroperitoneal organs** (pronounced *retro-peri-toe-neel*).



The kidney is a retroperitoneal organ.

Step 16 Pronounce New Terms

- ❑ Occasions arise when you have to communicate orally about a claim form or bill. You need to be able to understand a healthcare professional's pronunciation of terms, and you need to pronounce anatomical terms yourself. This exercise helps you understand and pronounce the terms you have been reading about.

  a. Take your Quick-learn Tutor and your Set 11 flashcards out of your Quick-learn Kit.

  b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 11.

  c. Listen to the flashterm as it is pronounced on the CD. After you hear a term, put the CD player on pause.

  d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

  e. Continue this process for each flashcard in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce each term clearly and easily.

🕮 Step 17 Write New Terms

❑ The next step in your lesson is to practice writing the terms you have learned. Follow these instructions:

a. Insert the first flashcard for this set into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each flashcard.

🕮 Step 18 Meanings of New Terms

❑ Follow these steps to learn the meanings of the terms you have pronounced and written.

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each word part or term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud. Before you look, see if you can remember the term that goes with that meaning. Check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the terms and their meanings. You may use the flashcards for the Practice Exercises and the Quiz.

d. When you feel comfortable with the spelling, pronunciation and meaning of each flashterm, go on to the next step.

🕮 Step 19 Organization of the Body

❑ You have been studying how the body is organized anatomically. You've been learning the locations of different body parts and how the internal parts of the body are divided into cavities.

Now you will be learning how the body is organized physiologically, that is, how the body is organized to do its work.

Your body has many tasks to perform in order to keep you alive. These tasks often have to be performed simultaneously. This requires great organization.

Your body has to work efficiently, like an army. In any army, there are many individual soldiers. These individual troops must be organized so that all the various tasks of the army can be completed. Soldiers are grouped into squads; squads are grouped into platoons; platoons are grouped into regiments, then divisions. The whole unit is called an army. The army then works with the navy and the air force in order to get the job done.

The smallest unit in your body is the cell. In fact, your body is composed of millions of cells. The work of the body, although it appears to be the work of large parts, is really the combined work of all the different types of cells in the body.

Similar types of cells group together to form tissues. There are four types of tissues:

- ➤ **Epithelial tissue** covers every body surface, including the outer surface, body cavities and organs.
- ➤ **Connective tissue** connects other types of tissues, helps support the body and has its own blood supply.
- ➤ **Muscle tissue** can extend and contract, allowing movement.
- ➤ **Nervous tissue** transmits electrical impulses and makes up the brain, spinal cord and peripheral nerves.

For example, muscle cells group together to form muscle tissue. Liver cells group together to form liver tissue. Nerve cells form nerve tissue.

Different types of tissues group together to form organs. For example, liver tissue, blood vessel tissue, nerve tissue and bile tissue group together to form the liver. Muscle tissue, connective tissue, nerve tissue and blood vessel tissue group together to form a muscle, such as the biceps muscle.

Body organs with similar functions can be grouped into organ systems. For example, the liver, stomach, intestines and pancreas are all organs whose function is digestion. As a group, they form the digestive system. The digestive system is also called the gastrointestinal system.

As you can see, body organization begins with the cell and progresses to tissues, organs and then organ systems.

🕮 Step 20 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 12 flashcards out of your Quick-learn Kit. Insert the first flashcard for this lesson into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 12.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each term in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 21 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-Learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each term in this set.

🕮 Step 22 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each word part or term and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times, until you are familiar with the word parts and terms and their meanings. You may use the flashcards for your Practice Exercises and Quizzes.

d. When you feel comfortable with the spelling, pronunciation and meaning of each term or word part, go on to the next step.

Step 23 Organs and Organ Systems

- Tissues are grouped together to form an organ. In an organ, all the tissues work like a team. Each type of tissue has its own job to do, but together the tissues have a common purpose: the function of the organ.

  Each type of tissue does its own job. For example, the liver contains tissues from each of the basic tissue groups (epithelium, connective, muscle, nervous). The epithelium covers and protects the organ and makes the glands of the organ. The connective tissue holds the organ together and provides support or repair. The muscle tissue provides motion, contraction or pressure in ducts and vessels. The nervous tissue provides connection to the brain and warning of danger. Even so, all the groups of tissues in the liver act together to perform the functions of the liver.

  In the same way, the heart also contains tissues from each of the tissue groups, all acting together to perform the function of the heart. However, from a practical point of view, when a patient has a problem, the problem is not with a tissue type but with a particular organ, such as the liver or the heart.

  An organ usually interacts with other organs that help it perform its function. For example, the liver, pancreas, stomach and bowel are organs that all work together to digest food. Thus, organs with similar functions or physiology are grouped together in organ systems. In fact, the different specialties of medicine are divided by organ systems. You can probably recognize some of them already.

Respiratory System

The organs in the **respiratory system** are all concerned with breathing, the function of respiration. The respiratory organs include the lungs, trachea and the larynx. The pleura and the pleural cavities are where the respiratory organs lie.

Look at the following encounter form. You can see that the patient was diagnosed with an upper respiratory infection. Even if you don't know specifics about the respiratory system, you do know that the respiratory system controls breathing functions. So this infection likely affects the patient's lungs, trachea or larynx.

As a medical claims specialist, you'll encounter anatomical and physiological terms many times each day. Having a basic knowledge of these terms will make your job much more interesting and enjoyable.

Circulatory/Cardiovascular System

The organs in the **circulatory** or **cardiovascular system** include organs that form and transport blood and lymph. The organs in this system include the heart, arteries, veins, lymphatic vessels and nodes, spleen and thymus gland. The cardiac portion of this system lies in the mediastinum.

The vascular part includes the blood and lymph vessels and lymph nodes. The vascular part is in every organ in the body. The thymus is a lymphopoietic organ. It lies in the mediastinum and produces lymph tissue.

Nervous System

The **nervous** or **neurological system** includes the central nervous system, which is made up of the brain and spinal cord, and the peripheral nervous system, which includes the nerves that reach each organ in the body. Because this system includes the mind, it can be called the **neuro-psychiatric system**.

Muscular System

The **muscular system** includes the skeletal muscles, ligaments and tendons. Only voluntary muscles are part of this system. Smooth muscles and cardiac muscles are considered part of the systems where they occur.

Skeletal System

The **skeletal system** includes bones, joints, cartilage and spine. Since it is so hard to separate the functions of the voluntary muscles and bones, some people combine the muscular and skeletal organ systems into one system, the **musculoskeletal system**. Hyaline cartilage occurs in other systems, such as the hyaline cartilage of the larynx in the respiratory system. Most people think bones aren't living tissue, but rather something hard, like a rock. But each bone in your body is a living organ, just like your heart.

Each bone in your body is a living organ.

Integumentary System

The **integumentary system** includes skin, nails, hair, sweat and sebaceous glands. **Integument** means *in the covering* or *in the skin*. The skin and the organs it contains are part of this system. The skin is the largest single organ in the body! A large skin injury, such as a burn, can be fatal.

Endocrine System

The **endocrine system** includes the glands that don't have ducts. These glands secrete within themselves directly into their blood vessels. They are made of epithelium. They secrete hormones. Endocrine glands include the thyroid, pituitary and adrenal glands.

Digestive System

This system is concerned with digestion of food. It begins with the mouth and ends at the anus. It includes the stomach, intestines, liver, pancreas, mouth and esophagus. The **digestive system** is also called the **gastrointestinal system**.

Urinary System

This system filters the blood and produces urine. It includes the kidneys, ureters, urinary bladder and urethra.

Reproductive System

This organ system involves the organs for reproduction. The **reproductive system** includes such organs as the ovaries, uterus, vagina, breasts, testes and penis.

The Immune System

One system you may have heard about is the **immune** or **immunologic system**. This system that defends the body from disease is not clearly understood. It appears to use parts of the cardiovascular system, the nervous system and the endocrine system to provide defense against some kinds of disease. The immune system provides **immunity**, or resistance, to diseases caused by stress, viruses and degeneration. It helps fight cancer and tries to kill any foreign substance in the body, even a transplanted organ.

🕮 Step 24 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and the flashcards labeled Set 13 out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 13.

c. Listen to the flashterm as it is pronounced on the CD. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Continue this process for each term in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce each term clearly and easily.

🕮 Step 25 Write New Terms

❑ The next step in your lesson is to practice writing the terms you have learned. Follow these instructions:

a. Insert the first flashcard for this set into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each flashcard.

🕮 Step 26 Meanings of New Terms

❑ Follow these steps to learn the meanings of the terms you have pronounced and written.

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term or word part out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud. Before you look, see if you can remember the term that goes with that meaning. Check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the flashterms and their meanings. You may use the flashcards for the Practice Exercises and the Quizzes.

✍ Step 27 Practice Exercise 11-3

❑ Match the description with the correct body system.

1. _____	**respiratory**	a.	includes the heart, arteries and veins
2. _____	**integumentary**	b.	includes the skin, hair and nails
3. _____	**cardiovascular**	c.	includes such organs as the uterus, ovaries, penis and testes
4. _____	**endocrine**	d.	begins with the mouth and ends with the anus
5. _____	**immune**	e.	includes the lungs, trachea and larynx
6. _____	**nervous**	f.	system which provides resistance to diseases
7. _____	**reproductive**	g.	includes the brain, spinal cord and peripheral nerves
8. _____	**digestive**	h.	includes the glands that don't have ducts

🗝 Step 28 Answers to Practice Exercise 11-3

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 29 Lesson Summary

❑ This lesson continued your introduction to anatomy—how the body works, how it is organized and how its systems are connected.

Doctors use terms, called *landmarks*, to describe locations on the body. These include superficial, or surface, landmarks for the body in the supine and prone positions. To accurately describe locations on the abdomen, surgeons divide the abdomen into nine areas or regions, which refer to certain organs in the abdominal cavity in each region. Non-surgical doctors often use a simpler way to describe locations on the abdomen by dividing the abdomen into fourths, or quadrants. Internal landmarks used by doctors to describe location include body cavities and the body cavity membranes.

The body is organized in a complex structure that enables it to work effectively. The smallest unit is the cell. Cells group together to form tissues. Tissues group together to form organs. Organs form organ systems, which function as a whole to operate the amazing mechanism we call the body.

This lesson is intended to serve as a base that will help you to understand the context of terminology used in medical bills and claims, and to communicate effectively with healthcare professionals.

✉ Step 30 Mail-in Quiz 11

❑ Follow the steps to complete the quiz.

a. Be sure you've mastered the instruction and the Practice Exercises that this quiz covers.

b. Mark your answers on your quiz. Remember to check your answers with the lesson content.

c. When you've finished, transfer your answers to the Scanner Answer Sheet included. Use only blue or black ink on your Scanner Answer Sheet.

d. **Important!** Please fill in all information requested on your Scanner Answer Sheet or when submitting your quiz online.

e. Submit your answers to the school via mail, e-mail, fax or, to receive your grade immediately, submit your answers online at www.uscareerinstitute.edu.

Mail-in Quiz 11

For questions 1 through 25, select the best answer from the choices provided. Each question is worth 4 points.

1. _____ anatomy refers to the study of body parts and systems that can be seen without the aid of a microscope.

a. Microscopic
b. Epithelial
c. Gross
d. Cellular

2. The study of the surface of the body is often called _____ anatomy.

a. deep
b. superficial
c. subdural
d. supine

3. When the body is _____, it is lying flat on its back.

a. supine
b. prone
c. transverse
d. superficial

4. When the body is lying _____, it is face down.

a. supine
b. prone
c. transverse
d. subdural

5. When surgeons examine the abdomen, they mentally divide the abdomen into _____ areas or regions.

a. six
b. nine
c. two
d. three

6. A simpler method of division is the quadrant method. Each quadrant is _____ of the abdominal region.

a. one-fourth
b. one-half
c. one-tenth
d. one-fifth

7. Body cavities have two functions: _____ the organs and keeping the organs in a fairly constant location.

a. nourishing
b. developing
c. moving
d. protecting

8. The two principal body cavities are the _____ body cavity and the ventral body cavity.

a. central
b. nervous
c. cranial
d. dorsal

9. Body membranes come from two basic tissue groups: _____ tissue and connective tissue.

a. endocrine
b. exoskeletal
c. epithelial
d. serous

10. Epithelial membranes include _____ membrane, mucous membrane and serous membrane.

a. cutaneous
b. cranial
c. connective
d. keratinized layer

11. The mucous membranes often secrete _____, which prevents body cavities from drying out.

a. melatonin
b. lymph
c. mucus
d. serosa

12. Muscle tissue _____.

a. covers every surface of the body
b. connects other types of tissues
c. can extend and contract
d. makes up the spinal cord and peripheral nerves

13. _____ provide(s) resistance to diseases.

a. Foreign substance
b. Immunity
c. Histamines
d. Antihistamines

14. The brain and spinal cord are protected by _____.

a. thoracic fluid
b. meninges
c. the mediastinum
d. all of the above

15. The largest serous membrane of the body is called the _____ and it protects the abdominopelvic cavity.

a. peritoneum
b. cranium
c. thoracical
d. synovial membrane

16. An organ that is outside of the abdominal cavity is known as a _____ organ.

a. meninx
b. retroperitoneal
c. dysfunctional
d. systemic

17. The _____ line the joints of the shoulders, knees and toes.

a. spinal meninges
b. parietal peritoneum
c. synovial membranes
d. cutaneous membrane

18. _____ tissue covers every surface of the body.

a. Connective
b. Epithelial
c. Muscle
d. All of the above

19. _____ tissue connects other types of tissues.

a. Connective
b. Epithelial
c. Muscle
d. All of the above

20. The skeletal system includes bones, joints, cartilage and _____.

a. mucus
b. muscles
c. spine
d. arteries

21. The digestive system is also called the _____ system.

a. urinary
b. gastrointestinal
c. immune
d. respiratory

22. As you're working on claims one day, you run across the phrase, "calculus of ureter." Which organ system corresponds to this phrase? _____

a. Urinary system
b. Reproductive system
c. Endocrine system
d. Circulatory system

23. As a medical claims specialist, you see the phrase, "follicular cyst; ovary," on an encounter form. Which organ system corresponds with this phrase? _____

a. Respiratory system
b. Immune system
c. Urinary system
d. Reproductive system

24. In your job as a claims specialist, you encounter the phrase, "RLQ pain—onset and history not typical for appendicitis." You know that this acronym stands for _____.

a. right or left quadrant
b. right lower quadrant
c. really lasting quinine
d. region of lower quadrant

25. When completing a claim one day, you note that the diagnosis listed is acne. Which body system is involved? _____

a. Nervous system
b. Integumentary system
c. Digestive system
d. Respiratory system

Congratulations

You've completed Lesson 11.

Don't wait for your quiz results to continue with Lesson 12.

Lesson 12

Organ Systems I

Step 1 Learning Objectives for Lesson 12

- ❑ When you have completed the instruction in this lesson, you will be trained to do the following:
  - ➤ Define terms relating to organ systems.
  - ➤ Describe the two tissue layers of the skin.
  - ➤ Explain the skin conditions and details concerning the skin appendages (hair and nails).
  - ➤ Describe how each gland in the skin works.
  - ➤ Discuss the major bones in the body.
  - ➤ Discuss the major muscles in the body.
  - ➤ Describe the anatomy of the nerves and the central and peripheral nervous systems.
  - ➤ Explain the anatomy and physiology of the heart.
  - ➤ Determine the functions and parts of the peripheral vascular system.
  - ➤ Describe the immune system and how it works to protect the body.
  - ➤ Use organ system terminology as it is applied in a medical setting.

Step 2 Lesson Preview

- ❑ In Lesson 11, you learned how the human body is organized to do its work. The highest level of organization in the body is the organ system. In this lesson and the next lesson, you will be studying each body system in greater detail. It is important that you, as a medical claims and billing specialist, understand the basic ways in which the body works. This helps you to communicate effectively with healthcare providers. It also helps you by giving you more knowledge in anatomy—a very important science in the world of medicine.

It is important that you, as a medical claims and billing specialist, understand the basic ways in which the body works.

This lesson is designed to give you a more in-depth understanding of five organ systems. The organ systems that you will be learning about in this lesson are the integumentary system (the skin), the musculoskeletal system, the neurological system, the cardiovascular system and the immune system.

You'll also see how you will encounter these organ systems each day as a claims specialist.

Step 3 Integumentary System

- The **integumentary system** is composed of the skin (known as the **integument**), a number of appendages growing from the skin (hair and nails), and the glands contained in the skin. The largest organ system in the body is the integumentary system. Its function is to protect the body from things such as heat, cold, harmful chemicals and bacteria. Loss of only part of the integument (in-teg-you-ment), for example, from a burn injury, can result in death. This system covers nearly two square meters of surface area.

Skin

The skin is composed of two layers of tissue. They are:

- the epidermis
- the dermis

The table shows the names of the components of each layer. The skin also includes **appendages**, structures arising from it, and **derivatives**, structures that grow within it.

Overview of Skin Elements

Skin
- Epidermis
  - Stratum corneum
  - Stratum lucidum
  - Stratum granulosum
  - Stratum germinativum
- Dermis
  - Papillary layer
  - Reticular layer

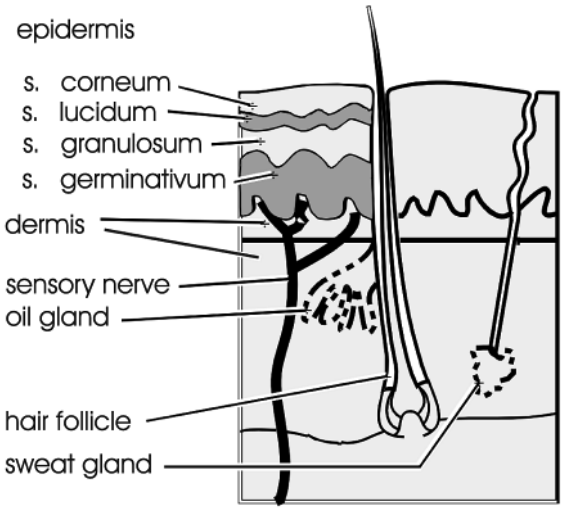
Skin Appendages
- Hair
- Nails

Skin Derivatives
- Sudoriferous glands
- Sebaceous glands

The Epidermis

The following figure illustrates the layers and components of the epidermis. The outermost layer is made up of squamous (flat) cells that dry to a tough, nonliving, **keratinized** (care-ah-tin-eyes-d) layer that waterproofs the skin. It is thicker on the palms of the hands and the soles of the feet.

The epidermis continually forms new cells in its deepest layer and sheds dead cells at its surface. Millions of dead squamous cells are shed everyday.



Layers of the epidermis

The epidermis contains specialized cells that add color to the skin. These cells are called **melanocytes** because they contain the pigment **melanin**. The color of skin depends on the number of melanocytes and the depth at which they lie. The epidermis is organized in four layers: the stratum corneum, stratum lucidum, stratum granulosum and stratum germinativum.

The Dermis

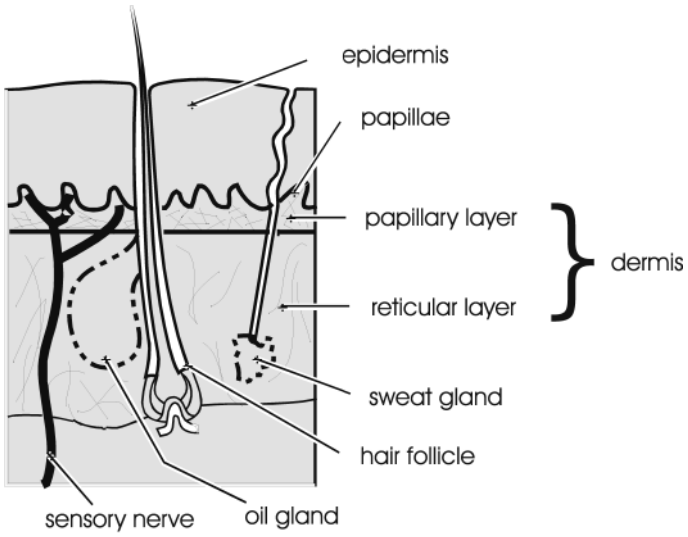
The **dermis** is the layer of the skin that lies beneath the epidermis. It is a layer of connective tissue that is tough and flexible. For example, the leather in leather gloves is dermal tissue. The dermis is thick over the palms and soles, thinner in your inner wrist and very thin in the eyelids. Rub the skin of your eyelid, wrist and palm to see the difference in toughness and flexibility in the skin, depending on the thickness of this layer.

Unlike the epidermis, the dermis has a generous supply of blood vessels, nerve endings, collagen and elastic fibers, and smooth muscles. The dermis contains two layers:

- the papillary layer
- the reticular layer

The **papillary layer** has finger-like projections extending into the epidermis. These projections are called **papillae**. The dermal papillae are very vascular, and this blood supply helps to regulate body temperature by letting heat reach the skin surface. The papillae contain many nerve endings for pain and touch.

The **reticular layer** is the deep layer of the dermis. Hair follicles, sweat glands and oil glands reach as deep as the reticular layer. Scattered throughout the dermis are **phagocytes**, cells that help fight infection by "eating" dead bacteria and debris.



Layers of the dermis

Skin Appendages

There are two appendages that develop from the skin: the hair and nails.

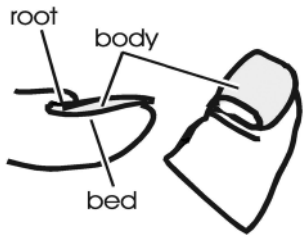
Hair

Hair grows from the epidermal layer all over the body. Some areas are hairier than others. The texture and color depend on the area of the body, gender, age, health and heredity. Hair patterns are different in males and females.

The hair grows from an envelope called the **follicle**. The follicle extends into the epidermis from the dermis. The hair grows like a flower grows from a bulb planted in the ground. The part of the hair thread inside the follicle is called the root. The part of the hair that emerges from the follicle, like a flower emerging from the ground, is called the hair **shaft**. The outermost layer, called the **cuticle**, consists of flat, thin scale-like keratinized cells.

Nails

Fingernails and toenails are hard, keratinized cells produced by the epidermis. They are like hooves and claws in other animals. The nail **body** is the part that attaches firmly to the skin and is not covered by skin. The nail **root** is embedded in a fold of skin. The nail **bed** is the skin under the nail.



Fingernail or toenail

The color of a healthy nail depends on the blood supply to the nail bed. Squeeze your thumbnail, then let go quickly. You will see that the nail bed is white, quickly filling in with pink as the blood vessels of the nail bed fill with blood. When the oxygen level of blood is very low, the resulting *cyanosis* will color the nail bed blue (*cyan/o* means *blue*). In an emergency, a simple way to see if there is blood flow or cyanosis is to squeeze the thumbnail to see how fast the blood returns and how pink it is.

Skin Derivatives

There are a number of glands that develop in the skin. The **sudoriferous** (soo-do-rif-er-us) **glands** produce sweat. They open to the surface through openings in the epidermis called **pores**. Sweat glands are an important factor in body temperature regulation. Sweat is produced when it is hot. The evaporation of this fluid cools the body surface, allowing heat to escape through the skin.

The **sebaceous** (seh-bay-shus) **glands** are oil glands connected to hair follicles. They actually produce a substance called **sebum** which is a mixture of lipids (fats) and cellular debris. These are the glands that keep the skin from being too dry, and sometimes they can make the skin too oily.

Example Claim Form

You may be wondering why you, as a claims specialist, need to know about follicles and sudoriferous glands! Well, each day as a claims specialist you'll use patients' encounter forms to complete CMS claim forms. Along with completing patient and physician information, you'll code each of the diagnoses and procedures listed on the encounter form.

We'll talk more about the process of coding later, but in the meantime, take a look at this diagnosis and procedure and the corresponding codes entered onto the claim form. See if you recognize some of the terms in the diagnosis and procedure.

Diagnosis code	**216.5**	**Benign neoplasm of skin, Skin of trunk, except scrotum**
Procedure code	**11403**	**Excision, benign lesion including margins, except skin tag (unless listed elsewhere), trunk, arms or legs; lesion diameter 2.1 to 3.0 cm**

The term "skin" in both code explanations is a giveaway that these particular diagnosis and procedure relate to the integumentary system, right? Even without a dictionary, we know that this patient was diagnosed with a non-cancerous lesion. The procedure was a removal of the lesion.

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 216.5 3. _____ . _____

2. _____ . _____ 4. _____ . _____

24. A. DATE(S) OF SERVICE						B.	C.	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances)		E.
FROM MM	FROM DD	FROM YY	TO MM	TO DD	TO YY	PLACE OF SERVICE	EMG	CPT/HCPCS	MODIFIER	DIAGNOSIS POINTER
1.										
04	06	XX	04	06	XX	22		11403		1

Don't worry if the codes don't make sense right now. They're not supposed to yet! For now, isn't it great to be able to see your knowledge go to work on a claim form?

Step 4 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 14 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 14.

c. Listen to the flashterm as it is pronounced on the CD. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each flashterm in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

Step 5 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside each word part or term.

d. Do this for each flashcard.

Step 6 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

✍ Step 7 Practice Exercise 12-1

❑ Match the correct meanings to the words below.

1. _____ **dermatitis**
2. _____ **symptomatic**
3. _____ **integumentary**
4. _____ **pemphigus**
5. _____ **keratosis**
6. _____ **mycosis**
7. _____ **cellulitis**
8. _____ **inguinal**
9. _____ **epidermal**
10. _____ **fascia**
11. _____ **nephritis**
12. _____ **erythematous**
13. _____ **cyanosis**
14. _____ **melanotic**
15. _____ **organomegaly**

a. Inflammation of cellular tissue
b. Bluish discoloration
c. Relating to the groin
d. Relating to inflammatory redness of the skin
e. Relating to black
f. Inflammation of the kidneys
g. Relating to the nature of a symptom
h. Fibrous tissue that lies deep to the skin
i. Inflammation of the skin
j. Chronic bullous diseases
k. Relating to the skin or covering
l. Horny growth on the epidermis
m. Enlargement of the organs or viscera
n. Relating to the outer layer of skin
o. Any disease caused by fungi

🗝 Step 8 Answers to Practice Exercise 12-1

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 9 Musculoskeletal System

- ❑ The **musculoskeletal system** is actually composed of two body systems that work closely together: the skeletal system and the muscular system. The skeletal system provides support for the body, and the muscular system allows the body to move.

The Skeletal System

The **skeletal system** is the "backbone" of the body. The spine, or backbone, is a stack of bones that provides support for the upper body. All the other bones of the skeleton have the same basic function: to support the soft tissues of the body. Even so, the skeletal system is more than a support system. Bones are responsible for making red and white blood cells, storing fat and regulating the body's supply of phosphorus and calcium.

The skeletal system includes other connective tissues in addition to bones. Here are the major types of connective tissue found in the skeletal system:

- ➤ bone (osseous tissue)
- ➤ cartilage
- ➤ ligaments

Bone Tissue

Bone tissue can be dense and smooth, which is called **compact bone**, or it can contain small pieces of bone with lots of open spaces in between, called **spongy bone**. Mature bone tissue is layered, like the skin. If you look at a beef marrow bone or a rib bone, you will see a solid superficial (outer) layer and a hollow center. This center is called the **marrow cavity**. The marrow cavity contains spongy bone filled with marrow.

Bones come in many shapes and sizes. There are **short bones** in your wrists and ankles that are cube shaped and contain mostly spongy bone tissue. The major bones in your arms and legs are called **long bones**, and they are comprised mostly of compact bone tissue. The bones in your skull and ribs are called **flat bones**. The bones that do not fit into any of these categories are called **irregular bones**. The vertebrae in your spine are examples of irregular bones.

Cartilage

Although bone is the largest component of the skeletal system, cartilage forms a very important part of the skeletal system as well. Cartilage is a very specialized type of connective tissue. **Cartilage** is the connective tissue on which bone is built. Like bone, it is hard and provides support for other kinds of soft tissue.

As you read about other body systems, you will discover that cartilage can be found in a number of places in the body. For example, the larynx, which is considered part of the respiratory system and forms the connection between the trachea and the pharynx, contains a cartilaginous skeleton.

Ligaments

Ligaments are very strong bands of dense, regularly arranged connective tissue that connect one bone to another at the joints. Like hinges on a door, they allow the joints to move enough for flexibility, but they also limit movement so that the joint is useful. Some joints, like the costochondral joints between the ribs and the sternum (breastbone), have almost no motion. Others, like the ankle, have a very wide range of motion.

Ligaments are named for the bones to which they are attached, usually naming the largest or most important bone first. For example, the ankle ligaments include the tibiotalar ligament (connecting the tibia and talus) and the talofibular ligament (connecting the weight-bearing talus with the non-weight-bearing fibula).

Joints

Most people think of joints as parts of the body that move when you flex a muscle. But did you know there are joints in your skull? It's okay. Everyone has them. **Joints** are created when two bones come together. Cartilage or fibrous connective tissue binds the bones together at the joints and also allows movement in many cases. In fact, joints are classified according to the amount of movement they allow. Some joints are immovable, like the joints in the skull. Some joints are slightly movable, like the joints in your pelvis. The last category of joints are freely movable joints. These include the wrist, elbow, shoulder, hip and knee, among others.

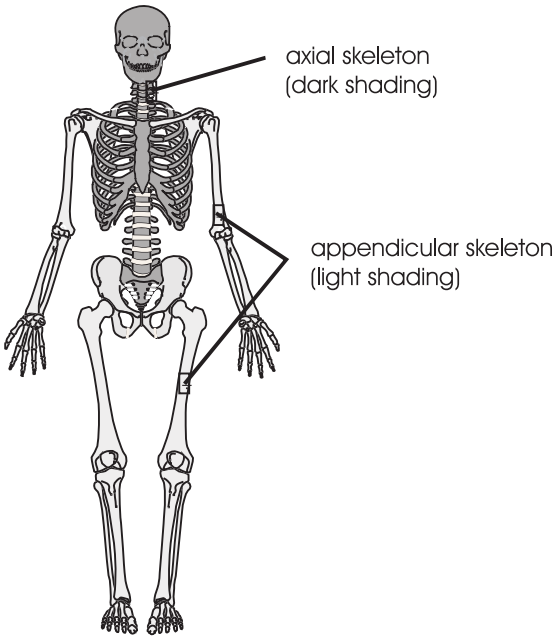
Now let's take a look at some of the bones found in the human body.

Bones of the Axial Skeleton

The bones of the **axial skeleton** are those in the long axis of the body:

- the skull and facial bones
- the spine
- the bony thorax

The remaining bones, in the extremities and the pelvis, are called the **appendicular skeleton** because they are appendages of the axial skeleton.



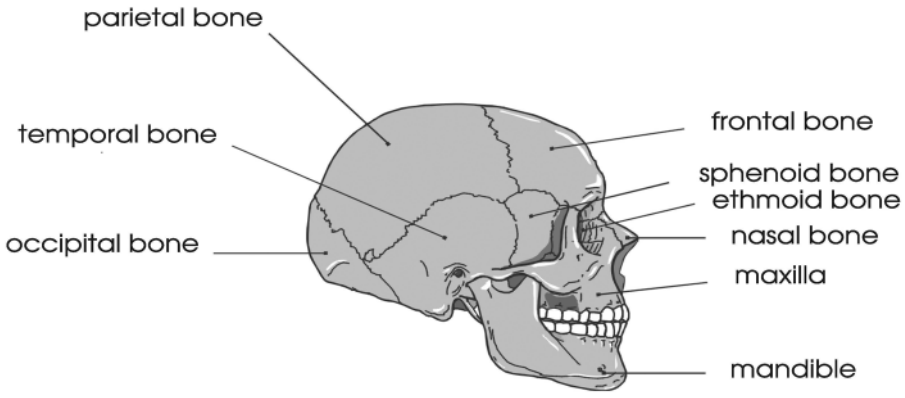
Axial and appendicular skeletons

The Skull and Facial Bones

The **skull** is the part of the skeleton that encases the brain and the special sense organs and forms the face.

The bony case for the brain is called the **cranium**. The cranium is made up of eight flat bones. The **frontal bone** forms the forehead and the roof of the **orbits** (eye sockets). There are two paired **parietal bones**, which form the top and upper sides of the skull. The two paired **temporal bones** lie on the lower sides of the skull, surrounding the ear like a fan. If you put your hand over your ear, your fingers are spread out over the temporal bone. The **occipital bone** forms the back of the skull. The **sphenoid bone** forms the floor and side walls of the eye sockets. The **ethmoid bone** lies behind the nose. It makes up the roof of the nasal cavity and the medial walls of the orbits.

Major facial bones include the **mandible** (lower jaw), the **maxilla** (the upper jaw) and the **nasal bone.**

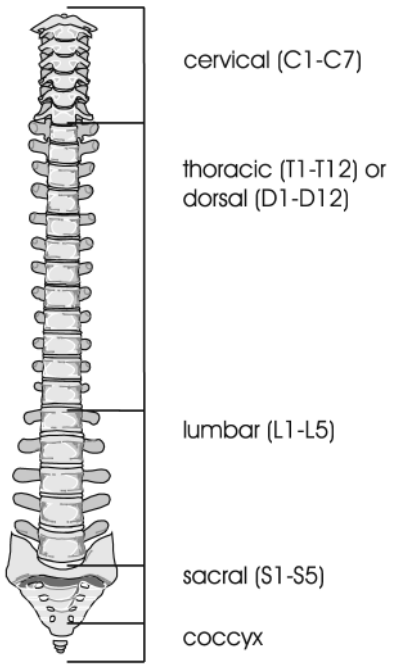


Human skull, lateral view

Spine

The spine is called the **vertebral column** because it is a column of vertebral bones that supports the body. It does not help humans stand upright; after all, four-legged animals, fish and snakes have spines. However, since we *are* upright, the spine also supports the weight of the upper body. Its primary function is to protect the spinal cord as it runs from the brain all the way to the sacrum. At every level, nerves are sent to the body from the spinal cord.

The spinal column is composed of a stack of 33 bones called **vertebrae**, divided into five distinct regions.



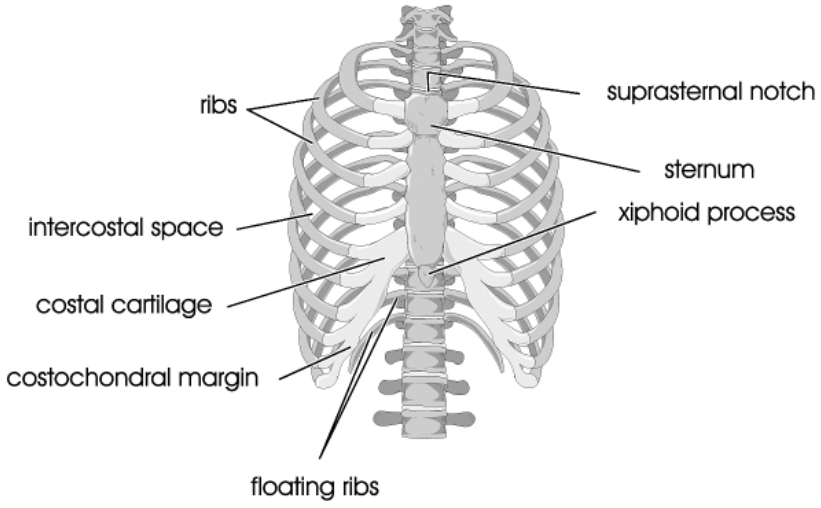
Vertebral column

Except for the joint between the first and second vertebrae, there are **intervertebral discs** that form the major joint at each level of the cervical, thoracid and lumbar vertebrae. These discs, up to one-half inch in thickness, cushion the vertebrae, like cushioned running shoes, from the shock of weight bearing. The discs are well-hydrated fibrocartilage, which makes them resilient when they are compressed. As the spine flexes and extends, the vertebral bodies are protected from injury by the discs.

There are seven **cervical vertebrae**, numbered C1-C7. The cervical vertebrae are smaller than the other weight-bearing vertebrae. The spine contains twelve **thoracic vertebrae** (T1-T12 or D1-D12). There are five **lumbar vertebrae** (L1-L5). The **sacrum** is a large, flat triangular-shaped bone that develops from the fusion of the five sacral vertebral segments (S1-S5). There are no intervertebral discs in the sacrum. The sacrum is the most inferior weight-bearing bone in the spine. From the sacrum, weight is transferred to the hips through the sacroiliac joint. The **coccyx** is a triangular-shaped stack of vertebral bodies, the smallest in the spine. The coccyx bears no weight.

Bony Thorax

The bony **thorax** includes the thoracic spine, the ribs and sternum. The bony thorax protects the heart and is the bellows that inflates and deflates the lungs. Because it looks like a bird cage, it has been called the **thoracic cage** or **rib cage**.

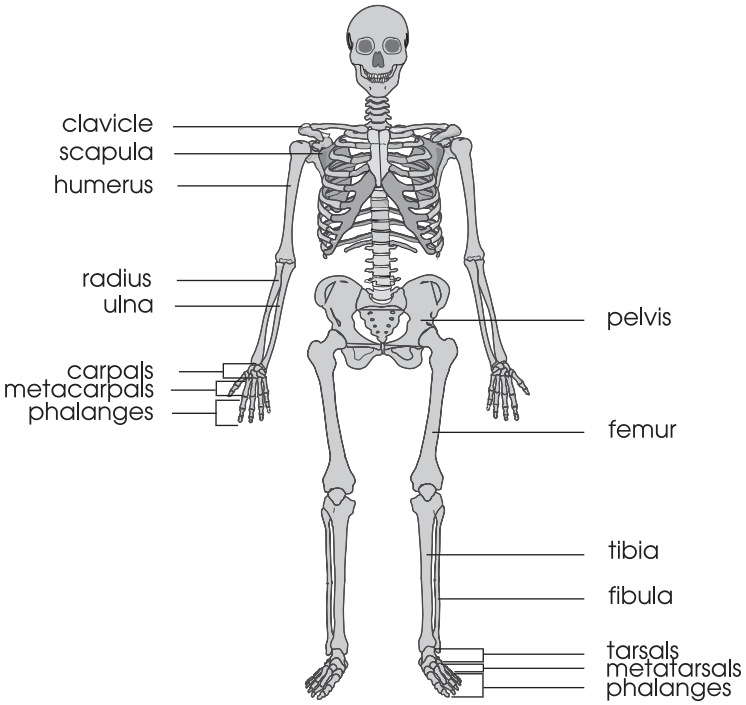


Bony thorax

The breastbone is called the **sternum**. The ribs are attached to the sternum. The lower edge of the costal cartilage is called the **costal margin**. There are twelve pairs of ribs. The most inferior two pairs of ribs do not connect with the costal cartilage. They are called **floating ribs**; they are almost never fractured.

Bones of the Appendicular Skeleton

The **appendicular skeleton** includes the shoulder girdles, pelvic girdle and the extremities (limbs).



Bones of the appendicular skeleton

Shoulder Girdle

The shoulder girdle attaches the upper extremity to the axial skeleton. It is also called the pectoral girdle. It is made up of two bones, the **clavicle** (collarbone) and the **scapula** (shoulder blade).

Upper Extremity

The upper extremity includes the upper arm, the forearm, the wrist and the hand. Except for the wrist, the bones of the upper extremity are long bones.

There is only one bone in the upper arm: the **humerus**. There are two bones in the forearm: the **radius** and the **ulna**. In the anatomical position, the radius is lateral and the ulna is medial. The location of the radius is easy to remember if you remember that the radius and thumb are always on the same side of the upper extremity.

The radius is the weight-bearing bone of the forearm. The upper end of the radius is called the **radial head**. It forms a joint with the bottom of the humerus. It also forms a joint with the medial aspect of the ulna. This allows you to rotate the palm of your hand without moving your elbow from an anatomic position. The medial bone in the forearm is the ulna.

There are three groups of bones in the hand:

- The carpal bones of the wrist
- The metacarpal bones of the hand
- The phalanges in the fingers (digits)

There are eight **carpal** bones which are aligned in two rows. The five **metacarpal** bones form the palm of the hand. The fingers have three bones called **phalanges**, except for the thumb, which has only two phalanges.

Bones of the Lower Extremity

The bones of the lower extremity are quite similar to the bones of the upper extremity except they are modified for their major physiologic function: weight bearing.

There is a single long bone in the thigh called the **femur**. It is the largest and strongest bone in the body. At the proximal end, the **femoral head** is shaped like a ball and connects with the hip socket, the **acetabulum**. Below the head of the femur is a knob-like structure known as the **greater trochanter**.

The lower leg contains two bones, the **tibia** and the **fibula**. The tibia is the weight-bearing bone in the leg. It lies anteriorly and medially. It has a ridge running along its anterior surface called the **anterior crest**. This is the shin bone, a prominent superficial landmark.

The **fibula**, which lies posterolateral to the tibia, is not a weight-bearing bone. The fibula is probably the thinnest of the long bones, and it does not have weight-bearing function. Both the distal tibia and fibula connect with the **talus** bone in the ankle.

The **foot** and **ankle** contain seven tarsal bones, five metatarsal bones and fourteen phalanges. The **tarsal** bones are arranged differently from the carpal bones in the wrist because the function of the ankle and proximal foot is to provide a forward thrust when we walk upright.

The five **metatarsal** bones form the arch of the foot. The arches help absorb the stresses and shocks involved in upright walking.

The 14 **phalanges** make up the toes on each foot. The great toe has two phalanges, the proximal and distal phalanges. The other four toes have three each: the proximal, middle and distal phalanges.

Example Claim Form

Let's look at some codes related to the skeletal system. This patient tripped and fractured the distal end of his radius. If you recall, *distal* means farther away from the center of the body or organ, and a *radius* is the lateral (meaning farther away from the middle) forearm bone. The physician set the fractured bone into a cast.

Diagnosis code	**813.42**	**Fracture of radius and ulna, Lower end, closed, Other fractures of distal end of radius (alone)**
	E885.9	**Fall on same level from slipping, tripping or stumbling, fall from other slipping, tripping or stumbling**
Procedure code	**25600**	**Closed treatment of distal radial fracture or epiphyseal separation, includes closed treatment of fracture of ulnar styloid, when performed; without manipulation**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 813 . 42 3. _____ . _____

2. E885 . 9 4. _____ . _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1.										
08	11	XX	08	11	XX	23		25600		1 2

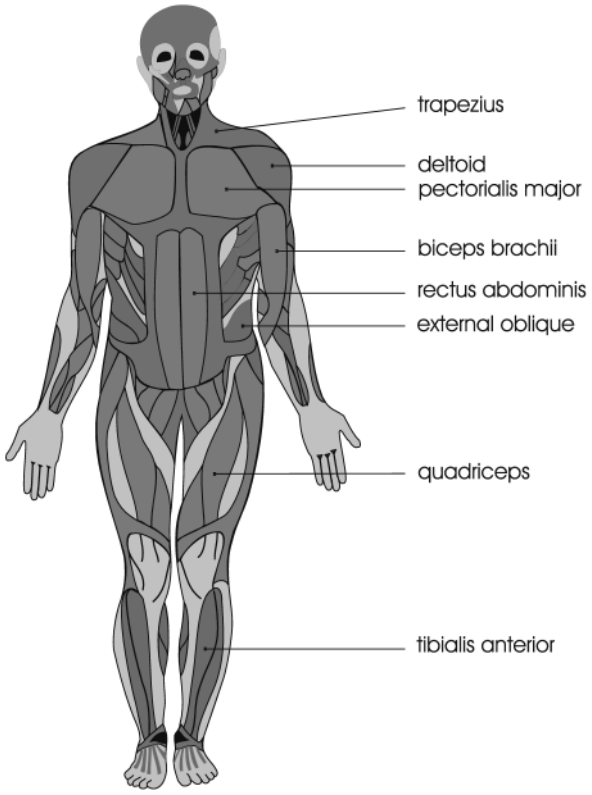
See if you can find the distal end of your radius. If you need a reminder which bone is the radius, look at the appendicular skeleton diagram given earlier. The distal end must be the end closest to your hand, right?

The Muscular System

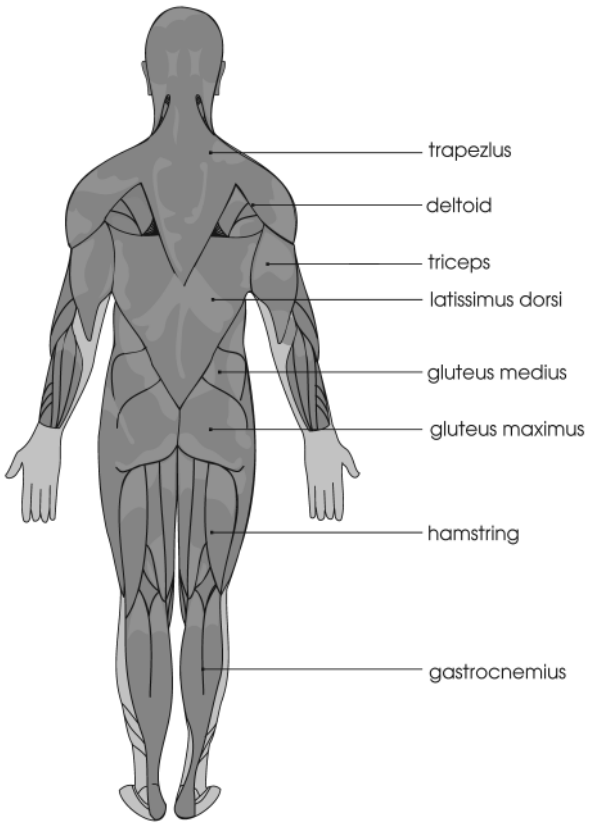
The **muscular system** consists of organs that produce movement by contracting and relaxing. Muscles account for a large part of body weight, somewhere between 35 and 45 percent. The percentage is higher in males than in females.

Muscles are not only found in the extremities, like the biceps muscle that bulges when you flex your arm, but they are found in almost every other organ system in the body, except the neurological system. Also included in the muscular system are the **tendons** and **aponeuroses**, connective tissue that attaches the ends of muscles to bones.

There are more than 600 skeletal muscles in the human body. Some of the major muscles of the body are shown in the following figures. Many of them are probably familiar to you.



Major muscles of the anterior surface of the body



Major muscles of the posterior surface of the body

Muscle Function

There are two kinds of muscle function:

- voluntary
- involuntary

Generally, voluntary muscle function occurs when you intentionally contract a muscle, such as when you bend your leg or make a fist. Other muscle functions, such as the beating of your heart and breathing, are involuntary since they occur whether you are conscious or not.

Muscle cells have a number of special characteristics that give them their special ability to create motion. **Contractility** means that the muscle cells have the ability to become shorter. This produces motions such as flexing your arm or opening your mouth.

Extensibility refers to a muscle's ability to stretch or lengthen. When one muscle flexes, another muscle extends to allow a body part to move. **Elasticity** is the property of muscle tissue that allows it to snap back to its original size and shape after stretching. Finally, the most unique property of muscle tissue is called **irritability**. This refers to the muscle's ability to respond to a stimulus. Muscles respond to a number of different types of stimuli, including nerve impulses, hormones, touch and heat.

Example Claim Form

Many athletes experience muscular injuries. As a claims specialist, you're likely to encounter muscular system terms like the ones below.

Diagnosis code	**727.62**	**Rupture of tendon, nontraumatic, Tendons of biceps (long head)**
Procedure code	**24342**	**Reinsertion of ruptured biceps or triceps tendon, distal, with or without tendon graft**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 727 . 62 3. _____ . _____

2. _____ . _____ 4. _____ . _____

24. A. DATE(S) OF SERVICE						B.	C.	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances)		E.
FROM			TO			PLACE OF				DIAGNOSIS
MM	DD	YY	MM	DD	YY	SERVICE	EMG	CPT/HCPCS	MODIFIER	POINTER
1.										
11	15	XX	11	15	XX	22		24342		1

We know that *tendons* are connective tissue that attach the ends of muscles to bones. We also know that the *biceps* muscle is the large, anterior muscle of the upper arm. This patient had a ruptured biceps tendon reattached to the bone at the distal end, at the inside of the elbow. Sounds painful, doesn't it?

Step 10 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 15 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 15.

c. Listen to the flashterm as it is pronounced on the CD. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each flashterm in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 11 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each flashcard.

🕮 Step 12 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the terms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

✍ Step 13 Practice Exercise 12-2

❑ Match each word part on the left with the correct definition on the right. Write the letter for the correct definition in the space provided. Not all definitions will be used.

1. _____ **rheumat/o**
2. _____ **/valgus**
3. _____ **humer/o**
4. _____ **uln/o**
5. _____ **/emesis**
6. _____ **navicul/o**
7. _____ **gangli/o**
8. _____ **ligament/o**
9. _____ **ten/o**
10. _____ **ankyl/o**

a. Bent outward
b. Navicular; scaphoid
c. Hump
d. Ganglion; a knot or swelling
e. Ligament
f. Ulna; elbow bone
g. Rheumatism; watery discharge
h. Bent inward
i. Stiff, bent, crooked
j. Humerus; the bone of the arm
k. Transmits light; a white spot on an x-ray
l. Tendon
m. Vomiting

🗝 Step 14 Answers to Practice Exercise 12-2

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 15 Neurological System

❑ The neurologic system, or nervous system, functions a lot like a computer. For example, when you touch the key marked *K* on the keyboard, a message is sent to the central processing unit (CPU) of the computer. The CPU recognizes this message and responds with an action, printing a *K* on your computer screen.

In the same way, the central nervous system receives messages from both inside and outside your body, processes the information and then creates an action as a response to the input. For example, when your finger touches a hot burner on the stove, the nerves in your finger send a message of pain to your CPU, your brain. The brain processes this information and realizes the appropriate response is to move the finger away from the pain.

The neurologic system, like a computer, has three basic functions:

- It collects information from sensory receptors.
- It analyzes the information it collects and integrates information from many different sources.
- It responds with an action.

The **sensory receptors** are the nerve endings present all over your body as well as the special sense organs: the eyes, ears, nose and tongue. The information these sensory receptors collect is called sensory input. Your body's response to **sensory input** is called **motor output**, because the output of the nervous system activates muscles, causing you to move, and activates glands, causing them to secrete hormones or release enzymes.

The nervous system is divided into two divisions:

- the central nervous system
- the peripheral nervous system

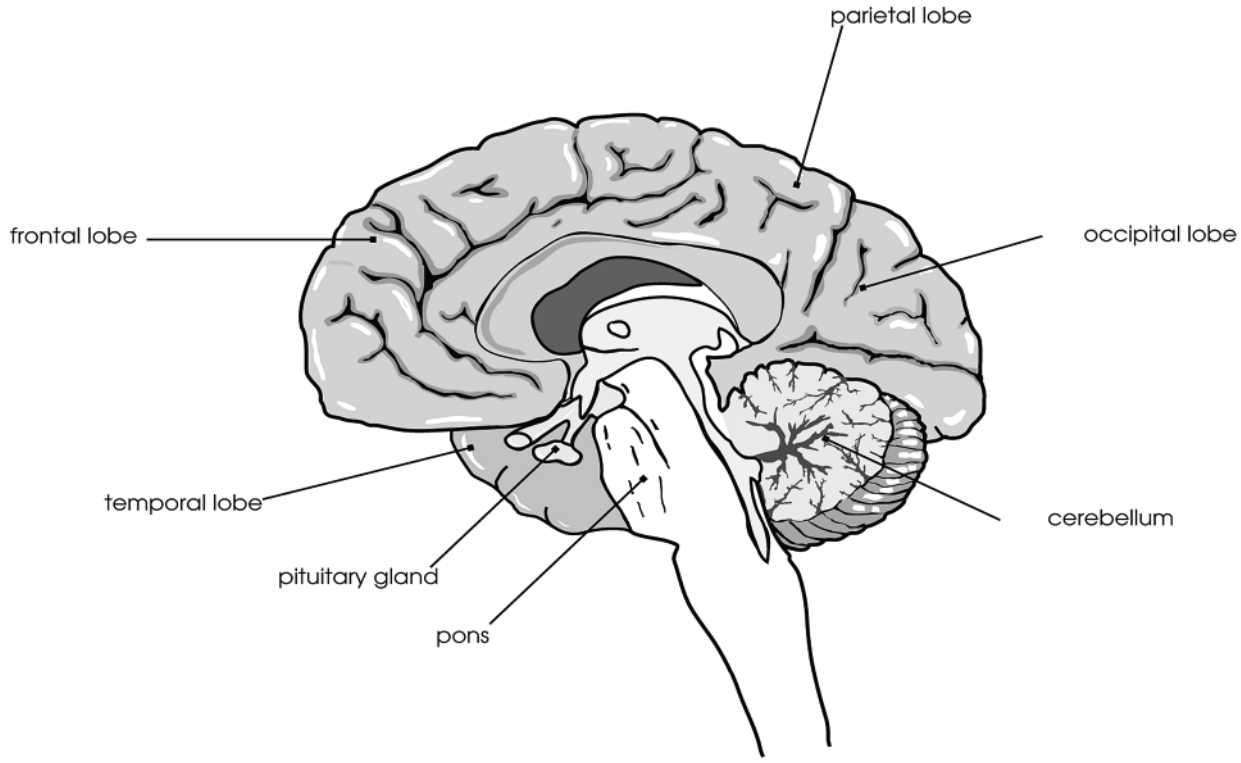
The central nervous system (CNS) includes the brain and spinal cord. The peripheral nervous system (PNS) includes nerves coming directly from the brain to the face and special sense organs of the face as well as nerves coming from the spinal cord to the rest of the body. Like city streets, the nerves of the peripheral nervous system are usually two-way thoroughfares. The peripheral nervous system is further divided into the somatic nervous system, which sends messages to the skeletal muscles for voluntary movements, and the autonomic nervous system, which sends messages to the smooth muscles of the heart and glands for involuntary movements.

Central Nervous System

The **central nervous system** is composed of the brain and the spinal cord.

Brain

The uppermost part of the brain is known as the **cerebrum.** This is where almost all voluntary activity takes place. In addition, this is the thinking portion of the brain. There are four lobes of the cerebrum, and their names correspond with the bones of the skull that you have read about. The four lobes are the **temporal lobe**, the **frontal lobe**, the **parietal lobe** and the **occipital lobe**. Below the cerebrum is the cerebellum. The cerebellum is responsible for muscle coordination and balance. The **pons** is part of the brainstem. Study the structures of the brain in the next figure.



Midsagittal section of the brain

Spinal Cord

The **spinal cord** is a thick-walled hollow tube about 20 inches long. Nerves travel the length of the spinal cord and exit from it to serve the body areas close by.

Peripheral Nervous System

The **peripheral nervous system** includes all the nerves that leave the central nervous system. There are three basic components to the peripheral nervous system:

- cranial nerves
- spinal nerves
- autonomic nervous system

There are 12 **cranial nerves** that primarily serve the head and neck. The cranial nerves are named according to the structures they control. There are 31 pairs of **spinal nerves** that are named for the region of the spinal cord from which they arise. The **autonomic nervous system** controls bodily functions that happen automatically, such as the beating of your heart and the release of hormones from your glands.

The special sense organs, the eyes, the ears, the nose and the tongue, are also considered to be a part of the nervous system. They are highly specialized organs that send sensory input to the brain. You will be learning some terminology relating to the nervous system and special senses in the next section.

Example Claim Form

Here are some codes relating to the neurological system. Can you identify which division, the central nervous system or peripheral nervous system, is affected here?

Diagnosis code	**324.0**	**Intracranial and intraspinal abscess, Intracranial abscess**
Procedure code	**61320**	**Craniectomy or craniotomy, drainage of intracranial abscess; supratentorial**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 324 . 0 3. _____ . _____

2. _____ . _____ 4. _____ . _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1.										
02	03	XX	02	03	XX	21		61320		1

Whew! Let's use our medical terminology background and add a few words to our vocabulary on this example. *Intra/* is a prefix meaning *within*. *Cranial* means relating to the cranium or skull. And remember that the *cerebrum* is the uppermost part of the brain. So this patient was diagnosed with an *abscess* (an infection filled with pus) located in the cerebrum. The physician drained the abscess with a procedure called a *craniotomy*, which is an incision into the skull.

Did you recognize that the central nervous system is the system affected by the abscess? That's right—the cerebrum is a part of the brain, which is a part of the central nervous system.

🕮 Step 16 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 16 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 16.

c. Listen to the flashterm as it is pronounced on the CD. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each flashterm in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 17 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each flashcard.

Step 18 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the flashterms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

Step 19 Practice Exercise 12-3

❑ Match each word part on the left with the correct definition on the right. Write the letter for the correct definition in the space provided. Not all definitions will be used.

1. _____ **cry/o**
2. _____ **/taxia**
3. _____ **retin/o**
4. _____ **arteriol/o**
5. _____ **vitre/o**
6. _____ **/opia**
7. _____ **presby/o**
8. _____ **/glia**
9. _____ **lent/i**
10. _____ **cleid/o**

a. Order or arrangement
b. Clavicle
c. Retina
d. Lenticulus; lens of the eye
e. Cold, freezing
f. Vision
g. Decreased, few
h. Elder or aging
i. Non-neuronal cell element of the nervous system
j. Little artery
k. Eye
l. Vitreous

Step 20 Answers to Practice Exercise 12-3

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

Step 21 Cardiovascular System

- Just as the neurologic system is the communication network of the body, the **cardiovascular system** is the supply and transportation network for the body. It brings nutrients like oxygen, glucose, amino acids and hormones to all the cells in the body and carries off waste products from cell metabolism throughout the body. The cardiovascular system includes the heart and blood vessels.

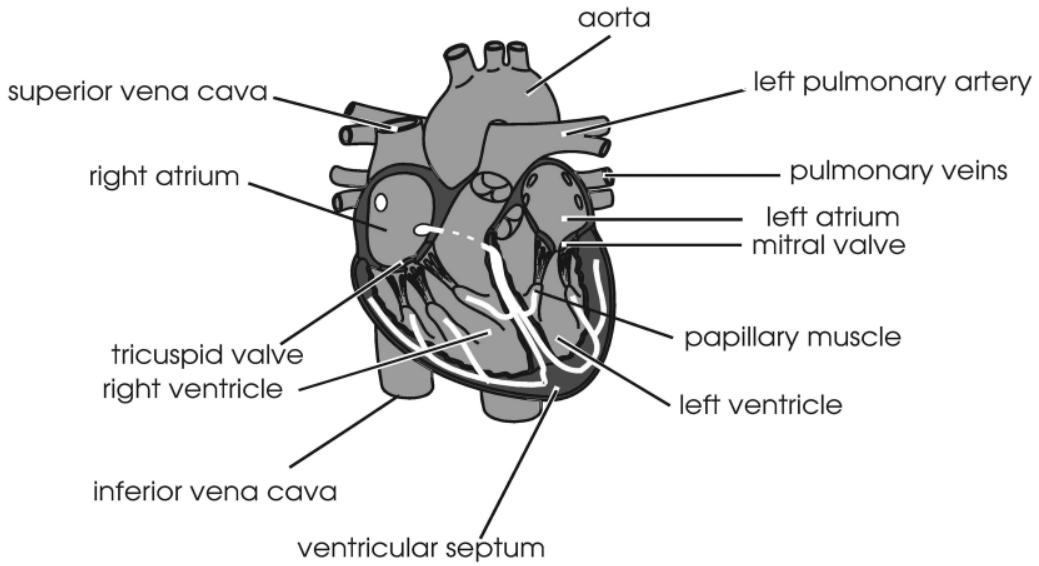
  The heart is like the dispatcher, sending blood out in regular shipments to all the organs and cells of the body. The vascular system, which includes arteries, veins and capillaries, is like the system of highways and city streets we use for transportation. The blood vessels provide a well-planned flow to and from delivery and pickup points. And just like a delivery service, each type of cell specializes in the supplies and waste materials it transports.

Heart

The **heart** is a specialized muscle that is a little larger than your clenched fist. It lies in your chest, just behind and to the left of the sternum. It rests on the diaphragm and is surrounded laterally and posteriorly by the lungs. The heart muscle is called the **myocardium**.

The heart is a four-chambered organ. This means it has four cavities that contain blood, two on the left and two on the right. The right side of the heart receives blood from the organs of the body and pumps it to the lungs where it can receive oxygen from the air we breathe. The left side of the heart receives this oxygenated blood from the lungs and pumps it out to the rest of the body. This cycle repeats itself continuously so that the organs of the body always have a plentiful supply of oxygen.

The two upper chambers of the heart are called the **right atrium** and the **left atrium** (together, they are *atria*, the plural of *atrium*). The lower chambers are called the **right ventricle** and **left ventricle**. Between the chambers of the heart are **valves** that control the flow of blood. See the following figure.



Internal cardiac anatomy

The blood vessels that carry oxygenated blood to the body are called **arteries**. The largest artery in the body is the **aorta**, which leaves the left ventricle and then branches out into many smaller vessels. The blood vessels that return deoxygenated blood back to the heart are called **veins**. Veins throughout the body come together into the **vena cava**, which carries blood back to the right side of the heart.

The heart muscle itself must be supplied with oxygenated blood, just like all organs in the body. The arteries that carry blood to the heart muscle are called the **coronary arteries**.

Peripheral Vascular System

The arteries and veins that supply blood to the organs of the body are part of the **peripheral vascular system**. There are three groups of vessels in the peripheral vascular system:

- arteries
- veins
- capillaries

As the **arteries** leave the heart, they branch off into smaller and smaller vessels, until they finally feed the capillaries. **Capillaries** are tiny vessels that connect the arteries with the veins. As the blood passes through the capillaries, the oxygen it carries is transported to the neighboring tissues and cells. Thus, as the blood flows into the veins and back toward the heart, it has been deoxygenated.

Most arteries and veins are named for the organs they supply, such as the pulmonary vein and the hepatic artery.

Example Claim Form

It's likely that you'll encounter cardiovascular terminology as a claims specialist. Only knowing the basics of the cardiovascular system gives you the inside scoop to some of the diseases related to the heart.

Diagnosis code	**441.1**	**Aortic aneurysm and dissection, Thoracic aneurysm, ruptured**
Procedure code	**33877**	**Repair of thoracoabdominal aortic aneurysm with graft, with or without cardiopulmonary bypass**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 441.1 3. _____.____

2. _____.____ 4. _____.____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1.										
07	27	XX	07	27	XX	21		33877		1

As with our basic cardiovascular terminology knowledge, we know that the aorta is the largest artery in the body. An *aneurysm* is a blood-filled dilation of a blood vessel. When an aneurysm ruptures, it often results in massive bleeding. This patient had an aortic aneurysm repaired.

Step 22 Pronounce New Terms

- ❑ Follow these steps:

  a. Take your Quick-learn Tutor and your Set 17 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

  b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 17.

  c. Listen to the flashterm as it is pronounced on the CD. Put the CD player on pause.

  d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

  e. Do this for each flashterm in this set.

  f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

  g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 23 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each flashcard.

🕮 Step 24 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times, until you are familiar with the flashterms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

🕮 Step 25 Immune System

❑ The immune system is a system that is more physiologic than anatomic. Unlike other systems in the body, the "organs" of the immune system are white blood cells and chemicals. The immune system is like an army. It is made up of millions of blood cells that are divided into groups, depending on the specific tasks they perform. There are organs, such as the thymus, lymph system and bone marrow, which are involved with the immune system, but they are like command centers, issuing orders or providing more troops. They don't directly participate in the war the army is fighting.

The **immune system** protects us from both foreign molecules, including bacteria and viruses, and from abnormal body cells, such as cancer or cells invaded by viruses. The immune system protects us from pathogenic invaders that are strong enough to have made it past superficial barriers. The foreign substances that the immune system recognizes are called **antigens**. Each type of invader is a specific antigen, unique in itself.

The immune system forms an immune response by making **antibodies**, which are proteins that react to a specific antigen by attacking and disabling it. Antibodies circulate in the blood serum, so that immunity is **systemic**—that is, it protects the whole body, not just the original site of infection. In addition, the immune system can remember a prior infection. Each time you are exposed to an antigen, the immune system gets better and better at producing antibodies and attacking the antigen. This reaction is important to immunity, a subject we will cover next in this section.

Immunity

Whenever the immune system is exposed to antigens that provoke an immune response, the body develops **active immunity**. That is, it responds to the antigen with a primary immune response. Memory cells provide the ability to form a secondary immune response when there is a second exposure.

Active Immunity

Unplanned exposure to antigens creates **naturally acquired active immunity**. Vaccines are *planned* exposures to antigens that create **artificially acquired active immunity**. In this instance, exposure to the antigen is planned and controlled. Why, you may ask, would anyone plan to be exposed to antigens, which cause diseases? A vaccine contains dead or weakened virus that are physically identical to the stronger antigens. The immune response to these dead cells creates immunity, but the antigens themselves are virtually harmless. The medical procedure that builds artificially acquired active immunity is called **vaccination** or **immunization**.

Some common immunizations include:

- DTaP: diptheria, tetanus (lockjaw) and pertussis (whooping cough) vaccine
- IPV: inactivated polio vaccine
- MMR vaccine: mumps, measles, rubella (German measles) vaccines
- HIB: hemophilus influenza type B vaccine

Example Claim Form

Most American children get immunized. If you work with a general practitioner or pediatrician, you're likely to see the following procedure codes. Do you recognize the immunization terms?

Diagnosis code **V20.2** **Routine infant or child health check**

Procedure codes **99393** **Periodic comprehensive preventive medicine reevaluation and management of an individual including an age and gender appropriate history, examination, counseling/anticipatory guidance/risk factor reduction interventions, and the ordering of laboratory/diagnostic procedures, established patient; late childhood (age 5 through 11 years)**

90700 **Diptheria, tetanus toxoids, and acellular Pertussis vaccine (DTaP), when administered to individuals younger than 7 years, for intramuscular use**

90460 **Immunization administration through 18 years of age via any route of administration, with counseling by physician or other qualified health care professional; first or only component of each vaccine or toxoid administered**

90713 **Poliovirus vaccine, inactivated (IPV), for subcutaneous or intramuscular use**

90461 **Immunization administration through 18 years of age via any route of administration, with counseling by physician or other qualified health care professional; each additional vaccine or toxoid component administered**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. V20 . 2 3. _____ . _____

2. _____ . _____ 4. _____ . _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1. 07	27	XX	07	27	XX	11		99393		1
2. 07	27	XX	07	27	XX	11		90700		1
3. 07	27	XX	07	27	XX	11		90460		1
4. 07	27	XX	07	27	XX	11		90713		1
5. 07	27	XX	07	27	XX	11		90461		1
6.										

Passive Immunity

Sometimes there isn't time to build active immunity or there may not be any vaccines available to stimulate acquired active immunity. In these cases, antibodies from an immune donor can be administered to provide passive immunity. In **passive immunity**, the antibody is made by an external source and only provides freely circulating antibodies, but no active cellular component, such as T cells or memory cells.

There are two types of passive immunity: natural passive immunity and artificial passive immunity. **Natural passive immunity** occurs when a fetus receives maternal (the mother's) antibodies across the placenta and when an infant receives antibodies through its mother's breast milk.

Artificial passive immunity is conferred by injections of **gamma globulin** (immune serum). Such injections are given after exposure to hepatitis or other serious infectious diseases. Tetanus antitoxin and antivenom serum are other examples of immune serum.

Naturally acquired immunity	
Active naturally acquired immunity	Passive naturally acquired immunity
Source of antigen: Exposure to disease invaders or toxins Source of antibodies: Plasma cells in secondary response	Source of antigen: None Source of antibodies: Maternal immune system, crossing placenta or in breast milk
Artificially acquired immunity	
Active artificially acquired immunity	Passive artificially acquired immunity
Source of antigen: Injection of killed or attenuated (weakened) invaders or toxins Source of antibodies: Plasma cells in primary or secondary (booster) response	Source of antigen: None Source of antibodies: Gamma globulin injection

Comparison of different types of immunity

Immune System Components

There are two basic cell lines in the immune system: **lymphocytes** and **macrophages**. Lymphocytes are formed in the bone marrow in humans and are further divided into B lymphocytes (B cells) and T lymphocytes (T cells).

Lymphocytes

The development of a lymphocyte determines whether it is a B cell or T cell. B cells migrate from the bone marrow to the spleen to develop and mature. T cells migrate from the bone marrow to the thymus to develop and mature.

B cells are the first lymphocytes to respond to the presence of antigens. The B cells secrete antibodies into the blood serum that then will bind with the antigens. This is called the **primary response** of the B cells.

T cells and macrophages form a second type of immune response in the body called **cellular immunity**. The effects of a T cell attack on an antigen can have different results, including:

- stimulating B cells to produce more antibody
- directly killing an antigenic cell
- suppressing antibody production to end the immune reaction

These differing reactions are carried out by different types of T cells.

Immunodeficiencies

Immunodeficiencies occur when the body lacks the ability to defend itself against invading antigens. There are two types of immunodeficiencies: congenital and acquired. **Congenital immunodeficiencies** exist from birth and are often fatal because they lead to repeated, severe infections early in life. **Acquired immunodeficiencies** are deficiencies in immune cell production or function, which decreases the effectiveness of an immune system that was normal at birth. Examples of acquired immune deficiencies are leukemia, lymphoma and AIDS (acquired immunodeficiency syndrome).

AIDS

AIDS (acquired immunodeficiency syndrome) has become a major, world-wide health problem. This condition is a sexually transmitted disease (STD). This means it is transmitted by bodily fluids such as blood and semen. The disease is also transmittable through intravenous drug use by people who share contaminated needles.

AIDS is associated with an immune response to HIV (human immunodeficiency virus). Apparently, the immunodeficiency is caused by the destruction of helper T cells, and a loss of the kind of immunity T cells provide. Tests for AIDS measure the presence an immune response for HIV. If there is such a response in a person, that person will test positive for HIV.

AIDS is a syndrome, which means it is a collection of different symptoms or diseases. HIV infection can progress to a severe immunodeficient state, resulting in the body becoming susceptible to unusual infections and malignancies (cancers). Some AIDS patients develop *pneumocystis carinii pneumonia (PCP)*, which is only seen in humans whose immune systems are suppressed or deficient. A rare skin cancer called *Kaposi's sarcoma* can also occur.

Once T cell levels begin a sharp downward spiral, AIDS seems to be invariably fatal. The mechanisms of this disease, as with cancer, are not fully understood.

🕮 Step 26 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 18 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 18.

c. Listen to the flashterm as it is pronounced on the CD. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each flashterm in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 27 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the flashterm.

d. Do this for each flashcard.

🕮 Step 28 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times. Remember, you are not attempting to memorize these terms, just to become familiar with them. You may use your flashcards for Practice Exercises and Quizzes.

🕮 Step 29 Lesson Summary

❑ As you now know, the body consists of complex systems. So far, you've learned about five of these systems: the integumentary, musculoskeletal, neurological, cardiovascular and immune systems. Each of these systems is essential to the body, and they function both individually and in cooperation with the other systems.

You've also seen how you will encounter some of the organ system terminology in your new career as a claims specialist. In the next lesson, you'll wrap up your journey through the organ systems. Let's complete the following quiz before we move to Lesson 13.

✉ Step 30 Mail-in Quiz 12

❑ Follow the steps to complete the quiz.

a. Be sure you've mastered the instruction and the Practice Exercises that this quiz covers.

b. Mark your answers on your quiz. Remember to check your answers with the lesson content.

c. When you've finished, transfer your answers to the Scanner Answer Sheet included. Use only blue or black ink on your Scanner Answer Sheet.

d. **Important!** Please fill in all information requested on your Scanner Answer Sheet or when submitting your quiz online.

e. Submit your answers to the school via mail, e-mail, fax or, to receive your grade immediately, submit your answers online at www.uscareerinstitute.edu.

Mail-in Quiz 12

Follow the instructions below to complete Parts I and II of the quiz.

Part I

For questions 1 through 10, circle the correct definition to each of the following word parts. Each question is worth 6.66 points.

1. kinesi/o _____

a. kidney
b. motion
c. unit of measure
d. knee

2. aort/o _____

a. aorta; large artery
b. vein
c. chest
d. lung

3. /cuspid _____

a. having cusps
b. cushion
c. skin
d. blood

4. **nitr/o** _____
   a. salt
   b. oxygen
   c. calcium
   d. nitrogen

5. **/uria** _____
   a. kidney
   b. bladder
   c. urination
   d. stomach

6. **ino/** _____
   a. lungs
   b. fiber or fibrous material
   c. inflammation
   d. interior

7. **valvul/o** _____
   a. tendon
   b. valvula; a small size valve
   c. muscle
   d. throat

8. **jugul/o** _____
   a. finger
   b. arm
   c. jugular; throat or neck
   d. artery

9. **fibrill/o** _____
   a. coagulation
   b. cartilage
   c. fibrillation; quiver
   d. bone

10. **/rhythmia** _____
    a. music
    b. skin
    c. vessle
    d. heart rhythm condition

Part II

For questions 11 through 15, circle the correct organ system that relates to each set of diagnosis and procedure codes and explanation. Each question is worth 6.66 points.

11. **Diagnosis code** **172.4** **Malignant melanoma of skin, Scalp and neck**

Procedure code **96401** **Chemotherapy administration, subcutaneous or intramuscular; non-hormonal anti-neoplastic**

a. Musculoskeletal
b. Cardiovascular
c. Integumentary
d. Neurological

12. **Diagnosis code** **440.20** **Atherosclerosis of the extremeties, unspecified**

Procedure code **37224** **Revascularization, endovascular, open or percutaneous, femoral, popliteal artery(s), unilateral; with transluminal angioplasty**

a. Musculoskeletal
b. Cardiovascular
c. Integumentary
d. Neurological

13. **Diagnosis code** **845.01** **Sprains and strains of ankle and foot, Deltoid (ligament), ankle**

Procedure code **27695** **Repair, primary, disrupted ligament, ankle; collateral**

a. Musculoskeletal
b. Cardiovascular
c. Integumentary
d. Neurological

14. **Diagnosis code** **324.1** **Intracranial and intraspinal abscess, Intraspinal abscess**

Procedure code **62272** **Spinal puncture, therapeutic, for drainage of cerebrospinal fluid (by needle or catheter)**

a. Musculoskeletal
b. Cardiovascular
c. Integumentary
d. Neurological

15.	**Diagnosis code**	**V05.4**	**Need for other prophylactic vaccination and inoculation against single diseases; Varicella**
	Procedure code	**90716**	**Varicella virus vaccine, live, for subcutaneous use**

a. Musculoskeletal
b. Immune
c. Integumentary
d. Neurological

Congratulations

You've completed Lesson 12.

Don't wait for your quiz results to continue with Lesson 13.

Lesson 13

Organ Systems II

Step 1 Learning Objectives for Lesson 13

- When you have completed the instruction in this lesson, you will be trained to do the following:
  - Describe the gross anatomy and conditions of the respiratory system.
  - Explain gastrointestinal tract anatomy.
  - Describe the anatomy and function of the urinary system.
  - Explain the structure and function of the male reproductive system.
  - Briefly describe the purpose of each organ that makes up the female reproductive system.
  - Describe how the endocrine system works.
  - Identify organ system terminology as it is used in a medical setting.

Step 2 Lesson Preview

- In this lesson, you will continue to learn medical terms that relate to organ systems of the body. This lesson presents five more organ systems. You will learn about the respiratory system, gastrointestinal system, genitourinary system, reproductive system and endocrine system. You'll also learn to recognize many terms relating to these systems that you will encounter on the job as a claims specialist.

  You have likely discovered at this point that there are close functional interrelationships between and among the body systems. By identifying what these interrelationships (and interdependencies) are, you will gain increased understanding of the terms presented and the functioning of the human body as a whole.

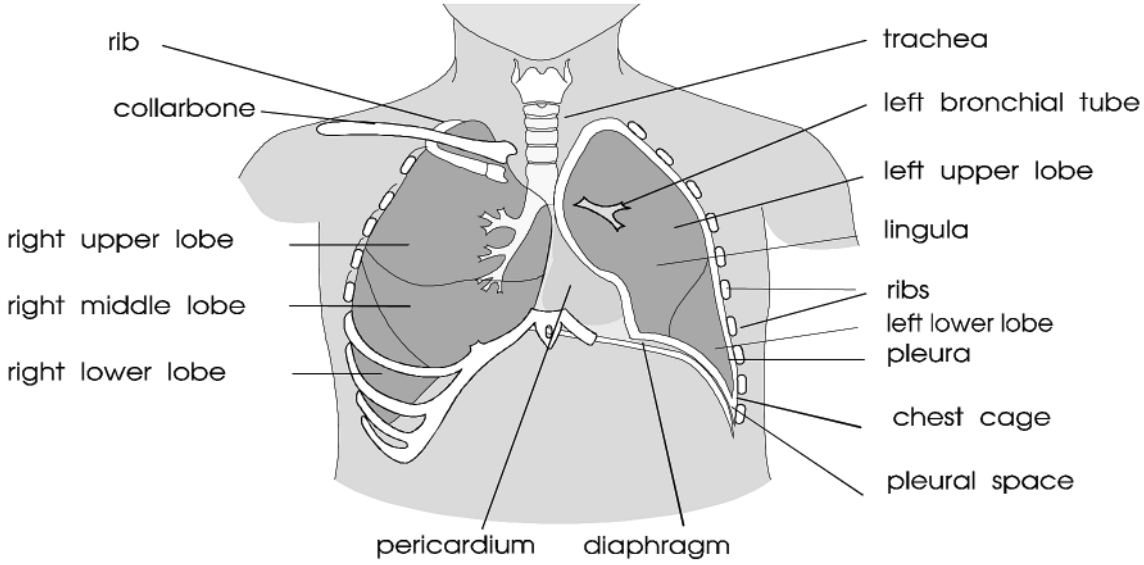
You'll study the reproductive system in this lesson.

Step 3 Respiratory System

- There are two basic nutrients that every cell requires: oxygen and glucose. Glucose is provided through the food we eat, and it is the responsibility of the digestive system to get glucose to the cells. Oxygen is transported to the cells through the work of the respiratory system and the cardiovascular system. You already know that the cardiovascular system carries oxygenated blood to the organs. The respiratory system has the job of bringing the oxygen into contact with the blood stream in the lungs. The body as a whole cannot do without oxygen for more than three to five minutes. That is why respiratory arrest (failure of the lungs) or cardiac arrest (failure of the heart) can lead to death.

Gross Anatomy of the Respiratory System

The respiratory system not only includes the lungs, but also the organs in the pathway of air through the body. These airway organs include the nose, the pharynx, the larynx, and the airways of the lungs, the trachea, bronchi, bronchiole and alveoli (small air sacs). See the following figure.



The lungs and chest cavity (cross section)

As you breathe air in through your nose and mouth, it passes into the pharynx. The **pharynx** is the tube that carries air and food into your body. Air is channeled into the **larynx** and toward the lungs. Food and water is channeled into the esophagus and toward the stomach.

After the air passes through the larynx, it enters the trachea, also known as the windpipe. The **trachea** is a long tube that travels from your neck into your chest cavity. When it reaches the lungs it splits into two branches, the right and left **bronchi** (singular is **bronchus**). Just as the veins and arteries branch off into smaller and smaller vessels, so the airways in the lungs branch off from bronchi to **bronchioles** and finally into **alveoli** (singular is **alveolus**), which are the actual air sacs in the lungs. The alveoli cluster around the bronchioles like buds on a tree.

It is at the level of the alveoli that gas exchange occurs across the respiratory membrane into the capillaries. The red blood cells capture the oxygen from the air and transport it back to the heart so it can be pumped to the rest of the body.

Example Claim Form

In the winter, you might encounter many diagnoses for respiratory problems. Below is one of the most common.

Diagnosis code **465.9** **Acute upper respiratory infections, Unspecified site**

Procedure code **99201** **New patient, office or other outpatient visit**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 465 . 9 3. _____ . _____

2. _____ . _____ 4. _____ . _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1. 02	02	XX	02	02	XX	11		99201		1

You may already know that *acute* means a condition with a rapid onset and a short, severe duration. So an *acute upper respiratory infection* can be one of those nasty cold-type illnesses that attack just at the most inopportune moments!

Step 4 Pronounce New Terms

- ❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 19 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 19.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each term in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 5 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the word part or term.

d. Do this for each flashcard.

🕮 Step 6 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the terms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

✍ Step 7 Practice Exercise 13-1

❑ Match each word part on the left with the correct definition on the right. Write the letter for the correct definition in the space provided. Not all definitions will be used.

1.	_____ **uvul/o**	a. Dust
2.	_____ **emphysemat/o**	b. Breathing
3.	_____ **coni/o**	c. Situated
4.	_____ **/trinsic**	d. Suturing or sewing up
5.	_____ **hil/o**	e. Uvula; fleshy mass
6.	_____ **/rrhexis**	f. Hilum; depression or pit
7.	_____ **spir/o**	g. Rupture
8.	_____ **alveol/o**	h. Small round sac
9.	_____ **/rrhaphy**	i. Mouth or oral
10.	_____ **carin/o**	j. Emphysematous; the nature of emphysema
		k. Carina; keel, ridge
		l. Gap or space

🗝 Step 8 Answers to Practice Exercise 13-1

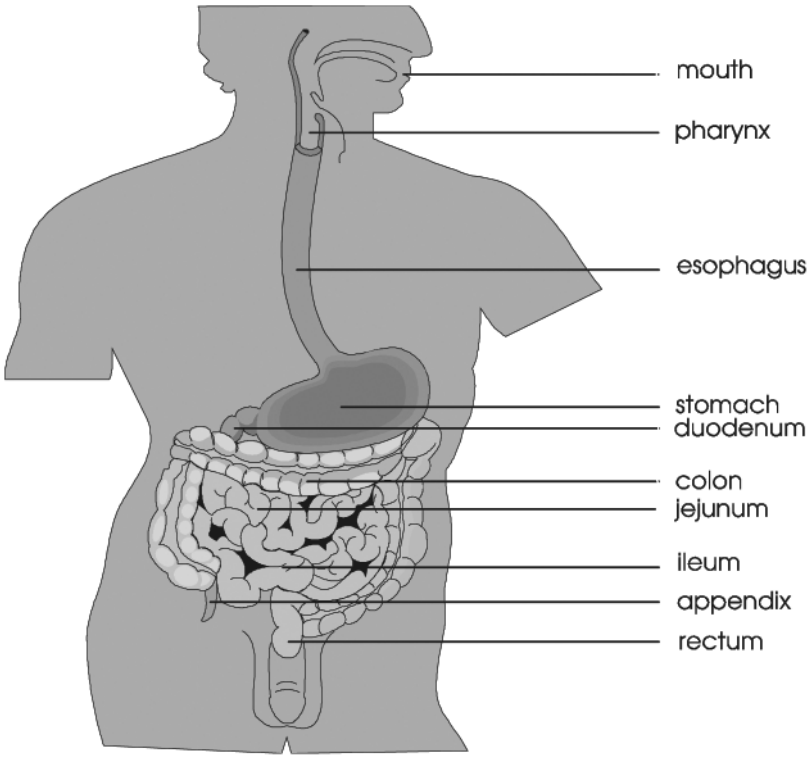
❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 9 Gastrointestinal System

❑ The gastrointestinal system is also called the digestive system because it is this system that digests food. Anything we ingest (swallow) can be broken down into its component chemical parts (carbohydrates, fats and proteins) to become building blocks for every cell in the body. The digestive system sorts through the materials ingested, removes the nutrients necessary for proper cell functioning and passes the rest on through the digestive system, eliminating it as a bowel movement.

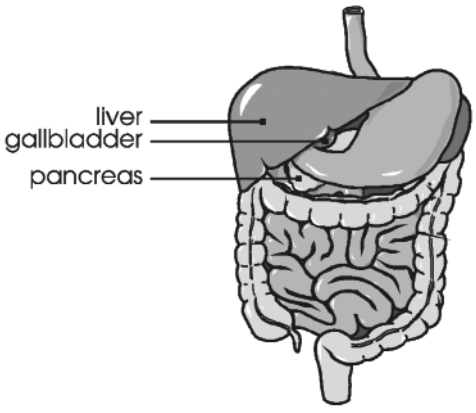
The digestive system is made up of a long tube extending from the mouth to the anus called the gastrointestinal (GI) tract. The other organs of the digestive system are the accessory digestive organs that process whatever is absorbed from the GI tract.

The **GI tract** includes the mouth, pharynx, esophagus, stomach, small intestine (which includes the duodenum, jejunum and ileum), and large intestine (which includes the colon, rectum and anus). See the following figure.



Organs of the GI tract

As food travels through the GI tract, it is broken down by the various chemicals produced by the digestive organs. There are a number of accessory digestive organs that aid in the digestive process by supplying enzymes to help break down food. The major accessory digestive organs are the **liver**, the **gallbladder** and the **pancreas**. See the following figure.



Accessory digestive organs

When food enters the mouth, it is ground into smaller pieces by the teeth. The food is then transferred from the mouth to the esophagus by swallowing. The food travels the length of the esophagus and then enters the stomach. The stomach then begins a churning motion, mixing the food with the digestive enzymes in the stomach until it has reached a paste-like consistency. The food then enters the first part of the small intestine, the duodenum. It is here that the accessory digestive organs release their enzymes to aid in the digestive process. After the food has been broken down into its nutrients, it is absorbed into the blood stream for transport to the body's cells. Any unneeded material continues on to the large intestine. Here, water is reabsorbed from the liquid waste material, forming solid feces. This completes the digestive process.

Example Claim Form

Having an appendix removed is a fairly common procedure. Look at the code explanations below. Would you have recognized that this diagnosis and procedure belonged to the gastrointestinal system?

Diagnosis code **540.0** **Acute appendicitis, With generalized peritonitis**

Procedure code **44950** **Appendectomy**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 540 . 0 3. _____ . _____

2. _____ . _____ 4. _____ . _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1.										
03	12	XX	03	12	XX	22		44950		1

Step 10 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 20 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 20.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each term in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 11 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the word part or term.

d. Do this for each flashcard.

🕮 Step 12 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the terms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

✍ Step 13 Practice Exercise 13-2

❑ Match each word part on the left with the correct definition on the right. Write the letter for the correct definition in the space provided. Not all definitions will be used.

1.	_____ **/iasis**	a. Ketones, a chemical in the blood and urine
2.	_____ **antr/o**	b. Second part of the small bowel, jejunum
3.	_____ **sphincter/o**	c. In the stool
4.	_____ **ket/o**	d. Sphincter, a band of muscle fibers that closes an opening
5.	_____ **/chezia**	e. Bile
6.	_____ **bili/o**	f. Cecum, first part of the colon
7.	_____ **pylor/o**	g. Portal; hepatic portal vein
8.	_____ **herni/o**	h. Hernia, protrusion through a wall defect
9.	_____ **amyl/o**	i. Starch
10.	_____ **port/a**	j. Condition of having (in the body)
		k. Pylorus, opening between stomach and duodenum
		l. Antrum, any nearly closed cavity or chamber

🗝 Step 14 Answers to Practice Exercise 13-2

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

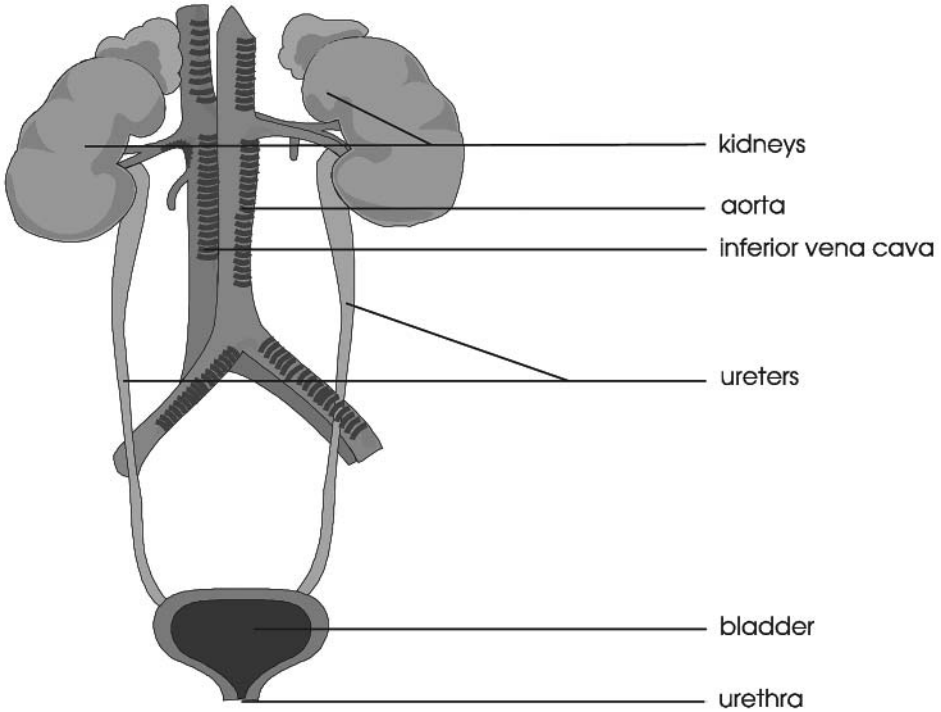
🕮 Step 15 Genitourinary System

❑ The genital and urinary systems are usually considered together because of the way they develop. In a human fetus, the ovaries or testicles develop from the same tissue that the kidneys develop from. Thus, irregularities in the urinary tract and genital tracts are often interrelated. In addition, in the male, the genital tract and urinary tract use the same external organ, the penis. For this reason, urologists treat diseases of the urinary tract as well as diseases of the male reproductive system. In this section, we will study the urinary system and the male reproductive system. We will study the female reproductive system in the next section of this lesson.

The Urinary System

The **urinary system** includes the kidneys, ureters, bladder and urethra. It is a small system that has a very important function. The **kidneys** work to remove wastes and toxins from the blood and eliminate liquid waste from the body. In addition, the kidneys help regulate blood pressure and stimulate red blood cell production in the bone marrow.

Urine is transported from the kidneys to the **bladder** through the two **ureters**. From the bladder, urine exits the body through the **urethra**.



Anterior view of urinary organs

You may have heard of someone having a kidney stone. Take a look at the "medical-ese" version of a kidney stone diagnosis and removal.

Diagnosis code **592.0** **Calculus of kidney**

Procedure code **50060** **Nephrolithotomy; removal of calculus**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 592.0 3. _____

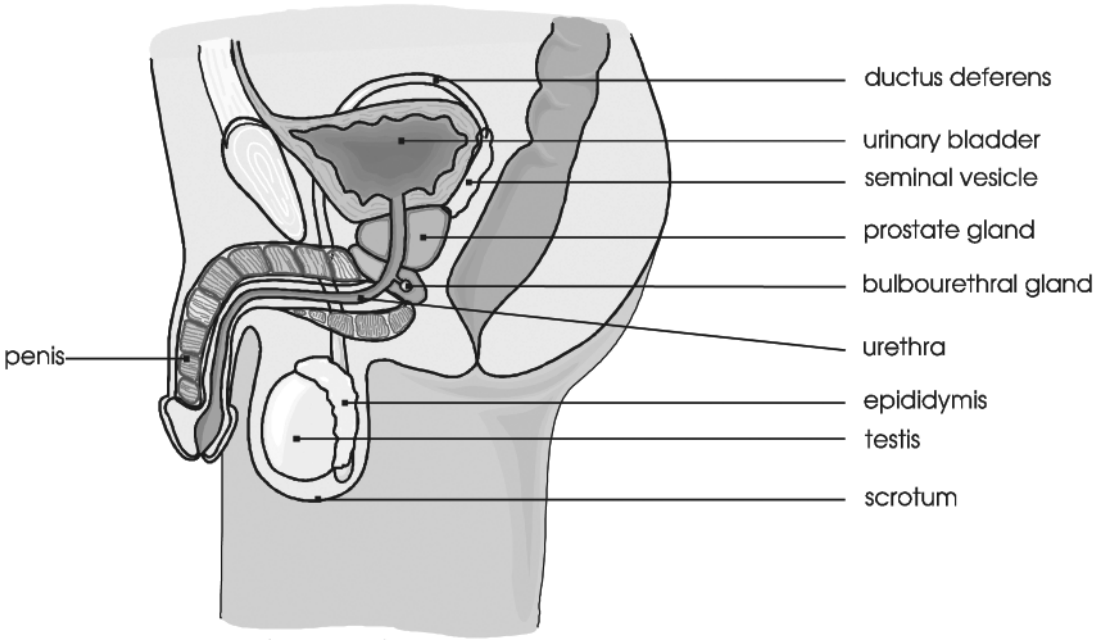
2. _____ 4. _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1.										
04	01	XX	04	01	XX	22		50060		1

Calculus refers to a buildup of mineral salts or other substance in an organ. These *stones*, as they're often called, commonly occur in the gallbladder, kidney and bladder. A *nephrolithotomy* is simply the medical term for the incision into a kidney to remove the stone. Ouch.

Male Reproductive System

The primary reproductive organ in the male is the **testis** (testicle). The job of the two testes is to produce sperm for reproduction and to produce the male hormone, testosterone. The external organs of the male reproductive system include the **penis** and **scrotum**, which contains the testes. The only portions of the male reproductive system that are internal are the accessory glands and the reproductive ducts.
The **accessory glands** include the seminal vesicle, the prostate gland and the bulbourethral gland. These glands make semen. The **reproductive duct system** includes the epididymis, the ductus deferens and the urethra. These ducts carry the sperm and semen on their way out of the body. See the figure.



Male reproductive system

🕮 Step 16 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 21 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 21.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each flashterm in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 17 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the word part or term.

d. Do this for each flashcard.

🕮 Step 18 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the terms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

✍ Step 19 Practice Exercise 13-3

❑ Match each word part on the left with the correct definition on the right. Write the letter for the correct definition in the space provided. Not all definitions will be used.

1. _____	**ser/o**	a. Calyx, a structure in the kidneys
2. _____	**areol/o**	b. Plasma
3. _____	**calyce/o**	c. Yellow
4. _____	**/kalemia**	d. Serum; clear, watery fluid
5. _____	**pen/o**	e. Cholesterol; an organic steroid found in the body
6. _____	**cholester/o**	f. Potassium in the blood
7. _____	**albumin/**	g. Areola, a circular area surrounding a central point
8. _____	**spermat/o**	h. Reflected sound or sonography
9. _____	**echo/**	i. Penis; male organ
10. _____	**xanth/o**	j. Protein found in the urine
		k. A protein that is soluble in water
		l. Sperm, semen

🗝 Step 20 Answers to Practice Exercise 13-3

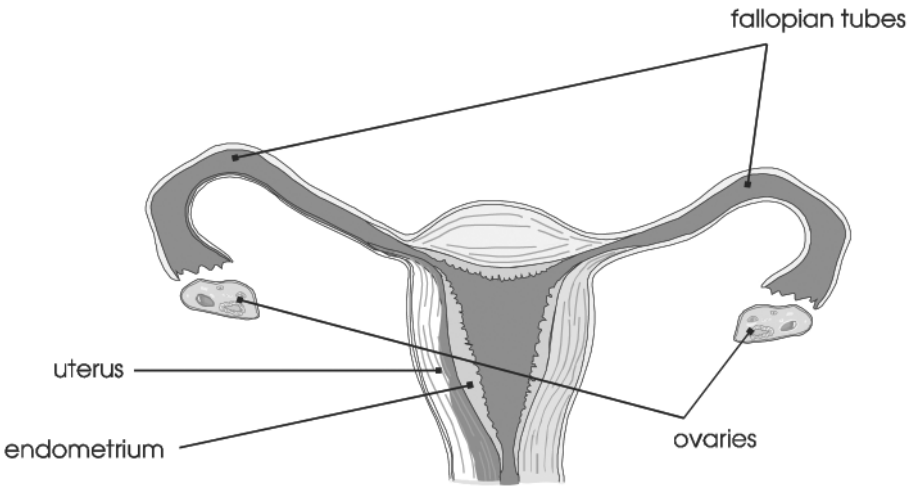
❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

🕮 Step 21 Female Reproductive System

❑ The female reproductive system has three main functions:

- ➤ producing reproductive cells called ova
- ➤ providing an environment for conception (uniting the sperm and ova to produce life)
- ➤ nurturing the developing fetus both before and after birth

In females, the primary sex organs are the ovaries, fallopian tubes, uterus and vagina. See the following figure. The secondary sex organs are the **mammary glands** (breasts).



Female reproductive organs

The ovaries, like the testes, are paired organs. It is the job of the **ovaries** to produce the egg cells needed for reproduction. When the eggs are mature, they are released by the ovaries and travel along the **fallopian tubes** into the **uterus**. If fertilized, the egg implants itself into the lining of the uterus, called the **endometrium**, where it grows and develops. Unfertilized eggs are disposed of along with the endometrium once a month during a woman's menstrual period, also called **menses**.

Example Claim Form

Do the following female reproductive terms look familiar to you?

Diagnosis code	**112.1**	**Candidiasis, of vulva and vagina**
Procedure code	**57150**	**Irrigation of vagina and/or application of medicament for treatment of bacterial, parasitic or fungoid disease**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 112.1 3. _____

2. _____ 4. _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1.										
05	12	XX	05	12	XX	11		57150		1
2.										

Cervix, vagina and *vulva* are all parts of the female reproductive system. *Candidiasis*, as the procedure code explanation implies, refers to a fungal infection.

🕮 Step 22 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 22 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 22.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each flashterm in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

🕮 Step 23 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the word part or term.

d. Do this for each flashcard.

🕮 Step 24 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the terms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

✍ Step 25 Practice Exercise 13-4

❑ Match each word part on the left with the correct definition on the right. Write the letter for the correct definition in the space provided. Not all definitions will be used.

1.	_____ **kal/o**	a. Bent
2.	_____ **fimbri/o**	b. Menses; menstrual cycle
3.	_____ **vulv/o**	c. Vertigo; turn or tilt
4.	_____ **oophor/o**	d. Cancerous
5.	_____ **campt/o**	e. Relating to malformed fetus
6.	_____ **papul/o**	f. Potassium
7.	_____ **men/o**	g. Papule; a pimple
8.	_____ **terat/o**	h. Bladder or blister
9.	_____ **myom/o**	i. Myoma; muscle tumor
10.	_____ **vert/o**	j. Ovary or egg-bearer
		k. Fimbria, fluted edge of fallopian tube
		l. Vulva, female external genitalia

🗝 Step 26 Answers to Practice Exercise 13-4

❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made.

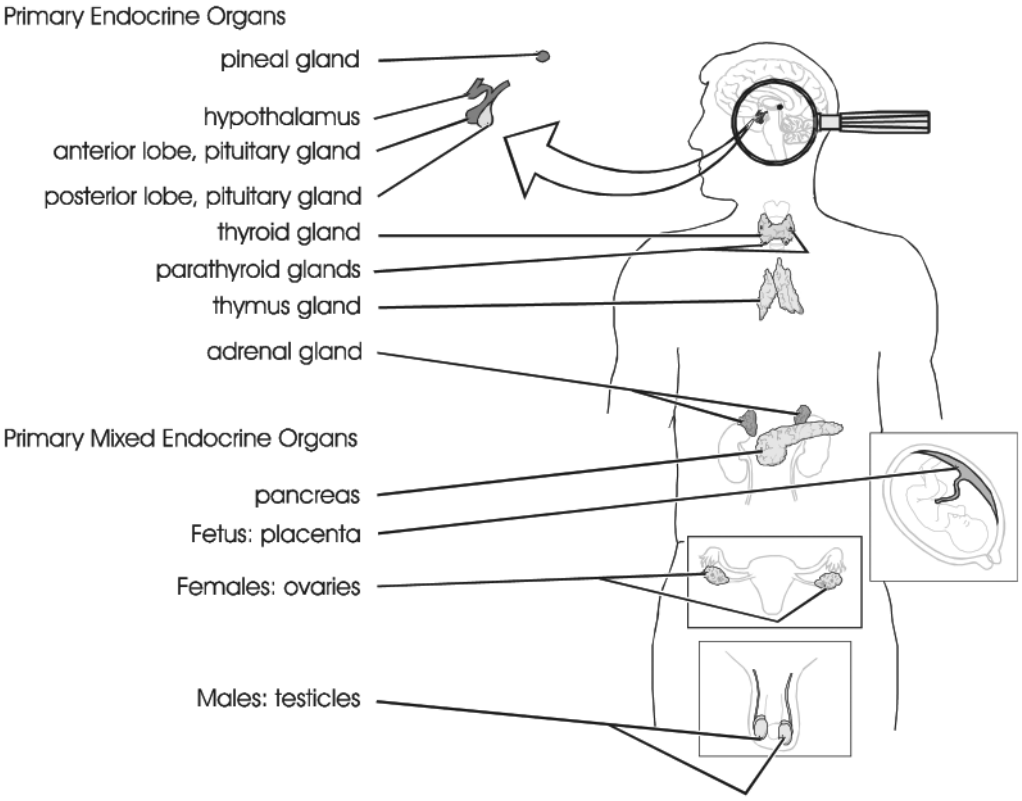
🕮 Step 27 Endocrine System

❑ There are two systems in the body for transmitting messages that regulate the activities of the body. We've already covered one of these systems—the nervous system. This section covers the second system that transmits messages to the body: the endocrine system. The endocrine system uses chemicals called hormones that are transported through the body in the blood stream. Some organs, when they receive these hormonal messages, will "respond" by releasing chemicals of their own.

Endocrine Glands

The organs of the endocrine system are called **endocrine glands** because their secretions are discharged into the blood stream or lymph. Unlike exocrine organs, endocrine glands are not drained by ducts. There are five main areas of endocrine glands in humans:

- the pineal gland, hypothalamus and pituitary gland of the central nervous system
- the thyroid and parathyroid glands in the neck
- the thymus gland in the chest
- the pancreas and adrenal glands in the gastrointestinal tract
- the testes, ovaries and trophoblastic "organs" in the reproductive tract



Endocrine organs

Many of these organs have dual functions, acting as endocrine and exocrine organs. The pancreas, for example, secretes enzymes into the pancreatic duct. However, the cells of the pancreas that secrete into that duct are not part of the endocrine system. You see, the pancreas is both an exocrine organ (the part that secretes enzymes into the pancreatic duct) and an endocrine gland.

The endocrine glands regulate a wide variety of functions in the body, including calcium metabolism (parathyroid gland), glucose metabolism (pancreas) and reproduction (ovaries and testes). Most hormones released by endocrine glands act only on a single organ. This organ is called the **target organ** of the hormone. Hormones may have one of two effects: They either stimulate an activity or suppress an activity. In addition, a hormone is a chemical that has a very specific effect on tissues far away from the organ that produced it. For example, progesterone (from the ovary) suppresses contractions in the uterus, but oxytocin (from the brain) stimulates them.

Regulating Hormonal Secretion

Most hormonal secretion is regulated by nerve impulses to stimulate or inhibit hormonal secretion. There are two types of feedback systems that regulate hormonal levels between the producer of a hormone and its target organ. A negative feedback system is the most common feedback system in the endocrine system. In a **negative feedback system**, a stimulus (for example, low serum calcium) starts the secretion of a hormone. As hormone levels rise, the level of another hormone or chemical changes, inhibiting more hormone release. For example, parathyroid hormone secretion is stimulated by decreasing blood calcium levels. However, the parathyroid hormone raises blood calcium levels. The increasing blood calcium level now inhibits parathyroid release and parathyroid secretion stops. A negative feedback system causes a rhythmic rise and fall of hormone levels.

A **positive feedback system** is one where the triggering event or chemical causes a rise in the hormone level, which doesn't decrease until the triggering substance decreases. The interaction of insulin and blood sugar is a good example of the positive feedback system. Insulin only rises when blood sugar rises. As long as the blood sugar stays elevated, insulin is produced. Insulin makes the liver store sugar and glucagon and makes target cells take up more sugar. Because of the activity of the target cells, the blood sugar level falls and the pancreas stops secreting insulin. This is the opposite of a negative feedback system, where decreasing levels of the triggering substance increase the secretion of a hormone.

When looking at any hormonal system, it is important to look at:

- the form of the stimulus, whether neural, hormonal or chemical
- the target organ of the hormone and the effect on that target organ
- whether there is a positive or negative feedback mechanism

The Hypothalamus and the Neuropituitary Axis

The **hypothalamus** is located at the base of the brain. The hypothalamus uses stimulating factors (releasing factors), hormones that control the output of the anterior pituitary lobe. Because the hypothalamus is part of the brain, it can respond to nervous stimulation and translate that to hormonal activity. The hormones of the hypothalamus include prolactin, as well as releasing factors for the tropic (growth) hormones of the anterior pituitary. These releasing factors increase production of the anterior pituitary hormones. In addition, the hypothalamus also has inhibiting factors that decrease the release of growth hormone and prolactin from the anterior pituitary. The hypothalamus also regulates a part of the pituitary that provides melanocyte stimulating hormone (MSH). These releasing and inhibiting hormones travel to the anterior pituitary lobe in a true endocrine fashion, through a small local blood supply called the hypophyseal portal vein.

The hypothalamus makes two hormones itself, oxytocin and vasopressin (antidiuretic hormone, ADH), but doesn't release the hormones directly. Instead, these hormones are transmitted along neuronal cell axons to the posterior pituitary. These two hormones are stored in the posterior pituitary and later released into the blood stream. Vasopressin elevates blood pressure by acting on smooth muscle cells in blood vessel walls, and it also prevents excessive urination, an antidiuretic effect.

The connections of the hypothalamus to the anterior and posterior lobes demonstrate the types of tissue found in each of these lobes of the pituitary. The hypothalamus sends its releasing hormones to the anterior pituitary lobe by way of the pituitary portal circulation. This makes the anterior lobe a purely endocrine organ, since it is controlled by hormones it receives through the bloodstream, and in turn, releases hormones into the blood stream to their target organs. On the other hand, the hypothalamus sends vasopressin and oxytocin to the posterior pituitary lobe along the axons of neurosecretory cells. The posterior pituitary lobe is a neuroendocrine storage site.

Other Endocrine Organs and Their Functions

The Pituitary Gland

The **pituitary gland** is a small round gland that hangs by its stalk from the inferior surface of the hypothalamus. It is divided into two lobes: The anterior pituitary is primarily gland tissue while the posterior pituitary is primarily nervous tissue. The **anterior pituitary** releases the following hormones:

- adrenocorticotropin (ACTH, adrenal cortex stimulating hormone)
- thyrotropin (TSH, thyroid stimulating hormone)
- gonadotropins: Follicle stimulating hormone (FSH); the female luteinizing hormone (LH); or the male interstitial cell stimulating hormone (ICSH)

The **posterior pituitary** does not make its own hormones; it only releases them after nerve stimulation by the hypothalamus. Oxytocin and vasopressin are stored in the posterior pituitary gland until they are ready to be released into the bloodstream.

The Thyroid Gland

The **thyroid gland** is a butterfly-shaped gland that lies just inferior to the Adam's apple and anterior to the trachea. The thyroid gland produces **thyroxine**, which regulates body metabolism, growth and development.

Parathyroid Glands

The parathyroid glands are four tiny glands found in the far corners of the thyroid gland. **Parathyroid glands** secrete parathyroid hormone (PTH, parathormone). PTH stimulates bone osteoclasts to break down bone matrix, releasing calcium into the blood.

Pancreas

The **pancreas** is a mixed gland, having both endocrine and exocrine functions. The exocrine function is part of the gastrointestinal system. The cells involved with endocrine function are the islets of Langerhans, which produce insulin and glucagon.

Adrenal Glands

The **adrenal glands** are two adenomatous glands shaped like flattened pyramids, capping each kidney. For this reason, they are often called **suprarenal glands**. Adrenal glands have an inner and outer layer. The outer layer is adenomatous (glandular) tissue called the **cortex**. The inner layer is neural tissue called the **medulla**. The **adrenal cortex** produces steroid hormones called **corticosteroids**. These hormones are produced in three different layers of the cortex:

- outer layer: mineralocorticoids (aldosterone)
- middle layer: glucocorticoids (cortisone, cortisol)
- inner layer: sex hormones (androgens, estrogens)

The **adrenal medulla** is a neuroendocrine organ, like the posterior lobe of the pituitary. The hormones of the adrenal medulla are **epinephrine** (adrenaline) and **norepinephrine** (nonadrenaline).

The Pineal Gland

The **pineal gland** is a small, thumb-like gland that lies centrally in the brain. In adulthood, the pineal gland often calcifies. The calcified pineal identifies the midline of the brain on a skull x-ray. The pineal gland produces melatonin and serotonin. **Melatonin** secretion is inversely related to the day/night cycle called the **circadian rhythm**. Melatonin levels decrease as light increases. When you are exposed to less light (such as at night), melatonin levels rise.

The Thymus Gland

The **thymus gland** is located in the anterior mediastinum of the thorax. It is shaped like the billowing sail of a sailboat. It is large in healthy infants, but decreases dramatically in size in later childhood and adulthood. The thymus produces a number of hormones. The most important is **thymosin**. Thymosin stimulates the maturation of T cells, white blood cells that are part of the immune response system. Other thymic hormones include thymic factor and lymphocytosis stimulating hormones (LSH), which stimulate white blood cell production.

Reproductive Endocrine Organs

Both the ovaries (female gonads) and testes (male gonads) produce sex hormones. Male hormones are called **androgens**. Female hormones are **estrogen** and **progesterone**. Both male and female hormones are produced by both sexes. After puberty, the testes in males produce much higher levels of testosterone, tipping the balance to favor male characteristics. Similarly, after puberty, the female ovaries secrete much higher levels of estrogen and progesterone, which tips the balance in favor of female characteristics in the target organs.

Ovaries

The **ovaries** are paired, walnut-sized organs lying low in the pelvis on either side of the uterus. Ovarian hormones are produced in the **graafian follicle** and the **corpus luteum.** A graafian follicle is a cellular sac within which an ovum develops. Graafian follicles produce two types of estrogen: **estrone** and **estradiol**. Alternating elevations in levels of estrogen and progesterone control the menstrual cycle.

Testes

The **testes** are ovoid shaped, like the ovaries, but they lie outside the pelvic cavity, in the scrotum. In the ovaries, the structures that produced ova also produce hormones. In the testes, sperm are produced in **tubules**, and hormones are produced in a separate part of the testis called interstitial cells. **Interstitial cells** produce **testosterone**, the androgenic male hormone.

Trophoblastic

The **trophoblastic** layer of the embryo during pregnancy forms the placenta. The **placenta** provides all materials needed by the fetus, filtering these materials from the maternal blood supply in the uterine wall. The placenta produces a hormone called **human chorionic gonadotropin** (HCG), along with other hormones, all of which aid in the normal development and delivery of the fetus.

Example Claim Form

As you can see, the endocrine system consists of quite a few organs. Here's an example of a diagnosis and procedure relating to the endocrine system.

Diagnosis code **246.2** **Cyst of thyroid**

Procedure code **60300** **Aspiration and/or injection, thyroid cyst**

21. DIAGNOSIS OR NATURE OF ILLNESS OR INJURY (Relate Items 1, 2, 3, or 4 to Item 24E by Line.)

1. 246 . 2 3. _____ . _____

2. _____ . _____ 4. _____ . _____

24. A. DATE(S) OF SERVICE FROM MM	DD	YY	TO MM	DD	YY	B. PLACE OF SERVICE	C. EMG	D. PROCEDURES, SERVICES, OR SUPPLIES (Explain Unusual Circumstances) CPT/HCPCS	MODIFIER	E. DIAGNOSIS POINTER
1.										
06	25	XX	06	25	XX	11		60300		1

Step 28 Pronounce New Terms

❑ Follow these steps:

a. Take your Quick-learn Tutor and your Set 23 flashcards out of your Quick-learn Kit. Insert the first flashcard into Side A of the Tutor.

b. Put your pronunciation CD in your CD player. Advance the CD to Flashcard Set 23.

c. Listen to the flashterm. Put the CD player on pause.

d. Practice pronouncing the term out loud. Take your time. Push the flashcard up and read the meaning of the word part or term.

e. Do this for each flashterm in this set.

f. Put the flashcards in order and play the CD again, pronouncing each word part or term after you hear it on the CD. Don't forget to listen to your own pronunciation of each term. If you mispronounce one, put a check mark next to that flashterm.

g. Practice the terms you mispronounced by listening to the CD again. Be sure you can pronounce the terms clearly and easily.

Step 29 Write New Terms

❑ Follow these steps:

a. Insert the first flashcard into Side A of your Quick-learn Tutor.

b. Look at each term as it appears in the window and say it out loud. Write the flashterm on blank paper. Remember to include the slash if it is a word part.

c. Push the card up until the meaning appears in the right window and read the meaning out loud. Write the meaning beside the word part or term.

d. Do this for each flashcard.

🕮 Step 30 Meanings of New Terms

❑ Follow these steps:

a. Again insert the first flashcard into Side A of your Quick-learn Tutor. Pronounce each term out loud and then say the meaning. Check yourself by pushing the flashcard up until you can see the meaning in the right window.

b. Now insert the flashcard into Side B of your Quick-learn Tutor. Push the card up until you see the meaning of the first flashterm in the right window. Read each meaning out loud, and then say the term. Again, check yourself by pushing the flashcard up until you can see the term in the left window.

c. Practice with the flashcards several times until you are familiar with the terms and their meanings. You may use your flashcards for Practice Exercises and Quizzes.

✍ Step 31 Practice Exercise 13-5

❑ Choosing from the following list, fill in the blank with the correct organ system that relates to each set of diagnosis and procedure codes and explanations.

endocrine	gastrointestinal
female reproductive	respiratory
genitourinary	

1. _____

Diagnosis code	**530.11**	**Reflux esophagitis**
Procedure code	**43234**	**Upper gastrointestinal endoscopy, simple primary examination**

2. _____

Diagnosis code	**161.1**	**Malignant neoplasm of larynx, Supraglottis**
Procedure code	**31367**	**Laryngectomy; subtotal supraglottic, without radial neck dissection**

3. _____

Diagnosis code	**242.90**	**Thyrotoxicosis without mention of goiter or other cause (hyperthyroidism); without mention of thyrotoxic crisis or storm**
Procedure code	**79005**	**Radiopharmaceutical therapy, by oral administration**

4. _____

Diagnosis code	**599.2**	**Urethral diverticulum**
Procedure code	**53240**	**Marsupialization of urethral diverticulum, male or female**

5. _____

Diagnosis code	**617.0**	**Endometriosis of uterus**
Procedure code	**58558**	**Hysteroscopy, surgical; with sampling (biopsy) of endometrium and/or polypectomy, with or without D & C**

Step 32 Answers to Practice Exercise 13-5

- ❑ Check your answers with the Answer Key at the back of this book. Correct any mistakes you have made

Step 33 Lesson Summary

- ❑ Over the past two lessons, we have covered 10 different body systems. By now, you have a better understanding of how the body works. The five systems in Lesson 13 have completed your overview of human anatomy and physiology. This section is important because you now have the foundation to communicate effectively with health care providers and office staff and to recognize basic organ system terminology when you encounter it as a claims specialist.

  Are you ready to see how much you've learned? The Quiz that follows covers the material in Lessons 12 and 13. Remember to use your lessons for reference. Good luck!

✉ Step 34 Mail-in Quiz 13

❑ Follow the steps to complete the quiz.

a. Be sure you've mastered the instruction and the Practice Exercises that this quiz covers.

b. Mark your answers on your quiz. Remember to check your answers with the lesson content.

c. When you've finished, transfer your answers to the Answer Sheet. Use only blue or black ink.

d. **Important!** Please fill in all information requested on your Answer Sheet or when submitting your quiz via e-mail.

e. Submit your quiz to the school via mail, e-mail or fax.

Mail-in Quiz 13

For items 1 through 25, fill in the blanks with the correct word or phrase. Not all words will be used. Each question is worth 3 points. One point will be deducted for each incorrect spelling.

respiratory	gamma globulin	hypothalamus
integumentary	white blood cells	semen
long	urethra	testis
tibia	endometrium	kidneys
larynx	humerus	brain
esophagus	voluntary	involuntary
myocardium	gastrointestinal tract	endocrine
fibula	autonomic	spinal cord
capillaries	pharynx	vagina
radius	musculoskeletal	naturally
spinal	sperm	producing ova
epididymis	chemicals	pancreas

1. **The _____ system is composed of the skin, a number of appendages growing from the skin and the glands contained in the skin.**

2. **The _____ system is comprised of two body systems: the skeletal system and the muscular system.**

3. **The major bones in your arms and legs are called _____ bones.**

4. **The lower leg contains two bones: the _____ and the fibula.**

5. **There are two basic kinds of muscle function: voluntary and _____.**

6. **The heart muscle is called the _____.**

7. **The three groups of vessels in the peripheral vascular system are the arteries, veins and _____.**

8. **The "organs" of the immune system are _____ and chemicals.**

9. **Unplanned exposure to antigens creates _____ acquired active immunity.**

10. **Artificial passive immunity is conferred by injection of _____.**

11. **There are three basic components to the peripheral nervous system: cranial nerves, spinal nerves and the _____ nervous system.**

12. **The central nervous system is composed of the brain and the _____.**

13. **After air passes through the pharynx, it is channeled into the _____.**

14. **The mouth, esophagus, stomach and small intestine are all part of the _____.**

15. **The urinary system includes the kidneys, ureters, bladder and _____.**

16. **The _____ work to remove wastes and toxins from the blood and eliminate liquid waste from the body.**

17. **One of the primary reproductive organs in the male is the _____.**

18. **The reproductive duct system in males consists of the ductus deferens, the urethra and the _____.**

19. **The function of the male reproductive duct system is to carry sperm and _____ out of the body.**

20. The female reproductive system has three main functions: providing an environment for conception, nurturing the developing fetus and _____.

21. The primary sex organs in females are the ovaries, fallopian tubes, uterus and _____.

22. The lining of the uterus is called the _____.

23. The _____ system uses hormones to signal organs throughout the body.

24. The endocrine glands of the central nervous system are the pineal gland, the _____ and the pituitary gland.

25. The _____ is a mixed gland, having both endocrine and exocrine functions.

For items 26 through 35, choose the diagnosis or procedural description that best corresponds with each organ system listed. Each question is worth 2.5 points.

26. _____ Integumentary system

27. _____ Respiratory system

28. _____ Female reproductive system

29. _____ Gastrointestinal system

30. _____ Genitourinary system

31. _____ Endocrine system

32. _____ Musculoskeletal system

33. _____ Cardiovascular system

34. _____ Neurological system

35. _____ Immune system

a. Biopsy of the epididymis
b. Cerclage of uterine cervix
c. Repair of single ventricle with aortic outflow obstruction and aortic arch hypoplasia
d. Biopsy of skin, subcutaneous tissue and/or mucous membrane
e. Bronchiectasis
f. Pituitary dwarfism
g. Hypogammaglobulinemia
h. Spinocerebellar disease
i. Duodenal ulcer
j. Contracture of tendon

Medical Claims and Billing Specialist
Mail-in Quiz 13

1. Fill in your **student ID** and your **course code** below.

STUDENT ID NUMBER _____ COURSE CODE _____

2. Be sure your **name** and **address** are filled in below.
3. **Transfer your answers** to this cover sheet.

For School Use Only:
Grade: _____

NAME _____

ADDRESS _____

CITY _____ STATE _____ ZIP _____

U.S. Career Institute
2001 Lowe Street
Fort Collins, CO 80525

C1

Fold on dotted line

Transfer your answers from the quiz pages to this Answer Sheet.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____

(Continued on back)

15. _____

16. _____

17. _____

18. _____

19. _____

20. _____

21. _____

22. _____

23. _____

24. _____

25. _____

26. _____

27. _____

28. _____

29. _____

30. _____

31. _____

32. _____

33. _____

34. _____

35. _____

Congratulations

You've completed Lesson 13 and Pack 2!

Don't wait for your quiz results to continue with Lesson 14 in Pack 3!

Pack 2

Answer Key

Lesson 8

Practice Exercise 8-1

	Divide	Meaning
1.	cardi/o/megaly	**enlargement of the heart**
2.	acr/o/megaly	**enlargement of the extremities (tips)**
3.	macro/gloss/ia	**large (gross) tongue**
4.	hist/o/logy	**study of tissue**
5.	arthr/itis	**inflammation of the joint**
6.	splen/o/megaly	**enlargement of the spleen**
7.	a/leuk/o/cyt/osis	**pathologic condition of the absence of white cells**
8.	thorac/o/centesis	**withdrawing fluid from the chest**
9.	gastr/ectomy	**removal of the stomach**
10.	pulmon/ary	**relating to the lung**

Practice Exercise 8-2

Part I

	Word Part	Meaning
1.	carcin/o	**cancer of the gland tissue**
2.	ox/o	**oxygen**
3.	laryng/o	**voicebox, larynx**
4.	cerebr/o	**brain**
5.	/genesis	**creating**
6.	axill/o	**armpit**
7.	/penia	**lack of, decrease, poor**
8.	/tome	**cutting insturment**
9.	/tomy	**cut into or slice**
10.	/oma	**tumor, mass**

Part II

	Meaning	Word Part
11.	self	**auto/**
12.	run	**/drome**
13.	chemical, drug	**chem/o**
14.	with	**con/**
15.	change, beyond	**meta/**
16.	rib	**cost/o**
17.	female	**gynec/o**
18.	lower jaw	**mandibul/o**
19.	brain	**cerebr/o**
20.	many	**poly/**

Practice Exercise 8-3

	Divide	Meaning
1.	oste/o/malacia	**softening of bone**
2.	sarc/oma	**tumor or mass of nongland tissue**
3.	carcin/oma	**cancer tumor or mass of gland tissue**
4.	con/nect	**bind with**
5.	maxill/ary	**relating to the upper jaw**
6.	laryng/itis	**inflammation of the voicebox**
7.	vit/al	**relating to living, alive**
8.	cost/al	**relating to the rib(s)**
9.	crani/o/tome	**cutting instrument for the skull**
10.	chem/o/therapy	**treatment with chemicals**

Practice Exercise 8-4

	Word Parts	Medical Term	Meaning
1.	gastr/o/enter/o/logy	**gastroenterology**	**study of the stomach and small intestine**
2.	oste/o/malacia	**osteomalacia**	**softening of the bone**
3.	laryng/o/scope	**laryngoscope**	**instrument used to see the voicebox**
4.	carcin/o/oma	**carcinoma**	**cancer tumor or mass of gland tissue**
5.	sarc/o/oid	**sarcoid**	**like nongland tissue**
6.	muc/o/ous	**mucous**	**relating to mucus**
7.	thromb/o/osis	**thrombosis**	**pathological condition of having a clot**
8.	hepat/o/ic	**hepatic**	**relating to the liver**
9.	peri/col/o/itis	**pericolitis**	**inflammation surrounding the colon**
10.	pulmon/o/ic	**pulmonic**	**relating to the lung**

Practice Exercise 8-5

	Divide	Meaning
1.	chem/ist	**one who specializes in chemicals**
2.	crani/o/tomy	**cut into the skull**
3.	laryng/ectomy	**remove the voicebox**
4.	endo/derm	**within the skin or inside tissue**
5.	peri/hepat/ic	**relating to around the liver**
6.	poly/gastr/ia	**condition of many stomachs**
7.	thromb/itis	**inflammation of a clot**
8.	sub/hepat/ic	**relating to under the liver**
9.	retro/gastr/ic	**relating to behind the stomach**
10.	myel/oid	**like the marrow or spinal cord**
11.	my/o/pathy	**muscle disease**
12.	ven/ous	**relating to a vein or the veins**
13.	nat/al	**relating to birth**
14.	klept/o/mania	**obsession with stealing**
15.	neur/osis	**condition of the nerves**
16.	electr/ic	**relating to electrical activity**
17.	arteri/al	**relating to an artery**
18.	cyst/ic	**relating to a sac of fluid or bladder**

Practice Exercise 8-6

Part I

	Word Part	Meaning
1.	lapar/o	**abdomen**
2.	pneum/o	**air, gas, lung air sacs**
3.	ana/	**positive, up**
4.	/physis	**grow**
5.	/pnea	**breathing**
6.	bronch/o	**airway tubes in lung**
7.	cutane/o	**skin surface**
8.	mort/o	**death**
9.	psych/o	**mind**
10.	phob/o	**fear**

Part II

	Meaning	Word Part
11.	break down, dissolve	**/lysis, lytic**
12.	bad, labored	**dys/**
13.	nose	**rhin/o**
14.	bear	**/phoria**
15.	secrete	**/crine, crin/o**
16.	ear	**ot/o**
17.	eye	**ophthalm/o**
18.	kidney	**nephr/o**
19.	tonsils	**tonsill/o**
20.	flow	**/rrhea**

Part III

	Word	Meaning
21.	Thermogram	**a picture, record, or tracing of heat**
22.	Postpartum	**after, past labor or delivery**
23.	Intracutaneous	**relating to within the skin surface**
24.	Epidermal	**upon or in addition to the skin**
25.	Nephrectomy	**the process of removing the kidney**

Lesson 9

Practice Exercise 9-1

	Abbreviation	Meaning
1.	CO_2	**carbon dioxide**
2.	mg	**milligram**
3.	O_2	**oxygen (gas)**
4.	n.p.o.	**nothing by mouth**
5.	NBS	**normal bowel sounds**
6.	EBV	**Epstein-Barr virus**
7.	kg	**kilogram**
8.	TPR	**temperature, pulse and respiration**
9.	IM	**intramuscular**
10.	q.n.s.	**quantity not sufficient**
11.	b.i.d.	**two times a day**
12.	DOB	**date of birth**
13.	Dx	**diagnosis**
14.	IV	**intravenous**
15.	stat.	**at once**
16.	q.a.m.	**every morning**
17.	GB	**gallbladder**
18.	Sx	**symptoms**
19.	Rx	**treatment, prescribe**
20.	FUO	**fever of unknown origin**

Practice Exercise 9-2

1. **d** sibs
2. **h** prep
3. **a** meds
4. **e** ab
5. **j** exam
6. **c** path
7. **i** appy
8. **f** primip
9. **b** nullip
10. **g** temp

Practice Exercise 9-3

1. **°** temperature (Celsius or Fahrenheit)
2. **#** number
3. **-** suture size
4. **/** over (blood pressure)
5. **&** and (between capitals)
6. – minus
7. **/** vision
8. **:** ratio

Practice Exercise 9-4

	Medical Phrase	Acronym
1.	blood urea nitrogen	**BUN**
2.	white blood count	**WBC**
3.	Venereal Disease Research Laboratory	**VDRL**
4.	rheumatoid arthritis	**RA**
5.	human immunodeficiency virus	**HIV**
6.	Physicians' Desk Reference	**PDR**
7.	(The) pupils (are) equal, round (and) reactive (to) light (and) accommodation	**PERRLA**
8.	electr/o/encephal/o/gram	**EEG**
9.	eye, ear, nose (and) throat	**EENT**
10.	intra/muscular	**IM**

Practice Exercise 9-5

1. micro/ **small, tiny**
   macro/ **gross, large**

2. ante/ **before**
   retro/ **behind, back**

3. pre/ **before**
   post/ **after, past**

4. hypo/ **decreased, below**
   hyper/ **increased, above**

5. eu/ **normal, even, good**
   dys/ **bad, labored**

6. inter/ **between**
   intra/ **within**

7. con/ **with**
   contra/ **opposite, against**

8. tachy/ **faster than usual**
   brady/ **slower than usual**

9. ana/ **positive, up**
   cata/ **negative, down**

10. ab/ **away from**
    ad/ **toward, near**

11. infra/ **inferior to, below**
    supra/ **above, superior to**

12. /malacia **softening**
    /sclerosis **hardening**

13. a/ **without, absent**
    (not using this prefix is the antonym)

14. endo/ **within**
    ecto/ **outside, outer**

Practice Exercise 9-6

	Singular	Medical Plural
1.	synthesis	**syntheses**
2.	centrum	**centra**
3.	vena	**venae**
4.	nervus	**nervi**
5.	ganglion	**ganglia**

Lesson 10

Practice Exercise 10-1

1. Anatomy, physiology and pathology are included in the study of life called human **biology**.
2. When there are changes in the form of an organ, such as size, shape or color, they are called **morphologic** changes.
3. The science of the appearance and relationships of body parts is called **anatomy**.
4. The study of the function of body parts is called **physiology**.
5. The study of disease is called **pathology**.
6. The study of tissues is called **histology**.
7. The science of the appearance of cells and tissues is called **microscopic anatomy**.
8. To see a cell, you would use an instrument called a **microscope**.
9. Changes in the function of an organ are called **physiologic** changes.
10. The disease changes you see in an organ are called **pathologic** changes.

Practice Exercise 10-2

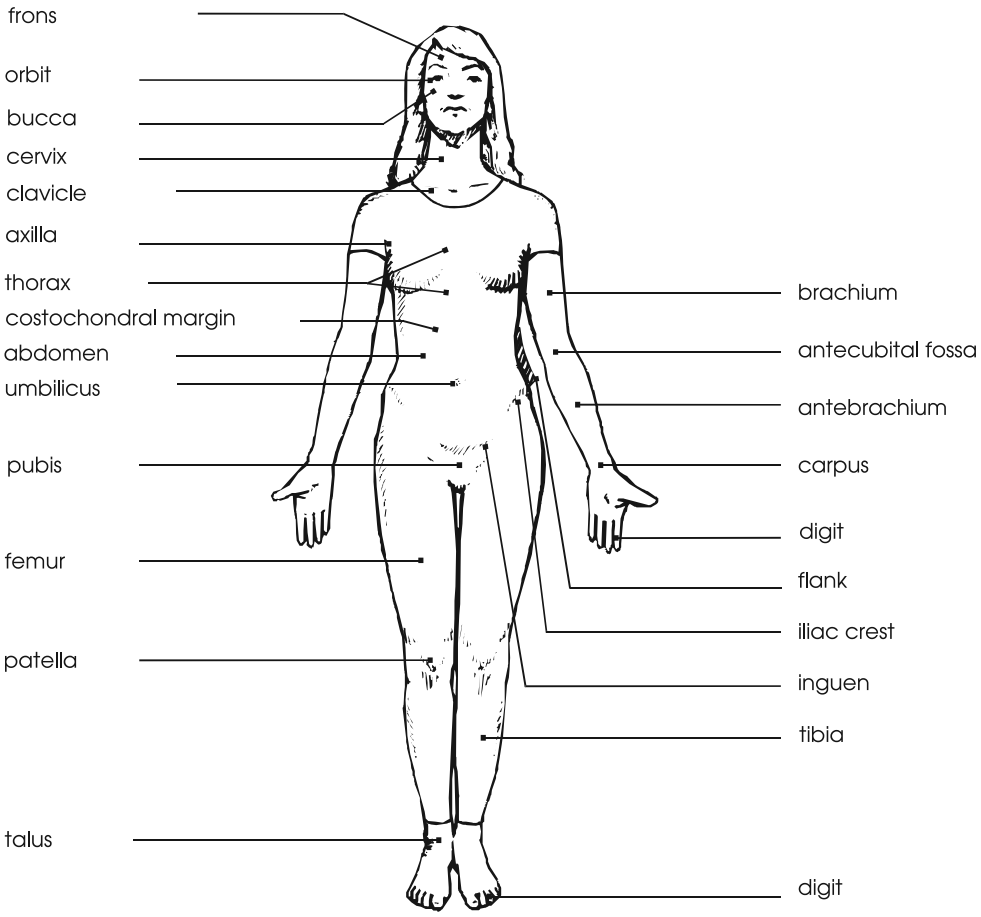
1. When the arms are at the side, the palms of the hands face forward and the thumbs point outward, the body is in the **anatomic position**.
2. A **transverse** plane is also called a horizontal plane.
3. A **parasagittal** plane divides the body into unequal left and right
4. A frontal plane is also called a **coronal** plane.
5. A **horizontal** plane divides the body into superior and inferior sections.
6. A longitudinal plane is also called a **sagittal** plane.
7. A **coronal (frontal)** plane divides the body into anterior and posterior sections.
8. A **midsagittal (median)** plane divides the body into equal left and right sections.
9. A midsagittal plane is also called a **median** plane.
10. A plane divides the body or organ into **sections**.

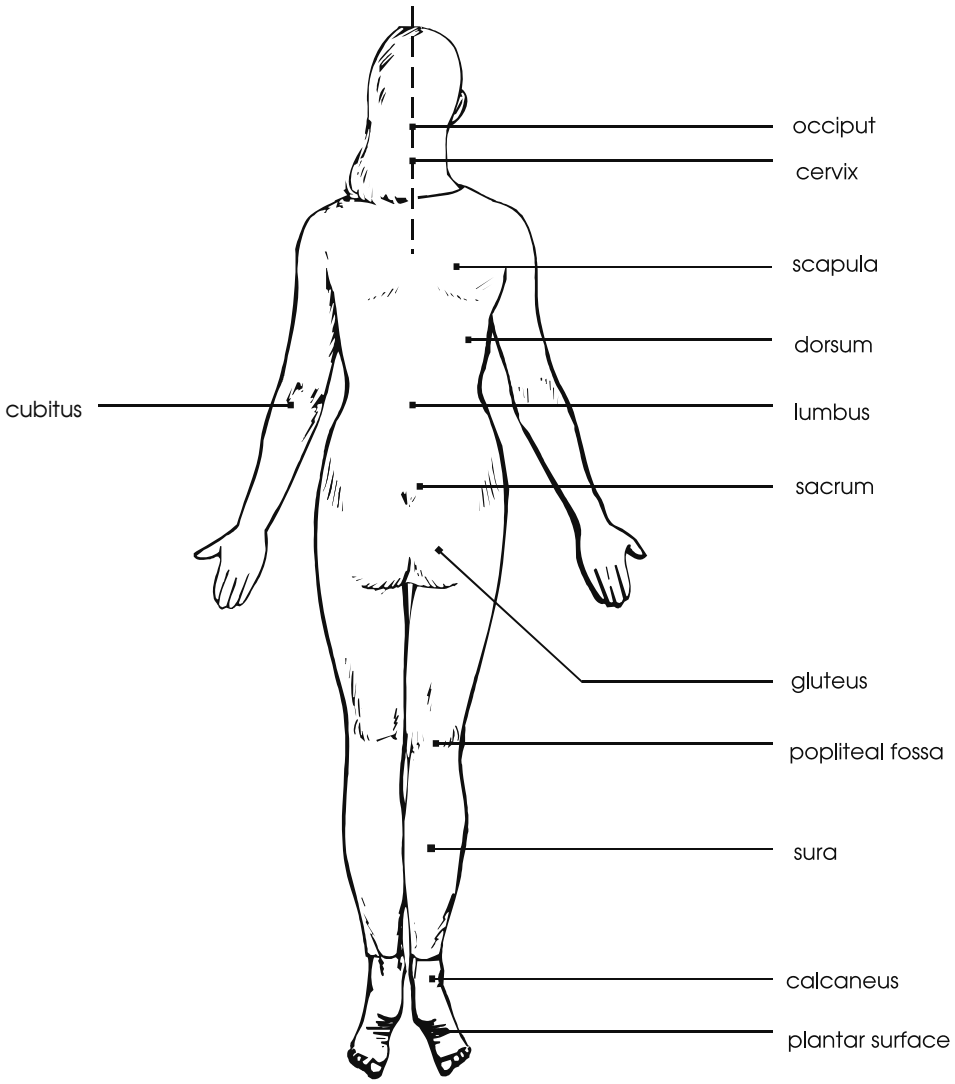
Practice Exercise 10-3

1. The hand is **caudad** to the elbow.
2. Separating the body into right and left halves is called a **sagittal** plane.
3. The knee is **inferior** or **caudad** to the chest.
4. The bellybutton is **anterior** or to the spine.
5. A blood vessel that carries blood away from the heart is called an **efferent** vessel.
6. In the anatomic position, the palms of the hands are **anterior** to the backs of the hands.
7. The nose is **medial** to the eyes.
8. The buttocks are **dorsal** and **caudad** to the breastbone.

Lesson 11

Practice Exercise 11-1




occiput
cervix
scapula
dorsum
cubitus
lumbus
sacrum
gluteus
popliteal fossa
sura
calcaneus
plantar surface

Practice Exercise 11-2

1. The line dividing the body into equal left and right areas is called the **midsagittal** plane.
2. The abdomen may be divided more simply into four **quadrants**.
3. The carpal bones are in the **wrist**.
4. A finger is also called a **digit**.
5. A break in the kneecap is called a **patellar** fracture.
6. A buccal smear is a tissue sample taken from the inside of the **cheek**.
7. The major vein in the thigh is the **femoral** vein.
8. A person who does not have a collarbone does not have a **clavicle**.
9. Lymphadenopathy in the armpit is called **axillary** lymphadenopathy.
10. Lymphadenopathy in the groin is called **inguinal** lymphadenopathy.
11. You can feel a pulse in the fossa anterior to the elbow, called the **antecubital** fossa.
12. The quadrant where the appendix can cause pain is on the right below the umbilicus and is called the **RLQ**.
13. The line dividing the body into top and bottom regions is called the **transverse** plane.
14. Pain in the lower back or flank is called **lumbar** pain.
15. When you put your hands on your hips, the bone you feel is the **iliac crest**.

Practice Exercise 11-3

1. **e** respiratory
2. **b** integumentary
3. **a** cardiovascular
4. **h** endocrine
5. **f** immune
6. **g** nervous
7. **c** reproductive
8. **d** digestive

Lesson 12

Practice Exercise 12-1

1. **i** dermatitis
2. **g** symptomatic
3. **k** integumentary
4. **j** pemphigus
5. **l** keratosis
6. **o** mycosis
7. **a** cellulitis
8. **c** inguinal
9. **n** epidermal
10. **h** fascia
11. **f** nephritis
12. **d** erythematous
13. **b** cyanosis
14. **e** melanotic
15. **m** organomegaly

Practice Exercise 12-2

1.	**g**	rheumat/o
2.	**a**	/valgus
3.	**j**	humer/o
4.	**f**	uln/o
5.	**m**	/emesis
6.	**b**	navicul/o
7.	**d**	gangli/o
8.	**e**	ligament/o
9.	**l**	ten/o
10.	**i**	ankyl/o

Practice Exercise 12-3

1.	**e**	cry/o
2.	**a**	/taxia
3.	**c**	retin/o
4.	**j**	arteriol/o
5.	**l**	vitre/o
6.	**f**	/opia
7.	**h**	presby/o
8.	**i**	/glia
9.	**d**	lent/i
10.	**b**	cleid/o

Lesson 13

Practice Exercise 13-1

1.	**e**	uvul/o
2.	**j**	emphysemat/o
3.	**a**	coni/o
4.	**c**	/trinsic
5.	**f**	hil/o
6.	**g**	/rrhexis
7.	**b**	spir/o
8.	**h**	alveol/o
9.	**d**	/rrhaphy
10.	**k**	carin/o

Practice Exercise 13-2

1. **j** /iasis
2. **l** antr/o
3. **d** sphincter/o
4. **a** ket/o
5. **c** /chezia
6. **e** bili/o
7. **k** pylor/o
8. **h** herni/o
9. **i** amyl/o
10. **g** port/a

Practice Exercise 13-3

1.	**d**	ser/o
2.	**g**	areol/o
3.	**a**	calyce/o
4.	**f**	/kalemia
5.	**i**	pen/o
6.	**e**	cholester/o
7.	**k**	albumin/
8.	**l**	spermat/o
9.	**h**	echo/
10.	**c**	xanth/o

Practice Exercise 13-4

1.	**f**	kal/o
2.	**k**	fimbri/o
3.	**l**	vulv/o
4.	**j**	oophor/o
5.	**a**	campt/o
6.	**g**	papul/o
7.	**b**	men/o
8.	**e**	terat/o
9.	**i**	myom/o
10.	**c**	vert/o

Practice Exercise 13-5

1. **gastrointestinal**

Diagnosis code	530.11	Reflux esophagitis
Procedure code	43234	Upper gastrointestinal endoscopy, simple primary examination

2. **respiratory**

Diagnosis code	161.1	Malignant neoplasm of larynx, Supraglottis
Procedure code	31367	Laryngectomy; subtotal supraglottic, without radial neck dissection

3. **endocrine**

Diagnosis code	242.90	Thyrotoxicosis without mention of goiter or other cause (hyperthyroidism), without mention of thyrotoxic crisis or storm
Procedure code	79005	Radiopharmaceutical therapy, by oral administration

4. **genitourinary**

Diagnosis code	599.2	Urethral diverticulum
Procedure code	53240	Marsupialization of urethral diverticulum, male or female

5. **female reproductive**

Diagnosis code	617.0	Endometriosis of uterus
Procedure code	58558	Hysteroscopy, surgical; with sampling (biopsy) of endometrium and/or polypectomy, with or without D & C