

## Scientometric study of patent literature in medicine

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### Abstract

A scientometric study was performed to assess the quantitative trend of patent literature in MEDLINE throughout 1965-2005. The kind of languages, publication type, journals, and the origin of published documents were presented.

The study showed that the growth of patent literature in MEDLINE with an annual growth of 11.4% was 3.6 times higher than the common growth of the MEDLINE database which had an annual growth of 3.1% through 1965-2005. More than 90% of all documents indexed as “*patents*” in MEDLINE were in English followed by Russian (4.12%), French (1.36%) and German (1.20%).

The study indicated that Genes and Genetics was the most frequented Major MeSH Descriptors (Main Heading) in MEDLINE throughout the period of study.

The USA with publishing 55% of all documents indexed as patents in MEDLINE was the most prolific country in the term of patent literature, followed by England with 27%, USSR with 4%, Canada with 2%. It is remarkable that 82% of all publications belong to the USA and England; only 18% of publications belong to other countries in the world. The origin country of four documents stayed unknown (in MEDLINE).

Journal “*Nature*” with publishing 14% of all documents, indexed as patents (patent literature) in PubMed was the most prolific periodical, followed by journal “*Science*” with 8%, “*Nature-biotechnology*” with 8%, “*Lancet*” with 2%, “*BMJ*” with 2%, “*New Scientist*” with 2% and “*Food and drug law*” with 1% respectively. From a total of 31 publications kind regarding to

the documents indexed as patents in MEDLINE with a total frequencies of 3,207 titles, 46% of all publications were in the form of journal Articles, 22% in the form of News, 5% Letter, 5% Comment, 4% Review, 3% Editorial, 2% Newspaper Article, 2% Research Support, 2% English Abstract. The rest were less than 2%.

The proportion of publications in English showed considerable growth through 1965-2005. It reached from 52% in 1965 to 90% in 2005 an increase of 72%. Analysis of study predicted that the percentage of publications in English in MEDLINE will reach to the saturation level at 97% in 2030. This indicates that the editorial policy of entering data to the database of MEDLINE is being changed, and the attention of policy makers in this database have focused on the literature of science in English.

### 1 Introduction

One of the most reliable ways to track science and technology activities is the study of scientific literature (Journal Articles, News, Review, Comment, Letter, Editorial, Newspaper Article, etc.), co-authorship, patents, citations, co-citations. Examining scientific literature underpins analysis of the scientific community and its structure in a given society, as well the motivations and networks of researchers. There are many methods for the measurement of patent and research activities, among them Scientometrics, which has earned its place as an important tool in evaluating research activities and scientific output by counting the number of papers and the impact of papers on scientific disciplines, by counting the number of citations,

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patents, etc.

Tracing of Scientific literature cited in patents goes back many years. This kind of analysis was pioneered by Francis Narin and his colleagues.

There were very few studies about tracing patents in the scientific publications. Glänzel, W. and Meyer, N. emphasized in their study that even specialists in the area of patent citations appear not to have studied this type of citation link.

In this concept the author is interested in attempting to study the linkage between patents and scientific publications in medical fields, indexed in MEDLINE. To achieve this aim all publications indexed as a term of "patents" in MEDLINE based on the major topic of MeSH thesaurus were extracted and analysed. MeSH (Medical Subject Headings) is a hierarchical and controlled vocabulary thesaurus of the National Library of Medicine (NLM), It is designed and structured for cataloguing and indexing MEDLINE database of journal citations and other media, and to search the MEDLINE data using MEDLINE.

## 2Method

All data was extracted from PubMed online. Extracting of data in PubMed was limited to MEDLINE by selecting MEDLINE from the Subsets menu on the Limits screen. The delimitation of the patent literature was made as all publications indexed as a main heading of "Patents" limited to the field of "MeSH Major Topic" in MEDLINE for a period of 40 years (1965-2005). These topics belonged to the countries all around the world, their publications published in the Periodicals, which MEDLINE provides access to them.

## 3Data

All data are connected to literature references which in turn are linked to PubMed.

## 4Results

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Figure 1: Number of total publications indexed in MEDLINE 1965-2005

Figure 1 shows the total number of publications indexed in MEDLINE through 1965-2005.

As the Figure indicates the number of total publications indexed in MEDLINE has a doubling time of 22.5 years. The rate of annual growth is 3.1%. It is clear that the number of total publications in MEDLINE through 1965-1985 shows relatively slight growth. From 1986 to 2005 the number of total publications in MEDLINE shows exponential increase. The exponential increase of documents indexed in the MEDLINE in this stage should not come as a surprise, because this time was simultaneous with the rapidly spreading microcomputers and the influence of core journals in MEDLINE.

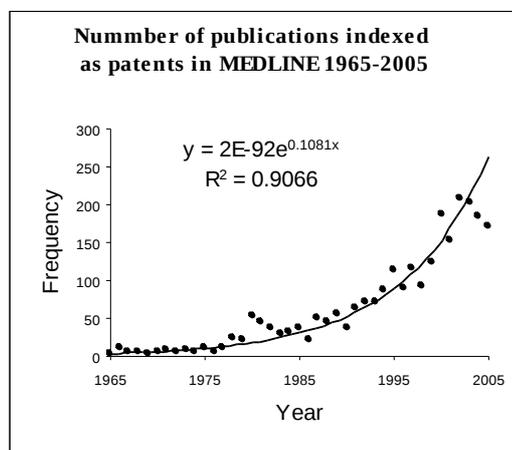


Figure 2: Number of publications indexed as patents in MEDLINE 1965-2005

As Figure 2 illustrates, the number of publications indexed as patents (literature about patents) in the field of Major MeSH Descriptors

(MJME) in MEDLINE from 1965 to 198 has increased slightly. From 1985 it shows relatively sharp growth, peaking in 2002.

The formula  $R^2 = 0.9066$  indicates that there is a high correlation ( $R = 0.95$ ) between the number of patent literature in MEDLINE and the years of under study.

The patent literature throughout the period of study shows a doubling time of 6.4 years.

Comparison of Figure 1 and Figure 2 indicates that the growth of publications indexed as patents in the field of MJME (patent literature) in MEDLINE with an annual increase of 11.4% is 3.6 times higher than the annual growth of total documents in MEDLINE (3.1%). It means that patents in medicine have an increasing influence.

Table 1: Distribution of languages for patent literature in MEDLINE 1965-2005

Languages	Number	Percent
English	2,253	90.16%
Russian	103	4.12%
French	34	1.36%
German	30	1.20
Italian	21	0.84
Spanish	14	0.56
Japanese	13	0.52
Swedish	9	0.36
Dutch	6	0.24
Czech	4	0.16
Ukrainian	4	0.16
Norwegian	3	0.12
Bulgarian	1	0.04
Danish	1	0.04
Finish	1	0.04
Hungarian	1	0.04
Polish	1	0.04
Total	2,499	100.00

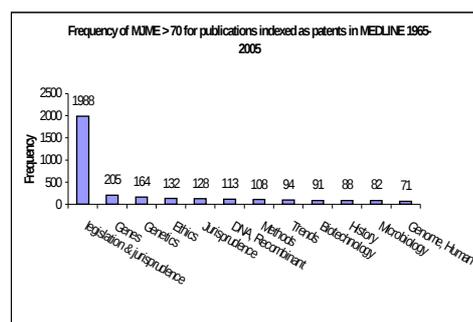


Figure 3: Distribution of Major MeSH descriptors > 70 for publications indexed as patents in MEDLINE 1965-2005

Figure 3 shows the distribution of MJME for publications indexed as “patents” in MEDLINE through 1965-2005. The Figure is restricted to the MJME with frequency above 70 times.

From a total of 6,869 Major MeSH Descriptors, the most often used show such a distribution.

The Figure indicates that after legislation-and-jurisprudence the most frequented major main heading in MEDLINE were Genes with 2.98% and Genetics with 2.39% respectively.

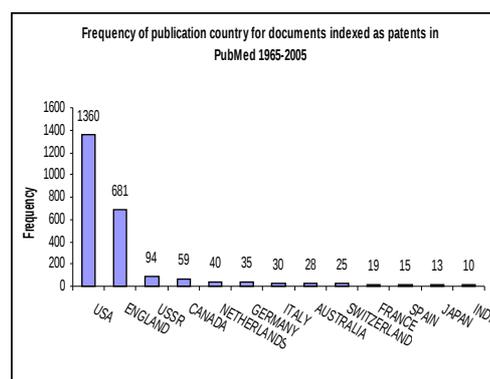


Figure 4: Distribution of publication countries for documents indexed as patents in MEDLINE 1965-2005

Figure 4 shows the frequency of most prolific countries, with regards to the documents, indexed as patents in the field of MJME in MEDLINE through 1965-2005. The graph is restricted to the countries with a frequency equal or higher than ten times. It is clear that the USA with 55% was the most prolific country, followed by England with 27%, USSR with 4%, Canada with 2%, Netherlands with 1% and Germany with 1% respectively.

The rest which consisted altogether 4% of all publication countries were Italy, Australia, Switzerland, France, Spain, Japan, India, Sweden, Russia, Poland, Denmark, Ireland, New Zealand, Ukraine, Brazil, Czechoslovakia, Norway, Scotland, South Africa, Argentina, Bulgaria, Chile, China, Colombia, Czech republic, Finland, Hungary, Kyrgyzstan, Mexico, Russia (Federation), Slovakia, Sri Lanka respectively.

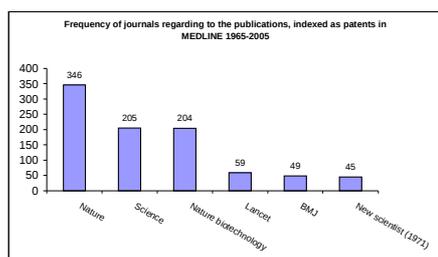


Figure 5: Distribution of journals regarding to the publications, indexed as patents in MEDLINE 1965-2005

Figure 5 shows frequency of most prolific journals regarding to the publications, indexed as patents in the field of MJME in MEDLINE through 1965-2005. The graph is restricted to the journals with a frequency of higher than forty times.

From a total of 671 periodical with a total frequency of 2,482 titles, only six journals showed a frequency higher than forty.

*Nature* with publishing 14% of all documents, indexed as **patents** (patent literature) in MEDLINE was the most prolific periodical, followed by *Science* with 8%, *Nature-biotechnology* with 8%, *Lancet* with 2%, *BMJ (Clinical research ed.)* with 2%, *New Scientist* with 2%, and *Food and drug law* with 1% respectively.

Table 2 maps the distribution of publication type for publications, indexed as patents in MEDLINE through 1965-2005.

From a total of 31 publications kind with a total frequencies of 3,207 titles, 46% of all publications were in the form of journals Article, 22% in the form of News, 5% Letter, 5% Comment, 4% Review, 3% Editorial, 2%

Newspaper Article, 2% Research Support, 2% English Abstract. The rest were lower than 2%.

Table 2: Distribution of publication type regarding to the documents indexed as patents in MEDLINE 1965-2005

No.	Publication types	Number	Percent
1	Journals Article	1,460	46%
2	News	701	22%
3	Letter	170	5%
4	Comment	147	5%
5	Review	141	4%
6	Editorial	112	3%
7	Newspaper Article	76	2%
8	Research Support	74	2%
9	Historical Article	71	2%
10	English Abstract	55	2%
11	Bibliography	30	1%
12	Comparative Study	29	1%
13	Biography	26	1%
14	Legal Cases	26	1%
15	Research Support, U.S. Gov't, P.H.S.	15	0%
16	Research Support, U.S. Gov't, Non-P.H.S.	14	0%
17	Congresses	12	0%
18	Evaluation Studies	11	0%
19	Interview	7	0%
20	Validation Studies	7	0%
21	Case Reports	4	0%
22	Classical Article	4	0%
23	Guideline	4	0%
24	Addresses	2	0%
25	Clinical Trial	2	0%
26	Directory	2	0%
27	Controlled Clinical Trial	1	0%
28	Government Publications	1	0%
29	Lectures	1	0%
30	Overall	1	0%
31	Research Support, N.I.H., Extramural	1	0%
	Total	3,207	100%

## 5 Discussion

Analysis of data indicated a slight growth for patent literature in MEDLINE from 1965 to 1985. Since 1986 it showed relatively sharp growth, peaking in 2002.

The patent literature throughout the overall period of study showed a doubling time of 6.4 years with an annual growth rate of 11.4%. This rate was 3.6 times higher than the annual growth rate of total publications in MEDLINE. The annual growth rate of total publication in MEDLINE was 3.1%.

From 37 German documents indexed as patents in the field of MJME in MEDLINE, 29 (78%) of them were published in German and only 8 (22%) documents were in English.

Journal "*Naturwissenschaften*" was the most prolific German journal regarding to publishing the documents, indexed as patents in MEDLINE through 1965-2005.

More than 90% (90.16%) of all publications indexed as "*patents*" in MEDLINE were in English followed by Russian (4.12%), French (1.36%) and German (1.20%).

The study indicated that from a total number of 6,869 Major MeSH Descriptors (Main Headings) in MEDLINE, after legislation & jurisprudence, Genes with 2.98% and Genetics with 2.39% were the most frequented Major MeSH Descriptors.

The USA with publishing 55% of all publications indexed as patents in MEDLINE was the most prolific country in the term of patent literature, followed by England with 27%, USSR with 4%, Canada with 2%. It is remarkable that 82% of all publications belonged to the USA and England; only 18% of publications belonged to other countries.

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## References

- Biglu, Mohammad Hossein (2008).  
Scientometric study of patent literature in MEDLINE & SCI. Ph.D. Dissertation, Humboldt - Universität zu Berlin, Institut für Bibliotheks- und Informationswissenschaft.
- Biglu, Mohammad Hossein (2008). The influence of references per paper in the SCI to Impact Factor and the Matthew Effect. *Scientometrics Vol 74*. Retrieved December 10, 2007 from <http://www.springerlink.com/content/8rj428gkx8h872j4/>
- Glänzel, Wolfgang and Meyer, Martin (2003). Patents cited in the scientific literature: An exploratory study of reverse. Citation relations. *Scientometrics*, Vol. 58, No. 2, P.415.428.
- Narin, Francis, and Elliot Noma (1985), Is Technology Becoming Science? *Scientometrics*, Vol. 7, P. 369-381.
- United States National Library of Medicine. <http://www.nlm.nih.gov/>