National Human Genome Research Institute Awards $54 Million in Support of Three Centers of Excellence in Genomic Science

The National Human Genome Research Institute (NHGRI) recently granted $54 million in support of three Centers of Excellence in Genomic Science (CEGS), with each Center receiving $18 million. Started in 2001, the CEGS program is a multi-institutional collaboration dedicated to the advancement of genomic research. The grants, which will span 5 years, will serve to renew funding for two existing CEGS at Yale University and the University of Washington, Seattle, and to establish one new center at the California Institute of Technology in Pasadena, California. Dr. Marianne Bronner-Fraser will lead a research team at the newly created Center for In Toto Genomic Analysis of Vertebrate Development at the California Institute of Technology. The Center will seek to develop imaging technologies and produce results that will further research into the impact of genetics and environment on developmental disorders. A team of investigators, led by Dr. Deirdre R. Meldrum, at the University of Washington's Microscale Life Sciences Center will work to develop tiny, automated systems to monitor differences between healthy and diseased cells. Specifically, the University of Washington Center aims to apply its technological advances to investigate the balance between cell growth and cell death. Dr. Michael P. Snyder and his research team at the Yale Center of Excellence in Genomic Sciences will build on their previous work toward creating technologies for detecting areas of the genome critical to biologic functions. Additionally, the Yale CEGS will work to integrate advancements from the previous funding period with current work, with the goal of outlining the regulatory steps involved in inflammation. Other participants in the CEGS program include Roger Brent, PhD, Molecular Sciences Institute, Berkeley, CA; George Church, PhD, Harvard Medical School, Boston; Andrew Feinberg, MD, Johns Hopkins University School of Medicine, Baltimore (this CEGS is cofunded by NHGRI and the National Institute of Mental Health); Jinguye Ju, PhD, Columbia University, New York (this CEGS is cofunded by NHGRI and the National Institute of Mental Health); William S. Talbot, PhD, Stanford University School of Medicine, Palo Alto, CA; Michael Waterman, PhD, University of Southern California, Los Angeles; and Maynard V. Olson, PhD, University of Washington, Seattle. More details about the NHGRI Centers of Excellence in Genomic Science can be found at <http://www.genome.gov/12511135>.

NIAID Initiative to Investigate Key Infectious Diseases and the Immune System Response

The National Institute of Allergy and Infectious Diseases (NIAID) recently announced the initiation of a new program, the Program in Systems Immunology and Infectious Disease Modeling (PSIIM), which will investigate the complex interplay between infectious organisms and the organisms they infect. Immunologist Dr. Ronald N. Germain will direct the PSIIM, a component of NIAID's Division of Intramural Research (DIR). According to DIR Director Kathryn C. Zoon, PhD, a better understanding of the interactions between infectious pathogens and the immune system response could present potential clinical applications, such as interfering with the pathology of the infectious disease or directing immune response. Using a novel method called computational systems biology and the boon of recent knowledge about the human genome, the Program will seek to advance knowledge of how pathogens cause disease and how the immune system reacts to these pathogens. Essential to the PSIIM is a software package, called *Simmune*, created by NIAID scientist Dr. Martin Meier-Schellersheim and his colleagues. The ability of *Simmune* to accurately predict cell function in both time and space was

DOI 10.2310/6650.2006.X0023

recently demonstrated in an article published by the journal *PLoS Computational Biology*, authored by Drs. Meier-Schellersheim and Germain and their colleagues. In the study, the investigators describe how they used *Simmune* to model the complex cell-biologic behavior called chemosensing, a biologic process in which cells sense and respond to external signals. The software produces models of cellular behavior from quantitative laboratory measurements, making complex mathematical calculations for the investigator that would otherwise be lengthy and require mathematical expertise. The computer models produced by this method will allow investigators to replicate the biology of cells, tissues, and, eventually, organisms. PSIIM scientists will work primarily with less hazardous pathogens; however, special facilities in the new C. W. Bill Young Center for Biodefense and Emerging Infectious Diseases at the National Institutes of Health (NIH) will allow researchers to investigate more dangerous pathogens, such as virulent forms of influenza or anthrax. The PSIIM will aim to promote collaboration between NIAID researchers and investigators both inside and outside the NIH, including the National Cancer Institute's Center for Cancer Research.

NIH Awards $22 Million in High-End Instrumentation Grants

The National Center for Research Resources (NCRR) recently announced that it will award $21.5 million for 14 high-end instrumentation (HEI) grants, which will finance the purchase of equipment costing more than $750,000. The HEI grants require that three or more National Institutes of Health (NIH)-funded investigators whose research necessitates the instrument be identified within the institution to receive the award. Although the HEI grants require no matching funds, the institutions are expected to supply funding sufficient for associated infrastructure, such as building alterations, technical personnel, and postaward service contracts for instrument maintenance and operation. High-end instruments supported in this set of awards include two supercomputers that rapidly process vast quantities of data, two nuclear mass resonance spectrometers, a quadrupole/trap-Fourier transform ion cyclotron resonance mass spectrometer, a Fourier transform ion cyclotron resonance mass spectrometer, three magnetic resonance imaging systems, a positron emission tomography/single-photon emission computed tomography/computed tomography scanner, two cryoelectron microscopes, a magnetic resonance microscope, and an ultrahigh-throughput genome sequencing system. NCRR furnishes laboratory scientists and clinical researchers with the equipment and environment necessary to continue the fight against a broad spectrum of diseases. Institutions receiving the latest HEI grants include Beth Israel Deaconess Medical Center (Boston, MA); Massachusetts General Hospital (Boston, MA); Purdue University (West Lafayette, IN); Stanford University (Stanford, CA); University of California, Los Angeles (Los Angeles, CA); University of California, Santa Barbara (Santa Barbara, CA); University of Maryland, Baltimore County (Baltimore, MD); University of Pennsylvania (Philadelphia, PA); University of Utah (Salt Lake City, Utah); University of Virginia (Charlottesville, VA); University of Washington (Seattle, WA); and Yale University (New Haven, CT).

NIAID Awards $1.3 Million to University of Pittsburgh School of Medicine to Support Avian Flu Vaccine Development

The National Institute of Allergy and Infectious Diseases (NIAID) has awarded the University of Pittsburgh School of Medicine $1.3 million over 2 years to fund the development of a promising avian flu vaccine that could be used in phase I and II human clinical trials. The research team, led by Dr. Andrea Gambotto, reported in January in the journal *Virology* that their vaccine completely protected mice and chicken from infection following exposure to the wild-type avian flu virus.

Through genetic engineering, recombinant adenoviruses were made to express either all or parts of an avian influenza hemagglutinin on its surface. Such hemagglutinins are present on the surfaces of all influenza viruses, where they are responsible for permitting the virus to bind to and infect cells. Researchers believe that the fact that the vaccine contains a live virus will cause it to be more effective than traditional vaccines at stimulating an immune response. Additionally, because the research team's vaccine is grown in cells, it lends itself to rapid production. Dr. Gambotto and his research team are hopeful that the NIAID will compare the effectiveness of this vaccine with that of the two others, produced by GlaxoSmithKline and Sanofi Pasteur, that have been tested in federally funded clinical trials. Since 1997, there have been 241 known human cases of infection with H5N1, with 141 of those resulting in death.

University of Texas System Regents Allocate $77.1 Million for New Facilities

The University of Texas System Regents recently granted $77.1 million from the Permanent University Fund for three new construction projects at the University of Texas Health Science Center at Houston. The funds are part of a larger initiative, an unprecedented $2.56 billion, "to boost competitiveness in key scientific areas." A total of $41.1 million of the funds will be devoted to the construction of a Biomedical Research and Education Center, which will serve as the home for adult stem cell teaching and research; $18 million of the grant will go toward constructing a new facility for the University of Texas Dental Branch at Houston. The project, which will replace the current Dental Branch building of 51 years, is approximated to cost at least $90 million to complete, with $60 million in tuition revenue bonds already appropriated by the 79th Legislature. The Biomedical Research and Education Center and the new dental school building will be located in the UT Research Park, a 100-acre location on the "South Campus" of the Texas Medical Center. Research Park is being codeveloped by the University of Texas Health Science Center and The University of Texas M. D. Anderson Cancer Center. A total of $18 million of the funds will support continuing construction of the Replacement Research Facility at The University of Texas Medical School at Houston, which is slated for occupancy in fall 2007. The facility will have a total cost of $80.53 million. The Permanent University Fund, a public endowment, supports institutions of The University of Texas System (other than The University of Texas - Pan American and The University of Texas at Brownsville) and institutions of The Texas A&M University System (other than Texas A&M University-Corpus Christi, Texas A&M International University, Texas A&M University-Kingsville, West Texas A&M University, Texas A&M University Commerce, Texas A&M University Texarkana, and Baylor College of Dentistry).

NIH Study May Help Identify Alcoholism Susceptibility

A research team at the Molecular Neurobiology Branch of the National Institute on Drug Abuse (NIDA) recently identified several candidate genes that may indicate genetic susceptibility to alcoholism. In a study to be published in the December 2006 issue of the *American Journal of Medical Genetics Part B (Neuropsychiatric Genetics)*, researchers conducted a thorough scan of the human genome, identifying genetic variations around 51 chromosomal regions that may contribute to alcoholism. Several of the suspected genes have previously been identified in other addiction research. Dr. George Uhl, Ms. Catherine Johnson, Ms. Donna Walther, Dr. Tomas Drgon, and Dr. Qing-Rong Liu led the research team. Using novel tools such as pooled data genome scanning and a new genetic platform, the research team was able to generate the equivalent of over 29 million individual genotypes and study 104,268 genetic variations from unrelated alcohol-dependent and control individuals. The research team used deoxyribonucleic acid (DNA) samples from the Collaborative Study on the

Genetics of Alcoholism, funded by the National Institute on Alcohol Abuse and Alcoholism. NIDA Director Dr. Nora D. Volkow said that the study provides further insight into the hereditary nature of alcoholism and offers new tools to better understand the physiologic basis for addiction.

Investigators Identify Gene Activity Able to Predict Liver Cancer Spread

Researchers from the National Cancer Institute (NCI) and other institutions have discovered a way to predict the spread of liver cancer, hepatocellular carcinoma (HCC), by observing a distinct pattern of gene activity in cells in the tissue neighboring a liver tumor. In a study published in the August 2006 issue of *Cancer Cell*, investigators examined patterns of gene activity, primarily in immune cells within the liver microenvironment, the area immediately around the tumor. From the set of 17 genes, scientists discovered a distinct pattern in the immune cells in the normal tissue of the liver microenvironment. The pattern, which is able to accurately predict the potential for liver tumor metastasis, involves gene activities that result in heightened production of particular cytokines associated with an anti-inflammatory response and inhibition of immune response. Dr. Xin Wei Wang, head of the Liver Carcinogenesis Unit at the Center for Cancer Research of the NCI, was the study leader.

The ability to predict a tumor's potential for metastasis following surgery presents significant clinical applications, such as when deciding on the best treatment option for a patient. The patients in the study were being treated at the Zhongsham Hospital, Shanghai, China. Fifty-two of the patients had tumors that had metastasized within the liver or to other organs; 63 of the patients had tumors that had not metastasized. Also included were samples from 22 patients with chronic liver disease and from 8 normal livers studied as controls. In 2006 alone, approximately 16,200 will die from HCC.

National Institutes of Health to Fund Science Education Programs

The National Institutes of Health recently granted more than $8.5 million in Science Education Partnership Awards (SEPAs) to promote community involvement and interest in science. SEPA grants, which last for 2 to 5 years, are administered by the National Center for Research Resources. Seven initiatives will be supported in SEPA's second round of fiscal year 2006 funding, with an emphasis on reducing health disparities through better teaching, curricula, and resources. The Science Education Programs aim to foster a more educated public, capable of making informed decisions about health issues. Additionally, the programs seek to arouse students' interest in a future as a scientist or professional in a health-related field. The awards are made up of two phases. The first phase, lasting 3 years, involves the collaboration of several societal institutions, including researchers, educators, and community groups, to create programs that provide greater insight into scientific research. The second phase, lasting 2 years, involves the spread of this knowledge of the SEPA-generated subject matter to a broader audience, including students, teachers, and the public at large. The most recent institutions to receive a SEPA include Illinois State University (Normal, IL), phases I and II; University of Alabama (Birmingham, AL), phases I and II; University of Arizona (Tucson, AZ), phases I and II; University of Maryland (College Park, MD), phase II; University of Michigan (Ann Arbor, MI), phases I and II; University of Pittsburgh (Pittsburgh, PA), phases I and II; and the University of Tennessee Health Science Center (Memphis, TN), phases I and II

University of Michigan Receives $2 Million Gift in Support of Depression Research

Ann Arbor businessman Phil Jenkins recently donated $2 million for depression research at the University of Michigan Depression Center, adding to $2 million that he previously donated to help fund the Center's construction. The Rachel Upjohn Building will open in October 2006 on the east medical campus of the University of Michigan Health System. Along with the Depression Center, the building will also house adult and child outpatient psychiatry clinics and substance abuse outpatient clinics and researchers. Mr. Jenkins' most recent gift will support the creation of the Phil F. Jenkins Research Professor of Depression in the University of Michigan Department of Psychiatry. Dr. Jon-Kar Zubieta has been chosen as the inaugural recipient of the endowment, which will also establish a research fund for Dr. Zubieta's use. Dr. Zubieta will continue to serve as associate professor of psychiatry and radiology and as a research associate professor in the University of Michigan Molecular and Behavioral Neuroscience Institute. Dr. Zubieta received his MD and PhD from the University of the Basque Country Medical School in Spain and then went on to complete his psychiatry residency and nuclear medicine fellowship at the University of Michigan. He received additional training in nuclear medicine at the Johns Hopkins University. Dr. Zubieta's research focuses on the use of genetics, brain imaging, and molecular neuroscience to gain insight into the causes of depression and bipolar disorder and seek novel, more effective treatments for these disorders.

NCI Researchers Investigate New Method of Gene Therapy for Treatment of Advanced Melanoma

Scientists at the National Cancer Institute (NCI) recently conducted a study investigating the use of genetically engineered lymphocytes for treatment in cases of advanced melanoma. By introducing a retrovirus containing genes that encode certain proteins called T-cell receptors (TCRs) into the lymphocyte, the research team was able to guide the genetically engineered lymphocyte toward the tumor cells. The TCRs identify and bind to specific molecules on the surface of the tumor cells, and the TCRs then activate the lymphocytes to destroy the cancer cells. The study consisted of 17 patients with advanced metastatic melanoma divided into three groups. The first group included three patients, none of whom showed any delay in the progression of their disease. Researchers were able to improve treatment of the lymphocytes delivered to the last two groups, resulting in administration of the lymphocytes in their most active growth stage. Two of the patients experienced cancer regression, with consistently high levels of genetically modified lymphocytes. These two patients remained disease free for over 1 year. All patients in the last two groups still had 9 to 56% of their altered lymphocytes 1 month after receiving gene therapy. The study, led by Dr. Steven A. Rosenberg, appeared in the on-line edition of the journal *Science* on August 31, 2006.

Possible methods for improving the function of the altered lymphocyte include the development of TCRs that bind more tightly to the tumor cells, the insertion of molecules that would assist in guiding the lymphocyte to cancerous tissue, and the use of total body radiation to diminish a patient's supply of normal lymphocytes prior to administration of the altered lymphocytes. Dr. Rosenberg said that the researchers have already expressed additional lymphocyte receptors that recognize breast, lung, and other cancers.

UCLA Researcher Granted $7.9 Million in Support of Alzheimer's Research

The National Institute on Aging recently awarded Dr. David B. Teplow a $7.9 million grant to head a nationwide initiative investigating how brain proteins stick together abnormally to cause Alzheimer's disease. Alzheimer's disease is caused by sticky plaque formation in the brain as a result of amyloid proteins clumping together. The plaques interfere with cellular communication and eventually result in cellular death. Dr. Teplow's team believes that structural alterations to the amyloid proteins make them toxic, which leads to Alzheimer's disease. Dr. Teplow said that a multidisciplinary collaborative approach is essential for the project, which will team together neurologists, physicists, chemists, and biologists at Boston University; the Massachusetts Institute of Technology; the University of California, Santa Barbara (UCSB); and the University of California, Los Angeles (UCLA). The multi-institution collaboration includes George B. Benedek, PhD, the Alfred H. Caspary Professor of Physics and Biological Physics at MIT; Michael Bowers, PhD, professor of chemistry at UCSB; H. Eugene Stanley, PhD, professor at Boston University; and Gal Bitan, PhD, assistant professor of neurology at UCLA.