



THE

2004 Annual Report

DANA

FOUNDATION

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he Dana Foundation is a private philanthropic organization with principal interests in science, health, and education. Charles A. Dana, a New York State legislator, industrialist, and philanthropist, was president of the Dana Foundation from 1950 to 1966 and actively shaped its programs and principles until his death in 1975.

Grants applications to the Dana Foundation are reviewed in accordance with the guidelines at the end of this annual report.



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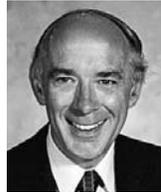
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CHAIRMAN'S LETTER



William Safire, Chairman

Chairman's Letter

In brainwork, one thing leads to another. When a charitable foundation takes the human brain as the focus of its philanthropy, it is soon drawn into related fields that are directly affected by breakthroughs in neuroscience.

For example, about 20 years ago, the Dana Foundation—long a supporter of medical research at the Dana-Farber Cancer Institute in Boston—began to make grants to other scientific researchers, especially in the field of brain science. Although major advances were quietly being made, that field had received little public attention and not nearly enough financial support. To rectify this as the 1990s began, the government launched “the Decade of the Brain,” but the effort had a hard time getting off the ground;

too many neuroscientists were forced to compete for too small a slice of the scientific funding pie.

That's when the marketing genius of David Mahoney and the scientific genius of James Watson combined to form the Dana Alliance for Brain Initiatives. Three dozen of the nation's leading neuroscientists met at Dr. Watson's Cold Spring Harbor Laboratory in 1992 and agreed on a set of tangible goals for the rest of the decade. These dedicated men and women pledged to carry their message of commitment and hope to people suffering from a variety of brain-related diseases and ailments.

The now 246 leading neuroscientists in the Dana Alliance for Brain Initiatives, including 10 Nobel laureates, marshaled their energies to help increase public awareness of the potential of brain science. The European Dana Alliance was soon formed and the dedication of its 160 neuroscientists, including 5 Nobelists, made Brain Awareness Week a transatlantic success. This interest in turn attracted more young scientists and students around the world to the field and stimulated other sources of public and private funding.

Surely the quickened interest in brain science would have happened sooner or later—but probably later, and time is lives. The National Institutes of Health's investment alone in the research that can lead to treatment and cures for brain diseases and disorders has more than quadrupled since 1989. Major advances have been made in the treatment of multiple sclerosis, the medical

and surgical management of Parkinson's disease, early treatment of stroke, and neurological management of epilepsy and AIDS. Researchers have reason for optimism about the treatment of Alzheimer's disease, macular degeneration, and spinal cord injury. Today, the study of the brain, aided immeasurably by advances in the technology of imaging, has attracted many of the best minds in scientific research.

At the same time, Dana put its grant money where its mouth was: We set up expert groups to request proposals in productive areas and organized peer-review panels to channel support to researchers with exciting ideas. Dana continues to make grants to neuroscientists as well as to those creating their investigatory tools, now including molecular imaging. Here is a recap of some recent findings by some of our Dana grantees whose neuroscience work began to come to fruition in 2004. You will note the frequent use of the conditional sense in describing their work; the "could" and "may" reflect their caution in making claims.

Exploring the Brain and Brain Imaging

- In the brain attack called *stroke*, Johns Hopkins researcher Argye Hillis, M.D., and colleagues found that patients who have strokes that interfere with language function suffer less speech and language damage when clinicians induce high blood pressure to supply more blood to damaged brain areas. Also, an MIT team led by Emilio Bizzi, M.D., developed an imaging "virtual environment" rehabilitation technique to improve patients' movements.
- In children with *sickle cell disease*, who are at risk for "silent" strokes, Washington University in St. Louis researchers, Michael DeBaum, M.D., M.P.H., and colleagues, found that Diffusion Tensor Imaging (DTI) could identify the strokes, leading to earlier diagnosis and treatment.
- In *Parkinson's disease*, Emory University researcher John Hoffman, M.D., found that changes in brain circuitry in Parkinson's patients could be surgically reversed. Surgical researchers Peter Brown, M.D., and colleagues, at the National Hospital for Neurology and Neurosurgery in London, received support to test surgical approaches to quieting abnormal brain-cell signaling and thereby prevent tremors in patients who no longer respond to medication. Also, researcher Gadi Goelman, Ph.D., at Hadassah Hebrew University Hospital in Jerusalem is determining whether nerve-cell firing is abnormally synchronized in Parkinson's disease and whether imaging can quantify the brain-cell loss that appears to result from this abnormal synchrony, in order to assess the effectiveness of therapies in preventing this destruction.

- In *epilepsy*, University of Washington researchers in Seattle led by Jeffrey Ojemann, M.D., developed preliminary evidence that a type of positron emission tomography (PET) imaging can guide surgical treatment of intractable epilepsy.
- In *pain management*, Memorial Sloan-Kettering clinical researchers led by Joy Hirsch, Ph.D., established the utility of MRI imaging of cortical systems for evaluating therapies to reduce pain.
- In *Alzheimer's disease*, University of Pittsburgh researchers, William Klunk, M.D., Ph.D., and colleagues, are seeking to validate and simplify a PET-imaging molecule they developed that appears to bind solely to brain amyloid. This may become a tool for confirming a diagnosis of Alzheimer's.
- Ethical guidelines for the use of deep brain stimulation in *minimally conscious adults* began being drafted in 2004 by Dana grantees Nicholas Schiff, M.D., and Joseph Fins, M.D., at Cornell University. Minimally conscious patients are at a higher level of brain functioning than those in a "persistent vegetative state," but are not conscious. The investigators are studying whether deep brain stimulation can help activate existing networks of brain cells that are still healthy to help the patient achieve a higher level of consciousness. A facet of this general

Just as our nervous system learns from experience and remembers to avoid dangers, our immune system learns from experience and remembers to counter the threat of infectious organisms.

subject was thrust into public controversy early in 2005 in the Terri Schiavo case, making all the more pertinent the need to gain informed consent from patients' families or legal guardians and to develop ethical guidelines for researchers undertaking brain stimulation.

Focusing on the Brain's Relation to the Immune System

Here is where one thing (Dana's central interest in the brain) led to another: to our active support of the closely related field of immunology. These two fundamental human systems, which scientists tell us were too long studied separately, have among much else in common the faculty of memory. Just as our nervous system learns from experience and remembers to avoid dangers, our immune system learns from experience and remembers to counter the threat of infectious organisms. From the recent understanding of

the relationship between the brain and immune system came the fast-growing discipline of neuro-immunology and the increasingly important field of human immunology.

Dana's interest in this relatively new field began a year before the attacks of 9/11 and the subsequent concern with bioterror. In the field of immuno-defense, these are a few of the studies we supported that showed results in 2004:

- To protect against "weaponized" *smallpox* infection, Ellis Reinherz, M.D., and colleagues at the Dana-Farber Cancer Institute developed a small-molecule drug to block a key signal that the smallpox virus needs to reproduce itself. In the long run, this could result in an effective treatment for the disease and preclude the need for mass vaccination in event of an attack.
- In studying viral *encephalitis* infection in mice, Johns Hopkins researcher Diane Griffin, M.D., and colleagues identified a specific protein that could be the basis for treatment in humans.
- To determine the way many viruses activate human innate immune cells, Jacques Banchereau, Ph.D., at Baylor Institute for Immunological Research developed a mouse model in which human dendritic cells are transplanted into the mice, bred with no immune system. This would enable scientists to study how human dendritic cells pick up tumor cells and then initiate an immune attack on the tumor.

Neuroimmunology and Human Immunology

- Dana Alliance member Carla Shatz, Ph.D., at the Harvard Medical School, is investigating how molecules once believed to exist only in the immune system may play an essential role in guiding *connections among brain cells*. To do this, Dr. Shatz relies on new imaging methods that allow her to study the behavior of individual nerve cells.
- In *arthritis* research at the University of Texas involving brain-immune system interaction, Terry McNearney, M.D., and colleagues are studying how chronic inflammation in the knee joint can be reduced by destroying the nerves that release the transmitter glutamate into the joint.
- Why do innate immune cells in some people recognize *pre-malignant* changes and destroy the affected cells, while in other people, these premalignancies go undetected and develop into cancers? A consortium led by Madhav Dhodapkar, M.D., at Rockefeller University and Olivera J. Finn, Ph.D., at the University of Pittsburgh, organized with Dana help, is trying to understand immune-based preventions against cancer, or what is termed "immune surveillance."
- In *brain tumors*, Rockefeller University researchers Kavita Dhodapkar, M.D., and

colleagues have found that innate immune cells called “natural killer” cells can be removed from a patient with a deadly brain tumor called a “glioma” and made strong enough in the laboratory to kill the brain tumor’s cells. Now the researchers are determining whether these enhanced glioma-fighting immune cells can be inserted back into the patient to attack the cancer directly and to help orchestrate other immune cells to resist glioma. If so, this may become a way to treat deadly brain tumors.

These and other research projects regarding brain science and immunology are covered later in this annual report.

Mapping the Field of Neuroethics

Try these 10 questions for size:

It’s a good idea to treat a failing memory in aging adults, but would providing students a pill to enhance memory before an academic exam be akin to providing steroids to athletes?

It’s important for justice to make certain nobody bears false witness—but is it right to image a brain to try to detect perjury?

It’s good to develop treatments for clinical depression—but is it bad to rely on mood brighteners to block natural sadness?

Would it be right, in the name of equal opportunity, to provide short people with

growth hormones or to level everyone’s I.Q. with chemicals?

What’s the right thing to do when scientists gain the means to predict mental or behavioral problems for which they have no effective treatment?

Would it be wrong, in developing treatments for disease, to inject human cells into animals or insert animal cells into a human brain?

Would it harm the development of human character or genius to artificially speed mental processes?

Is it ethical to increase longevity if the brain in advanced age makes people a burden to their families and society?

Would it be right to notify prospective employers, insurance companies, or police if future brain scans revealed the potential of violent behavior?

Is there a moral sense inherent in the brain that makes us responsible for our actions, or is conscience developed after birth?

Such roiling issues as privacy, life extension, fairness, cloning, and others are at the heart of—or more aptly, at the nerve-center of—social-scientific controversy today. By concentrating on that portion of the field of bioethics dealing with the stunning advances in brain research—focusing on what we call “neuroethics”—Dana has had a hand in engaging many thoughtful lay people and scientists in discussions about questions like these. In May of 2002, we joined with Stanford University and the University of California at

Such roiling issues as privacy, life extension, fairness, cloning, and others are at the heart of—or more aptly, at the nerve-center of—social-scientific controversy today.

San Francisco to sponsor the first major conference on what we called “neuroethics,” and published the proceedings in a Dana Press book, *Neuroethics: Mapping the Field*.

Since then, we have been among those in the forefront of sponsoring and hosting symposia and fora advancing discussion of this profound topic. In 2003, an invitational meeting in Washington, DC, convened by the American Association for the Advancement of Science in cooperation with the American Bar Association and the Dana Foundation, led to the Dana Press publication in 2004 of *Neuroscience and the Law: Brain, Mind and the Scales of Justice*. Meanwhile, at the Dana Centre in London, the subject of neuroethics was discussed at our regular series of meetings among scientists and the public. Our Dana Press series on neuroethics includes an edition of *Beyond Therapy*, a report of the President’s Council on Bioethics with special introduction and demurrers; it will be followed in 2005 by *The Ethical Brain*, by Michael Gazzaniga, Ph.D., director of the Center for Cognitive Neuroscience at Dartmouth College.

Enlivening Young Minds Through Arts Education

In 2004, we continued to increase our grants to organizations training both professional artists and in-school arts specialists to teach the performing arts—drama, dance, and music—in public schools in the greater metropolitan areas of New York City, Los Angeles, and the District of Columbia. At the same time, we helped others replicate these successful initiatives by extending our information reach to other educators and to professional presenters of the performing arts. A report of these grants, meetings, and publications appears later in this annual report, and in more detail on our Web site, www.dana.org. Here are a few highlights:

- *Grantee gathering:* Representatives of more than 30 arts organizations supported by Dana grants met at the New York Academy of Sciences to share their experience. Because the Foundation focuses on training professional artists to teach in public schools, these disparate groups—varying in size, region, and arts discipline—were able to have a stimulating interchange about professional development and curriculum issues and to arrange for future collaboration within this new network.
- *Working with arts presenters:* For the first time, more than a dozen arts service organizations coordinated their annual

meetings to take place at one time in one locale with 5,000 attendees. At the 2004 National Performing Arts Convention in Pittsburgh, Dana facilitated exchange of ideas on leading topics and challenges in education of children in dance, drama, and music. Two thousand copies of our free manual, *Acts of Achievement*, were subsequently distributed by individual organizations that had participated in the conference.

- *Grants with impact on entire school systems:* One example was the expansion of a unique curriculum that trains public school music ensemble leaders. Dana grantee David Barg of the Institute for Continuing Conductor Training was chosen by the NYC Department of Education to use this method in the Blueprint training, a new structure for teaching the arts in New York City public schools. Barg will be training music teachers in a method he developed.

Other examples: The UCLA Fowler Museum, with Dana support, piloted a curriculum for teaching artists based on the worldwide celebration of “Carnaval.” This unusual approach to multidiscipline training provided a vehicle for learning about different cultures here and overseas through their arts. At the same time, at the L.A. County Arts Commission, we supported workshops in its “Arts for All” blueprint, designed to improve teaching of arts in schools for more than a

fourth of the students in California schools.

Some of our grants were aimed at building on work that previous grantees developed, meeting demands for a higher level of training. With Dana support, the Washington Performing Arts Society in Washington, DC, the L.A. Music Center, and the Community Word Project in New York City created advanced workshops for artists teaching in public schools.

Our aim has been to encourage innovative methods proven to be working in three urban areas that could be replicated not only in cities but in localities across the country. Our participation in Rural Arts Education Day this past year at the William Inge Festival in Independence, Kansas, started us planning to adapt some of these successful models to artist training in lightly populated areas, and to plan a Dana Rural Arts Initiative for 2006.

Does Arts Education Enhance Other Cognitive Skills?

Why do many young children raised in bilingual homes have an advantage in later learning? Does this training in simultaneously understanding two languages affect the brain’s cognitive development? Does some cognitive improvement take place within the brain as the result of arts training in early youth?

Educators and cognitive scientists have long suspected a connection between arts study and proficiency in academic subjects,

Most educators hope arts education not only enriches the curriculum for a lifelong experience, but has a practical benefit as well in sharpening cognitive skills; if so, that would give a great boost to funding of arts education in public schools, now all too often cut when budgets are tight.

but the question, put in the most elegant jargon, has always been: Is it correlative or causal? In other words, do kids with a knack for music have the same knack for mathematics, or does one lead to and reinforce the other?

To pursue the theme in this annual report of how “one thing leads to another,” consider our latest enterprise of combined interest: the Dana Arts and Cognition Consortium.

Here we are, with one foot in brain science and the other in arts education; how could we overlook the obvious overlap? Our neuroethics association with Dartmouth professor Gazzaniga, one of the world’s leaders in the science of cognition (that’s the study of the way the brain perceives, thinks, and learns), led us to address that question: Is the connection between early learning in the

arts—dance, drama, music, and the visual arts—the cause of, or only incident to, success in learning science, math, literature, and other academic subjects? Does the “muscle memory” in dance, for example, transfer to a grasp of spatial relations in architectural design? Most educators hope arts education not only enriches the curriculum for a lifelong experience, but has a practical benefit as well in sharpening cognitive skills; if so, that would give a great boost to funding of arts education in public schools, now all too often cut when budgets are tight.

Though there have been useful studies of the relationship of arts education and learning in the recent past, there has been no rigorous longitudinal study on a large, national scale to determine whether arts training will have an enhancing effect on general cognition.

In June of 2004, Dana’s Board approved enlisting Dr. Gazzaniga to conceive and coordinate a three-year, six-university study—using the latest methods of brain imaging as well as other investigative techniques—to come up with some answers. Dana granted \$1.8 million to this consortium, which includes cognitive experts at Dartmouth College, the University of Michigan, University of California at Berkeley, University of Oregon, Harvard University, and Stanford University. Nobody can be certain where this study will lead, but as in our efforts in neuroscience and immunology, it will be based on solid science wherever it takes us.

One thing—the brain—has led Dana to another (immunology) and another (neuroethics) and another (arts and cognition). I hope this overview letter will lead you to examine the details of this annual report, which you can also read online at our freshly redesigned Web site, www.dana.org.

While maintaining our endowment at \$313 million, our active and involved Board approved \$23 million in direct grants and philanthropic operations and publications, which were given intellectual depth and worldwide scope by the invaluable participation of the scientists of the Dana Alliance for Brain Initiatives and European Dana Alliance for the Brain.

A handwritten signature in black ink, reading "William Safire". The signature is fluid and cursive, with the first name "William" and the last name "Safire" clearly legible.

William Safire
Chairman

REPORT ON 2004

NEW INTERDISCIPLINARY GROUPS EXPLORE ARTS AND COGNITION, BRAIN AND IMMUNOLOGY



From performing artists and in-school specialists teaching in public schools to scientists using neuroimaging to study the interactions between the brain and the immune system, Dana grantees are collaborating to break new ground.



Many tantalizing studies have linked training in the arts to related cognitive skills from memory to mathematics, but these studies have examined correlations and not cause-and-effect. Dana embarked this year on a multi-institutional research effort to confront the question of whether arts training actually produces learning improvements in other areas. The six institutions in this consortium will apply the powerful tools of cognitive neuroscience and imaging to this question.

Consortia developed by Dana in the early 1990s often proved to be an effective spur to progress in research on complex brain functions, such as learning and memory, and on brain disorders, such as manic-depressive illness. The consortium approach brings together scientific groups with complementary skills and expertise. This year, the Foundation returned to that strategy not only in arts and cognition, but also to explore multifaceted aspects of brain and immune system functioning.

Science and Health

Dana gives preference to investigators proposing pilot studies of innovative hypotheses on how the brain, the immune system, and their interactions affect our health, our cognition, and diseases that compromise them. Researchers able to develop proof of their concept are in a competitive position

when applying to traditional large-scale funders, such as the National Institutes of Health. In instances where researchers' original hypotheses are not borne out, their pilot research findings often point them in important new directions.

Immunology

Although most of the nation's immunology research involves animal studies, which yield insights into how the human immune system may work, Dana takes the less usual approach of supporting clinical research on how our human immune systems actually protect us. At a time when we are confronted not only with existing and newly emerging deadly viruses, but also with intentionally inflicted biological agents, Dana investigators are at the forefront of efforts to improve human biological defense systems.

Dana-supported researchers concentrate on discovering ways to improve the body's first line of defense, innate immunity, which launches immediate, generalized, and short-lived responses, and also on adaptive immunity, which produces sustained and repeated high-precision attacks against specific invaders. Additionally, clinical research grantees are exploring ways to galvanize immune responses to lethal cancers, and to calm the misdirected immune responses of autoimmune diseases, such as rheumatoid arthritis and juvenile diabetes, in which immune cells misidentify the body's own cells as foreign and attack them.

- **Immuno-defense**

Well before September 11, 2001, Dana recognized the urgent need to improve the body's natural defenses against intentionally inflicted pathogens, such as "weaponized" viruses and bacteria. This year, Ellis Reinherz, M.D., and his colleagues at the Dana Farber Cancer Institute made a major advance in efforts to prevent infection from weaponized smallpox. Their laboratory research has shown that weaponized smallpox infection may be treatable, which could preclude the need to vaccinate the population in the event of an attack.

The Dana-Farber researchers found that, in a test-tube, a small-molecule drug can block a key signal that the smallpox virus requires to propel itself from cell to cell as well as to reproduce itself within the cells it infects. The molecule also blocks the signal of a related virus (vaccinia) in a mouse model, suggesting that this treatment approach eventually may be feasible in humans if the molecule's deleterious effects on certain genes can be effectively addressed.

Progress also is being made in preventing deadly brain infections from weaponized or naturally occurring viruses such as several types of equine encephalitis. Diane Griffin, M.D., Ph.D., and her colleagues at Johns Hopkins, studying mice with viral encephalitis, have identified a specific protein that occurs in dangerously low levels in some people,

placing them at high risk for becoming infected with viral encephalitis. This protein may mean the difference between life and death, and if it could be effectively provided to people with this protein deficiency who become exposed to the virus, this might become a lifesaving treatment.

The body's first line of defense is its innate immune dendritic cells, which serve as sentries for identifying infectious agents of all types. Finding ways to enhance their performance holds promise for combating a wide range of infections, whether naturally occurring or intentionally inflicted. Baylor Institute for Immunological Research investigators Jacques Banchereau, Ph.D., and his colleagues have developed methods for transplanting human dendritic cells into mice that have been bred without their own immune systems. Now, Banchereau and his co-investigators are asking how these human dendritic cells are activated by various viruses, and how this activation could be speeded up to launch an attack more swiftly.

These advances in protecting against weaponized bioagents are applicable to efforts to protect against naturally occurring infections, one focus of Dana's Human Immunology grants.

- **Human Immunology**

If we are to improve the human immune system's abilities to fend off infections and cancers and prevent immune system

How human immunity works is the province of Dana-supported clinical and translational researchers, who apply discoveries from basic research to investigations in patients and also make clinical observations that can then be tested in the laboratory.

malfunctions that can produce allergies and autoimmune diseases such as lupus, we need to understand how that system functions. How human immunity works is the province of Dana-supported clinical and translational researchers, who apply discoveries from basic research to investigations in patients and also make clinical observations that can then be tested in the laboratory. These pioneer scientists measure, rather than experimentally manipulate, human immune responses to diseases and their treatments.

For example, studies on lung diseases and fatal brain tumors are revealing aspects of the immune system's role in these diseases that may lead to new immune-based treatments. According to Harvard investigator Andrew Luster, M.D., different types of lung diseases involving an immune inflammatory response, such

as allergic asthma or chronic obstructive pulmonary disease, occur when specific types of immune substances called "chemokines" lure immune T cells to the lungs, where they produce chronic inflammation of the airways. This finding may lead to methods to block the chemokines' actions.

Immune-based treatment also may become a reality for patients with deadly brain tumors called gliomas. According to Rockefeller University's Kavita Dhodapkar, M.D., and colleagues, in newly diagnosed patients, innate immune "natural killer" cells remain viable and can be removed and expanded through stimulation by dendritic cells in the laboratory into a force large enough to kill glioma cells. The investigators now are ascertaining if this enlarged force of natural killer cells can be inserted back into patients to attack their brain tumors.

Several immunologists are working as members of consortia on complex problems that require expertise from several interrelated fields. This year, Dana awarded grants to two consortia pursuing potentially ground-breaking studies. One consortium, composed of researchers from three departments at the Benaroya Research Institute in Seattle, is studying juvenile diabetes, an autoimmune disease in which patients' adaptive immune T cells misidentify pancreatic cells as foreign and attack them. The investigators are seeing whether a subset of T cells, which

ordinarily rein in errant T-cell attackers, are too weak or too few in number to prevent this autoimmune reaction. If so, the researchers will conduct animal model studies of two experimental therapies to strengthen these regulatory T cells.

The other consortium, involving University of Pittsburgh and Rockefeller University clinical investigators, is finding out why innate immune cells in some people recognize premalignant changes and destroy the affected cells, while, in other people, these premalignancies go undetected and eventually develop into cancers. The answer may lead to development of immune-based therapies to prevent conversion of premalignancies to deadly cancers.

- **Human Immunology Training**

To enlarge the ranks of today's small number of top clinical immunology researchers, we need to excite promising new investigators about careers in this field and provide them with mentors to guide their research. Dana embraces this critical challenge through a collaboration with the Irvington Institute for Immunological Research to provide mentored research fellowships. This year, three Dana-Irvington Fellows seeking to undertake clinical research on human autoimmune and chronic inflammatory diseases were competitively selected. In years to come, Dana expects to be highlighting their contributions as part of the next generation of senior leaders.

Guidelines for applying, and summaries of the projects of fellows, are posted on the Web sites of the sponsors: www.dana.org and www.irvingtoninstitute.org.

- **Neuroimmunology**

The Foundation's neuroimmunology grants are a natural conjoining of Dana's interests in the brain and the immune system. Collaborating neuroscientists and immunologists are invited to compete for three-year funding to figure out how the nervous and immune systems influence one another in health and disease.

Through an ongoing study by New York University scientists Michael Dustin, Ph.D., and Wen-biao Gan, Ph.D., for example, we are close to learning how microglial cells, the only immune cells known to reside in the brain, protect brain tissue when it is injured.

Meanwhile, in a surprising finding from a current investigation of nervous and immune system interaction in an animal model of arthritis, it appears that chronic inflammation in the knee joint is produced when small nerve fibers there release a neurotransmitter called glutamate into the joint. Neurotransmitters carry messages from one nerve cell to another. Now the investigators, led by University of Texas researcher Terry McNearney, M.D., have evidence that the inflammation can be reduced by injecting capsaicin (an ingredient in hot peppers). This depletes the

small nerve fibers and reduces the amount of glutamate released into the joint.

This year, four supported collaborative studies have the potential, if successful, to begin to alter some basic and long-established assumptions in both neuroscience and immunology.

One of these projects, by Dana Alliance member Carla Shatz, Ph.D., at Harvard, will investigate certain molecules (major histocompatibility complex class I) that once were believed to exist only in the immune system but now are suspected to play an essential role in guiding connections among brain cells during development. Dr. Shatz hypothesizes that these molecules are involved in both normal and abnormal brain wiring. To explore the apparent multifaceted roles of these molecules, Dr. Shatz is employing new imaging methods that enable her to study the behavior of individual nerve cells.

Three other studies will ask questions about how immune cells try to fend off invaders without inadvertently damaging nearby nervous system cells. Although “microglia” are the only immune cells stationed in the brain, once foreign invaders that get into the brain are recognized, other immune cells can enter the brain to attack them. Can the immune response be strengthened while avoiding collateral damage to brain cells? Can immune cells clear a particular virus from the brain without harming brain cells? Does inflammation that is provoked in the spinal cord

Dana-supported imaging investigators are testing many novel hypotheses. These include fresh ideas about normal brain functions such as memory, as well as how specific diseases affect the brain and how various therapies work against these diseases.

by immune cells, in an animal disease similar to Lou Gehrig’s disease (amyotrophic lateral sclerosis), kill the neurons that control movement?

Brain and Immuno-imaging

Advances have been made in evolving cellular and molecular imaging techniques that show the actions of individual brain and immune cells and their interactions. These new techniques, along with conventional brain tissue imaging technologies that transformed the ability to study how the brain functions normally and how it is affected by disease, provide unprecedented opportunities to advance human health and cognitive functioning.

Dana-supported imaging investigators are testing many novel hypotheses. These include fresh ideas about normal brain functions such as memory, as well as how specific diseases affect the brain and how various therapies work against these diseases.

Others are trying new tools in imaging to diagnose diseases early, when treatment is most likely to be effective. We support research to refine and advance imaging technologies and to test new applications of existing techniques. One advantage of Dana grants is that they are awarded within six months of receiving an application in response to twice-yearly requests for proposals sent to all U.S. medical schools and selected research institutions.

In some of the notable results of previously funded studies, for instance, Johns Hopkins investigator Argye Hillis, M.D., used magnetic resonance perfusion-diffusion imaging (which can show whether brain tissue has been destroyed due to lack of oxygen) and found that patients who have strokes that interfere with language function suffer less speech and language damage, and recover better, if clinicians induce high blood pressure to supply more blood to the damaged brain areas.

For rehabilitating adults who have suffered a stroke, Massachusetts Institute of Technology researcher Emilio Bizzi, M.D., developed a virtual environment displayed on a computer screen. Displays of animated movement are imitated by the stroke patients. This generates feedback designed to enhance learning. Participants showed the ability to generalize the movements to specific real-world functions, such as shaking hands, reaching, and turning a key. Identification of the brain changes that accompany this learning, as identified by

functional magnetic resonance imaging (fMRI), are anticipated to advance understanding of the way rehabilitation techniques can best lead to formation of new neural networks to facilitate stroke patients' abilities to move their affected arms and legs.

Children with sickle cell disease are at risk of suffering silent strokes that can impair cognitive functioning if not detected and treated or prevented. Michael DeBaum, M.D., M.P.H., of Washington University found that Diffusion Tensor Imaging (DTI) could identify the strokes in children with sickle cell disease. This finding is enabling physicians to diagnose and treat the silent strokes. In premature infants, meanwhile, neurologists have been seeking improved means for predicting whether the infants will develop neurodevelopmental problems. In an important diagnostic advance, Stanford University's Susan Hintz, M.D., and colleagues found that DTI is better than conventional ultrasound in detecting subtle brain signs in premature infants that may predict their risk of developing neurodevelopmental problems, including cerebral palsy. DTI also will be an important tool in assessing interventions intended to prevent or alter neurological problems emanating from these brain injuries.

Emory University's John Hoffman, M.D., used positron emission tomography (PET) to study Parkinson's disease patients before and after they underwent surgery on a nerve tract in the brain involved in control of movement. He found that this surgery appears to reverse changes produced by the disease

in the neural networks within this nerve tract, leading to improved motor control. In a related finding, Washington University neurosurgeon Jeffrey Ojemann, M.D., has found that a type of PET imaging that identifies brain cells that use the neurotransmitter GABA to communicate can identify a subset of epilepsy patients who have seizures outside of the temporal lobes, and can provide a roadmap for surgically treating these patients.

Washington University investigator Bradley Schlaggar, M.D., Ph.D., and colleagues have found, using fMRI imaging, that adults activate different regions of their brains compared to children when they generate words. This finding grew out of a Dana-funded study to determine how brain signals control the normal generation of words, and how this control malfunctions in children with the developmental disorder called Tourette's syndrome, who sometimes utter inappropriate words, such as obscenities. This first step, shedding light on how normal cognitive control occurs in healthy children and adults as they generate words, established the validity of fMRI in studying changes in brain activation that occur over time as the brain matures. Dr. Schlaggar has now undertaken preliminary work to image children with Tourette's syndrome to see if their methods of cognitive control differ from those of healthy children

Memorial Sloan-Kettering clinical investigator Joy Hirsch, Ph.D., established the utility of fMRI imaging to identify specific cortical systems involved in chronic pain

and cancer-related pain, and to identify pathways involved in the relief of these types of pain. Now fMRI imaging of these pathways is being used to evaluate therapies to reduce pain.

The 23 imaging grants awarded in 2004 show similar promise of advancing our understanding of brain and immune-related diseases, and improving their diagnosis and treatment. Among these studies is research that eventually may revolutionize diagnosis of Alzheimer's disease in living patients. A University of Pittsburgh team, headed by William Klunk, M.D., has developed a PET-imaging molecule (called a "probe") that appears to bind solely to brain amyloid (a hallmark of Alzheimer's disease). They received funding to this year to validate and simplify this promising imaging technique. If their studies confirm its utility, this method will advance understanding of the role of amyloid in Alzheimer's disease, and could become the first technique for confirming the diagnosis in patients.

While reports for years have suggested that memories are consolidated during sleep, a perfusion fMRI study by University of Pennsylvania researcher Geoffrey Aquirre, M.D., Ph.D., will explore what occurs in the awake and sleeping brain while people learn to recognize faces and buildings, through a process called "visual perception." Perfusion fMRI shows where the blood is circulating in the brain and providing glucose for energy. The findings could provide a basis for restoring recall capacity in people who have sustained

brain injury. Concurrently at the University of Pennsylvania, Murray Grossman, M.D., will see how an inherited language disability may shed light on the genetic basis of our language capacity. Rochester University's Daphne Bavelier, Ph.D., meanwhile, will determine how people who are deaf best learn to read. Although research has demonstrated that the amount of residual hearing is the best predictor of reading proficiency, some profoundly deaf people with no residual hearing are excellent readers. Bavelier will use MRI to image the left brain (the seat of language ability) and the right brain to identify regions that facilitate reading as a function of language. She will investigate whether reading is aided more by oral speech training or by learning sign language or by Signed English (a manual communication system that violates ordinary language structure rules).

Brain tumors remain a deadly menace because they grow unimpeded by immune intervention. Therapies have traditionally aimed at killing the cancer cells, but have made little progress. Brain tumors should be key targets for immuno-therapies that strengthen the immune system's capacity to recognize and attack these tumors. Three research groups will study the role of cell communications in growth or destruction of brain tumors by asking: How do tumor cells block brain cells from sending distress signals to their immune cell protectors? Can experimental therapies prevent tumor growth by blocking signals that the tumor's abnormal proteins require to keep growing?

Many patients suffer from devastating brain diseases that still resist treatment. Invited Clinical Neuroscience Research projects take the vital first step of testing in such patients promising experimental treatments that have demonstrated an initial potential to be effective through their testing in animal models of these diseases.

Parkinson's disease still presents long-term treatment challenges, and research on how this disease kills brain cells and disrupts cellular communication may lead to new approaches to manage this degenerative disease. Gadi Goelman, Ph.D., at Hadassah Hebrew University is using imaging to ascertain whether certain nerve cells abnormally fire in synchrony, and whether imaging can quantify brain-cell loss to assess the effectiveness of therapies in preventing nerve cell destruction. Concurrently, Georges El Fakhri, Ph.D., at Harvard is testing a new imaging technique for diagnosing Parkinson's in its earliest stages, differentiating it from diseases with similar symptoms so that therapy can be initiated at the earliest stage.

During the past decade, the Foundation has supported more than 100 imaging

studies that seemed to meet the requirement for originality and conceptual risk that Dana encourages. This year, Dana surveyed the investigators. Almost 90 percent of those who had completed studies at the time of the survey had obtained additional funding to build on their Dana-supported pilot work, and two-thirds of these researchers reported that their initial research findings had led to important changes in their thinking about the diseases under study, or about the imaging approach being tested. Two out of every five grantees considered that their research had produced profound effects on standard practice or scientific direction.

Clinical Neuroscience Research

Many patients suffer from devastating brain diseases that still resist treatment. Invited Clinical Neuroscience Research projects take the vital first step of testing in such patients promising experimental treatments that have demonstrated an initial potential to be effective through their testing in animal models of these diseases. This year, neurosurgeon Peter Brown, M.D., F.R.C.P., of the Institute of Neurology in London began a Dana-supported test of surgical approaches to quieting abnormal brain-cell signaling to prevent tremors in Parkinson's disease patients who no longer respond to medication. The neurosurgeons will assess the accuracy of two methods for deciding how to optimally place electrodes to regulate signaling deep within the brain. Also invited are Clinical Neuroscience Research proposals

that seek to refine existing ethical guidelines for studies involving patients with debilitating brain diseases and injuries, or to shape new guidelines for clinical researchers who work with families or legal guardians to arrive at an informed decision to have the patient receive an experimental clinical intervention for the illness or injury that precludes the patient from being able to make such decisions. Also invited are studies to assess outcomes from various approaches used to treat serious conditions, such as stroke.

Another Clinical Neuroscience Research grant awarded in 2004 extends efforts by the University of Pittsburgh team that is validating the use of the new radio-tracer PIB with PET imaging to detect amyloid in Alzheimer's disease. Through the Clinical Neuroscience Research grant, the Pittsburgh investigators will work with colleagues at Washington University and the University of Michigan in a consortium to see if this new imaging technique produces uniform results. This next step, if successful, could lead to large-scale studies of the reliability of using PET-PIB imaging as a research and ultimately a diagnostic tool in Alzheimer's disease.

Arts and Cognition

Does training in the arts change how the brain processes information? Do these changes affect how an individual acquires new information? What brain regions activated by arts training may be used in other tasks? Is there

Artists who want to teach in the public schools need a defined career track, supported by strong professional development programs, and Dana grants have enabled organizations to mount arts education programs that can serve as models.

a critical period for acquiring an arts education? To address these and other questions, the Foundation this year awarded \$1,850,000 over three years to Dartmouth College to lead a new Dana Arts and Cognition Consortium. Dartmouth is responsible for the coordination of research by investigators at Dartmouth, Harvard University, the University of California at Berkeley, University of Michigan, University of Oregon, and Stanford University. The investigators will work under the overall direction of Michael Gazzaniga, Ph.D., who is director of the Center for Neuroscience at Dartmouth and a member of the Dana Alliance for Brain Initiatives.

The consortium studies will involve children and adults of different ages and a variety of techniques, including imaging technologies, to investigate the neural and cognitive effects of arts learning. Consortium scientists will meet twice a year to exchange information in person, but will keep in touch

continuously via a new private Web site developed by Dana.

Arts Education

Four years into its arts education initiative, Dana, in 2004, kept its focus on supporting innovative professional development programs leading to improved teaching of the performing arts in K-12 classrooms in the public schools. The Foundation's specific interest is the training of in-school arts specialists and professional artists in residencies in the public schools

Dana's work since 2001 has alerted professionals in arts education that artists who want to teach in the public schools need a defined career track, supported by strong professional development programs, and Dana grants have enabled organizations to mount arts education programs that can serve as models. Grants in this program are limited to projects that originate within a 50-mile radius of New York City, Los Angeles, or the District of Columbia.

This year, 19 grants, including 10 renewals, and several related publications, furthered Dana's role in arts education. Many proposals in 2004 were requests from former grantees to expand their previously funded models of professional development to include more advanced curricula for artists-educators. The Foundation gave priority to proposals with potential for disseminating and sharing resources. Though focused in a specific area of arts education, the Foundation's grants include a wide range of

projects, many of which have broad outreach, as is evident from a few examples.

With Dana funding, the Institute for Continuing Conductor Education (ICCE) created several unique models of curriculum for teachers who lead school music ensembles. For example, intensive workshops in two or five day formats and classes extend through an entire semester and focus on student-centered learning. The conductors are taught how to help young musicians take responsibility for their own music making. These models have been presented in New York State and other locales nationally. The success of that work led to an invitation to ICCE to create a comprehensive Professional Development program for all New York City music teachers.

Dana support to Irondale Productions enables the New York theater company to document its popular training, which emphasizes creative teaching methods, for theater artists and classroom teachers. The company will produce a series of video tapes and a manual that will facilitate dissemination of Irondale's model nationwide.

The Alvin Ailey Dance Foundation's arts education program traditionally serves an exceptionally diverse population, including people of all races, socio-economic backgrounds, ages, physical abilities, and languages. A Dana Foundation grant will support the implementation of training workshops that address the professional development of the dance artists who conduct Ailey's arts-in-education residencies in New York City and across the country,

with a particular focus on the "Revelations: An Interdisciplinary Approach" program. Created in 1999, it is an innovative, curriculum-based initiative that enables teachers and students to examine Alvin Ailey's signature work, *Revelations*, through social, cultural, historical, and aesthetic contexts, connecting the work to classroom curricula in language arts and social studies.

Funding to the Los Angeles County Arts Commission supports an intensive training program for artists and arts organizations that provide the schools with a range of arts disciplines from music to dance to film, theater, and the visual arts. This is a pivotal component of L.A.'s "Blueprint," a ten year plan that will provide for county-wide sequential K-12 arts education.

Also in California, the UCLA Fowler Museum, with Dana support, is piloting a curriculum for teaching artists based on the arts of Carnival. This unusual approach to multidisciplinary training, centered on a specific worldwide cultural event, is providing a distinctive vehicle for learning about different cultures through their arts.

In Washington, DC, the Foundation continued its support of Classics in the Classroom, a teacher-learning program designed to provide educators methods to integrate theater into the academic curriculum. It provides pre-K-12 grade level appropriate workshops for teachers in DC public and charter schools.

Through the partnership of the Association of Performing Arts Presenters,

In addition to making arts education grants, the Foundation supports dissemination of ideas and resources in this field and seeks to make known model practices.

the Kennedy Center, and the Kentucky Center for the Performing Arts, Dana support is creating a regional center for artist training in a state facing the problems of providing arts education in rural areas. Such urban-rural partnership is one model Dana is considering as it moves to extend current grants to include a rural initiative in 2006.

To further coordinate the fields of arts residencies and artist training, the Foundation hosted the first conference for its arts education grantees. Representatives from 28 organizations gathered in New York City for a day-long meeting that followed the Open Space format, which enables participants to identify specific concerns at the beginning of the meeting, which then become the agenda for the gathering. Participants were able to select from nine sessions at which they could discuss issues ranging from curriculum development to intellectual property. In 2005, a series of three regional meetings will follow this initial gathering.

The 2005 round of grant-making began with an August 31, 2004, deadline for letters

of intent, which became the basis for the Foundation's requesting full applications from 35 organizations. Awards will be made based on announced guidelines, as well as concern for diversity, compensation of artists who teach, suitability for young people, and provision for mentors and assessment.

Arts Education Events and Publications

In addition to making arts education grants, the Foundation supports dissemination of ideas and resources in this field and seeks to make known model practices. Dana's own arts education publications are *Planning an Arts Centered School*, a handbook designed to guide organizations in school planning; *Acts of Achievement*, which discusses the essential elements of successful arts residencies and provides a broad range of performing arts center model programs; and *Arts Education in the News*, a quarterly newspaper that reprints articles about issues in arts education. All are available free. In 2004, profiles of the artist-training curriculum of each Dana grantee were added to the arts education resources available at www.dana.org.

Dana's interest in training artists for work in schools expanded nationally through several events in 2004. Most notably, the Foundation supported arts education components of the National Performing Arts Convention in Pittsburgh in June, 2004. This convention, with more than 5,000 attendees, was the first time that more than two dozen service organizations coordinated their annual

meetings to take place at the same time, in the same location, so participants could benefit from joint gatherings and workshops based on common concerns. Dana supported discussion on the leading topics in arts education, and some 2,000 copies of *Acts of Achievement* were distributed in the individual-organization meetings at the convention.

Throughout the year, Dana staff attended and led workshops, served as moderators and panelists, and distributed Dana publications at arts education gatherings, including conferences convened by ArtsBridge, the Arts Education Partnership, Bushnell Auditorium in Hartford, the National Arts Learning Coalition, the Georgia Association for Physical Health Education, Recreation and Dance, Crossing Paths, Face to Face, the William Inge Festival's Arts Education Day, and the aDvANCE Project.

The Artsbridge national conference in Salt Lake City in March featured Dana's principal arts consultant, Janet Eilber, who spoke on the Foundation's arts initiatives and trends in higher education. Representatives from 20 campuses across the country attended and received Dana's arts education publications.

The Inge Festival featured, for the first time, an arts education day supported by Dana. The event focused on rural arts education models, with Eilber and Dana vice president Barbara Rich discussing arts education resources and leading two panels.

The Bushnell Auditorium, a regional performing arts center in Hartford, Connecticut,

held a national arts education meeting in October. The program featured the Dana Press book *Acts of Achievement* and the recognition of Bushnell as one of the case studies in the publication.

The Foundation was also involved with and supported the Association of Performing Arts Presenters' annual conference and the Empire State Partnership's Summer Seminar for Educators. The conference focused on New York State partnerships between schools and teaching artists.

Ms. Eilber participated in the American Assembly, a national institution affiliated with Columbia University, which focused on "Creative Campus: The Training, Sustaining, and Presenting of the Performing Arts in American Higher Education."

Internationally, the Foundation supported "Dance and the Brain," a symposium held at the Ballett-Frankfurt in Germany under the supervision of choreographer Ivar Hagendoorn, based in The Hague.

K-12 Education

Dana's established commitment to improving K-12 education is implemented through grant-supported activities at the Charles A. Dana Center for Educational Innovation at the University of Texas in Austin, directed by Philip Uri Treisman, Ph.D. Through grant support in 2004, the Center is continuing and expanding efforts to improve teaching in mathematics, science, and reading in public schools in Texas and nationally. ■

SUMMARY OF PROGRAM GRANT APPROPRIATIONS IN 2004

Arts and Cognition Consortium

Dartmouth College (Coordinator)—Hanover, NH
Harvard University—Cambridge, MA
Stanford University—Palo Alto, CA
University of California at Berkeley—Berkeley, CA
University of Michigan—Ann Arbor, MI
University of Oregon—Eugene, OR

Arts Education

18th Street Arts Complex—Santa Monica, CA
Alvin Ailey Dance Foundation—New York, NY
American Place Theatre—New York, NY
Association of Performing Arts Presenters—
Washington, DC
Ballett Frankfurt—Frankfurt, Germany
Choral Arts Society of Washington—Washington, DC
Community Word Project—New York, NY
Irondale Ensemble Project—Brooklyn, NY
John F. Kennedy Center for the Performing Arts—
Washington, DC
Los Angeles County Arts Commission—
Los Angeles, CA
Metropolitan Opera Guild—New York, NY
Midori & Friends—New York, NY
Peabody Institute—Baltimore, MD
Performing Arts Center of Los Angeles—
Los Angeles, CA
Shakespeare Theatre—Washington, DC
State University of New York at Buffalo—Buffalo, NY
University of California, Los Angeles—
Los Angeles, CA
Washington Performing Arts Society—Washington, DC
Wolf Trap Foundation—Vienna, VA
Young Audiences—New York, NY

Brain and Immuno-imaging

Academy of Neuroscience for Architecture—
San Diego, CA
Albert Einstein College of Medicine—New York, NY
Baylor College of Medicine—Houston, TX
Children's Research Institute—Washington, DC
Columbia University College of Physicians & Surgeons—
New York, NY
Dana-Farber Cancer Institute—Boston, MA
Hadassah Hebrew University—Jerusalem, Israel
Harvard Medical School—Cambridge, MA
Johns Hopkins University—Baltimore, MD
Kennedy Krieger Institute—Baltimore, MD
Manic Depressive Illness Foundation—Washington, DC
Massachusetts General Hospital—Boston, MA
Princeton University—Princeton, NJ
Uniformed Services University of the Health
Sciences—Bethesda, MD
United Cerebral Palsy Research & Educational
Foundation—Washington, DC
University of Pennsylvania—Philadelphia, PA
University of Pittsburgh—Pittsburgh, PA
University of Rochester—Rochester, NY
University of Washington School of Medicine—
Seattle, WA
University of Wisconsin—Madison, WI
Yale University School of Medicine—New Haven, CT

Clinical Neuroscience Research

National Hospital for Neurology & Neurosurgery—
London, England
Consortium (Alzheimer's Diagnosis):
University of Pittsburgh—Pittsburgh, PA
University of Michigan—Ann Arbor, MI
Washington University—St. Louis, MO

Human Immunology

American Association of Immunologists—
Bethesda, MD
Benaroya Research Institute (Consortium: Regulatory
Defect in Autoimmunity)—Seattle, WA
Emory University School of Medicine—Atlanta, GA
Irvington Institute (Dana-Irvington Fellows Program)—
New York, NY
Memorial Sloan-Kettering Cancer Center—
New York, NY
New York Academy of Sciences—New York, NY
University of Alabama School of Medicine—
Birmingham, AL
University of Cambridge—Cambridge, England
University of Miami School of Medicine—Miami, FL
Consortium (Pre-Malignancy Detection):
Rockefeller University—New York, NY
University of Pittsburgh—Pittsburgh, PA
Consortium (Genetics of Immunodeficiency Disease):
Baylor College of Medicine—Houston, TX
Stanford University—Palo Alto, CA

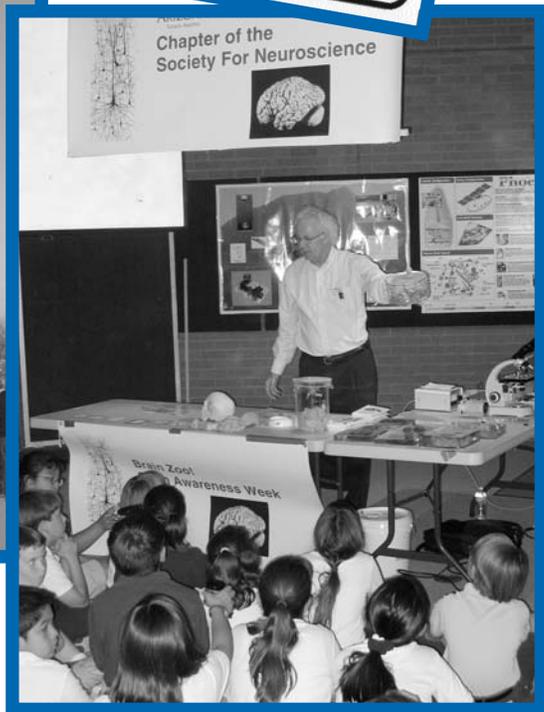
Neuroimmunology

Cleveland Clinic Foundation—Cleveland, OH
Harvard Medical School—Cambridge, MA
Johns Hopkins University—Baltimore, MD
New York Academy of Sciences—New York, NY
Scripps Research Institute—La Jolla, CA
Yale University School of Medicine—New Haven, CT

DANA ALLIANCE: EDUCATING STUDENTS TO SENIORS ON BRAIN SCIENCE'S BENEFITS



Activities during international Brain Awareness Week 2004 entertained and educated children and adults.



The enthusiasm and commitment of more than 235 member scientists, including 10 Nobel laureates, help to make the Dana Alliance for Brain Initiatives a leader in raising public awareness of the progress and promise of brain research.

Public Programming

The Dana Alliance's public programming offers programs, events, and publications that communicate the excitement and importance of neuroscience, many produced in partnership with a diversity of organizations.

Brain Awareness Week 2004

Beginning March 12, the ninth annual Brain Awareness Week featured innovative, creative, and educational events that gave audiences a window on the advances in brain research and how they will change our lives. More than 1,730 Brain Awareness Week partner organizations in 57 countries participated in the campaign, supported by the coordinating role of the Dana Alliance and 150,000 copies of Dana Alliance and Dana Press publications.

The Dana Alliance organized Brain Awareness Week events including the New York City Regional Brain Bee and National Capital Area Brain Bee. The Brain Bee competitions, open to high-school students in the United States, Canada, and abroad, are popular with both students and teachers. Students compete for cash and other prizes,

with regional winners going on to compete in the international championships held each year during Brain Awareness Week.

Planning began in 2004 for Brain Awareness Week's tenth anniversary celebration in March 2005. Its slogan will be "Brain Awareness Week: the Next Decade."

Dana Alliance and AARP's Educator Community

Baby boomers, now the largest single segment of Americans, are beginning to move into their older years, when many brain disorders become more prevalent. To provide this important group with more information about brain health and brain disorders, the Dana Alliance joined with AARP's educator community, NRTA, which is dedicated to enhancing the quality of life through continued learning as we age. To appeal to this generation's desire to maintain a healthy lifestyle, the Dana Alliance and NRTA presented forums on brain health and disorders, complete with companion booklets, and disseminated information on the Internet on the theme "Staying Sharp." Attendance at forums ranged from several hundred to more than 2,000. Alliance member scientists spoke at the forums and reviewed the companion booklets for scientific accuracy. "Staying Sharp" booklets are now available on learning throughout life, depression, memory loss and aging, chronic health issues, and quality of life. They can be downloaded from the Brain Resources for Seniors section at www.dana.org.

Radio Broadcasts

The year 2004 marked the tenth anniversary of the *Gray Matters* public radio series, which to date has aired 23 one-hour specials nationwide. During the decade, 50 Dana Alliance scientists have been interviewed or consulted on various episodes; many have participated in the programs. Two shows added to the series in 2004 were *Mapping the Brain*, which explored new brain-imaging research, and *The Body Clock*, developed from a talk by a European Dana Alliance member that discussed the brain structures regulating body clocks.

Neuroeducation

Neuroeducation is a Dana Alliance and Dana Foundation initiative to augment the neuroscience curriculum in schools. The goal is to offer a solid base of knowledge of the brain and brain research to students and to encourage early interest in neuroscience, fostering the next generation of neuroscientists.

In 2004, the Dana Alliance and our consultant Joseph Perpich, M.D., J.D., began creating neuroscience course materials for high school students. These will feature Dana Press and Alliance publications and other materials on the brain, organized into a resource for a seminar-style course for advanced placement biology students. The resource addresses five major brain-related topics—addiction, Parkinson's disease, depression, brain tumors, and brain and spinal cord injuries—arranged in modules for use during the school day or in

after-school programs. The flexible package can be presented on DVD or as a Web-based program, and instructors can use a module for an entire course or extract sections to use with other material.

The project team includes members of the Dana Alliance, education and technical advisors, and a Web site designer/information architect. Students at a Washington, DC, high school gave the package a trial run so that developers could evaluate the design and content. Based on reviews by the project's advisors, Dana will refine and enhance the modules in 2005.

The Dana Alliance continued to collaborate with other partners in education. Young people learned about the brain in enjoyable, engaging activities during Brain Awareness Week; the National Institutes of Health Office of Science Education offered workshops for teachers on brain-related topics; and teenagers learned about the brain and brain research at museum training programs with the Association of Science and Technology Centers.

The Dana Foundation made a grant to the New York Hall of Science to develop the Dana Educator Institute as a setting in which teachers, designated Dana Fellows, can create curricula to introduce brain research into high school classrooms. The Fellows used Dana Alliance and Dana Press publications and materials to shape lesson plans on learning and memory. Fellows had an opportunity to work with museum education trainers, attend a lecture by an Alliance scientist, and visit a neuroscience laboratory.

The 92nd Street Y in New York City invited the Dana Alliance to join in its Science Enrichment Program. The Alliance participated in the Program's Science Career Institute, where high school students learned about science careers and summer internships and spoke with professionals from areas such as ecology, neuroscience, and astronomy.

Many education programs in which the Dana Alliance is not a formal participant or partner use Dana publications. *It's Mind-boggling!*, originally designed for children, is the most popular Alliance booklet for people of all ages. It features introductory information on the brain, brain teasers, puzzles, and brain facts and is now available in English, Spanish, French, German, Italian, and Swedish. Also available in 2004 was the third edition of *Q&A: Answering Your Questions About Brain Research*.

Neuroethics

The Alliance continues to foster discussion, both within the scientific community and among the public, of the ethical issues associated with brain research. The Alliance has produced a radio program, sponsored lectures, and hosted workshops addressing ethical challenges facing researchers. At a European Dana Alliance workshop in 2004, neuroscientists and science communicators gave playwrights ideas for a play for high school students that would tackle a neuroethical topic. The play about memory that

resulted was called "Mind the Gap." Other efforts include symposia on topics such as brain death, stem cell research, and animal experiments; advising organizations presenting their own programs; and recommending expert speakers.

In November 2004, the Alliance hosted and participated in a symposium at the Dana Center in Washington, DC, organized by the Phoebe R. Berman Bioethics Institute in conjunction with the Institute of Brain Science at Johns Hopkins University, on "Personal Identity: Challenges for Ethics and Neuroscience." The Alliance also helped to plan a 2005 symposium at the Library of Congress, organized by Columbia University, to explore the ethical, legal, and regulatory issues arising from brain imaging, brain stimulation, and pharmacology.

European Dana Alliance for the Brain

The British Neuroscience Association honored the European Dana Alliance with its 2004 Award for Public Service. The award acknowledges the Alliance's successful efforts to communicate the progress and promise of brain research in the UK and Europe. During the year, the European Dana Alliance presented public events, produced publications on the brain in five languages, and maintained a Web site with information in four languages, www.edab.net.

The Alliance, with members from 28 countries, including five Nobel laureates,

organized the eighth annual Brain Awareness Week campaign outside the Americas. More than 400 events were held in 31 European, African, Middle Eastern, and Australasian countries. Events, including public forums, radio and television broadcasts, interactive exhibitions, and in-school visits by neuroscientists, reached tens of thousands of people.

In July, the European Alliance participated in the Federation of European Neuroscience Societies conference held in Lisbon, Portugal. Alliance members presented a symposium on “The Public Awareness of Brain Research,” a Brain Awareness Week panel discussion and information session, and a lecture at the British Council, as well as holding press conferences for journalists.

The Alliance also presented the inaugural Maxwell Cowan Memorial Lecture, honoring the late vice chairman of both Dana Alliances. European Alliance member, Geoffrey Raisman, M.D., Ph.D., FRS, delivered a lecture to more than 600 scientists on “Plasticity in the Nervous System: A Sea of Change, and Why it is Taking so Long to Accept It” and spoke about Maxwell Cowan as his mentor.

The Dana Centre

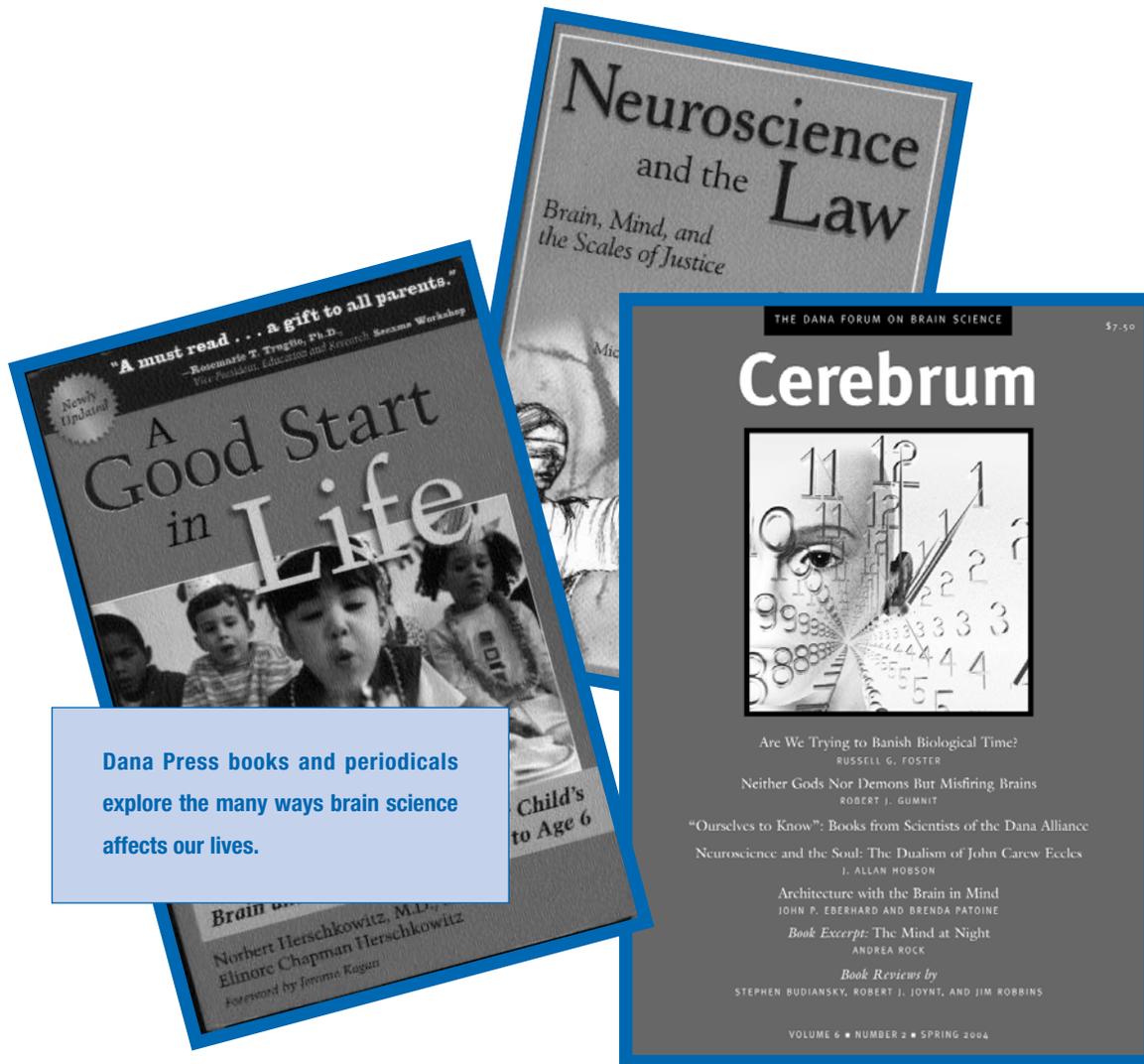
The Dana Centre in London, created with support from the Dana Foundation, the Wellcome Trust, the Wolfson Foundation, and the Garfield Weston Foundation, completed its first year of more than 100 public events. The European Dana Alliance, either

alone or in collaboration, presented 16 such events on brain science and research. It also joined with the British Association for the Advancement of Science and the Science Museum to present “Arts and the Mind,” “Science of Attraction,” and “Fear Factor: the Psychology of Fear and the Paranormal.” Various programs included music, dance, visual arts, and humor. Events attracted large audiences and multiple, simultaneous sessions were presented to accommodate everyone.

Centre communication resources include wired and wireless Internet connections, and, to reach broader audiences, video conferencing, Webcasts, and online questionnaires. Video conferences between the Dana Centre in London and the Dana Center in Washington, DC, are being planned for 2005.

The European Dana Alliance also collaborated with the Medical Research Council, the British Neuroscience Association, and Imperial College to present smaller, more intimate discussions on topics including drugs to treat depression, circadian rhythms, and surviving cancer. “Life after Cancer in a Multicultural Society” featured Dana Foundation Board member LaSalle D. Leffall, Jr., M.D. In many ways, the Dana Centre is pursuing its mission to increase public interest in science and earning a reputation as the place to go in London for lively scientific discussion. ■

**FROM BRAIN SCIENCE AND IMMUNOLOGY
TO ARTS EDUCATION, DANA PRESS PUBLICATIONS
REACH A WIDE AUDIENCE**



Dana Press books and periodicals explore the many ways brain science affects our lives.

Dana Press, the publishing division of the Foundation, produces periodicals and books for general readers as well as publications on behalf of the Dana Alliance for Brain Initiatives. The periodicals focus on news, trends, and debates in the Foundation's areas of interest: neuroscience, immunology, and arts education. The books (which include several sourcebooks for educators) explore aspects of special interest in these areas. Most of the periodicals and education books are available at no cost. The journal *Cerebrum: The Dana Forum on Brain Science* is sold by subscription, and books for general readers are distributed worldwide by the University of Chicago Press for sale through bookstores and online retailers. All Dana Press publications can be ordered from the Foundation Web site, www.dana.org.

Circulation of the Foundation's free periodicals—*BrainWork*, *The Brain in the News*, *Immunology in the News*, and *Arts Education in the News*—reached a combined readership of 46,000 at the end of 2004, an increase of 9 percent over 2003.

The Dana book program provides readers with high quality information and concepts in accessible, non-technical language. It also has the goal of giving voice to serious ideas with public importance that might otherwise remain topics of discussion only within the scientific and scholarly specialties. The books invite readers to explore Dana's fields from many perspectives: self help, reference, popular science, literature,

and intellectual inquiry. Dana Press publishes three to five books each year. In 2004, three were published; the subjects were brain development in children, music and the brain, and neuroscience and the law.

Periodicals

Cerebrum: The Dana Forum on Brain Science

Dana's quarterly paid-subscription journal of ideas, *Cerebrum*, features articles, book reviews, and book excerpts for general readers and scientists interested in neuroscience research and its significance for fields such as medicine, philosophy, education, and the arts. *Cerebrum* authors are leading scientists, scholars, and science writers. The journal is popular with secondary and post-secondary educators.

In 2004, *Cerebrum* published articles on topics such as dementia and the right to vote, controversy over the causes of autism, challenges to our biological rhythms in a 24/7 society, and the search for the brain basis of consciousness. The fall issue focused entirely on neuroethics, with a debate and 10 articles by prominent thinkers in neuroscience, genetics, law, and bioethics.

BrainWork

The Foundation's flagship neuroscience publication, *BrainWork*, is now in its 15th year. This free, eight-page, full-color bimonthly newsletter for general readers offers news and feature articles on basic

and clinical research in neuroscience and neuroimmunology and its implications for human health and well-being. Readership grew to more than 28,000 in 2004.

The Brain in the News

Launched in 1994, *The Brain in the News* continues to be Dana's most requested free periodical, with readership nearing 24,000. This eight-page, tabloid-sized monthly was the first of Dana's "in the news"-style newspapers (now including *Immunology in the News* and *Arts Education in the News*). *The Brain in the News* reprints in their entirety articles about the brain and brain research from current newspapers and magazines in the United States and abroad.

Arts Education in the News

Arts Education in the News, which debuted in March 2003, is an eight-page, tabloid-sized quarterly reprinting the latest arts education stories from newspapers around the world, as well as more in-depth articles from arts and education journals. Arts education advocates and organizations continue to respond enthusiastically to the newspaper. Requests in 2004 brought the mailing list to about 9,000; the national arts organization, the Association of Performing Arts Presenters, distributes another 1,700 copies of each issue to its members.

Immunology in the News

Launched in 2001 and now with a circulation of 5,000, *Immunology in the News* is

published quarterly as an eight-page tabloid and includes articles from newspapers around the world on the emerging field of immunology. Each issue also includes a featured article from a research journal.

Publications for Schools and Professionals

The Dana Sourcebook of Brain Science: Resources for Secondary and Post-Secondary Teachers and Students (Third Edition)

Some 62,000 copies of the 164-page, soft-cover guide on brain science, first published in 1999, have gone to more than 6,400 schools in all 50 states and 29 foreign countries. Free to educators, the *Sourcebook* is notable for its concise language, illustrations of how the brain works, discussions of brain-related problems, and glossary of brain science terms. It also lists other resources, including recommended reading, and, in personal profiles, introduces students to the lives of two neuroscience professionals. The teacher's edition includes a half-hour video program, two one-hour audio tapes, and easy-to-use classroom experiments. A DVD for easier teacher preparation and enhanced classroom audio/visual presentations will be available in 2005.

Acts of Achievement: The Role of Performing Arts Centers in Education

Professionals continued to request *Acts of Achievement*, the first study of K-12 education programs offered by performing arts

centers nationwide. Published in 2003, the book showcases 74 centers, large and small, that partner with their local schools. It outlines the development of school residencies and offers checklists for arts organization coordinators, artists, teachers, and school coordinators planning to develop residencies.

Planning an Arts-Centered School: A Handbook

Requests continued for this resource, published in 2002, for elementary and secondary educators and performing arts professionals in education. The handbook presents the best practices in curriculum development, governance, funding, assessment, and community participation from a dozen arts-centered schools.

Dana Alliance for Brain Initiatives Publications

Progress Report on Brain Research

Published annually since 1995, the *Progress Report on Brain Research* is the signature publication of the Dana Alliance for Brain Initiatives. Released in March of each year in conjunction with Brain Awareness Week, each edition reviews the most significant findings reported during the prior year and includes a featured essay on research of special interest. The *Report's* 10 chapters cover research in neurological, psychiatric, and neuroimmunological disorders and studies in neurogenesis, stem cells, and

neuroethics. For *Update 2004*, the *Report* was redesigned to be a convenient 6 x 9-inch, 116-page soft cover book. The introduction was written by Nobel laureate Eric Kandel, M.D., vice-chairman of the Alliance. The featured essay, coauthored by Guy McKhann, M.D., of Johns Hopkins University and Carolyn Asbury, Ph.D., both science advisors to Dana, reviewed the gathering momentum in neuroimmunology research.

Brain Connections: Your Source Guide to Information on Brain Diseases and Disorders (Sixth Edition, 2003-2006)

A convenient 50-page booklet, *Brain Connections* lists 278 organizations that provide information and services for patients and families affected by brain-related disorders and problems. Since the first edition was released in 1996, 570,000 copies of *Brain Connections* have been distributed.

Dana Alliance Member News

The bi-monthly, eight-page *Dana Alliance Member News* keeps Dana Alliance members informed of the organization's activities and outreach by individual members. A regular feature, Member Views, acquaints members with their colleagues' opinions, research, and efforts in support of the Alliance's mission.

Dana Press Books Published in 2004

A Well-Tempered Mind: Using Music to Help Children Listen and Learn

Author Peter Perret, conductor of the Winston-Salem Symphony for more than 25 years, describes his innovative music education program for first through third graders and how it improved academic achievement. The foreword was written by Maya Angelou, Ph.D.

A Good Start in Life: Understanding Your Child's Brain and Behavior from Birth to Age 6

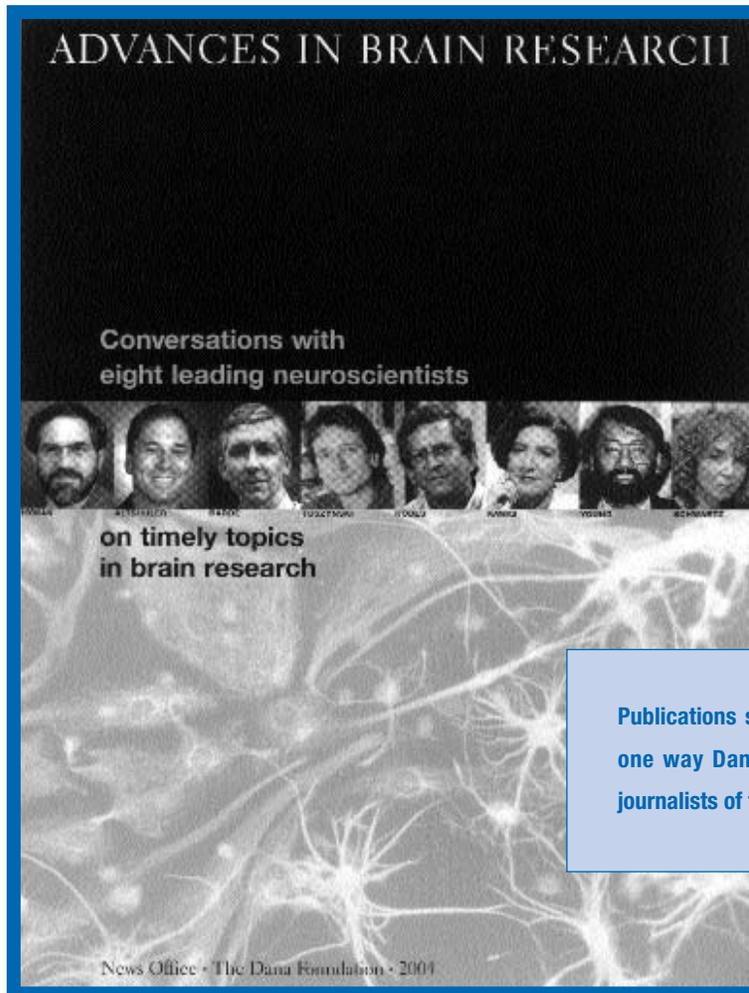
In this new paperback edition of their 2002 Dana Press book, Norbert Herschkowitz, M.D., and Elinore Chapman Herschkowitz added the latest information and new material on children's social and cognitive development, offering parents and educators a rich resource on how children learn to live in family and society.

The Dana Foundation Series on Neuroethics

With the publication in 2004 of its third book on the subject of neuroethics, Dana Press established the Dana Foundation Series on Neuroethics to highlight this significant new field, which is probing the ethical issues arising from discoveries in brain research. Previously published books in the series, both released in 2003, are *Neuroethics: Mapping the Field*, the full proceedings of the landmark first interdisciplinary national conference on neuroethics, and *Beyond Therapy: Biotechnology and the Pursuit of Happiness—A Report of the President's*

Council on Bioethics, exploring the ethics of using biotechnology not only to treat illness, but also to perfect ourselves. The 2004 title, *Neuroscience and the Law: Brain, Mind, and the Scales of Justice*, is a concise, jargon-free work that examines the influence of neuroscience on criminal and civil law and whether future advances may affect the United States justice system. Based on a two-day conference cosponsored by the American Association for the Advancement of Science and the Dana Foundation, the book summarizes the workshop discussions and includes in full the four scholarly papers that anchored the meeting. ■

**NEWS AND INTERNET OFFICE:
FACILITATING MULTIMEDIA COMMUNICATION
ABOUT DANA PROGRAMS AND PUBLICATIONS**



Publications such as *Advances in Brain Science* are one way Dana's News and Internet Office informs journalists of the latest in brain science.

The News and Internet Office is where journalists and the public can turn for information on brain research, brain disorders, and a host of other brain-related topics. In 2004, the Office released several new or updated publications, organized a first meeting for the Dana Arts and Cognition Consortium, and redesigned the Dana Web site to reflect the Foundation's main interests in brain research, immunology, and arts education.

News Office

In 2004, the News Office published *Advances in Brain Research*, an annual publication distributed to print and broadcast journalists nationwide. *Advances* features interviews on timely topics in neuroscience with experts in the field; the 2004 edition investigated a new form of genetic mapping, neurotrophins, aging, and spinal cord injury. Dana Alliance members Yves A. Barde, M.D., Richard Hodes, M.D., Steven E. Hyman, M.D., Claudia Kawas, M.D., and Wise Young, M.D., Ph.D., were among the scientists who contributed to the publication.

During Brain Awareness Week in March, the News Office distributed two briefing papers. One paper, "Exercise and the Brain," examined cognitive effects and brain changes related to exercise. Scientists say exercised-induced changes occur at several levels in the brain, including the molecular, cellular, synaptic, and circuit. The paper described the work of Dana Alliance members Carl Cotman,

Ph.D., Fred Gage, Ph.D., and William Greenough, Ph.D., among others. The second paper, "Pain and the Brain," examined advances in the neurobiology of pain and new treatment possibilities. By looking at the processes by which persistent pain changes the nervous system at various levels, scientists can begin to identify the specific molecules involved. Each of these molecules represents a potential therapeutic target. Among scientists interviewed for this paper was Dana Alliance member Allan I. Basbaum, Ph.D.

The News Office assisted journalists reporting on Brain Awareness Week 2004. It distributed to journalists an updated Dana Alliance *Resource Directory*. The *Directory* provides working reporters with contact information, fields of specialization, publications, and awards for Dana Alliance members. The print edition is accompanied by an interactive, searchable CD, which was updated for 2004. Users need only run the CD on their computers and select the upgrade button to download all of the changes. The News Office, working with Internet staff, will provide upgrades electronically on a semi-annual basis and discontinue the print publication. News and Internet staff members are also working on an *EDAB Resource Directory* to be available in 2005 on an interactive CD.

In the fall of 2004, News Office staff and members of ArtsConnection, a New York based organization providing programming in the arts to public schools, planned the publication of a book focusing on research that will be presented at an ArtsConnections national symposium in March, 2005.

Internet

The Dana Web site, www.dana.org, was redesigned in 2004 to cover the Foundation's three major interests: brain research, immunology, and arts education. The main home page now provides easy access to individual sections, each with its own home page and guides to resources, publications, grants, and general information. For instance, the Brain Center features the *Brain Web and Resource Information*, the Brain Awareness Week section, access to all of Dana's books and publications, *Brainy Kids Online*, and *Brain Resources for Seniors*. For the first time since its inception, the Web site reached one million users in a single month in March 2004.

The Brain Awareness Week and Dana Press sections were upgraded with new graphics and made more user friendly, and a major mail campaign was designed to make organizations working with older adults and journalists aware of the new *Brain Resources for Seniors* section. The grants section of the Web site was also upgraded to include lay summaries and biographies of scientists receiving neuroimmunology grants. In 2005, a similar design will be created for human immunology grantees. Improvements were also made to the application process for arts education grants. Letters of intent and grant applications submitted online through the Web site can now be formatted by grantees in a more formal manner using new editor software compatible with both PCs and Macs.

The Internet Office also designed a private Web site called an Extranet where the nine scientists in the Dana Arts and Cognition Consortium can post documents, upload pictures or graphics of their work, speak in a closed forum, note tasks, and keep each other apprised of work underway.

In 2004, video conferencing equipment and a plasma screen monitor were installed in the David Mahoney Forum Room at the Dana Center in Washington, DC. Video conferencing equipment will be added to the New York Dana office, allowing video conferences between the two Dana offices, as well as with the Dana Centre in London, and other major institutions in the United States and Europe. ■

AUDITORS' OPINION AND FINANCIAL STATEMENTS

INDEPENDENT AUDITORS' REPORT

To the Board of Directors The Charles A. Dana Foundation, Incorporated

We have audited the accompanying combined statement of financial position of The Charles A. Dana Foundation, Incorporated, and Affiliates as of December 31, 2004, and the related combined statements of activities and cash flows for the year then ended. These combined financial statements are the responsibility of the Foundation's management. Our responsibility is to express an opinion on these combined financial statements based on our audit. The financial statements of The Charles A. Dana Foundation, Incorporated, and the Dana Alliance for Brain Initiatives, Inc. for the year ended December 31, 2003, were audited by other auditors whose reports dated February 24, 2004, and February 25, 2004, respectively, expressed unqualified opinions on those statements. The accompanying 2003 financial statements were combined by us from the respective financial statements mentioned above and are presented for comparative purposes only.

We conducted our audit in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the combined financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the combined financial

statements. An audit also includes assessing the accounting principles used and significant estimates made by management, as well as evaluating the overall combined financial statement presentation. We believe that our audit provides a reasonable basis for our opinion.

In our opinion, the combined financial statements referred to above present fairly, in all material respects, the financial position of The Charles A. Dana Foundation, Incorporated and Affiliates as of December 31, 2004, and changes in their net assets and cash flows for the year then ended in conformity with accounting principles generally accepted in the United States of America.

O'Connor, Davies, Munns & Dobbins, llp
New York, New York
March 14, 2005

COMBINED STATEMENTS OF FINANCIAL POSITION

December 31, 2004 and 2003

	2004	2003
Assets:		
Cash and cash equivalents	\$ 2,976,932	\$ 7,671,221
Accounts and interest receivable	780,600	832,670
Investments	309,120,167	290,046,277
Prepaid rent	1,293,639	—
Leasehold improvements, net of accumulated amortization, \$738,843 and \$437,659 for 2004 and 2003	2,397,138	2,698,322
Total Assets	<u>\$ 316,568,476</u>	<u>\$ 301,248,490</u>
Liabilities and Net Assets:		
Liabilities		
Accounts payable and accrued expenses	\$ 582,516	\$ 1,833,122
Unpaid grant awards	26,108,351	21,682,574
Federal excise tax payable	10,237	10,237
Deferred Federal excise tax	1,123,194	593,073
Other deferred liabilities	1,148,259	1,094,966
Postretirement benefit obligation	1,592,154	—
Total Liabilities	<u>\$ 30,564,711</u>	<u>\$ 25,213,972</u>
Net assets		
Unrestricted net assets	\$ 286,003,765	\$ 276,034,518
Total Liabilities and Net Assets	<u>\$ 316,568,476</u>	<u>\$ 301,248,490</u>

See notes to combined financial statements.

COMBINED STATEMENTS OF ACTIVITIES

For the years ended December 31, 2004 and 2003

	2004	2003
Investment income		
Dividends and interest	\$ 5,481,696	\$ 4,838,551
Net realized gain from limited partnerships	6,283,142	14,878,884
Net realized gain from sales and redemptions of securities	9,433,346	2,476,776
	<u>21,198,184</u>	<u>22,194,211</u>
Less: Investment expenses	1,066,091	983,628
Net realized investment income	20,132,093	21,210,583
Other income	533,170	121,600
	<u>20,665,263</u>	<u>21,332,183</u>
Expenses		
Grant awards	14,944,338	18,445,201
Direct charitable activities	8,307,836	7,861,148
General administration	2,276,336	2,023,146
Provision for Federal excise tax	175,000	160,000
	<u>25,703,510</u>	<u>28,489,495</u>
Excess of expenses over net realized investment income	(5,038,247)	(7,157,312)
Unrealized appreciation of investments, net of provision for deferred Federal excise tax, \$530,121 and \$454,517 for 2004 and 2003	16,382,919	27,315,129
	<u>11,344,672</u>	<u>20,157,817</u>
Change in unrestricted net assets before cumulative effect of accounting change	11,344,672	20,157,817
Cumulative effect of adoption of postretirement benefit plan	(1,375,425)	—
	<u>9,969,247</u>	<u>20,157,817</u>
Change in unrestricted net assets	9,969,247	20,157,817
Unrestricted net assets, beginning of year	276,034,518	255,876,701
Unrestricted net assets, end of year	<u>\$ 286,003,765</u>	<u>\$ 276,034,518</u>

See notes to combined financial statements.

COMBINED STATEMENTS OF CASH FLOWS

For the years ended December 31, 2004 and 2003

	2004	2003
Cash flows from operating activities		
Change in unrestricted net assets	\$ 9,969,247	\$ 20,157,817
Adjustments to reconcile change in unrestricted net assets to net cash (used in) by operating activities		
Amortization	301,184	382,394
Realized (gains) from investments	(15,716,488)	(17,477,260)
Unrealized (gains) from investments	(16,913,040)	(27,769,646)
Deferred Federal excise tax	530,121	454,517
Postretirement benefit obligation	1,592,154	—
Net changes in operating assets and liabilities		
Accounts receivable	52,070	998,818
Prepaid rent	(1,293,639)	—
Accounts payable and accrued liabilities	(1,250,606)	10,213,693
Unpaid grant awards	4,425,777	7,426,388
Federal excise tax payable	—	195,160
Other deferred liabilities	53,293	65,660
Net cash (used in) operating activities	<u>(18,249,927)</u>	<u>(5,352,459)</u>
Cash flows from investing activities		
Cost of leasehold improvements	—	(164,998)
Purchase of investments	(170,126,938)	(212,804,345)
Proceeds from sales of investments	183,682,576	200,400,222
Net cash provided (used) by investing activities	<u>13,555,638</u>	<u>(12,569,121)</u>
Net (decrease) in cash	<u>(4,694,289)</u>	<u>(17,921,580)</u>
Cash and cash equivalents, beginning of year	7,671,221	25,592,801
Cash and cash equivalents, end of year	<u>\$ 2,976,932</u>	<u>\$ 7,671,221</u>

See notes to combined financial statements.

NOTES TO COMBINED FINANCIAL STATEMENTS

December 31, 2004 and 2003

NOTE 1 - ORGANIZATIONS

The Charles A. Dana Foundation, Incorporated (the "Foundation") is a private philanthropic organization chartered in 1950 with particular interests in neuroscience, immunology, and arts education. The Foundation is a nonprofit organization exempt from Federal income taxes under the provisions of Section 501(c)(3) of the Internal Revenue Code (the Code), and is a private foundation as defined in Section 509(a) of the Code.

The Dana Alliance for Brain Initiatives, Inc., (the "Alliance") is a private philanthropic organization chartered in 1993. The principal purposes of the Alliance are to educate and inform the general public and interested professionals regarding advancement in research on the human brain, development of new effective treatments for brain diseases, and the critical need for such research and development to be vigorously pursued and supported. The Alliance is a nonprofit organization exempt from Federal income taxes under the provisions of Section 501(c)(3) of the Internal Revenue Code (the Code), and is a private foundation as defined in Section 509(a) of the Code. In 1998, the Dana Alliance Limited (DAL) was organized in the United Kingdom, as a wholly-owned subsidiary of the Alliance, with the purpose of increasing public awareness in Europe of the latest developments in neuroscience. The accompanying financial statements include the consolidation of the Alliance and DAL.

The accompanying combined financial statements include the accounts of all the above organizations on a combined basis. These combined entities share the same mission and are referred to collectively as the "Foundation," unless otherwise specifically referred to. All inter-company accounts and transactions have been eliminated when combined.

NOTES TO COMBINED FINANCIAL STATEMENTS *(continued)*

December 31, 2004 and 2003

NOTE 2 - SUMMARY OF SIGNIFICANT ACCOUNTING POLICIES

Basis of Accounting

The accompanying combined financial statements are prepared on the accrual basis. All of the activity and net assets of the Foundation are unrestricted.

Use of Estimates

The preparation of combined financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect certain reported amounts of assets and liabilities and disclosures of contingent liabilities at the date of the combined financial statements and the reported amounts of revenues and expenses during the reporting period. Accordingly, actual results could differ from those estimates.

Cash Equivalents

Cash equivalents represent short-term investments with original maturities of three months or less.

Investments

All investments in debt securities and publicly traded equities are at fair value. Investments in securities traded on a national securities exchange are valued at the last reported closing price on the last business day of the year; securities traded in the over-the-counter market and listed securities for which no sales are reported on that day are

valued at bid prices. Investments in limited partnerships are carried at fair value as determined by the general partner. Purchases and sales of investments are recorded on a trade-date basis. Realized gains and losses on the sale of investments are based on the specific identification basis.

Grant Expense

The Foundation recognizes grant expense upon award of the grant.

Fixed Assets and Leasehold Improvements

Leasehold improvements are amortized over the terms of the office leases. Furniture, fixtures and equipment purchased during the course of normal business activities are charged to operations when purchased.

Reclassifications

Certain items in the 2003 combined financial statements have been reclassified for comparative purposes only.

NOTES TO COMBINED FINANCIAL STATEMENTS *(continued)*

December 31, 2004 and 2003

NOTE 3 - INVESTMENTS

The investment portfolio is summarized as follows:

	2004		2003	
	COST	FAIR VALUE	COST	FAIR VALUE
Fixed Income Securities:				
Government	\$ 37,247,602	\$ 37,516,521	\$ 37,816,888	\$ 37,935,464
Corporate	<u>31,077,754</u>	<u>31,050,829</u>	<u>29,250,665</u>	<u>29,700,886</u>
	68,325,356	68,567,350	67,067,553	67,636,350
Common stock	19,875,005	29,349,115	20,677,054	29,477,726
Mutual funds	74,604,882	98,736,450	76,613,686	96,815,989
Limited partnerships	<u>90,155,548</u>	<u>112,467,252</u>	<u>86,441,648</u>	<u>96,116,212</u>
Total	\$ 252,960,791	\$ 309,120,167	\$ 250,799,941	\$ 290,046,277

NOTE 4 - TAXES

The Foundation is subject to a Federal excise tax of 2% of its net investment income. This tax is reduced to 1% if certain distribution requirements are met. For the years ended December 31, 2004 and 2003, the Foundation satisfied these requirements. In addition, the Foundation provides for deferred Federal excise tax at 2% on the net unrealized appreciation in the fair value of investments.

The Alliance is subject to a Federal excise tax of 2% on its net investment income.

NOTE 5 - RETIREMENT PLAN

Retirement benefits under a defined contribution plan are provided to full-time employees who have completed six months of continuous service. Employees are 100% vested after 18 months. The Foundation contributes 20% of an employee's wages to the plan, up to a maximum of \$200,000. Contributions are charged to expense when made. Retirement plan expense for the years ended December 31, 2004 and 2003 amounted to \$493,477 and \$435,236, respectively.

NOTES TO COMBINED FINANCIAL STATEMENTS *(continued)*

December 31, 2004 and 2003

NOTE 6 - POSTRETIREMENT BENEFITS OTHER THAN PENSIONS

The Foundation sponsors an unfunded plan to provide certain health care benefits for retirees. The Foundation adopted the provision of Statement of Financial Accounting Standards No. 106, Employers' Accounting for Postretirement Benefits Other than Pensions for the year ended December 31, 2004. The Foundation has chosen to immediately recognize the accumulated postretirement benefit obligation of \$1,375,425 as of January 1, 2004, the effective date that the Foundation adopted this standard.

The following table sets forth the financial information for the plan for 2004 and 2003:

	2004	2003
Benefit obligation at December 31	\$ 1,592,154	\$ 1,375,425
Benefit costs	\$ 229,080	\$ 167,622
Benefits paid	\$ 12,351	\$ 16,356
Weighted average discount rate as of December 31	6.25%	6.25%
Health care trend rate assumption	5.50%	5.50%

NOTES TO COMBINED FINANCIAL STATEMENTS *(continued)*

December 31, 2004 and 2003

NOTE 7 - COMMITMENTS

Leases

The Foundation leases office space in New York City and Washington, DC, under amended lease agreements. As of December 31, 2004, future minimum annual rental payments are as follows:

2005	\$ 1,513,618
2006	1,532,060
2007	1,552,973
2008	1,576,455
2009	1,596,757
2010 through August 31, 2013	<u>5,258,278</u>
	<u>\$ 13,030,141</u>

The lease agreements require additional payments to cover the escalation of maintenance costs and real estate taxes. Rental expense included in the statements of activities, amounted to \$1,445,718 in 2004 and \$1,535,231 in 2003.

DAL occupies office space in the United Kingdom. During 2004 the Alliance made one advance rent payment in the amount of \$1,419,847, covering the 15-year lease term which began in September 2003. Rental expense included in the statement of activities amounted to \$144,128 in 2004.

Investments

As of December 31, 2004, under the provisions of certain limited partnership agreements, the Foundation has unpaid commitments to contribute approximately \$16,600,000 in additional capital over the next 10 years.

GUIDELINES

GRANT GUIDELINES

The Dana Foundation, established in 1950 by the industrialist, philanthropist, and legislator Charles A. Dana, is a private philanthropic foundation with principal interests in science, health, and education. The Foundation's current areas of research emphasis are in neuroscience, immunology, and the effects of arts training on cognitive skills. Selected proposals have the potential to improve human health or functioning. Grants also support improvement in K-12 education, particularly in training professional artists to teach in the public schools. Specific grant-making programs in these areas are the basis for decisions on grant applications. No applications are considered apart from these grant programs. Additional information on current grant programs is available on our Web site, www.dana.org.

General Policies

The Foundation:

1. Supports programs in science, health, and education through specifically defined objectives in each field.
2. Requires grantee institutions, in many cases, to share the cost of a project or raise matching funds.
3. Makes no grants directly to individuals.
4. Does not support annual operating costs of organizations, deficit reduction, capital campaigns, or individual sabbaticals.
5. Does not schedule meetings with applicants, other than by specific invitation initiated by the Foundation.

Science and Health Grants

Through competitive applications, Dana supports research in neuroscience, immunology, and the effects of arts training on cognition.

Brain and Immuno-imaging. Investigators use anatomical, physiological, or cellular and molecular imaging techniques to pilot-test novel clinical hypotheses on the brain, immune cells, or their interactions. Requests for Proposals (RFPs) are sent twice yearly to deans of U.S. Medical Schools and other invited biomedical research institutions.

Human Immunology. Grants support clinical studies that measure human immune system functioning in health and disease, including the measurement of immune system responses to experimental therapeutic trials supported by other sources. Individual investigators are invited to submit proposals for consideration. Additionally, applications by consortia (collaborating investigators) are solicited through a call for proposals in *The Journal of Experimental Medicine*.

Human Immunology research training awards, co-funded by the Irvington Institute for Immunological Research, support Dana-Irvington Fellows to undertake mentored clinical studies. Fellowships are designed to interest promising new investigators in considering clinical immunology research careers.

Neuroimmunology. By invitation, collaborating neuroscientists and immunologists apply for grants to study interactions between the nervous and immune systems in health and disease. Both clinical and animal model studies are funded.

Clinical Neuroscience Research. By invitation, translational researchers apply for support to test promising therapies from animal model research in a small number of patients with devastating, currently untreatable, brain diseases. Also supported are studies to develop ethical guidelines for clinical brain research, and prognostic data based on treatment outcomes in patients with severe brain injuries or disorders.

Arts and Cognition. A consortium is currently funded to study the effects of training in the arts on cognitive skills. No additional applications are being accepted.

All other Science and Health Grants are made solely by invitation. For information on Science and Health grants, please contact:

Grants Office, The Dana Foundation
745 Fifth Avenue, Suite 900
New York, New York 10151
(212) 223-4040

arts specialists and must originate in New York City, Washington, DC, or Los Angeles, and their surrounding areas within a 50 mile radius. The application process currently takes place online. A Letter of Intent form and detailed arts education guidelines are available on the Foundation's Web site.

The Foundation has supported advances in education throughout its history. The Foundation's continuing interest in fostering innovations in K-12 education is maintained through grant support for the Dana Center for Education Innovation at the University of Texas in Austin. Other Foundation support for select education projects is internally generated or invited.

While the education grants program is designed to benefit schools and school systems throughout the country, Foundation grants ordinarily are not made directly to individual schools.

For information on Arts Education grants, please contact:

Arts Education Project Manager
The Dana Center
900 15th Street, N.W.
Washington, DC 20005
(202) 408-8800

Education Grants

The Foundation's current interest in arts education is focused primarily on professional development that fosters improved teaching of the performing arts in public schools. Proposed projects must emphasize innovative training curricula for artists and in-school

Publications Available

Dana Press, publisher for the Dana Foundation and the Dana Alliance for Brain Initiatives, produces periodicals, special publications, and books, chiefly in the field of health, particularly brain research. Most publications are available free of charge and may also be read on the Dana Web site. To order, send your written request to Dana Press, 900 15th Street, N.W., Washington, DC, 20005, or see the request form on www.dana.org.

Periodicals

Cerebrum: The Dana Forum on Brain Science

Paid subscription journal of ideas, with articles, debates, and reviews by top scientists and thinkers. Edited for readers who may or may not have a scientific background, but who are stimulated by the ways in which brain science is reshaping our world view. Request free sample issue. (Quarterly)

BrainWork: The Neuroscience Newsletter

Lay-oriented articles dealing with the brain, its powers, and its problems. Includes coverage of major conferences and scientific meetings, reports on the latest discoveries, and interviews with brain research experts. (Bi-monthly, by mail and online)

The Brain in the News

Reprinted articles from major newspapers about the brain and new research findings. (Monthly, by mail only)

Immunology in the News

Reprinted news stories and studies in the fields of immunology, neuroimmunology, and innate immunity. (Quarterly, by mail only)

Arts Education in the News

Reprinted articles and studies about arts education methods and their practical application in the classroom. (Quarterly, by mail only)

Special Publications

The Dana Alliance for Brain Initiatives

Annual Progress Report on Brain Research

Annual highlights of progress in all areas of brain research in the previous year. Published every March. (By mail and online)

Q&A: Answering Your Questions

About Brain Research

Pamphlet, in question-and-answer format, that illustrates how discoveries in brain research are giving us new hope for happier, healthier lives. (By mail and online)

Education Resources

These publications are available online in downloadable format at www.dana.org/books. Print copies may also be ordered there.

Acts of Achievement: The Role of Performing Art Centers in Education

This book documents significant K-12 education practices by performing arts centers across the country, providing resource materials for educators, teaching artists, and others interested in arts education. 164 pages, paperback, full-color and black-and-white photographs, 8½ x 11.

Planning an Arts-Centered School: A Handbook

Artists and educators highlight best practices and offer approaches from their own varied experiences in the development of arts-centered schools. Designed to guide organizations in essential issues, including curriculum development, governance, funding, assessment, and community participation. 164 pages, paperback, full-color and black-and-white illustrations, 8½ x 11.

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A basic introduction to brain science, its history, our current understanding, new developments, and future directions. Classroom sets include up to 30 copies of the book and one copy each of an introductory

video and two audios. 164 pages, paperback, full-color and black-and-white illustrations, 8½ x 11.

Books From Dana Press

Available at retail and online bookstores.

The Ethical Brain

By Michael S. Gazzaniga, Ph.D.

This groundbreaking 2005 volume explores how the lessons of neuroscience can help us resolve today's ethical dilemmas, ranging from when life begins to "off-label" use of drugs, such as Ritalin, by students preparing for exams, and from free will and personal responsibility to public policy and religious belief. The author, a pioneer in cognitive neuroscience, is a member of the President's Council on Bioethics. (Dana Press) 272 pages. Cloth. \$25.00. ISBN: 0-932594-01-9

Fatal Sequence: The Killer Within

By Kevin J. Tracey, M.D.

Kevin Tracey, a neurosurgeon, immunologist, and highly regarded investigator, offers a riveting account of a medical and scientific "perfect storm": the deadly downward spiral of infection and organ failure in septic shock and severe sepsis. Focusing on his battle to save a baby girl's life, Tracey uses this example to examine how the brain plays an integral role in the onset of septic shock and severe sepsis. (Dana Press) 225 pages. Cloth. \$23.95. ISBN: 1-932594-06-X

The Dana Foundation Series on Neuroethics

The field of neuroethics examines the implications for individuals and society of the extraordinary power of discoveries resulting from brain research. Issues in the field range from questions about enhancing memory and thought to the definition of responsibility and dangers to brain privacy from the new tools that can observe the working brain and predict individual predilections. Titles in the *Dana Foundation Series on Neuroethics* explore these controversies.

*Neuroscience and the Law:
Brain, Mind, and the Scales of Justice*

Edited by Brent Garland, M.S., J.D.
Foreword by Mark S. Frankel, Ph.D.
This concise, jargon-free book examines how discoveries in neuroscience are influencing criminal and civil legal proceedings and what imminent and longer-term advances may affect the U.S. justice system. (Dana Press) 226 pages. Paper. \$8.95. ISBN: 1-932594-04-3

Beyond Therapy: Biotechnology and the Pursuit of Happiness—A Report of the President's Council on Bioethics

This is the concluding report of the President's Council on Bioethics, created in November 2001. This volume, prepared by Dana Press, includes an introduction by William Safire, a special foreword by Leon R. Kass, M.D., Ph.D., chairman of the Council, and added comments by Council members Michael S. Gazzaniga, Ph.D.,

Elizabeth Blackburn, Ph.D., and Janet Rowley, M.D., D.Sc. (Dana Press) 376 pages. Paper. \$10.95. ISBN: 0-1-932594-05-1

Neuroethics: Mapping the Field

As a record of the first formal gathering on the subject of neuroethics, these proceedings, edited for a comprehensive reading experience, will be a primary resource for anyone interested in the ethical issues emerging from neuroscience. (Dana Press) 367 pages. Paper. \$10.95. ISBN: 0-9723830-0-X

A Well-Tempered Mind: Using Music To Help Children Listen and Learn

By Peter Perret and Janet Fox
A Well-Tempered Mind shows educators and artists how a music-based program worked during a decade in a Winston-Salem, NC classroom. It also explores recent theories about the relationship between music and how the brain learns. (Dana Press) 225 pages. Cloth. \$22.95. ISBN: 1-932594-03-5

A Good Start in Life: Understanding Your Child's Brain and Behavior from Birth to Age 6

By Norbert Herschkowitz, M.D., and Elinore Chapman Herschkowitz, M.A.
Foreword by Jerome Kagan, Ph.D.
Newly updated with the latest information and added material, *A Good Start in Life* covers how children learn to live together in family and society from birth to age six. (Dana Press) 312 pages. Paper. \$13.95. ISBN: 0-9723830-5-0

Back From the Brink: How Crises Spur Doctors to New Discoveries About the Brain

By Edward J. Sylvester

This book unveils the world of the neurological intensive care unit, pioneered in the 1980s at Johns Hopkins Medical Centers and reveals a world in which aggressive new treatments are saving critically brain-injured patients from once-devastating fates and giving neurology and neurosurgery residents outstanding educations in the management of acute neurological emergencies.

(Dana Press) 296 pages. Cloth. \$25.00.
ISBN: 0-9723830-4-2

The Bard on the Brain: Understanding the Mind Through the Art of Shakespeare and the Science of Brain Imaging

By Paul M. Matthews, Ph.D., and Jeffrey McQuain

This beautifully illustrated, full-color book explores the beauty and mystery of the human mind and the workings of the brain, following the paths Shakespeare pointed out in 35 of the most famous speeches from his plays. (Dana Press) 248 pages. \$35.00. Cloth. ISBN 0-4723830-2-6

Striking Back at Stroke

By Cleo Hutton and Louis R. Caplan, M.D.
Striking Back at Stroke is an autobiographical account of a stroke survivor, detailing her hard-won success rebuilding a life in ruins and overcoming difficulties she never imagined confronting. Cleo Hutton's account of her experiences is interwoven with medical

and scientific commentary by Louis Caplan, M.D. (Dana Press) 240 pages. \$27.00. Cloth. ISBN 0-9723830-1-8

The Dana Guide to Brain Health

Edited by Floyd E. Bloom, M.D., M. Flint Beal, M.D., and David J. Kupfer, M.D.
The Dana Guide to Brain Health offers essential information about how the brain works along with health preserving advice and the latest treatments for brain diseases. Edited by three of the world's leading brain experts, the book is a collaboration of more than 100 distinguished scientists and clinicians. (Published by The Free Press, 2003. The Dana Press directed the *Dana Guide* project.) 768 pages. \$45.00. Cloth. ISBN: 0-7432-0397-6

Understanding Depression: What We Know and What You Can Do About It

By J. Raymond DePaulo, Jr., M.D., with Leslie Alan Horvitz
Dr. DePaulo explains what depression is, who gets it and why, what happens in the brain, the troubles that come with the illness, and the treatments that work—or don't. (A co-publication of Dana Press and J. Wiley & Sons, Inc.) 296 pages. Paper. \$14.95. ISBN: 0-471-43030-7

Keep Your Brain Young: The Complete Guide to Physical and Emotional Health and Longevity

By Guy McKhann, M.D., and Marilyn Albert, Ph.D.

Prof. Albert and Dr. McKhann counsel us on the real changes, some good and some dismaying, that take place in the brain, along with the real illnesses that can occur. The authors discuss every aspect of aging—changes in memory, nutrition, mood, sleep, and sex—as well as problems that creep up in alcohol use, vision, hearing, and movement and balance. (A co-publication of Dana Press and J. Wiley & Sons, Inc.) 304 pages. Paper. \$15.95. ISBN: 0-471-43028-5

The End of Stress As We Know It

By Bruce McEwen, Ph.D., with Elizabeth Lasley

The End of Stress as We Know It provides readers with the “gold standard” in understanding how their bodies work under stress and why they have the power to avoid its debilitating effects. (A co-publication of Dana Press and Joseph Henry Press; June 2002) 262 pages. Paper. \$19.95. ISBN: 0-309-09121-7

The Secret Life of the Brain

By Richard Restak, M.D.

Best-selling author Richard Restak reveals what brain science is uncovering about the intricate magic of the brain from birth to old age. A comprehensive, beautifully illustrated companion to the PBS television series by

award-winning producer David Grubin. (A co-publication of Dana Press and the Joseph Henry Press) 201 pages. Cloth. \$35.00. ISBN 0-309-07435-5

In Search of the Lost Cord: Solving the Mystery of Spinal Cord Regeneration

By Luba Vikhanski

A riveting account of courage and conviction as top scientists and young acolytes fight their way toward vital advances in the understanding and treatment of spinal cord injury. (A co-publication of Dana Press and the Joseph Henry Press) 269 pages. Cloth. \$27.95. ISBN: 0-309-07437-1

The Longevity Strategy: How to Live to 100 Using the Brain-Body Connection

By David Mahoney and Richard Restak, M.D. Foreword by William Safire

From the latest research about how the brain works and through the vital connection between the brain and body, here is your life plan for good health, fulfilling relationships, and financial security. (A co-publication of Dana Press and J. Wiley & Sons, Inc.) 272 pages. Paper. \$14.95. ISBN: 0-471-32794-8

States of Mind: New Discoveries About How Our Brains Make Us Who We Are

Edited by Roberta Conlan

Contributors: J. Allan Hobson, Steven Hyman, Kay Redfield Jamison, Jerome Kagan, Eric Kandel, Joseph LeDoux, Bruce McEwen, and Esther Sternberg
Eight leading brain scientists reveal how our

health, behavior, feelings, and identities are influenced by what goes on inside our brains. (A co-publication of Dana Press and J. Wiley & Sons, Inc.) 224 pages. Paper. \$18.95. ISBN 0-471-39973-6

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