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PATENT INFORMATION SEARCH AS MODERN TOOL OF RESEARCH IN THE FIELD OF MEDICAL AND BIOLOGICAL SCIENCES

Introduction. Today, progress and competitiveness in the field of biomedical sciences is achieved through the development of innovative biological, medical, and pharmaceutical high-tech technologies and R&D developments, resulting from the implementation of R&D projects.

Problem Statement. Patent information retrieval is an integral part of research, development, and introduction of new products. The patent information retrieval allows determining the scientific and technical level of developments in the medical and biological sphere and predicting the trends of their development. However, in scholarly research literature today there is no systematic information on the features of monitoring intellectual property in medicine and biology, as part of the formation of the scientific and innovation strategy of the institution.

Purpose. Analysis of patent and information databases to determine the most relevant for the implementation of an effective strategy for patent research in the field of biomedical sciences.

Materials and Methods. The sources of information and scientific communication — scholarly research articles, periodicals, Internet resources, patent databases, and regulatory documents. The methodological basis of the research is the methods of structural-logical and comparative content analysis of international and domestic patent databases and a synthesis of the results of the analysis.

Results. The specificity of the use of national and international databases lies in the specialization of their search capabilities and in the completeness of the provision of subject information in each branch of science. When conducting a patent information search in the field of biomedical sciences, it is advisable to use a search in patent and R&D databases. This gives the opportunity to get complete information about the novelty of the object of economic activity, promising commercial solutions in medicine and biology.

Conclusions. Patent and information databases have been analyzed to determine the most relevant documents corresponding to the search query for conducting patent information research in the field of biomedical sciences in R&D institutes and higher educational establishments.

Keywords: patent information search, database, biomedical sciences, R&D development, R&D institute, and higher educational establishment.

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Today, progress and competitiveness in the field of medical and biological sciences (MBS) is secured by the development of innovative biological, medical, and pharmaceutical science-intensive technologies and R&D developments resulting from R&D projects. The rapid development of medical and biological sciences and the demand for research in these areas contribute to the commercialization and acceleration of the implementation of a significant number of innovative products in health care, which, accordingly, raise the effectiveness of diagnosis and treatment, encourage the abandonment of ineffective approaches to prevention, prolong the life of patients, and improve its quality [1–3].

Patent documentation, as a rule, comes two or three years earlier than other types of publications, is not duplicated in other sources of information, is legally reliable and, in the case of inventions, is confirmed by the conclusions of state expert review, covers all fields of science and is published in more than 90 countries throughout the world [9]. Patent is the only source of information about the scope of patent holder rights. In addition, patent documents are a valuable source of technical and commercial knowledge about the development of machinery and technology, market trends and corporate assets of companies, which are presented in the form of an innovative product [1, 8, 13].

The aim of this research is to analyze patent and scholarly research databases to determine the most relevant patent research in the field of medical and biological sciences for the implementation of an effective strategy.

The research has been done using modern sources of information and scientific communication: scholarly research articles, periodicals, Internet resources, patent databases (DB), and legal documents. The methodological framework of the research consists of the methods for structural-logical and comparative content analysis of international and domestic patent databases and further generalization of the analysis results. Patent databases that contain copyright protection

for R&D innovations in the field of medical and biological sciences have been searched on the Internet, as well.

In most advanced economies, patent information analysis is an integral part of research and the basis of competitive analysis [2, 5, 10]. Limitation of an information-analytical search to the conventional sources of information, including publications in scholarly research journals, proceedings of seminars or conferences, without comprehensive study of patent documentation may lead to loss of much scientific and technical knowledge, which certainly affects the quality of research, implementation of potential R&D developments and their commercialization [6]. Research made by the European Patent Office has shown that 70–90% of the unique information contained in patent documents is not published any longer [10]. Therefore, analytical research on patent information is used to generate new ideas and to identify areas where they can be applied. In the modern world, patent information as a stable flow of information is formed as a result of the relations regulated by the laws that arise while creating and using inventions, industrial designs, and utility models [12].

Patent Information Search (PIS) is a modern tool for analyzing the patentability of intellectual property, which enables monitoring the R&D progress in various fields of science and technology.

In general, the PIS allows users:

- ◆ to get information about the technical level of object, as well as to determine the feasibility of its legal protection;
- ◆ to minimize the risk associated with possible duplication of existing technical solutions at the initial stage of development of a potential patent object, thereby determining the compliance of the patent object with the "novelty" criterion;
- ◆ to get information on technical solutions or technologies that are the object of research, in order to further obtain a patent or license for an already patented solution;

- ◆ to identify violations of patent holder's rights to industrial property;
- ◆ to analyze the conditions for the unimpeded sale of products on the market of a particular country(ies) and to exclude violation of the rights of third parties who hold patents valid in the territory of these countries;
- ◆ to develop a marketing strategy for identifying the most promising areas of activity, to identify potential competitors, areas of their activities and to choose a market niche; and
- ◆ to study the development trends of a certain type of technology [4, 12].

The complexity, completeness, reliability, and analytical capabilities of the PIS directly depend on the sources of information used. The databases of national and regional patent offices (European Patent Office, Eurasian Patent Organization, WIPO, USA, CIS, Canada, Japan, etc.) provide official information on patents and are therefore the most reliable source of legal information.

In Ukraine, PIS is mandatory for business entities that are fully or partially funded from the state budget. This requirement applies to R&D institutes and higher education institutions (HEIs), whose activities are related to medical and biological field [7]. Therefore, the government standard of Ukraine DSTU 3575-97 *Patent Search. Basic Provisions and Procedure* (hereinafter referred to as DSTU), effective since 01.01.1998, testifies to the government's interest in creating perfect competitive products [5].

According to DSTU [5], there is a need for a clear statement of the problem to be solved while doing PIS, depending on the stage of the life cycle of the object of study. The most important are results of PIS at the initial stages of research, i.e. forecasting and long-term planning.

The specificity of PIS in the field of MBS lies in the fact that the objects of economic activity are different: method, substance, strain of the microorganism. With regard to PIS in the field of MBS, it is important to take into account some features of its implementation: search, selection, and analysis of patent and information materials that are

relevant to the research to be implemented; definition of the degree of development of the problem, identification of the factors influencing the negative results obtained, the possibility of obtaining new results in the problem studied; definition of the degree of coincidence and discrepancy of essential features of the object of economic activity and identification of analogous patents; and determination of the probability of finding the necessary information materials.

It is important to consider the specifics of acquiring intellectual property rights, such as treatment and diagnosis. Such objects can be patented only in some countries, including Ukraine, the Russian Federation, other CIS countries, South Korea, Nigeria, Australia, and in the United States, with significant restrictions. In most countries, treatments and diagnosis are not object of invention, in particular, in all EU Member States, Canada, Mexico, New Zealand, South America, Asia, and Africa. The most important reason for referring such objects to non-patentable is that medical care shall not depend on the will of the patent holder. Thus, when studying the novelty and invention with respect to these objects, it is necessary to analyze not only the materials from patent databases, but also from databases of scientific and scholarly research publications.

Patent documentation in the form of standardized documents is published by official offices, which increases the degree of reliability and completeness of information contained in copyright documents [13]. Public sources of patent information are official bulletins of patent offices of different countries. In Ukraine, the official body that publishes information on applications, amendments to applications, patents issued, and rejected applications is the state enterprise *Ukrainian Institute of Intellectual Property* (<http://www.ukrpatent.org>). Information about a specific patent can be published in several subsequent issues of the bulletin, reflecting amendments/modifications to the application (patent) throughout its validity (in Ukraine, 10 years for the utility model patents and 20 years for the invention pa-

tents) [8]. Patent information of national patent offices is published not only in official bulletins, but also on the websites of these offices. The full list of patent offices that provide patent information is given on the website of the World Intellectual Property Organization (WIPO) (<https://www.wipo.int/members/en/>).

The web resource of each patent office has its own search engine and principles for processing the documents. The largest collection of free patent information is contained in the resources of the European Patent Organization (EPO) (<http://worldwide.espacenet.com>), WIPO (<http://patentscope.wipo.int>), Japan, Austria, Belgium, Cyprus, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Liechtenstein, Luxembourg, Monaco, the Netherlands, Portugal, Spain, Sweden, Switzerland, and England.

The USA has offered access to a full-text database of patents since 1976, an abstract database of patents since 1976, and a database of trademarks. The search is based on bibliographic data and the full text of document (<http://www.uspto.gov>).

WIPO PATENTSCOPE database (<https://www.wipo.int/patentscope>) allows users to read the full text of international applications filed under the Patent Cooperation Treaty (PCT), from the first day of their publication, as well as patent documents of national and regional patent offices

of its member states. As of 2019, the PATENTSCOPE database contains data from 57 national or regional agencies. Also, it is the only database that provides access to the complete collection of PCT international applications, as well as to collections of regional and national patents. It is the only free patent information search system that enables creating a pool of search terms in different languages, in order to conduct an integrated information search in many languages, as well as a specialized search for chemical compounds mentioned in information structured elements of patent document description.

Today, the largest commercial corporations for the creation of patent and R&D databases in the field of MBS are as follows: *Chemical Abstract Service (CAplus, Registry, CASReact, ChemCats, ToxCenter CIN databases)*, Elsevier B.V. (*Embase, Reaxys databases*), Clarivate ANalytics (*Derwent World Patent Index, Derwent Genesequence, BIOSIS, DRUGU, IPA, VETU*), and many other companies.

The aggregate database collection in the MBS field contains information on scientific facts, knowledge, and methods of their use in the form of scholarly research publications or patent documents and covers such areas as inorganic and organic chemistry, genetic and cellular engineering, engineering enzymology, drug biotechnology, bio-

Search Capabilities of Databases

Search parameters	<i>CAplus</i>	<i>CASReact</i>	<i>ChemCat</i>	<i>CIN</i>	<i>Embase</i>	<i>Reaxys</i>	<i>Scopus</i>	<i>BIOSIS</i>	<i>DGENE</i>	<i>DRUGU</i>	<i>WPIndex</i>	<i>WOS</i>	<i>Espacenet</i>	<i>PATENTSCOPE</i>
Chemical names	+	+	+	+	+	+	+	+	+	+	+			+
Chemical structures	+	+				+	+			+				+
DNA									+					
Classifier	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Special thesaurus	+				+					+	+			
Scientometric attributes	+				+		+	+			+	+		
Patent attributes	+					+			+		+		+	+
Commercial names	+	+	+	+	+		+		+		+		+	+
Production attributes	+		+	+						+				

technology of food supplements and creation of biotechnological equipment, as well as biotechnology methods for environmental protection.

Hence, national and international databases provide complete information in each field of science. When conducting PIS in the field of MBS, it is advisable to use the search in patent and R&D databases, which enables obtaining information about the novelty of the object of economic activity, the technical level, searching for similar patents, promising commercial solutions in medicine and biology, as well as about competitiveness and contributes to the identification of trends in the formation of new research areas.

The specifics of using such databases is based on the specialization of their search capabilities. The Table 1 shows the specific search capabilities of the respective databases.

One group of databases (*CAplus* [14], *Embase* [15], *BIOSIS* [16], *IPA* [17], *VETU* [18] or patent documents under the trademark *Derwent DWPI* [19], *DPCI* [20], *DGENE* [21]) enables searching with the use of a standardized system of synonyms of chemical names of compounds, terms of scientific thesauri or their registration numbers and classification indices. Another group focuses on searching for documents by the chemical structure of compounds or DNA structure of (*CAplus* [14], *Reaxys* [22], *DGENE* [21], *CASReact* [23], etc.). In other segment, there are databases that accumulate marketing information (such as *CIN* [24], *CHEMCATS* [25], *IPA* [17], *Derwent – DRUGU* [26], etc.). In some databases, in addition to thematic (scientific) search it is possible to search by

bibliometric criteria (for example, the scientometric database *Scopus* [27] that contains a significant part of the *Embase* information database), or the *Web of Science* database [28] that makes it possible to take into account associative data, or factors of influence of subjects of the science-intensive product market.

While implementing the innovation cycle of creation, commercialization, and manufacture of knowledge-intensive products, patent information search changes both its goals (patentability – novelty – invention – freedom of use – marketing of serial products) as well as patent and R&D (factual and documentary) databases, economic and marketing information databases, industrial designs, and trademarks corresponding to these goals. Regarding the use of methodological approaches to search in such databases, it should be noted that most of the above databases form search chains that enable a comprehensive research across scientific and practical innovation.

Thus, this research has analyzed patent and information databases to determine the most relevant documents that meet a search query for patent research, which enables identifying the competitive areas in the field of medical and biological sciences and the most promising of them; making an objective assessment of novelty, as well as technical and economic efficiency of research works; using the most significant achievements of world science while doing research works; and timely protecting technical and technological solutions with patents in Ukraine and abroad.

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ПАТЕНТНО-ІНФОРМАЦІЙНИЙ ПОШУК ЯК СУЧАСНИЙ ІНСТРУМЕНТ ДОСЛІДЖЕНЬ У ГАЛУЗІ МЕДИКО-БІОЛОГІЧНИХ НАУК

Вступ. Сьогодні прогрес і конкурентоспроможність у галузі медико-біологічних наук (МБН) досягається за рахунок розвитку інноваційних біологічних, медичних, фармацевтичних наукоємних технологій і науково-технічних розробок, які є результатом виконання науково-дослідних робіт та проєктів.

Проблематика. Проведення патентно-інформаційного пошуку (ППП) є невід'ємною складовою наукових досліджень, розробки та впровадження нової продукції. PPP дозволяє визначити науково-технічний рівень розробок в медико-біологічній галузі й спрогнозувати тенденції їхнього розвитку. Проте, в науковій літературі сьогодні відсутні систематизовані відомості стосовно особливостей моніторингу інтелектуальної власності в медицині та біології як частини формування науково-інноваційної стратегії установи.

Мета. Аналіз патентних та інформаційних баз даних для визначення найбільш релевантних для реалізації ефективної стратегії патентних досліджень у галузі медико-біологічних наук.

Матеріали й методи. Сучасні міжнародні та вітчизняні джерела інформації та наукової комунікації – наукові статті, матеріали періодичних видань, ресурси Інтернет, патентні бази даних (БД), нормативно-правові документи, опрацьовані методами структурно-логічного і порівняльного контент-аналізу та узагальнення результатів проведеного аналізу.

Результати. Специфіка використання національних та міжнародних БД полягає як у спеціалізації їх пошукових можливостей, так і у повноті надання предметної інформації у кожній галузі наук. При проведенні PPP у галузі МБН доцільно використовувати пошук в патентних та науково-технічних БД – це дає можливість отримати повну інформацію про новизну об'єкту господарської діяльності, перспективні комерційні рішення в медицині та біології.

Висновки. Проаналізовано патентні та інформаційні БД для визначення найбільш релевантних документів, що відповідають пошуковому запиту для проведення патентно-інформаційних досліджень у галузі медико-біологічних наук у наукових установах та вищих навчальних закладах.

Ключові слова: патентно-інформаційний пошук, бази даних, медико-біологічні науки, науково-технічна розробка, наукова установа, вищий навчальний заклад.