

SOURCES AND SEARCH STRATEGIES IN PAEDIATRIC IMMUNOLOGY

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Pediatric Immunology is a rather young subspecialty. Where this discipline primarily relates to a variety of rather infrequent diseases, basic research in Immunology has shown the omnipresence in medicine of the immune response. Where information sources on allergy and immunology in Pediatrics are rather scarce, Immunology as a basic science is very broad. Searching the literature can only be successful if some basic rules are followed. The most important advice is to first determine the level at which information is searched: basic or clinical, review or original study, diagnostic or therapeutic... The article intends to guide the general pediatrician in his immunological queries.

Descriptors: ALLERGY, IMMUNOLOGY, DOCUMENTARY INFORMATION, LITERATURE SEARCH, PEDIATRICS

INTRODUCTION

Since the digital revolution information gathering has become a problem of overload. The real challenge in documentary information is not to get information, but to know the ways to obtain correct, timely, at the required level understandable, tailored information. This paper wants to review the sources of good information that will allow a general pediatrician to consult the best possible sources for adequate information on Immunology and stay updated with the recent evolution in the field. Moreover, some attention will be asked for patient education and the public health information tools. The need for continuous learning and keeping up with recent discoveries will only increase in the years to come, especially in the booming field of immunology.

Immunology: from a small research field to an omnipresent mechanism

Very recently E.R. Stiehm and R.B. Johnston published an excellent overview of the history of Pediatric Immunology (1). Pediatric Immunology, organized as a small discipline since the early 19-50's, concentrated primarily on immune deficiencies, and so doing accumulated a wealth of basic scientific knowledge on the host defense mechanisms. Recently newer insight in immunoglobulin use, stem cell transplantation and gene therapy made clear that no single organ escapes the basic mechanisms of recognition of the "self" and of the "other". No field of Pediatrics now escapes to the omnipresence of the immune system.

This progressive infiltration of Immunology into other medical disciplines was a slow process. The antigen-antibody mechanism was first understood in the field of infectious diseases, originally in the study of diphtheria, and thereafter in the study of other pathogens. Immunization for several potentially lethal diseases constituted the first therapeutic success of a long research path. Soon, one started to understand that the defense mechanism could also lead to aggression of the own organs, especially of the external and internal teguments and mem-

branes. Rheumatology worked with the concept of auto-immunity. In the study of pulmonary diseases, especially bronchial hyperreactivity, one preferred the word "allergy". In Dermatology "atopy" was the leading term. The basic mechanisms however turned out to be based on the same underlying basic principles in all these diseases.

The next discipline to become an "immunological specialty" was nephrology; where a long list of diseases turned out to have an immune origin, just to name a few: lupus nephropathy, immune glomerulonephritis, and many more. Nowadays there is not a single discipline where the immune processes have not been identified as a major pathophysiologic factor. No single organ escapes the process, at any age: immune hydrops of the fetus has since long been identified.

Knowledge sources of pediatric immunology?

The omnipresence of the immune process explains that information on this topic can be found in almost every journal or book. This is at the origin of the fact that searching for immunologic knowledge should be done in a special way, but we will discuss this in a later section. Now I would first turn to the in-

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formation on "core" immunology i.e. the studies and review on the immune process itself.

Journals

The European Academy of Allergy and Clinical immunology has defined two journals as their official organs: 1. Pediatric Allergy and Immunology (ISSN 1399-3038) and 2. Allergy (former Acta allergologica) (ISSN 0105-4538) (2-4). Both are published by the Blackwell group. Mary An Liebert ed. publishes the US oriented only quarterly appearing Pediatric Asthma, Allergy and immunology (ISSN 0883-1874). The review journal Immunology and Allergy Clinics of North America (ISSN 0905-6157) also publishes articles of general interests to the general pediatrician and the Pediatrics clinic of North America (ISSN 0031-3955) publishes occasionally review articles on Pediatric aspects of Immunology.

This very limited number of journals stays in contrast with the 431 immunology journals cited in the Ulrich's database of journals. The ranking of the immunology pediatric journals in the list of immunology journals is low. The two journals devoted to clinical immunology in children rank only low in the list: Allergy is 28th and Pediatric Allergy 75th on 113 Immunology journals retained in the 2003 ISI ranking. The 5 highest ranking for immunology journals according to ISI journal citation reports are: Annual Review Immunology, Nat Immunology, Nat Rev Immunology, Trends Immunol and Immunity, all primarily concerned with basic research in Immunology and many much laboratory sciences oriented. The clinician has no real direct message from the majority of these publications.

Books

Books offer a structured introduction to a knowledge field. However, the disadvantage of books is that they normally represent the status of science of roughly 3 years back. In a rapidly evolving field as Immunology this is not reflecting the actual state of the art. In such discipline one had to refer to the newest

literature. And searching in Immunology topics has special rules, consequence of its omnipresence in science.

The best quoted introductions to Pediatric Immunology at this moment are *Essential Pediatric Allergy, Asthma, and Immunology* - by Raul Wolf and the more elaborated and basic sciences oriented *Immunologic Disorders in Infants and Children* by E. Rich, et al. In 2005 the exhaustive *Pediatric Allergy, Asthma and Immunology* by Arnaldo Cantani will become available. This 1570 pages thick Springer Verlag publication is expected to lay in the bookstore by July 2005. As comprehensive general introductory books *Immunology, Fifth Edition*, by Richard A. Goldsby, and *Immunobiology* by Charles Janeway can be mentioned.

Staying updated in
Pediatric Immunology:
there is no shortcut to heaven

The paucity of books and journals restricted to Pediatric Immunology in the narrow sense stays in contrast to the omnipresence of immunology in every single pediatric journal. The best knowledge updating policy follows our findings on the history and structure of the specialty. The first step in a good search is to clearly formulate the search question, and also to determine the level at which the question should be answered. This will be totally different in the case of a researcher in basic immunology or in the case of the pediatrician concerned to find the best possible diagnostics, therapeutics and guidelines for his or her patients.

I usually recommend to at least starting with the reading of a thorough review or an introductory textbook. The paradox is that more we know more we find. We should be aware of the basic paradigms and major findings of a discipline before any literature search will be successful. The few references I use in this paper can serve as a good start for basic knowledge in immunology at the level of the practicing physician. In what follows I will limit the search policy to that profile. Once we have a basic understanding of the principles of immunology, we are able to formulate further ques-

tions. The very powerful search engine is Pubmed. Other commercial products exist such as Embase and Ovid-medline, but the pricing is their biggest disadvantage. The freely available Pubmed serves all needs of the general pediatrician, and has a lot of additional tools such as linking to free full text if available, possibility to store searches and possibility to personalize its function to the individual user (Cubby). I highly recommend any user to first work himself through the excellent interactive tutorial (5).

Before going to the PUBMED search, the user should get familiar with the use of MESH (Medical Subject headings) (6). This hierarchically structured vocabulary (based on the index medicus) will guarantee a content-specific search. The use of the links and of copy-paste technology will avoid orthographic errors, so easily committed especially for those who use English as a foreign language. We should use MESH not only to find the best search term, but also to learn definition, year of introduction of the different terms, and the related terms. We should always verify the place of any term within the MESH-TREE. I usually recommend making a print out of the MESH information page on the terms in which we want to formulate our question.

After this MESH interlude the user possesses the best possible terms in which to put his or her question. He should simplify his question and if possible come to a one term or at the most a two term search. What can be searched by limits such as population age groups, date and type of publication, should be searched for by LIMITS and not by the search string. Only after this extensive preparation, the user is fit to click the PUBMED link. Only after this preparation he will find himself satisfied with the results.

If we now explore the word "Immunology" using MESH, five possibilities are offered:

- "Allergy and Immunology": If we enter this term (introduced in 1980) the PUBMED Link will select all articles related to Immunology as a medical

specialty. The PUBMED definition of the subspecialty is: the medical specialty concerned with the hypersensitivity of the individual to foreign substances and protection from the resultant infection or disorder.

- "Immunology (subheading), introduced in 1966, which should be used for immunologic studies of tissues, organs, microorganisms, fungi, viruses, and animals. It includes *immunologic aspects of diseases* but not immunologic procedures used for diagnostic, preventive, or therapeutic purposes, for which "diagnosis", "prevention and control", or "therapy" is used. The concept is also used for chemicals as antigens or haptens.
- Transplantation immunology, introduced in 1965, which means "a general term for the complex phenomena involved in allo- and xenograft rejection by a host and graft vs host reaction. Although the reactions involved in transplantation immunology are primarily thymus-dependent phenomena of cellular immunity, humoral factors also play a part in late rejection".
- Immune system diseases, only introduced in 2005 as a full MESH term, by which we are guided towards disorders caused by abnormal or absent immunologic mechanisms, whether humoral, cell-mediated, or both.
- Immunogenetics, introduced in 1971, by which PUBMED will select articles from a subdiscipline of genetics which deals with the genetic basis of the immune response.

It is clear from these definitions that the general pediatrician will mostly have to use the first two. If he/she is searching for a recent review in Immunology, he will use the first offered search path. If he wants to explore immunological aspects of whatever disease outside the field of Immunology itself, he will work with "immunology" as a subheading. The easiest way to use subheading is to click the subheading within the information page of the MESH-Term before sending it to PUBMED Search. However, searching for information about the diagnostic or

therapeutic use of immunoglobulins, or specific protein fractions should be done using these specific search terms. The finding that using immunology as "subheading" is the secret clue to finding relevant clinical information on immune aspects of whatever disease is not surprising given the omnipresence of the immune process.

To explain this more clearly let us turn to a concrete example. It is generally accepted that immune mechanisms play a role in infective endocarditis. If one explores "Endocarditis, bacterial" in MESH and click also immunology (subheading) before sending it to the search window, we obtain 382 rather adequate hits, from which 38 reviews. Some browsing is necessary to retrieve the best ones, but this work can be done in minutes. If we combine the two MESH terms "Allergy and Immunology" AND (do never forget to write the Boolean operators in higher case) "endocarditis, bacterial" no hits are retrieved, because endocarditis is not studied in allergy or immunology as a discipline. Combining "endocarditis, bacterial" as MESH term with immunology as wild card we obtain 660 unselected hits, useful to the understanding of endocarditis but not relevant to its immunological aspects. So, the use of wild cards (the word is introduced as plain text and not as a MESH term) is not recommended. If, on the other hand, we look for a recent review of allergy (as a discipline) we enter option 1 into PUBMED and set limits on publications since "2004" and "review". This gives a very good selection of publications all relevant to the subspecialty. Personally I would recommend from this search the reading of the review article of J. Chinen and W.T. Shearer (7).

Medical health statistics

We stated already that it is important to determine the level and kind of information we want to search for. Published literature and bibliographic databases will almost never give in-depth information on the incidence or prevalence of disease, neither will they offer adequate information on the care system, formulary, and so on. This information is to

be found on the web using the national institutes of statistics, WHO, OESO, the country's governmental sites, etc...

Public health informatics and patient information

Another level of information is intended to the general public. It is not the scope of this article to dig deeply in all existing possibilities. At this moment MedlinePlus offers the best choice of patient education in English and Spanish (8). The section on treatment of lung asthma and dermatological atopy are a must to read.

Conclusions

In this paper the sources of knowledge in Pediatric Immunology and the basic principles of searching the best possible information are presented. Special attention is drawn on the use of "immunology" as subheading when exploring the immune mechanisms related to a specific disease.

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Sažetak

IZVORI I PRAVCI ISTRAŽIVANJA U PEDIJATRIJSKOJ IMUNOLOGIJI

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Pedijatrijska imunologija je relativno nova subspecijalnost. Dok se ova disciplina primarno bavi nizom rijetkih bolesti, imunologija kao bazična grana medicine je sveprisutna u istraživanjima imunoloških reakcija. Izvori informacija o Pedijatrijskoj imunologiji su relativno nedostupni, za razliku od imunologije kao sveobuhvatne bazične znanosti. Pretraživanje literature može biti uspješno samo ako se slijede neka osnovna pravila. Prvo je potrebno odrediti područje u kojem tražiti informaciju: bazičnom ili kliničkom, u pregledu ili izvornoj studiji, u dijagnostici ili terapiji... Cilj članka je usmjeriti pedijatra u traženju potrebnih informacija.

Deskriptori: ALERGIJA, IMUNOLOGIJA, OBJAVLJENE INFORMACIJE, PRETRAŽIVANJE LITERATURE, PEDIJATRIJA