Research and Discovery:
Online Databases at Your Fingertips

Focused for the Radiology Community

National Library of Medicine
http://www.nlm.nih.gov/

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National Institutes of Health – http://www.nih.gov/

The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services, is the primary Federal agency for conducting and supporting medical research and is composed of 27 Institutes and Centers including:

National Cancer Institute (NCI) – http://www.nci.nih.gov/

NCI conducts and supports research that will lead to a future in which we can prevent cancer before it starts, identify cancers that do develop at the earliest stage, eliminate cancers through innovative treatment interventions, and biologically control those cancers that we cannot eliminate so they become manageable, chronic diseases.

NIBIB – http://www.nibib.nih.gov/
National Institute of Biomedical Imaging and Bioengineering

NIBIB promotes fundamental discoveries, design and development, and translation and assessment of technological capabilities in biomedical imaging and bioengineering, enabled by relevant areas of information science, physics, chemistry, mathematics, materials science, and computer sciences.

National Library of Medicine (NLM) – http://www.nlm.nih.gov/

NLM collects, organizes, and makes available biomedical science information and databases to scientists, health professionals, and the public. NLM conducts and supports research in biomedical communications; creates information resources for molecular biology, biotechnology, toxicology, and environmental health; and provides grant and contract support for training, medical library resources, and biomedical informatics and communications research. The National Center for Biotechnology Information (NCBI) updates and maintains the PubMed interface and the Images database.

NIH Blueprint for Neuroscience Research – http://neuroscienceblueprint.nih.gov/

The NIH Blueprint is a cooperative effort among 15 NIH Institutes, Centers and Offices that support neuroscience research. By pooling resources and expertise, the Blueprint supports the development of new tools, training opportunities, and other resources to assist neuroscientists in both basic and clinical research.

Literature Resources

PubMed® – http://pubmed.gov/

PubMed was developed National Library of Medicine (NLM) and contains over 22 million bibliographic citations dating back to the 1800s. PubMed provides links to full-text of articles at participating publishers' Web sites, Bookshelf and PMC (formerly PubMed Central). PubMed also includes links to the PMC Images database, to biological data, sequence data and other molecular biology databases, and to chemical information in the PubChem database. **MEDLINE®** is the indexed subset of PubMed and contains over 20 million bibliographic citations from 5,600 international biomedical journals.

PMC (PubMed Central) – http://www.ncbi.nlm.nih.gov/pmc
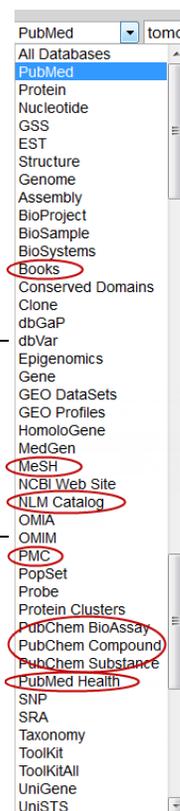
This NLM NCBI free archive of over 2.6 million biomedical and life sciences journal publications and contains over three million associated images. PMC may be searched from PubMed and the images from PMC articles are visible in both PMC and PubMed.

Bookshelf – http://www.ncbi.nlm.nih.gov/books

Bookshelf, the books division of the NLM Literature Archive (LitArch), is an online collection providing free access to over 1100 books, reports and documents in life science and healthcare, including the Molecular Imaging & Contrast Database (MICAD). Bookshelf contents may have a corresponding entry in PubMed. From the PubMed search box use *Books* in the drop-down menu. When there are four or more images from a search of the NLM Bookshelf, the *Images search in Bookshelf* box will appear. Click on the *See more* link.

PubMed Health – http://www.ncbi.nlm.nih.gov/pubmedhealth/

PubMed Health, a service of NCBI, specializes in reviews of clinical effectiveness research, with easy-to-read summaries for consumers as well as over 34000 full technical reports, clinical guides and DARE Reviews.

Additional literature databases and specific journals are available online, often through a subscription service. Contact your librarian to identify services which your hospital or institution has already purchased.

Patient & Family Websites

MedlinePlus® – http://medlineplus.gov/

In this NLM patient and family-oriented database, MedlinePlus brings together and links to authoritative information from NLM and other government agencies and health-related organizations. MedlinePlus addresses over 950 health topics with materials in multiple languages and includes drug information, an illustrated medical encyclopedia, surgery and downloadable anatomy videos, interactive patient tutorials, and the latest health news.

RadiologyInfo™ – http://radiology.org/

This public information web site was developed and funded by the American College of Radiology (ACR) and the Radiological Society of North America (RSNA). Focused on information on radiologic procedures and the role of radiologists in healthcare, topics include tests and treatments, body systems, procedures, and videos.

Hospitals, Health systems, Consumer health libraries, and **Public libraries** are additional sources of information, websites and materials for patients and their family members. MedlinePlus provides links to libraries under *Directories* then *Find a Library*.

Substance Databases

TOXNET – http://toxnet.nlm.nih.gov/

The TOXNET search portal contains databases on toxicology, hazardous chemicals, environmental health, toxic releases and drugs. Two literature databases, **Toxicology Literature Online (TOXLINE)** and the **Developmental and Reproductive Toxicology Database (DART)**, access information from PubMed and other sources.

Two key substance databases are:
- **ChemIDPlus:** Dictionary of over 370,000 chemicals (names, synonyms, and structures)
- **LactMed:** Drugs to which breastfeeding mothers may be exposed and including are maternal and infant drug levels of drugs and effects on breastfed infants and on lactation

Additional databases focus on carcinogenic chemicals and genetic toxicology.

PubChem – http://pubchem.ncbi.nlm.nih.gov

PubChem is a component of the *NIH Roadmap for Medical Research* initiative and provides information on the biological activities of small molecules. PubChem is organized as three inter-connected databases and includes links to PubMed citations and protein 3D structures. PubChem **Substance** contains about 93 million records of chemical samples descriptions. **Compound** contains nearly 33 million chemically unique structuress and **BioAssay** accesses almost 650,000 BioActivity screens. PubChem can be accessed from PubMed by using the dropdown search menu.

MICAD: Molecular Imaging & Contrast Database – http://www.micad.nih.gov/
(Available with a PubMed search using *Books* from the drop-down **Search** menu.)

MICAD is an online database cataloging key research data on *in vivo* molecular imaging and contrast agents for over 1330 agents. Also a component of the NIH Roadmap initiative, the database includes but is not limited to agents developed for positron emission tomography, magnetic resonance imaging, ultrasound, optical imaging, and planar gamma imaging. MICAD contains information on human and animal studies, literature references with links to PubMed, and links to structure information in PubChem.

Drug Information Portal – http://druginfo.nlm.nih.gov

The NLM Drug Information Portal provides a gateway to selected drug information from NLM and other U.S. Government agencies; and includes information on nearly 29,000 drugs covering from the time the drugs are entered into clinical trials (Clinicaltrials.gov) through their entry in the U.S. market place (and listed in Drugs@FDA).

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Data Archives

Cancer Imaging Program (CIP) – https://wiki.nci.nih.gov/x/mAimAQ

From the National Cancer Institute (NCI) Division of Cancer Treatment and Diagnosis, this survey of publicly available in vivo medical imaging archives highlights those databases containing DICOM images and raw data. This page includes information on sponsoring institutions, the names of the archives and datasets, supporting software and a table of archive software solutions.

The Cancer Imaging Archive (TCIA) – http://cancerimagingarchive.net

Archive of medical images of cancer in the DICOM format accessible for public download.

National Biomedical Imaging Archive (NBIA) – http://ncia.nci.nih.gov

National repository integrating in vivo cancer images with clinical and genomic data.

Osteoarthritis Initiative (OAI) – http://oai.ucsf.edu

Multi-center, four-year observational study of nearly 5,000 men and women; cases include images, assessments, biospecimens and clinical data. The images are also available through the **National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) (https://niams-imaging.nci.nih.gov/)**

Pediatric MRI Data Repository – https://nihpd.crbs.ucsd.edu

The National Institutes of Health (NIH) MRI Study of Normal Brain Development contains phenotypic information and imaging data from typically developing children.

National Database for Autism Research NDAR – http://ndar.nih.gov

Bioinformatics platform for Autism Spectrum Disorder (ASD) investigators. Genetic, imaging and phenotypic research from over 25,000 participants accessed through the Pediatric MRI Data Repository; registration required.

National Health and Nutrition Examination Surveys (NHANES) http://www.cdc.gov/nchs/nhanes.htm

Use the **Web-based Medical Information Retrieval System (http://archive.nlm.nih.gov/proj/webmirs/)** to access to the NHANES II & III databases of medical survey data and x-ray images.

Shared project databases

Lung Cancer Alliance (LCA) Give A Scan –http://www.giveascan.org/
Patient-powered open access database for lung cancer research

National Alliance for Medical Image Computing (NA-MIC) – http://www.na-mic.org/
A multi-institutional, interdisciplinary community of researchers

Laboratory of Neuro Imaging (LONI) Image Data Archive (IDA) – https://ida.loni.ucla.edu
Integrated environment for neuroimaging data accommodating MRI, PET, MRA, and other formats

BIRN (Biomedical Informatics Research Network) – http://www.birncommunity.org/
Hosting multiple institutional archives and links to the Function BIRN Data Repository, under Resources, Data.

Image Sources

Literature Search Engines

Open I – http://openi.nlm.nih.gov

An Open Access Biomedical Image Search Engine initially accessing over 600,000 images from full text collections such as PMC. Retrieve citation information, the outcome statements in the article and the most relevant figure from it. Also available: image region-of-interest (ROI) based querying.

American Roentgen Ray Society (ARRS) Gold Miner® – http://goldminer.arrs.org/

Provides access to over 250,000 radiological images published in over 260 selected peer-reviewed journals; search by findings, anatomy, imaging technique, age or sex.

YottaLook™ – http://www.yottalook.com/

This free medical search engine is specifically designed to search radiology images from peer-reviewed online sources; access to over 800,000 images.

SearchingRadiology.com™ – http://www.searchingradiology.com/

Accesses radiology peer-reviewed information from journals, atlases (e.g. *Gray's Anatomy)* and *Medcyclopaedia.* Related search engines are **RadiologyEducation.com**™ and **PediatricRadiology.com**™

Image Databases

Images from the History of Medicine (IHM) – http://www.ihm.nlm.nih.gov/

Access to nearly 70,000 images from this NLM History of Medicine Division database, including posters, photographs, and portraits illustrating the social and historical aspects of medicine from the 15th to 21st century.

National Institutes of Health NIH Image Bank – http://media.nih.gov/imagebank/

Access biomedical, science-related, and patient care-related images from the NIH and at the **National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) Image Gallery (http://images.niams.nih.gov/)**

Image Galleries

A number of organizations share their images. E.g.: **Surgical Planning Laboratory (SPL) publication Database (http://www.spl.harvard.edu)**

Online books

These are additional sources of information and images. See: **CHORUS: Collaborative Hypertext of Radiology (http://chorus.rad.mcw.edu/)** and **The Basics of MRI (http://www.cis.rit.edu/htbooks/mri/)**

Individual journals

Many journals provide access to the images associated with their articles. Click Advanced Search then look for *Search Figures and Tables.* Note: when the journals submit articles to PMC, these images are visible PubMed (e.g. **British Journal of Radiology (http://bjr.birjournals.org/)**).

Vendors may offer image databases, for example, SONOWORLD **(http://www.sonoworld.com/).**

Case Studies

MedPix™ – http://rad.usuhs.edu/medpix/

This free online medical database and radiology portal is provided by the Departments of Radiology and Biomedical Informatics, Uniformed Services University, Bethesda, MD. Over 12,000 teaching file cases and 56,000 images are included along with free online CME.

Trauma.org – http://www.trauma.org/

Trauma.org provides education, information and communication resources for professionals in trauma and critical care. The site includes a Trauma Image Database and Case Presentations section.

Pediatric Radiology online – http://www.pedrad.info/

The Peer Reviewed Pediatric Radiology Platform on the Web: Pediatric Radiology information, publication and communication platform.

Radiology Assistant – http://radiologyassistant.nl/

The Radiology Assistant focuses on common radiological issues in a problem-oriented way. This is the educational web site of the Radiological Society of the Netherlands.

MyPACS.net Reference Case Manager –http://www.mypacs.net/

Worldwide community members have submitted over 26,850 cases and nearly 162,000 images.

Radiolopolis – http://www.radiolopolis.com/

International radiology community education, research and clinical practice; includes over 14000 case studies.

Imaging Science Today – http://www.imagingsciencetoday.com/

Active online community promoting ultrasound and radiology knowledge and education.

Additional Resources

Tool Sources

Cancer Biomedical Informatics Grid® (caBIG®) – cabig.nci.nih.gov

Information network enabling constituencies in the cancer community to share data and knowledge; committed to being federated, open-access, open-development and open-source.

Medical Imaging Resource Center (MIRC) – mirc.rsna.org

RSNA project providing tools sharing, forums and a library of medical information.

I Do Imaging: Free Medical Imaging Software – www.idoimaging.com

Tracks free medical imaging applications and resources including conversion programs, image display and analysis, surface and volume rendering.

Neuroimaging Informatics Tools and Resources Clearinghouse (NITRC) – www.nitrc.org

A web-based bank of software and other tools used for neuroimaging funded by the National Institutes of Health Blueprint for Neuroscience Research.

Open-Source Software

ClearCanvas – http://www.clearcanvas.ca

Company devoted to creating innovative open source healthcare IT applications.

3D Slicer – http://www.slicer.org

A multi-platform, free open source software for visualization and image computing.

OsiriX Imaging Software – http://www.osirix-viewer.com

Open-source image processing software dedicated to DICOM images.

National Biomedical Imaging Archive (NBIA) – http://ncia.nci.nih.gov

Software providing access to the NBIA and other imaging archives.

Extensible Neuroimaging Archive Toolkit (XNAT) – http://xnat.org

Open source imaging informatics platform, developed by the Neuroinformatics Research Group at Washington University

ImageJ – http://rsb.info.nih.gov/ij/

This public domain, Java-based image processing program was developed at the National Institutes of Health. Fiji is the distribution of ImageJ (**http://fiji.sc**).

Focused Search Engines

Science.gov – www.science.gov

Science.gov searches over 55 databases and over 2100 selected websites from 13 federal agencies, offering authoritative U.S. government science information including research and development results.

SearchMedica – www.searchmedica.com/?c=ra

Searches over 1,000 websites organized into numerous therapeutic categories selected by an advisory board. Related site: **Diagnostic Imaging - www.diagnosticimaging.com**

Radiology.org – www.radiology.org

Custom search engine compiled from over 500 premier radiology resources: journals, organizations, hospitals, medical schools, universities, and research institutions.

PolyMeta – www.polymeta.com

The Universal Meta Search and Discovery Engine™. For images, search across multiple search engines including Ask, Bing, Google, and Yahoo.