



Traditional and modern trends in medical terminology formation in various languages

Olga Maslova ^{a1} 

^a *Sechenov First Moscow State Medical University, Moscow, Russian Federation*

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Abstract

Modern medical terminology is constituted by a complex system, a combination of medical and paramedical terms that have been added and modified alongside the centuries-old development of world medicine and medical science which are still bearing dynamical character. The article discusses the specificity of medical terminology formation, one of the major functions of which is to spread scientific information. It often requires global approaches to medical concept nomination. This research is aimed to identify the main criteria in international term formation, based on comparative description of lexical forms presented in different periods in medical science. An essential role in medical vocabulary creation has been played by a number of scientific international languages (Greek, Latin, English). In this regard, the terms of the described type can be assumed to be made up by the patterns of a scientific communication language. Nowadays, medical professionals have a choice between adopting and translating international terms into their native languages, which decreases a lingua franca importance. However, continuous knowledge exchange causes new ways of information globalization. A widespread form in this respect is represented by a coding system maintained by World Health Organization.

Keywords: medical terminology; term; term formation; terminological unit; pattern; globalization.

1. Introduction

The dynamical movement of scientific and technological progress, discoveries in various fields of science and technology contribute to the emergence of special words or phrases (so-called 'terms') to indicate new objects, processes and phenomena. The mentioned above factors for the medical terminology development and use which regularly change educational objectives imply the perpetual relevance of the subject under study. Like any other specialized lexis, the terminology of the medical field has been drawing attention of many linguists (Dirckx, 1983; Wulf, 2004; Baethge, 2008; Džuganová, 2013; 2019) studying the described language area from the diachronic and synchronic standpoints with a use of varied approaches and methods, such as: terminological, stylistic, educational and linguistic ones.

The diverse investigation of medical terminology indicates on the use of it in different areas of knowledge and communication (i.e., not only in medical scientific communication particularly, but

¹ Corresponding author.

E-mail address: o-maslova7678@ust-hk.com.cn

also in the study of applied linguistics or language history, in educational medium as well as in specialist and non-specialist communication (e.g., between doctors and patients, etc.)). In diachronic analysis, researchers (Dirckx, 1983; Sakai, 2007; Džuganová, 2013; 2019) usually base on the Greek and Latin roots which, historically, served as the sources for the universal medical scientific vocabulary.

2. Literature Review

According to C. Baethge (2008, 37), we need to note the ‘leading role’ of English in the modern medical language development. Nowadays, specialists have a choice between adopting or translating terms from the lingua franca into their native languages, which causes other ways of word formation in medicine. However, continuous knowledge exchange requires constant globalization of nominations in the pointed field. The purpose of this research is to identify the main criteria in international medical term formation, based on comparative description of lexical forms presented in different periods in the considered field development. It includes the solution of the following objectives:

- to trace various trends in terminology formation in the history of medical science;
- to determine the current ways of medical concept nomination and globalization;
- based on diachronic medical terminology description, to highlight the factors for concept globalization by the studied language area.

The hypothesis assumes that medical term globalization is, mainly, realized by means of word-formative elements or lexemes borrowed from a prevalent language which is used in scientific communication.

This work comprised both theoretical research by a number of linguists such as, J.H. Dirckx (1983), M.K. Wynia (1995), H.R. Wulf (2004), T. Sakai (2007), A.M. Alcaraz (2012), G. Masukume (2012), R.P. Ferguson and D. Thomas (2014), and descriptions of the studied language units, which were provided by the following sources: medical English (Bartolucci and Forbis, 2005, Schroff et al., 2015), general English (Augustyn et al., 2015, 2021) glossaries; Latin-English (Lesser, 2018), English-German (Crystal, 2021a), English-Russian (Crystal, 2021b) translation dictionaries; coursebook (Chabner, 2015); and the conventions on International Statistical Classification of Diseases and Related Health Problems (2016) established by World Health Organization (WHO). The subject of the research is a variety of medical terms (including word-formative patterns) and code groups that define the main medical concepts.

3. Materials and Methods

This research was based on the use of such methods of linguistic analysis, as: descriptive (characterizing the ways of concept nomination as well as word-formative elements in medicine), distributive (identifying and classifying the constituents combined into lexical units by the meaning) and comparative. The last was implemented on two levels: 1) synchronic (comparing current term forms in a number of (English and German) languages, which originate from the common Latin stems, as well as certain units describing the same concepts in the following (English, German and Russian) languages) and 2) diachronic (oriented to comparison and classification of terminological patterns, including globalizing ways, referred to different periods in the researched field).

As a basis for medical science birth, the works by old Greek philosophers and doctors, such as Hippocrates, Aristotle, Galen, are often regarded. Many terminological units introduced by the presented scientists have still been retained in international vocabulary, e.g., ‘bronchus’, ‘aorta’, ‘diaphragm’, ‘trachea’, ‘hepatitis’, ‘diphtheria’, ‘carcinoma’, ‘massage’, ‘epidemics’ (Dirckx, 1983,

14; Wulf, 2004, 187; Sakai, 2007, 70; Džuganová, 2013, 59-60). The following periods in the considered scientific field are marked by the Latin use. One of the main creators of terminology in the pointed language has been represented by Roman scientist Aulus Cornelius Celsus (25 BC – 50 AD) (Figure 1) who wrote an encyclopedic overview titled as ‘De Medicina’ (Dirckx, 1983; Parkinson, 2000) of Greek medical research. In adoption of Greek terms, he either replaced their original endings with the Latin ones, e.g., ‘bronchos’ (Gr.) > ‘bronchus’ (L) or wholly translated Greek words into Latin, e.g., ‘kynodontes’ (Gr.) > ‘dentescanini’ (L) > ‘canine dents’ (Engl.) (‘dog teeth’) (Parkinson, 2000). After Roman Empire failed, knowledge of Latin was temporarily lost.



Figure 1. Aulus Cornelius Celsus

4. Results and Discussion

In Renaissance Europe, Latin regained its importance as the unique scientific language. At that period, much of medical research, e.g., ‘that by Vesalius, Harvey and Sydenham’ (Wulf, 2014), was published in the given language.

In the spread to national languages, Latin terms were often undergoing certain assimilations, as demonstrated by the current forms presented in the following English and German languages, namely: 1. in the ending, e.g. ‘extremitas, es f’ – ‘extremity, ies’ (Lesser, 2018, 3), ‘Extremitat, en f’ (Crystal, 2021a), etc.; 2. in the suffixes peculiar to nouns, e.g. ‘infectio, onis’ – ‘injection’ (Lesser 2018, 5), ‘Injektion, en f’ (Crystal, 2021a), or adjectives, e.g. ‘lymphaticus, a, um’ – ‘lymphatic’ (Lesser, 2018, 6), ‘lymphatisch’(Crystal, 2021a), etc.; 3. in the root, e.g. ‘musculus, i m’ – ‘muscle, -s’ (Lesser, 2018, 6), ‘Muskel, n m’ (Crystal, 2021a), etc.

To emphasize, in international terminology formation, an essential role has been played by Greek and Latin prefixes and suffixes. As examples of the Latin word-formative elements, can be observed such prefixes, as: dis- (denoting lacking of a feature, e.g., ‘disfunction’), ab- (indicating an action of moving away, e.g., ‘abduction’) or ad- (describing the process of attraction, e.g., ‘addiction’), etc. Sometimes, the latter presented element serves as a suffix of the same meaning, e.g., ‘dorsad’, ‘ventrad’. In turn, the Greek term forming components used in international medicine include the following units: prefixes a- or an- (indicating ‘absence’, e.g., ‘apathy’, ‘analgesic’), cata- (denoting a decreasing process, e.g., ‘cataract’, ‘catabolism’) as well as suffixes describing a pathological condition or process (i.e. – osis, e.g., ‘atherosclerosis’, ‘psychosis’ or -itis, e.g., ‘arthritis’, ‘tonsillitis’) (Chabner, 2015), etc.

It should be noted that many affixes encountered in medical vocabulary were, originally, independent lexemes. The presented type of units embraces a number of suffixes originated from Greek (such as, -cyte, -graphy, -logy, -lysis, -opsy, -osis, -poiesis, -scopy, etc.) or Latin (e.g. -ation) as well as prefixes based on both Greek (e.g., ankilo-, arsen(o)-, fibro-, fibri-, gynaeco-, myo-, etc.) and

Latin (e.g., ambi-, amylo- etc.) words. Semantically, the suffixes of the considered type can be divided into several groups which denote in the Table 1 (Chabner, 2015).

Table 1. Groups of the suffixes

Group	Suffix	Meaning	Example
medical branch or research area	-logy	study	cardiology, cytology
medical examination	-graphy	description	fluorography
	-scopy	observation	endoscopy
	-opsy	view	autopsy
biological process	-ation	process	medication
	-lysis	destruction	haemolysis
	-poiesis	production	haematopoiesis
abnormal condition	-pathy	suffering	encephalopathy
	-osis	disease	osteoporosis
medical procedure	-ectomy	removal	cholecystectomy
organic part	-cyte	cell	erythrocyte
classification	-phil	pertaining to	neutrophil

The prefixes based on the meanings of independent words can be classified by the criteria indicated in the Table 2(Chabner, 2015).

Table 2. Groups of the prefixes

Group	Suffix	Meaning	Example
organic part	myo-	muscle	myocardium
	fibro-	filament	fibrosarcoma
	angio-	blood vessel	angiogram
quality	amylo-	starchy	amylase
	ankyl-	curved	ankylosis
position	ambi-	on both sides	ambidextrous
	ecto-	outer	ectoblast
relation to a gender	arsen(o)-	male	arsenoblast
	gynaeco-	female	gynaecology

Alongside Greek and Latin, international medical vocabulary has been increased by other national languages, such as: French (which brought the words ‘diet,’ ‘disease,’ ‘migraine,’ etc.), Italian (with the borrowed units ‘influenza,’ ‘malaria,’ ‘pellagra,’ ‘quarantine,’ ‘scarlatina,’ etc.) or Arabic (with the borrowings ‘alcohol,’ ‘Alchemy’ (Chemistry), ‘elixir,’ etc.) (Alcaraz, 2012, 67-90). From the middle of the 20th century, the lingua franca in scientific nominations has become English, which is, mainly, due to the international status acquired by the mentioned language in communication. Researcher H.R. Wulf (2004, 287) presents such internationally used English medical terms, as: ‘screening,’ ‘scanning’. According to the latter cited author, we need to add that ‘with a use of English international terms, doctors from non- English- speaking countries have the choice between directly importing or translating them into their own languages’. Therefore, contemporary medical vocabulary can be assumed to have no lingual boundaries in its formation.

It is also worth emphasizing the metaphoric units applied in medical descriptions. In observation by G. Masukume and Z. Zumla (2012, 55), the considered tradition was widely used in both the terminological nominations and translations from the 19th till the early 20th centuries ‘due to lack of accurate diagnostic services. Totally, researchers (Wynia, 1995; Masukume, 2012) note over 450 metaphors in medical literature, which are associated with various foods (fruits, vegetables, cereals, seafood, dairy products), plants, animals, astronomical bodies, weapons, dining table utensils, laboratory items, drinks and colours. So, English medical terminology reveals a variety of phrases including the word ‘grape,’ e.g., ‘the lexical unit ‘grape-like vesicles’ describes hydatidiform mole, an

abnormal pregnancy in which the placenta contains chorionic villi distended by fluid vesicles visible with the naked eye.

The following term ‘Carswell’s grapes’ denotes ‘multiple tubercles of active pulmonary tuberculosis clustered around the finer bronchioles which open into the alveoli. The infiltration of muscular and elastic tissues, and its extension along the walls of the bronchial tubes themselves, assume a ‘racemose’ distribution of pulmonary tubercles giving them a ‘grape-like’ appearance’ (Wynia, 1995, 438; Masukume, 2012). To add, medical metaphors can be of both national and international character, the latter literally translated into different languages. Here is a set of lexical units of the pointed type, which present the following forms in English, German and Russian: ‘avian flu’ (Schroff et al., 2015) – ‘vogelgrippe’ (Crystal, 2021a) – ‘bird flu’ (Crystal, 2021b), ‘cat’s cry syndrome’ (Schroff et al., 2015) – ‘katzenschrei-Syndrome’ (Crystal, 2021a) – ‘cat cry syndrome’ (Crystal, 2021b), ‘mad cow disease’ (Schroff et al., 2015) – ‘Rinderwahnsinn’ (Crystal, 2021a) – ‘mad cow disease’ (Crystal 2021b). At present, metaphors are usually referred to a common speech, most of them having their corresponding names in scientific styles, e.g., ‘avian flu’ – ‘Influenza virus A,’ ‘mad cow disease’ – ‘Creutzfeld-Jacob disease’ or ‘Spongiform Encephalopathy’ (as infectious diseases), ‘cat’s cry syndrome’ – ‘Lejeune syndrome’ or ‘the lack of the 5th chromosome fragment’ (as a genetic mutation followed by mental disorder) (Schroff et al., 2015), etc.

The shift from a lingua franca to the word-formative patterns of native languages has resulted in new ways of term formation in medicine. In this respect, the leading part belongs to word combinations which denote one object, as demonstrated by the following terms in English: ‘blood pressure’, ‘heart attack’, ‘side effect’ (Schroff et al., 2015), etc. To emphasize, many phrases of the described terminology have reduced to abbreviations in speech functioning, e.g., DNA (‘deoxyribonucleic acid’), HIV (‘human immunodeficiency virus’). Such terms are usually spread from one language into another as literal translations including their own abbreviation forms. For example, all the pointed above units have the following equivalents in German and Russian: ‘blood pressure’ – ‘Blutdruck’ (Crystal, 2021a), ‘blood pressure’ (Crystal, 2021b); ‘deoxyribonucleic acid’ – ‘DesoxyribonukleinSäure’ (DANS) (Crystal, 2021a), ‘Deoxyribonucleic acid’ (DNA) (Crystal, 2018b); ‘heart attack’ – ‘Herzanfall’ (Crystal, 2021a), ‘heart attack’ (Crystal, 2021b); ‘human immunodeficiency virus’ – ‘Humanes Immundefizienz-Virus’ (HIV) (Crystal, 2021a), ‘AIDS virus’ (HIV) (Crystal, 2021b); ‘side effect’ – ‘Nebenwirkung’ (Crystal, 2021a), ‘side effect’ (Crystal, 2021b). Sometimes, an abbreviation is borrowed by different languages as the original form, e.g., the English term ‘COVID-19,’ which is spelled like ‘coronavirus disease of 2019’ (Augustyn et al., 2021). The international spread of the presented form has been carried out under the pandemic condition for 2019-2021.

Another specific group of contemporary medical terms is being occupied by eponyms which are defined as: ‘The name of an object or activity that is also the name of the person who first produced the object or did the activity’ (Ferguson and Thomas, 2014, 4). So, Stedman’s Medical Eponyms Dictionary (2005) accounts about 18,000 eponymic terms. Otherwise, the concept ‘eponym’ is connected with a proper name which is related to the researched field in different ways: as an inventor or discoverer as well as a character (of mythology, bible, fiction) who experienced the described condition or possessed the mentioned anatomical part, or as a geographic place of discovery. Many units of the pointed type have received more concrete names expressing the meanings, as found in Stedman’s Medical Eponyms Dictionary, e.g., ‘Christmas disease’ – ‘Haemophilia B’, ‘Cinderella dermatitis’ – ‘perioral dermatitis,’ ‘Job syndrome’ – ‘Hyperimmunoglobulinemia E syndrome,’ ‘non-Hodgkin’s lymphoma’ – ‘lymphosarcoma’ (Bartolucci and Forbis, 2005, 3-8), etc.

As earlier noted, nowadays, specialists have a right either to adopt or translate scientific terms from a lingua franca into their native languages. However, continuous international exchange by medical

knowledge requires to organize a standard terminology. In solution of this problem, a medical scientific style often reveals pairs of synonyms, the presented lexemes of which indicate international and national names for the denoted objects. For example, Merriam-Webster Dictionary (2015) provides international synonyms for numerous English medical terms, e.g., ‘myopia x short-sightedness,’ ‘coagulation x blood clotting,’ ‘oedema x swelling’ (Augustyn et al., 2015), etc. In addition, modern medicine includes hybrid terms (e.g., in cytology) which combine lexemes from an original and native languages, as observed in the following German and Russian equivalents for the English term ‘killer cell’ based on the word ‘killer:’ ‘killerzellen’ (Crystal, 2021a) and ‘killer cell’ (Crystal, 2021b). The other examples of the considered type are represented by such units, as: ‘B-lymphocyte’ or ‘T-lymphocyte’ indicating the origins of the denoted object by the initial letters, i.e., ‘lymphocyte produced by the bone marrow’ or ‘thymus’ (Schroff et al., 2015). In maintenance of the described classifiers, such terms have been translated into various languages (particularly, into German and Russian): ‘’, ‘T-Lymphozylen’ (Crystal, 2021a) and ‘B-lymphocytes’, ‘T-lymphocytes’ (Crystal, 2021b).

The ICD contains a variety of code numbers which indicate certain types of health conditions (i.e., diseases, disorders including various signs, symptoms, complaints), causes for injuries or deaths, or medical services.

Consider some of them presented in International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) edited in 2016 (Wells and Bay-Nielsen, 2016):

- certain infectious and parasitic diseases (A00-B99);
- neoplasms (C00-48);
- mental and behavioral disorders (F00-F99);
- external causes for morbidity and mortality (V01-Y98);
- health services for examinations and investigations (Z00-Z13), etc.

In consideration of all the term forming rules referred to different periods in medical science, we need to emphasize the following factors for concept globalization in the researched field:

- the prevalence of a lingua franca (i.e., Greek, Latin and English);
- term hybridization;
- encoding nominations for certain types of diagnoses, causes, services.

The Greek and Latin use included term formation by means of common word stems and affixes. Such patterns have been of universal importance which enables specialists speaking any language to recognize the meanings of the applied units. The English influence has not only contributed a number of new terms into international use, but also provided the terminologies of other languages with the syntactic patterns: word combinations often followed by abbreviations. To add, the universal medical vocabulary has been supplemented by scientific contributions from various nations. This process involved both borrowing and translating lexemes from one language into others, the latter way retaining an original form of nomination, e.g., an eponymic unit or metaphoric description.

The term hybridization combining a borrowed word and that of a native language should be identified as a specific globalizing way for modern terminology that is, mostly, based on a national language pattern. Another presented above way (i.e., encoding nominations) is, mainly, used as a non-lingual means for designations in health care information, which is, especially, important for international use. In this regard, the last-mentioned factor has to be considered as the basic prospect for further globalization of various medical concepts with maintaining a right for each language users to create their own terms.

5. Conclusions

The diachronic description of medical scientific vocabulary enables to identify 3 basic periods (marked by a prevalent language use), each having determined a certain type of patterns in the analyzed language area, namely: 1) Greco-Latin, 2) English periods and 3) that of a native language pattern use. The first mentioned period has been characterized by the prefixal-suffixal patterns, the second and the following third ones have, mainly, contributed syntactic patterns. A set of other widespread forms observed in medical terminology has been represented by such units, as: metaphors and eponyms. By the researched results, the terms of the pointed types often have synonymic names which either refer the denoted concepts to a diagnostic area (as for metaphors) or clarify the described meanings (in eponyms).

One of the major functions of the researched language area is international scientific information exchange, which requires a global approach to concept nomination. In the course of medical science, the presented role has been much performed by the word-formative elements of a lingua franca. Occasionally, the vocabulary has been added by the borrowings or translations from other languages. Now, as a lingua franca is losing its influence, the prevalence in international concept description is being acquired by the following factors: term hybridization and coding system. The latter is of especial importance in the spread of common medical information.

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AUTHOR BIODATA

Olga Maslova is a PhD in Philology, Senior Teacher, Institute of Linguistics and Intercultural Communication of the Sechenov First Moscow State Medical University, Moscow, Russian Federation.