FUNDAMENTALS OF MEDICAL ETYMOLOGY

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Twenty-six hundred years ago the Asiatic Greeks of Ionia and the Italian Greeks in Magna Graecia began the speculative and investigational sciences, pushing the then Greek to its limits, pushing beyond those limits, riveting new meanings onto old words, smithing new words for new ideas and discoveries—*philosophia*, "the love of wisdom," was supposedly first used by Pythagoras.

The sciences still go their robust way, iconoclastic but also indebted to and respectful of their ancient tradition. In anatomy, surgery, clinical medicine, and laboratory medicine, Greek, Latin, and Greco-Latin have always formed well over ninety per cent of the technical terms. Knowing the fundamentals of Greek and Latin word formation is immensely helpful in learning the vocabulary of modern medicine or of any modern science and is absolutely necessary for anyone coining a word for a new hypothesis, theory, process, or entity. The purpose of this introduction is to present those fundamentals in as practical and concise a form as possible; any statements contrary to historical and comparative linguistic fact that are made in the following pages are deliberate in keeping with this purpose.

Alphabet and Pronunciation

The Latin alphabet is a modification of one of the many Greek alphabets. The order and shape of the Latin letters are the same as in ours except that the Classical Latin alphabet has no *j*, *u*, or *w*, which are improvements dating from the Middle Ages.

The consonants of the Latin alphabet have about the same values as the English except that *c*, *ch*, *g*, *s*, *t*, and *v* are pronounced as in *c*old, *ch*rome, *g*et, *s*o, *t*in, and *w*ine, and not as in *c*ent, *ch*ill, *g*em, ro*s*e, men*t*ion, and *v*ine. *Ph* and *th* may be pronounced as in *ph*ilosophy and *th*eology.

Latin vowels may be long or short. The short vowels are pronounced very much like the American w*a*nder, b*e*d, *i*t, h*o*pe, and p*u*t; short *y* sounds like the *ü* in German *dünn*. The long vowels are pronounced as in f*a*ther, h*e*y, mar*i*ne, st*o*ve, and r*u*de; long *y* is pronounced like the *ü* in the German *über*.

Words are stressed on the next-to-last syllable, called the penult, if that syllable contains a long vowel or diphthong or is followed by two or more consonants, otherwise on the syllable before the penult.

The Greek alphabet used today is based on that used in Athens by the end of the fifth century BCE. The accompanying table shows one modern English pronunciation of each ancient Greek character in terms of English.

Capital	Small Letter	Sound	Name	Transcription
Α	*α*	f*a*ther	alpha	a
Β	*β*	*b*arbarism	beta	b
Γ	*γ*	*g*rammar	gamma	g
Δ	*δ*	*d*iet	delta	d
Ε	*ε*	*e*lephant	epsilon	e
Ζ	*ζ*	*z*oology	zeta	z
Η	*η*	r*a*bies	eta	ē
Θ	*θ*, *ϑ*	*th*eory	theta	th
Ι	*ι*	mach*i*ne	iota	i
Κ	*κ*	*k*eleton	kappa	k or c (Latin)
Λ	*λ*	*l*ithograph	lambda	l
Μ	*μ*	*m*usic	mu	m
Ν	*ν*	*n*eolithic	nu	n
Ξ	*ξ*	e*x*egesis	xi	x
Ο	*ο*	*o*belisk	omicron	o
Π	*π*	*sp*asm	pi	p
Ρ	*ρ*	*ar*achnid	rho	r
Σ	*σ*, *ς*	*s*ymbol	sigma	s
Τ	*τ*	*st*adium	tau	t
Υ	*υ*	*ü*, *ü*ber (German)	upsilon	y
Φ	*φ*	*ph*oto	phi	ph
Χ	*χ*	Ba*ch* (German)	chi	ch
Ψ	*ψ*	di*ps*omania	psi	ps
Ω	*ω*	*o*cher, Sh*aw*	omega	ō

The vowels are *α*, *ε*, *η*, *ι*, *ο*, *υ*, *ω*, most of which may be followed by *ι* or *υ* to form diphthongs, the most common of which are shown below.

Diphthong	Sound	Transcription
αι	*ai*sle	ae, e, or ai
αυ	*ou*t	au
ει	*ei*ght	i or ei
ευ	*eu*phony	eu
οι	p*oi*son	oe, e, or oi
ου	gh*ou*l	ou or u
υι	s*ui*te	ui

Transliteration

The Romans transliterated kappa with *c*, not *k*, and chi with *ch*, not *kh*; thus *ch*ara*c*ter, not *kh*ara*k*ter. This Dictionary transliterates kappa with *k* in its etymologies in order to make immediately clear the nature of the underlying Greek sound: Spelling *cystis* for *kystis*, cyst, could cause doubt whether the sound was "kystis" or "systis." Similar difficulties with chi are less likely, and

therefore *Dorland's* retains the traditional *ch*; hence our etymological spelling is *charakter*.

Classical Greek *ει* was pronounced as in *skein*, but by the end of the fourth century BCE it was pronounced as in *seize;* thus the city that Alexander the Great founded in Egypt, *Alexandreia*, became Alexandria in Latin. English generally prefers the Latin transliteration, but the use of *ei* for *ει* is growing. This Dictionary transliterates *ει* with *ei* in its etymologies.

The Romans transliterated Greek *αι* and *οι* with their own *ae* and *oe*, which had nearly the same pronunciation. By late antiquity the Greek and Latin diphthongs had become simple vowels, having gone through the regular progression *ai*sle to *ai*r to *a*im, and the spelling wavered between the old diphthongs and the new pronunciation. This vacillation persists in English: the British prefer the diphthongs (*oe*dema, h*ae*morrhage); the Americans, the simple vowel (*e*dema, h*e*morrhage). In the etymologies of this Dictionary Greek *αι* and *οι* are transliterated by *ai* and *oi*, and Latin *ae* and *oe* retained, for clarity's sake.

The Greeks especially but also the Romans had the same troubles with aitch (*h*) that Cockneys do, dropping it where it belonged and adding it where it did not. In Greek, initial *h-* ordinarily remained in simple words (*haima*, blood) but would either assimilate with or disappear before a prefix. For assimilation, *hypo* and *haima* make *hyphaimos*, suffused with blood (first appearing in Hippocrates); for disappearance, *a-*, *an-*, and *haima* make *anaimia*, anemia (first appearing in Aristotle), not *ahaimia* and *ahemia*.

Latin usually preserved initial *h-* even after prefixes (*Homo habilis*, *habilitas*, *inhabilitas; honor*, *honestus*, *inhonestus)*, but very much of our Latin has come through French with inconsistent (to say the least) spellings and pronunciations: *able*, *ability*, and *inability*, not *hable*, *hability*, and *inhability*; *honor* and *honest*, not *onor* and *onest*.

Speakers of American English generally have no difficulty with *h-* and treat it as a full consonant when adding prefixes; thus we have *inharmonious*, not *anarmonious*; *ahaptoglobinemia*, not *anaptoglobinemia*; and *anhydride*, not *anydride* or *ahydride*.

Greek words are written with several accents (´ ` ^) that now indicate the stressed syllable. Words beginning with a vowel, diphthong, or rho (*ρ*) are written with a so-called breathing mark over the initial vowel or rho or over the second element of the diphthong (*ἑτεροδοξία*, *heterodoxia; αἰσθητικός*, *aisthētikos*; *ῥυθμός*, *rhythmos*). The *rough* breathing mark (῾) indicates that the syllable begins with an aspiration (aitch) as in *heterodoxia*, above, and words beginning with the rough breathing are usually transcribed into English with an initial *h*. Words beginning with a rho or an upsilon always have a rough breathing (*ὑπέρ*, *hyper; ῥεῦμα*, *rheuma)*. The smooth breathing (᾽) shows the absence of aspiration and so has no effect on pronunciation (*ἀρωματικός*, *arōmatikos; αὐτογράφος*, *autographos*).

The other conventions for transliterations from Greek are as follows: Gamma (*γ*), which before gamma (*γ*), kappa (*κ*), chi (*χ*), or xi (*ξ*) has the sound of *n* as in *finger*, is transcribed as *n*.* Initial rho and its rough breathing (*ῥ*) are transcribed as *rh*, not *hr*, as *rheuma*, above; double rho (*ρρ*) is transcribed as *rrh* (*διάρροια*, *dia*rrho*ea*, *dia*rrh*ea*). Upsilon (*υ*) is transcribed as *y* (*ῥυθμός*, *rhythmos*) except in diphthongs, where it is reproduced by *u* (*ῥεῦμα*, *rheuma*).

A few Greek words have come into English unchanged (*σκελετόν*, skeleton; *αυτόματον*, automaton); most Greek words have passed into English through Latin, undergoing slight change (Greek *στέρνον*, *sternon*; Latin *sternum*); and some Greek words have passed through a secondary intermediary language, such as French, with still further change (Greek *χειρουργία*, *cheirourgia*; Latin *chirurgia*; French *cirurgerie*; English *surgery*). Other changes are accounted for by our tendency to drop Greek and Latin inflectional endings (*ἀξίωμα*, *axioma*, becomes axiom; *dorsalis* becomes dorsal) or replace them with a final mute *e* as if the words have come into English through French (*γονοφόρος*, *gonophoros*, becomes gonophore; *spina* becomes spine).

Word Formation

The most frequent, the most important, and the seemingly most capricious changes in Greek or Latin words (or in English words, for that matter) arise not when the words pass from Greek or Latin into English, but when these words are first formed in the original language.

Many words in English and nearly all words in the Classical languages are combinations of roots and affixes. The root of a word contains the basic, lexical meaning, and the affixes give the root its shape as a word. (Affixes for the most part are prefixes and suffixes, including the inflections, added before or after the root, respectively.)

For example, in the English *love*, *loves*, *lover*, *lovers*, *loving*, *loved*, *lovingly*, *unloved*, and *unlovable*, the root is *love*, and the various prefixes (*un-*) and suffixes (*-s*, *-r*, *-r-s*, *-ing*, *-ingly*, etc.) form the root into a word and modify that word for use in an utterance.

In English a root may very often function as an independent word, as *love*, *hate*, *smile*, *frown*, *milk;* these "root words" are extremely rare in the Classical languages. Nearly always in Latin and Greek, and usually in English, a word is a complex consisting of a form of a root and one or more affixes, which are not independent words themselves but may be used only to modify the root in some way (as *un-*, *-er*, *-ed*); such words are called "derived words."

When the root remains unchanged from derived word to derived word (a "regular" or "weak" root) and the affixes remain unaffected in their surroundings, the entire system of derived words has a transparent, instantly comprehended simplicity, as in *love* and its forms. So in Latin and Greek: there is a systematic clarity to derivations of the Latin root *laud-* (praise)—the nouns *laudis* and *laudatory* (praise, praiser); the principal parts of the regular verb, *laudo* (I praise), *laudare* (to praise); and the adjectives *laudabilis* and *laudatorius* (laudable, laudatory). There is also a regular system in the Greek root *pau-* (stop): the nouns

*During World War II, *Ancistrodon* (from *ἄγκιστρον*, fishhook, and *ὄδοντ-*, tooth) was reformed to *Agkistrodon*, which is the official spelling. *Ancistrodon* and *Ankistrodon* are both correct, but not *Agkistrodon*: Greek *ἄγγελος* (messenger) becomes *angelus* in Latin and *angel* in English, not *aggelus* and *aggel*.

pausis (pause) and *paustēr* (reliever, calmer); the regular principal parts of the verb *pauō* (I stop), *pausō* (I shall stop); and the adjectives *pausteōn* (to be ended) and *paustērios* (relieving, calming).

Difficulties arise in English, Latin, and Greek with roots that change from word to word ("irregular" or "strong" roots) as in the English *sing, sang, sung, song;* and one says *singer*, not *songer; unsung*, not *unsing;* and *unsingable*, not *unsungable*. One example will suffice. The root *ten-* (stretch) appears in Latin and Greek (and also in English in *thin*). In Latin the root is as regular as the English *talk*, and the derivations are obvious: *tendo* (tendon), *ten*sio (tension), *ten*ius (tenuous, thin), ex*ten*uatus (stretched out, thinned out, weakened). In Greek, however, the same root appears as *ten-*, *tein-*, *ton-*, *ta-*, *tan-*, and *tain-*. Indeed, the rules for ancient Greek word formation would make a heavy book, and therefore, for efficiency's sake, the list of prefixes, suffixes, and combining forms gives examples of which affixes are attached to which forms of the root, for both the methodical Latin and the exuberant Greek.

In the Latin system there is an inconsistency affecting many common Latin and therefore English words: Latin roots with short vowels will have the normal, strong vowel in simple, unprefixed words but a reduced, weakened vowel in prefixed words.

Consider the Latin root *făc-* (do, make). The normal *ă* remains in unprefixed words; hence the principal parts of the verb are:

făcio	I make
făcere	to make
făctus	made

Other unprefixed derivatives are:

facies	thing made or formed, face, "facies"
factor	factor
factura	as in manu*facture*
faction-	faction
factiosus	factious
facil-	doable, feasible, easy

From *facil-* are derived in turn:

facultat-	faculty
facilitat-	facility

Now let us add the prefix *ex* to the root *fac-*. *Ex* assimilates to *ef-* before *f* and changes the meaning of *fac-* to "complete." This or any prefix will cause a short *ă* to become a short *ĭ* before one consonant and a short *ĕ* before two consonants. Note the changes in the principal parts of the prefixed verb:

efficio	from	*exfacio*
efficere	from	*exfacere*
effectus	from	*exfactus*

It is from words like *efficio* that one can most clearly understand the derivations of Latin words. One forms the present participle by dropping the final *-re* from the present active infinitive, which is the form used in the etymologies of *Dorland's*, and adding *-nt* (verbs like *efficio* drop the final *-ere* and add *-ient*). The present participle of *efficio*, *efficere* is *efficient-* (efficient). And from the present participle is derived the noun *efficientia* (efficiency).

From the last principal part, *effectus*, one forms derivatives by dropping the *-us* and adding other suffixes. Thus from *effect-* one derives

effectum	effect
effector	effector
effectivus	effective

Occasionally the Romans would recompose a prefixed form according to the unprefixed norm. The most common example, and perfect for medical use, is *calefacio*, I warm, not *caleficio*, and therefore *calefacient-*, not *caleficient-*.

Alas, there are exceptions. *Tenant* comes to English not directly from the Latin *tenēre*, to hold, which would give us *tenent*, but through the French *tenir*, and in French all verbs form their present participles in *-ant*, therefore *tenant*; a *locum tenens* is a *lieu tenant*.

Assimilation may affect the consonants between roots and affixes. In English the *v* in dri*v*e and thri*v*e becomes voiceless and changes to *f* before the voiceless suffix *-t* that forms the nouns *drift* and *thrift*. In Latin, assimilation is usually minimal and obvious: *scribo* ("I write") and *scriba* ("writer, scribe") alternate with *scripsi* ("I wrote") and *scriptura* ("writing, scripture"). Occasionally the assimilation between Latin roots, prefixes, and suffixes may cause enough distortion to result in confusion. Below are listed some common Latin prefixes (most of them are also used as prepositions) showing the assimilation of the prefix to the following element. Note that the prefix *in-* has two sources and hence two uses: as a spatial prefix meaning *in*, *on*, or *into* (*in*scribe, *im*bibe, *il*luminate, *ir*radiate) and the antonymous prefix (*in*sensitive, *im*mature, *il*legible, *ir*reverent).

Consonant Changes		English
ad-	before *c* becomes *ac-*	*ac*celerate
ad-	before *f* becomes *af-*	*af*finity
ad-	before *g* becomes *ag-*	*ag*glutinant
ad-	before *p* becomes *ap-*	*ap*pendix
ad-	before *s* becomes *as-*	*as*similate
ad-	before *t* becomes *at-*	*at*trition
ex-	before *f* becomes *ef-*	*ef*fusion
in-	before *l* becomes *il-*	*il*linition
in-	before *m* becomes *im-*	*im*mersion
in-	before *r* becomes *ir-*	*ir*radiation
ob-	before *c* becomes *oc-*	*oc*clusion
sub-	before *f* becomes *suf-*	*suf*focate
sub-	before *p* becomes *sup-*	*sup*pository
trans-	before *s* becomes *tran-*	*tran*spiration

In Greek, assimilation may cause drastic changes to a word, and the phonetic laws governing these assimilations are far beyond the limits of this Dictionary. Fortunately, however, Greek prefixes are fairly regular. Like Latin prefixes, they may also function as prepositions of motion or location. Most Greek prefixes end in a vowel, which is maintained when the following element begins with a consonant and is lost (elided) when that element begins with a vowel: for example, the iota in *epi* ("on, upon") is unchanged in *epi*demic and is elided before *o* in *epo*nychium ("cuticle"). When a Greek prefix ends in a consonant and the following element begins with a

consonant, assimilation takes place with results as in Latin: the nu (*n*) of *syn* ("with") changes in *symphatheia* and *syllogismos* (sympathy and syllogism). Note that the prevocalic prefix *an-* has two sources and therefore two uses: it is the spatial preposition *ana* ("up, back"), as in *ana*bolism and *an*ode; and it is the antonymous prefix *a-*, *an-*, as in *a*theist and *an*odyne, coming from the same source as Latin and English antonymous prefixes *in-* and *un-*.

Below are listed some common Greek prefixes with examples of elision and assimilation.

Preposition	Combining Forms	English
amphi	amphi-	*amphi*crania
	amph-	*amph*eclexis
ana	ana-	*ana*bolism
	an-	*an*ode
anti	anti-	*anti*gen
	ant-	*ant*helminthic
apo	apo-	*apo*physis
	ap-	*ap*andria
dia	dia-	*dia*thermy
	di-	*di*uretic
ek	ek-	*ec*topia
ex	ex-	*ex*osmosis
en	en-	*en*ostosis
	em-	*em*bolus
epi	epi-	*epi*nephrine
	ep-	*ep*arterial
hyper	hyper-	*hyper*trophy
hypo	hypo-	*hypo*dermic
	hyp-	*hyp*axial
kata	kata-	*cata*lepsy
	kat-	*cat*ion
meta	meta-	*meta*morphosis
	met-	*met*encephalon
para	para-	*para*mastoid
	par-	*par*otid
peri	peri-	*peri*toneum
pro	pro-	*pro*gnosis
syn	syn-	*syn*thesis
	sym-	*sym*physis
	syl-	*syl*lepsis
	sy-	*sy*stole

Many Latin suffixes have been naturalized in English for centuries, and little comment is needed on their morphology and use. Some common suffixes of particular use in medicine are listed below with their English derivatives. Note that the suffixes *-abilis* and *-alis*/*-aris* are attached to verb stems of the first conjugation (the infinitives end in *-āre*, as in *laudāre* to praise); and *-ibilis* and *-ilis* are used with the other conjugations (*vidēre*, *visibilis*; *legĕre*, *legibilis*; *audīre*, *audibilis*).

Latin components	English
avis + *-arium*	avi*ary*
dormio (*dormitus*) + *-orium*	dormit*ory*
nutrio (*nutritus*) + *-io*	nutrit*ion*
moveo (*motus*) + *-or*	mot*or*
porosus + *-tas*	porosi*ty*
frio + *-abilis*	fri*able*
edo + *-ibilis*	ed*ible*
corpus (*corporis*) + *-alis*	corpor*al*
febris + *-ilis*	febr*ile*
oculus + *-aris*	ocul*ar*
cilium + *-arius*	cili*ary*
sensus + *-orius*	sens*ory*
reticulum + *-atus*	reticul*ate*
morbus + *-idus*	morb*id*
aborior (*abortus*) + *-ivus*	abort*ive*
squama + *-osus*	squam*ous*
adeps (*adipis*) + *-osus*	adip*ose*
prae + *caveo* (*cautus*) + *-io* + *-arius*	precaut*ionary*

Greek suffixes in general have not been naturalized in English as the Latin have, with spectacular exception of the family of suffixes represented by verbs in *-izō* (-ize), agent nouns in *-istēs* (-ist), and verbal nouns in *-ismos* (-ism).

So far we have examined the various forms of roots, root words, and derived words; only compound words remain. A compound word is one formed from two (or more) independent words, the first word modifying, dependent upon, or being object of the next. In English, *housewife*, *kidney transplant*, *salesman*, *schoolboy*, *store-bought*, *backbreaking*, and *anteater* are compound words. In English the individual elements undergo little if any change from their basic, lexical forms but remain isolated, as it were, and receive their new meaning solely from juxtaposition (an example is the difference between *house guest* and *guest house*).

The conditions are vastly different in Latin and Greek; in the Classical languages one must use so-called combining forms of substantives (i.e., nouns and adjectives including past participles) that are often considerably different from the lexical forms.

In Latin all native compound words ordinarily will consist of the stem of the first word; then the connecting vowel, usually -i-, sometimes -u-; then the stem of the second word; then the inflection: magn-i-ficient-ia, *magnificientia*, magnificence. In science there are many compounds like *dorsoradial* and *frenosecretory* with Latin words and Greek connecting vowels (see the next paragraph); the true Latin forms for such compounds would be *dorsiradialis* and *frenisecretorius*.

In Greek the rules for forming compound words are much more complicated. If the first substantive of a Greek compound ends in *-a* (but not *-ma*) or *-ē*, one nearly always changes that vowel to *-o-*:

glōssa, tongue + *ptōsis*, fall = glossoptosis
phōnē, voice, sound + *logos*, word, reason, study = *phōnologia*, phonology

Substantives ending in *-on*, *-os*, or *-ys* usually drop the final consonant and leave the vowel unchanged:

osteon, bone + *arthritis*, gout (first appears in Hippocrates) = osteoarthritis
myelos, marrow + *poiēsis*, production = myelopoiesis
pachys, thick + *derma*, skin = pachydermia (first appears in Hippocrates)

If the second element begins with a vowel, one merely drops the final *-a* or *-ē* from the first element without adding *-o-*:

archē, beginning, chief, rule + *enteron*, intestine = archenteron
bradys, slow, dull + *akusis*, hearing = bradyacousia

There are exceptions:

idea, idea + *logos* = ide*o*logy is regular,
but
genea, family, lineage + *logos* = *genealogia*, gene*a*logy is irregular, as are
architektōn not *archotektōn*, archi*t*ect
archetypos not *archotypos*, arche*t*ype

Indeed the regular *archo-* is extremely rare compared with *arche-* and *archi-* and is therefore "irregular."

Forming compounds from other substantives is complicated by the fact that one cannot generally predict the combining form of a substantive from the lexical entry, and in fact one usually predicts the lexical entry from the combining form, not vice versa.

In Greek, substantives ending in *-ma* have a stem or combining form in *-mat-*; so *haima* (blood), *haimat-* and *poiēsis* (making, "poesy") make *haimatopoiēsis*, hematopoiesis. But Hippocrates himself uses *haimorrhagia*, hemorrhage, not *haimatorrhagia*. And no one could predict from the nominative *gynē* (woman), which looks like a regular noun, a combining form *gynaik-*, whence gynecology; or from *gala* (milk), *galakt-*, whence galactophorous.

Latin is not so irregular, but even so the combining stem of *lac* (milk) is *lact-* (lactacidemia); of *cor* (heart), *cord-* (cordial); of *miles* (soldier), *milit-* (military); of *rex* (king), *reg-* (regicide); and of *nomen* (name), *nomin-* (nominate). The combining form of *homo* (human being, man) is *homin-* (hominoid ape), but Cicero himself uses *homicida* (murderer, homicide), not *hominicida*.

Prefixes, Suffixes, and Combining Forms Used in Medical Etymology

For a list of Greek and Latin elements used in medical terminology, see *Frequently Used Stems.*