Chapter I

Latin Prefixes 1

In this chapter you will study …

* *Some commonly-used Latin prefixes*
* *A series of Latin bases that are used with these prefixes to create medical terms*
* *The human skeletal system*
* *Ancient ideas about the origins of the medical art*

The ability to recognize prefixes, suffixes, bases, and combining vowels is essential in determining a word's meaning (for explanations of these elements, see the Introduction). While the number of possible bases is extremely large, prefixes and suffixes are relatively few. Many of the prefixes will already be familiar to you (e.g., you know that "circumnavigate" and "circumference" both have something to do with "around"), so the transference of their basic meanings to medical terminology will usually not require a great deal of effort.

A "prefix" is a word element that is "fixed before" a base and gives further definition to it. Consider the examples *pre-* and *post-* in the words "prenatal" and "postnatal." When these prefixes are added to the base "natal," there is a shift in meaning, specifically with reference to a designated time period. Prefixes may also denote spatial relationships, as in "intracellular" and "extracellular," where the change in prefix shifts the meaning from "within the cell" to "outside of the cell." In these cases the prefixes have been added to adjectives ("natal," "cellular"), but prefixes may also be added to other parts of speech, including nouns (e.g., "pretrial") and verbs (e.g., "predict"). Note that adding a prefix to a base does not change its part of speech; "natal," "prenatal," and "postnatal" are all adjectives.

There are some 50 Latin prefixes to be learned (including numerical prefixes), and these will be spaced out across the first three chapters. To get started, examine the following list of words. Can you determine the meaning of each prefix from these familiar English examples?

antechamber
benefaction
contradiction
dehydrate
deplane
descend
extramarital
infrastructure
international
intervene
intramural
juxtaposition
maleficent
persevere
perspective
perverse
postdoctoral
postscript
premonition
prepare
proceed
produce
progress
retroactive
retrospect
secede
seduce
separate
ultramarathon
ultraviolet

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Even without formal instruction in Latin prefixes, you may be able to get a sense of their meaning through familiar English words. For example, "intervene" has to do with getting involved in a situation, and "international" indicates something that is shared by multiple countries, so you can see that *inter-* means "between" or "among." A "premonition" is a warning of something yet to come, and to "prepare" something means to get it ready in advance; therefore, you can see that *pre-* means "before." You might also be able to detect that the prefix *de-* has a sense of "down" ("descend"), though it can also carry a sense of "from" ("depart") or give a word an opposite meaning ("decaffeinated," "dehydrate").

You may have noticed that in many cases a prefix is attached to a word that could otherwise stand alone. For example, "national" can exist on its own apart from the prefix *inter-*, and the same phenomenon can be observed when one removes the *de-* from "dehydrate," the *post-* from "postdoctoral," and the *retro-* from "retroactive." In other cases, however, the base cannot stand on its own and requires a prefix to be added to it in English. Such is the case for "descend," "intervene," and "retrospect." That is, "~~scend~~," "~~vene~~," and "~~spect~~" are not English words. Other examples of this kind include "rejuvenate" and "interrogate." Can you think of more?

Learn the following prefixes and study the notes that follow. (You can find vocabulary drills for these and other word elements online at *hippocratescode.com*.)

Prefix	Meaning	Examples
ante-	before, in front of	antecedent, antenatal
ben(e)-	well	benefit, benevolent
contra-	opposite, against	contraception, controversial
de-	down, away, off	decongestant, defecation
extra-	outside of, beyond	extraterrestrial, extrovert
infra-	below	infrared, infrasonic
inter-	between, among	intermediate, intermittent
intra-	within	intravenous, introvert
juxta-	by the side of, close to	juxtaposition, juxta-articular
mal(e)-	badly, poorly	malnutrition, malevolent
per-	through	perforation, perspiration
post-	after, behind	postnatal, postoperative
pre-	before, in front of	precancerous, premolar
pro-	forward, in front of	prolapse, protrusion
retro-	backward, behind	retrograde, retrovirus
se-	aside, away	secrete, segregation
super-	above	supersonic, supervise
ultra-	beyond	ultrasound, ultraviolet

Notes

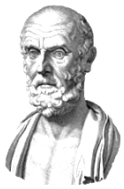
1. Do not confuse *ante-* ("before") with *anti-* ("against"), a Greek prefix that will be learned later. Notice the difference between "antebellum" ("before the war") and "anti-war" ("against war").

2. It is worth observing that the prefixes *ben-* and *mal-* may have an additional "e" (e.g., "benefaction," "maleficent"), but this "e" is not always present (e.g., "malfunction," "malnutrition").

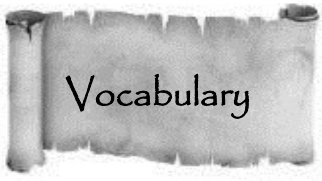
3. In the prefixes *contra-*, *extra-*, and *intra-*, the combining vowel "o" is sometimes used, as in "controversy," "extrovert," and "introvert." Note that in these cases the final "a" is dropped; that is, the word is not spelled "~~contraoversy~~." There is no clearly defined rule for determining when this will happen—why do we say "extravagant" and "extrovert" instead of "~~extrovagant~~" and "~~extravert~~"?

4. The prefix *super-* can be written as *supra-* without a change in meaning (as in "supramolecular"). In contrast to *super-* and *supra-*, *inter-* and *intra-* have distinct meanings despite being related. The difficulty of these two prefixes is demonstrated by the common misspelling "~~internural~~" instead of the proper "intramural," which means "within the walls" (e.g., of a college campus).

5. The normal way to use the prefix *post-* is to append it directly to the base, as in "postnatal" and "postoperative." Note that by convention, however, *post-* may be added to a base with a hyphen, as in "post-anesthesia," "post-concussion," and "post-traumatic." Sometimes the prefix may appear as a separate word altogether ("post anesthesia," "post concussion," "Post Traumatic Stress Disorder"). There is often no logical reason for these variations, nor do they show any kind of consistency. You should simply be aware that they exist and that they may be used interchangeably.



> *I shall begin with a definition of what I believe medicine to be: to free the sick of all their suffering, to dull the pains brought on by disease, and, being aware that medicine has no power in such cases, not to treat those who have been overwhelmed by their illness.*
>
> Hippocrates, *The Art* 3



In the Vocabulary section of each chapter you will learn a series of bases: Latin for Chapters I-XIV, Greek for Chapters XV-XXV, and a mixture for Chapters XXVI-XXVIII. The entries for each chapter have been chosen to suit the linguistic principle taught in that chapter. While it may be desirable in some cases to group vocabulary items into their more obvious categories (e.g., names of bones, parts of the heart, etc.), this course is designed to emphasize linguistic principles, and the vocabulary has been arranged to suit that emphasis. You will, however, also be able to study terms grouped into anatomical systems in the *Know Yourself* section.

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Each vocabulary box has the base on the left, the definition in the middle, and example terms on the right. No definitions for the example terms are given, because nearly all of them are found in the exercises of this or later chapters, which will allow you to learn the meaning of these terms in an interactive way. For now, see if you can guess the meaning of the examples as you study the bases.

articul-	*joint*	abarticular, juxta-articular
bucc-	*cheek, mouth*	buccolingual, suprabuccal
caps-	*box, container*	capsule, extracapsular
ced-, **cess-**, **-cede**	*to go, to come*	procession, secede
celer-	*quick*	accelerator, deceleration
cerebr-	*brain*	cerebrum, decerebration
cut-, **cuss-**	*to shake, to strike*	concussion, percussion
ict-	*stroke, blow*	interictal, preictal
ject-	*to throw*	interject, retroject
later-	*side, flank*	contralateral, quadrilateral
matur-	*ripe, fully grown*	immature, premature
ment-	*mind*	dementia, mental
mit(t)-, **mis(s)-**	*to send*	intermission, remit
par-, **part-**	*to give birth to*	intrapartum, postpartum
pariet-	*wall*	parietal, transparietal
pon-, **posit-**, **-pose**	*to put, to place*	depose, juxtaposition
salin-	*salt*	desalination, saline
uter-	*womb*	extrauterine, postuterine
vas-	*vessel*	extravasate, vascular
vert-, **vers-**	*to turn*	extrovert, retroversion

Notes

1. The definitions for the Latin bases above are a mixture of nouns, adjectives, and verbs (e.g., "cheek," "quick," "to send"). This distinction exists because the bases come from Latin words that are themselves different parts of speech. This does not mean, however, that any English derivatives from a base have to be the same part of speech as the Latin original. For example, the adjectival base *celer-* ("quick") can be used in English verbs and nouns (e.g., "decelerate," "deceleration"). While the part of speech of a given Latin base is not a totally irrelevant consideration, you will not need to memorize whether a given base is a noun, adjective, or verb.

2. As you can see, most of the verbal bases have alternative forms (e.g., *ced-* may also appear as *cess-*). It is important to learn the alternatives, since any of them may be used depending on the nature of the English word being formed.

3. The base *caps-* appears in several frequently-used words as *capsul-*. This is a diminutive form, meaning that *capsul-* indicates a "little box." The same principle can be seen in the diminutive base *vascul-*, which is derived from *vas-* ("vessel"). You will study diminutives in Chapter IX.

4. Note that the base *pon-* takes the form *-pose* when it is placed at the end of a word, as in "depose," "juxtapose," and "propose." The same is true for *ced-*, which has an alternate form *-cede* (e.g., "recede, secede"). The final "e" in *-pose* and *-cede* is a standard English suffix found in many words derived from Latin or Greek, but it is not a Latin or Greek suffix and will not be taught as such. This suffix is simply a spelling convention in English (cf. the varied spelling in words such as "proceed" and "exceed").

Words often retain their general meaning while gradually changing their degree of intensity. For example, the English word "plague" is derived from the Latin *plaga*, "stroke, blow." On the contrary, the Latin for "plague" is *pestis*, which has diminished nowadays to the milder "pest," and even the colloquial "pesky." By contrast, the word "disease" began as a gentle term—"lack of ease"—but now it has more serious connotations. Nnote in particular that some experts now talk of Sexually Transmitted Infections instead of Sexually Transmitted Diseases on account of the latter term being too extreme for some ailments of this kind, which do not always have serious symptoms.

Complete these exercises. When you are finished, check your answers at the end of the chapter.

I. Identification

Give the meaning of the following words, paying special attention to the prefixes that you have learned in this chapter. All prefixes and most bases can be found in the chart above (bases not covered will already be familiar to you); suffixes will be taught formally in later chapters. Note that you are not expected to arrive at the exact definitions given in the Guide to the Exercises, which often contain very precise technical information; do your best to define the terms and then check the Guide to see how close you were.

Example: secrete _____to separate or emit_____

1. premature _____
2. deceleration _____
3. suprabuccal _____
4. dementia _____
5. ultrasensitive _____
6. juxta-articular _____
7. extrauterine _____
8. capsule _____
9. postoperative _____
10. desalination _____
11. percussion _____
12. malabsorption _____

13. mental _____
14. extravascular _____
15. benefactor _____

II. Name That Term

Using your knowledge of the prefixes learned in this chapter, come up with a suitable term for the definitions given below. (Hint: you can find a word for each definition in the Identification section above. First, see if you can come up with the term on your own; then use the list above if you need help.)

Example: occurring between cells _____*intercellular*_____

1. located or occurring outside of a vessel _____
2. decrease in velocity _____
3. the removal of salt from a substance _____
4. occurring before the proper time, not ripe _____
5. located or occurring outside the uterus _____
6. one who confers a gift or benefit _____
7. overly responsive to stimuli _____
8. a striking or drumming _____
9. a progressive debilitation of the cognitive faculties _____
10. referring to the time after a medical procedure _____

III. Everyone Makes Mistakse

The following groups of words contain two properly-spelled and one improperly-spelled term. Circle the incorrect one.

Example: antebellum, antichamber, anterior

1. contravene, controdiction, contrary
2. extrovert, extroordinary, extradition
3. introvenous, introduction, intracranial
4. supraorbital, superfluous, suprasaturated
5. benificent, malevolent, benefactor
6. supersonic, ultrasonic, ultersonic

IV. Fill in the _____

For the following words, supply a prefix from this chapter that will complete the meaning provided.

Example: ____pre____cancerous: not yet developed into cancer

1. _____ject: throw between, utter an exclamation
   _____ject: throw backwards, set something in the past

2. _____ocular: within the eye
   _____ocular: between the eyes

3. _____diction: a statement about the future, a prophecy
   _____diction: a statement against, refuting arguments or evidence
   _____diction: a speaking well, a blessing
   _____diction: a speaking badly, a curse

4. _____duce: lead down, infer from a general principle
   _____duce: lead away, persuade (usually to do something bad)

V. Matching

Definitions for the following terms are included in the right-hand column. Put the letter of the corresponding definition in the blank by the appropriate word. Each term has only one correct answer.

1. _____	anteflexion	a. to withdraw or separate from
2. _____	postuterine	b. removal of the brain
3. _____	contraindication	c. sunstroke
4. _____	retroversion	d. a downward turning (esp. of the eyes)
5. _____	decerebration	e. an abnormal forward bending (esp. of the uterus)
6. _____	intrapartum	f. placement next to or near to
7. _____	infraversion	g. relating to a wall or wall-like structure
8. _____	extravasate	h. having to do with the opposite side of the body
9. _____	preictal	i. a symptom that makes treatment with a drug unsafe
10. _____	contralateral	j. occurring during birth
11. _____	process	j. referring to the region behind the uterus
12. _____	parietal	k. a turning backwards (esp. the tilting of an organ)
13. _____	ictus solis	l. prior to a stroke or convulsion
14. _____	secede	m. to escape from a vessel into tissue
15. _____	juxtaposition	n. a prominence or projection, as of a bone

VI. Back to the Bases

Much of the task of understanding medical terminology comes down to intuition—that is, the ability to determine a word's meaning even when you have not formally studied it before. The following words are grouped into pairs that have the same base. See if you can use each pair of words to work out what each base means.

Example: *inspect, spectacle* *spect-* _____*to look at*_____

1.	invalid, valiant	*valid-*	_____
2.	binocular, oculist	*ocul-*	_____
3.	evacuate, vacuum	*vacu-*	_____
4.	reflex, flexible	*flex-*	_____
5.	quadruped, pedestrian	*ped-*	_____

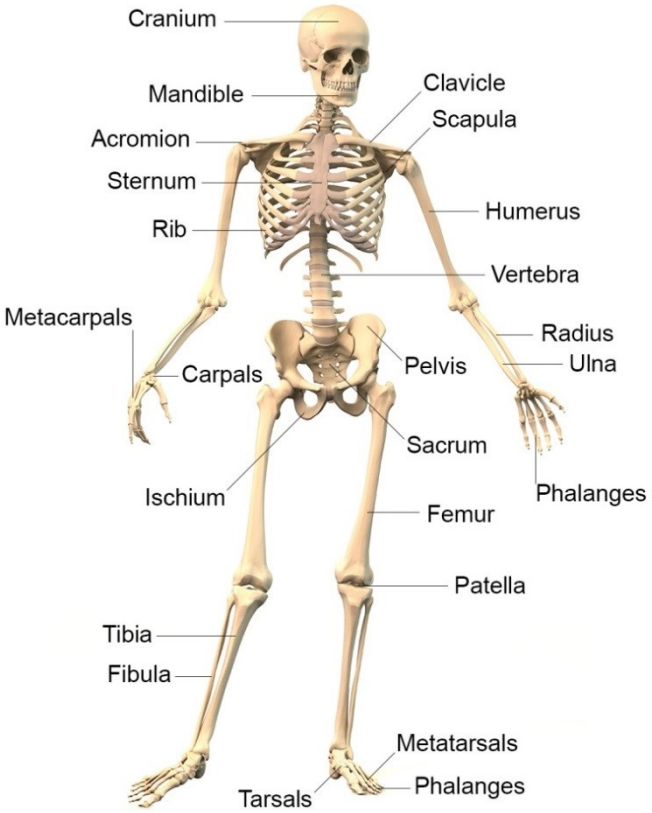
VII. The Wordsmith

*In the scientific world, researchers often need to create names for newly discovered species of plants and animals, diseases, procedures, elements, and other such things. In this exercise you will come up with your own terminology. The goal here is not to get the "right answer" or even to form a "real word," but to think creatively and to practice using the vocabulary you have learned. (Some of your answers may seem strange to you, but this is par for the course in scientific terminology, which often contains vocabulary that would never be used in everyday speech.) In the early chapters you will receive more guidance, with subsequent chapters offering more of a creative challenge. For this exercise, use the term "**corporeal**" ("of the body") and **a prefix from this chapter** to form an appropriate word.*

Example: An ailment "within the body" could be called ___intracorporeal___.

1. Someone with an "out-of-body" experience undergoes a(n) _____ event.
2. According to some worldviews, the human soul wanders around by itself before being united with a physical body. The time prior to this union could be called _____ or _____.
3. Static electricity that travels between two bodies could be called a(n) _____ discharge.
4. Someone who has delusions about possessing a badly-formed body suffers from _____ Psychosis.
5. If there were an unfortunate medical condition in which people had bodies that were oriented in a direction opposite to their faces, it could be called _____ Syndrome.

Each chapter will include a diagram with important vocabulary for various (usually anatomical) structures. This section will serve three chief purposes: 1) to build your vocabulary, 2) to reinforce the linguistic principles you have already learned, and 3) to prepare you for what is to come in later lessons. You will find that many words in these diagrams also appear in other chapters; such repetition in multiple contexts will help to solidify what you have learned. Early on there will be terms which you will not yet be able to analyze in full, but rest assured that in time you will have acquired the tools that you need. Finally, by learning about human anatomical systems, you will be putting into practice in a literal way one of the most popular ancient Greek maxims, and one which was associated with the god Apollo, the purported father of Asclepius: GNOTHI SAUTON ("Know yourself"), seen written in Greek in the mosaic here.



Although not all names for human body parts are derived from Latin or Greek (e.g., "knee," "knuckle," and "elbow" are Germanic; see p. 114), the names of bones often come directly or indirectly from Latin. "Humerus," "ulna," "pelvis," "patella," "tibia," and "fibula," for instance, are unchanged Latin words. In some cases the name arose from the supposed resemblance between the bone and some object: *tibia* means "flute," whereas *fibula* means "clasp" or "buckle," *patella* means "little dish," and *pelvis* means "washing basin."

Other bones get their names directly from Latin, but for reasons other than some physical resemblance. The sacrum, short for *os sacrum* ("holy bone"), may have been so called in antiquity because it was the part of an animal that was offered as a sacrifice to the gods. (There is a Greek myth explaining how humans managed to trick the gods into accepting the less desirable parts of a sacrificial victim while they retained the meat for themselves.) *Vertebra* is a pure Latin word derived from the verb *vertere*, "to turn," and refers to the mobility of the spinal column. In an interesting anticipation of Darwin, it was suggested in antiquity that animals originally had a rigid spinal column and that it evolved its present flexibility from their turning around to see if predators were pursuing them. In other cases, such as *femur*, it is unclear why the name was chosen—some Romans speculated, with no great logic, that it was so called because it is located in the region of the body in which a man differs from a woman (*femina*).

Other bone names are derived from Latin, but have undergone some sort of change. The diminutive "clavicle," from the Latin *clavicula* ("little key") has kept the Latin base but received an anglicized suffix (for more on Latin diminutive suffixes, see Chapter IX). The same is true for "mandible," which comes from the Latin base meaning "to chew" and the suffix *-ble*, which indicates a means of doing something; that is, the mandible is a "means of chewing." Of course, some bone names undergo changes that are technically speaking not correct. "Humerus" involves a slight error in spelling and would be more correct as *umerus*, the original Latin word for "shoulder." (Interestingly, the term "funny bone" may have arisen as a pun, playing on "humerus" and "humorous.")

As described in How to Use This Book, this section will provide excerpts from primary documents that shed light on some aspect of ancient medicine. Passages from Greek and Roman sources will be used throughout the book, often side-by-side so that you will get a broader view of a particular issue. There follows a short commentary on the passages to help you think critically about what you have read. For details about the authors, see the Glossary and Chronological Table.

The Origins of Medicine I: Asclepius

1. Diodorus Siculus, *The Library* 4.71
   According to mythology, Asclepius was the son of the god Apollo and the nymph Coronis. He had outstanding natural abilities, and devoted himself to the science of medicine. Many of the discoveries that contribute to human health were made by him. He gained a great reputation and was even able to cure many people whose lives had been despaired of. The unexpected success of his cures was the reason why he was thought to have brought numerous dead people back to life. Mythology states that Hades, god of the underworld, accused him of diminishing the importance of his kingdom; he claimed that, because of Asclepius' cures, the number of dead people was steadily decreasing. Stirred to anger, Zeus destroyed Asclepius with a thunderbolt.

2. Celsus, *On Medicine* Proem 2
   The Greeks have made rather greater medical advances than have other peoples. Even among the Greeks, however, medicine is just a few generations old, and does not go back to the origins of the race. Asclepius is famous as the earliest exponent of the art. Medicine was still rudimentary and crude in his time, and he came to be reckoned as one of the gods simply because he developed it in a more sophisticated way.

3. Celsus, *On Medicine* Proem 3
   Asclepius had two sons, Podalirius and Machaon, who went with Agamemnon to the Trojan War and rendered very considerable assistance to their fellow-soldiers. Even so, Homer makes no mention of them providing relief from the plague [in *Iliad* 1] *or any of the other diseases that afflicted the Greeks. He says that they used to treat patients with either surgery or drugs. Hence it is clear that these were the only branches of medicine that they attempted, and that they must be the longest established practices. We can also learn from Homer that diseases were thought to be caused by the anger of the immortal gods, and that it was to the gods that humans looked to obtain relief from diseases.*

In the developed world today, the medical art is advanced in the laboratory through scientific experimentation and discovery. New devices, chemicals, and procedures are carefully tested and retested to improve the efficacy and convenience of various medical treatments, and human ingenuity plays a major part in the development of these treatments. But how did the art of medicine get its start? To answer this question, a historian of science could produce a long list of people and events that have helped to shape the progression of medicine throughout history, and even if there is likely to be some disagreement about when medicine as we understand it actually began, there would probably be a general consensus about the processes by which medical knowledge has been obtained, at least as far as our historical records allow.

The passages above, however, show a tension in identifying the source of that knowledge. On the one hand, note that some ancient people evidently regarded medicine as an inheritance from the divine. According to

both Diodorus and Celsus, some of the most important early medical advances came at the hands of Asclepius, who was later counted among the gods (you will read about the mysterious happenings in his temple sanctuary in Chapter III). Celsus also says that, according to Homer, it was a common belief that the gods were responsible for diseases and cures in general. On the other hand, as Diodorus and Celsus themselves show, not everyone was so quick to credit such things to the gods. Celsus is doubtful that Asclepius was actually a god, and Diodorus also seems skeptical about claims that he raised people from the dead. To these men, the birth of medicine was the result of human factors, and rumors of divine intervention arose only because new types of medicine produced such wondrous results.

Nevertheless, observe how both authors regard these mythical accounts as an indication of an important historical reality concerning the birth of medicine. For both of them, the idea that Asclepius was divine may have been a fabrication, but it was a telling one, for it revealed something about the social impact medicine had in its early stages—and about people's tendency to seek explanations for the unexplained. Modern readers may be predisposed to seeing a sharp line between "history" and "myth," where one is true and one is fabricated, but we should be careful not to assume that this same dichotomy was made in other times by other cultures. For people of Greco-Roman antiquity, at least, the origins of medicine might not have been so much shrouded in myth as illuminated by it.

Guide to the Exercises

I. Identification

1. occurring before the proper time, not ripe
2. decrease in velocity
3. located or occurring above the cheek
4. a progressive debilitation of the cognitive faculties
5. overly responsive to stimuli
6. located or occurring next to a joint
7. located or occurring outside of the uterus/ womb
8. a structure in which something is enclosed (e.g., a soluble container of a dose of medicine)
9. referring to the time after a medical procedure
10. the removal of salt from a substance
11. a striking or drumming
12. impaired absorption (e.g., of nutrients)
13. related to the mind
14. located or occurring outside of the vessels
15. one who confers a gift or benefit

II. Name That Term

1. extravascular
2. deceleration
3. desalination
4. premature
5. extrauterine
6. benefactor
7. ultrasensitive
8. percussion
9. dementia
10. postoperative

III. Everyone Makes Mistakse (correct form provided in parentheses)

1. controdiction (contradiction)
2. extroordinary (extraordinary)
3. introvenous (intravenous)
4. suprasaturated (supersaturated)
5. benificent (beneficent)
6. ultersonic (ultrasonic)

IV. Fill in the _____

1. interject, retroject
2. intraocular, interocular
3. prediction, contradiction, benediction, malediction
4. deduce, seduce

V. Matching

1. e
2. j
3. i
4. k
5. b
6. j
7. d
8. m
9. l
10. h
11. n
12. g
13. c
14. a
15. f

13: *Ictus solis* is a Latin phrase literally meaning "stroke of the sun"; you will learn about such phrases in Chapters XI-XIV.

VI. Back to the Bases

1. to be strong or well
2. eye
3. empty
4. to bend
5. foot

4: Notice that *flect-* (like *spect-* in the example) is given in a verbal form. This is because the Latin word from which it comes is a verb. By contrast, *lumin-* and *ocul-* come from Latin nouns, and so their definition is given as a noun. Do not worry if you choose a different part of speech so long as you get the general meaning (e.g., for #3 it is also fine to say that *vacu-* means "to be empty").

VII. The Wordsmith

1. extracorporeal
2. antecorporeal, precorporeal
3. intercorporeal
4. Tricorporeal
5. Retrocorporeal

1: Did you happen to spell this word "extrocorporeal"? Which sounds better?
2: Which term did you think of first? These prefixes are often used interchangeably ("antenatal," "prenatal"), but not always ("premonition," but not "antemonition").

Chapter II

Latin Prefixes 2

In this chapter you will study …

* *Assimilation in Latin prefixes*
* *More commonly-used Latin prefixes*
* *A series of Latin bases that are used with these prefixes to create medical terms*
* *More of the human skeleton*
* *Ancient ideas about how writing shaped the art of medicine*

As with the prefixes in Chapter I, the prefixes that you will learn in this chapter are to some extent already familiar to you through regular English usage. What can you deduce about the meaning of the prefixes in the following words?

abduction	dismember	obstruct
abort	dissipate	replay
addition	exhume	return
ambidextrous	expel	reverse
ambivalent	extend	submarine
circumnavigate	inconceivable	subpar
circumvent	intolerable	subterranean
conduct	intuitive	transcontinental
contraction	invasion	transition
discontinue	obliterate	transplant

You might have guessed that, since "ambidextrous" means able to use both hands with equal proficiency and "ambivalent" describes someone who has mixed feelings about something, *ambi-* means "both." You also know that to "expel" something is to eject it or push it out and that "extend" means to "stretch out," so you might have guessed that *ex-* means "out of." Similarly, *re-* means "back" or "again," as is evident in "return" and "reverse," and "transcontinental" can help you guess that *trans-* means "across."

All of these examples show the prefixes in their standard form (e.g., *ab-, circum-, re-*), but you read in Chapter I that some prefixes have alternative forms that must be learned as well. Such is the case for *contra-*, which appears in its standard form in "contraception" but with an altered spelling in "controversy." In this chapter you will learn some more ways in which the spelling of prefixes can vary.

One of the primary ways in which the appearance of prefixes changes is through a process known as assimilation (Lat. *ad-* + *simil-* + *-atio*, "a making similar to"), where a part of the prefix is altered to fit more

neatly with the base. Assimilation occurs for phonetic reasons: some consonant clusters are hard to pronounce or, when pronounced quickly, tend to change in sound, so when a prefix and a base combine to create such a cluster, part of the prefix is modified to ease the transition. Interestingly, the word "assimilation" itself undergoes the process of assimilation at the union of *ad-* and *simil-*. The combination "ds" makes "adsimilation" slightly difficult to pronounce, and it is more naturally rendered as "assimilation." The following list of words will demonstrate this feature further, with the unmodified version given in parentheses to allow you to see the transformation that has taken place. Pronounce each pair of words aloud and observe which form has the easier or more natural pronunciation.

ad-	*con-*	*sub-*
accentuate (adcentuate)	collate (conlate)	succumb (subcumb)
affect (adfect)	compact (conpact)	sufficient (subficient)
aggregate (adgregate)	coordinate (conordinate)	suppress (subpress)
alleviate (adleviate)	corrode (conrode)	suspend (subpend)

These examples show that in some cases the final consonant of the prefix is changed to match the initial consonant of the base ("collate," "succumb"), but in other cases the final consonant of the prefix becomes a different letter altogether ("compact," "suspend"). Note that you cannot always tell from the first letter of the base which of these two types of change will occur: *sub-* becomes *sus-* when joined to the base *-pend*, but it becomes *sup-* when joined to the base *-press*.

In still other cases the consonant disappears completely, as in "coordinate" and "eject." In the first of these examples, the "n" has been removed from the prefix *con-*, and in the second the prefix *ex-* has become simply *e-*. Again, these changes are made for ease of pronunciation: "coordinate" sounds better than "conordinate," and "eject" sounds better than "exject." (It is also telling that modern English pronunciation of the Latin-based word *subpoena* assimilates the "b" sound to a "p.")

In a couple of cases the prefix may also gain a letter that was not there previously. Such is the case in "abstraction," where the prefix *ab-* is now written as *abs-*. The same is true for *re-*, which becomes *red-* in "redemption" (*empt-*, "to buy") and "redundant" (*und-*, "wave").

It should be noted that assimilation does not change the *meaning* of the prefix, but only its *form*. When *ex-* appears as *e-*, for example, the prefix still means "out of." Therefore, you only need to be able to recognize a prefix when it is found in one of its alternative forms. Some of these changes will be immediately obvious, while experience will make others much easier to identify.

Learn the following prefixes, paying special attention to the variety of alternative forms.

Prefix	Alternative Forms	Meaning	Examples
ab-	**a-, abs-**	away from, from	absorption, aversion
ad-	**ac-, af-, ag-, etc.**	to, toward, near	adhesive, affect
ambi-	**ambo-**	both, around	ambidextrous, ambiguous
circum-	**circu-**	around	circuit, circumcision
con-	**co-, com-, etc.**	with, together, very	congenital, correct
dis-	**di-, dif-**	apart	dislocation, disseminate
ex-	**e-, ec-, ef-**	out, from	effusion, extension

in-	**il-, im-, ir-, etc.**	into, on	implant, injection
in-	**il-, im-, ir-, etc.**	not	impotent, indigestion
ob-	**oc-, of-, etc.**	against, toward	occlude, occult
re-	**red-**	back, again, against	recuperate, redundant
sub-	**suc-, sus-, etc.**	under, up from under	subconscious, suffused
trans-	**tra-, tran-**	across, through	tradition, transplant

Notes

1. The prefix *ab-* may lose its consonant, becoming *a-*, but the "b" never changes to a different consonant. Therefore, do not assume that *ab-* is the prefix in such words as "arrive," "alleviate," or "affect." In words of this type the prefix will always be *ad-* and never *ab-*. Conversely, the alternative form *a-* comes from *ab-*, not *ad-* (there are just a few exceptions to this rule, including "astringent" and "aspire").

2. The prefix *con-* comes from the Latin preposition *cum*, meaning "with" (you are probably most familiar with this word from the phrase *summa cum laude*, "with highest praise"). However, when used as a prefix the preposition *cum* never keeps its original spelling, so it is conventional to speak of *con-* as its regular form.

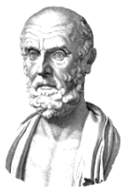
3. Be careful with words like "contraction." At first glance you might be tempted to say that the prefix is *contra-* ("against"), but in fact the "tra" is part of the base. It may help to note that, if the prefix is assumed to be *contra-*, the resultanting word ("~~ction~~") would be nonsensical.

4. Be careful to distinguish between the two prefixes that are spelled *in-*. The word "intense" has the prefix *in-* that means "into," whereas the word "impenetrable" has the prefix *in-* that means "not." Consider also the examples "illuminate" ("to shine light on") and "illicit" ("not permissible"). When encountering an unfamiliar word beginning with *in-*, you will have to decide which prefix is being used, since there is nothing in the form of the words to differentiate between them (you will notice that the alternative forms of *in-* are the same as well). This is an *im*portant, but not *im*possible task.

5. The prefix *sub-* may also mean "slightly" or "not fully," as in "subacute," "subastringent," and "subgranular" (e.g., subacute afflictions are less intense than acute ones).

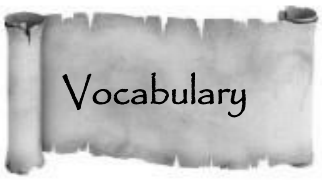
6. In some cases a prefix does not greatly change the meaning of the stem, but rather *intensifies* it, in which case the prefix is translated as "completely," "very," or "thoroughly." Such is the case with the prefix *con-* in examples such as "corrode," where the base (*rod-*) means "gnaw" (as in "rodent," a creature that gnaws), with the full form meaning "to eat up (completely)."

7. In certain situations you may encounter the Latin prefix *cis-* ("on this side, on the nearer side"), which together with *trans-* forms an antonymic pair. The Romans used this distinction most famously in designating their Gallic provinces as "Transapline" and "Cisalpine": Gaul across the Alps vs. Gaul on this side of the Alps (i.e., from the perspective of Rome). In modern terminology, *cis-* can be used in chemistry and in genetics to describe structures that have certain elements "on the same side" of a midline division, but perhaps the most common use nowadays is in discussions of gender, where "cisgender" and "cissexual" denote someone whose psychological gender and physical gender align, as opposed to "transgender" and "transsexual."



Medicine has been well organized now for a long time, and has evolved both a set of principles and a method on the basis of which many fine discoveries have been made over a period of many years. What remains to be discovered will be discovered, if the researcher has the requisite ability and a sound knowledge of what has already been discovered, and uses this knowledge as the starting point for his research. Anyone who undervalues and rejects all this knowledge and tries to pursue research along some other path, following some other theory, has been, and still is, delusional.

Hippocrates, *Ancient Medicine* 2



Learn the following Latin bases, including any alternative forms.

ax-	*axis*	abaxial, adaxial
cori-	*skin*	corium, excoriation
corn(u)-	*horn*	circumcorneal, unicornous
cub-, **cumb-**, **cubit-**	*to lie down*, *to recline*	incubation, recumbent
fund-, **fus-**	*to pour, to melt*	effusion, transfusion
glutin-	*to glue*	agglutinant, conglutinant
greg-	*flock, herd*	aggregate, segregation
ili-	*flank, hip*	ilium, transiliac
lab-, **laps-**	*to slip, to fall*	prolapse, relapse
ocul-	*eye*	circumocular, interocular
rad-, **ras-**	*to scrape*	abrasion, erase
sangui(n)-	*blood*	exsanguination, sanguinous
stru-, **struct-**	*to build*	construction, obstruction
sud-	*to sweat*	sudomotor, transudation
tund-, **tus-**	*to beat, to strike*	contusion, obtundent
vesic-	*bladder*	transvesical, vesicle

As stated in *Know Yourself* from Chapter I, many Latin words undergo some kind of transformation in the process of becoming an English word (e.g., *clavicula* > "clavicle"), but others are adopted directly into English without any changes (e.g., "abdomen"). The latter require no specialized knowledge of Latin to identify, since they are the same in both languages. As you will learn in Chapter XI, however, Latin nouns change their form depending on how they are used in a sentence, and sometimes this change involves an alteration of the base itself (albeit normally a minor one), so with some Latin words it is necessary to learn both a standard form and an alternative. For example, "abdomen" is a regular English word, but there is a slight change made in its

adjectival form, "abdominal." So too the noun "cervix" undergoes a slight change in its adjectival form, "cervical." The following Latin nouns are related in that all of them may be used as English words in their standard form but undergo changes in other situations. Learn both forms along with the definition.

abdomen, **abdomin-**	*abdomen*	abdominal, abdominoplasty
cervix, **cervic-**	*neck*	cervical, costocervical
corpus, **corpor-**	*body*	corporeal, corporectomy
cortex, **cortic-**	*bark, outer layer*	cortical, juxtacortical
femur, **femor-**	*femur, thigh*	femoral, femoroiliac
semen, **semin-**	*seed*	insemination, seminal

Notes

1. The term "cervix" often indicates the part of the body connecting the head to the trunk, but it can also refer to any constricted, neck-like portion of a body part or organ. In cases of ambiguity, the full Latin name may be used to specify which cervix is meant. For example, the *cervix uteri* is the lower, narrow end of the uterus. The *cervix vesicae urinariae* is the constricted portion of the urinary bladder near its union with the urethra. The *cervix dentis* is the slightly constricted region of a tooth where the crown and root meet. You will learn about such Latin phrases beginning in Chapter XI.

2. The cornea of the eye is a transparent structure forming the anterior part of the sclera, the tough, white outer coating of the eyeball. It was so called because of its "horn-like" consistency. *Cornea* is actually a Latin adjective and is the source of the English adjective "corneous." The full name for this structure of the eye is *cornea tunica*, or "horn-like coating" (the omission of the noun in such phrases is not uncommon in scientific vocabulary; later you will learn about *biceps* and *trachea*, two other examples of this phenomenon).

The term "ambulance" is derived from the French *hôpital ambulant*, literally "walking hospital" (from Lat. *ambul-*, "to walk"), which arose in the early 19th century, when medical personnel walked over battlefields to treat wounded soldiers where they lay or to transport them in carts to safety. In antiquity it was thought by some that the Greek word for "doctor" (*iatros*) was also derived from a military context, since in the olden days doctors earned their name from extracting arrows (Grk. *ios*). The Latin word for "doctor" (*medicus*) was thought to be related to *medius*, "in the middle," since medicine ensured good health by striking a balance between extremes. The Latin word *doctor* meant "teacher" and was not originally specific to medicine (cf. the modern use of "Doctor of Philosophy," that is, a Ph.D).

Complete these exercises and then compare your answers with those at the end of the chapter.

I. Identification

Give the meaning of the following words, paying special attention to the prefixes that you have learned in this chapter. Again, suffixes will be learned later, so give the best answer you can from your knowledge of the prefixes and bases.

1. recumbent _____
2. accelerator _____
3. juxtacortical _____
4. abrasion _____
5. excoriation _____
6. adaxial _____
7. circumocular _____
8. conglutinant _____
9. exsanguination _____
10. invertebrate _____
11. transiliac _____
12. collateral _____
13. transfusion _____
14. inject _____
15. circumvascular _____

II. Name That Term

Give a suitable term for the definitions below. (Hint: you can find a word for each definition in the Identification section above. First, see if you can come up with the term on your own; then use the list above if you need help.)

1. extensive loss or draining of blood _____
2. a scraping away of some surface _____
3. promoting adhesion or gluing _____
4. at or toward the axis _____
5. located or occurring near the outer surface _____
6. located or occurring around the vessels _____
7. an agent that speeds up an action or function _____

8. lying down, in a reclined state _____
9. the removal of the skin through scratching, burning, etc. _____
10. across or extending between the hips _____

III. Everyone Makse Mistakes

The following words have spelling errors in their prefixes. Provide the correct form.

Example: inrigate _____ *irrigate*_____

1. subceptibility _____
2. obposition _____
3. disferential _____
4. exlimination _____
5. circumitous _____
6. inreparable _____
7. conefficient _____
8. adpetite _____
9. inliterate _____
10. osstruction _____

IV. Fill in the _____

For the following words, supply a prefix (or prefixes) from this chapter that will complete the meaning provided. Be sure to use assimilation where necessary.

1. _____clude: "to close out," to place outside of a group
   _____clude: "to close in," to assign to a group

2. _____version: "a turning inside out," a change in order
   _____version: "a turning aside," an amusement or lure

3. _____ject: "to throw forward," to set in the future
   _____ject: "to throw against," to protest or complain
   _____ject: "to throw in," to put something (e.g., a fluid) inside

4. _____articular: near a joint
   _____articular: around a joint
   _____articular: distant from a joint

5. _____lapse: a slipping back into something
   _____lapse: the falling forward or slipping of a body part from its normal location
   _____lapse: a falling down (lit. "together")

6. _____cussion: "a striking together," a head injury
   _____cussion: "a shaking under," a technique used in detecting water in a body cavity
   _____cussion: "a shaking through again," a consequence

7. _____pose: "to place near," to locate besides
   _____pose: "to set forward," to put forth
   _____pose: "to set against," to compete against
   _____pose: "to place upon," to force something on someone

V. Matching

Definitions for the following terms are included in the right-hand column. Put the letter of the corresponding definition in the blank by the appropriate word. Each term has only one correct answer.

1. _____	contusion	a. restoration of blood flow to the vessels
2. _____	obtundent	b. the escape or pouring of fluid into another area
3. _____	aggregate	c. someone showing both introversion and extroversion
4. _____	ambivert	d. across or through the bladder
5. _____	revascularization	e. a medicinal substance "placed up under" an orifice
6. _____	suppository	f. a soothing agent that deadens the senses
7. _____	transudation	g. a substance that causes adhesion or gluing
8. _____	effusion	h. a bruise, the result of a blunt-force strike
9. _____	agglutinant	i. a sum total of substances coming together in a mass
10. _____	transvesical	j. the oozing or sweating of a fluid through pores

VI. Back to the Bases

Use the following pairs of words to guess the meaning of each base.

1.	centigrade, gradual	*grad-*	_____
2.	intermediate, medium	*medi-*	_____
3.	tripartite, particle	*part-*	_____
4.	incandescent, candid	*cand-*	_____
5.	concord, cordial	*cord-*	_____

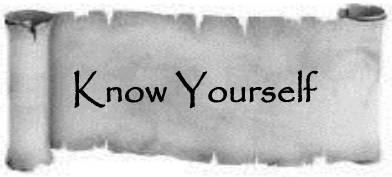
VII. The Wordsmith

*The English language lays claim to countless fascinating words. Among these is "defenestration," the act of throwing something or someone out of a window (*fenestra *is Latin for "window"; recall that the prefix de- means "down from"). Perhaps not surprisingly, there are few other words that use the root word "fenestrate" and a prefix to indicate the movement of something in relation to a window—until now. For the following situations, provide a term of your own creation that is comprised of the base "****fenestration****" and* ***a prefix from this chapter****. Remember that there is no single correct answer. And if you are troubled by the oddity of the words you come up with, they will be no more ridiculous than "defenestration" itself.*

> *Example: The bedroom window had been the entry point for burglars in the past, but Todd's ___profenestration___ of a menacing thorn bush in front of the sill put a stop to this.*

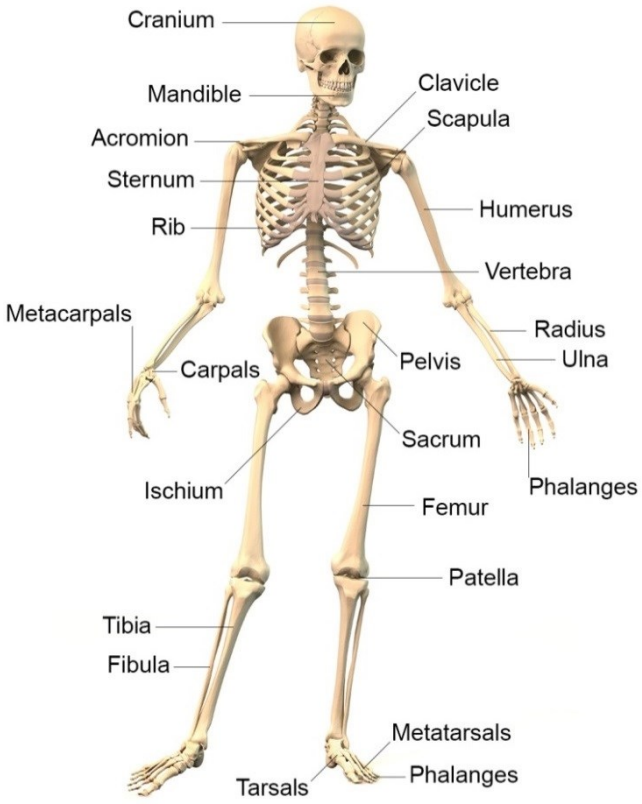
1. _____ of certain types of plant near a window may not be a good idea, since too much sunlight can be detrimental to their growth.
2. The broken glass resulting from the _____ of the baseball all but sealed the boys' fate: they were to be grounded indefinitely.
3. The janitorial staff at the aquarium do their best to keep the glass clean from the constant nasal _____ of children who press their noses against the transparent surface to see the creatures up close.

4. The couple reveled in the delights of the evening: the chirping of crickets, the aroma of wine, and a delicate _____ of moonlight that gave the room a soft glow.
5. _____ is a common problem in school on a sunny day, as students often look past the classroom window into some idyllic setting in the distance.



In the previous chapter, it was emphasized that many bone names are derived from Latin: some are taken directly from that language without any alteration (e.g., "tibia"), while others undergo spelling changes in the process of their adoption as English words (e.g., "clavicle"). Bones could be named for a variety of reasons, including their resemblance to some object (e.g., *patella*, "little dish") or function (e.g., *vertebra*, from the Latin verb meaning "to turn"). Since the history of anatomy is so complex, it should come as no surprise that there is such variation in the ways bones get their names.

Not all bone names come from Latin, though, and it is worth observing a few instances in which other languages have had some input in anatomical nomenclature. Although it will be some time before you begin studying Greek terms formally, note that several bone names come directly or indirectly from this language. *Acromion*, the name for the bony process of the scapula at its juncture with the clavicle, is adopted from Greek without any change (lit. "point of the shoulder"). So too is *phalanges*, which literally means "phalanxes," that is, lines of troops. *Cranium*, *ischium*, and *sternum* are all Latin words, but they have been adopted from Greek with a small phonetic change (*cranion*, *ischion*, *sternon*). Other names, such as "tarsals" and "metacarpals," are derived from Greek, but have been adapted slightly to an English spelling system.



In anatomical systems, Latin and Greek names predominate, but it is not uncommon to find words of a different origin. For example, many familiar names for body parts are Germanic: "finger," "hand," "arm," "shoulder," "toe," "foot," etc. When it comes to bones, however, nearly all examples are Latin and Greek. While "skull," "kneecap," "shin," and other such Germanic words are often used as informal designations, the official names for bones (e.g., "cranium," "patella," "tibia") are all derived directly or indirectly from Latin or Greek, with the exception of the Germanic "rib" (though note the adjectival form "costal," from Lat. *costa*).

The Origins of Medicine II: The Written Word

1. Galen, *On Anatomical Procedures* 2.280K
   In the earliest times, there was no need for manuals on anatomy, since sons practiced dissection under their fathers' supervision, just like reading and writing … and there was no fear that anyone who learned that way would forget what he practiced, any more than those who have practiced the letters of the alphabet are likely to forget how to write. But, as time went on, it seemed good to share the skill with people outside the family and not just with their own children. Once they began to share their art with adults whom they respected as good people, this brought an immediate end to instruction in anatomy from an early age, and that inevitably meant an immediate decline in standards of instruction. … When medicine was no longer confined to the clan of the Asclepiads, it deteriorated more and more with each passing generation, and hence the need arose for manuals to preserve knowledge of it.

2. Celsus, *On Medicine* Proem 5
   After Asclepius and his sons, no one of any distinction practiced medicine until literary studies became more widespread.

3. Pliny the Elder, *Natural History* 29.4
   Amazing as it may be, medicine lay in darkest obscurity throughout the time from the Trojan War until the Peloponnesian War [end of the 5th century BC]. *Then it was called back into the light by Hippocrates, who was born on the famous and powerful island of Cos, which was dedicated to Asclepius. It was customary for those who had been freed from a disease to record in Asclepius' temple the remedies that would be helpful, so that people who suffered the same illness at a later time might be helped. Hippocrates is said to have copied these cures down and used them as the foundation for clinical medicine after the temple burned down.*

Educated people in developed countries will likely find it difficult to imagine a world without writing. From books to blogs to billboards, writing is encountered and absorbed constantly, usually without any special consideration of the fact that one is performing the action of reading, so natural has it become for so many. Indeed, in many developed countries the literacy rate among adults is near 100%. But for ancient Greeks and Romans, writing was hardly so common, and literacy came at a much higher premium.

The earliest form of written Greek that has been identified comes from about 1400 BC. This script, known as Linear B, was used primarily for record-keeping, and it is probable that only a very select group of scribes possessed the ability to work with these symbols. Records of this writing die out at around 1200 BC, and it is not until the 8th century BC that written Greek again appears in inscriptions on cups and other artifacts, this time with the alphabet that is still in use today. This is the time period in which the Greek poets Homer and Hesiod lived, and it is thought by many that the new alphabet was used to record their poems (others believe that it took generations of oral recitation before this literature was set down in writing). However that may be, the rediscovery of writing did not suddenly cause a huge spike in the literacy rate of the Greek mainland. As before, it was probably only a small percentage of individuals who could operate in this medium, and oral recitation remained the most important mode of literary performance. In fact, it was not until the period after Alexander the Great (died 323 BC), the era in which our modern notion of a library was birthed, that writing truly seemed to take hold as a primary method for the transmission of Greek literature. We might therefore

estimate that it took about half a millennium for writing to become widespread in Greek society—a fact that is quite difficult for us to appreciate.

Although the technology of writing had been available for some time, even in the 5th and 4th centuries BC writing was sometimes viewed with suspicion. Most famously, the character of Socrates in Plato's dialogue *Phaedrus* criticized writing as an inferior mode of communication, at least as far as philosophical knowledge is concerned: you could ask a person questions to probe for further information or to expose inconsistencies, but you could not do anything with a written document except read it. Furthermore, writing could only *remind* a person of what had already been learned; it could not *teach* any truth on its own. For Plato, interactive conversation was the only way to ensure a proper philosophical education.

The passage by Galen above suggests that the medical art was similarly slow to adopt writing as the primary means of transmitting its specialized knowledge, with all medical education being achieved through one-on-one apprenticeship. Whatever the cause of this exclusive reliance on individual interaction—whether a distrust of writing as an educational medium or simply the weight of tradition—all three passages above refer to a general decline in the art of medicine under this model until the adoption of writing led to a sort of medical resuscitation that kept the art of doctoring alive. It is unlikely that any ancient doctor would have regarded the written word as sufficient in and of itself for a medical education, but after Asclepius it was at least clear that writing provided an absolutely essential element in the spread of medical knowledge.

At first glance it might seem that these passages describe a shift from a world of "divine" medicine to "human" medicine. After all, it was the divine system under the guidance of Asclepius that eventually failed to perpetuate itself, necessitating the use of writing by human scholars taking a "scientific" approach. Look again, however, at the passage of Pliny. It was in the temple of Asclepius, a religious sanctuary for miraculous healing, that Hippocrates discovered the cures that would form the basis for his own practice—cures which, importantly, he wrote down. Even long after the tradition of medicine begun by Asclepius died out (according to the consensus tradition presented by the texts above), one of the foremost thinkers in ancient medical science was still indebted to the divine for his success. It is no surprise, then, that well over a thousand years later a Byzantine encyclopedia records that "everyone who consults the books written by Hippocrates regards them as preeminent in their understanding of medicine, and welcomes them as the utterances of a god, rather than as words coming from the mouth of a mere mortal." In the next chapter you will learn more about the sorts of things Hippocrates might have learned from perusing the lists of cures found in the healing sanctuary of Asclepius.

Guide to the Exercises

I. Identification

1. lying down, in a reclined state
2. an agent or apparatus that is used to increase the rate at which an object proceeds or a substance acts or at which some reaction occurs
3. located or occurring near the surface/ skin of an organ or tissue
4. the wearing or scraping away of a substance, or an area of the body surface stripped of skin or membrane by such a process
5. a wearing off or abrading of the skin, or an area so affected
6. located alongside of or directed toward the axis
7. surrounding or occurring around the eye
8. promoting union or adhesion (e.g., of the edges of a wound); lit. "gluing together"
9. extensive loss or draining of blood through hemorrhage
10. any animal that has no vertebral column
11. across or between the two ilia, the superior portions of the hip bone
12. secondary or accessory; located on the side or flank; a side branch (e.g., of a blood vessel or nerve)
13. the introduction of blood or blood components into the bloodstream; lit. a "pouring across"
14. to force (lit. "throw") a substance (esp. a drug or vaccine) into the body
15. around or encircling a vessel

II. Name That Term

1. exsanguination
2. abrasion
3. conglutinant
4. adaxial
5. juxtacortical
6. circumvascular
7. accelerator
8. recumbent
9. excoriation
10. transiliac

III. Everyone Makse Mistakes

1. susceptibility
2. opposition
3. differential
4. elimination
5. circuitous
6. irreparable
7. coefficient
8. appetite
9. illiterate
10. obstruction

IV. Fill in the _____

1. exclude, include
2. inversion, diversion
3. project, object, inject
4. juxta-articular, circumarticular, abarticular
5. relapse, prolapse, collapse
6. concussion, succussion, repercussion
7. juxtapose, propose, oppose, impose

V. Matching

1. h
2. f
3. i
4. c
5. a
6. e
7. j
8. b
9. g
10. d

VI. Back to the Bases

1. step, degree
2. middle
3. part, portion
4. to glow white
5. heart

VII. The Wordsmith

1. juxtafenestration
2. perfenestration, infenestration
3. obfenestration
4. infenestration, perfenestration
5. ultrafenestration, perfenestration

3: You may also have written “offenestration” by analogy with words such as “offer,” where there is assimilation of the “b,” though there is also the example of “obfuscate,” where there is no assimilation.

4, 5: It is noteworthy that some variations of the word “defenestration” are almost by definition interchangeable. In order for something to go “into” or “beyond” a window, it must also go “through” it. Even so, you might feel a slight difference in tone between these options: “perfenestration,” for example, would seem more likely to include broken glass than “infenestration.”