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National Institute on Deafness and Other Communication Disorders

INTRODUCTION

The National Institute on Deafness and Other Communication Disorders (NIDCD) conducts and supports research on the normal and disordered processes of hearing, balance, smell, taste, voice, speech, and language. NIDCD uses a wide range of mechanisms to achieve its mission in biomedical and behavioral research and in research training. NIDCD scientists, research grant programs, individual and institutional research training awards, career development awards, center grants, and contracts to public and private research institutions are used to accomplish the Institute's research goals.

HIGHLIGHTS OF RECENT SCIENTIFIC ADVANCES RESULTING FROM INTERNATIONAL ACTIVITIES

The NIDCD Division of Intramural Research continues to support an international consortium with the purpose of expediting the discovery of genes responsible for hereditary hearing impairment. The consortium encompasses research on nonsyndromic and syndromic forms of hereditary hearing loss, such as Waardenburg syndrome and Usher syndrome. Scientists from countries including Belgium, Colombia, Finland, France, Germany, Israel, Japan, Norway, South Africa, and the United Kingdom, as well as scientists throughout the United States, continue their efforts to map the genes responsible for syndromic and nonsyndromic hereditary hearing impairment. Almost 60 genes have been identified for recessive and dominant nonsyndromic hereditary hearing impairment in families from Colombia, India, Indonesia, Israel, Lebanon, Newfoundland, Pakistan, Tunisia, and the United States, including Puerto Rico. The collaborative efforts fostered by the consortium have been instrumental in identifying a large number of the genes responsible for hereditary hearing impairment and in advancing the understanding of these disorders.

SUMMARY OF INTERNATIONAL PROGRAMS AND ACTIVITIES

Country-to-Country Activities and Bilateral Agreements

The Director of the Division of Intramural Research is the co–principal investigator for a binational grant for the United States and Israel to study properties of G protein–coupled receptors expressed in *Xenopus* oocytes.

The Laboratory of Molecular Genetics, Division of Intramural Research, has clinical protocols in place to study the genetics of hereditary hearing impairment in isolated populations throughout the world. NIDCD scientists are collaborating with other U.S. and international scientists to identify such populations and to map the genes associated with hereditary hearing impairment.

The Laboratory of Cellular Biology initiated an effort at Sackler University School of Medicine, Tel Aviv, Israel, to study functional properties of putative taste receptors.

The NIDCD Epidemiology, Statistics, and Data System Branch supports a research contract for the Genetic and Environmental Study of Hearing Loss in Nord-Tröndelag County, Norway. Using a population-based cohort of adults aged 20 years or older, the investigators are studying prevalence of genetic and environmental risk factors for age-related hearing loss and other hearing disorders, including tinnitus. Hearing is assessed directly with pure-tone audiometry, and for a subset of persons, otoacoustic emission is used to measure cochlear function. The researchers use questionnaires to ascertain environmental risk factors, such as long-term exposure to loud noise from occupational and recreational sources.

The Branch also supports an interagency agreement with the National Institute of Child Health and Human Development for a study of hearing in children participating in the Avon Longitudinal Study of Pregnancy and Childhood. These children, who had audiometric examinations at 5 and 7 years of age, belong to a subsample of about 1,500 children in the Children in Focus study. Most of the children also had detailed longitudinal assessments based on periodic examination beginning in the 1st year of life and were examined by "play" audiometry at the age of 2½ years. In this project, longitudinal measurements of hearing will be correlated with the incidence of childhood ear infections and measures of middle ear function, as evidenced by tympanogram. The frequency of ear infections (otitis media) in early childhood was determined by tympanometry and frequent parental reports of the children's health.

Activities With International and Multinational Organizations

NIDCD continues to support and participate in two international research consortia to expedite the discovery of genes responsible for hereditary hearing impairment. (See the section on "Highlights of Recent Scientific Advances Resulting From International Activities.")

Extramural Programs

Canada

NIDCD continues to support research at the University of Saskatchewan, Saskatoon, on the glial cell modulation of axonal growth. The long-term goal of this research is to determine whether manipulation of the glial cell environment enhances or impedes the growth of olfactory and nonolfactory axons in the adult mammalian central nervous system.

Israel

NIDCD supports ongoing research at the Weizmann Institute of Science, Rehovot, on the identification, isolation, and molecular cloning of olfactory proteins, with particular emphasis on the components related to the previously unexplored area of regulation and termination of olfactory signals. The sense of smell plays an important role in the behavior of vertebrates. It is crucial for

assessment of food quality, avoidance of harmful substances, and social interactions. In combination with parallel research, in which individual genetic differences in the human olfactory receptor repertoire are being investigated, the results of this work may shed light on the mechanisms underlying human olfactory sensory deficits.

International Meetings

During fiscal year 1999, NIDCD staff participated at international meetings in various capacities, including the following:

- attendee at the joint meeting of the Acoustical Society of America and the European Acoustics Association, in Berlin, Germany, in March 1999;
- presenter at the meeting of the Organization for Human Brain Mapping, in Düsseldorf, Germany, in June 1999;
- presenter at the Genomic Views of Jewish History Meeting, in Tel Aviv, Israel, in June 1999;
- program advisor and presenter at the 7th International Symposium on Recent Advances in Otitis Media, in Fort Lauderdale, Florida, in June 1999;
- presenter at the Recent Developments in Auditory Mechanics Meeting, in Zao-zan, Japan, in July 1999;
- attendee at the Gordon Research Conference on Neuroethology, at Queen's College, in Oxford, England, in August 1999;
- presenter at the Sendai Ear Symposium, in Sendai, Japan, in September 1999;
- attendee at the Seminar on Neurotransmission in the Cochlea, at Yonsei University, in Seoul, Korea, in September 1999;
- presenter at the Brazilian Cell Biology Society meeting, in Santos, in October 1999;
- presenter at the Pan-Hellenic Conference in Otorhinolaryngology, on Molecular Pathogenesis and Therapy of Neoplasms of the Upper Aerodigestive Tract and Inner Ear, in Kalamata, Greece, in October 1999; and
- presenter at the Vth Interamerican Electron Microscopy Congress, in Caracas, Venezuela, in October 1999.

Intramural Programs and Activities

There is a regular exchange of training opportunities between NIDCD and foreign countries. Visiting Scientists, Visiting Associates, and Guest Researchers from a number of countries are making significant contributions to the research efforts of the Division of Intramural Research. Essentially all NIDCD laboratories are involved in this effort, which benefits both NIDCD and the scientists receiving the training.