IV.
National Institute on Aging

INTRODUCTION

The National Institute on Aging (NIA) conducts and supports biomedical, social, and behavioral research, training, dissemination of health information, and other programs that address the aging process and the diseases, special problems, and needs of the aged. NIA research priorities include Alzheimer's disease (AD); the aging process, frailty, disability, and rehabilitation; health and effective functioning; and long-term care.

NIA awards grants to research institutions through extramural grant programs—the Behavioral and Social Research Program, the Biology of Aging Program, the Geriatrics Program, and the Neuroscience and Neuropsychology of Aging Program. In addition, scientists conduct intramural research through the Intramural Research Program.

The NIA Office of International Activities coordinates international activities and works with NIA scientists to advance the NIA mission in international research on aging.

HIGHLIGHTS OF RECENT SCIENTIFIC ADVANCES RESULTING FROM INTERNATIONAL ACTIVITIES

NIA activities involving international health promotion and disease prevention in older persons are reflected in the Okinawa 2000 G8 Summit final communiqué. The communiqué gives impetus to an international focus on the implications of population aging for pension, health, and long-term care systems, including advancing the goal of "active aging"—the desire and ability of many older people to continue work and other productive activities well into old age. NIA efforts were also pivotal in promoting an interest in comparable data among the G8 countries: the communiqué calls for increasing relevant cross-national research, including comparable longitudinal surveys.

NIA supported collaboration between Karolinska Institute, Stockholm, Sweden, and investigators from the University of Colorado Health Sciences Center, Denver, on studies of nerve growth factors and their receptors. The purpose was to find methods for treating neurodegenerative diseases. This research has identified new neurotrophic factors, the receptors for those factors, and their functional activity in the brain. In fiscal year 2000 (FY 00), these studies of rodents demonstrated that physical activity in the form of running influenced the activity of specific growth factor signaling systems in the brain. This finding indicates that enhancement of neural growth factors by exercise may exert a neuroprotective action in the adult and aging brain.

Working together, scientists in NIA's Laboratory of Clinical Investigation, the University of Linz, Austria, and the University of Leiden, the Netherlands, made significant progress in research on single-channel properties of calcium channel variants deprived of Ca^{++}-induced inactivation. Single-molecular imaging of the L type Ca^{++} channel in the living cell, by wide-field fluorescent microscopy, demonstrated the principles of lateral and rotational mobility of the channel in the native membrane, as well as the properties of its clusters. These findings will be published in the *Journal of Physiology* (October 2000).

SUMMARY OF INTERNATIONAL PROGRAMS AND ACTIVITIES

Activities With International and Multinational Organizations

In undertaking collaborative research on aging, NIA supported the coordinating efforts of major international organizations, including the development of consistent strategies for measurement and data collection. This support is designed to allow comparisons across countries, to promote preventive health strategies among older persons, and to plan for needs in the areas of age-related health and long-term care. The coordinating efforts were as follows:

- The Population Activities Unit of the United Nations Economic Commission for Europe received NIA support to explore the feasibility of a European Health and Retirement Survey and began to lay the foundation for undertaking such a survey. The Population Activities Unit also received support in database development and in promotion of research on aging in Europe.
- The value of comparative research on health was demonstrated by data reported in the "World Health Report 2000," from the World Health Organization (WHO). Factors relating to the existing level of development of the country and the health care system are important in determining expectations for the level of health and the rate of progress in improving health.
- WHO received NIA support to begin developing minimum data sets for research in African countries. This project collated available information from Ghana, Nigeria, South Africa, Tanzania, and Zimbabwe and made progress toward creating a systematic and coordinated approach to collecting other data.
- The Behavioral and Social Research Program, NIA, supported other WHO projects, including "The Global Burden of Disease," a report that has generated useful discussion of the methodological issues surrounding the measurement of the burden of illness, its distal and proximal causes, and the forecasting of future burden of illness.
- The Pan American Health Organization received funding to further develop research on aging in Latin America and the Caribbean.
- The Organization for Economic Cooperation and Development received support from the Behavioral and Social Research Program to compile cross-national data on health care policy, health, and functional ability.
- NIA intramural scientists analyzed the relationship of blood pressure, smoking,

lipid levels, and depression to brain changes, as part of a joint study of Cardiovascular Determinants of Dementia, which receives funding from the European Union.

■ NIA intramural scientists also collaborated in a project of the European Commission, Burden of Disease in Old People, which was funded to facilitate better exploitation of existing data resources by creating a multidisciplinary network that stimulates new research ideas.

Extramural Programs

Behavioral and Social Research

NIA supports research and research training in behavioral and social sciences in relation to aging processes and the place of older people in society. International activities emphasize demographic research studies of health and productive functioning in the middle and later years of life and the delivery of services in the various cultures. Activities include the following:

■ With NIA support, the Harvard School of Public Health, Boston, Massachusetts, collaborated with the Global Program on Evidence for Health Policy, WHO, Geneva, Switzerland, in beginning a study of the Health Cost of Aging: Present and Future Trends. The study, a project of The Global Burden of Disease 2000 in Aging Populations, will bring direct costs of care into the discussion of the impact of diseases on populations.

■ New England Research Institutes, Inc., Watertown, Massachusetts, and the University of Surrey, Guildford, England, began a study to compare the clinical decision-making patterns of physicians in the U.S. health care system with those of physicians in the nationalized health care system of the United Kingdom.

■ University College, London, England, began to conduct the 1st 5 years of the English Longitudinal Study of Aging, a study modeled after the U.S. Health and Retirement Study.

■ The Rand Corporation and a consortium of the Economic Studies and the Population Studies Center, Inter-University Center, Gadjah Mada University, Yogya Karta, Indonesia, collaborated on the Third Indonesian Family Life Survey of Aging.

■ The University of Missouri, Columbia, and the Institute for Research in Extramural Medicine, Vrije University, Amsterdam, the Netherlands, started a study to compare the consequences of different approaches to treating nursing-home residents who have lower-respiratory infections, in an effort to inform the national debate on appropriate care at the end of life.

■ The University of Southern California, Los Angeles, and Karolinska Institute, Stockholm, collaborated on the Swedish Adoption/Twin Study of Aging. The project is investigating the origins of individual differences in aging, to learn why some persons retain high levels of functional competence to the very end of long lives but others display considerable frailty and senescent decline at an earlier age.

■ NIA supported a major international conference on issues associated with aging in rural areas, in Charleston, West Virginia, on June 7–11, 2000. The meeting drew participants from around the world.

Biology of Aging

NIA supported researchers at Prince Henry's Institute for Medical Research, Victoria, Australia, in a study of the physiological consequences of a total lack of estrogen, through use of a unique mouse model that cannot make estrogen.

An investigator at McGill University, Montreal, Quebec, is working to elucidate changes in the extracellular matrix of cartilage during normal aging and in osteoarthritis. Collagen type II, a principal and important functional component of cartilage matrix, decreases in both aging and osteoarthritic cartilage. However, only in osteoarthritic lesions is there denaturation and cleavage of the collagen, suggesting that distinct processes are at work in the two types of cartilage.

Scientists at University College, London, England, studied growth regulation of the prostate in adult men, by identifying, isolating, and growing in continuous culture stem cells derived from the various zones of healthy prostate tissue.

The NIA Office of Biological Resources and Resource Development provided aged rodents for research on aging to more than 15 international institutions.

AIDS Research

A complete and accurate vital registration system does not exist in any African nation, and censuses are not adequate to measure the rapid progression of an epidemic like the epidemic of human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS). NIA and the Office for AIDS Research, National Institutes of Health, worked to reduce the rate of progression of this epidemic and the consistent prevalence of HIV. The researchers developed accurate, agile, data-collection systems that can provide the kind of data necessary to improve understanding of the progression of the epidemic. NIA and the Office of AIDS Research began to rapidly develop significant local capacity to operate those data-collection systems and to conduct the primary analysis of the data, by funding projects at WHO, the University of Colorado at Boulder Center, the University of Wisconsin, Madison, the University of Michigan, Ann Arbor, and Tulane University, New Orleans, Louisiana.

Cancer

NIA scientists continued to collaborate with scientists at the Institute of Health, Rome, and the National Cancer Institute, Milan, Italy, on three studies using innovative statistical methods to estimate cancer prevalence in the United States. The research is focusing on older patients who have cancer. Joint research on cancer in older patients also continued with scientists at the University of Trieste, Italy. The scientists are using cancer registry data augmented with autopsy data in the study.

Neuroscience

Investigators at Indiana University, Indianapolis, and the University of Ibadan, Nigeria, compared the age-specific prevalence and incidence of dementia disorders in a sample of African Americans living in Indianapolis who are 65 years of age or older with those in a sample of age-matched Nigerians living in Ibadan. Results from the NIA-supported study indicate that the incidence of AD is significantly lower in the Yoruba living in Ibadan than in African Americans living in Indianapolis. Further studies are under way to determine genetic and environmental factors that may contribute to this difference in incidence.

NIA also supported the following international neuroscience projects:

■ Two of NIA's Alzheimer's Disease Centers pursued international collaborations. Investigators from Washington University

Alzheimer's Disease Research Center, St. Louis, Missouri, and Universidad de Antioquia, Medellín, Colombia, worked together to study a large Colombian family with a rare genetic form of AD, in an attempt to discover additional risk factors that influence the age at disease onset. The Alzheimer's Disease Research Center, John Hopkins University, Baltimore, Maryland, collaborated with a neuropathology laboratory at the University of Aarhus, Denmark, to examine brains of research participants, by using stereological principles that are not widely used elsewhere.

■ Researchers from the University of Arkansas, Fayetteville, Imperial College, London, England, and Glasgow University, Scotland, cooperated in studies to elucidate early events in progression of AD, by focusing on the role of interleukin 1 and other inflammatory molecules.

■ Investigators in the Indo-U.S. Cross-National Dementia Epidemiology Study of the University of Pittsburgh, Pennsylvania, in conjunction with investigators at the Centre for Ageing Research, New Delhi, India, began to examine the distribution of and risk factors for dementing disorders among older people in Ballabgarh, a rural community in Northern India.

■ Scientists at the University of Washington Medical Center, Seattle, studied the epidemiology of dementia in older Japanese Americans and are comparing results cross-culturally with those of ongoing studies in Honolulu, Hawaii, and Hiroshima, Japan.

■ Researchers from the University of Southern California, Los Angeles, partnered with researchers at Karolinska Institute, Stockholm, and the Institute of Gerontology, Jönköping, Sweden, to estimate the contribution of genes and environment in the expression of dementia in the Swedish Adoption/Twin Study of Aging.

International Meetings

October

An NIA scientist gave a presentation on genes for longevity at the Workshop on Genes, Genealogies, and Longevity, at the French National Institutes of Health and Research, Montpellier, France, in October 1999.

Another scientist attended the U.S.-India Vaccine Action Program and spoke at a seminar on Therapeutic DNA Vaccine—DNA Triple Helix Formation and Gene Therapy, in New Delhi, India.

November

NIA investigators presented the following lectures in November 1999:

■ Present Trends and Prospects in Aging Research, to the International Bioethics Committee of UNESCO (United Nations Educational, Scientific, and Cultural Organization), in Quito, Ecuador;

■ DNA Damage and Its Role in Aging, at a seminar at Dimanches Biologiques de Lariboisiere, in Paris, France; and

■ Cytogenetic Diagnosis of Hematological Malignancies and Molecular Genetics of Sex-Mismatched Bone Marrow Transplantation, at the University of Ancona and the University of Camerino, Italy.

December

A scientist from the Laboratory of Molecular Genetics, NIA, participated in scientific meetings at the Danish Center for Molecular Gerontology, Middlefart, Denmark, in December 1999.

January

An investigator from the Laboratory of Cardiovascular Science presented several lectures on Calcium Sparks, at Fourth Military Medical University, Xi'an, and at the College of Life Sciences, Peking University, Beijing, China, in January 2000.

A scientist from the Laboratory of Molecular Genetics presented a seminar on Molecular Functions of Werner Protein and participated in joint studies with scientists in Aarhus, Denmark.

A researcher from the Laboratory of Genetics spoke on Topics From the Human Genome Project, at a special meeting called by the Japanese Genome Initiative, in Tokyo, Japan.

February

An investigator at the Laboratory of Epidemiology, Demography, and Biometry (LEDB) participated as a discussant at a Novartis Foundation Symposium entitled Aging Vulnerability: Cause and Interventions, in London, England, in February 2000.

A scientist from the Laboratory of Molecular Genetics made a presentation on DNA Repair As a Biomarker, at the German Cancer Research Center, Heidelberg.

An investigator from LEDB reported on the Epidemiologic Aspects of Diabetes in the Aging Male, at the 2nd World Congress on the Aging Male, in Geneva, Switzerland.

March

A scientist from the Biology of Aging Program attended a meeting sponsored by the Novartis Foundation to discuss Aging Vulnerability: Causes and Interventions, in London, England, in March 2000.

April

Five international investigators representing Australia, England, and the United Kingdom gave oral presentations at the National Institutes of Health Workshop on Selective Estrogen Receptor Modulators, in Bethesda, Maryland, in April 2000. The Geriatrics Program spearheaded NIA's substantial contributions to this important collaborative international effort.

A scientist from the Laboratory of Genetics was a member of the scientific organizing committee and chaired a plenary session on Technology Development, at the Human Genome Meeting, in Vancouver, British Columbia. He also reported to the Council of HUGO (Human Genome Organization), as the President of HUGO Americas.

May

A scientist in the Biology of Aging Program presented an informal talk on support of research on aging at NIA, at a meeting on Biological Ageing, sponsored by the European Science Foundation, in Spa, Belgium, in May 2000.

An investigator from the Laboratory of Cardiovascular Science presented a lecture on Calcium Sparks, at the National Laboratory of Biomembrane and Membrane Biotechnology, Peking University, Beijing, China.

A researcher from LEDB gave a lecture in a postgraduate course entitled The Interaction Between AD and VaD (vascular dementia), in Göteborg, Sweden.

June

The Biology of Aging Program sponsored a symposium on the Study of Women's Health Across the Nation (SWAN), at the Endocrine Society Annual Meeting, a worldwide gathering of endocrinologists, in Toronto, Ontario, in June 2000.

An investigator from the Laboratory of Molecular Genetics lectured on DNA Repair and Mutagenesis, at the Niels Bohr Institute, University of Copenhagen, Denmark, and discussed collaborations with members of the Danish Center for Molecular Gerontology, Odense.

A scientist from the Laboratory of Molecular Genetics performed research at Clare Hall Laboratories, Imperial Cancer Research, London, England.

A researcher at LEDB presented a 3-day course in the Epidemiology of Aging, at the University of Tampere School of Public Health, Finland.

Two investigators from LEDB reported on (1) AD Risk With Head Injury and (2) Correlates of Low Bone Mineral Density, at the Nordic Gerontological Congress, in Reykjavik, Iceland.

A scientist at LEDB visited the principal investigator of the In Chianti Study, in Florence, Italy, to conduct analyses of data from the Women's Health and Aging Study and to evaluate operating procedures and data quality for the In Chianti Study. He met in Padua, Italy, with a senior investigator in the PROVA (Aging Project of the Veneto Region) Study, to conduct collaborative research and to plan for the longitudinal data collection.

A researcher in the Laboratory of Genetics gave an inaugural lecture on Genetics and Genomics of Aging for the new doctoral program at the University of Modena, Reggio Emilia, Italy.

July

A scientist from the Laboratory of Molecular Genetics helped to organize and spoke at the Royal Society Meeting on Generation of Somatic Diversity in Antibody Genes, in London, England, and then consulted and collaborated with scientists at the Center of Molecular Gerontology, Copenhagen, Denmark.

An investigator from LEDB met with Italian investigators to explore and develop possibilities of joint studies using the autopsy database in Trieste.

Scientists from the Laboratory of Neurosciences cosponsored a workshop on Research Directions for Gerontology and Geriatrics, with scientists from the National Institute of Longevity Science, in Obu City, Aichi, Japan.

August

A scientist at the Laboratory of Molecular Genetics attended the Gordon Conference on Mutagenesis, in Oxford, England, in August 2000.

September

A Research Fellow in LEDB participated in the meeting of the American Society of Bone and Mineral Research, in Toronto, in September 2000, and presented a report on Cross-sectional Geometry and Bone Density of the Femoral Midshaft: Gender and Race Effects in Older Adults.

An investigator from the Laboratory of Cardiovascular Science was named a Cheung Kong Scholar by the Chinese Ministry of Education.

A scientist from the Laboratory of Genetics served as one of the scientific advisors for the Vatican-sponsored Jubilee Year International Symposium on the Human Genome, in Naples and Rome, Italy. He also chaired the concluding session and presented the summary of the proceedings.

A scientist from the Laboratory of Molecular Genetics was a speaker for a seminar on Oxidative DNA Damage Processing, at the University of Oslo, Norway. He also held scientific discussions with scientists at the Institute of Medical Microbiology, in Oslo.

A researcher in the Geriatrics Program participated with international scientists in the 5th International Meeting on Cancer in the Elderly, in New York City, New York.

Intramural Programs and Activities

The NIA Intramural Research Program is a comprehensive, multidisciplinary research institution. The long-term goals of the Program are as follows: (1) to develop and sustain a broad, basic program relevant to understanding aging processes and age-associated disabilities and (2) to develop biological, pharmacological, and other interventions to prevent or retard age-associated diseases and disabilities, including AD, cardiovascular disease, frailty, osteoporosis, cancer, incontinence, metabolic disturbances, osteoarthritis, and hypertension.

Laboratory of Biological Chemistry

Scientists from Mainz University, Germany, collaborated with the Laboratory of Biological Chemistry on a study of the interaction of the pVHL tumor-suppressor protein with cellular proteins and investigated the post-transcriptional regulation of vascular endothelial growth factor by pVHL. A graduate student from Mainz University received training in the Laboratory.

The Laboratory invited an Imperial Cancer Research Fund research scientist and honorary lecturer from the University of Dundee, Scotland, to present a seminar on the role of mitogen-activated protein kinase phosphatases in the regulation of signaling cascades of mitogen-activated protein kinase, in June 2000.

Laboratory of Cardiovascular Science

In FY 00, Peking University, Beijing, hosted scientists from the Laboratory of Cardiovascular Science to perform joint experimental work. The projects of mutual interest focus on Ca^{++} signaling in cardiac and neuronal cells, with future plans to initiate collaborations on computational modeling of Ca^{++} handling and excitation–contraction coupling in cardiac myocytes.

Laboratory of Clinical Investigation

Working together, scientists in NIA's Laboratory of Clinical Investigation, the University of Linz, Austria, and the University of Leiden, the Netherlands, made significant progress in research on single-channel properties of calcium channel variants deprived of Ca^{++}-induced inactivation. (See the section on "Highlights of Recent Scientific Advances Resulting From International Activities.")

Laboratory of Epidemiology, Demography, and Biometry

The LEDB Program plans, conducts, and directs epidemiology, demography, and biometry programs relevant to the mission of NIA.

In FY 00, LEDB scientists worked with scientists from Canada, Finland, Iceland, Italy, the Netherlands, and the United Kingdom and organized the collaborative activities presented here.

Canada

A professor from Laval University, Quebec, visited the Laboratory to conduct an evaluation of the association of serum vitamin D levels with changes in strength and physical function over 3 years, using data from the Women's Health and Aging Study.

Finland

A physician and gerontologist from the University of Tampere visited LEDB to evaluate the impact of self-reported and objectively measured gait problems on perception of overall health, using data from the Women's Health and Aging Study.

Iceland

In an attempt to meet an anticipated need for new resources to study genetic susceptibility and gene–environment interaction in diseases of old age, Laboratory investigators developed a 7-year clinical research project to be performed in collaboration with the Icelandic Heart Association, in Reykjavik. The project will build on the Reykjavik Study—a unique, established, longitudinal, cohort study in Iceland, which is under the supervision of the Icelandic Heart Association.

Italy

Collaboration continued between LEDB and PROVA, an observational study in Italy, which is designed to depict the causal pathway from disease to disability in a representative group of older Italian men and women.

The Laboratory worked with the National Institute for Research and Care of the Elderly on the Postural Control in the Elderly Study, at Ospedale I Fraticini, Florence, to develop measures that identify specific components of balance problems.

LEDB investigators continued joint research efforts with the Italian Longitudinal Study on Aging—a study on the health status, the transition in physical and cognitive functioning with age, and the biological, socioeconomic, and environmental determinants of healthy aging.

Using data from the Women's Health and Aging Study, a physician–researcher from the University of Ferrara studied the association between several age-related chronic conditions and the decline of physical function in older, frail women.

A preventive medicine specialist from Istituto Superiore de Sanitá, Rome, visited the Laboratory to collaborate on the Cardiovascular Determinants of Dementia Study.

In a joint study, a geriatrician from the University of Florence visited LEDB to work on the analyses of data from the Women's Health and Aging Study and a new study of age-associated frailty in older persons living in the Chianti area, in Tuscany.

A senior researcher from the Italian National Research Council collaborated with Laboratory investigators by using data from the European Longitudinal Study on Aging and other data sets.

The Netherlands

Collaboration of scientists at the Laboratory with scientists at Leiden University Medical Center on the study of Genetic Epidemiology of Migraine resulted in two reports that were published in *Neurology* (January and June 2000).

LEDB scientists cooperated with scientists from Erasmus University Medical School, Rotterdam, to analyze data from the Rotterdam Scan Study. The research involves a volumetric analysis of the hippocampus and amygdala measured on magnetic resonance imaging (MRI) in a population-based sample of 568 persons aged 60–90 years.

In collaboration with investigators from Erasmus University Medical School, the Laboratory continued a project on the prospective Rotterdam Study, in which approximately 400 cases of AD are expected to develop during a 5-year follow-up. The project involves analyses of the risk for AD and cognitive decline. The investigators are gathering data on age at menopause, circulating levels of estrogen (estradiol and estrone), and the interaction between estrogen markers and the apolipoprotein E4.

Four postdoctoral researchers from Vrije University, Amsterdam, visited the Laboratory to conduct investigations using data sets from several studies: the Rotterdam Study; the Honolulu-Asia Aging Study; the Women's Health and Aging Study; the Longitudinal Aging Study, Amsterdam; and the Health and Body Composition (Health ABC) Study.

United Kingdom

A research professor in physiotherapy at Coventry University, England, visited LEDB to analyze longitudinal data on falls, using data from the Women's Health and Aging Study.

A Laboratory scientist collaborated with a cardiovascular genetics professor at the University College of London Medical School, England, in a study of inflammation. The scientists analyzed polymorphisms of a promoter region allele for the interleukin 6 gene.

An investigator from LEDB worked with a clinical senior research associate and honorary consultant in public health medicine from the University of Cambridge, England, in planning the next phase of the English Longitudinal Study of Aging.

Laboratory of Genetics

The Laboratory of Genetics trained scientists from Chile, Italy, Japan, Jordan, Korea, and Mexico. In addition, the Laboratory hosted international visitors to plan and discuss projects. A leading authority on studies of osteoarthritis and other age-related conditions in the Dutch population, from the Gaubius Laboratory, TNO (the Netherlands Organization for Applied Scientific Research), presented a seminar on population studies and genetic studies of specific phenotypes and discussed possible collaborations.

A professor of medicine from the University of Oxford, England, discussed projects on inherited diseases related to bone and minerals, including X-linked hypoparathyroidism. Plans were made for collaboration on studies of global gene expression in osteoblasts and osteoclasts.

A scientist from the International Institute of Genetics and Biophysics, Italian Research Council, Naples, visited the Laboratory of Genetics to assess the content of newly discovered X-linked genes in NIA gene collections.

An investigator from the Institute of Research on Thalassemia and Mediterranean Anemias, Italian Research Council, Naples, visited the Laboratory to collaborate on the identification of a gene for premature ovarian failure and to discuss phenotypes that will be included in a planned contract-based study of the genetics of age-related conditions in the population of Sardinia.

Bioinformatics specialists from the South African National Biotechnology Institute visited the Laboratory of Genetics to discuss new collaborations to analyze the census of genes and their content in the collections the Laboratory is studying. These studies deal globally with the current questions of the number of genes in the genome and their function.

Laboratory of Immunology

Researchers in the Laboratory of Immunology collaborated with scientists in Brazil, Germany, Japan, Korea, Scotland, and Sweden on a number of projects.

Joint research projects were established with Fundaço Oswaldo Cruz, Rio de Janeiro, Brazil, to examine the roles of various chemokines and chemokine receptors in thymocyte emigration.

Investigators at the Laboratory and at the University of Tübingen, Germany, studied differential chemokine receptor expression on subsets of human T cells and investigated the role of chemokines and their receptors in various inflammatory neuritis models.

A scientist at the Fukuoka Prefectural University, Japan, worked with the Laboratory in the use of in vivo microdialysis to examine the effects of chemokines and amyloid beta on production of nitric oxide by rodent hippocampal neurons.

A researcher from Kyungpook National University, Taegu, Korea, continued to collaborate with Laboratory researchers on the differential gene expression and biochemical signaling in cycling and aging murine and human T lymphocytes.

Investigators at Lister Research Laboratories, University of Edinburgh, Scotland, contributed to the Laboratory's studies of CD40 expression on various human carcinoma cells and the role of anti-CD40 agents in cell growth and viability.

Scientists from Uppsala University, Sweden, worked with Laboratory scientists on mast cell trafficking, chemokines, and immunoregulatory molecules.

Laboratory of Molecular Genetics

Investigators in the Laboratory of Molecular Genetics collaborated with investigators in Australia, Denmark, England, France, Germany, Italy, Korea, the Netherlands, Norway, Slovakia, Sweden, and Turkey in studying DNA repair and transcription in human disorders of premature aging and in older persons.

Scientists at Copenhagen University and Aarhus University, Denmark, through a collaborative organization, the Danish Center for Molecular Gerontology, explored the role of topoisomerases in DNA repair, the functions of the Werner and Cockayne proteins, and the differential expression of specific proteins in old versus young cells. Researchers in the Netherlands and in Norway contributed to joint research on DNA repair in nuclear and mitochondrial DNA from knockout mice lacking various DNA repair genes.

Laboratory of Personality and Cognition

The Laboratory of Personality and Cognition hosted scientists from Canada and France. A neuropsychologist from Canada examined the relationship among age, cortisol concentrations, and hippocampal morphology in participants in the Baltimore (Maryland) Longitudinal Study of Aging (BLSA). In particular, he investigated whether high concentrations of cortisol are associated with reduced hippocampal volume.

A French investigator extended his work on methodology to study the use of partial volume for correction of physiological measures, including studies of cerebral blood flow using positron emission tomography (PET). These methods were applied to brain images from BLSA participants. By combining information from high-resolution MRI with PET images, it is possible to account for signal loss and distortion due to the interaction of the distribution of tracer in the brain with PET detection and image-reconstruction systems.

Research Resources Branch

A scientist from Canada completed her research on development of a multilevel model for the classification of prostate disease. Also, scientists from the National Committee on Scientific Research, Paris, France, and Free University of Berlin, Germany, collaborated on the creation of a murine conditional knockout of the opioid receptor via Cre-lox technology and created a mouse that expresses the cre-recombinase in the sensory neurons of the peripheral nervous system. The mouse model will be used to study the role of this receptor in peripheral analgesia.