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1

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of 27 centers and institutes that carry out the medical research mission of NIH. For example, these include the National Cancer Institute, the National Eye Institute, and the National Heart, Blood and Lung Institute. Each institute is dedicated to conducting scientific research on a particular disease or a part of the human body, how to reduce people's chances of acquiring disease, or particular health-related societal problems such as drug abuse.

In addition to the work of scientists at NIH headquarters in Bethesda, the agency has awarded nearly 50,000 competitive grants to more than 325,000 researchers at over 3,000 universities and medical schools who are seeking cures for cancer, diabetes, and other health ailments. More than 100 scientists who have worked on NIH projects have received Nobel Prizes. Their medical discoveries are put to use by health care providers, patients, and caregivers. For example, in 1977, it was a group of NIH researchers and collaborators who recommended that women begin getting regular breast exams as an early warning against breast cancer, according to an NIH press release. Twenty years later, new research showed that mammography screenings should be conducted on a regular basis for women in certain age groups.

In fact, NIH-sponsored research has been deemed responsible for the following medical improvements: (a) a decrease in heart and stroke death rates, from 51% in 1975 to 40% in 2000; (b) a 70% decline in the number of AIDS-related deaths between 1995 and 2001; (c) an increase in life expectancy from 47 years in 1900 to nearly 77 years by 2000; and, (d) thanks to vaccines produced by NIH, a reduction in major infectious diseases like whooping cough, rubella, and pneumococcal pneumonia, which used to kill millions.

NIH tackles other health-related issues, too. In June 2009, for example, NIH released a study concluding that school-based prevention programs in elementary school can reduce problem behaviors in students. The study found that fifth graders were almost 50% less likely to engage in substance abuse or violent or sexual behavior if they participated in a comprehensive interactive school prevention program for 1 to 4 years, versus students who did not participate in the program. The study was supported by the National Institute on Drug Abuse, one of the NIH institutes.

Other NIH research grants allow researchers in underdeveloped countries to collaborate with those in developing countries to build research and training centers to prevent and control chronic diseases, such as heart and lung disease and diabetes. As of 2009, the National Heart, Blood and Lung Institute planned to award 10 contracts worth \$34 million in the Collaborating Centers of Excellence, or CCOE, network. A CCOE consists of a research institution in a low- or middle-income developing country, which is paired with at least one partner academic institution in a developed country in a collaborative effort to address chronic diseases on a global scale. Bangladesh, China, Guatemala, and India are among the countries where these CCOEs will be established. Heart and lung disease, cancer, and type 2 diabetes account for more than 50% of deaths worldwide, according to the World Health Organization, a United Nations agency that monitors health and shapes health research on a global scale.

Kim Smith

See also Cancer Prevention and Risk Communication; Centers for Disease Control and Prevention, U.S.; Health Communication, Overview; Health Literacy; Public Health Service, U.S.

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NATIONAL SCIENCE FOUNDATION, U.S.

The National Science Foundation (NSF) was created by the U.S. Congress in 1950 as an independent

federal agency with a general mandate to promote the progress of science, particularly in the areas of national health, prosperity, welfare, and national defense. Later on, this federal agency concentrated on areas of basic research in science and engineering, leaving other areas such as health and national defense to different agencies. Today, NSF is the only U.S. federal agency with a mandate to support all nonmedical fields of research. NSF is the most important source of basic science funding in the world, with a budget that by the year 2008 surpassed \$6 billion. In the United States especially, a good portion of the scientific progress with which science communicators are most concerned is generated from this investment; in addition, NSF is an important source of background statistics on all areas of science and education, including statistics on science literacy and public understanding of science.

Although the budget for NSF comes from the U.S. Congress, the agency has usually been able to stay away from political turmoil and severe budgetary constraints. In fact, NSF usually garners bipartisan support in Congress, which sometimes funds it with even more money than it requests. Thus, this federal agency has seen its budget increase steadily over the years. That support has increased significantly after events such as the launch of the Soviet satellite *Sputnik* in 1957 and the technological boom of the 1980s. Most recipients of the money NSF grants are America's colleges and universities. Although the NSF budget is less than 5% of the federal budget for research and development, it provides about 20% of the federal money that U.S. academic institutions of higher education receive.

NSF has its headquarters in Arlington, Virginia, and has a staff of about 1,700 employees who are overseen by a director, who works together with a 24-member National Science Board. Both the director and the board members serve for 6-year terms and are appointed by the president of the United States and confirmed by the U.S. Senate. The board meets six times a year to establish the general policies of the foundation.

In addition to funding research in the traditional academic research areas, NSF dollars support less traditional areas considered high-risk, either those pursuing less conventional directions or those representing novel collaborations among people from different disciplines. Sometimes NSF

also supports international ventures. Some NSF funding goes to educational projects in the sciences and social sciences, ranging from public outreach efforts to formal education at all levels—from primary school to postsecondary education.

As part of its mandate, NSF identifies areas of science that need federal funding and establishes programs to address those needs. To that end, NSF constantly gathers information about research activities in the United States and other countries. Among the data they gather and analyze is information about the levels of public understanding of science in the United States and the world, education from the elementary to the postdoctoral level, demographics of colleges and universities both nationally and internationally, research and development in the United States in general, the impact and needs of industry in scientific areas, science-related facilities, and information technologies. Reports by NSF are made public in print as well as in electronic documents through its Web site.

Funding to applicants is generally decided through a complex and highly competitive process that is executed by the directors of the different programs. The process is as follows: (a) NSF announces funding opportunities that include guidelines and deadlines; (b) after the proposals are received, the program director selects a number of external reviewers from U.S. colleges and universities, who submit their recommendations back to the program director; (c) the program director makes a number of recommendations that are submitted to the division director for review; (d) the division director makes a final decision; (e) this decision is reviewed by the Division of Grants and Agreements, which looks into the business, financial, and policy implications of the grant or cooperative agreement; and (f) after the program director negotiates details with the grantees, the final decision is announced.

The merits of the proposal are judged based on a series of criteria that vary from program to program but generally include elements such as the scientific rigor of the proposal, its societal impact, the level of innovation it represents, the background of the investigators involved, and evidence of good planning and budgeting. Based on the availability of funds, the best projects are recommended for funding. Some types of projects can be renewed after the initial funding period.

NSF has given increasing priority to collaborative projects among two or more institutions, particularly if one of those institutions has a sizable representation of ethnic group members from groups historically underrepresented in the sciences. Depending on the specific discipline, gender is also taken into consideration. For example, mathematics and engineering have traditionally had a low representation of women. The same can be said of people with disabilities.

Another area that has received increasing attention by NSF relates to projects that are interdisciplinary in nature, bringing in different perspectives and backgrounds aimed at solving specific problems.

Projects that are aimed at improving public understanding of science among people of all ages, children through adults, as well as more formal education projects, are supported by NSF through a diversity of programs and initiatives. Other awards go to science and engineering infrastructure.

NSF also administers a number of other programs, such as the President's National Medal of Science, the Presidential Awards for Excellence in Mathematics and Science Teaching, the Presidential Early Career Awards for Scientists and Engineers, and the Presidential Awards for Excellence in Science, Mathematics, and Engineering Mentoring.

Aldemaro Romero

See also Big Science; National Academies, U.S.; Science Indicators, History of the NSB Project on

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publisher. Like its American counterpart *Science*, the international weekly journal *Nature* publishes important scientific findings from almost every scientific field and is therefore called multidisciplinary. Its original mission statement was revised in 2000 and defines the publication as primarily concerned with "prompt publication" of important results in any scientific field, as well as reports and discussion of news and issues in the world of science.

Nature is ranked among the top 10 of 6,426 listed journals ranked in the *Journal Citation Reports 2007*, provided by Thomson Reuters. *Nature* is not only famous for its papers on basic research, particularly in the life sciences, but also for its news stories on scientific developments and research policy.

The Nature Family

Nature's headquarters are in London. The journal's publisher, NPG, is a division of Macmillan, in turn affiliated with the German publishing group Georg von Holtzbrinck. Compared to its main competitor, the society-based journal *Science*, *Nature's* print circulation is much lower, yet the trend toward electronic publishing arguably makes circulation figures less significant. In addition, a large number of reputable *Nature* sister journals are published, devoted to special research areas. Currently, the *Nature* family consists of 15 *Nature Research* journals, such as *Nature Genetics*, which was the first and was launched in 1992, *Nature Reviews* journals, *Nature Clinical Practice* journals, and *Nature Protocols*, an online resource for information on scientific protocols. All *Nature* sister journals operate independently. Recently, NPG expanded with new online products in Asia, like *Nature China* and *Nature India*. As bibliometric analyses have shown, *Nature* has a wider international scope than *Science*. In 2007, NPG launched a free preprint server called *Nature Precedings*, which allows an informal exchange among researchers on new preliminary findings.

Role in Science Communication

Nature is considered one of the most relevant journals to science communication for the following reasons: (a) its high impact factor (a measure of

NATURE

Nature is the flagship journal of the Nature Publishing Group (NPG) and is one of the most prestigious scientific journals worldwide. It was founded in 1869 and works editorially independently from its