LIBRARY NIH

Informatics, informationists, & information management:
How modern libraries can help train and support modern neuroscientists

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Introduction

Neuroscientists depend heavily on information. They use and produce vast amounts of protocols, cDNA sequences, brain activity images, gene expression data, anatomical atlases, disease descriptions, behavioral data, and many other types of information. It is important for students to be trained in finding and using this information, and to realize that libraries can be a great asset to their work. Broadly speaking, surveys of students and professionals in a variety of health-related fields have found a lack of time and training for literature searching [1]. Skills are limited to the basics of one or two databases [2]. Unfortunately, many faculty apparently don't appreciate the role libraries can play [3], nor have many of them had training on using modern information resources themselves.

What are the costs? At the very least, time, which could be spent planning or conducting research, is wasted. More significantly, a delay in finding relevant information could mean money wasted on misguided or outdated research paths. In a worst case scenario, the death of a healthy volunteer was attributed in part to inadequate review of the literature [4].

Neuroscientists should take advantage of resources made available to them at their libraries. These include not just the online journals and PubMed, but a wide variety of specialized databases and professional librarians with expertise in finding biomedical information.

1. Nail-Chiwetalu, B., & Bernstein Ratner, N. (2007). *J. Med. Libr. Assoc., 95*(2), 182-8; Wallis, L.C. (2006). *J. Med. Libr. Assoc., 94*(4), 442-6; Franks, H., & McAlonan, C. (2007). *Nurse Educ. Pract., 7*(4), 258-65
2. Wessel, C.B., Tannery, N.H., & Epstein, B.A. (2006). *J. Med. Libr. Assoc., 94*(1), 48-54; Cullen, R.J. (2002). *J. Med. Libr. Assoc., 90*(4), 370-9; Griffiths, P., & Riddington, L. (2001). *Health Info. Libr. J., 18*(1), 2-9
3. McGuinness, C. (2006). *J. Academic Librarianship, 32*(6), 573-582; Wallis, L.C. (2006). *J. Med. Libr. Assoc., 94*(4), 442-6; Yang, Z. Y. (2000). *J. Academic Librarianship, 26*(2), 124
4. Savulescu, J., & Spriggs, M. (2002). *J. Med. Ethics, 28*(1), 3-4

Informatics

Many libraries now support bioinformatics researchers and are active in medical informatics projects. By dint of their experience with databases and information of all kinds, librarians are well suited to the informatics fields, plus some libraries (e.g., Stanford, U. Wash.) employ bioinformaticists without a library background. Libraries are involved in analyzing microarray data, integrating information resources with electronic medical records, providing information resources at the point of need, offering training on using bioinformatics resources, text and data mining, bibliometrics, and more.

Did you know?
A library (the National Library of Medicine) produces and/or provides access to all these bio- and medical informatics tools:

PubMed	GenBank
HomoloGene	PubChem
Taxonomy Browser	TOXNET
PubMed Central	OMIM
Human Genome Map Viewer	UniGene
Conserved Domain Database	BLAST

Probably *your* library can help you get the most out of them!

Building or working with a new database?
Librarians work with databases and know about
metadata standards
database structure
information architecture
usability testing
search specificity & sensitivity
access points
licensing & copyrights
remote access & authentication
Boolean logic
proximity searching
ontologies
authority control
web coding
search engines

Informationists
Science knowledge + Library skills

● Informationists are specialized librarians trained in information resources and services as well as clinical/biological research. They bring information skills to research teams by attending lab meetings, rounds, seminars, answering questions at the point of need, and collaborating on research projects from start to finish.

● The concept originated in an editorial in a medical journal [5]. This described a new paradigm in which physicians would delegate their information needs to the informationists, just as they submit pharmacy orders to pharmacists and x-ray orders to radiologists.

● Currently, informationists are visible in a growing number of clinical and laboratory research settings around the country and are integrated members of their research teams.

Consider a career in libraries or information science!
A minority of librarians, even in medical libraries, have science degrees [6].

Predicted annual job openings, 2004-2014 [7]

Librarians   8,000

Biologists,
Biochemists,   } 4,000
Biophysicists

5. Davidoff, F., & Florance, V. (2000). *Ann. Intern. Med., 132* (12), 996-8
6. Medical Library Association. (2003). Member Survey Results. www.mlanet.org.;
Mayer, J., & Terrill, L.J. (2005). *College & Research Libraries, 66* (1), 59-73
7. U.S. Dept. of Labor Statistics (data.bls.gov)

NIH Library Informationists
The NIH Library has 14 informationists. This pie chart shows the means they use to communicate with patrons. Note that informationists work alongside clients, rather than expect them to come to the library.

Pie chart: Staff meeting, Class, Rounds, Email, Client's office, Other, Phone
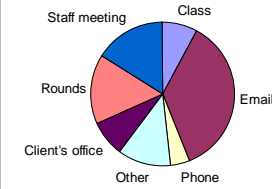
We recently interviewed long-term clients to find out why they liked working with informationists. Here are the six reasons they identified:

**Save time
Provide onsite training
Convenient library interface
Add to team's skills
Bibliographic expertise
Knowledge of new resources**

Information Management

People often see libraries as places merely to access published literature, but libraries also assist with creating and distributing information. Libraries provide…
● Training and support for bibliographic management software (e.g., EndNote®, RefWorks, Reference Manager®, Zotero, Quosa™, et al.), to **keep track of your references** and cite them in the proper style for each journal.
● Advice on **where to publish**, based on journals' impact factors and/or access policies.
● Physical or **digital repositories** of staff publications, data, notes, presentations, and images. Many documents should be kept for scientific, historical, or legal reasons.
● Advice on **copyright**. Can you legally distribute that article to your class, even if you wrote it? Can you reprint that figure? Can you post it on the web or send it to a colleague?

Recommendations

Find out what resources and services your library provides: classes, mediated searching, specialized databases, custom services, etc.

Use all your library has to offer.

Learn how to use those resources effectively. Attend classes or request tutorials for your lab or department.

Ask your librarian. Don't waste time with inefficient searches in suboptimal databases and search engines.

Support your library. Advocate for them. Give them your input.

Neuroscience students need information. Do they know how to get it efficiently? Do you? Here we show a typical path through graduate school and points where information resources (and libraries) play a role.

These are just examples. Some resources are free but many are not, and most are not accessible with search engines such as Google. **Consult with your librarian to see which resources are available at your institution.** (Note that your librarian may have access to resources not generally available at your institution and not listed on your library's website.)

Graduate school path

Read a book! Or search for review articles, using controlled vocabulary and restricting to major topics.

Choose research question.

Learn more about topic.

Comprehensive literature search.

Attend SfN. Get inspired.

Possible information components

Search the Online Meeting Planner or printed abstract books to find relevant sessions.

Use several databases and print indexes and search keywords, controlled vocabulary, synonyms, antonyms, and spelling variants.

Search relevant papers (full-text when possible) for methods. Refer to books or journals focusing on techniques.

Develop protocols.

Collect pilot data.

Get IRB approval.

Choose agonists, reagents, medications, etc.

Apply for grants.

Use CRISP to see which agency funds similar work.

Check related sequences (GenBank®), species (Taxonomy Browser and HomoloGene), chemical structures (PubChem), and diseases (OMIM™).

Discuss animal care and consider alternative methods and model systems (AGRICOLA, BIOSIS®). Address ethical issues (ethics subset in PubMed).

Use EMBASE™ to access pharmaceutical literature, PubChem for chemical info, Micromedex® and MedlinePlus® for drug information for professionals and patients.

Collect data.

Stay current.

Set up alerts for searches you've done, or tables of contents of top journals, to keep up to date. Scan blogs and editorials to see what people are talking about.

Find collaborator.

Analyze data.

Write papers.

Use Web of Science® or Scopus™ to see who is most cited in the field.

Use bibliographic management software (e.g., EndNote®, RefWorks, Zotero) to collate, search, and organize references. Cite them in the proper style.

Submit for publication.

Identify journals that have high impact factors and/or are free to read.

Write dissertation.

Help other scientists and fulfill the requirements of your grant! Submit your paper to an online archive, such as PubMed Central. Submit your data to an online repository.

Archive your work.

Graduate!

Become an informationist!

Use Web of Science, Scopus, & Google Scholar to show how many times you've been cited.

Apply for academic job.

Go corporate.

Use specialized databases to find businesses and patents related to your research.

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