

NAVIGATING THE INTERNET

YOU'VE HEARD THE BUZZ THAT the Internet (NET) offers a wealth of information in the realm of nuclear medicine. You've probably also heard that navigating the Net can be mind-numbing, even for the most computer-literate practitioner. If you're a stranger to Internet commands, haven't a clue where to find an Internet connection, or think Internet addresses look like an extinct form of pig Latin, don't despair. This get-started guide provides jumpoff points for using the Internet to do the things you want to do. It's time to join your colleagues on the information superhighway.

Conducting Literature Searches

An AIDS patient with a slightly enlarged thyroid gland was referred to you by an oncologist. Before beginning treatment, you want to find out if the condition is linked to AIDS. Until a few years ago, you would have needed to spend hours in a medical library to conduct a thorough search of the medical literature. Today, you can find answers within minutes by logging onto Internet.

Newsline conducted a literature search for a nuclear physician who was faced with this diagnostic case. Elizabeth Wu, MLIS, assistant director for planning and systems at the Francis A. Countway National Library of Medicine (NLM) at Harvard Medical School, conducted the search using a user-friendly software program called CD Plus. She decided to search the databases of the Library of Medicine (a.k.a. Medlars), which contain millions of medical entries. "Most nuclear physicians will find that in the vast majority of cases, the Library of Medicine will provide the information they need," said Wu. You can choose one of several libraries to search within Medlars. In this case, Wu chose Medline, a database of over 7 million journal citations.

Before even beginning a search, it's helpful to make a list of subjects that relate to your search. In the scenario above, our subjects would be "acquired immunodeficiency syndrome" and "thyroid". (Note: It's important to choose the correct scientific terms when searching the literature. For instance, entering "heart attack" as a text word yields only 154 entries, whereas "myocardial infarction" yields 9,536.)

1. enter subject: acquired immunodeficiency syndrome

number of entries: 13,829

(Obviously, this search is too vast to do us any good.)

2. enter subject: thyroid

number of entries: 2,958

(Now we're ready to narrow down the search by combining both subjects.)

3. enter subject: 1 and 2

number of entries: 6

(These are the total number of entries that have both acquired immunodeficiency syndrome and thyroid as their subjects in the Medlars index.)

4. enter subject: thyroid.tw

(We put the ".tw" to search all entries that have thyroid in the main text.)

5. enter subject: 1 and 4

number of entries: 14

(We then decided to run the same search in AIDSline, another Medlars library, and this turned up 58 entries.)

The entries revealed that the *P. carinii* infection of the thyroid has been observed with HIV infection. The nuclear physician ordered a thyroid biopsy with a special stain for the bacteria. The diagnosis was confirmed, and appropriate antibiotic therapy was given.

You can access Medlars through your institution's own mainframe system or the NLM mainframe. However, the search can be made vastly easier by using a user-friendly software program.

The three best known software programs are Grateful Med, Paperchase and CD Plus, which all search Medline plus other Medlars databases. With Grateful Med, you send a search request to a central computer, which then grabs your information, disconnects and displays your search results on your screen. PaperChase and CD Plus differ from Grateful Med in that you conduct an active session with the source computer to refine your search and display search results while online. The software usually costs around \$30 and the average cost per search is \$2. Packages include a Medlars ID, password and information about modem setup and memory requirements. For information on the various software, call Grateful Med at (800) 338-7657, PaperChase at (800) 722-2075 and CD Plus at (800) 950-2035.

If your institution has a permanent Internet connection, you can use telnet, a program that connects distant computers over the Net, to load the software for free. However, you first need to call Medlars at (800) 272-4787 to get a password. PaperChase's telnet address is **pch.bih.harvard.edu**. Call CD Plus to get the telnet access site. You can also telnet directly to Medlars at **medlars.nlm.nih.gov**.

News
You Can
Use

Books for Beginners

If you're just getting connected to the Internet (or still thinking about it), you may find it easier to have a guide to direct you. However, keep in mind that the Internet is constantly expanding, so these books will get outdated fairly quickly.

1. FINDING IT ON THE INTERNET

John Wiley and Sons, Inc.
by Paul Gilster
\$19.95.

2. THE COMPLETE IDIOT'S GUIDE TO THE INTERNET

(It also comes with a free disk containing software and info on Internet resources.)
Prentice Hall Computer Publishing by Peter Kent
\$19.95.

You can get these books off of the Internet directly through file transfer protocol (ftp).

3. ZEN AND THE ART OF INTERNET

PTR Prentice Hall by Brendan Kehoe
ftp.nisc.sri.com introducing.the.internet/zen.txt or
192.33.33.22 (ASCII version)

4. BIG DUMMY'S GUIDE TO THE INTERNET

ftp.eff.org pub/Eff/papers/bdumy.txt or
192.77.172.4

Consultations Via Electronic Mail

Let's say you're having trouble making a particular diagnosis, and you want to consult two nuclear physicians several states away. You can either express them the patient's chart and wait at least a day for their input, or you can e-mail them the chart and have it at their desks within minutes. Electronic mail or e-mail is the most popular use for the Internet in the world at large and within the nuclear medicine community. "E-mail is a great way to avoid playing phone-tag and negotiating around time zones," says Tom Lewellen, PhD, professor of radiology, electrical engineering and bioengineering at the University of Washington. "You can also e-mail software and exchange datasets with your collaborators." What's more, you can access your e-mail on your business trips and travels.

How can you get connected to e-mail? If you're using a commercial online service—such as Prodigy or America Online—e-mail is all set up for you and you'll get your own personal address. You just point and click on "mail" to enter the system. (These services cost about \$10 per month for 5 hours and an additional \$3 for each extra hour.) If you're going through your own or your institution's Internet con-

nexion, your Internet service provider will provide you with an e-mail address and password (see "How to Get Connected" on page 28N).

In some cases, you'll have to ask the Unix system to get into e-mail. Unix is a user-unfriendly operating system that's on most Internet service provider's computers. This means that after you log on to an Internet-connected computer at, say, your hospital or university, the first thing you'll see will be either a Unix menu featuring a list of choices including e-mail, or a Unix shell prompt (usually a "%" or "\$" sign), at which you need to type the mail command.

Although Unix commands are obtuse at best, you can get a handle on them using a "how-to" book for Internet beginners (see "Books for Beginners" on page 25N). If you're working through your own Internet connection (i.e., your own PC and modem) rather than through your institution, software packages for Windows and Macintosh, such as Eudora for e-mail, bypass much of the ugly Unix underbelly. Here are some challenges you may encounter.

► **Attaching files to e-mail:** As in the scenario described above, you can affix a file to an e-mail message and send it to anyone on the Internet. They can be of any size or type, such as word processing, software, diagnostic images, or even sound recordings (although some hospitals may have e-mail systems that don't allow you to send files for privacy reasons). If you're using a modem to dial up the Internet, you'll first need to modem the file from your own computer onto the Internet service provider's computer where it can be packaged to send with your e-mail message. To do this, you'll have to use a modem transfer protocol such as "X-modem" or "Y-modem"—just as you would use to modem any file between your computer and another computer down the hall at the hospital. You'll also need to convert the file into a "text" format called ASCII, using a program called uuencode/uudecode. If you're on an Internet computer at your hospital or institution, you'll have to use the Unix version of uuencode/uudecode. If you're on your own connection, you can convert the file on your own computer using the conversion program on word processing software on DOS or Macintosh.

► **Address mix-ups:** Internet addresses are "case-sensitive." This means that you must write them (with upper-case and/or lower-case letters) exactly as you see them. Also, don't put spaces between anything in an address unless a space appears. If you add a space or change a case, your message may not get to the appropriate place.

► **Return to sender:** Your e-mail messages may get returned, which means that the Internet either can't find or can't send your message to the host or user you've designated. If your e-mail is flashing

The Nuclear Medicine Bulletin Board

Whether you're at a university, a remote area hospital or a private clinic, Lunis (Loyola University Nuclear Information Service) is an easy way to connect with fellow nuclear physicians and hook into their conversations on the electronic bulletin board. "Lunis now has 1500 registered users, including nuclear physicians, technologists, researchers and commercial vendors throughout the U.S. and 23 countries abroad," said Lunis manager James Halama, PhD, assistant professor of radiology at Loyola University, Chicago. As of 1991, Lunis has been connected to the Internet, so users can access the bulletin board via the Internet.

Once on LUNIS, you're likely to find an ongoing discussion about ^{201}TI brain tumor imaging, as well as dialogues on thyroid cancer therapy, reimbursement issues, government regulatory policies and image transfer between computer systems. Lunis also has an internal post office where users can exchange e-mail, and it offers e-mail accessibility for nonusers.

Lunis is a free service, although you'll have to pay the toll charge for dial-up connections. Since Lunis is password-protected, you'll need to register for a user name and password before logging on. To sign onto Lunis, contact Halama by e-mail at jhalama@lunis.nucmed.luc.edu or call him at (708) 216-5373 weekdays 9-4 (central time).

Although Lunis is now menu-driven, Halama is working to move the service onto Web servers. "Right now, someone using Mosaic software on the Web can read and download the entire history of Lunis," said Halama. "By the end of this year, Mosaic users will be able to post new information to fellow Lunis members on the World Wide Web server. They'll also be able to link directly from the Lunis home page to other World Wide Web servers, including the National Library of Medicine, federal agencies and nuclear medicine teaching files." Lunis users will also be able to enter the Web through Lunis. Once on the Web, the access number for Lunis will be www.LUNIS.luc.com.

How to Get Connected

Want to get connected to the Internet but are not sure how? Here are several pathways for getting yourself onto the information superhighway.

Via your institution's system: Most universities and teaching hospitals now have a permanent (or "dedicated") terminal connection to an Internet service provider. Although it's free for you to use, your institution pays the Internet service provider for the number of users on the service. To log on to a permanent terminal connection, you first need to get registered through your institution. You'll be assigned an Internet address and a password.

Via your personal computer: If you work at a small private clinic or a remote-area hospital or if you prefer to Net-surf after hours, you may not have access to a permanent Internet connection. In order to hook up to Internet on your own, you have to join up with a service provider who will link you into its computer that is directly connected to the Internet. To find a local service provider in your area, call InterNic Information Services at (800) 444-4345. If you practice in or near Washington, DC, or if your closest Internet service provider isn't a local call, the International Internet Association's offers a free Internet account; call 202-387-5445 or fax 202-387-5446.

After joining up with a service provider, you'll be asked if you want a direct dial-up (a.k.a. SLIP or PPP accounts) or a terminal dial-up (a.k.a. shell accounts). Direct dial-up gives you full access to World Wide Web so you can download complex graphics such as nuclear medicine images directly onto your computer. However, the direct dial-up is more expensive than a terminal dial-up and can cost \$100 for setup plus about \$200 for the software (which gives you a graphical interface) and an additional \$15 per month for use.

The terminal dial-up connection has a minimal \$20 setup charge and costs an additional \$15 to \$25 per month. Although it's less expensive than a direct dial-up, it won't allow you to transfer images directly onto your computer. Instead, you'd have to download to your service provider's computer and then to your own, which takes about 45 minutes per image and inflates your bill to your service provider.

To make full use of the Internet, you'll need a fast modem (at least 14,400 bps speed) which costs around \$150 and telecommunications software. If you don't plan to transfer diagnostic images, you can get away with a cheaper modem (2400 bps) on a dial-up terminal connection.

All-in-one packages: For a sure-fire simple way to get onto the Internet, there are all-in-one packages available that can connect you to the Internet in a few quick steps. They provide full graphical access without the setup hassles and the need to collect software or shop around for a provider. However, they're more expensive than a direct connection you purchase yourself. Some leading examples are: Internet-in-Box (800-557-9614, ext 26), Pipeline (212-267-3636), NetManage (408-973-7171), IBM (800-426-2255) and NetCom (800-353-6600). These kits cost around \$150 to \$300. Operating costs vary with the cheapest being NetCom at a cost of \$20/month.

SNM Joins the Internet

Last month, the Society joined the information superhighway by establishing a permanent connection, or node, on the Internet. Society members will now be able to communicate with all staff members in the Reston office via e-mail. To reach staff members, you can key in their e-mail address by typing their first initial and last name followed by **@snm.org**. For example, the e-mail address of Torry Mark Sansone, executive director of SNM, is: **tsansone@snm.org**. *Newsline* would appreciate your comments on particular articles. Please send e-mail to: **dkotz@snm.org**.

"return to sender," double-check the following: Did you type in the address correctly? Were you given the complete e-mail address? (This should include both the user's name and domains which indicates the host computer. For instance if your friend John Smith worked at the Food and Drug Administration, his e-mail address might be **jsmith@fda.gov**.) If you know you've keyed in the correct address, there may be a glitch in the mail server handling your mail. Your institution's Information Services or your Internet service provider should be able to help.

► **Hidden Costs:** Commercial online services all furnish e-mail exchange with the Internet and with each other. By and large, these connections work really well—but be informed that some online services charge postage (around 15 cents) for every e-mail message you get or send.

► **E-mail address books:** If a colleague gives you his e-mail address, keep it on file. Unlike the phone system, Internet addresses can be tricky to find because each network has its own directory system. However, if you know your colleague's institution, you can use telnet to log on remotely to that institution's network and conduct an active session with the network's "whois" site—a sort of white pages. You can also get a general list of whois sites by telnetting to: **sipb.mit.edu pub/whois/whois-servers.list**. (Of course, you can also just pick up the phone and call the institution directly.)

Medical Conversations Via Newsgroups

Looking for a list of suppliers of PET scan machines? Can't find that particular electronic journal on the Internet? Need more information about appropriate procedures for a gastrointestinal study? You can often find what you're looking for by consulting a community of Internet-accessible online bulletin boards, called newsgroups. Newsgroups let you post messages to thousands of people at once, as well as read the messages people post to each other. Newsgroups are connected to the Internet via a network called Usenet. Here's what you need to know to participate in a newsgroup.

► **Joining up:** If you're on a commercial online service, the newsgroup address is all you need to know to get into newsgroups. Otherwise, you'll have to access one of the Internet service provider's Unix newsreader programs and use a series of Unix commands to read and post messages. (Internet resource books can show you how.)

► **Evaluating the questions:** One helpful way to discern which newsgroup is best suited for your posting is to peruse the newsgroup's frequently asked questions (FAQ). Each newsgroup has its own FAQ listing to provide information important to the general topic and also to keep users from asking the

Places to Go

e-mail subscription

- Internal dosimetry services are now available through DOSE-NET (at the Radiation Internal Dose Information Center, Oak Ridge Institute for Science and Education). Send e-mail to director James B. Stubbs at stubbs@orau.gov for information on joining.
- Nucmed is a "mail burster" service that distributes e-mail messages throughout the nuclear medicine community. Nucmed hosts discussions specific to nuclear medicine with an emphasis on formatting digital images. Send a message to nucmed-request@uwovax.uwo.ca to get connected.

➤ IsoTOPICS@aol.com is a multimedia software package that lets you do a self-audit of NRC regulations for compliance/implementation. The kit also includes the newsletter IsoTopics.

newsgroups

- **alt.image.medical**—includes postings on finding services and equipment for digitizing medical images, advice on using imaging software, and medical imaging resources on the Internet.
- **sci.med.telemedicine**—covers the healthcare industry, clinical queries and advice on topics ranging from macular degeneration to pulmonary fibrosis.
- **sci.med.physics**—includes postings related to medical-physics topics such as papers and articles on neural transmission and dental amalgams.
- **sci.med.radiology**—hosts postings on medical images, radiation treatment and planning, clinical questions and medical imaging software.
- **sci.med.informatics**—includes questions and answers about computer-aided medical instruction, computerized medical records, health information networks and medical software.
- **sci.engr.biomed**—focuses on interactive technology in medicine and science as well as medical device and instrumentation technologies.
- **sci.image.processing**—includes banter about digital images, both medical and nonmedical.

World Wide Web locators

- Let's Play PET is a new resource that can give you hyperlinks to text, images and references concerning PET tracers, nuclear physics and clinical case examples. http://www.nuc.ucla.edu/html_docs/Crump/LPP.html
- Medical Matrix Uniform Resource Locator—provides links to medical information all over the Internet, including teaching files, institutions and biomedical journals. <http://kuhttp.cc.ukans.edu/cwis/units/medcntr/Lee/HOME PAGE/HTML>
- HyperDoc—the National Library of Medicine (NLM) site with links to non-NLM sites. <http://www.nlm.nih.gov/>
- Radiation biology resources—conference listings, journal contents, editorials and e-mail addresses. <http://www.science.ubc.ca/departments/physics/biol-HomePage.html>
- Francis A. Countway Library of Medicine—contains nuclear medicine teaching files and electronic publications and links to other WWW servers. <http://www.med.harvard.edu/>
- The Journal of Medical Imaging—<http://jmi.gdb.org/JMI/ejourn.html>
- Radiologic Society of North America—<http://www.rsna.org/edu/internet.html>
- Society of Nuclear Medicine Computer and Instrumentation Council — <http://gamma.wustl.edu/tf/caic.html>

same questions repeatedly. FAQs can be accessed with Unix commands within the Unix newsgroup reader. If you're on a commercial online service, just click on FAQ within the newsgroups section.

Browsing the Web:

From Meetings to Teaching Files

Whether you're trying to get proceedings from a medical society meeting or a nuclear medicine teaching file, the easiest way to find information is via the World Wide Web. Other Internet navigation systems, such as gopher, use only text menus to zero in on a file on the Internet. The Web, however, shows you lively graphics and images so you can use a mouse to click your way through a trail of hypertext files linking you to sites all over the Internet.

To use the Web on your Internet connection, you'll need two things: a special kind of software called a "browser," which knows how to search through hypertext files and allows you to click on highlighted topics, and the addresses of Web servers, the computers that the browsers contact. A good resource for information on using a Web server is your own medical library or institution. The Francis A. Countway Library of Medicine at Harvard Medical School, for example, helps residents mount and operate the library's Web server, said Wu. The next best place is other Web servers. "Each of us who has a Web server publishes lists of the other servers on the Internet. Right now, the effort is to produce teaching files and other materials to serve nuclear medicine," said J. Anthony Parker, MD, PhD, (jap@nucmed.bih.harvard.edu), director of Harvard University's Joint Program in Nuclear Medicine.

Be aware, though, said Lauren V. Ackerman, PhD, director of the Electronic Communication Committee at the Radiological Society of North America, that the Web often doesn't deliver what you expect. Web information is generally grouped according to institutional sites, rather than by subject—making an inter-institutional search for a specific topic difficult. Also, you often may have difficulty reaching a Web server—variable connection speeds and high network traffic can create perpetually clogged servers at high-volume sites. Depending on the routing your computer goes through to get to a popular server, you may have to try repeatedly, or at strange hours, before you connect. If all this information about the Internet still seems weird and incomprehensible, take comfort in this: The Internet doubles in size every 10 months, so having an Internet account for a year will mean you have more experience than at least half your fellow users. Before you know it, you'll be an old pro.

—Jill Steuer