

## Review

# HIV-Associated Resources on the Internet

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*The Internet provides easy, widespread access to new developments in the field of medicine. The pace of HIV-related research is rapid and has global relevance, making the Internet a particularly well-suited technology for dissemination of information. The number of sites offering HIV-related information is vast, and the quality is variable. Nevertheless, access to reliable information can be a highly efficient method to acquire up-to-date knowledge about advances in HIV investigation. This review summarizes high-quality HIV-related Web sites, including sites that provide access to HIV-related guidelines, conferences with Web content, images, case studies, and clinical and scientific databases. Also included are HIV-related reference sites, Web sites for journals that publish regularly on HIV- and AIDS-related advances and epidemiology, and policy-oriented sites. In addition, Web sites with materials for patient information and advocacy and specialty societies for HIV practitioners are listed.*

In the 25 years since the first descriptions of AIDS, there has been an explosion of scientific discovery; clinical, social, and behavioral research; epidemiologic investigation; and community organization associated with the HIV infection. The pace of discovery and number of ongoing projects and clinical trials exceed the capacity of the HIV practitioner to remain current in all aspects of HIV investigation. Parallel with the HIV epidemic has been the emergence of the Internet and the World Wide Web as crucial resources to help manage and access information for researchers, clinicians, epidemiologists, members of the allied health services, patients, and others.

The total number of Web sites dedicated to HIV-related issues is staggering. In 2000, Shafer and Deresinski<sup>1</sup> published an early guide to Internet resources for HIV disease. Almost a decade later, some of the sites they mentioned remain highly relevant, and new ones have been developed. Sheer numbers prevent listing all high-quality HIV-associated Web sites, but this article describes some of the most utilized sites across a variety of related

subject areas. Although several important international sites are included, the focus is on those in English.

### Search Methods

A search using 2 standard Internet search engines (Google, Yahoo) yielded  $65.6 \times 10^6$  and  $279 \times 10^6$  visits, respectively, for the search term "HIV" and  $122 \times 10^6$  and  $501 \times 10^6$  visits, respectively, for the search term "AIDS." Of these, Web sites included in this compilation were identified from (1) personal knowledge or experience, (2) personal communication with experts in various aspects of HIV disease or AIDS, (3) Web links from other recognized Internet sites, and (4) articles identified after a MEDLINE search for "Internet" and "HIV" or "AIDS." Web sites were assessed for ease of use, presence of up-to-date information (unless otherwise noted), and quality of overall content.

In addition, the quality criteria set forth by Silberg and colleagues<sup>2</sup> were assessed. These criteria describe standards to be applied to Web sites and include (1) identification of authors and their affiliations and credentials, (2) a

listing of content sources with copyright information, (3) identification of dates content was posted, and (4) disclosure of Web site ownership, sponsorship, advertising, underwriting or commercial funding arrangements. Most sites included are affiliated with an academic institution, governmental organization, nonprofit organization, or commercial entity, and the majority focus exclusively on HIV- and AIDS-related issues.

### Results

#### Web Sites for HIV-Related Guidelines

Table 1 lists Web sites with the most commonly referenced guidelines for testing and treatment of HIV infection and AIDS. The AIDSinfo Web site is sponsored by the US Department of Health and Human Services (DHHS). On the site, the current treatment guidelines developed by working groups convened by the US Office of AIDS Research Advisory Council are posted in Portable Document Format (PDF) and Personal Digital Assistant (PDA) versions. The most recent revisions of these documents are readily available. These include the (1) Guidelines for the Use of Antiretroviral Agents in HIV-1-Infected Adults and Adolescents, (2) Guidelines for the Use of Antiretroviral Agents in Pediatric HIV Infection, and (3) Recommendations for Use of Antiretroviral Drugs in Pregnant HIV-Infected Women for Maternal Health and Interventions to Reduce Perinatal HIV Transmission in the United States.

In addition, guidelines are available for management of occupational and nonoccupational exposure to HIV and

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Table 1. Selected Web Sites Providing HIV-Related Clinical Guidelines

Title of Web Site, in Alphabetical Order	Uniform Resource Locator	Source or Sponsor	Description
<b>Guidelines Published in the United States</b>			
AIDSinfo	<a href="http://www.aidsinfo.nih.gov">http://www.aidsinfo.nih.gov</a> <a href="http://www.aidsinfo.nih.gov/Guidelines/Default.aspx?MenuItem=Guidelines">http://www.aidsinfo.nih.gov/Guidelines/Default.aspx?MenuItem=Guidelines</a>	US Department of Health and Human Services (DHHS)	Links to guidelines, including treatment (adult, pediatrics, perinatal), postexposure prophylaxis, opportunistic infections, testing
HIV Medicine Association of the Infectious Diseases Society of America Practice Guidelines	<a href="http://www.idsociety.org/Content.aspx?id=1922">http://www.idsociety.org/Content.aspx?id=1922</a>	HIV Medicine Association of the Infectious Diseases Society of America	Guidelines for HIV primary care, management of dyslipidemia, chronic kidney disease, and others in HIV-infected patients
International AIDS Society–USA	<a href="http://www.iasusa.org/guidelines/index.html">http://www.iasusa.org/guidelines/index.html</a>	International AIDS Society–USA	Antiretroviral therapy and resistance testing guidelines originally published in <i>JAMA</i> and <i>Clin Infect Dis</i>
US Health Resources and Services Administration	<a href="http://hab.hrsa.gov/publications.htm">http://hab.hrsa.gov/publications.htm</a>	DHHS	Guidelines and protocols for HIV primary care, hepatitis C virus and HIV coinfection, others
<b>Guidelines Published Outside the United States</b>			
British HIV Association	<a href="http://www.bhiva.org">http://www.bhiva.org</a> <a href="http://www.bhiva.org/cms1191540.asp">http://www.bhiva.org/cms1191540.asp</a>	British HIV Association	Links to several guidelines for treatment, opportunistic infections, transplantation, others
European AIDS Clinical Society	<a href="http://www.europeanaidscinicalsociety.org/guidelines.asp">http://www.europeanaidscinicalsociety.org/guidelines.asp</a>	European AIDS Clinical Society	European guidelines for treatment, management of metabolic diseases, and coinfection
World Health Organization (WHO)	<a href="http://www.who.int/hiv/pub/guidelines/en/">http://www.who.int/hiv/pub/guidelines/en/</a>	World Health Organization	Links to WHO guidelines on priority interventions, interventions in resource-limited settings, mother-to-child transmission, others

recommendations for postexposure prophylaxis, as are guidelines for counseling, testing, and referral and for the prevention and treatment of opportunistic infections. Many of these were originally published in journals or the *Morbidity and Mortality Weekly Report (MMWR)*. The site also includes links to fact sheets on other aspects of HIV disease, drug information, and listings of clinical trials including those pertinent to research on HIV vaccines.

Treatment and resistance testing guidelines developed by the International AIDS Society–USA (IAS–USA) are available on the IAS–USA Web site, along with additional content described below. The British HIV Association, the European AIDS Clinical Society, and the World Health Organization (WHO) also have guidelines available at the

corresponding Web sites for these organizations.

A variety of other management guidelines for HIV-associated conditions are also available online. For example, the Infectious Diseases Society of America (IDSA) has published recommendations for primary care of HIV-infected patients and the management of chronic kidney disease and dyslipidemia. The British HIV Association has guidelines that address transplantation in patients with HIV disease, HIV and tuberculosis coinfection, and other conditions, and the European AIDS Clinical Society also publishes guidelines regarding hepatitis B virus and hepatitis C virus coinfections and metabolic diseases associated with HIV infection. Many of these documents are available in languages other than English.

### Web Sites Providing HIV-Related References

Electronic media provide a convenient method of maintaining up-to-date reference material, which is particularly important in specialties for which the pace of new investigation is rapid such as in the HIV medicine field. Table 2 lists Web sites with reference material related to HIV and AIDS in general and to specific HIV-associated issues. The HIV InSite Web site, sponsored by the University of California San Francisco, offers a wide array of reference material, in addition to the *HIV Insite Knowledge Base*. The Knowledge Base is a comprehensive online textbook on HIV disease posted as a series of more than 100 chapters written by content experts and individually updated periodically. The topics are broad

Table 2. Selected Web Sites Providing HIV-Related Literature Citations and Other Educational Materials

Title of Web Site, in Alphabetical Order	Uniform Resource Locator	Sponsor (Type/Sponsor)	Description
<b>General Sites</b>			
AIDS Education and Training Centers National Resource Center	<a href="http://www.aids-ed.org">http://www.aids-ed.org</a>	Government/US Health Resources and Services Administration	Resources for education and training for HIV health care practitioners
Centers for Disease Control and Prevention HIV/AIDS	<a href="http://www.cdc.gov/hiv/">http://www.cdc.gov/hiv/</a>	Government/Centers for Disease Control and Prevention	Numerous links to guidelines and information
Clinical Care Options HIV	<a href="http://www.clinicaloptions.com/HIV.aspx">http://www.clinicaloptions.com/HIV.aspx</a>	Commercial/Supported by pharmaceutical and biotechnology companies	Reference material including conference coverage, free continuing medical education (CME) credits; requires free registration
HIV InSite	<a href="http://hivinsite.ucsf.edu/">http://hivinsite.ucsf.edu/</a>	Academic/University of California San Francisco	AIDS Knowledge Base, links to guidelines, current events, other Web sites
HIV Medicine	<a href="http://hivmedicine.com">http://hivmedicine.com</a>	Commercial/Flying Publisher, via Amedeo Web site; supported by pharmaceutical companies	Textbook available free online, published 2007, edited by Hoffmann, Rockstroh, and Kamps
International AIDS Society–USA (IAS–USA)	<a href="http://www.iasusa.org">http://www.iasusa.org</a>	Not-for-profit/IAS–USA	Resources for education
Johns Hopkins Point-of-Care Information Technology (POC-IT) Center	<a href="http://www.hopkins-aids.edu/">http://www.hopkins-aids.edu/</a>	Academic/Johns Hopkins University	POC-IT HIV guide with free registration, links
Medical Matrix	<a href="http://www.medmatrix.org/_Spages/Aids.asp">http://www.medmatrix.org/_Spages/Aids.asp</a>	Commercial/Medical Matrix, LLC	Links to numerous Web sites rated by quality; requires paid subscription
Medscape HIV/AIDS	<a href="http://www.medscape.com/hiv">http://www.medscape.com/hiv</a>	Commercial/Supported by advertising and corporate sponsors; part of WebMD Health Professional Network	Reference material including conference coverage, free CME credits; requires free registration
Pathology of AIDS	<a href="http://library.med.utah.edu/WebPath/AIDS2009.PDF">http://library.med.utah.edu/WebPath/AIDS2009.PDF</a>	Academic/University of Utah Eccles Health Sciences Library and Mercer University School of Medicine	Electronic textbook updated May 2009 by William Klatt, Mercer University School of Medicine
The Body Pro	<a href="http://www.thebodypro.com/">http://www.thebodypro.com/</a>	Commercial/Supported by pharmaceutical companies	HIV resource for health professionals; requires free registration

(Continued on next page)

and include sections on HIV pathogenesis, diagnosis, clinical management, opportunistic infections, transmission, prevention, and policy. Although many chapters are currently in need of updating, the Knowledge Base remains a valuable and high-quality source of information. HIV InSite also lists news developments and links to sites with clinical tools or additional information on treatment, prevention, and policy.

The Johns Hopkins (University) HIV Point-of-Care Information Technology

(POC-IT) Center is home to the *HIV Guide*, which offers short bullets on a broad array of issues in HIV care. The manual *Medical Management of HIV Infection* by Bartlett and Gallant can be purchased as of December 2009 at this site ([http://www.hopkins-aids.edu/publications/main/medical\\_management\\_of\\_hiv\\_infection/medical\\_management\\_of\\_hiv\\_infection.html?contentInstanceId=30315&siteId=](http://www.hopkins-aids.edu/publications/main/medical_management_of_hiv_infection/medical_management_of_hiv_infection.html?contentInstanceId=30315&siteId=)). The Centers for Disease Control and Prevention (CDC) Web site has many links

to guidelines and information for HIV care practitioners. It also offers access to the *MMWR* and the *MMWR Recommendations and Reports*.

Medscape HIV/AIDS, Clinical Care Options (CCO)-HIV, and The Body Pro are commercial Web sites supported by advertising fees and grants from commercial pharmaceutical and laboratory testing companies. The sites provide conference summaries and access to current published data along with expert commentary. CCO also provides sum-

Table 2. Selected Web Sites Providing HIV-Related Literature Citations and Other Educational Materials (cont'd)

Title of Web Site, in Alphabetical Order	Uniform Resource Locator	Sponsor (Type/Sponsor)	Description
<b>Specialized Sites</b>			
HIVandHepatitis.com	<a href="http://www.hivandhepatitis.com/">http://www.hivandhepatitis.com/</a>	Commercial/Supported by pharmaceutical sponsors	Treatment issues in HIV and hepatitis B or C virus–coinfected patients, conference updates; CME credits available
HIV Drug Interactions	<a href="http://www.hiv-druginteractions.org/">http://www.hiv-druginteractions.org/</a>	Academic/University of Liverpool	HIV pharmacology resource, offers drug–interaction charts, pharmacology fact sheets
HIV French Resistance	<a href="http://www.hivfrenchresistance.org">http://www.hivfrenchresistance.org</a>	Government/French National Agency for AIDS Research AC11 Resistance Group	Drug resistance algorithms for genotypic data
HIV Transplant	<a href="http://www.hivtransplant.com/">http://www.hivtransplant.com/</a>	Government/US National Institute of Allergy and Infectious Diseases	Solid Organ Transplantation in HIV Study protocol, pilot data, links to posters and literature from the study
National HIV/AIDS Clinicians' Consultation Center	<a href="http://www.nccc.ucsf.edu/Info/index.html">http://www.nccc.ucsf.edu/Info/index.html</a>	Academic/University of California San Francisco	Links to guidelines, resistance cases, and other information; links to sites below
<ul style="list-style-type: none"> <li>• PEpline: The National Clinicians' Post-Exposure Prophylaxis Hotline</li> <li>• Warmline: The National HIV Telephone Consultation Service</li> <li>• Perinatal HIV Hotline: The National Perinatal HIV Consultation and Referral Service</li> </ul>	<a href="http://www.nccc.ucsf.edu/Hotlines/PEpline.html">http://www.nccc.ucsf.edu/Hotlines/PEpline.html</a> <a href="http://www.nccc.ucsf.edu/Hotlines/Warmline.html">http://www.nccc.ucsf.edu/Hotlines/Warmline.html</a> <a href="http://www.nccc.ucsf.edu/Hotlines/Perinatal.html">http://www.nccc.ucsf.edu/Hotlines/Perinatal.html</a>		<ul style="list-style-type: none"> <li>• Postexposure prophylaxis hotline for treating clinicians; related links</li> <li>• Advice to clinicians with questions about HIV and HIV care; related links</li> <li>• Consultation and advice on management of HIV in pregnancy and HIV-exposed infants</li> </ul>
Stanford University HIV Drug Resistance Database	<a href="http://hivdb.stanford.edu/">http://hivdb.stanford.edu/</a>	Academic/Stanford University	HIV drug resistance database with genotypic, phenotypic, and clinical correlations and resistance algorithm

maries of recent abstracts and selected studies and an annual HIV update.

Additional general references available online include 2 HIV textbooks reproduced in full (*Pathology of AIDS* and *HIV Medicine*). Training and education materials can be found at the AIDS Education and Training Centers (AETCs) Web site. The AETCs are regional organizations funded by the Health Resources and Services Administration (HRSA, part of the US DHHS), dedicated to providing multidisciplinary educational programs to train HIV care practitioners.

Several reference Web sites focus on specialized aspects of HIV and AIDS care. The Stanford University HIV Drug Resistance Database is an up-to-date, high-quality Web site that serves as a valuable resource for information on HIV drug resistance. The site is extensively referenced and has an easy-to-use interface permitting en-

try of individual resistance profiles for interpretation. Additional Web-based resources for resistance interpretation are well reviewed by Liu and Shafer<sup>3</sup> and include the resistance algorithms developed by the French National Agency for Research on AIDS and Viral Hepatitis (ANRS).

Sponsored by the University of Liverpool, the HIV Drug Interactions Web site is also a key resource for the HIV practitioner. Practitioners can request individualized interaction data between antiretroviral drugs and other medications, including other antiretroviral drugs. The resultant reports give extensive information about the importance of the specific interaction(s) and any necessary dose adjustments. In addition, interaction charts for each antiretroviral drug class are available for downloading. Specific information on drugs can always be found at the manu-

facturer's site as well as at [aidsinfo.nih.gov](http://aidsinfo.nih.gov).

The Web site HIVandHepatitis.com focuses on new developments in patients infected with HIV, hepatitis B virus, or hepatitis C virus, particularly, in those with hepatitis and HIV coinfection. Management guidelines and conference coverage are available in addition to continuing medical education (CME) programs.

The Solid Organ Transplantation in HIV multicenter study funded by the National Institute of Allergy and Infectious Diseases (NIAID) maintains a Web site accessible to patients and practitioners. The study protocol is available on the site, as is a listing of NIAID-participating study centers and links to publications from the study. Finally, the federally funded National HIV/AIDS Clinicians' Consultation Center (NCCC), sponsored by the Universi-

Table 3. Selected Web Sites of HIV-Related Scientific Conferences

Title of Conference Web Site, in Alphabetical Order	Uniform Resource Locator	Description
Conference on Retroviruses and Opportunistic Infections (annual)	<a href="http://www.retroconference.org">http://www.retroconference.org</a>	Free access to Webcasts, posters, searchable abstracts; links to previous conferences
Infectious Diseases Society of America Annual Meeting	<a href="http://www.idsociety.org/Content.aspx?id=12006">http://www.idsociety.org/Content.aspx?id=12006</a>	General conference information
International AIDS Conference (even years)	<a href="http://www.aids2010.org/">http://www.aids2010.org/</a>	Free abstracts; some Webcasts and Podcasts of presentations
International AIDS Society Conference on HIV Pathogenesis, Treatment and Prevention (odd years)	<a href="http://www.ias2009.org/">http://www.ias2009.org/</a>	Free Webcasts, abstracts
International HIV Drug Resistance Workshop (annual)	<a href="http://www.informedhorizons.com/resistance2009/index.html">http://www.informedhorizons.com/resistance2009/index.html</a>	Content 2002-2009 available with abstracts and some presentations
International Workshop on Adverse Drug Reactions & Co-Morbidities in HIV (annual)	<a href="http://www.intmedpress.com/lipodystrophy/default.cfm?itemtypeid=1&amp;title=Home">http://www.intmedpress.com/lipodystrophy/default.cfm?itemtypeid=1&amp;title=Home</a>	Link to 2008 abstracts from link to Webcasts and videos
Interscience Conference on Antimicrobial Agents and Chemotherapy (annual)	<a href="http://www.icaac.org/">http://www.icaac.org/</a>	Sponsored by American Society for Microbiology; digital recordings available for purchase, free searchable posters for attendees

ty of California San Francisco, provides consultative services for clinicians with urgent questions regarding postexposure prophylaxis (PEPline), management of HIV in pregnancy and HIV-exposed infants (Perinatal Hotline), and general HIV disease information for practitioners (Warmline). The NCCC site provides contact information for these services in addition to links to reference material.

### Web Sites for HIV-Related Conferences

Worldwide, many conferences are dedicated to research in HIV medicine (Table 3). Several sites provide conference material electronically. The Conference on Retroviruses and Opportunistic Infections (CROI) has been held annually since 1994. Nearly the entire oral content and all of the abstracts are available almost immediately on the CROI Web site and have been for several years. The International AIDS Conference first convened in 1985 and has been held biennially in even years since 1994. In recent years, much of the content of the conference, including Webcasts and abstracts, is available online. In addition,

the biennial International AIDS Society (IAS) Conference on HIV Pathogenesis, Treatment, and Prevention (held in odd years beginning in 2001), the International HIV Drug Resistance Workshop, and the International Workshop on Adverse Drug Reactions and Co-Morbidities in HIV provide substantial amounts of conference material online.

### Web Sites With Images and Case Studies

Several Web sites have an array of images available to upload for teaching purposes (Table 4). Among the best is the AIDS Images Library sponsored by Geneva University Hospital and maintained by HIV expert Bernard Hirschel. With more than 1000 images of manifestations of HIV-associated comorbidities, the site is an outstanding resource, and the images can be uploaded into a PowerPoint presentation. Registration is required, but access to all material is free. The CDC-funded Public Health Image Library and the VA Image Library also have good collections. The Web site AIDS Imaging has not been updated in many years, but the images

remain relevant. Finally, several dozen histopathologic images can be found on the Internet Pathology Library Webpath site highlighting common opportunistic infections.

Several Web sites have an extensive selection of case studies with interactive components. The University of Washington and the Northwest AETC have teamed together to produce more than 65 Web-based case studies addressing issues in HIV care including antiretroviral therapy, dermatologic and oral manifestations of HIV infection, opportunistic infections, and issues in special populations. The IAS-USA provides an interactive *Cases on the Web* series on its Web site, with a growing library of cases that provide CME credit. Clinical Care Options also has cases for study, all with interactive components and links to relevant studies in the discussion. New cases are added to each of these sites regularly.

### HIV-Related Journals

Original HIV-related research is published in a broad array of journals. Although listing all of these journals and

Table 4. Selected Web Sites with HIV-Related Images and Case Studies

Title of Web Site, in Alphabetical Order	Uniform Resource Locator	Sponsor	Description
<b>Images</b>			
AIDS Images Library	<a href="http://www.aids-images.ch/">http://www.aids-images.ch/</a>	Geneva University Hospital, Switzerland	Maintained by HIV expert; free registration
AIDS Imaging	<a href="http://members.xoom.virgilio.it/Aidsimaging/">http://members.xoom.virgilio.it/Aidsimaging/</a>	Casa del Sole Hospital, Palermo, Italy	Clinical, radiologic, and histologic images of AIDS and sexually transmitted diseases; last update 2002
Public Health Image Library	<a href="http://phil.cdc.gov/phil/home.asp">http://phil.cdc.gov/phil/home.asp</a>	US Centers for Disease Control and Prevention	Photographs, illustrations, and multimedia files on a variety of medical topics
The Internet Pathology Library WebPath	<a href="http://library.med.utah.edu/WebPath/TUTORIAL/AIDS/HIV.html">http://library.med.utah.edu/WebPath/TUTORIAL/AIDS/HIV.html</a>	University of Utah Eccles Health Sciences Library and Mercer University School of Medicine	HIV tutorial and many images of pathology with limited text
US Department of Veterans' Affairs HIV/AIDS Image Library	<a href="http://www.hiv.va.gov/vahiv?page=im-00-00">http://www.hiv.va.gov/vahiv?page=im-00-00</a>	US Department of Veterans Affairs	> 200 images of clinical symptoms of HIV infection; available free for downloading
<b>Case Studies</b>			
Clinical Care Options HIV–Management Series	<a href="http://www.clinicaloptions.com/HIV/Management%20Series.aspx">http://www.clinicaloptions.com/HIV/Management%20Series.aspx</a>	Commercial site supported by pharmaceutical and biotechnology companies	Free continuing medical education (CME) credits offered through accredited providers
HIV Web Study: A Case-Based Clinical Curriculum	<a href="http://depts.washington.edu/hiv aids/">http://depts.washington.edu/hiv aids/</a>	University of Washington and Northwest AIDS Education and Training Center	> 65 case-based modules; free CME credits
International AIDS Society–USA <i>Cases on the Web</i>	<a href="http://www.iasusa.org/cow/">http://www.iasusa.org/cow/</a>	International AIDS Society–USA	> 40 <i>Cases on the Web</i> interactive presentations; free CME credits

their Web sites is beyond the scope of this article, several journals that specialize in HIV-related original research plus other important high-impact general medical journals that include original HIV and AIDS research are listed in Table 5. All except *AIDS Research and Therapy* require a subscription for full access to all content. Other journals that publish predominantly review articles include *AIDS Clinical Care*, which compiles short reviews with commentary on current research and *Current Opinion in HIV and AIDS*, a commercial venture that publishes review articles on current topics and controversies by experts and requires a subscription for access. The IAS–USA publishes *Topics in HIV Medicine*, which is available free on the IAS–USA Web site and includes an annual CROI review issue written by experts, summaries of

expert presentations made at IAS–USA education courses, as well as guidelines articles and drug resistance mutations updates by IAS–USA panels.

#### HIV-Related Research Web Sites

**Clinical Trials and Trial Networks.** In the United States, the National Institutes of Health (NIH) sponsors a registry (ClinicalTrials.gov) that is a searchable, useful resource for clinical trials information. Online information regarding the 5 US HIV-related clinical trials networks funded by the NIAID through the Division of AIDS (DAIDS) is also available. A Web site serves each of these networks: the AIDS Clinical Trials Group (ACTG), the HIV Prevention Trials Network (HPTN), the HIV Vaccine Trials Network (HVTN), the Microbicide Trials

Network (MTN), and the International Maternal Pediatric Adolescent AIDS Clinical Trials Group (IMPAACT) (Table 6). The sites provide information about ongoing trials, and the amount of password-restricted content varies by site.

There are 20 NIH-funded Centers for AIDS Research (CFAR) throughout the United States dedicated to supporting multidisciplinary research efforts in HIV prevention, detection, and treatment. The core Web site has links to the institutional sites, which list affiliated investigators and describe supports available at each site. The American Foundation for AIDS Research (amfAR) is a not-for-profit organization dedicated to supporting HIV research and policy efforts. Its Web site has links to funding opportunities through the foundation.

Table 5. Selected Web Sites of Major Journals Specializing in or Including HIV-Related Content

Journal Title, in Alphabetical Order	Uniform Resource Locator	Publisher, Access
<b>HIV and Infectious Diseases Specialty Journals</b>		
<i>AIDS</i>	<a href="http://journals.lww.com/aidsonline/pages/default.aspx">http://journals.lww.com/aidsonline/pages/default.aspx</a>	Lippincott Williams & Wilkins; requires subscription for full access
<i>AIDS Clinical Care</i>	<a href="http://aids-clinical-care.jwatch.org/">http://aids-clinical-care.jwatch.org/</a>	Massachusetts Medical Society; requires subscription for full access
<i>AIDS Research and Human Retroviruses</i>	<a href="http://www.liebertonline.com/loi/aid">http://www.liebertonline.com/loi/aid</a>	Mary Ann Liebert, Inc; requires subscription for full access
<i>AIDS Research and Therapy</i>	<a href="http://www.aidsrestherapy.com/">http://www.aidsrestherapy.com/</a>	BioMed Central; open access
<i>Antiviral Therapy</i>	<a href="http://www.intmedpress.com/index.cfm?pid=12">http://www.intmedpress.com/index.cfm?pid=12</a>	International Medical Press; requires subscription for full access
<i>Clinical Infectious Diseases</i>	<a href="http://www.journals.uchicago.edu/toc/cid/current">http://www.journals.uchicago.edu/toc/cid/current</a>	University of Chicago Press; requires subscription for full access
<i>Current Opinion in HIV and AIDS</i>	<a href="http://journals.lww.com/co-hivandaids/pages/default.aspx">http://journals.lww.com/co-hivandaids/pages/default.aspx</a>	Lippincott Williams & Wilkins; requires subscription for full access
<i>Journal of Acquired Immune Deficiency Syndromes</i>	<a href="http://journals.lww.com/jaids/pages/default.aspx">http://journals.lww.com/jaids/pages/default.aspx</a>	Lippincott Williams & Wilkins; requires subscription for full access
<i>Journal of Infectious Diseases</i>	<a href="http://www.journals.uchicago.edu/toc/jid/current">http://www.journals.uchicago.edu/toc/jid/current</a>	University of Chicago Press; requires subscription for full access
<i>Topics in HIV Medicine</i>	<a href="http://www.iasusa.org/pub/">http://www.iasusa.org/pub/</a>	International AIDS Society-USA; open access
<b>General Medical Journals</b>		
<i>Annals of Internal Medicine</i>	<a href="http://www.annals.org/">http://www.annals.org/</a>	American College of Physicians; requires subscription for full access
<i>Journal of the American Medical Association</i>	<a href="http://jama.ama-assn.org/">http://jama.ama-assn.org/</a>	American Medical Association; requires subscription for full access
<i>Nature</i>	<a href="http://www.nature.com/">http://www.nature.com/</a>	Nature Publishing Group; requires subscription for full access
<i>New England Journal of Medicine</i>	<a href="http://content.nejm.org/">http://content.nejm.org/</a>	Massachusetts Medical Society; requires subscription for full access
<i>Science</i>	<a href="http://www.sciencemag.org">http://www.sciencemag.org</a>	American Association for the Advancement of Science; requires subscription for full access
<i>The Lancet</i>	<a href="http://www.thelancet.com/">http://www.thelancet.com/</a>	Elsevier; requires subscription for full access

Web sites for a few prominent internationally based clinical trials networks are also listed in Table 6. EuroSIDA, a prospective cohort of more than 16,000 patients, is among the largest cohorts in the world. EuroCo-

ord coordinates cohorts across Europe including EuroSIDA. Sites for the British-based Medical Research Council, the Canadian HIV Trials Network, and the International AIDS Vaccine Initiative are also listed.

**Scientific Databases.** Several of the clinical trials network Web sites offer access to research databases generated from the clinical cohorts, including EuroSIDA and EuroCoord. In addition, several others offer access to information

Table 6. Selected Web Sites and Organizations Providing HIV-Related Clinical and Scientific Databases

Title of Web Site, in Alphabetical Order	Uniform Resource Locator	Sponsor	Description
<b>Clinical Trials and Trial Networks</b>			
<b>United States–Based Sites</b>			
AIDS Clinical Trials Group (ACTG)	<a href="http://www.aactg.org">http://www.aactg.org</a>	National Institutes of Health (NIH), National Institute of Allergy and Infectious Diseases (NIAID), Department of Health and Human Services	ACTG information site, link to member site requires password to access information
Centers for AIDS Research (CFAR)	<a href="http://www3.niaid.nih.gov/LabsAndResources/resources/cfar/">http://www3.niaid.nih.gov/LabsAndResources/resources/cfar/</a>	NIH, NIAID	CFAR information site, with links to individual center's Web sites
ClinicalTrials.gov	<a href="http://www.clinicaltrials.gov">http://www.clinicaltrials.gov</a>	NIH	Registry of federally funded and privately supported clinical trials
Foundation for AIDS Research (amfAR)	<a href="http://www.amfar.org/">http://www.amfar.org/</a>	amfAR	Web site for foundation promoting HIV/AIDS research, education, and public policy initiatives
HIV Prevention Trials Network (HPTN)	<a href="http://www.hptn.org/">http://www.hptn.org/</a>	NIH, NIAID	HPTN information site
HIV Vaccine Trials Network (HVTN)	<a href="http://www.hvtn.org/">http://www.hvtn.org/</a>	NIH, NIAID	HVTN information site; access to trials data requires password
International Maternal Pediatric Adolescent AIDS Clinical Trials (IMPAACT) Group	<a href="http://www.impaactgroup.org/">http://www.impaactgroup.org/</a>	NIH, NIAID	Cooperative group focusing on advances in therapy for infants, children, adolescents, and pregnant women; portions of site password protected
International Network for Strategic Initiatives in Global HIV Trials (INSIGHT)	<a href="http://insight.cabr.umn.edu/">http://insight.cabr.umn.edu/</a>	NIH, NIAID	INSIGHT information site for trials network organized to optimize treatment and prevention strategies globally; portions password protected
Microbicide Trials Network (MTN)	<a href="http://www.mtnstopshiv.org/">http://www.mtnstopshiv.org/</a>	NIH, NIAID	MTN site for trials to reduce sexual transmission of HIV with topical or oral agents; some portions of site password protected
<b>International-Based Sites</b>			
Canadian Institutes of Health Research Canadian HIV Trials Network	<a href="http://www.hivnet.ubc.ca/e/home/">http://www.hivnet.ubc.ca/e/home/</a>	Canadian Institutes of Health Research	Canadian HIV research network site, link to Canadian HIV Trials Database
EuroCoord	<a href="http://www.eurocoord.net/">http://www.eurocoord.net/</a>	European Coordinating Committee for the Integration of Ongoing Coordination Actions Related to Clinical and Epidemiological HIV Research	Integrates projects across partners including cohorts from EuroSIDA, Concerted Action on Seroconversion to AIDS and Death in Europe (CASCADE), Collaboration of Observational Epidemiological Research Europe (COHERE), and Paediatric European Network for Treatment of AIDS (PENTA), requires password for some portions

(Continued on next page)

Table 6. Selected Web Sites and Organizations Providing HIV-Related Clinical and Scientific Databases (cont'd)

Title of Web Site, in Alphabetical Order	Uniform Resource Locator	Sponsor	Description
EuroSIDA	<a href="http://www.euro sida.org">http://www.euro sida.org</a>	Copenhagen HIV Programme	Web site includes EuroSIDA prospective cohort of > 16,000 patients in Europe, Israel, and Argentina
International AIDS Vaccine Initiative	<a href="http://www.iavi.org/">http://www.iavi.org/</a>	Various governmental grants, foundation grants, and corporate support	International consortium focused on scientific discovery, vaccine design, and clinical trials work
Medical Research Council of United Kingdom Clinical Trials Unit	<a href="http://www.ctu.mrc.ac.uk/research_areas/hiv.aspx">http://www.ctu.mrc.ac.uk/research_areas/hiv.aspx</a>	Medical Research Council	United Kingdom Clinical Trials Unit
<b>Scientific Database Sites</b>			
HIV Databases	<a href="http://www.hiv.lanl.gov/context/index">http://www.hiv.lanl.gov/context/index</a>	Los Alamos National Laboratory	Sequence, Resistance, Immunology, Vaccine trials databases
HIV Structural Database and Chem-BLAST	<a href="http://xpdb.nist.gov/hiv sdb/hiv sdb.html">http://xpdb.nist.gov/hiv sdb/hiv sdb.html</a>	National Institute of Standards and Technology (NIST)	Chemical taxonomy-based search engine for HIV-related compounds, specifically designed to provide structure-based data
• Chem-BLAST tree	<a href="http://bioinfo.nist.gov/SemanticWeb_pr3d/chemblast.do">http://bioinfo.nist.gov/SemanticWeb_pr3d/chemblast.do</a>		• See above
National Center for Biotechnology Information (NCBI)	<a href="http://www.ncbi.nlm.nih.gov/guide">http://www.ncbi.nlm.nih.gov/guide</a>	National Library of Medicine, NIH	Link to NCBI-sponsored nucleotide, protein, structural, and chemical databases.
• Entrez	<a href="http://www.ncbi.nlm.nih.gov/sites/gquery">http://www.ncbi.nlm.nih.gov/sites/gquery</a> (Entrez page)		• Entrez is a cross-database search engine
NIAID Division of AIDS Resources for Researchers	<a href="http://www3.niaid.nih.gov/LabsAndResources/resources/default.htm">http://www3.niaid.nih.gov/LabsAndResources/resources/default.htm</a>	NIAID	Link to numerous resources, tools, and databases for researchers, including following 3:
• HIV/Opportunistic Infections/Tuberculosis (OI/TB) Therapeutics Database HIV-1	<a href="http://chemdb2.niaid.nih.gov/struct_search/default.asp">http://chemdb2.niaid.nih.gov/struct_search/default.asp</a>	NIAID, DAIDS	• Chemical, biological, and bibliographic database of compounds tested against HIV or opportunistic pathogens including TB
• Human Protein Interaction Database	<a href="http://www.ncbi.nlm.nih.gov/RefSeq/HIVInteractions/">http://www.ncbi.nlm.nih.gov/RefSeq/HIVInteractions/</a>	NIAID	• Comprehensive database of interactions between HIV-1 proteins and host cellular proteins, and proteins of other organisms associated with HIV
• HIV/AIDS Specimen Repository	<a href="http://www3.niaid.nih.gov/LabsAndResources/resources/reposit/">http://www3.niaid.nih.gov/LabsAndResources/resources/reposit/</a>	NIAID	• Links to clinical trials networks and long-term epidemiologic studies with available specimens for further study including Multicenter AIDS Cohort Study (MACS), Women's Interagency HIV Study (WIHS), others

at a molecular level (Table 6). The National Center for Biotechnology Information (NCBI), established in 1988 as a division of the National Library of Medicine (NLM), acts as a national and international resource for molecular biology and other information. Resources include the literature databases (PubMed and the linked databases AIDSLINE,

AIDSDRUGS, and AIDSTRIALS), nucleotide databases (including GenBank and many others), protein sequence databases (including the Protein Data Bank and others), genome-specific resources, tools for data mining, sequence analysis and 3-dimensional structure display (including BLAST searching). The search engine Entrez provides cross-

referencing among the numerous available databases.

Los Alamos National Laboratory (LANL) maintains the HIV Sequence Database, the HIV Molecular Immunology Database, the HIV Vaccine Trials Database, and the HIV Drug Resistance Database. The LANL's HIV Sequence Database includes all HIV and sim-

Table 7. Selected Web Sites With Patient Information and Advocacy Content

Title of Web Site, in Alphabetical Order	Uniform Resource Locator	Description
AEGiS (AIDS Education Global Information System)	<a href="http://www.aegis.com/">http://www.aegis.com/</a>	Sponsored by National Library of Medicine and donations; largest free-access virtual AIDS library
AIDS.gov	<a href="http://www.aids.gov/">http://www.aids.gov/</a>	US government site coordinated by the Department of Health and Human Services; HIV/AIDS information and resources
AIDS InfoNet	<a href="http://www.aidsinonet.org">http://www.aidsinonet.org</a>	Sponsored by the New Mexico AIDS Education and Training Center. HIV/AIDS resource for patients and practitioners, including information and fact sheets in Spanish, Russian, Bulgarian, Indonesian, and Nepali
Aidsmap	<a href="http://www.aidsmap.com/">http://www.aidsmap.com/</a>	Based in London with information in English, Spanish, Portuguese, French, and Russian. Sponsored by NAM, a nonprofit organization providing HIV/AIDS information
AVERT	<a href="http://www.avert.org">http://www.avert.org</a>	Sponsored by AVERT, an international AIDS charity based in the United Kingdom. Provides patient information on a variety of topics; includes Spanish section
Canadian AIDS Treatment Information Exchange	<a href="http://www.catie.ca/eng/Home.shtml">http://www.catie.ca/eng/Home.shtml</a>	Canadian HIV/AIDS resource for patients; in English and French
Centers for Disease Control and Prevention: HIV/AIDS	<a href="http://www.cdc.gov/hiv/">http://www.cdc.gov/hiv/</a>	Links to information for the public on HIV/AIDS
POZ	<a href="http://www.poz.com/">http://www.poz.com/</a>	Commercial patient information site, including link to POZ magazine; portion of site in Spanish
The Body	<a href="http://www.thebody.com/">http://www.thebody.com/</a>	Commercial HIV/AIDS resource for patients; portion of site in Spanish

ian immunodeficiency virus (SIV) sequences since 1987. This content can be accessed easily along with software for analysis. Annually, the LANL produces an HIV Sequence Compendium in printed form. The HIV Molecular Immunology Database of the LANL contains a searchable database of HIV-1 cytotoxic and helper T cell epitopes and antibody binding sites. Each of these databases can be accessed fully and freely through the LANL Web site.

The Stanford HIV Drug Resistance Database (Table 2) also maintains a database of HIV sequences linked to clinical and resistance data. At present, sequence data from close to 100,000 isolates are available, with more than 40,000 associated phenotypes. Another Web site, Resources for the Researcher, can be accessed through the

NIAID Web site. This important source provides links to numerous resources such as the DAIDS Database for Anti-HIV Compounds (including chemical structure and biologic data), the DAIDS HIV/AIDS Specimen Repository, the DAIDS HIV/OI/TB (opportunistic infection/tuberculosis) Therapeutics Database and the NIAID HIV-1 Human Protein Interaction Database. This last database provides a summary of known interactions of HIV proteins with host cell proteins, other HIV proteins, and proteins from disease organisms associated with HIV and AIDS. Finally, the National Institute of Standards and Technology maintains a database of HIV-related compounds specifically with structure-based data and biologic data of interest for drug-design efforts. Data can be retrieved in

several ways including through use of a taxonomic tree to assess related inhibitory compounds.

### Web Sites for Patient Information and Advocacy

Hundreds of Web sites provide information directed toward individuals living with HIV infection. The accuracy of this information is highly variable. Table 7 lists a selection of sites with reputable, carefully presented information, often with commentaries by recognized HIV researchers. The information on the sites varies from relatively basic content about the virus and transmission to more detailed summaries of ongoing research. Many sites have information in languages other than English. In addition, information pages are available for clinicians

Table 8. Selected Web Sites With HIV-Related Epidemiology and Policy Content

Title of Web Site, in Alphabetical Order	Uniform Resource Locator
<b>United States Based</b>	
Centers for Disease Control and Prevention: HIV/AIDS	<a href="http://www.cdc.gov/hiv/">http://www.cdc.gov/hiv/</a>
Division of AIDS (DAIDS)	<a href="http://www3.niaid.nih.gov/about/organization/daids/">http://www3.niaid.nih.gov/about/organization/daids/</a>
Food and Drug Administration (FDA)	<a href="http://www.fda.gov/">http://www.fda.gov/</a>
Health Resources and Services Administration (HRSA): HIV/AIDS program	<a href="http://hab.hrsa.gov">http://hab.hrsa.gov</a>
HIV/AIDS Atlas	<a href="http://maps.z-atlas.com/HIVAtlas/Atlas.aspx">http://maps.z-atlas.com/HIVAtlas/Atlas.aspx</a> (after free registration)
Kaiser Family Foundation: HIV/AIDS	<a href="http://www.kff.org/hivaids/index.cfm">http://www.kff.org/hivaids/index.cfm</a>
National Institute of Allergy and Infectious Diseases (NIAID)	<a href="http://www3.niaid.nih.gov/">http://www3.niaid.nih.gov/</a>
United States Agency for International Development (USAID): HIV/AIDS	<a href="http://www.usaid.gov/our_work/global_health/aids/index.html#">http://www.usaid.gov/our_work/global_health/aids/index.html#</a>
United States President's Emergency Plan for AIDS Relief (PEPFAR)	<a href="http://www.pepfar.gov/">http://www.pepfar.gov/</a>
<b>International Based</b>	
Joint United Nations Programme on HIV/AIDS (UNAIDS)	<a href="http://www.unaids.org/en/default.asp">http://www.unaids.org/en/default.asp</a>
World Health Organization (WHO): HIV/AIDS	<a href="http://www.who.int/topics/hiv_aids/en/index.html">http://www.who.int/topics/hiv_aids/en/index.html</a>

to print and distribute to patients.

Particularly noteworthy are the AIDS InfoNet Web site, developed by the New Mexico AETC, and the *aidsmap* and *AVERT* sites, both run by not-for-profit organizations. These sites are committed to providing high-quality educational material. The *Body* and *POZ* are excellent commercial resources with reliable content that are updated regularly to include reports of recent studies and findings at scientific meetings. Their content is supported through advertisement and pharmaceutical sponsorship. The Canadian AIDS Treatment Information Exchange (CATIE) contains informational sections on preventing, living with, and treating HIV in addition to links to other sites.

Both *AIDS.gov* and *CDC.gov* are federally funded Web sites that maintain reliable educational information for persons living with and caring for those

with HIV and AIDS. *AEGIS*, a site sponsored by the NLM, is easy to navigate and allows access to the vast resources available through the NLM. The site has links to daily news updates, articles on many different aspects of HIV and AIDS, conference sites, and other sites of interest to patients and the public.

### Epidemiology and Policy Web Sites

Several government- or organization-sponsored sites are excellent sources of epidemiologic and policy information (Table 8). For current, accurate US data, the CDC posts updates on its Web site on the US epidemic including rates in different risk groups, sex-specific data, and data by race, in addition to many other detailed analyses. Much of this information is also available as downloadable slide sets. The Kaiser Family

Foundation site also provides a link to another site, *statehealthfacts.org*, which details HIV- and AIDS-related statistics by state. This information is also available at many of the individual state health department Web sites that are not listed separately in the table but can be found using any major search engine. The newly developed HIV/AIDS Atlas Web site shows epidemiologic data graphically and at the county level.

Data detailing the international HIV epidemic can be found on the Joint United Nations Programme on HIV/AIDS (UNAIDS) and WHO Web sites. The annual report on the global AIDS epidemic can be downloaded from the UNAIDS site, which provides detailed information by region and by country throughout the world. Slide sets are also available from most of these sites.

Several Web sites outline current policy and maintain current data regarding policy changes. HRSA administers the Ryan White HIV/AIDS Program and its Web site, which has detailed information regarding the current status of this important resource. The President's Emergency Plan for AIDS Relief (PEPFAR) and the US Agency for International Development (USAID) are US programs tasked with fighting HIV and AIDS in the global arena. Their Web sites detail these programs and include recent updates of new initiatives and policy changes. Web sites for NIAID and DAIDS link to research and clinical resources in addition to funding sources for research and training programs. Finally, the US Food and Drug Administration Web site has data regarding approval and package insert updates for antiretroviral drugs and other relevant medications. Interested practitioners can subscribe to the site's HIV/AIDS listserve to receive e-mail notification of updates to medication indications and approvals.

### Web Sites of US and International Societies for HIV Practitioners

Table 9 lists major US-based and international societies serving HIV care practitioners. In the United States, the IDSA, its subgroup, the HIV Medical Association (HIVMA), and the American Academy of HIV Medicine (AAHIVM) advocate

Table 9. Selected Web Sites of Societies or Organizations for HIV Practitioners

Name of Organization, in Alphabetical Order	Uniform Resource Locator
<b>United States Based</b>	
American Academy of HIV Medicine (AAHIVM)	<a href="http://www.aahivm.org/">http://www.aahivm.org/</a>
HIV Medicine Association (HIVMA) <sup>a</sup>	<a href="http://www.hivma.org/">http://www.hivma.org/</a>
Infectious Diseases Society of America (IDSA)	<a href="http://www.idsociety.org/">http://www.idsociety.org/</a>
International AIDS Society–USA (IAS–USA)	<a href="http://www.iasusa.org/">http://www.iasusa.org/</a>
<b>International Based</b>	
AIDS Society of Asia and the Pacific	<a href="http://www.aidsocietyap.org">http://www.aidsocietyap.org</a>
Brazilian Interdisciplinary AIDS Association	<a href="http://www.abiaids.org.br/">http://www.abiaids.org.br/</a>
Brazil National Sexually Transmitted Diseases (STD) and AIDS Programme	<a href="http://www.aids.gov.br/main.asp?LangID=en">http://www.aids.gov.br/main.asp?LangID=en</a>
European AIDS Clinical Society	<a href="http://www.europeanidsclinicalsociety.org">http://www.europeanidsclinicalsociety.org</a>
International AIDS Society (IAS)	<a href="http://www.iasociety.org">http://www.iasociety.org</a>
International Association of Physicians in AIDS Care	<a href="http://www.iapac.org">http://www.iapac.org</a>
Society for AIDS in Africa <sup>b</sup>	<a href="http://www.saafrica.org/index.php">http://www.saafrica.org/index.php</a>
YR Gaitonde Center for AIDS Research and Education (YRG CARE) <sup>c</sup>	<a href="http://www.yrgcare.org">http://www.yrgcare.org</a>

<sup>a</sup>Sponsored by IDSA.

<sup>b</sup>In French and English.

<sup>c</sup>India-based not-for-profit organization.

for HIV physicians on a national scale. Both societies accept non-infectious-diseases-trained HIV practitioners (physician and others) as members. The IAS is the leading international association of HIV physicians and researchers and sponsors the largest HIV/AIDS conferences in the world.

The IAS–USA (which is not affiliated with IAS) has an important educational mission for HIV practitioners. The group sponsors CME update courses throughout the United States, is contracted by HRSA to sponsor the Annual CME Conference for Ryan White HIV/AIDS Program clinicians, develops treatment guidelines by panels of HIV experts, and publishes educational material and programs on its Web site

and in print, as noted above. It also maintains and updates a list of drug resistance mutations in HIV-1, which are available as downloadable slides on the Web site.

Many other international organizations exist; notable examples include the International Association of Physicians in AIDS Care (IAPAC), the European AIDS Clinical Society (EACS), the AIDS Society of Asia and the Pacific, and the Society for AIDS in Africa.

## Conclusions

An enormous amount of information is available on the World Wide Web pertaining to HIV and AIDS. Available Web sites provide current information

on the status of the epidemic, prevention and treatment trials, molecular and research data, policy data, and educational content. Maintaining current knowledge in all of these areas is important to provide the best care for patients affected by the disease and to promote national and international collaborations to combat HIV and AIDS. Furthermore, patients access the Internet regularly, and health care practitioners must be able to direct patients and their family members to reliable sites. Readers need to be discriminative when using the Internet as an information resource. Whereas a lot of useful information can be found online, there is also the danger that inaccurate information can be obtained as well. Knowing who is responsible for a given site is a good starting point in deciding how reliable and current the information presented by that site really is. The World Wide Web allows all of us to be members of the global community addressing the epidemic in myriad ways.

*Financial Disclosure:* Dr del Rio has received research grants awarded to Emory University from Merck & Co, Inc, and Sanofi Pasteur. He served as a consultant to, or received honoraria from, Bristol-Myers Squibb, Merck & Co, Inc, and Janssen-Cilag. Dr Armstrong has no relevant financial affiliations to disclose.

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