

## **English and Latin Corpora of Medical Terms – A Comparative Study**

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**Abstract:** *Our study is based on comparison of the terminological corpora of medicine in English and Latin. English medical terms (anatomical and clinical) are studied from confrontational and contrastive viewpoints. Terminological units are studied from descriptive, semantic and partially also from historical aspects.*

*Comparative analysis of two languages in the field of terminology has shown that language similarities and differences in English and Latin terminological corpora have an impact on the practice and theory of terminology. Results show not only morphological and semantic shifts, but also historical development in some terms of the studied corpus based on codified medical handbooks and dictionaries. The studied corpus contains approx. 7,000 terms used in classes of Latin medical terminology in medical students.*

*Contrastive linguistics can be useful for the teaching e.g. of English-Latin medical terminology. Medical terms derived from classical languages present another “foreign” language (specifically its vocabulary and grammar rules). In medical language, a high number of English medical terms are equivalents of Latin ones in terms of their semantic and partially also morphological aspects. English is a language historically and culturally linked with Latin. Emphasis of differences can serve to evoke interest in medical students.*

**Keywords:** *contrastive linguistics, English/Latin corpora, medical terminology*

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### **1. INTRODUCTION**

Latin medical terminology is an obligatory study subject taught in the first academic year at all Slovak medical faculties. It is taught in conjunction with anatomy and means the first step in detecting the amazing world of the human body for the first year students.

Jessenius Faculty of Medicine (Comenius University) in Martin provides medical education both for Slovak students and for students from abroad, mostly citizens from other European Union countries. Also for them Latin medical terminology became an obligatory subject. A new textbook of Latin medical terminology, tailored to students' needs, had to be developed. This creative, highly specialized work required a lot of study, searching in medical dictionaries, Latin and English grammars, textbooks, comparing individual Greek/Latin terms with their English equivalents etc. In our paper we would like to share the results of our study done besides others also by means of a contrastive analysis of English and Latin corpora of medical terms.

### **2. FOCUS OF STUDY**

In medical terminology generally there can be observed two completely different phenomena: a very precisely worked-out, internationally standardized anatomical terminology and a quickly developing clinical terminology of all medical branches, characterized by a certain terminological chaos. The main cause of this phenomenon is quick development of scientific knowledge and a need to name promptly new devices, diseases, symptoms etc. (Dzukanova, 2002).

Our paper is based on comparison of the “safer” standardized anatomical Latin and English terminological corpora of medicine. It is because (a) we will try to prove the strength of impact of Latin medical corpora on English medical terminology and (b) the new quickly developing clinical terminology of nowadays is mostly of English origin and is subsequently translated into national terminologies. Of course it does not mean that we will not deal with clinical terms as well.

English medical terms (anatomical and clinical) can be studied from various viewpoints. We decided to study them from confrontational or contrastive viewpoints using the tools of contrastive linguistics.

“Contrastive linguistics is not a unified field of study. The focus may be on general or on language specific features. The study may be theoretical, without any immediate application, or it may be applied, i.e. carried out for a specific purpose. Contrastive linguistics is a systematic comparison of two or more languages, with the aim of describing their similarities and differences” (Johansson, 2000).

It can be regarded as a branch of comparative linguistics that is concerned with pairs of languages which are or are not ‘socio-culturally linked’. Contrastive studies focus on the differences, rather than the similarities, between the languages compared (Gast, 2012, 2013). Differences between medical terminologies of two different languages are interesting from the etymological, morphological, semantic and lexical point of view. They can be studied in synchronic or diachronic ways.

Our aim is to find out analogies, parallels, and similarities of Latin and English terms and specify major differences in English and Latin medical vocabularies.

### **3. DATA/METHODS**

Parallel corpora are a valuable source of data and were the principal reason for the revival of contrastive linguistics that took place in the 1990s (Salkie 2002).

“They give new insights into the languages compared – insights that are likely to be unnoticed in studies of monolingual corpora; they can be used for a range of comparative purposes and increase our understanding of language-specific differences; they can be used for a number of practical applications, e.g. in lexicography, language teaching, and translation (Johansson, 2000).

Comparisons of specialized corpora are necessary for various purposes, e.g. compiling bilingual technical dictionaries and thesauri, teaching technical translation (Pal Hentai, 1988), and study of English/Latin medical terminology.

Our study is based on the parallel corpora of approximately 7,000 medical terms incorporated in the textbook *Terminologia medica*, Greco-Latin Medical Terminology (Bujalkova - Jureckova, 2013) and in *Terminologia Anatomica*. International Anatomical Terminology; Gray’s Anatomy; International Statistical Classification of Diseases. English equivalents were consulted with Dorland’s Illustrated Medical Dictionary, Stedman’s Medical Dictionary and The Pocket Atlas of Human Anatomy by H. Feneis. The most common method we applied was the method of contrastive analysis, respecting the specific signs, features, and developmental peculiarities of individual terms as well as their universal signs/characteristics. Terminological units were studied from descriptive, semantic and partially also from historical aspects.

### **4. ANALYSIS OF ENGLISH VS. LATIN MEDICAL CORPORA - HISTORICAL/ETYMOLOGICAL, MORPHOLOGICAL AND SEMANTIC ASPECTS**

The founders of scientific medicine and terminology were Old Greeks. From the 6th century B. C., they gradually abandoned magic and necromancy and started medical practice based on experience and old-Greek philosophy. They realized the importance of clear and exact terms in science. Old-Greek medicine came into existence with Hippocrates, the father of medicine. In his time, primitive terms and descriptions were no longer used.

Romans (as in many fields) took over the medical knowledge from the Greeks, translating and re-writing the Greek books. The greatest Roman medical writer, Celsus, was considered to be a founder of Latin medical terminology. The Latin language was lacking the names for many medical notions, especially the terms for pathological conditions, and that is why Celsus and others had to borrow the Greek terms into Latin. This was the way Latin medical terminology based on two languages - Latin and Greek - was founded. The Greek part of the terminology was latinised.

When the Romans conquered Britain in the first half of the 1<sup>st</sup> century, they established Latin as the official language. Probably it led to Celtic-Latin bilingualism in some social classes and in doctors even to trilingualism: Celtic-Latin-Greek (Andrews, 1947).

Current medical terminology may be divided into two main parts: anatomical (based on Latin) and clinical (based on Greek). The anatomical medical term „brain“ is called „*cerebrum*“ but inflammation of the brain, i. e. the name of the disease, is called „*encephalitis*“. This division is not absolute. There are also Latin clinical terms and Greek anatomical terms in a latinised form.

In the following pages we will have a look at the impact of each of these two languages on English medical terminology separately. We will take into account historical/etymological, morphological and semantic aspects of both corpora.

## **5. ENGLISH MEDICAL TERMS OF GREEK ORIGIN**

In spite of the fact that there was no direct contact between Greek and English as was the case with Greek and Latin, a certain number of Greek terms have been preserved in English medical corpora in three possible forms:

### **5.1. Terms Preserved in Original Ancient Greek Form**

From a number of preserved English medical terms of Greek origin we have chosen the following ones with their explanation of the meaning in terms more familiar to laymen:

*bregma* – the point on the surface of the skull at the junction of the coronal and sagittal sutures

*arteria* – (artery) any vessel carrying blood away from the heart

*chorion* – outer extra-embryonic membrane

*diabetes* – disorder characterized by excessive urine excretion as in diabetes mellitus

*diarrhoea* – abnormal frequency and liquidity of faecal discharges

*empyema* – accumulation of pus in a cavity of the body

*glottis* – the vocal apparatus of the larynx consisting of the true vocal cords and the opening between them

*myopia* – 1. nearsightedness, 2. shortsightedness

*ophthalmia* – a severe inflammation of the eye

*pneumonia* – inflammation of the lungs with congestion caused by viruses or bacteria

*carcinoma* – malignant tumour of cancerous nature

*trauma* – harm or hurt; a wound or maim

These terms have preserved the original ancient Greek form till now with some modification according to phonetic rules of English. As a developmental peculiarity we present the term *arteria* (artery) and its etymology in which the medical concept underwent significant changes in its meaning in the course of centuries. The word *arteria* probably consists of the Greek word *aer* - air and the verb *terein* – to keep, because the arteries were supposed by the ancients to contain air, or from Gr. *aeirein* – to lift or attach (Bujalkova, 2013).

### **5.2. Greek Medical Terms in Latin “Dress”**

Most Greek medical terms came into English in Latin “dress”, i.e. with a Latin ending or spelling. Masculine nouns changed their Greek ending *-os* to the Latin ending *-us*, Greek neuter nouns preserved their original ending *-on* or changed to the Latin ending *-um*. The endings *-er*, and *-ma* preserved their original Greek forms.

L. *bronchus* - from Gr. *bronchos* = windpipe

L. *colon* - from Gr. *kolon* = the part of the large intestine extending from the cecum to the rectum

L. *pericardium* - from Gr. *pericardion* = the membrane around the heart

L. *thrombus* - from Gr. *thrombos* = a clot, formed during life, in a blood vessel or in one of the cavities of the heart

L. *embolus* - from Gr. *embolos* = plug

L. *coma* - from Gr. *koma* = state of profound unconsciousness

L. *bacterium* - from Gr. *bakterion* = any single-celled organism

L. *sphincter* - from Gr. *sphinkter* = sphincter, muscle closing an orifice *Greek terms assimilated into English*

Many Greek terms resisted assimilation for a very long time and were anglicised only partially, either as adjectives or names of diseases (never as a denomination of a part of the human body). At the beginning the process of anglicisation was very slow or in a very changed form, e.g

Gr. *paralysis* → Engl. *palsy* (loss or impairment of motor function of the neural or muscular mechanism)

Gr. *pleuritis* → Engl. *pleurisy* (inflammation of the pleura, with exudation into its cavity and upon its surface)

Gr. *rhachitis* → Engl. *ricketts* (inflammatory disease of the vertebral column)

Here are several examples of Greek adjectives/names of some diseases referring to organs or parts of the body such as *arm, skin, liver, heart, kidney, bone, head, hip, mouth, wrist* which have kept their original English denominations

Organ in Greek	Organ in English	Adjective / Disease
<i>brachion</i>	<i>arm</i>	<i>brachial</i> / -
<i>derma</i>	<i>skin</i>	<i>dermal</i> / <i>dermatitis</i>
<i>hepar</i>	<i>liver</i>	<i>hepatic</i> / <i>hepatitis</i>
<i>kardia</i>	<i>heart</i>	<i>cardiac</i> / <i>carditis</i>
<i>nephros</i>	<i>kidney</i>	<i>nephric</i> / <i>nephrosis</i>
<i>osteon</i>	<i>bone</i>	<i>osteal</i> / <i>osteoma</i>

After the decline of the Roman Empire, Greek as a scientific language disappeared completely. The rebirth of Greek as a tool suitable for scientific purpose did not occur until the period of Humanism.

### **5.3. English Medical Terms of Latin Origin**

Latin kept its position only thanks to the fact that it was a language of the Church for many centuries. There is a historical paradox that Latin, as the second major source of medical vocabulary, had to vanish first as a living language before it became a means of doctor's communication for long centuries during the Middle Ages. Latin terms of medical corpora penetrated into English terminology in various forms.

### **5.4. Terms Preserved in Original Latin form**

From a number of preserved English medical terms of Latin origin we have chosen the following ones with explanations of their meanings

*abdomen* – the region of the body of a vertebrate between the thorax and the pelvis

*appendix* – a vestigial pouch-like process extending from the lower end of the cecum

*aorta* – the largest artery in the body

*caecum* – (Am. *cecum*) – the cavity in which the large intestine begins and into which The ileum opens

*dorsum* – back

*femur* – the longest and thickest bone of the human skeleton that extends from the pelvis to the knee

*humerus* – upper arm bone

*nucleus* – a part of the cell containing DNA and RNA and responsible for growth and reproduction

*tonsillitis* – inflammation of the tonsils, sore throat

*vagina* – 1. a genital canal of the female reproductive organs; 2. sheath (in tendons);

*vena* – a blood vessel that carries blood from the capillaries to the heart;

*varicella* – chickenpox

*variola* – smallpox

*virus* – a non-cellular microorganism

These terms have preserved their original Latin form up to now with some modification of their pronunciation according to the phonetic rules of English, e.g. *aorta* [eɪ'ɔ:tə], *virus* ['vaɪərəs], *vagina* [və'dʒaɪnə].

### **5.5. Latin Terms Assimilated Into English**

Another similarly numerous group is of anglicized Latin terms. Terms such as *muscle, oil, vein, nerve,* and *crown* are obvious to everybody and do not need any definition.

L. *mandibula* → Engl. *mandible* = the lower jaw bone

L. *pulpa* → Engl. *pulp* = soft structure inside the tooth

L. *punctura* → Engl. *puncture* = perforation

L. *pulsus* → Engl. *pulse* = the rhythmical contraction and expansion of the arteries with each beat of the heart

L. *ventriculus* → Engl. *Ventricle* = a chamber of the heart which receives blood from the atrium and pumps it to the arteries

L. *musculus* → Engl. *muscle*

L. *oleum* → Engl. *oil*

L. *nervus* → Engl. *nerve*

L. *corona* → Engl. *crown*

Similarly, as in the case of Greek terms, some Latin terms assimilated only as specialized denominations of organs or diseases, the organs commonly named by English words, e.g.

Organ in Latin	Organ in English	Adjective
<i>pulmo</i>	<i>lungs</i>	<i>pulmonary</i>
<i>os (oris)</i>	<i>mouth</i>	<i>oral</i>
<i>cutis</i>	<i>skin</i>	<i>cutaneous</i>
<i>ren</i>	<i>kidney</i>	<i>renal</i>
<i>umbilicus</i>	<i>navel</i>	<i>umbilical</i>
<i>cor</i>	<i>heart</i>	<i>cordial</i>
<i>dens (dentis)</i>	<i>tooth</i>	<i>dental</i>

### 5.6. Terms that Experienced a Multiple Assimilation

After the conquest of England by the Normans in 1066, they brought to England a new official language that considerably influenced English vocabulary, spelling, grammar, and sentence structure. French words penetrated first of all into administrative, legal, religious, political, military, artistic, and culinary terminologies, less into medical vocabulary, though there are some French terms, such as *jaundice* (Fr. *jaunisse*), *ague* (Fr. *aigu*), *poison*, *faint* etc. French played a far more important role as a medium for penetration of Latin words into English. These are e.g. *superior*, *inferior*, *male*, *female*, *face*, *gout*, *migraine*, *odour*, *ointment*, *pain*, *venom* (Andrews, 1947).

A few medical terms experienced a multiple assimilation – from Greek into Latin, from Latin into Old French, from Old French into English. Compare

Greek	Latin	French	English
<i>diaita</i>	<i>diaeta</i>	<i>diète</i>	<i>diet</i>
<i>rheumatikos</i>	<i>rheumaticus</i>	<i>reumatique</i>	<i>rheumatic</i>
<i>spasmos</i>	<i>spasmus</i>	<i>spasme</i>	<i>spasm</i>
<i>chirurgos</i>	<i>chirurgus</i>	<i>chirurgien</i>	<i>surgeon</i>

In the 16th century many neologisms from Latin elements entered the language for a scientific purpose, e.g. *cerebellum*, *delirium*, *cadaver*, *cornea*, *vertigo*, *albumen*, *sinus*, *appendix*, *abdomen*, *digit*, *ligament*, *saliva*. Although the Renaissance brought a lot of new terms (Andrews, 1947, puts the number at 12,000 words), this new vocabulary did not penetrate into English as deeply as French did. Humanism created not only humanistic Latin but also conditions for its successive replacement by living languages. Since the time of Humanism and the Renaissance, the history of international medical terminology has overlapped with the history of national terminologies. They influence each other and cannot be separated (Simon, 1989).

Latin had a tendency to replace Greek nouns describing the parts of the human body and their relative adjectives with its own terms and used Greek stems for the creation of compound words suitable for denomination of pathological changes. A similar process can be observed in English, which also prefers its own terms for the denomination of organs while all other terms are taken from Latin together with the tendency mentioned above. See

Organ (Engl.)	Organ (Lat.)	Disease (Gr.)	Adjective (L. or Gr.)
breast	<i>mamma</i>	<i>mastitis</i>	<i>mammary</i>
kidney	<i>ren</i>	<i>nephritis</i>	<i>renal</i>
marrow	<i>medulla</i>	<i>myelitis</i>	<i>medullary</i>
skin	<i>cutis</i>	<i>dermatitis</i>	<i>cutaneous</i>
eye	<i>oculus</i>	<i>ophthalmia</i>	<i>ocular/optic</i>

### 5.7. Synonymy and Polysemy of Medical Terms

Too many synonymic terms for one concept is an unwanted phenomenon in scientific language and contributes to misunderstanding. Although polysemy, homonymy and synonymy are unwanted phenomena in medical terminology, however, their occurrence is relatively abundant and no branch of medicine can avoid them. While homonyms are rather rare within one branch of medicine, synonyms quantitatively enlarge the vocabulary. Synonyms are defined as words with similar or very close meanings. Synonymy is very closely connected with calques (words translated from other languages) (Dzukanova, 2013).

### 5.8. Polysemy

Polysemy refers to a word that has two or more similar meanings.

“Many standard vocabularies try to organize medical terminology in order to enumerate the main meaning shifts of terms. In particular, the big effort devolved in the construction of the merging repository called UMLS, succeeded in controlling the more superficial kind of ambiguities, due to historical relatedness, accidents of orthographic blending, or syntactic alternation (e.g., noun vs. verb). In linguistics, this kind of polysemy is named contrastive polysemy. For example, by inflammation one could mean a physiological function, a condition, or the area of an organ that bears an inflammation process” (Gangemi et al., 2000).

In anatomical and clinical medical terminology polysemy is important in some common nouns; it uses medical terminology in specific meanings such as *suture*, *stitch*; *opening*; *hollow*, *labium*. The given examples are taken from a textbook in which the principles of contrastive polysemy were put into practice (Bujalkova – Jureckova, 2013)

English common noun	Latin / English special meaning
1. suture	<b>sutura</b> - (anat.) suture, union of flat bones with ligament - (clin.) surgical stitch
	<b>raphe</b> - (anat.) suture, union of soft structures (skin, muscles)

English common noun	Latin / English special meaning
2. opening	<b>apertura</b> - most often it means the mouth of some passage - opening made up of big bones
	<b>foramen</b> - denotes many types of various openings as passages for veins, arteries, muscles and nerves
	<b>ostium</b> - means an opening such as a mouth or entrance

English common noun	Latin / English special meaning
3. hollow	<b>cavitas</b> - hollow, cavity; most frequent
	<b>sinus</b> - hollow in the bone
	<b>caverna</b> - (anat.) cavern, hollow - (clin.) pathological cavity as a result of tissue destruction
	<b>antrum</b> - hollow, cavity

English common noun	Latin / English special meaning
4. labium	<b>labium superius (oris)</b> - upper <b>lip</b>
	<b>labium inferius (oris)</b> - lower <b>lip</b>
	<b>labium pudendi majus</b> - outer <b>fold</b> of vulva
	<b>labium pudendi minus</b> - inner <b>fold</b> of vulva
	<b>labium internum</b> - internal <b>margin</b> (of a bone) <b>labium externum</b> - external <b>margin</b> (of a bone)

### 5.9. Synonymy

Synonymy in our study appeared on three main levels

a) Along with an international Greek/Latin term, another synonym formed from foreign (Greek/Latin) elements has developed at the same time, e.g.

*erythrocyte* x *normocyte*;  
*neutrophil* x *polymorphonuclear leucocyte*;  
*antihæmophylic factor A* x *coagulation factor*;  
*asiderotic anaemia* x *sideropenic anaemia*;  
*haematopoiesis* x *sanguinification*, etc.

Such synonyms arise due to the different motivation of word-formation of individual terms. For example in the term *erythrocyte* the red colour is emphasized. In its synonymic term *normocyte* the normal development of the cell is emphasized. Similarly in the term *neutrophil* the neutral stain used in staining of leucocytes in laboratories was the basic motivating element in development of this term, while in its synonymic variety *polymorphonuclear leucocyte* it was the amount of differently shaped cores which the white cell contains (Besa, 1992).

b) An international Greek/Latin term has been translated into English, e.g.

<i>cranium</i> – skull	<i>femur</i> – thighbone
<i>cerebrum</i> – brain	<i>sternum</i> – breastbone
<i>haematopoiesis</i> – blood cell production;	<i>monocyte</i> – mononuclear cell;
<i>erythrocyte</i> – red blood cell (RBC);	<i>leukocyte</i> – white blood cell (WBC);
<i>thrombocyte</i> – blood platelet;	<i>coagulation</i> – blood clotting;
<i>haemolysis</i> – blood destruction;	<i>haemostasis</i> – arrest of bleeding.

Translations (calques) of Greek/Latin terms into English have different stylistic value and validity. While the international terms *erythrocytes*, *leukocytes*, *thrombocytes* and *coagulation* serve for specialists, their English equivalents *red blood cells*, *white blood cells*, *blood platelets* and *blood clotting* are used in articles or speech intended for the common reader or listener.

c) Sometimes along with a borrowed term, several variants of a translation occur and enter mutually into synonymic relations, e.g.

*erythrocyte* – red (blood) cell x red (blood) corpuscle;  
*phagocyte* – phagocytic cell x defensive cell, or the colloquial expression scavenger cell;  
*haemastasia* – control of haemorrhage x control of bleeding x prevention of blood loss.

Since the 18<sup>th</sup> century, there has been a need for systematic order and a certain regularity in the English language that has still not been fulfilled. For instance, besides terms with Greek-Latin spelling there are terms with English spelling:

*haemostasis* x *haemostasia*, *polyglobulia* x *polyglobulism*,  
*thrombopathia* x *thrombopathy*, *thrombopenia* x *thrombopeny*;

different affixes are used in words with the same meaning, e.g. we have found in English texts the following terms used as synonyms:

*embolia* x *embolus* x *embolism*; *coagulum* x *coagulate* x *coagulant*.

## 6. RESULTS OF ANALYSIS OF RELATIONS BETWEEN LATIN AND ENGLISH MEDICAL CORPORA

Our analysis has brought results which are illustrated in the following schemes:

a) Development of English medical corpus in historical context:

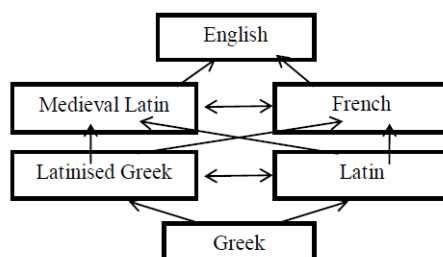


Fig1. Historical development of English medical corpus

b) Linguistic relationships between Latin and English medical corpora:

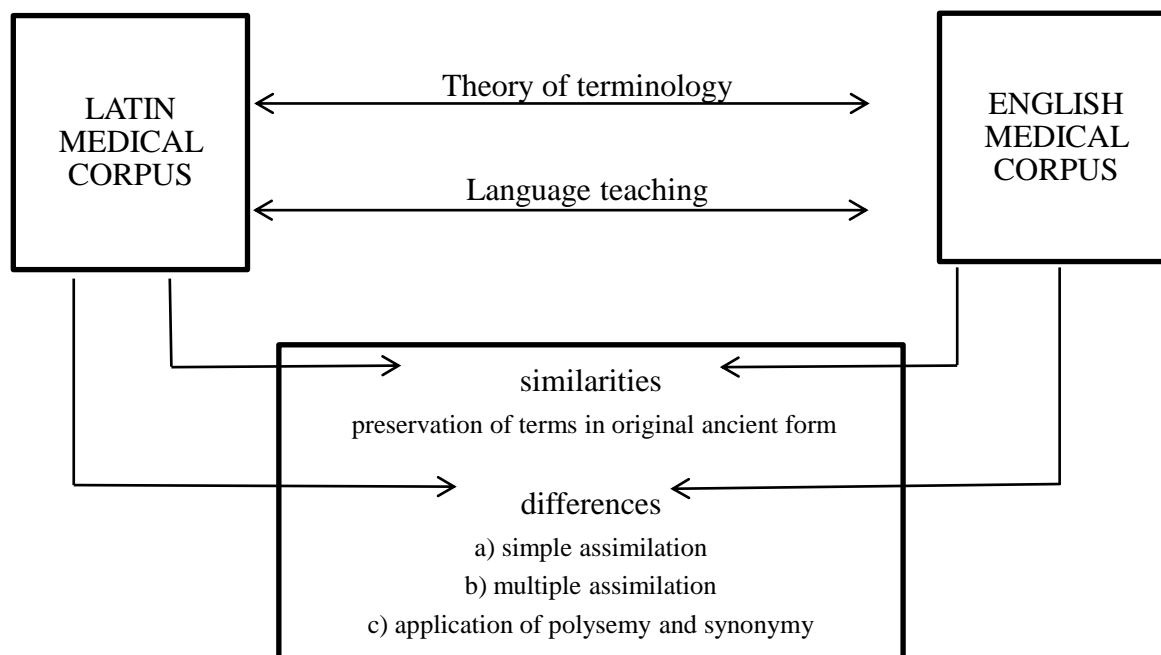


Fig2. Comparison of English and Latin medical corpora

## 7. CONCLUSION

Greek-Latin terminology is primarily used by a relatively small circle of people – specialists – and is used as a peripheral part of the lexical system of Modern English even today (Vachek, 1974). Medical terminology based on Latin and Greek has several advantages:

1. It provides continuity between the past and the present as well as the continuity in space –  
Latin terminology is used in the Western (so called scientific) medicine;
2. There is no ambiguity in it because Latin and classical Greek as dead languages do not undergo any changes;
3. Latin language has simple spelling and pronunciation.

Anatomical terminology contains, according to the latest edition of *Terminologia Anatomica. International Anatomical Terminology* (1998), about 5,800 Latin terms (4/5 of them are Latin, 1/5 are Greek). Clinical terminology elaborates statistical classification of diseases. The names of diseases have been formed empirically in various times and places so clinical terminology is not so uniform. Besides, clinical subjects are developing very progressively and their knowledge must be continually revised.

English is a language historically and culturally linked with Latin. Emphasis of differences can serve to evoke interest in medical students and enable them to remember things better. Medical terms derived from classical languages present another “foreign” language (specifically its vocabulary and grammar rules because syntax is not addressed in terminology studies). In medical language, a high number of English medical terms are equivalents of Latin ones in terms of their semantic, historical and morphological aspects. Contrastive analysis has been used as a means of predicting and explaining difficulties in Latin medical terminology teaching and learning in international students through English whose mother tongue is often another language and not English.

Comparative analysis of two languages in the field of terminology has shown that language similarities and differences in English and Latin terminological corpora have an impact on the practice and theory of terminology. Results show not only morphological and semantic shifts mainly in the area of polysemy and synonymy, but also historical development in some terms of the studied English corpus. The expected results also have a theoretical purpose contributing to understanding of specific linguistic, typological differences as well as of universal features.



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