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The National Library of Medicine: A Leader in Biomedical Informatics and Data Science Research

The National Library of Medicine (NLM) is a leader of research in biomedical informatics and data science – the fields applying computer and information science approaches to biomedical research, medicine, and public health. This research promotes discovery that can lead to better patient care, innovation, and education, all of which support improved health outcomes. To drive advances in electronic health records, clinical decision support, information retrieval, advanced imaging, computational biology, telecommunications, and other areas, investigators conduct research in NLM's intramural research program at the Lister Hill National Center for Biomedical Communications and the National Center for Biotechnology Information. NLM's extramural program also supports research, training, and resource grants in universities, medical centers, small businesses, and community organizations. As described in the *NLM Strategic Plan 2017-2027 A Platform for Biomedical Discovery and Data-Powered Health*, advancing research and training in biomedical informatics and data science will enable a future of biomedical discovery and data-powered health.

Basic Computational Biology and Biomedical Science Research

NLM maintains a robust intramural research program in biomedical informatics, data science, and computational biology, emphasizing new methods approaches to enable data-driven discovery. NLM research in areas such as machine learning, deep learning, and natural language processing has accelerated diagnosis and treatment of diseases including cervical cancer, tuberculosis, and macular degeneration; and enabled identification of adverse drug reactions. NLM partners with other NIH institutes and Federal agencies, including the National Institute on Drug Abuse, the Food and Drug Administration, the Centers for Disease Control and Prevention Services, and the United States Department of Agriculture, to address health crises, such as the opioid epidemic and foodborne illness outbreaks.

Informatics and Data Science Research: 152 active grants valued at almost $58 million

NLM awards grants for basic and applied research in the sciences of organizing, storing, managing, analyzing, visualizing, and integrating biomedical data, information and knowledge. NLM also supports research that applies concepts from computer, information, engineering, and data sciences to problems in medicine, public health, and biological/behavioral sciences, with a focus on the needs of clinicians, public health officials and consumers. Six of NLM's grantees have been recipients of Presidential Early Career Awards for Scientists and Engineers. In FY2018, NLM:

- Awarded research grants to 10 early-stage investigators in support of the NIH Next Generation Researcher initiative;
- Issued four administrative supplements to NLM grantees in support of the NIH Helping to End Addiction Long-Term (HEAL) initiative;
- Funded five new Small Business Innovation Research and Technology Transfer awards to facilitate innovations, such as block-chain enabled decision support to safeguard privacy and security of patients and research participants:
- Funded 7 information resource grants to reduce health disparities;
- Launched new research initiatives to:
    - Apply data science approaches to help consumers gather, manage, use, and understand information about their personal health, resulting in the development of new consumer health tools and applications; and to

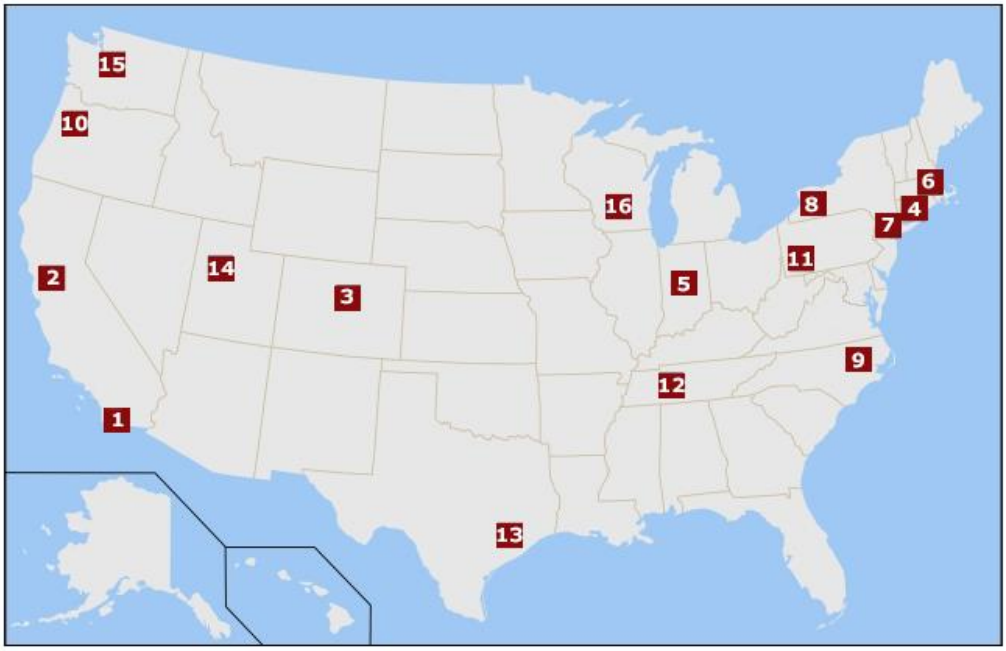
- Support computational approaches to increase the speed and assure the quality of automated annotation, storage, and retrieval of biomedical research resources to make them findable, accessible, interoperable, and reusable.

Training Biomedical Informatics and Data Science Leaders and Engaging Community Members: For more than 40 years, NLM has been the principal source of federal government support for research training in biomedical informatics. In 2018, NLM's university-based training programs funded more than 200 trainees in 16 university-based training programs offering graduate education and postdoctoral research experience. In addition, the NLM training programs extended their reach through supplemental awards in three areas:

- Partnerships with minority-serving institutions, i-schools and other NIH-supported training programs to develop and share curriculum on biomedical data science;
- Summer research internships for high school and undergraduate students to increase recruitment into biomedical informatics graduate training programs; and
- In the intramural research program, NLM supports research fellowships and engages community members through hackathons on topics such as novel virus discovery and reproducibility.

NLM's University-based Biomedical Informatics and Data Science Research Training Programs

Listed in alphabetical order by state



1. University of California San Diego; 2. Stanford University; 3. University of Colorado Anschutz Medical Campus; 4. Yale University; 5. Indiana University/Regenstrief; 6. Harvard University Medical School; 7. Columbia University Medical Center; 8. State University of NY at Buffalo; 9.University of North Carolina at Chapel Hill; 10. Oregon Health & Science University; 11. University of Pittsburgh; 12. Vanderbilt University; 13. Rice University; 14. University of Utah; 15. University of Washington; 16. University of Wisconsin Madison.

The Medical Library Association (MLA) *is a nonprofit, educational organization with 3,500 health sciences information professional members worldwide. Founded in 1898, MLA provides lifelong educational opportunities, supports a knowledgebase of health information research, and works with a global network of partners to promote the importance of quality information for improved health to the health care community and the public.*

The Association of Academic Health Sciences Libraries (AAHSL) *supports academic health sciences libraries and directors in advancing the patient care, research, education, and community service missions of academic health centers through visionary executive leadership and expertise in health information, scholarly communication, and knowledge management.*