

## Is Your Journal Indexed in MEDLINE?

After some philosophic musings in my last *Perspectives*, I think the start of a new year is a good time to come back to some editorial issues. In this short article, I will detail what it takes for a medical journal to become indexed in MEDLINE and briefly discuss other available data bases. Undoubtedly, one of the largest and the most prestigious data bases is MEDLINE. It houses more than 17 million articles from more than 5300 journals published in 80 different countries (there are about 13,000–14,000 biomedical journals published worldwide).<sup>1</sup> It is administered by the National Library of Medicine (part of the Department of Health). This library, physically located on the campus of the National Institutes of Health in Bethesda, Maryland, is the largest facility of its kind in the world. It houses more than 7 million books, journals, films, etc. The MEDLINE data base contains articles from medical, nursing, dental, veterinary, health care, and preclinical sciences journals and is updated 5 days a week.

The instrument that is used to search this huge data base is called PubMed (the name comes from “Pub” for “published” and “public” and “Med” for “medicine”). PubMed also searches some journals not contained in MEDLINE. PubMed is available free of charge and, during 2009, was used about 1.3 billion times, an increase of nearly 65% compared with 2008.<sup>2</sup> The PubMed software was designed by the National Center for Biotechnology Information and the National Library of Medicine as a part of a larger search system called *Entrez*. PubMed has several features I particularly like, such as “See related articles” (no explanation needed) and “LinkOut,” which directs you to specific publisher Web sites. Nearly 90% of all articles indexed in MEDLINE are in English. To rapidly search the data base, PubMed uses a system based on medical subject headings (MeSH). The algorithm used is a Boolean expression in which the results are either true or false. One of its benefits is that it is very fast. MeSH also allows searching definitions of individual terms.

MEDLINE is part of a larger data base called MEDLARS. The on-line component of MEDLARS is MEDLINE. The decision to accept a journal into MEDLINE is made by the Director of the National Library of Medicine under the guidance of an advisory group called the Literature Selection Technical Review Committee.<sup>3</sup> The committee assures representation of minorities, women, and individuals with different expertise from all regions of the United States. Members (a total of 15) are elected on the basis of their scientific activities, achievements, honors, and other traits, but an MD or PhD is usually needed. To balance it out, some members of the general public are included. Total membership is renewed every 4 years in a tiered fashion. This committee convenes 3 times per year, and during each meeting, about 140 publications are evaluated. The committee assesses the following elements when considering a journal for inclusion in MEDLINE:

**1) Scope and Coverage.** Articles must deal with biomedical subjects. The committee will, however, consider non-biomedical journals occasionally if they are thought to significantly contribute to the medical and allied sciences.

**2) Quality and Content.** The most important aspect of any journal is its scientific merit (validity, importance, and degree of contributions to the biomedical sciences).

**3) Quality of Editorial Work.** The quality of the editorial work must reflect objectivity, credibility, and quality. The committee carefully evaluates the external peer-review process, adherence to ethical guidelines, disclosure of conflicts of interest, timely publication of errata, responsible retractions when appropriate, and opportunity for the expression of dissenting opinions.

**4) Lack of Commercial Influence.** The committee specifically assesses the potential influence that any advertising or commercial activities may have on the quality of the articles published.

**5) Production Quality.** The layout, printing, graphics, and illustrations are all taken into account. A journal printed on acid-free paper (as the *American Journal of Neuroradiology* [AJNR] is) receives higher evaluation scores.

**6) Audience.** Journals must be geared toward audiences comprising health professionals at every level (physicians, researchers, administrators, etc).

**7) Types of Content.** Content of a journal must include 1 or more of the following: original research, clinical observations, reviews, statistical compilations, case reports, and varying analysis (philosophic, ethical, social, etc). Publications consisting mainly of previously published articles (such as our *Special Collections*) or only abstracts (such as meeting program syllabi) are not considered for inclusion in MEDLINE.

**8) Journals in Languages other than English.** These are considered as long as the abstracts are in English and they meet the same criteria as their English counterparts.

**9) Geographic Coverage.** Journals are selected independent of where they are published. They should provide wide international coverage.

**10) Journal Categories.** All of the above criteria are influenced by the main purpose of a journal. Journals fall into the following categories:

A) Research: those that report original investigations.

B) Clinical or Practice: those that contain information regarding the current state of medical practice.

C) Review: those that provide background information of accepted principles in a consensus fashion.

D) General or All-Purpose: those geared toward broad audiences that contain elements of A–C.

After evaluation, journals are graded on a 0- to 5-point scale and about 25% of those reviewed will be accepted for indexing in MEDLINE. Only those receiving scores of 3.75 or higher are selected. If acceptance is denied, one may appeal the decision or decide to reapply 2 years later. Subsequent reviews are done on a 3-year basis. If a journal is less than 3 years old, it will be indexed entirely at the time of selection; if it is older than 4 years, indexing begins with the most recent year. A change in the title of a journal necessitates undergoing a new application. The merger of an indexed journal with one that is not indexed also requires a new application. Journals are audited periodically, and major changes for the worse may result in loss of their indexing.

Of course, because less than 50% of all biomedical publications are listed on MEDLINE, there are other data bases. This commentary would not be complete without mention of

some of these. The Embase data base (owned by Elsevier) contains about 1800 journal titles not found in MEDLINE (for a total of approximately 7000) and about 20 million individual entries.<sup>4</sup> The benefit of using Embase is wider coverage and inclusion of extensive pharmacologic and drug-related literature. Most medical school libraries that I know subscribe to this fee-for-service activity. Elsevier also owns the FIRST Consult data base.<sup>5</sup> This data base is divided into 3 parts: medical topics (apparently those related to evidence-based medicine), differential diagnosis, and a guide to procedures. It contains an index to all articles published in the *Clinics* series. Another important data base owned by Elsevier is Scopus.<sup>6</sup> This data base covers articles and abstracts from more than 16,500 journals extending beyond the biomedical sciences. The interesting thing about Scopus is that it contains author information including bibliography, citation rates, affiliations, etc.

There are other data bases that deal mostly with drugs, natural medicine, sports-related diseases, and psychiatric illnesses that are of no or little interest to neuroradiologists and are not addressed here. The Web of Science data base (owned by Thomson Reuters) is of interest mostly to editors and those in related occupations (it is also used by some promotions committees).<sup>7</sup> It contains information on more than 10,000 highly rated journals and expands to the social sciences, humanities, and arts. This powerful data base allows in-depth analysis of the performance of a journal and individual authors. The Journal Citation Reports data base is part of the Web of Science (it contains the famous "Impact Factor"). These are also paid services and are generally available through most medical school libraries.

The main difference between MEDLINE and the above-mentioned data bases is that journals included in them generally do not undergo rigorous evaluation. For example, Embase requires filling out a simple form suggesting the title you want included there. Their Web site provides no details as to who reviews the applications or the process. For Scopus, the title to be included is evaluated by a committee formed by "approximately 20 scientists and 10 librarians from all corners of the world," but further details are not given on that Web site. Content (either partial or full) from *AJNR* is found in all of these data bases.

Now I want to touch on Google Scholar. This is a subset of Google Web Search that permits searching of the academic literature, including articles, theses, books, and reports, so it is much more comprehensive than all other data bases. Google Scholar often links you to the article you are looking for via the Web site of the commercial publisher (these, in turn, may be linked to your medical school library, and you should not have to pay for most articles). The problem with Google Scholar,

paradoxically, is its comprehensiveness. Because all references appear in a search, one must be careful to select only those items that seem reliable, relevant, timely, and valid. This search engine can also look for legal opinions and patents. Google Scholar is still considered to be in its "beta" testing stage and what the final product will be able to do and look like, no one is certain. At this time, some academic libraries use Google Scholar as one of their search engines. Google Scholar sends "crawlers" into Web sites to learn their content, and some sites do not allow it. Listings of articles published in journals owned by Elsevier may be limited because this publisher did not allow entry of Google crawlers before 2007. More important, Google Scholar often displays only the first and last authors. Because Google Scholar registers all activities related to publications, it may become the most important scientific search engine in the future.

To end, a few words about *Index Medicus*. The *Index* was started in 1879 as a comprehensive list of medical science articles and was last published in 2004. Throughout its history, it assumed different configurations and was published by the National Library of Medicine or the American Medical Association. All data contained in it can now be found on MEDLINE and are accessible via PubMed.<sup>8</sup> Inclusion of a journal in the *Index* was subject to the same requirements as MEDLINE. Many of us still remember using the hefty *Cumulated Index Medicus* books to look for references. What a relief to be able to do it from our computers!

I think our readers and contributors can be confident that *AJNR* meets all criteria put forth by all data bases mentioned and can be found there. As criteria change, we will too, assuring that *AJNR* maintains its preeminent position in the clinical neurosciences.

## References

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