Learning Terms and Word Parts on a Medical English Course

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With vocabulary playing an important role in English language learning, one of the challenges for teachers is to ensure that items of lexis are organized and taught in a way that offers the best opportunities for acquisition. In this article, we describe the development of a word list that is integrated into a set of teaching materials, and how over the duration of several years, techniques and technology have been developed and utilized to aid students in the learning and retention of medical English words.

In the first part of the article, we summarize our medical English curriculum and the synthesis of discourse with corpus analysis in the development of a set of teaching materials for students at Hiroshima University. In the main part of the article, we describe how a word list was extracted from the materials and an analysis of that word list resulted in a list of key medical word parts. We then summarize the development and use of software, called Hi-Lex, that enables students to explore the vocabulary in the units. In the final part of the article, we discuss how materials comprising teaching units and a word list are combined with technology in the form of Moodle and Hi-Lex, and how these systems are combined with classroom instruction to form an integrated syllabus. We then consider how this syllabus could be developed further in subsequent years.

BACKGROUND

Our research on medical English began in 2012, following our institute's provision of a four-day intensive medical English course by four experienced teachers to approximately 120 third-year students (Davies et al., 2013), most of whom were Japanese. Each student received 12 classes of teaching (three classes taught by each teacher). The teachers themselves did not have a background in medical English, although one member of the team had done doctoral research on English for specific purposes, with a focus on pharmacology. Materials were built from a variety of sources, including commercially produced CDs, DVDs, and the internet. A word list was produced for the students, which was well received.

After being asked to continue with the medical English course the following year, several members of the institute formed a research team and, with support from the medical school, started to conduct corpus analysis on medical resources and conduct interviews (Davies et al., 2014) to gather information on the medical English curriculum and ideas concerning medical English. This background research initially resulted in the development of a set of materials consisting of seven units for the intensive course, and then through collaboration with the medical school's English specialist, a further seven units of material were created, resulting in a 14-unit curriculum.

A further development in recent years has been the provision of the intensive medical English course

through flipped learning, in which materials and tasks have been placed on a learning management system (LMS), and students engage in self-study of these before taking a set of classes with a strong focus on speaking skills and abilities. In addition, during the COVID-19 pandemic, the other seven units of material were placed online.

LITERATURE REVIEW

A particular challenge in the research has been how to integrate a lexical sub-syllabus into a set of teaching materials. From a vocabulary perspective, the aim has been to develop a pedagogic word list, one which can be learned through the study of the units of material. In this section, we cover ideas on curriculum and vocabulary.

Curriculum

The teaching of English for Medical Purposes takes place in a variety of settings and at different levels. Our approach to the development of materials has been strongly influenced by the communicative approach, particularly ideas on meaning-focused input, meaning-focused output, and language-focused learning (Nation, 2009). Needs analysis has played an important part in our research, and we have developed a SiReN analysis (Fraser & Davies, 2022), arguing that needs must intersect with the situation and resources available. For example, in terms of situation, Willey and Suzuki (2022) have focused on in-service courses for professionals, in contrast to our initial situation of teaching a course to third-year medical students as a component of a curriculum worth two credits in that system, equivalent to thirty-two 90-minute classes, and with a current situation of providing a course worth one unit, equivalent to a minimum of sixteen 90-minute classes. In their situation, Willey and Suzuki (2022) note that needs analysis often focuses on students and faculty rather than clinicians. They argue that students may not have sufficient awareness of the skills necessary for their careers and that faculty may have different perceptions of language needs from doctors working in clinical settings.

In our case, we were dealing with medical students in the third grade, and our approach reflected Willey and Suzuki's (2022) view that students may lack understanding of their future language needs (although they are a good source of information on how they currently learn), so that medical teaching staff are the individuals with a broad overview of the curriculum and future needs. After interviewing several faculty members, we decided to gather general information on the medical English curriculum, which led us to develop a content-based syllabus with a central focus on body systems. We started to produce materials that covered both the more technical communication between specialists and the more everyday English of doctor–patient communication. This parallels Guest's (2022) distinction between what he terms horizontal discourses, those taking place between specialists in medical disciplines, and vertical discourses, in which medical specialists interact with patients. An example of the former is clinical case presentation while an example of the latter is history-taking.

With the aim of providing the students with discourse that they could use and analyze, we wrote materials that contained short descriptive essays on anatomy/physiology, medical problems, and treatments. This paralleled the students' studies in medicine. In addition, doctor–patient dialogues covering history-taking, examining patients, and discussing results were integrated into the materials. Around these, a variety

of tasks were built, from comprehension questions and vocabulary matching tasks to speaking practice and role plays. Because the syllabus was content-based, organized around body systems, the essays and dialogue in each unit were all conceptually linked.

We describe our syllabus as *quasi-parallel* because doctor–patient interaction in the students' medical curriculum is dealt with after their medical English courses, but from an English language perspective, we considered the vocabulary and structures to be less challenging than the technical English, and could be taught on the basis of learnability.

Vocabulary

A particular challenge in the research has been how to integrate a lexical sub-syllabus into a set of teaching materials. From a vocabulary perspective, the aim has been to develop a pedagogic word list, one which can be learned through the study of the units of material. Here, we consider lexical items in English for Specific Purposes (ESP) and how vocabulary in general can be learned.

Vocabulary in ESP

Fraser (2013) has analyzed the types of specialized terms that emerge in English for Specific Purposes, particularly in the written mode. He makes the distinction between cryptotechnical vocabulary, lay technical vocabulary, fully technical vocabulary, and academic vocabulary. Cryptotechnical vocabulary describes familiar words which become "technicalized," taking on specific meanings within a discipline. For example, in medicine, *inferior* and *superior* are purely locational terms meaning "below" and "above." In contrast, in general English, the words refer to quality. Lay technical vocabulary encompasses words known to the general reader, examples being *heart*, *liver*, and *vaccination*. Fully technical words are those which are known primarily by specialists within a field, such as *astrocyte*, *pleura,* and *ventricle*. Academic vocabulary covers words that are important for reporting research, examples being *variable*, *T-test,* and *data*.

It is also important to note that terms can be single words or be multiword units. In both cases, the terms may consist of word parts. An example of a single word consisting of just one part is *heart,* in contrast to *hematoma,* which has two parts (*hemat/oma*). Similarly, with multiword terms, words in the terms may be indivisible or consist of parts, an example of the former being *body fluid* and an example of the latter being *subarachnoid hemorrhage* (*sub/arachnoid hemo/rrhage*).

Chabner (2015) provides a pedagogic word analysis, dividing words into roots, combining vowels, affixes, and suffixes, with roots and combining vowels being labelled combining forms. In her coursebook for students, Chabner (p. 4) provides some simple definitions:

1. Root—gives the essential *meaning* of the term
2. Suffix—is the word *ending*
3. Prefix—is a small part added to the *beginning* of a term
4. Combining vowel—connects roots to suffixes and roots to other roots
5. Combining form—is the combination of the root and the combining vowel

From a teaching perspective, while this categorization works well in general, there are some gray areas

to it. For example, a minor problem with Chabner's definitions is that her first two categories are not distinct but overlapping – a suffix can also be a root. One of the examples that Chabner gives is *gastr/o/scope*, which she describes as a combining form and a suffix, with a subsequent example being *gastr/ic*, a root and a suffix. However, what happens when we analyze *gastr/o/scop/ic*? In this case, the suffix must be */ic,* but this means that the */scop/* is no longer at the end of the sentence and therefore is a root. Another problem is that if the root gives the essential meaning of the term, *gastr/o-* by itself does not provide the meaning of the term without */scope*, a suffix with an essential meaning. In contrast, suffixes like */al* and */ic* indicate adjectives. From a pragmatics perspective, a consideration has to be an analysis of word parts in the context of the words, and Chabner's analysis works well because it emerges through the vocabulary course she has designed in which full terms are analyzed, and with the framework of analysis and materials forming an integrated whole. It should also be noted that the central focus of Chabner's book is on medical terminology, in contrast to our units, in which terminology forms a strand. In our case, we use the more general term "word part" in the materials.

Learning Vocabulary

Nation (2013) classifies word knowledge into three key parts: form, meaning, and use. *Form* concerns knowing a word by sight and sound, which relates to its spelling and pronunciation. *Meaning* is the understanding of a word through its definition of the concept that it represents. It also includes identifying the relationships with other words and how they are used in context. *Use* relates to the ability to deploy a word accurately in interaction and is linked to language production. For Nation, it is important to master all three aspects to be able to use a word effectively in communication. This requires the practice of new words in context and a regular review of words that have been studied. In our situation, students are exposed to and practice medical terms during their courses. However, this leaves the issue of how much those terms are reviewed after the courses end.

Another factor to consider concerns incidental and intentional exposure to vocabulary. Gu (2003) notes that incidental learning requires a high degree of exposure to language. This is not always possible, especially where the primary language of instruction for medicine is Japanese. A small background questionnaire on our medical students' English study habits showed that the medical English that they did study was for their mandatory medical English courses. Also, they did not read or study much non-specialized English. The finding is perhaps unsurprising given that medical students have a very busy study schedule. Consequently, providing them with the opportunity to consolidate their learning becomes increasingly important, given that their English study is highly focused on their courses.

WORDS AND WORD PARTS

As we noted at the beginning of the literature review, a key question has been how to integrate a word list into a course taught broadly on the principles of the communicative approach. To achieve this, the initial focus was on the development of pedagogic materials that were informed by corpus analysis and research on the medical curriculum for students. Our view of syllabus was one in which a set of syllabus strands intertwine but in which one strand is the key organizing principle. In our case, the key organizing principle was body systems (their parts, function, problems relating to them, and treatments), and the vocabulary

formed a sub-syllabus. By creating vocabulary-rich materials, the key terms could be extracted. This would have the added benefit of controlling the size of the word list, an important consideration for a discipline that contains a substantial number of terms.

Extracting Medical Terms

Having developed the 14 units of material in a way that ensured they contained a rich range of medical vocabulary, our team then reviewed the units to identify and list key terms, writing them on sheets in an Excel file. The average number of terms per unit was 167, with a standard deviation of 27. The terms were then collated onto one spreadsheet and ordered alphabetically. Duplications or very similar items were removed. This created a list of just over 1,700 terms.

Word Parts

Because a large number of technical words are of Latin or Greek origin, which are potentially more difficult to learn, and can be broken down into their constituent elements, our team has analyzed the materials and word list to extract word parts. We arrived at a final list of approximately 170 word parts (see Appendix). In the case of the seven units taught by members of the research team, a number of these word parts have been taught in class. With the remaining seven units, the word parts that have been extracted are in the process of being added to the materials. Consideration has been given to presenting students with words broken down into learnable chunks that help with their acquisition, and in some cases a learnable chunk consists of two word parts. An example of this is *-algia*, which is technically two parts: *-alg/ia*, with *-ia* meaning condition and *-alg-* meaning pain. From a teaching perspective, breaking the chunk into two parts provides too much detail, and so *-algia* is listed, not *-alg-*. Similarly, with *-emia* and *-uria*, these are much easier to learn than *-em-* and *-ur-* by themselves. However, *-ia* is an important word part in itself, and is listed.

Teaching Medical Terms and Word Parts

As the syllabus is content-based, ordered primarily around body systems, the word parts are taught opportunistically, being drawn from the terms that the students encounter in the materials. Consequently, in most cases, the students see the word part contextualized in a term that is contextualized in a sentence that is in a passage, although some terms come from diagrams where the word part is only contextualized in the term. For example, the word part *sub-* is identified from the term *subdural hematoma* which can be seen in the following passage:

> A subdural hematoma, which may be acute or chronic, is a build-up of blood in the space between the dura mater and the arachnoid membrane. With a chronic subdural hematoma, the bleeding takes place over days or weeks, and often occurs after minor head trauma.

In relation to the medical terms themselves, several tasks in the unit are oriented towards learning key vocabulary: matching terms to diagrams, matching terms to definitions, and inserting terms into a passage.

Using Software to Aid Medical Vocabulary Learning

As we have noted above, our students tend to be very focused on their courses, but this leaves open the need for periodic review. Once a course has been taught and students have been evaluated, they may start to forget what they have learned. Consequently, the research team has been working on providing software that allows students to analyze the lexis from texts, store words that they want to learn, and periodically review them. The software itself, called Hi-Lex, has been developed at Hiroshima University, initially for general English study, and has been documented (Higa & Ashida, 2023; Higa et al., 2023). It includes useful word lists for Japanese students that help them to analyze words and identify those which they consider most useful to learn.

In the case of medical English, we decided to add the 1,700 words as a medical English word list (MEWL). For each item, a translation was added. In addition, the research team decided to add a sentence that contextualized the word. For this, we experimented with the new artificial intelligence software by using ChatGPT 3.5, which was asked to provide a sentence for each item. There were several reasons for taking this approach. The first related to time: It would be a long process to extract sentences from the existing materials. In addition, some words were linked to diagrams rather than being seen in essays and dialogues. Also, because the sentences were to be seen in isolation, not all of them made sense out of their context in the materials.

While using Chat GPT was a quick way to generate sentences, these had to be carefully checked and analyzed. In the case of fully technical or lay technical medical terms, the sentences were usually appropriate. However, regarding cryptotechnical terms, such as *inferior* and *superior*, the sentences had to be re-written. In addition, terms relating to academic vocabulary have wide application across disciplines, and these often needed to be changed to something more linked to medicine. Finally, some general English terms that are important in medical descriptions have wide applications. For example, *mass* or *lump*, frequently used in relation to tumors, are applicable to a very wide range of contexts, and the generated sentences often had to be changed. Finally, even within medicine, it was useful to have a sentence that linked to the specific field in which a term was used in the materials. Consequently, a careful review was undertaken to ensure that the sentences were appropriate. After this, the word list was loaded into the Hi-Lex software.

Hi-Lex

The Hi-Lex software (Higa, 2023) is designed to analyze text with reference to the word lists it contains. A student can copy passages from a digital text (PDF, web browser, etc.), paste them into Hi-lex's workspace, then analyze the results in relation to the word lists. In the example in Figure 1, the terms in the visible list (02) appearing in the MEWL are *anterior*, *posterior*, and *inferior.* A student can then save the terms in a list and review the words regularly through spaced-repetition software (Wozniak & Gorzelańczyk, 1994). Because Hi-Lex is hosted on a cloud, students can easily access their word lists through a smartphone or other device with access to the internet.

There are advantages to following this approach. First, Hi-Lex allows learners studying English for Specific Purposes (ESP) to develop word lists that are targeted to their individual needs. In the case of medical students, cryptotechnical terms need to be studied in a specific context, and the use of traditional word lists may make this difficult. Second, ability to profile a word and instantly save it in a word list for review

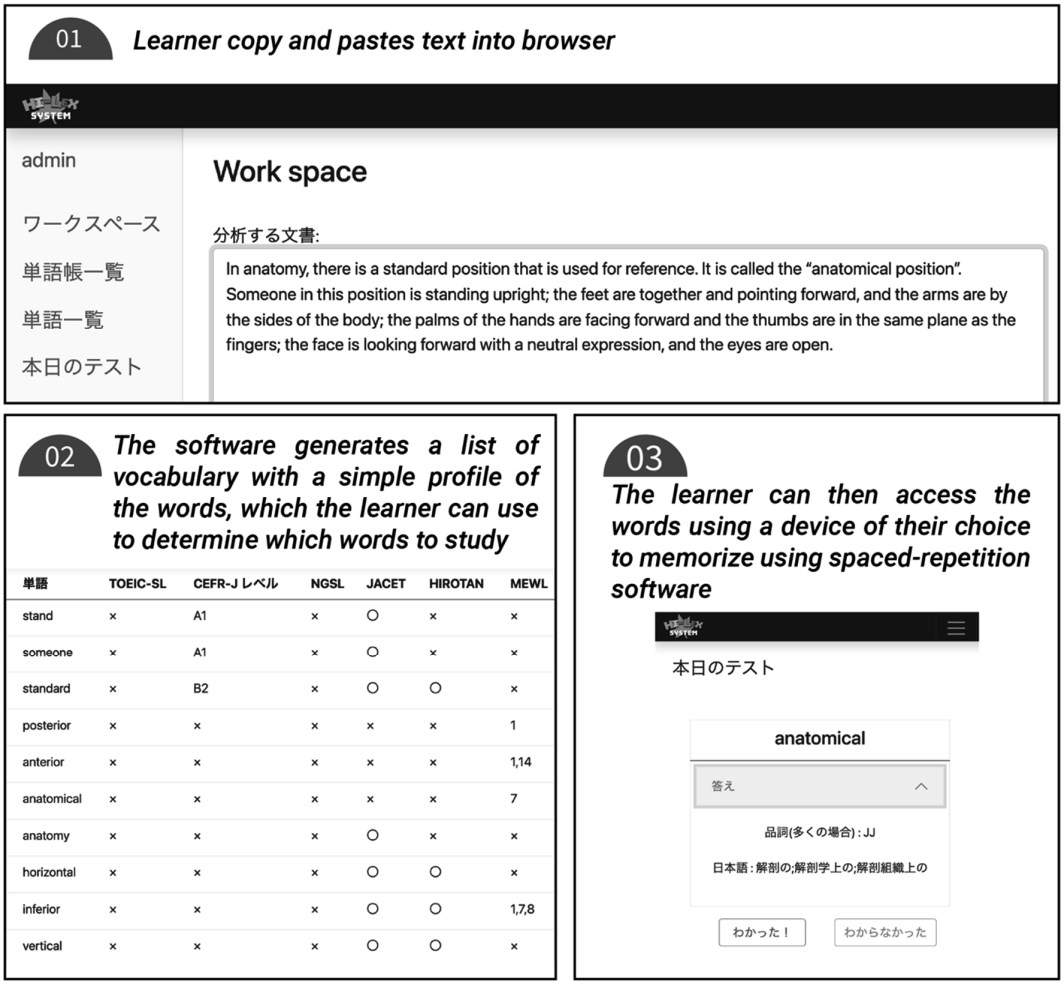

FIGURE 1. Steps in Creating a Personalized Word List

reduces the need for multiple applications and streamlines the study process. Finally, after their medical English courses, learners can continue to review and add to the word lists they created.

DISCUSSION

In this section we review the various aspects of our curriculum and its delivery. We consider how a focus on medical terms and word parts may aid our students with their long-term English language development.

Word Lists and Materials

As we have noted, a key issue in our project has been to integrate a word list with a set of teaching materials. The word list emerges through a focus on a quasi-parallel syllabus, one which roughly follows the medical curriculum set by professors to give a basic grounding in medicine to their students. A very strongly

stressed area in interviews with professors in our medical school was anatomy, which the interviewees felt was a core area of study for their students. A highly linked area was physiology, leading us to focus on body systems as the primary organizing principle of the medical English materials. Corpus analysis of *Gray's Anatomy for Students* and *Harrison's Principles of Internal Medicine* aided in the modification and development of the materials. Consequently, the materials form a syllabus designed to provide a grounding in medical English that reflects the content they have learned in their medical studies in Japanese, with most of the medical English terms emerging mainly through essays and dialogues.

Units of material are learned partly through an LMS (from 2023, Moodle) and partly through classroom instruction. Some of the LMS tasks focus on vocabulary that has been identified as important. However, as teachers, we do not know what terms students may consider important. For example, in Figure 1, the terms *vertical* and *horizontal* might be identified by some students as important to learn or review. Students can select from the terms listed in accordance with their own needs, saving items to their personalized word lists on Hi-Lex. In this way they can consolidate their learning.

The Uses of a Pedagogic Word List

As we have noted, our pedagogic word list is one that is designed to be learned rather than a comprehensive list of medical terms that might, for example, be used for dictionary creation. Part of the aim of creating the list and the word parts is to present a core of items that sensitizes the students to the make-up of medical words, and helps them when they encounter new terms. Consequently, while Hi-Lex has a useful consolidating function, it has a much broader application regarding the selection and learning of new terms. This may be done through the analysis of medical discourse that students choose or need to study outside medical English courses. It seems likely that, during their studies, they will need to read articles in English recommended by medical professors, or they may be given lists of medical English terms. The Hi-Lex software can act as a resource where the materials and medical terms can be brought together and stored.

In addition, there are likely to be students who need to develop their medical English to the level that they can work in English-speaking countries. Although the number is small, some students have the aim of passing the *United States Medical Licensing Examination (USMLE).* Also, while the main courses in medical English finish at the end of their third year, a number of students will continue their medical English learning, particularly into areas of specialization. Being able to collect, analyze, and review important material can be a major benefit in their future studies, as well as helping them deal with patients who need to use English as the language for communication.

CONCLUSION

In this article, we have described how we have developed a medical English word list via a process of materials development combined with corpus analysis. From this word list, we have organized a sub-list of medical English word parts, which we use to help students develop their understanding and retention of vocabulary as well as giving them tools for understanding new terms that they encounter. In addition, we have documented how software developed at Hiroshima University can be used to aid students retain vocabulary items that they encounter during their medical English courses and gather new terms that they encounter after those courses.

Currently the Hi-Lex software is being experimentally trialled with two groups of 30 students who are studying seven of the units of material for their studies. Through these trials, we hope to establish how students use the software, when they use it, and what words they focus on. With students' permission, an analysis of their personalized word lists should give insight into how to adapt or extend the MEWL. In addition, the research team does not know what terms medical professors themselves teach to students in the medical courses. Through word list analysis, it may be possible to identify areas in which the EMP curriculum can be strengthened and developed. This is the direction that our future research on medical English will take.

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APPENDIX. List of Word Parts

	Word Part		**Unit**	**Meaning**	**Example**
1	a-	2	U2	not	asymptomatic
2	ad-	2	U2	towards	adnexal
3	aden/o-	11	U11	gland	adenocarcinoma
4	-algia	6	U6	pain	epigastralgia
5	-alysis	11	U11	analysis	urinalysis
6	an-	2	U2	without	analgesic
7	angi/o-	4	U4	blood vessel	angioplasty
8	anter/o-	1	U1	front side	anterolateral
9	anti-	4	U4	against	anticoagulant
10	arthr/o-	3	U3	joint	arthroscope
11	bas/o-	9	U9	base (pH>7)	basophil
12	bi-	4	U4	two	bicuspid valve
13	bili-	8	U8	bile	bilirubin
14	-blast	10	U10	immature cell	fibroblast
15	-blastoma	14	U14	tumor of the blasts	retinoblastoma
16	-caine	13	U13	anesthetic	benzocaine
17	-calci-	11	U11	calcium	hypercalciuria
18	-capnia	13	U13	level of CO_2	hypercapnia
19	carb/o-	8	U8	carbon	carbohydrate
20	carcin/o-	11	U11	cancer	adenocarcinoma
21	cardi/o-	4	U4	heart	cardiology
22	-ceps	3	U3	head (of muscle)	quadriceps muscle
23	cerebr/o-	2	U2	cerebrum	cerebrospinal fluid
24	chondr/o-	3	U3	cartilage	subchondral bone
25	-clonal	12	U12	from a clone	monoclonal
26	-coccus	13	U13	spherical bacteria	streptococcus
27	col/o-	6	U6	colon	colonoscopy
28	colon/o-	6	U6	colon	colonoscopy
29	contra-	4	U4	against	contraceptive
30	cortic/o-	10	U10	cortex	corticosteroid

31	-costal	5	U5	rib	intercostal
32	crani/o-	2	U2	cranium	craniotome
33	-crine	7	U7	secreting	endocrine
34	cyst/o-	11	U11	sac (e.g., bladder)	cystitis
35	-cyte	3	U3	cell	leukocyte
36	de-	4	U4	remove	deoxygenated blood
37	derma-	10	U10	skin	dermatitis
38	dia-	4	U4	through	diaphoresis
39	dyps/o-	7	U7	thirst	polydypsia
40	dys-	4	U4	bad	dysphasia
41	-ectomy	6	U6	surgical removal	appendectomy
42	-emia	7	U7	condition of the blood	hypoglycemia
43	endo-	4	U4	within	endocarditis
44	endocrin/o-	7	U7	endocrine	endocrinology
45	enter/o-	6	U6	intestines	gastroenterology
46	eosin/o-	9	U9	pinky-red dye	esosinophil
47	epi-	4	U4	above or upon	epiglottis
48	erythr/o-	3	U3	red	erythrocyte
49	esophag/o-	6	U6	esophagus	esophagitis
50	eu-	5	U5	normal	euglycemia
51	exo-	5	U5	outside	exocrine
52	extra-	5	U5	beyond	extravasation
53	fibr/o-	2	U2	fiber	fibroblast
54	gastr/o-	6	U6	stomach	gastroenterology
55	-gen	9	U9	generator	antigen
56	-genesis	8	U8	creation	glycogenesis
57	gluc/o-	7	U7	glucose	glucagon
58	glyc/o-	7	U7	glucose	hyperglycemia
59	granul/o-	9	U9	particle or granule	granulocyte
60	-graph	1	U1	image	radiograph
61	-graphy	1	U1	process of imaging	computed tomography
62	gynec/o-	12	U12	woman	gynecology
63	hem/o-, hemat/o-	2	U2	blood	hemorrhage, hematoma
64	hepat/o-	8	U8	liver	hepatology
65	hetero-	5	U5	other or different	hetero/topic
66	-hydrate	8	U8	$(H_2O)_n$	carbohydrate
67	hyper-	5	U5	above	hypertension
68	hypo-	6	U6	below	hypogastric
69	hyster/o-	12	U12	uterus or womb	hysteromyoma
70	-ia	5	U5	condition	pneumonia
71	in-	6	U6	lack of	infertility
72	inter-	7	U7	between	intercostal
73	intra-	7	U7	within	intravenous
74	-iod/o-	7	U7	iodine	triiodothyronine

75	-itis	3	U3	inflammation	arthritis
76	-kine	9	U9	regulating	cytokine
77	lapar/o-	6	U6	abdomen	laparoscope
78	laryng/o-	13	U13	larynx	laryngopharynx
79	leuk/o-	3	U3	white	leukocyte
80	-lith	11	U11	stone	nephrolith
81	lymph/o-	5	U5	lymph	lymphocyte
82	-lysis	8	U8	breakdown (chemical)	glycogenolysis
83	macro-	7	U7	large	macrophage
84	mamm/o-	12	U12	breast	mammary duct
85	mast/o-	12	U12	breast	mastectomy
86	meningi/o-	2	U2	meninx (pl. meninges)	meningioma
87	meth/o-	12	U12	methyl	methotrexate
88	-metrium	12	U12	uterus or womb	endometrium
89	micro-	10	U10	small	microorganism
90	mono-	9	U9	single	monocyte
91	my/o-	4	U4	muscle	myocardial infarction
92	-mycin	13	U13	antibiotic	azithromycin
93	myco-	5	U5	fungus-like	mycobacteria
94	nas/o-	13	U13	nose	nasopharynx
95	-neo-	8	U8	new	gluconeogenesis
96	nephr/o-	11	U11	kidney	nephrology
97	neur/o-	2	U2	nerve	neurosurgery
98	neutr/o-	9	U9	neutral (pH=7)	neutrophil
99	-o/logist	2	U2	specialist in the study of a field	neurologist
100	-o/logy	2	U2	study of a field	neurology
101	ocul/o-	14	U14	eye	extraocular
102	-oma	2	U2	tumor or mass	meningioma
103	-opia	14	U14	condition of seeing	myopia
104	-opsia	14	U14	condition of the eye	photopsia
105	opthalm/o-	14	U14	eye	opthalmologist
106	opto-	14	U14	seeing	optometry
107	or/o-	13	U13	mouth	oropharynx
108	-orexia	11	U11	appetite	anorexia
109	ortho-	3	U3	straight or proper	orthopedics
110	-oste-	3	U3	bone	periosteum
111	oste/o-	3	U3	bone	osteocalcin
112	ot/o-	13	U13	ear	otorhinolaryngology
113	-o/tomy	6	U6	incision or surgical cut	laparotomy
114	-ox-	13	U13	oxygen	hypoxia
115	para-	13	U13	near	paranasal
116	patho-	9	U9	disease	pathogen
117	-pedics	3	U3	guided development	orthopedics
118	peri-	10	U10	surrounding	pericranium

119	phaco-	14	U14	lens	phacoemulsification
120	phag/o-	5	U5	eating	polyphagia
121	-phage	5	U5	eater	macrophage
122	pharyng/o-	13	U13	pharynx	pharyngitis
123	-phasia	2	U2	condition of speech	dysphasia
124	-phil	9	U9	liker	eosinophil
125	-phoresis	11	U11	transmission	diaphoresis
126	photo-	14	U14	light	photoreceptor
127	-plasty	4	U4	surgical repair	angioplasty
128	-pnea	13	U13	breathing	apnea
129	pneum/o-	5	U5	lung	pneumothorax
130	pneumon/o-	5	U5	lung	pneumonia
131	poly-	11	U11	large or many	polyphagia
132	post-	12	U12	after	postpartum
133	postero-	1	U1	back side	posterolateral
134	pre-	12	U12	before	prepartum
135	pulmon/o-	5	U5	lung	pulmonology
136	pyel/o-	11	U11	renal pelvis	pyelonephritis
137	-pyretic	13	U13	fever causing	antipyretic
138	quadr/i-	3	U3	four	quadriceps muscle
139	radio-	1	U1	ray (e.g., X-ray)	radiography
140	re-	6	U6	return or go back	reflux
141	retin/o-	14	U14	retina	retinopathy
142	rhegmat/o-	14	U14	tear in a tissue	rhegmatogeneous
143	rhin/o-	13	U13	nose	rhinovirus
144	-rrhea	6	U6	abnormal flow	diarrhea
145	-rubin	8	U8	ruby-colored substance (red)	bilirubin
146	salping/o-	12	U12	fallopian tube	salpingectomy
147	sarc/o-	12	U12	connective tissue	sarcoma
148	-scope	6	U6	viewing instrument	laparoscope
149	-scopy	6	U6	viewing (instrument)	colonoscopy
150	scot/o-	14	U14	dark area or shadow	scotoma
151	semi-	12	U12	half	semilunar valve
152	sono-	1	U1	sound	sonography
153	sub-	2	U2	beneath or under	subdural hematoma
154	super-	11	U11	over or above	supersaturation
155	syn-	12	U12	together	synthesis
156	-tens-	11	U11	pressure	angiotensin
157	-thelium	11	U11	lining layer	epithelium
158	-thesis	10	U10	placing	synthesis
159	thromb/o-	3	U3	blood clot	thrombocyte
160	-thyronine	7	U7	an amino acid	tetraiodothyronine
161	-tome	2	U2	surgical instrument for drilling/cutting	craniotome
162	-tomy	2	U2	cutting of a structure	craniotomy

163	tomo-	1	U1	section or slice	tomography
164	-topic	12	U12	location	heterotopic
165	-toxic	9	U9	poisonous	cytotoxic
166	-trexate	12	U12	folic acid analog	methotrexate
167	tri-	12	U12	three	tricuspid valve
168	ultra-	1	U1	beyond	ultrasonography
169	ur-	7	U7	urine	polyuria
170	-uria	11	U11	condition of urine	dysuria
171	ur/o-	11	U11	urine or urinary system	urology
172	urin/o-	11	U11	urine	urinalysis
173	-vas/o-	6	U6	vessel	extravasation
174	-verdin	8	U8	green substance	biliverdin
175	vir/o-	9	U9	virus	virology
176	vitr/o-	14	U14	vitreous humor	vitrectomy

ABSTRACT

Learning Terms and Word Parts on a Medical English Course

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In this article, we summarize our work on creating a medical English word list for students at Hiroshima University and its delivery, first via a set of courses and materials, and then through the development of software that includes the list. Through the software, students have the means to consolidate their acquisition of the word list as well as new words that they encounter in their future medical research.

The medical English word list has been developed via vocabulary-rich medical English materials designed by our team through research at the university's medical school and corpus analysis of key reference books. The materials themselves have been taught through a mixture of a learning management system and in-person classes. We summarize this process and then focus on the development of the medical English word list and a further list of word parts, designed to sensitize students to the meanings contained within complex medical terms.

In the final part of the article, we describe how the new software incorporates the medical English word list, how it can be used to analyze the words in a text, and how the texts themselves can be saved for further study and as aids to the acquisition of medical terms during and beyond the students' medical English courses.

要　旨

医学英語コースにおける英単語学習方略

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本稿では，広島大学の学生を対象とした医学英単語リストの作成とその提供に関して，コースと教材の作成と，単語リストを含むソフトウェアを開発した過程について報告する。このソフトを通じて，学生は単語リストの習得を定着させるとともに，将来の医学研究で出会うであろう新しい単語も習得することができる。

医学英単語リストは，私たちのチームの医学部での教育研究成果と主要な参考書のコーパス分析を通してデザインした。教材そのものは，学習管理システム (Moodle) と対面授業の両方で使用している。

その過程を簡単に説明したのち，医学英単語リストおよび語源学習法のための word parts リストに焦点を当てる。これらのリストは学生が複雑な語構成からなる医学用語をパーツに分解し，意味推測を容易にするために設計したものである。

最後に，新しいソフトウェアがどのように医学英単語リストを組み込んでいるか，テキスト中の単語を分析するためにどのように使用できるか，さらに学習するためにテキストそのものをどのように保存できるか，また学生が医学英語コース受講中や受講終了後の医学用語習得の補助としてどのように活用できるかについて述べる。