The National Institutes of Health (NIH)
The National Institute on Deafness and Other Communication Disorders (NIDCD)

NIH Overview

- The National Institutes of Health (NIH), a part of the U.S. Department of Health and Human Services
- The primary Federal agency for conducting and supporting medical research
- Traces its roots to 1887, when a one-room laboratory was created within the Marine Hospital Service (MHS), predecessor agency to the U.S. Public Health Service (PHS)

NIH Overview

- The total budget in 2007 was $29.2 billion
- Anticipated to be flat for near future
- Has over 18,000 employees
- NIH distributes 80% of its funding in research grants to all 50 states, its territories, and several foreign countries
- Directed by Elias Zerhouni, MD since 2002

NIH Organization

- The National Institutes of Health is made up of 27 different components called Institutes and Centers (ICs)
- Each has its own specific research agenda
- All but three of these components receive their funding directly from Congress, and administrate their own budgets: CC, CSR, CIT
- Some not all are authorized to give grants
NIH ICs

- National Cancer Institute (NCI)
- National Eye Institute (NEI)
- National Heart Lung & Blood Institute (NHLBI)
- National Human Genome Research Institute (NHGRI)
- National Institute on Aging (NIA)
- National Institute on Alcohol Abuse & Alcoholism (NIAAA)
- National Institute on Allergy & Infectious Diseases (NIAID)
- National Institute of Arthritis & Musculoskeletal & Skin Diseases (NIAMS)
- National Institute of Biomedical Imaging and Bioengineering (NIBIB)
- National Institute of Child Health & Human Development (NICHD)
- National Institute on Deafness & Other Communication Disorders (NIDCD)
- National Institute of Dental & Craniofacial Research (NIDCR)
- National Institute of Diabetes & Digestive & Kidney Diseases (NIDDK)
- National Institute on Drug Abuse (NIDA)
- National Institute of Environmental Health Sciences (NIEHS)
- National Institute of General Medical Sciences (NIGMS)
- National Institute of Mental Health (NIMH)
- National Institute of Neurological Disorders & Stroke (NINDS)
- National Institute of Nursing Research (NINR)
- National Library of Medicine (NLM)
- Center for Information Technology (CIT)
- Fogarty International Center (FIC)
- National Center for Complementary & Alternative Medicine (NCCAM)
- National Center on Minority Health & Health Disparities (NCMHD)
- National Center for Research Resources (NCRR)
- NIH Clinical Center (CC)

National Institute of Biomedical Imaging and Bioengineering (NIBIB)

- Established in 2001
- Mission is to improve health by leading the development and accelerating the application of biomedical technologies
- Scientific program areas:
  - [http://www.nibib.nih.gov/Research/ProgramAreas](http://www.nibib.nih.gov/Research/ProgramAreas)

Mission of the NIH

- NIH is the steward of medical and behavioral research for the US
- Its mission is science in pursuit of fundamental knowledge about the nature and behavior of living systems and the application of that knowledge to extend healthy life and reduce the burdens of illness and disability.
NIH Strategic Vision for the Future

- In the future, research will allow us to predict how, when, and in whom a disease will develop.
- We can envision a time when we will be able to precisely target treatment on a personalized basis to those who need it, avoiding treatment to those who do not.

4Ps (cont)

- Ultimately, this individualized approach will allow us to preempt disease before it occurs.
- Utilizing the participation of individuals, communities, and healthcare providers in a proactive fashion, as early as possible, and throughout the natural cycle of a disease process.

Today’s Scientific Advances Are

Tomorrow’s Medicine

Goals of NIH

- Foster fundamental creative discoveries, innovative research strategies, and their applications as a basis to advance significantly the Nation’s capacity to protect and improve health.
- Develop, maintain, and renew scientific human and physical resources that will assure the Nation's capability to prevent disease.
Goals of NIH

- Expand the knowledge base in medical and associated sciences in order to enhance the Nation's economic well-being and ensure a continued high return on the public investment in research
- Exemplify and promote the highest level of scientific integrity, public accountability, and social responsibility in the conduct of science

NIH achieves its goals by supporting research in:

- The causes, diagnosis, prevention, and cure of human disease
- The processes of human growth and development
- The biological effects of environmental contaminants
- The understanding of mental, addictive and physical disorder

NIH achieves its goals by supporting research in (cont):

- Directing programs for the collection, dissemination, and exchange of information in medicine and health, including the development and support of medical libraries and the training of medical librarians and other health information specialists

Trans-NIH Programs to Support Mission

- NIH Roadmap for Medical Research
  - http://nihroadmap.nih.gov/
- Strategic Plan for NIH Obesity Research
- Neurosciences Blueprint
  - http://neuroscienceblueprint.nih.gov/
NIH Roadmap for Medical Research

- New Pathways to Discovery
- Research Teams of the Future
- Re-engineering the Clinical Research Enterprise

New Pathways to Discovery

- Building Blocks, Biological Pathways, and Networks
- Molecular Libraries & Imaging
- Structural Biology
- Bioinformatics and Computational Biology
- Nanomedicine
- Human Microbiome Project
- Epigenomics
- Science of Behavior Change
- New Protein Capture Technologies
- Connectivity Map

Research Teams of the Future

- High Risk Research
  - NIH Director’s Pioneer Award
  - NIH Director New Innovator Award
  - Interdisciplinary research
- Public-Private Partnerships

Re-engineering the Clinical Research Enterprise

- Clinical Research Networks & NECTAR
- Clinical Outcomes Assessment
- Clinical Research Training
- Clinical Research Policy Analysis and Coordination
- Translational Research
The NIH Blueprint for Neuroscience Research is a cooperative effort among the 16 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.

NIH Neuroscience Resources

- Animal Models
- Clinical Tools
- Imaging
- Neuroinformatics
- Core Facilities
- Cell, Tissue, DNA
- Genes & Protein Expression
- Training

Background on NIDCD

- In 1988, Congress established NIDCD as a separate Institute within the NIH. NIDCD will celebrate its 20th anniversary in 2008.
- NIDCD supports and conducts research and research training in the normal and disordered processes of:
  - Hearing
  - Balance
  - Smell
  - Taste
  - Voice
  - Speech
  - Language

Mission of NIDCD

- NIH's mission is to uncover new knowledge that will lead to better health for everyone.
- NIDCD shares the same mission with emphasis on preventing and reducing the burden of communication disorders.
- It is estimated that more than 46 million people in the United States suffer some form of disordered communication.
Communication

- Essential to wellness, learning and meaningful lives (home, play, school, work etc)
- Whereas communication disorders aren’t thought to be life threatening they are *life altering*
- “Communication to relationship is like breathing is to life” Virginia Satir, family therapist

VSL Research thru the lifespan

- From congenital disorders to acquired conditions
- Voice: RRP, dysphonias, spasmodic dysphonias, alaryngeal speech; tissue engineering
- Speech: stuttering; speech sound acquisition; apraxia of speech; TBI; dysarthria/anarthria; locked-in-syndrome

Lifespan (cont)

- Dysphagia: neurologic, structural, pulmonary etc
- Language: Specific language impairment, American sign language/deafness; language in autism; aphasia; language dissolution in dementia
- Augmentative and Alternative Communication (AAC)
- Brain-Computer Interface (BCI)

NIDCD Voice grants

- Computer-Based Tools for Medialization Laryngoplasty/Bielamowicz
- Aeroacoustics of Voice/Alipour
- Biomechanical Characterization of Vocal Fold Tissues/Chan
- Efficacy of Laryngeal High-Speed Videoendoscopy/Deliyski
- Development of Voice Neural Prosthesis Technology
NIDCD Voice grants

- Glottal jet aerodynamics/Krane
- Fluid Structure Interactions Within the Human Larynx/Mongeau
- Dynamics of Vocal Tract Shaping/Narayanan
- A Simulator for Sound Production in Airways/Titze

Types of Hearing Loss

- Injury to inner ear hair cells from noise or ototoxic medications
- Age-related
- Hereditary
- Many other diseases and conditions

Hearing Aids

- Helpful when inner ear sensory cells (hair cells) are damaged
- Magnify sound vibrations entering the ear
- Audiologist needs to measure the type and degree of hearing loss
- NIDCD-funded researchers are working to improve future hearing aids

All Abuzz About Hearing Aid Research

NIDCD-funded researchers are studying how Ormia ochracea, a tiny parasitic fly, locates the source of a sound. Results could improve directional microphones in hearing aids.
Cochlear Implants

- For severe, profound hearing loss
- Directly stimulates the auditory nerve
- Does not restore normal hearing, but provides a representation of sounds
- Allows a deaf person to understand speech and recognize warning sounds

Future Hearing Implants and Beyond

- Penetrating electrode auditory brainstem implant (clinical trial)
- Auditory nerve implant (animal studies)
- Vestibular implant (animal studies)
- Brain-computer interface for speech synthesis

New Short Electrode Provides Greater Cochlear Implant Benefits

- Cochlear implants bypass nonfunctioning hair cells to enable detection of sound
- Implant works through electrodes inserted in cochlea
- Long electrodes may destroy any residual hearing in individuals with a selective high frequency hearing loss
- New shorter hybrid electrode helps preserve residual hearing by extending only through the basal turn of the cochlea

Programs to explore

- Collaborative Research in Computational Neuroscience (CRCNS)/NSF-NIH
- Enabling Technologies for Tissue Engineering and Regenerative Medicine (R01) /NIH
- BECON

Learn More About NIDCD

www.nidcd.nih.gov

The Mentored Quantitative Research Career Development Award - K25

- The purpose of the (K25) is to engender and foster such activities by supporting the career development of investigators with quantitative scientific and engineering backgrounds outside of biology or medicine who have made a commitment to focus their research endeavors on behavioral and biomedical research (basic or clinical)

Science cannot be focused solely on acquiring knowledge. It must also examine the ethical implications of the application of such knowledge in an international context in order to form legitimate public policy, and it must promote ways to ameliorate the miserable conditions in which the majority of the world’s people live”

Bruce Alberts, Former President
National Academy of Sciences
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