THE NATIONAL INSTITUTES OF HEALTH: INVESTING IN RESEARCH TO PREVENT AND CURE DISEASE

HEARING

BEFORE THE

SUBCOMMITTEE ON HEALTH

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED SEVENTH CONGRESS

SECOND SESSION

JUNE 6, 2002

Serial No. 107–122

Printed for the use of the Committee on Energy and Commerce

Available via the World Wide Web: http://www.access.gpo.gov/congress/house

U.S. GOVERNMENT PRINTING OFFICE

80–676PS WASHINGTON : 2002

For sale by the Superintendent of Documents, U.S. Government Printing Office
Internet: bookstore.gpo.gov Phone: toll free (866) 512–1800; DC area (202) 512–1800
Fax: (202) 512–2250 Mail: Stop SSOP, Washington, DC 20402–0001

COMMITTEE ON ENERGY AND COMMERCE

W.J. "BILLY" TAUZIN, Louisiana, *Chairman*

MICHAEL BILIRAKIS, Florida
JOE BARTON, Texas
FRED UPTON, Michigan
CLIFF STEARNS, Florida
PAUL E. GILLMOR, Ohio
JAMES C. GREENWOOD, Pennsylvania
CHRISTOPHER COX, California
NATHAN DEAL, Georgia
RICHARD BURR, North Carolina
ED WHITFIELD, Kentucky
GREG GANSKE, Iowa
CHARLIE NORWOOD, Georgia
BARBARA CUBIN, Wyoming
JOHN SHIMKUS, Illinois
HEATHER WILSON, New Mexico
JOHN B. SHADEGG, Arizona
CHARLES "CHIP" PICKERING, Mississippi
VITO FOSSELLA, New York
ROY BLUNT, Missouri
TOM DAVIS, Virginia
ED BRYANT, Tennessee
ROBERT L. EHRLICH, Jr., Maryland
STEVE BUYER, Indiana
GEORGE RADANOVICH, California
CHARLES F. BASS, New Hampshire
JOSEPH R. PITTS, Pennsylvania
MARY BONO, California
GREG WALDEN, Oregon
LEE TERRY, Nebraska
ERNIE FLETCHER, Kentucky
JOHN D. DINGELL, Michigan
HENRY A. WAXMAN, California
EDWARD J. MARKEY, Massachusetts
RALPH M. HALL, Texas
RICK BOUCHER, Virginia
EDOLPHUS TOWNS, New York
FRANK PALLONE, Jr., New Jersey
SHERROD BROWN, Ohio
BART GORDON, Tennessee
PETER DEUTSCH, Florida
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
BART STUPAK, Michigan
ELIOT L. ENGEL, New York
TOM SAWYER, Ohio
ALBERT R. WYNN, Maryland
GENE GREEN, Texas
KAREN MCCARTHY, Missouri
TED STRICKLAND, Ohio
DIANA DEGETTE, Colorado
THOMAS M. BARRETT, Wisconsin
BILL LUTHER, Minnesota
LOIS CAPPS, California
MICHAEL F. DOYLE, Pennsylvania
CHRISTOPHER JOHN, Louisiana
JANE HARMAN, California

DAVID V. MARVENTANO, *Staff Director*
JAMES D. BARNETTE, *General Counsel*
REID P.F. STUNTZ, *Minority Staff Director and Chief Counsel*

SUBCOMMITTEE ON HEALTH

MICHAEL BILIRAKIS, Florida, *Chairman*

JOE BARTON, Texas
FRED UPTON, Michigan
JAMES C. GREENWOOD, Pennsylvania
NATHAN DEAL, Georgia
RICHARD BURR, North Carolina
ED WHITFIELD, Kentucky
GREG GANSKE, Iowa
CHARLIE NORWOOD, Georgia
Vice Chairman
BARBARA CUBIN, Wyoming
HEATHER WILSON, New Mexico
JOHN B. SHADEGG, Arizona
CHARLES "CHIP" PICKERING, Mississippi
ED BRYANT, Tennessee
ROBERT L. EHRLICH, Jr., Maryland
STEVE BUYER, Indiana
JOSEPH R. PITTS, Pennsylvania
W.J. "BILLY" TAUZIN, Louisiana
(Ex Officio)
SHERROD BROWN, Ohio
HENRY A. WAXMAN, California
TED STRICKLAND, Ohio
THOMAS M. BARRETT, Wisconsin
LOIS CAPPS, California
RALPH M. HALL, Texas
EDOLPHUS TOWNS, New York
FRANK PALLONE, Jr., New Jersey
PETER DEUTSCH, Florida
ANNA G. ESHOO, California
BART STUPAK, Michigan
ELIOT L. ENGEL, New York
ALBERT R. WYNN, Maryland
GENE GREEN, Texas
JOHN D. DINGELL, Michigan,
(Ex Officio)

CONTENTS

THE NATIONAL INSTITUTES OF HEALTH: INVESTING IN RESEARCH TO PREVENT AND CURE DISEASE

THURSDAY, JUNE 6, 2002

HOUSE OF REPRESENTATIVES,
COMMITTEE ON ENERGY AND COMMERCE,
SUBCOMMITTEE ON HEALTH,
Washington, DC.

The subcommittee met, pursuant to notice, at 10:05 a.m., in room 2123, Rayburn House Office Building, Hon. Michael Bilirakis (chairman) presiding.

Members present: Representatives Bilirakis, Deal, Norwood, Shadegg, Pickering, Bryant, Buyer, Brown, Strickland, Barrett, Capps, Stupak, and Green.

Staff present: Cheryl Jaeger, majority professional staff; Steven Tilton, health policy coordinator; Eugenia Edwards, legislative clerk; John Ford, minority counsel; and Jessica McNiece, staff assistant.

Mr. BILIRAKIS. Good morning. I don't like to start a hearing without at least one member of the minority being present. But, as you may have just heard, we have a journal vote on the floor. So it is a start of maybe a tough day; I don't know. I think probably the best bet is for us to break before we even start, run over and make that vote. By then, I am sure Mr. Brown and others will be here and then we could start. So if you will forgive us, we will go ahead and do that. Thank you.

[Brief recess.]

Mr. BILIRAKIS. The hearing will come to order. I again apologize on behalf of the committee. There may be another similar type of vote called in a few minutes, unfortunately. We shall see.

All right, I call this hearing to order. I would like to thank our witnesses for appearing before the subcommittee today, particularly those of you that altered your schedules to be here. The subcommittee certainly values your expertise, and we are grateful for your cooperation and attendance.

Over the past 5 years Congress has shown its commitment to scientific research by setting a path that would double the budget of the National Institutes of Health. I am proud to have been an active participant in that effort.

These increased resources have ensured that our best scientists and researchers have access to the funds they need to develop treatments and cures for diseases. This funding has enabled the

NIH to maintain its exalted status as the premiere research institution in the world.

President Bush's fiscal year 2003 budget includes the final installment in the 5-year plan to double the NIH budget. I know we all hope and expect that Congress will follow suit and appropriate the necessary funds to complete this important effort.

As is always appropriate with large investments of taxpayer dollars, I believe that it is our responsibility to review, with the assistance of the scientific experts at the NIH, how these new resources are being used. More specifically, how are the various institutes managing these large annual increases? Have we found new cures? If so, are they helping Americans live healthier lives?

Given the vastness and the complexity of the NIH, the subcommittee is focusing on two institutes today: the National Heart, Lung, and Blood Institute and the National Institute of Neurological Disorders and Stroke. These institutes are critical in the discovery of basic causes of a number of diseases. These discoveries will help put researchers on the correct paths to cure illnesses like Parkinson's, alpha-1, heart disease, and stroke, which devastate millions of Americans every year.

I would like to thank Dr. Lenfant and Dr. Penn for appearing before this subcommittee today to outline how they are progressing in the war against disease.

I am particularly pleased that part of today's hearing will focus on the Stroke Treatment and Ongoing Prevention Act of 2001, which was introduced by two members of our subcommittee, Mr. Pickering and Ms. Capps. I am very supportive of the provisions contained in this bill and look forward to working with my colleagues on this issue.

Now I am pleased to yield to the ranking member, Mr. Brown, for an opening statement.

Mr. BROWN. I thank the chairman for holding this morning's hearing. I want extend a special welcome to Dr. Bonow with the American Heart Association. The Heart Association, as the chairman said, has been working with Ms. Capps and others on the stop strokes bill.

Congress will double the NIH budget by 2003. It is rare for virtually all Members to endorse any kind of large increase in Federal spending for one purpose like this, but when I think about constituents I have met over the past 10 years who rely on research funded by NIH, doubling the budget is an easy sell to Congress and to the American public.

We have all met children who give themselves daily shots of insulin, families who have lost a loved one to lupus or heart disease or Duchenne's muscular dystrophy. I have a constituent in my district who lost her husband to CJD 3 months after he woke up with a headache. Our increased investments at NIH afford even more opportunities to confront these diseases.

I want to briefly touch on other aspects of NIH's role that I hope we will devote more attention to during future hearings on NIH. I am interested in how the institutes respond to a medical need that is not being addressed by the private sector. I have been told repeatedly by infectious disease specialists, especially talking to people involved in tuberculosis and malaria and AIDS, that one

area where such a gap currently exists, especially in the area again of tuberculosis, is in the development of new antibiotics.

In April 2000 the FDA approved Zyvox, the first in a new class of antibiotics to be approved in more than 3 decades. We desperately need new antibiotics, especially as antibiotic resistance becomes more and more of a problem to fight infectious diseases like drug-resistant tuberculosis, like pneumococcus, and other bacterial infections.

According to WHO, too few new drugs are being developed to replace those antibiotics that have lost their effectiveness. Take tuberculosis, for instance, where four drugs are administered to people that have drug-sensitive tuberculosis, and then if their tuberculosis is drug-resistant, two other antibiotics are given to those patients. They are old antibiotics. They are weaker antibiotics that are drug-sensitive because they have not been on the market for so long, and they have much worst side effects than other kinds of antibiotics.

Fourteen thousand Americans die of resistant infections each year. Tens of millions die worldwide of treatable infections. Eleven hundred people a day in India die of tuberculosis. Instead of reverting to older drugs with greater and worst side effects, we should be encouraging drug companies to devote their considerable resources to antibiotic R&D, but if the private sector, as has been the case apparently, is unwilling to develop these needed antibiotic drugs, this responsibility should fall, and must fall, on NIH with many of its new resources available from taxpayers.

Another area I am interested in is the role NIH invariably plays in the economics and allocation of health care in this country. Ideally, NIH could steer clear of thorny issues like health care costs and access, and focus exclusively on producing and supporting medical research.

Unfortunately, the agency's technology transfer policies have an obvious direct bearing on the return consumers receive on our investment as taxpayers in NIH. When NIH licenses a patent on an NIH-developed medical breakthrough like Taxol, the agency's private sector partner is awarded a period of market exclusivity. During that exclusivity periods, consumers pay monopoly prices for a drug that their tax dollars produced. How long should that exclusivity period be? Affordability and access hinge on NIH driving a hard bargain. I haven't seen them do much of that. This subcommittee has a responsibility to ensure that NIH does that.

NIH also has the power to break the patent on any product that was developed with U.S. tax dollars. That is a pretty big stick to use to convince drug companies to stop overcharging the American consumers.

If drug inflation weren't a major issue, if American consumers weren't paying two, three, and four times what consumers in Canada and France and Israel and Japan and England and Germany were paying, I am sure no one would look at that option given to NIH seriously. But prescription drug inflation is a major problem. We all know that Americans are paying more than consumers in any other country for the same drugs.

NIH has information on drug costs that this country needs that this committee should see. You know how much it costs to develop

a drug, including the cost of failures. You have the information necessary to clear the air to reality-check the drug industry's claim that R&D costs average $800 million per drug, which the media obediently picks up and repeats over and over and over. We have never seen the facts from your agency, from the FDA, or from the drug companies themselves.

We want to respond appropriately to the public's outrage at prescription drug prices. We need to understand how these prices relate to costs. There is no way around it.

Because this hearing is not, however, focused on the issues I have just raised, I obviously don't expect answers today. I will ask for written responses, share those responses with the subcommittee, and my other colleagues, and hope that we can pursue, Mr. Chairman, these thoughts and questions and ideas in subsequent hearings.

Our investment in NIH, again, is compromised when Americans are priced out of access. Research and access and costs are linked. We can't ignore that.

Thank you, Mr. Chairman.

Mr. BILIRAKIS. I thank the gentleman. Mr. Deal, for an opening statement?

Mr. DEAL. I have none.

Mr. BILIRAKIS. Mr. Stupak?

Mr. STUPAK. I will waive my opening statement, Mr. Chairman.

[Additional statements submitted for the record follow:]

PREPARED STATEMENT OF HON. CHARLIE NORWOOD, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF GEORGIA

Mr. Chairman, I would like to thank you for holding this hearing this morning. In the interests of our witness's time, I will be brief.

The National Institutes of Health are one of our most important national resources. The research done at the NIH makes a real difference in the health of Americans. From basic research to collaborative efforts to cutting edge science, the NIH leads the way in health research.

Work done at the National Institute of Neurological Disorders and Stroke has taught us the importance of early intervention when people suffer a stroke. We have taken that research and translated it into legislation to educate the public on the importance of recognizing the signs of stroke. My colleagues Ms. Capps and Mr. Pickering have introduced the Stroke Treatment and Ongoing Prevention Act to improve stroke care and increase public awareness. I am pleased to be a cosponsor of their effort. This is what makes the NIH so valuable—the application of NIH research into valuable public policy.

Mr. Chairman, I would like to thank our witness for appearing before us today. I look forward to their testimony and yield back the balance of my time.

PREPARED STATEMENT OF HON. W.J. "BILLY" TAUZIN, CHAIRMAN, COMMITTEE ON ENERGY AND COMMERCE

Thank you, Mr. Chairman, for holding this hearing today. I commend the Chairman for taking a closer look at the National Institutes of Health, one of the most promising investments we have made to advance public health.

Taxpayer dollars invested in medical research will yield untold benefits to all Americans. It is absolutely essential that we ensure that the investments we have put in place at the National Institutes of Health are maximized.

Today's hearing will be the first in a series of hearings the Committee plans to hold to learn more about the amazing research being conducted at the Institutes and Centers of the NIH, and to explore options to strengthen the research programs. For the last five years, Congress has committed to doubling the budget of the National Institutes of Health. If we move to adopt the President's request to fund the NIH for fiscal year 2003 at $26.5 billion, we will have completed the fifth

and final year of this investment initiative. Given that we have expanded the budget for NIH rather rapidly, I believe this hearing is particularly timely.

I am pleased that we have the opportunity to hear from not only one, but two directors of the institutes at NIH today: Dr. Claude Lenfant and Dr. Audrey Penn, of the National Heart, Lung and Blood Institute and the National Institute for Neurological Disorders and Stroke, respectively. Thank you, for taking the time to address our Committee this morning. I look forward to becoming more familiar with the advancements being made at these institutes with the additional resources Congress has allocated.

Cardiovascular disease is currently the leading cause of death in America, and stroke the third leading cause of death. Although great strides have been made to reduce the burden of cardiovascular disease and stroke through improvements in detection and treatment, the death rate for both are still too high. Furthermore, when we talk about doubling the overall budget of the NIH, this increase in funding did not necessarily translate into a unilateral doubling of all budgets in all scientific areas. Funding for stroke research, for example, has remained relatively flat over the past five years. This obviously begs the question: are we investing taxpayer dollars at NIH wisely? Are we capitalizing on real opportunities for scientific innovation that will have a major impact on public health?

The National Institutes of Health truly is a shining example of a public-private partnership. Over 80 percent of NIH dollars are distributed through extramural grants. The grant structure we have built through the National Institutes of Health has become a significant resource for both public and private institutions across the United States. Scientists are competing for the opportunity to be the next Jonas Salk, to be the one who discovers a vaccine that is so widespread that a deadly disease like polio is no longer an immediate threat. Scientists are competing for the opportunity to discover new scientific theories and laws that will help guide and advance research on all disease fronts. It is easy to forget that two decades ago, mapping the humane genome seemed an unattainable goal. But yet, now, we are there, and I would like to think that the investments we have made at the federal level have helped to speed the development.

Funding medical research and innovation is a worthwhile investment of limited taxpayer dollars. Research takes time and patience, and not all of our investments in research can be clearly tracked to a tangible end product like a new diagnostic or vaccine. But this research, nonetheless, helps us as a nation move forward in our efforts to improve public health.

We all need to better understand how medical research is conducted. We also need to better understand what impediments are currently in place that unnecessarily delay new research developments and shortchange the potential impact of research findings. Only when we learn about the barriers to high-quality research, can we begin to remove them.

I would like to thank all of the witnesses for coming before the Committee today to demonstrate the impact critical research plays in saving and improving American lives. I hope and pray that we will ultimately reach a point in time that all Americans will be free from disease. Congress needs to be a proud partner with the NIH and the public in this important goal.

Thank you, Mr. Chairman. I look forward to hearing from the witnesses.

PREPARED STATEMENT OF HON. JOHN D. DINGELL, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. Chairman, thank you for holding this hearing to examine how the National Institutes of Health (NIH) is investing taxpayer dollars to improve and expand their research activities. I would also like to thank the directors from the National Heart, Lung, and Blood Institute (NHLBI) and the National Institute of Neurological Disorders and Strokes (NINDS), as well as all of our other witnesses, for their testimony before us today.

NIH is a vital and significant institution which conducts basic research, observational- and population-based research, clinical research, and health services research. The contribution that NIH, and its 27 individual institutes, makes to our medical community and the general public is unparalleled and invaluable.

Our stewardship of this multibillion dollar investment of public money is crucial to maintaining public support for these programs. Taxpayers expect their money to be spent in an efficient and effective manner. I hope that we will ask tough questions.

Continued funding for NHLBI is important, as this institution seeks to conduct research on diseases of the heart, blood vessels, lungs, and blood; sleep disorders;

and blood resources management. Cardiovascular disease is the leading cause of death in America. NHLBI conducts research related to the causes, prevention, diagnosis, and treatment of some of today's most pressing and dangerous health problems.

NINDS, another valued research institution, currently leads the neuroscience community in research on brain disease. This institution works to address problems in minority health disparities, Parkinson's disease, brain tumors, epilepsy, and stroke. Since stroke is the third leading cause of death in the United States, claiming the life of one American every three and a half minutes, the work of NINDS is vitally important to future of America's health.

My friend and colleague, Representative Capps, has worked very hard to increase funding and focus attention on stroke research, and I encourage all of my colleagues to join me in sponsoring Representative Capps's STOP Stroke Act.

Thank you again for holding this hearing, and I look forward to the testimony of our distinguished guests.

Mr. BILIRAKIS. All right, we will go right into the panel then. First, Drs. Lenfant and Penn, you know that you submitted your written statement; it is a part of the record. We would hope you would complement, if you will, or supplement it orally.

The first panel consists of Dr. Claude Lenfant—am I pronouncing that correctly?

Dr. LENFANT. Yes.

Mr. BILIRAKIS. [continuing] Director of the National Heart, Lung, and Blood Institute here in Bethesda, Maryland, and Dr. Audrey S. Penn, Acting Director for the National Institute of Neurological Disorders and Strokes, also out of Bethesda.

Dr. Lenfant, why don't we start off with you, please, sir?

STATEMENTS OF CLAUDE LENFANT, DIRECTOR, NATIONAL HEART, LUNG, AND BLOOD INSTITUTE, NATIONAL INSTITUTES OF HEALTH, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES; AND AUDREY S. PENN, ACTING DIRECTOR, NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE, NATIONAL INSTITUTES OF HEALTH, U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

Mr. LENFANT. Thank you very much, Mr. Chairman. I truly welcome the opportunity to appear before you today and to present some of our programs, a panoramic view, I should say, of some of the programs that we are supporting. As requested, I will limit my comments to cardiovascular diseases, specifically coronary heart disease, stroke, and congestive heart failure, and also on blood diseases and resources.

When the institute was created 50 years ago, Mr. Chairman, this country was in the middle of a true epidemic of heart disease. Now today, thanks to decades of research, heart disease death rates have receded quite markedly. Just to give you an example, since the peak of the epidemic, which was in 1968, the death rate from coronary heart disease has declined by 68 percent, and likewise for stroke.

In addition, all of us in this room today can expect to live 6 years longer than was the case 30 years ago. Four of the 6 years are due to the decline of the death rate from heart disease and the progress that we have accomplished with regard to this condition.

However, I should say that we are far from out of the problems of heart disease. Today the majority of Americans will die from heart disease. In addition, the societal burden of living with heart disease is absolutely tremendous. Patients spend up to $30 billion

each year to take care of their condition in acute care, hospital, medication, whatever else. A recent study has revealed that 13 of the top 22 prescriptions taken in the United States are for cardiovascular diseases.

Thus, it is very clear that the research that we are pursuing is an important step and vital to reduce the tremendous burden. Let me take the case of heart failure, which accounts for a new public health problem and a new epidemic in this country. Ironically, I should say that this problem which is emerging is actually the cost of our success. Indeed, having saved many people from dying from acute events such as heart attack, we have created a large population with damage of their hearts.

What we now have at our disposal is a number of palliative measures ranging from medications to instrumental intervention such as left ventricular assist devices, but that is not a cure for these patients. However, I should say that we are seeing surprising new research directions which may eventually bring us to a cure. I am referring to cell transplantation treatments which may really contribute a great to the treatment of heart failure in the future.

The mapping of the human genome, which has been very much discussed in the last months, few months, years, I should say, gives us another group of new opportunities on which we are capitalizing as much as we can. We can expect that in years from now, hopefully sooner than later, we would be able to help in the prevention of cardiovascular disease, to predict the evolution of a disease if it develops, and, finally, perhaps more important, to develop treatments which will be personalized for the patients.

If you will allow me to be a bit futuristic, I can envision the time when a child is born, that child will be given at the same time a birth certificate and a small CD that will include each of her genetic profiles that could be used for the whole life of this patient, to be sure that this patient, that this subject is treated very adequately when diseased.

As we pursue these and other avenues, we are working very hard to strengthen our clinical research programs. As you might expect, we are pursuing a number of clinical trials which include medical as well as surgical intervention. They also include trials to examine the value of lifestyle interventions.

We have clinical trials today to evaluate dietary approaches which could be acceptable to the public. We have clinical trials to prevent excessive gain of weight, which, as you know, is a very significant problem in this country, as well as to prevent a decline in physical activities, which, unfortunately, occurs in our younger population, and that, in turn, will lead eventually to excess weight and obesity.

Let me now turn briefly to work in blood disease, and especially in sickle cell disease, a condition which affects 70,000 of our minority citizens. Here again, I am glad to report to you some progress. In 1960, the lifespan of a patient with sickle cell disease, the most severe cases, was approximately 10 years. Today I am glad to tell you that it is between 40 and 50 years.

Studies are ongoing to address the problem of sickle cell anemia and other hemoglobin disorders, as well as the problem of the

transplantation of hematopoietic cell, that is, a cell which supplies all the other cells in the blood.

I am also pleased to know that as today we talk a lot about gene therapy, hemophilia, a very serious condition, inherited blood condition, may as it turns out not too far away be the first disease to be treated by gene therapy.

I was asked to make some comments on blood safety. Here again, I have to report to you that over the last 20 years, when the problems of blood contamination and transmission of disease by way of blood transfusion became so apparent with the occurrence of AIDS, at that time the risk of contracting hepatitis C, for example, from a transfusion was about 1 in 100—no, it was 1 in 25 units of blood transfused. Today that number has been reduced to one chance out of 1.7 million transfusions.

The last thing that I want to mention, Mr. Chairman, is that all this research that we have supported will do no good to anyone unless it is translated and disseminated to the public and to the health professionals. To this end, the institute has undertaken a number of programs to assure benefits to the patients.

One which was referred to by Mr. Brown is the Stroke Belt, an initiative that was begun by the institute years ago. The Stroke Belt is in 11 States from the southeastern United States where the prevalence of stroke and high blood pressure, which is one of the main causes of stroke, was very high. The mortality rate in these States from coronary heart disease and from stroke was the highest in the country.

I am pleased to tell you that today, between the early eighties and the mid-nineties, the reduction in stroke in these States has been the highest that we have witnessed in the entire United States. This shows that, indeed, we can do something, and an organization like me, like my colleague from the NINDS and all the other institutes are working very hard to take to the patients what we can.

That concludes my remarks, Mr. Chairman, and I would be pleased to answer questions.

[The prepared statement of Claude Lenfant follows:]

PREPARED STATEMENT OF CLAUD LENFANT, DIRECTOR, NATIONAL HEART, LUNG, AND BLOOD INSTITUTE, NATIONAL INSTITUTES OF HEALTH

Mr. Chairman and Members of the Subcommittee: I am pleased to have this opportunity to discuss the programs and activities of the National Heart, Lung, and Blood Institute (NHLBI). As requested, my comments will focus specifically on cardiovascular diseases—which include, among others, coronary heart disease, stroke, and congestive heart failure—and on blood diseases and resources.

CARDIOVASCULAR DISEASES

To begin with a historical perspective, let me mention that when the NHLBI was founded more than 50 years ago, this country was in the throes of an epidemic of heart disease. Beginning at the turn of the 20th century, and particularly after the end of World War I, heart disease death rates increased quite precipitously among men and ominously among women. One could envision no end to this trend, as medical science was largely ignorant about the causes of heart disease and extremely limited in its ability to treat or prevent it. Now, thanks to decades of research, heart disease death rates among men have receded to the level of 100 years ago, and among women they are about 37 percent lower. Stroke death rates have plummeted, due in great measure to improvements in detection and treatment of high blood pressure. The average American can expect to live 5° years longer today than was the case 30 years ago, and nearly 4 years of that gain in life expectancy can be at-

tributed to our progress against cardiovascular diseases. I believe it is fair to say that medical science has made more advances in this area than in any other major disease.

Nonetheless, many challenges remain. As the following chart illustrates, we in this country are far more likely to die of cardiovascular diseases than of any other cause.

Moreover, the societal burden of living with these diseases is considerable. Cardiovascular disease patients spend more than 30 million days each year in acute-care hospitals—far more than patients with other diagnoses. And, a recent study revealed that 13 of the top 22 prescription drugs taken in the United States address cardiovascular problems. Thus, beyond the suffering caused by these diseases, the health-care costs demand our attention.

Heart failure accounts for a large and growing public health burden that has, in effect, become our next epidemic. Ironically, it is a cost of our success: having saved many people from dying of acute events, such as heart attack, we have created a large and vulnerable population with heart muscle damage. We now have at our disposal a number of palliative measures, ranging from drugs to instrumental interventions such as the left ventricular assist device. While they improve patients' quality of life by alleviating symptoms and reducing hospitalizations, they are by no means a cure. However, current research provides grounds for cautious optimism that a cure may ultimately be found. For example, we are stimulating research on cell-based therapy in the wake of astonishing discoveries that, contrary to everything we thought we knew before, cells of the heart and other organs are capable of regeneration. If we could find a way to harness and direct the body's ability to grow new cells, we would have an entirely new approach to therapy for diseases such as end-stage heart failure.

The mapping of the human genome has provided an extraordinary opportunity to understand the genetic underpinnings of disease. We have initiated Programs of Genomic Applications, which seek to maximize the fruits of the new information in order to identify the causes of disease, determine who is susceptible to it, and tailor treatments and, possibly, cures to the individual. We have also launched a program to identify genetic modifiers of disease—genes that determine, for instance, why some people with high blood pressure suffer heart attacks, while others have strokes, still others experience kidney failure, and some escape with few ill effects. The ability to predict the course of disease in a given patient will open up a new era of therapeutic approaches. Accumulating evidence suggests that inflammation—the body's normal, protective response to injury or infection—may be at the core of many chronic degenerative diseases such as atherosclerosis. This notion is supported by recent findings that blood levels of a substance called C-reactive protein, a marker of inflammatory activity, are correlated with risk of heart attack and stroke. Understanding the delicate balancing act of the immune system could pave the way for new preventive and therapeutic strategies. Related work from a number of laboratories has found that exposure to a variety of infectious agents is associated with development of vascular disease. We are vigorously pursuing basic research to elucidate the mechanisms underlying these phenomena in the expectation that it may ultimately lead to new approaches, perhaps even vaccines, to prevent cardiovascular disease.

As we pursue these and other basic research avenues, we are working to strengthen clinical research to ensure that findings from the laboratory have a swift and effective impact on patient care. Our research centers program has been reconfigured as Specialized Centers of Clinically Oriented Research to sharpen its focus on the patient. We also conduct numerous clinical trials of promising approaches to treat or prevent disease. As you might expect, they include trials of medical and surgical interventions, but they also include trials that examine the value of lifestyle interventions such as the Dietary Approaches to Stop Hypertension (DASH) diet—an eating pattern that is rich in fruits, vegetables, and low-fat dairy products and low in fat and cholesterol—which has been shown to lower blood pressure. The DASH diet is now being tested in the context of an intensive behavioral intervention to promote other lifestyle changes to lower blood pressure (e.g., decreased salt and alcohol consumption, increased physical activity, and weight control). Two other trials focus on preventing excessive weight gain among teenaged African American girls—a population that is highly susceptible to weight-related problems such as high blood pressure and diabetes in adulthood—and on preventing the decline of physical activity that typically occurs among girls during the middle-school years.

BLOOD DISEASES AND RESOURCES

Turning to blood diseases and resources, we also have much progress to report. In sickle cell disease, which affects approximately 70,000 Americans, we have found that hydroxyurea, a chemotherapeutic drug that is taken by mouth, decreases the frequency of acute pain crises in adults and may actually prolong the life span. We are funding a study to determine whether benefits of this drug can be extended to very young children, thereby preventing primary damage to organs such as the spleen and kidneys. Clinical studies funded by the NHLBI also have proven the efficacy of transfusions in preventing the recurrence of stroke in young children with sickle cell disease.

Clinical trials are also in progress to establish whether a cure is possible for Cooley's anemia and other hemoglobin disorders such as sickle cell disease through transplantation of hematopoietic (blood-forming) stem cells obtained from sibling donors. The cells can come from the circulating blood of the sibling or from umbilical cord blood, in cases where there is a newborn brother or sister. Also in this area, the NHLBI is funding studies on cord blood transplantation in children and adults to determine the most appropriate role for this source of stem cells in blood diseases such as acute leukemia. This approach may provide new hope for thousands of patients in need of a transplant, because cord blood is readily available, can be collected at no risk to the newborn donor, is less likely than bone marrow to transmit infection, and may work well despite less precise tissue matching,

Gene therapy for the eventual cure of hemophilia is now under development by several companies. The original research leading to the actual commercial development of this approach came from funding provided by the NHLBI. Our own research in this area is gaining addition momentum with recent funding of Programs of Excellence in Gene Therapy, which are designed to move these studies rapidly into the clinical arena within the context of careful and appropriate safeguards for patient safety and welfare.

In the early 1980s the Institute created a research program in transfusion medicine that has actively pursued methods to improve the safety of the U.S. blood supply. I am happy to report great success in this endeavor. For instance, the risk of contracting hepatitis C from a transfusion—a great public health concern—is now about 1 in 1.7 million units, whereas it was an estimated 1 in 25 units 2 decades ago. Taken as a whole, our investment in transfusion medicine research has given the United States a blood supply that is the safest in the world.

EDUCATION AND OUTREACH

To maximize the impact of research findings on the people whom we serve, the NHLBI is strongly committed to educating patients, health professionals, and the public about disease risk, diagnosis, treatment, and prevention. Over the past 3 decades, we have conducted education programs in high blood pressure, cholesterol, blood resources, smoking, asthma, heart attack awareness, obesity, and sleep disorders. Two campaigns—one that has been under way for some time and one that is brand new—may be of particular interest to the Subcommittee.

The NHLBI *Stroke Belt Initiative* had its origins in observations during the 1980s that a band of states located generally in the southeastern portion of the country (depicted in the graphic on the top of the page that follows) suffered an excessive death toll from stroke, and that extraordinary rates of high blood pressure were the culprit. In subsequent years, we worked with state health departments and other groups to address improvement of blood pressure control in these populations. The approaches taken are too numerous to mention, but they included church-based screenings ("High Blood Pressure Sunday," the first Sunday in May, is now established in many communities, and features sermons, gospel music, and cooking related to lowering blood pressure) and screening at baseball games (the "Strike out Stroke" campaign, which began with the Atlanta Braves). As we look back on these efforts, it is clear that stroke is still a major problem in the Southeast. However, it is also apparent (see second graphic) that some of the greatest gains in reducing the number of stroke deaths per 100,000 population over the past 2 decades have occurred in the Stroke Belt states. Building on what has been learned about improving the health of high-risk communities, we are now working to extend our reach to other vulnerable subsets of the population. We have established what we call EDUCs (Enhanced Dissemination and Utilization Centers) in communities whose residents are at especially high risk of developing cardiovascular disease. These projects are mobilizing community resources—including health centers, churches, schools, businesses, and soup kitchens—to increase awareness and control of cardiovascular disease risk factors.

Our very recent campaign, *Act in Time to Heart Attack Signs,* addresses a missed opportunity to save lives. More than 1 million Americans suffer heart attacks each year, and about 460,000 of these attacks are fatal. In many cases, the deaths occur because heart attack victims do not get to the hospital in time to benefit from the treatments we have to offer. Why? Often, patients fail to recognize the symptoms of heart attack, shrink from the notion of calling an ambulance, or worry that they will feel foolish if their distress turns out to be "indigestion." The new educational initiative seeks to counteract misconceptions about heart attack symptoms, alleviate patient fears, and emphasize the importance of getting treatment promptly. Materials have been developed—for the public and for doctors—to teach people the key messages: (1) recognize the symptoms and (2) call 9-1-1. Although the program is only in its 9th month, the *Act in Time* message is already an official course of the American Red Cross, and the National Council on the Aging is offering *Act in Time* in senior centers throughout the country.

CONCLUSION

We are confident that our approach, which is driven both by compelling public health needs and by extraordinary scientific opportunities, will continue to yield progress in the future. I would be pleased to answer any questions that the Subcommittee may have about the programs and plans of the NHLBI.

Mr. BILIRAKIS. Thank you very much, Doctor.

Dr. Penn?

STATEMENT OF AUDREY S. PENN

Ms. PENN. Mr. Chairman and members of the committee, I am, indeed, Dr. Audrey Penn, Acting Director of the National Institute of Neurological Disorders and Stroke. I am here today to discuss our efforts at addressing stroke, the third leading cause of death and a leading cause of disability in the United States, with a total cost to the Nation estimated to be in excess of $40 billion and immeasurable personal and emotional costs to the victims and their families.

As the institute name implies, stroke is a priority for NINDS. We are committed to developing safe and effective treatments for all forms of stroke, including strategies to maximize knowledge of warning signals, to apply known preventative measures, to minimize damage, and protect compromised brain, to avert recurrences, and to restore full function.

Historically, NINDS has committed more funding to stroke research than any other single disease or disorder within our mission. In fiscal year 2001 our funding for stroke research was more than $117 million, and across NIH the total was $239 million.

Now, as you all know, a stroke is a brain attack which occurs when a clot blocks blood flow supplying the brain. An ischemic stroke occurs then or, when a blood vessel ruptures, you have a brain hemorrhage. In contrast to a heart attack, a stroke doesn't usually hurt. Instead, specific regions of the brain supplied by the compromised blood vessels stop functioning, resulting in unilateral loss of strength or sensation, loss of speech or vision, and even loss of consciousness, if it is big.

In some persons, there may be brief episodes, transient ischemic attacks, which, if recognized, provide warnings that can allow us to use preventative strategies. It is critically important that all be instructed in the warning signs of stroke, and I would encourage everyone here to take home a copy of these bookmarks which list the risk factors and the warning signs, and are supplied actually in English and Spanish.

Over 3 decades, NINDS has supported a series of productive clinical studies of stroke. Atrial fibrillation and irregular heart rhythm significantly predisposes to embolic stroke, especially in those over 60. We have supported clinical trials in over 3,800 patients which confirm that aspirin and warfarin, which is a blood-thinning agent, were so beneficial that stroke incidence was cut by 50 to 80 percent. Optimal use of warfarin in appropriate patients could prevent 40,000 strokes per year and save $600 million per year in health care costs. In 60 percent of patients with atrialfibrillation younger than the age of 75, a daily adult aspirin provides adequate protection against stroke, with minimal complications.

Transient ischemic attacks, which serve as warnings of impending stroke, can suggest the presence of stenosis in the carotid arteries in the neck, which is related to arteriosclerosis. So we have studied different surgical strategies and examined them in a series of major clinical trials leading to changes in practice and standard use of carotid endarterectomy to clean out the plaque.

In another trial, which required over 10 years to complete, we developed the first FDA-approved acute treatment for ischemic stroke, and this is tissue plasminogen activator, or t-PA, which dissolves blood clots and restores blood flow, if you give it intravenously within 3 hours of the stroke. The impressive results show that more patients were out of the hospital, free of major neurological impairments, not in rehabilitation centers or nursing homes, and back to their usual activities at the end of 3 months.

So to develop units that can deliver rapid treatment for strokes and conduct high-quality translational research, the institute has issued a grant solicitation for Specialized Programs of Translational Research in Acute Stroke, which are known as SPOTRIAS. The SPOTRIAS programs will combine the latest methods used in neurology critical care units with research into neuro-protection, reversal of brain damage, and restoration of function after acute stroke.

In the past several years, research—actually, it started in the early 1990's in our institute as well—has revealed remarkable capacity of alternate parts of the brain to take over functions which have been lost in response to injury. So new brain imaging techniques that measure the activity of the brain cells involved are providing insights into how they do this, and rehabilitation medicine and neurology are also beginning to apply what has been learned about this, this so-called brain plasticity, to encourage stroke recovery through a method called constraint-induced therapy.

Dr. Lenfant referred to the increased incidence of stroke in the Stroke Belt which involves, in particular, our African American population, but also the general population. We are working with the National Heart, Lung, and Blood Institute and the National Center for Research Resources in developing a Stroke and Cardiovascular Prevention-Intervention Research Program at the Morehouse School of Medicine in Atlanta, Georgia. We also have an Acute Brain Attack Research Program in the Baltimore-Washington area, the pilot of which is the 24-Hour Stroke Research Program at Suburban Hospital in Bethesda, Maryland, part of our intramural program.

It is critical to continue to pursue and encourage basic research into mechanisms of stroke, and continuous advances in our knowledge of the biology of brain cells and of brain blood vessels, both normal and abnormal, are critical, including mechanisms of cell survival and death, neural growth factors, stem cell therapy, neuronal plasticity, and glial cell biology. We have funded many new projects to study strategies to protect these brain cells from the loss of glucose and oxygen consequent to stroke. We even have evidence that inflammation is involved right at the brain blood vessels.

We recognize that scientific opportunities and research needs, coupled with the increases in the NINDS budget, as a result of the recent doubling efforts, mandate the identification of clear scientific priorities, so that the institute can determine the best uses for its resources. So we convened a Stroke Progress Review Group, the PRG, of over 140 prominent scientists, clinicians, consumer advocates, representatives of several concerned NIH institutes, and industry representatives, which developed a comprehensive document that identifies the scientific priorities to achieve breakthroughs in stroke. I believe all of you have copies of the Stroke PRG report.

So, we also recognize that supporting research is only part of the battle, and it is critical to help people recognize that they are having a stroke, to think of stroke as an emergency and as a treatable disease, so that they call 911 to seek help immediately. So, we direct an extensive education and outreach effort for health care professionals and the general public, and these include "Know Stroke: Know the Signs. Act in Time." campaigns, where we have a variety of extremely well-received public education materials, including television and radio spots really given to us by the industry.

Some of our public education strategies are targeted to specific at-risk minority communities. We had a "Stroke Sunday" program at a local African American church in October 2000, which included participation by the then Surgeon General.

We have partnerships, including the Brain Attack Coalition, which is a group of professional voluntary and government groups. We have signed a Memorandum of Understanding with the National Heart, Lung, and Blood Institute, the Centers for Disease Control and Prevention, and the Health and Human Services Office of Disease Prevention and Health Promotion, and the American Heart Association, to foster cooperation in reaching the heart disease and stroke goals for the Nation, which were articulated in the "Healthy People 2010" Initiative.

So we feel we have made, and continue to make, contributions, significant contributions to achievements in stroke research which have impacted, and will impact, prevention, treatment, and rehabilitation. Encouraged by the recent progress in understanding the vascular biology of the brain, and enabled by the support we are getting from Congress, I can assure you that NINDS is committed to pursuing all of these opportunities to alleviate the devastating effects of stroke on our society.

Thank you very much for the opportunity to talk to you, and I will be glad to answer any questions.

[The prepared statement of Audrey S. Penn follows:]

PREPARED STATEMENT OF AUDREY S. PENN, ACTING DIRECTOR, NATIONAL INSTITUTE OF NEUROLOGICAL DISORDERS AND STROKE, NATIONAL INSTITUTES OF HEALTH

Mr. Chairman and Members of the Committee, I am Dr. Audrey Penn, Acting Director of the National Institute of Neurological Disorders and Stroke (NINDS). I am pleased to be here before you today to discuss our efforts in addressing stroke—the third leading cause of death in the United States after heart disease and cancer, and a leading cause of long-term disability. The National Institute of Neurological Disorders and Stroke at the National Institutes of Health (NIH) is the leading federal organization committed to research on improving stroke prevention, treatment, and recovery, through increased understanding of how to protect and restore the brain. Historically, NINDS has committed more funding to stroke research than to any other single disease or disorder within our mission. In Fiscal Year (FY) 2001, NINDS funding for stroke research was more than $117 million, and the NIH total was nearly $239 million. More importantly, our stroke programs impact all areas of scientific opportunity and public health priority—from stroke awareness to rehabilitation—and are advancing the state of cutting-edge knowledge about the ways to prevent, diagnose, treat, and educate the public and health professionals about stroke.

BACKGROUND

As many of you know, a stroke is a "brain attack" caused by an interruption of blood flow to the brain. There are two different types of stroke—ischemic and hemorrhagic. Ischemic strokes occur when blood flowing to a region of the brain is reduced or blocked, either by a blood clot or by the narrowing of a vessel supplying blood to the brain. Approximately 80 percent of all strokes are ischemic. The remaining 20 percent of strokes are caused by the rupture of a blood vessel, and leakage of blood into the brain tissue. These hemorrhagic strokes can occur from the rupture of an aneurysm, which is a blood-filled sac ballooning from a vessel wall, or leakage from a vessel wall itself weakened by an underlying condition like high blood pressure.

At every conceivable level, stroke is a tremendous public health burden to our country. More than 600,000 people experience a stroke each year. Of the more than 4 million stroke survivors alive today, many experience permanent impairments of their ability to move, think, understand and use language, or speak—losses that compromise their independence and quality of life. Furthermore, stroke risk increases with age, and as the American population is growing older, the number of persons at risk for experiencing a stroke is increasing. Over the past several decades, NINDS has supported some of the most significant achievements in stroke research, which have contributed to reductions in the death rate from stroke. We continue to be committed to reducing this burden.

HISTORICAL PROGRESS IN STROKE PREVENTION AND TREATMENT

NINDS has a long and distinguished history of supporting productive clinical studies in the field of stroke prevention and acute treatment. Indeed, successes in prevention date back more than twenty years, and there has been remarkable progress in stroke prevention—which reflects sustained efforts of private organizations, NIH, and other government agencies. Stroke prevention is also highly cost-effective because it averts the direct costs of hospitalization and rehabilitation. As NINDS celebrated its 50th anniversary, the U.S. Centers for Disease Control and Prevention estimated that the age-standardized stroke death rate declined by 70 percent for the U.S. population from 1950 to 1996 [*MMWR Weekly* 48:649-56 1999], and the American Heart Association tallied a 15 percent decline just from 1988 to 1998. I would like to briefly summarize a few of the major NINDS-supported efforts, which have included dozens of clinical trials, that have contributed significantly to our knowledge of stroke.

Several early studies investigated medical management approaches to the prevention of recurrent strokes in people with atrial fibrillation (AF). This irregular heart rate and rhythm is a common disorder in older Americans, and a significant stroke risk factor. It has been estimated that two million Americans, primarily over the age of 60, have AF and are six times more likely to have a stroke as a result. The drugs aspirin and warfarin had been used to prevent recurrent stroke in these individuals, however their use was based on little hard scientific evidence. To address this issue, NINDS supported a series of three trials in Stroke Prevention in Atrial Fibrillation— referred to as the SPAF trials. The SPAF I, II and III trials evaluated the use of aspirin and warfarin for stroke prevention in more than 3,800 human subjects. The SPAF I study reported in 1990 that both aspirin and warfarin were

so beneficial in preventing stroke in patients with atrial fibrillation that the risk of stroke was cut by 50 to 80 percent. The results suggested that 20,000 to 30,000 strokes could be prevented each year with proper treatment. The SPAF II study results in 1994 identified the 60 percent of people with atrial fibrillation for whom a daily adult aspirin provides adequate protection against stroke with minimal complications. This group consists of those younger than 75 and those older than 75 with no additional stroke risk factors such as high blood pressure or heart disease. SPAF III, which included 1,044 patients at 20 medical centers in the U.S. and Canada, studied the remaining 40 percent of atrial fibrillation patients with additional risk factors for stroke and for whom warfarin had been shown to be effective. The study was stopped ahead of schedule in 1996 because early results clearly demonstrated the benefit of standard warfarin therapy over the combination therapy of aspirin and fixed-dose warfarin, in these high-risk patients. Other reports have estimated that the use of warfarin to prevent strokes in persons with AF costs as much as $1,000 annually, but a year of post-stroke treatment can cost $25,000. Based on these estimates, optimal use of standard warfarin therapy in the appropriate patients could prevent as many as 40,000 strokes a year in the U.S., and save nearly $600 million a year in health care costs.

Other studies supported by the Institute, such as the Warfarin Antiplatelet Recurrent Stroke Study, the Vitamin Intervention for Stroke Prevention study, the African-American Antiplatelet Stroke Prevention Study, and the Women's Estrogen for Stroke Trial, build on these earlier findings, and continue to add to our knowledge about medical interventions that can affect the incidence of stroke in different at-risk groups.

The NINDS has also supported several major studies of surgical approaches to the secondary prevention of stroke. This work has particular significance for people with carotid artery stenosis, a narrowing of the major blood vessels that supply the brain. One definitive study in the late 1970s examined a procedure called extracranial/intracranial (EC/IC) bypass. EC/IC bypass had been used for several years as a means to restore blood flow to the brain. The NINDS-funded study of the procedure's effectiveness found that the data did not support its continued use in medical practice to prevent stroke. These findings were of significant benefit to patients, who could avoid the risks and costs of this surgery, and to researchers, who used this information to redirect their attention to other promising approaches. As a result, investigators explored an alternative surgical strategy, called carotid endarterectomy, which involves the removal of fatty deposits, or plaque, in the carotid arteries. In two NINDS-funded trials—the North American Symptomatic Carotid Endarterectomy Trial (NASCET), and the Asymptomatic Carotid Atherosclerosis Study (ACAS)—this approach was examined more extensively.

The results of the 12-year NASCET trial were reported in two stages. The investigators' early data led to a radical change in the recommended treatment for severe (70-99 percent) carotid stenosis, or blockage, when it was determined that, together with appropriate medical care, carotid endarterectomy for patients with severe blockage prevented more strokes than did medical treatment alone. NINDS responded to this finding by halting the part of the study involving patients with severe blockage, and issuing a nationwide alert to physicians asking them to consider the study results in making recommendations to their patients. The rest of the study focused on determining the efficacy of this surgery for symptomatic patients with moderate carotid stenosis (30-69 percent blockage). Those results showed that patients with the higher grades of moderate stenosis (50-69 percent) clearly benefit from surgery. There was no significant benefit for patients with less than 50 percent stenosis. As a result of the NASCET trial, patients with moderate stenosis are better able to decide whether to risk surgery in order to prevent possible future strokes.

In the ACAS trial, carotid endarterectomy was found highly beneficial for persons who are symptom-free, but have a carotid stenosis of 60 to 99 percent. In this group, the surgery reduces the estimated 5-year risk of stroke by more than one-half, from about 1 in 10 to less than 1 in 20.

To the long list of studies contributing to improvements in secondary stroke prevention, we can add a more recent NINDS-funded trial, which resulted in the first FDA-approved acute treatment for ischemic stroke, in 1996. This therapy—tissue plasminogen activator or t-PA—dissolves blood clots and restores blood flow, if given intravenously within the first three hours after an ischemic stroke. Patients must be screened carefully before receiving t-PA, since it is not appropriate for use in treating hemorrhagic stroke, and should not be given beyond the three-hour window. However, in carefully selected patients, use of t-PA can achieve a complete recovery. Unfortunately many, indeed most, stroke patients do not receive t-PA because they do not arrive at the hospital in time to be evaluated and treated within

the crucial three-hour window of effectiveness. Or, in many cases, hospitals are not prepared to rapidly identify and treat these patients. It is this dual challenge that NINDS is actively pursuing through the development of model systems and through education and outreach efforts that are discussed later in my testimony.

RECENT ADVANCES

Within the framework of these historical successes, NINDS continues to build its basic science and clinical stroke programs, and to reap the rewards of past investments. A sampling of these recent advances includes:

The use of medical therapy to prevent recurrent stroke in people without cardiac risk factors

As described above, past clinical studies provided important information about preventing recurrent stroke in people with cardiac arrhythmias. However, it has been difficult for physicians to choose between aspirin and warfarin for patients who do not present with cardiac risk factors. To help address these questions, another large clinical trial—the Warfarin versus Aspirin Recurrent Stroke Study (WARSS) was initiated with NINDS support. More than 2000 individuals with a history of stroke unrelated to cardiac problems participated in this study, with equal groups receiving aspirin and warfarin. After two years of treatment, there was no significant difference in the prevention of recurrent stroke or death, or in the rate of brain hemorrhage, in the aspirin and warfarin groups. This finding will likely have a major impact on the standard of care for this group of stroke survivors, since aspirin is considerably less expensive, safer, and easier to administer than warfarin.

The use of the "warning signs" of stroke to aid in prevention

Recently, NINDS-funded researchers evaluated the risk of stroke after a transient ischemic attack (TIA), or "mini-stroke." The symptoms of TIAs pass quickly, within a day or even hours, and are often ignored. After following 1700 people with a TIA, the study found that these episodes warn of a dramatically increased likelihood of experiencing a stroke within the subsequent 90-day period. Other risk factors, such as advanced age, other health conditions, and severity of the TIA, also helped to predict stroke risk, and may be useful in determining whether patients should be hospitalized immediately and/or receive preventive interventions following a TIA.

The development of clinical tools that can be used to predict stroke recovery

In order to offer clinicians the best possible methods for evaluating patients after a stroke, intramural investigators at NINDS have explored the types of clinical measurements and diagnostic tools that might be used to predict how well a person will recover from a stroke. They found that the combined use of a unique type of magnetic resonance imaging, the score on the NIH Stroke Scale—a diagnostic tool developed at NINDS for evaluating stroke patients, and the time from the onset of symptoms to the brain scan, can effectively predict the extent of stroke recovery. Future studies will focus on the potential of computerized tomography (CT) scanning to predict recovery as this is a technology more commonly available in most hospitals. We expect that all of these tools will help physicians manage patients more efficiently and reduce distress and anxiety among patients and their families.

Brain plasticity

Over the last several years research has revealed the remarkable extent of brain plasticity—that is, the capacity of the brain to change in response to experience or injury. Scientists are now using brain imaging techniques that reveal the activity of brain cells, as well as structure, to understand why some patients recover lost abilities following stroke and others do not. In other efforts, researchers are trying to apply what has been learned about brain plasticity to encourage stroke recovery through a method called "constraint-induced therapy." This therapy involves constraining an unaffected extremity while actively exercising the affected one, thereby inducing use-dependent brain reorganization.

The use of stem cells to treat stroke in animal models

Stem cells are immature cells that can multiply and form more specialized cell types. Recent animal studies have provided evidence that transplanted stem cells can help restore brain function after stroke. Other animal research suggests that the adult brain may itself have a latent capacity to regenerate new cells following stroke, which might be encouraged in efforts to repair the brain. The continuing efforts to develop these approaches to restoration of function in survivors of stroke build on active NINDS support to understand the basic biology of animal embryonic stem cells and adult human stem cells. Within the President's policy guidelines, the

Institute is encouraging research to evaluate the capabilities of human embryonic stem cells.

CURRENT STROKE INITIATIVES

The generous appropriations provided by Congress have made it possible for us to expand our programs in stroke, and we are grateful for the opportunity. Since the doubling of the NIH budget began in FY 1999, the Institute has initiated many new clinical and basic science projects. Currently, the Institute is supporting 14 Phase III clinical trials in stroke, eight of which have been initiated since the start of the doubling effort. Even more importantly, the doubling effort has enabled NINDS to fund 17 Phase I and II clinical trials in stroke. These numbers are impressive and indicate that many novel prevention strategies, therapeutic interventions, and rehabilitation techniques for stroke are closer to the clinic as a result of the significant investments in NIH over the past several years. Areas of clinical research that are under exploration include the use of hypothermia to improve outcome following aneurysm surgery, the use of magnesium to treat stroke, and improvements in stroke imaging techniques. Several studies, including research in the NINDS intramural program at the NIH Clinical Center, are examining various strategies for rehabilitation after stroke including the use of constraint therapy, exercise, anesthesia, and electrical stimulation to improve functional recovery.

NINDS also continues to be committed to exploring stroke at the basic science level, and has provided funding for many new projects since the doubling effort began. These include studies of procedures and drugs that may protect the brain against further injury, a possible vaccine for stroke, the role of inflammation, the expression of genes and proteins in response to stroke, and pre-clinical testing of therapies—just to name a few. Cellular "communications" between blood vessels, neurons, and glia, and the role of the blood-brain barrier, are also subjects of intense interest. In addition to studies specifically targeted to stroke, NINDS also provides support for many areas of basic neuroscience research that have broad applicability to stroke and other brain injuries. These include mechanisms of cell survival and death, neural growth factors, stem cell therapy, neuronal plasticity, and glial cell biology.

In addition to the investigator-initiated projects that make up the core of our grant programs, NINDS is constantly looking for understudied areas in stroke research that the Institute could address through the use of targeted initiatives. Several years ago, NINDS identified a need for acute stroke centers, and in May 2001, we issued a grant solicitation for Specialized Programs of Translational Research in Acute Stroke (SPOTRIAS). The goal of the SPOTRIAS program is to reduce disability and mortality in stroke patients, by promoting rapid diagnosis and effective interventions. It will support a collaboration of clinical researchers from different specialties whose collective efforts will lead to new approaches to early diagnosis and treatment of acute stroke patients. In its report language for the Institute's FY2001 appropriation, the Senate also encouraged the creation of acute stroke research or treatment research centers to provide rapid, early, continuous 24-hour treatment to stroke victims, and noted that a dedicated area in a medical facility with resources, personnel and equipment dedicated to treat stroke, would also provide an opportunity for early evaluation of stroke treatments. The SPOTRIAS program is responsive to the recommendation highlighted by the Senate. Institutions supported under this program must be able to deliver rapid treatment for acute stroke and to conduct the highest quality translational research on the diagnosis and treatment of acute ischemic and hemorrhagic stroke. They will also help to recruit and train the next generation of stroke researchers. The SPOTRIAS initiative will facilitate the translation of basic research findings into clinical research, and ultimately, the incorporation of clinical research findings into clinical practice. The first two centers have recently been approved for funding under this program, and as more centers are added, it is expected that they will form a national network that will lead to significant changes in the care of stroke patients.

On a more local level, NINDS is also developing the "Acute Brain Attack Research Program" in the Baltimore-Washington Area. This effort has already established a 24-hour stroke research program in diagnosis and treatment at Suburban Hospital in Bethesda, Maryland, and our plan is to replicate this program in other medical facilities in the Baltimore-Washington metropolitan area, next targeting those serving predominantly inner city minority populations.

STROKE RESEARCH PLANNING

While a significant knowledge base about stroke has been amassed through research supported by the NINDS, continually emerging discoveries and new tech-

nologies create constantly increasing research needs and scientific opportunities. Coupled with the increases in the NINDS budget as a result of the recent NIH doubling effort, it is necessary to identify clear scientific priorities, so that the Institute can determine the best uses for its resources. Such priorities will also serve as benchmarks for the broader scientific community against which progress can be measured. NINDS convened a Stroke Progress Review Group (Stroke PRG) to identify priorities in stroke research. The Stroke PRG had its origins in Fiscal Year 2001 report language from the House and Senate Appropriations Committees to the NINDS urging us to develop a national research plan for stroke. Following on the success of the Brain Tumor Progress Review Group, a joint collaboration between NINDS and the National Cancer Institute to identify priorities for research on brain tumors, NINDS decided to use a Progress Review Group to develop a plan for stroke research. Members of the Stroke PRG include approximately 140 prominent scientists, clinicians, consumer advocates—including leaders from the American Stroke Association and the National Stroke Association, industry representatives, and participants from other NIH Institutes. Together, these individuals represent the full spectrum of expertise required to identify and prioritize scientific needs and opportunities that are critical to advancing the field of stroke research.

At the Stroke PRG Roundtable meeting in July 2001, and in many subsequent discussions, the Stroke PRG report was developed—a comprehensive document that identifies the national needs and opportunities in the field of stroke research. The final draft of this report was submitted for deliberation and acceptance by the National Advisory Neurological Disorders and Stroke Council in February, and the final report was published in April 2002. The PRG report will be widely disseminated to the stroke community, and is available online at www.ninds.nih.gov (Search: Stroke PRG); copies were provided to the Committee earlier this week.

Several areas of scientific need are identified in the Stroke PRG report, but five consensus priorities emerged from the PRG:

- bIdentification of the genes and proteins that contribute to stroke;
- An improved understanding of the relationship of blood, blood vessels, and brain tissue;
- A better appreciation of how blood flow is regulated and how it can be improved after stroke;
- The development of combination therapies based on molecular and cellular pathways of injury; and
- A better understanding of the neural mechanisms that regulate recovery after stroke.

Participants also identified a number of scientific resource needs including:

- Access to new technologies that allow for large numbers of genes or proteins to be analyzed simultaneously;
- Improved animal models of stroke that better simulate the human disease;
- Improved methods of imaging the brain;
- Improvements in clinical trial design and methods;
- Development of a network of stroke centers;
- A national database that would capture information on the burden of stroke; and
- Better education and training for clinicians in the care of stroke patients.

The full PRG report expands on all of these issues, and provides in-depth analysis of the status of 15 different fields of stroke research. As we move forward from the planning process into the implementation phase, the Stroke PRG members will work with NINDS staff to "map" the Institute's current stroke research efforts to the recommendations of the report. Using this approach, we will be able to identify existing research gaps and resource needs, and to incorporate these into a formal implementation plan.

HEALTH DISPARITIES IN STROKE

NINDS recognizes that stroke is one of several neurological disorders that has a disproportionate effect on minority and underserved populations. For example, African Americans are twice as likely to die of stroke or complications from stroke as people in any other racial or ethnic group in the country, and Hispanics have a stroke rate two times higher than that of Caucasians. For this reason, we have identified stroke as a critical health disparities issue in several Institute planning efforts: health disparities in stroke was considered as an over-arching issue by the Stroke PRG panel; stroke is one of the top research priorities in the NINDS Five-Year Strategic Plan on Minority Health Disparities; and the Institute is also in the process of establishing a planning panel that will specifically address health disparities in stroke.

The NINDS is also working to establish prevention/intervention research networks throughout the extramural community, particularly in regions of the "Stroke Belt," an area in the Southeastern U.S. with stroke mortality rates approximately 25 percent above the rest of the nation. The goal is to foster stronger linkages between investigators at minority and majority institutions and community-based organizations in order to improve minority recruitment and retention in clinical studies—as one way of addressing health disparities. As part of this program, NINDS, working with the National Heart, Lung and Blood Institute (NHLBI) and the National Center for Research Resources, is developing the "Stroke and Cardiovascular Prevention-Intervention Research Program." The pilot phase of this program is at the Morehouse School of Medicine in Atlanta, Georgia.

In addition to these programs, NINDS supports a number of ongoing clinical projects that specifically address stroke in minority populations, including a new study that will examine the phenomenon of the "Stroke Belt." In this study, the role of geographic and racial differences as contributors to differential mortality rates will be examined and risk factors estimated. We are also engaged in targeting special public education efforts to minority populations, as I will describe later in my testimony.

STROKE IN WOMEN

In addition, we recognize that stroke is a major health problem for women. To address this critical research area, NINDS is supporting studies that will help us to better understand gender differences in stroke. Specific projects include a clinical study to determine if hormone replacement therapy affects stroke severity, and a study examining blood flow in the brain and the role of female hormones in protecting brain tissue during ischemia. In all clinical trials, we ensure that appropriate numbers of women are enrolled, and many of these trials involve specific analyses to examine the effects of the intervention tested in the female participants. For example, we are currently supporting a clinical study that is comparing the efficacy of two procedures—carotid endarterectomy and carotid stenting—that unblock a clogged carotid artery in the neck, a significant risk factor for stroke. Previous research has shown that women may not benefit from carotid endarterectomy as much as men do, so one facet of the trial will examine gender differences in these procedures.

EDUCATION AND OUTREACH PROGRAMS

NINDS recognizes that supporting research into new prevention strategies and treatment options is only part of the battle in reducing the health burden of stroke. Helping people to recognize that they are having a stroke, so that they can seek help immediately, is a critical first step. To address this problem, the NINDS directs an extensive health promotion effort to raise awareness of the signs and symptoms of stroke, the need for urgent action if experiencing a stroke, and the possibility of a positive outcome with timely hospital treatment.

In May 2001, the NINDS launched the "Know Stroke. Know the Signs. Act in Time" campaign, a multi-faceted public education campaign to educate people about how to recognize stroke symptoms, and then to call 911 to get to a hospital quickly for treatment. The campaign's target audiences are those most at-risk for stroke—primarily people over the age of 50—and their family members, caregivers and health care providers. Because stroke attacks the brain, a stroke patient often cannot act alone to call 911 and seek medical treatment, so bystanders are integral to acting quickly and getting stroke patients to the hospital. For this activity, the NINDS developed a wide variety of public education materials including airport dioramas jointly sponsored with the National Stroke Association, billboard displays, an award-winning eight minute film, consumer education brochures, exhibits, and new radio and television public service announcements (PSAs). All indications are that the "Know Stroke" campaign has been extremely well-received and effective. The television PSA garnered more than 87 million viewer impressions and hundreds of thousands of dollars worth of free broadcast time; the radio PSAs received more than 46,000 broadcasts on 272 stations; the airport dioramas received more than 800 million annual impressions; and thousands of nursing homes, hospitals, senior centers and other organizations have received consumer education materials.

All of our public education strategies are designed to increase awareness of stroke. However, since the problem of stroke is even more acute in the African American and Hispanic communities, some are targeted to specific at-risk minority communities. These campaigns started with outreach to the media in May 2002 for Stroke Awareness Month and, in the coming months and years, will include public service advertising and grassroots community education components. NINDS also co-spon-

sored a "Stroke Sunday" program in October 2000, with the American Stroke Association and the Black Commissioned Officers' Advisory Group of the U.S. Public Health Service. This program was led by the former U.S. Surgeon General, Dr. David Satcher, and I participated on behalf of the NINDS. Held at a Rockville, Maryland church, the event was designed to bring attention to the major impact of stroke in the African American community and to help inform participants about reducing their stroke risk.

NINDS also participates in "Operation Stroke," a coalition of health care professionals, allied health providers, civic leaders and representatives of community organizations for stroke education. This effort is being coordinated by the American Stroke Association, and is aimed at the public as well as medical professionals. An intramural investigator at NINDS, who is a stroke clinician, is chairing this coalition in the greater D.C. and Maryland suburban areas.

Finally, NINDS has held several meetings and workshops to help educate health care professionals about advancements in stroke research, like t-PA. For example, our Institute held a major national scientific meeting after the publication of the t-PA study that involved more than 400 medical professionals. We plan to convene another conference later this year to revisit stroke treatment, and to explore how more people can be encouraged to recognize stroke as an emergency medical situation. The Institute hopes to use this symposium to educate healthcare professionals about the benefits of early treatment for all stroke patients. In addition, NINDS scientists speak at medical meetings all over the country in order to educate physicians about effective stroke care, and our grantees produce educational videos and offer continuing medical education courses on proper administration of t-PA. To complement these efforts, NINDS also distributes free copies of the NIH Stroke Scale.

PARTNERSHIPS

As part of our ongoing prevention efforts, we have formed collaborative relationships with other NIH Institutes and federal agencies, and numerous voluntary organizations. NINDS coordinates the Brain Attack Coalition—a group of professional, voluntary, and government groups dedicated to reducing the occurrence, disabilities, and death associated with stroke—to increase awareness of stroke symptoms. To encourage improvements in stroke care, the Brain Attack Coalition published an article in June 2000 designed to help physicians and hospitals set up stroke centers.

In February 2001, the NINDS signed a memorandum of understanding (MOU) with NHLBI, the Centers for Disease Control and Prevention (CDC), the HHS Office of Disease Prevention and Health Promotion, and the American Heart Association to foster cooperation in reaching the heart disease and stroke goals for the nation articulated in the Healthy People 2010 initiative. These goals include: the prevention of risk factors for cardiovascular disease (CVD) and stroke; the detection and treatment of risk factors; the early identification and treatment of CVD and stroke, especially in their acute phases; and the prevention of recurrent CVD and stroke, and their complications.

In order to achieve these goals, we will work with the participating partners on focused initiatives such as population- and community-based public education and health promotion programs; activities to bring about improvements in the nation's cardiovascular health care delivery systems; media-based public awareness campaigns about the warning signs and symptoms of heart attack and stroke; promoting professional education and training, and other activities. CDC has already used our public education materials in cooperation with their networks, and we are enthusiastic about this partnership, and anticipate that it will continue for the next several years.

NINDS is also participating in the development of a comprehensive National Action Plan for Cardiovascular Health—A Comprehensive Public Health Strategy to Combat Heart Disease and Stroke. This planning process was initiated last year by the CDC. It will chart a course for the CDC with the states, territories and other partners—including public health agencies, health care providers, and the public—for achieving national goals for heart disease and stroke prevention over the next two decades. The pillars of this public health strategy incorporate the three core functions of public health: assessment, policy development, and assurance.

CONCLUSION

NINDS has made, and continues to make, significant contributions to the achievements in stroke prevention, treatment, and rehabilitation, and we are extremely proud of our accomplishments. However, the incremental nature of progress in stroke prevention has confirmed that there is no easy route to success. There are

still difficult challenges to be addressed, and we have invested more than a year in gathering recommendations from the best clinicians and researchers in the field, as well as our committed partners in the advocacy community, in order to help us make the best use of our resources.

Our planning efforts tell us we must continue to pursue, in parallel, several areas of basic, translational, and clinical research that may have an impact on stroke. We must find better ways to prevent strokes before they occur. We must improve upon and encourage acceptance of pioneering diagnostic tools and acute treatments for when stroke happens. We must capitalize on the prospect, for the first time, of actually repairing the brain damaged by stroke and recovering function. The broad portfolio of NINDS research on stroke offers a glimpse of what the future might bring—the possibility of vaccines, genetic tests to tailor preventive measures for each individual, studies that may link infections or inflammation within blood vessels to stroke, biological markers that could aid in the identification of stroke risk, and new information about how chronic stress and hormones may affect susceptibility to stroke damage. Encouraged by the recent progress in neuroscience, guided by extensive and inclusive planning, and enabled by the support from Congress, I assure you that NINDS is committed to pursuing all of these opportunities to alleviate the devastating effects of stroke on our society.

Thank you again for the opportunity to speak with you today. I would be happy to answer any questions you may have.

Mr. BILIRAKIS. Thank you very much, Dr. Penn.

I will start off the questioning. First of all, by the way, the bookmarks that you referred to are back at that rear table.

Ms. PENN. Yes.

Mr. BILIRAKIS. They are in English also? The one that is available up here is in Spanish.

Ms. PENN. Yes, there should be two sets.

Mr. BILIRAKIS. Good enough.

I guess this question may be for both of you: The Department of Defense, as we know, has also invested, Dr. Lenfant, significant dollars in blood research. So they are conducting blood research also. We have represented here today by the two of you two institutes, the Institute of National Heart, Lung, and Blood Institute, your institute as well as Dr. Penn's institute.

So I guess my question goes to coordination. It is something that has always concerned me. Maybe I am placing too much emphasis in my own mind on that, but there's Veterans' Administration research, Department of Defense research, similar type of research by your two institutes. My question goes to coordination.

Is much duplication taking place? Is that duplication, if it is taking place, necessary? In order to reach the ultimate result, is some duplication a necessary evil, if you will, if I can call it that? What coordination takes place among the institutes with other departments of the government, et cetera, university research, all that? Yes, sir?

Mr. LENFANT. I think the varieties of cooperation and collaboration are many, and I would say ideal. First of all, Mr. Chairman, we are all on the same campus. We bump into each other all day. So we have this free-wheeling discussion about topics and whatever.

But there are, as Dr. Penn mentioned to you, some formal ways to do it. For example, a few months ago, our two institutes signed a Memorandum of Understanding to assure our corroboration and cooperation in areas of mutual interest. But, furthermore, not only do we do it with the two of us, but we worked with the American Heart Association and other agencies of the government such as

CDC. There was also the Office of Prevention from the Department, and we discuss things.

If you are looking at the initiatives which are issued by NIH, that is, new programs which are initiated, you probably would be amazed to see that there may be as many as 10 institutes sponsoring one program. We all contribute the technical contributions, technical support, but also monetary support.

Mr. BILIRAKIS. How do you tie into other departments, the VA, the Defense, the universities?

Mr. LENFANT. I will go into that. With the VA, we have many cooperations. In fact, we have a number of joint studies in our institute with the VA. You mentioned blood safety earlier. We do have exchange of information. In fact, I believe—and I would have to verify that—but I believe that we have a project on blood safety and substitutes that is, quote/unquote, artificial blood. We have programs which are jointly supported between our institutes and the Department of Defense. So there is a lot of cooperation.

The idea is that you want enough in the open so that people know about it. We cannot, with the rules of NIH, we cannot issue a new program, initiate a new program, without posting it for, I believe it is, 2 weeks for anyone to see it, and to indicate its intents, that is, another institute or somebody else. That happens all the time.

We could probably do more.

Mr. BILIRAKIS. Does that information get to the other departments in some way? Does it become known to the universities?

Mr. LENFANT. The NIH publishes widely on the Internet and I believe also on paper all the things which are being developed.

You also asked about the academic community. Most, not to say all, of the things which are initiated, new programs, by the National Institutes of Health, and certainly by our two institutes, are actually the result of deliberations and discussions and debates, I should say sometimes, with the scientific community. In fact, we do have an obligation, either by rule or legislation—I must admit I don't know which one it is—but to basically seek the support of our national advisory council, which is made up of representatives of the public as well as the scientific community, before we can start the new programs.

Mr. BILIRAKIS. Well, my time has expired.

Mr. LENFANT. I'm sorry.

Mr. BILIRAKIS. Dr. Penn, if you wanted to take 30 seconds or a minute to maybe expand upon what Dr. Lenfant said?

Ms. PENN. I would say it depends somewhat on what kind of science or medicine you are trying to drive. In the case of issues actually of a particular type of therapy for Parkinson's disease, we are working with the Veterans' Administration, also through a Memorandum of Understanding between the two agencies, because they have patients that the general academic health centers don't have. They started this, and they asked us to work with them. We helped design this large clinical trial of deep brain stimulation. So that is one example.

Another example depends somewhat, as Dr. Lenfant just said, on who the investigators are, and the investigators really do work both through the Department of Defense, some of them are in the

VA system; some of them are coming to us for grants. We just have to—you know, we know who is getting support from whom. In some cases, such as the prion diseases that Mr. Brown referred to, we have an action plan in the Department, which involved all the institutes as well as several other units of HHS. That really did require collaboration, and that was not overlap. The prion diseases are a major problem or potentially a major problem.

Mr. BILIRAKIS. So I am unduly concerned then? I am unduly concerned about that problem? There isn't that much duplication?

Ms. PENN. Well, we do talk to each other first, is what I am getting at.

Mr. BILIRAKIS. Thank you.

Mr. Brown?

Mr. BROWN. Thank you, Mr. Chairman.

I think that probably Members of Congress, when they look at NIH and look at CDC, they think of, first of all, they fund NIH to the tune of about $4, $5 for every dollar that Congress funds CDC, and there are a lot of reasons for that. One of them, I think, is that all of us know people that have awful diseases in our families, our friends, our constituents. NIH is a terrific agency responding to those challenges.

Most of us don't know, frankly, because of the way we live our lives and run our offices, don't know a lot of people that are poor, where CDC, which is not an agency only for the poor, but an agency that seems to be that to many people in this body. I think of NIH, I think of both CDC and NIH as public health agencies. I am not sure you would characterize yourselves that way, but you are a public health agency in the sense that you respond to health demands, to public health demands, in terms of basic research, sometimes in the case of Taxol more than simply basic research.

But your charge in many ways, in my mind, is that when neither the private sector in terms of antibiotics, as an example perhaps, and a host of other awful developing world illnesses where there is not much money for private pharmaceutical—not much monetary incentive for private pharmaceutical companies to respond, or in the sense of sometimes the public where we didn't respond publicly quickly enough, to the public sector, on something like coming up with responses to the awful AIDS epidemic.

So my questions is, how does NIH respond when it is clear that a medical need is not being sufficiently addressed? Do you see your model in part the way that the Department of Defense's Walter Reed took it upon themselves, with little private involvement and private money, simply to develop malarial drugs and not exactly go to market with them, but really develop them almost in toto—do you see your role fulfilling a public need in that way?

How poorly we have done developing antibiotics, how we haven't done well enough in malarial vaccines, how we haven't done well enough for—I know less about this—but river blindness and various awful Third World diseases that none of our constituents will have, and certainly nobody that dresses the way I do will probably have.

Not that I dress that well. I have heard from several people how ugly this tie is, but because it is from Children's Hospital I get a break on it.

Go ahead.

Ms. PENN. The mission of the National Institute of Neurological Disorders and Stroke is to apply research in basic neuroscience to solving our major disorders. We, obviously, focus on disorders of the central and peripheral nervous system, and to some degree muscles. So muscular dystrophy is in there.

So we look for opportunities by looking, on the one hand, at the scientific opportunities that are there that our basic scientists and our clinical scientists are providing us, and then saying, okay, how can we move this into the clinic? We don't go so far, necessarily, as to start by saying—well, we do say we want to treat this. This is underserved or not treated well or it has got way too many side effects. We could do that.

But we concentrate really—and it is becoming increasingly clear to all of us—that we have to do the translational research. So that we are right in the middle of taking the mechanisms and saying, okay, if you tweak this or you do that, you are going to get a therapy. Then we have to least start to work out the therapy and say, it's safe; it isn't safe; how much do you need, and all of this.

At some point in there we do have to talk, and we often do, to small or large pharmaceutical companies because they are going to finally make this drug and market it. I am really not into what they do. We leave it a lot to the NIH Office of Technology Transfer, as you mentioned.

But we do look, and sometimes get a little concerned, as all citizens do, about how things are being done in terms of delivery of care and all of that, but we are really into taking the science, making sure the science is done, making sure the science—some of our science is really purely at the bench and purely doesn't seem to be related to anything, but sooner or later it is. It is amazing how much it is. We think that is the key, to figure out where, all of a sudden, okay, that breakthrough is going to work on that.

Mr. BROWN. But the other key is when there is not private sector incentives. There apparently hasn't been in antibiotics, and with multi-drug resistance. Was NIH taking—not your institute, but NIH as a whole—taking on that public burden?

Ms. PENN. I would just say this is not something we think of first; we really don't. But, I mean, sooner or later, we do have to consider that.

Mr. BROWN. But your charge as a public health agency needs to be broad enough, as we have just piled on money for you—to think of doubling the budget over 5 years, when of course there are untold number of scientific opportunities and thoughts and proposals and ideas and ideals, but we need not you and necessarily your institute, but the NIH as a whole needs to think what ultimate, not just basic scientific research, but what ultimate public goals do you have.

When you see antibiotic resistance, you see what happens with TB, you see we are going back to the 1940's and 1950's antibiotics, which have terrible side effects, that people have to take for 2 years to treat multi-drug-resistant TB, as it is getting worse and worse, there is a public need there that the drug industry probably won't address, and who else will if not you with a doubled budget? Just comment.

Mr. BILIRAKIS. Yes, a brief comment to that.

Mr. BROWN. Dr. Lenfant, if you——

Mr. LENFANT. Yes, I would like to add to what Dr. Penn has said. I cannot speak about antibiotics because that is not something that we are doing and are involved with. But what I can say to you, Mr. Brown, is that there are medications which have the potential to have an effect on disease. Well, let me put it this way: on diseases which basically are not on the label of the medication. You can be sure that the pharmaceutical industry will not engage in exploring the whole possibilities that one medication may offer.

In our institute we initiate many clinical trials, and the reason we do it, it is basically because we know that industry will not do it, either because, if it is done, it may not have enough impact and the business aspect is small to get into that, but we take it. In effect, we know that there are some significant benefits which are given to the public and the patients by this kind of approach to explore what it is and investigate what it is that is not being done by the industry, for whatever reason they may have, which may be business, which may be—I don't know what it is, sometimes liability issues. We have the capability to do it, and we do it.

Mr. BILIRAKIS. Would you say that you speak for the NIH as a whole?

Mr. LENFANT. I believe—well, you know, I can tell you at least one institute that I know a little bit better than most, it is the Cancer Institute. I know that the Cancer Institute has a drug development program which is extraordinarily active. Basically, I suppose if the industry would do it, they would not have that program. I am sure that there are many other examples with regard to NIH.

Mr. BILIRAKIS. Well, thank you. I am not sure that Mr. Brown is completely satisfied, but we've really got to go on.

Mr. BROWN. Thank you.

Mr. BILIRAKIS. But it is a good start.

Mr. Deal, to inquire?

Mr. DEAL. Thank you, Mr. Chairman.

As I understand it, each of you represent 27 institutes or centers under the umbrella of NIH. I would like to find out how the operational activities take place within each institute. Could you give me an idea, first of all, as to what percentage of the research is done through extramural grants as opposed to in-house research? And what process do you use to determine to whom those extramural grants will be given? Do you have a review panel within each institute, I assume? Is that review panel made up of people from the outside who are recognized experts? Would you elaborate on those two areas? First of all, how much is done in-house versus grants, and how do you decide how the grant process is going to work?

Mr. LENFANT. Well, okay, let me take it. These are very important questions.

Let me say that, as a rule, the amount, the fraction of the total NIH budget which is for intramural research is pretty much fixed. I think the average for the NIH as a whole is 11 percent. Eleven percent of the total is intramural. It varies greatly. My institute is the one with the smallest intramural budget. It is, I believe, 6 per-

cent, but of course it is 6 percent of $2.7 billion. So it is a significant amount of money.

It varies. It may go up and down a little a bit, but not significantly. But years ago there was a review of the intramural programs, and the decision was made by all of us that we would pretty much limit our intramural research to that amount for the corporation.

Now the extramural research is, indeed, all decided by a peer review process. Applications for grants are all coming into a central place at NIH. That place has two responsibilities. The first one is to assign them to one of the institutes. Say, for example, something comes on strokes, depending on what it is going to be specifically, it may go here or it may go here.

Now once the application is assigned, it does not come to my institute until it has been reviewed, evaluated independently of me and my staff. The people who are going to do that are people from the institutions which are in all of the States that you are from. So it is a independent peer-review process.

What they do, they give a numerical score, 100 being the best, 500 being the worst. By and large, these things are funded on the ranking of the score that you have received.

Ms. PENN. Right. We have to follow the NIH guidelines for the intramural program. It has its own review committee made of external experts that come in three times a year to look at—the same cycle as extramural—how 4 years of work has proceeded. It is at least as tough as any academic tenure committee or worse. So people really have to show that they have done good work, really good work, and that they are fulfilling the mission of the institute in what they are doing.

Our intramural program has a set of units, laboratories, that have to do with clinical research and another set that have to do with basic laboratory research, all in related neuroscience aspects. The extramural is exactly as Dr. Lenfant described. We receive, following assignment by the Center for Scientific Review, grants that will then—we just know they are there, and we monitor until they have gone through the review process.

Study sections are the review process. That is the other name for these committees. The set up and the organization of the Center for Scientific Review has recently been looked at by a star committee of outside experts, looking at whether they have the proper sets of science covered. I would say we all, all the institutes, through central NIH, contribute to the funding of the Center for Scientific Review. But it is critical that they are peers, but they are not in any way run by our institute or Dr. Lenfant's institute.

Mr. DEAL. Just a real quick question: During the course of the 4-year grant period—as I understand, it is usually 4-year grant periods—what oversight is exercised by the respective institutes over what is being done in these research projects? Could you give us some idea of what percentage may be renewed after an initial 4-year period?

Mr. BILIRAKIS. Please try to answer the question, but try to be as brief as you can.

Ms. PENN. Be as brief as possible.

Mr. BILIRAKIS. I will tell you why. We are going to have another, I will call it, nonsense vote in a few minutes. So we are trying to get through——

Ms. PENN. Quickly, both institutes have a group of extramural persons who are all scientists, or who are physicians themselves, who work on different parts of this program and are experts, pretty expert in the topics. They keep an eye on their particular set of people with grants. They are charged to review the progress every year to sort of let them know when they are not doing anything, and then to decide whether they possibly would get some kind of monetary supplement or not. But it is really monitored very carefully.

Mr. LENFANT. Yes, I can only echo what has been said. There are some instances where actually your progress is not deemed to be satisfactory, and there are some consequences which may be from reducing the budget to in some instances, very rare, I have to say, but sometimes to basically closeing the grant.

Ms. PENN. It varies, but it is somewhere between, I guess, 25 and 40 percent are successful on the first pass on their renewal. This is, I think, your question.

Mr. DEAL. Thank you.

Mr. BILIRAKIS. I thank the gentleman. Mr. Stupak?

Mr. STUPAK. Thank you, Mr. Chairman.

In the NIH, you are required to transfer new biomedical technologies to the private sector for further research and commercialization and development. Also, Congress intends that NIH research will lead to new products such as diagnostics and vaccines.

My question is, how far along do you go in developing new vaccines? Do you work with the pharmaceutical companies? Do you say, "Look, we have an idea that this is where we think it should go. Here's the idea. Take it from here."? How do you do it?

Ms. PENN. The vaccine program, all of it pretty much, is under—except for very unusual new cases in Alzheimer's and potentially even in stroke—but most of the vaccines for infectious agents are in the hands of the National Institute for Allergy and Infectious Disease and the Vaccine Program, including the one for HIV/AIDS.

When something is developed, we do talk to industry, or industry may be developing something also. There comes the NIH Office of Technology Transfer. I mean, we do monitor, they do monitor, they do come in and talk at various of our committees. They are always involved in all these groups that I talked about because they are very interested, obviously. I mean they are really interested in fixing diseases, too.

Mr. STUPAK. Okay, you say, well, here comes your Office of Technology, and you work with them. You transfer that to, let's say, the pharmaceutical company——

Ms. PENN. Yes.

Mr. STUPAK. [continuing] to develop whatever the vaccine may be, correct?

Ms. PENN. Yes. I mean, they are the group that handles things like intellectual property, things like, you know, we don't always take brand-new ideas because the brand-new ideas are really—our investigators have developed the brand-new ideas most of the time.

Mr. STUPAK. Okay.

Ms. PENN. But it is a very active component of our intramural program, where our investigators really are us, and they are developing new technologies, diagnostics, and drugs.

Mr. STUPAK. Okay. Then in response to Representative Brown's question, you mentioned clinical trials. Are you involved in the clinical trials as these new vaccines are developed?

Mr. LENFANT. I would assume that the answer to that is yes, but again——

Mr. STUPAK. Well, I don't want you to assume.

Mr. LENFANT. Neither our institute nor Dr. Penn's institute are involved with vaccine and drug developments, especially antibiotics. So it is a bit difficult for us, at least for me, to tell you what another institute is doing.

Mr. STUPAK. Okay. If we assume for the sake of discussion here this morning that you do do the clinical trials, do you do post-marketing surveillance on drugs then after they have been on the market?

Mr. LENFANT. I mean, if I understand the question, if clinical trials were said to assess the possibility of a new application of a medication of some sort, we work very closely with the FDA. Basically, any event, good or bad, that may occur during that process is reported to the FDA.

Mr. STUPAK. Sure. Well, we all are painfully aware up here that FDA doesn't do post-marketing surveillance on drugs, or very little, if any. So my question, I was wondering if you did then.

Mr. LENFANT. Post-marketing?

Mr. STUPAK. Yes.

Mr. LENFANT. No, not post-marketing. We don't have the authority to do it. We are not a regulatory agency.

Mr. STUPAK. Pardon?

Mr. LENFANT. We are not a regulatory agency. We do not have the authority to do it.

Mr. STUPAK. Oh, I agree, but you are also a public health agency, as we established earlier. It would seem to me, if you helped to produce a vaccine or a drug an do clinical trials, you would really want to know what happens once it is out in the real world, and would probably do some post-marketing surveillance or work with the drug company, whoever it may be, who is making this vaccine, to make sure that the good intentions that you had in producing or going down this route is actually being fulfilled in the real world.

Mr. LENFANT. Well, these events are not reported to us.

Ms. PENN. Not in that way.

Mr. LENFANT. If you ask about adverse events that are in the post-marketing phase, I think they probably appear in the newspaper long before they come to us actually. I am not being flippant about it.

Mr. STUPAK. I just think of the recent publicity around the drug Lariam which they indicated that NIH helped to develop. That is to fight malaria. There's been some side effects on it, mental health, especially some suicide. In the articles I read, NIH was more or less protecting the quality of this drug.

But if you are telling me you don't do the post-marketing surveillance and it is not really your job, and it is not important, I cer-

tainly would think it would be important to all those people who may have been harmed by a drug. While it might help you out with malaria, but Lariam also has some side effects that, if the FDA isn't doing the post-marketing and you are not doing the post-marketing, who in the heck is?

Ms. PENN. Now I would add that, of course, we work with our investigators in academic medical centers who are then using this drug. Not only will it come out in the newspapers, it will come out in medical journals. We certainly would hear.

Now the question then is still, who's got the responsibility? We really don't. We don't like what is happening. Actually, our best drugs have a lot of side effects.

Mr. STUPAK. Yes, they have a lot of side effects, and they are out in the general public. They are not in the academic world or the research world anymore, and the people who are suffering are the people who don't have the scientific background, medical expertise, and we look to NIH when we double your budget and FDA to do it. If you don't do it and FDA doesn't do it, the pharmaceutical companies aren't doing it, who has to do it then?

Ms. PENN. I hear you.

Mr. BILIRAKIS. The gentleman's time has expired.

Dr. Penn, following up, you say it is not part of your responsibility, but if you wanted to do it, could you do it? I realize you don't have the regulatory authority.

Ms. PENN. Yes, we simply don't have the authority.

Mr. BILIRAKIS. You don't have the authority to do it even if you wanted to?

Ms. PENN. No. Our Program Director certainly and our staff, we are all aware when something that we have invested a lot of time and effort, and we think it is going to work, and then it goes out—this is true, for instance, of some anti-convulsants, anti-epilepsy agents, and we have a big program for that. If something goes out, the best possible studies we thought were done, and then a side effect occurs, then we would get the investigators to look at it again. Actually, we found out why Felbamate gave a hepatic effect, that kind of thing.

Mr. BILIRAKIS. Dr. Norwood, to inquire.

Mr. NORWOOD. Thank you very much, Mr. Chairman. I would like to state at the outset that probably NIH is one of our most important national resources, and I am happy to be part of the group that doubled your funding. I know ever since I have been here we have increased NIH funding almost every year, but that does, then, lead us into the realm of being responsible to some degree for that funding.

I just want to follow up on some of the questions that have been asked. For example, Congressman Deal asked you the question of what percent of your research is done in-house, and I would like to know the answer to that.

Mr. LENFANT. Well, Mr. Norwood, as I indicated, for the NIH as a whole, it is 11 percent of the budget, 11.

Mr. NORWOOD. Percent of the budget goes for in-house research?

Mr. LENFANT. Correct. Correct. And that varies from institute to institute.

Mr. NORWOOD. But, in general, the average is 11 percent?

Mr. LENFANT. Correct.

Mr. NORWOOD. I understand. Would you describe for me, briefly, because I think I have lost my way, not you, what is the simple mission statement of NIH?

Mr. LENFANT. It is to do research to improve the health of the American people.

Mr. NORWOOD. I have always labored under the thought that a lot of your research was basic science.

Mr. LENFANT. Well, the research process begins with basic science.

Mr. NORWOOD. I understand.

Mr. LENFANT. From basic science, it moves to applications, and applications means clinical research.

Mr. NORWOOD. I know it does move to that, but does it move to that at NIH? Is that part of your mission——

Mr. LENFANT. I would say yes. I can speak for our institute. We spend a lot of our budget to basically carry into clinical practice the basic research that is conducted either from us or from Dr. Penn, or from any of the institutes.

The beauty and the problems with clinical research is that you address an idea, but you don't know for sure where it is going to take you. Our job, my job, is to identify things which appear to be promising and important and move them into the next step. The end of all these steps is basically the practice of medicine, what is going to happen between the physician and the patient.

Mr. NORWOOD. So you do, then, a lot of clinical research——

Mr. LENFANT. Oh, yes.

Mr. NORWOOD. [continuing] as well as basic science?

Mr. LENFANT. Yes.

Mr. NORWOOD. Do you think Congress emphasizes enough the need to conduct basic scientific research? Do we imply that to your agency in different ways, how important we think basic science research is?

Mr. LENFANT. Yes. Mr. Norwood, you know, I have been at the NIH for 32 years and the Director of this Institute for 20. I am not aware that the Congress ever said to us and to our institute, "You shall do this much clinical research or this much basic research," or whatever. What the Congress has done, and I would say in its wisdom, is to say, "You have to address them all." Sometimes it is going to be more of this; the next time it is going to be more of that.

Mr. NORWOOD. Do you define yourself as a public health agency? Is that how you think of yourself?

Mr. LENFANT. Absolutely. I can tell you that, I mean speaking for myself, I am entirely committed to the public health mission of our institute.

Mr. NORWOOD. Let me just conclude with a last questioning sort of thought about it. Dr. Penn, you said that many, if not most, of our best drugs have side effects.

Ms. PENN. Yes, sir.

Mr. NORWOOD. Actually, most drugs have side effects, don't they?

Ms. PENN. Yes, they do. Well, I'm thinking——

Mr. NORWOOD. Isn't it also true that the side effects don't occur the same in each and every patient? Some may have them; some may not. Some may have drastic side effects; some may not.

Ms. PENN. Yes. I am thinking of the big drugs. I am thinking of penicillin. I am thinking of aspirin and all of the ones that we do use and sometimes we absolutely have to use them, side effects or no side effects. But they do have side effects, and you are absolutely correct, it has to do with the genetic makeup of the individual to some degree. It has to do with how it is given in some cases. But everybody tries. What you need to do, again, is the doctor-patient communication, as soon as something happens. You hope it doesn't happen seriously.

Mr. NORWOOD. Because anaphylactic shock may occur with penicillin, it is probably not a wide decision to conclude from that that we shouldn't use penicillin?

Ms. PENN. Yes, sir, because some bacterial infections are best treated with penicillin. So you do your best.

Mr. NORWOOD. And that is what I am trying to get you to say here.

Ms. PENN. Yes.

Mr. NORWOOD. I think we all do our best that we possibly can, and there are sometimes some very drastic outcomes, but these drugs are very important to many other people.

Ms. PENN. But I would say that part of our mission, as Dr. Lenfant just said, is to say, okay, if we change one chemical part of penicillin, can we get a better penicillin?

Mr. BILIRAKIS. The gentleman's time has expired. Ms. Capps, and then we are going to break right after her inquiry.

Ms. CAPPS. Thank you, Mr. Chairman. Thank you for holding this very important hearing. I was frustrated by being detained on the floor and didn't get here for opening statements. I understand that you spoke to the importance of a particular bill that my colleague, Mr. Chip Pickering, and I are working on on Stroke Treatment and Ongoing Prevention Act of 2001. Thank you for your support of that legislation.

I am sorry I didn't get your opening testimony either, but I am so appreciative that you are both here. I have three questions I am going to wrap into one. They have to do with the report that came recently from your group, Dr. Penn, I think. This is about stroke.

You have written a report that will serve as a blueprint for a long-range strategic plan on stroke research. I want to hear from you about it. I know you have talked about it some, but I want to focus on the cost, the breakdown of cost, the aspects of it that will address women's health in perhaps a reinforced way, and also some concerns that I have that the doubling of the NIH budget has meant the Heart and Stroke Coalition is concerned in the House that the stroke and heart disease budget has not kept pace as it should have, and that there is a letter that I have signed, written and signed on with 80 of my colleagues, to see if we can fix this discrepancy.

Ms. PENN. I said in my opening statement——

Ms. CAPPS. Yes, I'm sure.

Ms. PENN. [continuing] that we really do spend more on stroke than any of our other major disorders at NINDS. Part of what we

did at the Stroke Progress Review Group meeting was to prioritize the kinds of science and medicine that they felt, as over 140 of our investigators thought should be done as we move ahead, as we implement this plan.

Ms. CAPPS. I am actually not——

Ms. PENN. I have a summary here for you, but I don't know if it is back there. You have the book.

Ms. CAPPS. But I want to clarify that.

Ms. PENN. Yes.

Ms. CAPPS. I am not talking about within your agency. I am talking about within NIH as a whole.

Ms. PENN. NIH. Well, we do work, as we said this morning with Dr. Lenfant, with all the other institutes——

Ms. CAPPS. Yes.

Ms. PENN. [continuing] at NIH that could impact on, not only figuring out what stroke really is, but treating it. I haven't even mentioned the hemorrhagic strokes this morning.

Ms. CAPPS. Yes, exactly.

Ms. PENN. So I believe that we have an excellent plan. We know roughly where we have to go, and we will fund it. We are very grateful for the help that we have gotten in funding it.

Ms. CAPPS. So you see that the ability that you have to work among other institutes, that——

Ms. PENN. We are definitely talking to other institutes, and we are talking, again, to the FDA. We can talk to them when the time comes about some of the things because we have to be concerned about safety. We talked, as we said before, to the Veterans' Administration about some of the things.

Ms. CAPPS. Right.

Ms. PENN. I mean, we do interact and we know the folks.

Ms. CAPPS. Then your blueprint, we can expect that it really is going to——

Ms. PENN. It will go forth. It won't all go forth at one time.

Ms. CAPPS. Right.

Ms. PENN. We would like to get grants in on some of the issues here, right, and set up new clinical trials, the whole thing.

Ms. CAPPS. Then how much do you think it is going to cost and how much do we need to be prepared to address?

Ms. PENN. We are going to do this in the context of the budgets that we think, and we think that——

Ms. CAPPS. What would you like?

Ms. PENN. I am not even going to try. Just to say, again, that stroke is extraordinarily important.

Ms. CAPPS. Yes.

Ms. PENN. We, of course, are hearing from a lot of other disorders because we have some really major and disabling disorders, but we will fund this.

Ms. CAPPS. Thank you.

Ms. PENN. You're welcome.

Mr. BILIRAKIS. I thank the gentlelady.

We are going to break to make this vote. I plan, Mr. Brown and I, I think, plan to get back immediately, and then we will—I am just not going to discharge the panel. I apologize again. You are going to have to just wait a few more minutes. Thank you.

[Brief recess.]

Mr. BILIRAKIS. I think Mr. Brown is on his way, is he not? There must be some Greek blood in Mr. Brown because he is always late.

Until he comes and others, Mr. Pickering is here. I think I will yield to Mr. Pickering at this point.

Mr. PICKERING. Mr. Chairman, I want to thank you for holding this hearing today, and I want to thank you for calling attention to legislation that I have introduced with my colleague on the committee and from the other side of the aisle, Mrs. Capps, the Stop Stroke Act.

I want to commend both Dr. Lenfant and Dr. Penn for their institutions and the great contributions that they are making and efforts across the board. I wanted to ask them for their comment on how important this legislation is, if they have had a chance to review the legislation, any recommendations they may make. What difference do you think this legislation may make and add to your ongoing efforts, as we try to take it one step up in trying to get the grants, the resources, and the information out to both our physician and medical community, but also to individuals who need to know what the signs are, how they can get treatment, what are the medical and technological and pharmaceutical breakthroughs that have really made a tremendous difference as we look at how to treat and effectively prevent strokes.

With that, Dr. Lenfant.

Mr. LENFANT. Mr. Pickering, with your permission, I would defer to Dr. Penn whose institute is overseeing the stroke program at NIH.

Ms. PENN. We feel that we have made a start with this, and we have several campaigns that will fit right into the Stop Stroke Campaign, which are the public service announcements. We are trying to get a network out, so that in some communities we work through the churches, in some communities through professional societies.

The Stroke Progress Review Group report will certainly address some of the issues that are in the Stop Stroke Act. It is extraordinarily important still to make sure that everybody knows the signs of stroke, and we finally think we have a therapy, which can intervene immediately. So people really have to get to the hospital.

So we are foursquare behind this campaign. As I said, we have started, but this can only help. The bookmarks in the back are to address our populations in a bilingual way.

So in terms of the idea, it is just terrific.

Mr. PICKERING. Let me follow up. What is your current spending at NIH as it relates to strokes? As you know, it is the third leading cause of death, approximately $50 billion in economic impact to our country on an annual basis. What I would like to know is, what is the research commitment that we are making as a country, given that tremendous loss of life or the quality of life of victims of stroke and to their families, their community, and to our economy because of strokes? What is our research commitment in NIH?

Ms. PENN. NIH-wide, it is for fiscal year 2001, it is $239 million. We, as an institute, we are spending more on stroke than any of our other disorders at the moment, and that is over $117 million.

Everything, of course, is relative, but we are getting done what needs to be done. I just answered your colleague in terms of mobilizing the resources and using them to fulfill what is in the plan.

Mr. PICKERING. Again, just putting it in context, if it is the third leading cause of death, how would you say that $239 million is in the priority at NIH, as we look at other diseases and research? Would you be able to put it into, what are the leading five areas of overall spending at NIH on research?

Ms. PENN. On research, I would have to get you those answers for the written record.

In terms of our own priorities, as I said, we are spending more on stroke. The rest of NIH has, obviously, institute-per-institute—I mean, we've got cancer; we've got AIDS; we've got diabetes. So they have their own priorities. The diabetes impacts strokes. So there you go.

Mr. PICKERING. If you could, I would just like, as a policymaker, to understand where we are putting our resources and our priorities, and to put it in context to both the medical and the economic impact of our communities, of our families, of individuals, and to make sure that our priorities are right.

Ms. PENN. Yes. Well, I think everybody, including all the people at NIH—it is just that you don't know exactly what is going to strike, but I did this on "Stroke Sunday." I asked the audience, you know, "How many of you have hypertension or high blood pressure?" It was well over half the congregation. I mean, you could do that with stroke. Most of them had had relatives with stroke. That was the second question. So we all know the impact and we all know that it is a major, major problem.

I think we are doing something for it, though, and I think——

Mr. PICKERING. I want to commend you and congratulate you for what you are doing. I would just like to know as to our research budget on AIDS, cancer, diabetes, hypertension, stroke, where we are in the allocations.

Ms. PENN. Right. I can give you stroke, and I did, numbers, but I will have to get the relative amounts for you.

Mr. BILIRAKIS. There will be a series of questions that will be presented to you after the hearing in writing which you would be asked to respond to in writing. So that certainly would be one, Chip.

Mr. LENFANT. If I may add something, Mr. Pickering, our institute, the National Heart, Lung, and Blood Institute has spent approximately over $60 million in research on stroke, either basic but mostly clinical research. But, as you know, one of the main risk factors of stroke is elevated high blood pressure. Our institute supports $120 million in high blood pressure, and we have an extensive program of public and professional education and dissemination of what we know. It is called the National High Blood Pressure Education Program, which has been in existence for 30 years.

I believe that we can fairly say that it has been a great contributor in the decreasing prevalence and, more importantly, in the control of high blood pressure. See, the issue is, again, to be sure that what we know is used, in this case that people who have high blood pressure are treated and controlled; that is, that we keep their blood pressure low.

I think these programs do that, and I think that jointly with our colleagues we endeavor to do that with much increased intensity now, because we do realize the importance of that significant problem, especially in the Stroke Belt that was mentioned before you came this morning. But we are beginning to see some significant successes.

Mr. BILIRAKIS. Thank you. Mr. Green, to inquire.

Mr. GREEN. Thank you, Mr. Chairman. Again, I apologize to the panel for lots of us coming and going. We actually had votes scheduled, and some of us didn't know when we would vote on the House floor.

I have one question of both witnesses. It is great following up my colleague from Mississippi. One of the most common concerns, I guess, with the NIH is that funding allocation is not proportionate with the burden of the certain diseases. For example, diabetes, which affects 17 million Americans and costs our Nation more than $100 billion in medical costs each year, actually receives only about $769 million in research funding at the NIH. This amounts to about .7 of 1 percent of the cost of the treating the disease.

The NIH is probably the only agency I know that Congress is reluctant to micromanage, simply because none of us have the expertise. But it seems to me the NIH would be emphasizing those diseases that have the largest burden both physically and economically on our society. If each of you could comment on that?

Mr. LENFANT. Yes. First of all, I would like say, sir, that the diabetes research is not precisely in the purview of our two institutes. There is an institute where they do that.

Having said that, it is a sad state of affairs that most diabetic patients suffer development of vascular disease which often leads to arteriosclerosis and then to death eventually, coronary heart disease and what have you.

Our institute has a very significant program. In fact, yesterday I spent the day in New York discussing the development of a program which is precisely for the prevention of cardiovascular disease in diabetes.

So if you take this commitment in addition to the basic research and the work that has been done by our colleague who is not here today whose responsibility is diabetes, we almost doubled, not quite, but we certainly had a very solid amount of money to the research, not only of the disease, but of the consequences of the disease.

Mr. GREEN. Okay.

Ms. PENN. Yes, sir, I was thinking somewhat of consequences of some of our disorders. You can talk about numbers. You can also talk about consequences because some of our disorders kill people sort of slowly. We have things like amyotrophic lateral sclerosis in our portfolio. We have the dystrophies where the kids are going to die by the age of 25. Now Parkinson's certainly and MS, and, therefore, what we look for are ways to make breakthroughs. We really want to go after the mechanisms of these, so we can figure out how to fix them.

So sometimes small diseases can give you information on big diseases. We have a small disorder, very rare, genetic, which is prob-

ably giving us ideas on how to treat some major diseases that have to do with loss of balance.

So it isn't just always dollars. It is how the whole package is coming together. If I really thought that, if I just added more and more dollars to some of these, something would happen tomorrow, I would probably do it. But I'm not always sure of that.

We need to get the scientists involved. We need to train more to look at these disorders. We need to look at all of our disorders. We've got like 300 genetic diseases with some 5 or 10, or 20 patients, but they are children. Again, these are very important also.

So it is a balance. We have to balance the disorders in our mission, and we certainly consider burden. As I said, we all have—the more common the disorder, the more likely all of us will have somebody around who's got the disorder.

Mr. GREEN. I guess I understand, hopefully, there is better correlation in NIH between your institutes than we have between our intelligence agencies.

I hope that is the case. When we look at the loss, for example, in my home State of Texas with diabetes and juvenile diabetes—in fact, the House passed a resolution 2 days ago encouraging increased investment in diabetes research in juvenile diabetes.

But I appreciate the correlation, and, hopefully, that will happen, because you are right, one success in one research area or one illness may also turn into something else.

Ms. PENN. And I don't want to say that we aren't—you know, and Dr. Lenfant, too, we are a working—we have, again, a Memorandum of Understanding with the Juvenile Diabetes Research Foundation to deal with the complications in the nervous system for diabetes. So we do talk to people.

Mr. GREEN. Thank you, Mr. Chairman.

Mr. BILIRAKIS. Well, and just if I may, and Mr. Green has basically said it, really sometimes the toughest part of our job is having witnesses come here and pleading for additional funding for research for their particular diseases. Muhammad Ali has been here, just so many others.

We try to stay on the path of not interfering with NIH because we are an ivory tower and don't really know, and we like to think that the funding is going where maybe they are closer to a particular cure and emphasize that sort of thing, but it is frustrating sometimes when we feel strongly, as Mr. Green does about diabetes, and don't see maybe a little more funding going that way.

That is something that I don't want to take the time here now because I would really like to be able to excuse you in a few minutes, after Mr. Buyer has asked you questions, but that is something you might want to give a little thought to, giving us a little more rationale to sort of stay on the path that we are on, rather than to press NIH to allocate so much funding to a particular disease versus any others. You might want to think about doing that in writing to us.

Mr. Buyer, to inquire.

Mr. BUYER. Thank you.

Dr. Lenfant, I am new to this Health Subcommittee. This is my first term. I am more challenged than I was before I walked into this hearing 2 hours ago. I am more challenged because maybe it

is my logical reasoning; I can follow methodologies; I don't follow things very well if it is said, well, it is not always about dollars. I must interpret, then, that you are asking for great deference.

I then hear your testimony in response to a very good question by Mr. Deal, and I know that you didn't mean to be flippant, but you said, well, we've spent a little more here and we've spent a little more there, and makes it sound like this or that, which then I must interpret that you like being capricious. It is a strong word, "capricious." So if Congress—let me pause for a second. Mr. Pickering asked a very simple question: What are the five leading areas for which you do funding? And, Dr. Penn, you wouldn't even answer that. You said, "Well, I want to answer that on the record, give you a written answer." Well, excuse me, I am almost challenged here at the moment.

If this Congress is going to double the investments into NIH, please, we are not being intrusive into your territory. We would like you to be responsive because this Member here is challenged at the moment.

So let me ask Dr. Lenfant, please respond to Mr. Pickering's question, what are the five leading areas in which you invest in your research? You ought to be able to do this off the top of your head. Thirty years, what are they?

Mr. LENFANT. Well, I am going to let Mr.—would you allow me to——

Mr. BUYER. I will allow you to say what are the five leading areas. What are they?

Mr. LENFANT. Okay. In heart disease, congestive heart failure, coronary heart disease, and congenital heart disease. In——

Mr. BUYER. Those are your five leading areas?

Mr. LENFANT. That is three in our cardiovascular area. Our institute is the National Heart, Lung, Blood, blood resources, that is, blood safety, sleep, these are all areas, sir. So I could give you examples for each of these areas.

Mr. BUYER. All right. No, that's fine.

Now let me ask this question: I am trying to understand, quote, "methodology." If you know this answer, what are the percentage of applications that receive funding compared to the total applications received?

Mr. LENFANT. That's very easy, Mr. Buyer. In our institute during the last2 or 3 years, it has been between 30 and 33 percent.

Mr. BUYER. All right. Is it fair for us—I am looking at this chart by the American Stroke Association that uses some of your statistics here on funding. It shows the investments. It lists cancer, AIDS, heart disease, and stroke. I can understand why we doubled your budget, we've got this huge increase in cancer, but I don't understand this large increase in AIDS funding relative to a flat line in stroke and a minimal increase with heart disease. So could you explain it to me?

Let me ask, before you jump to this, what can you tell me about the death rates of cancer versus AIDS versus heart disease and versus stroke? Is that a fair question for me to say?

Mr. LENFANT. It is a fair question. I do not know, Mr. Buyer, whether you have in front of you a copy of my written statement. If you would turn on page 2——

Mr. BUYER. No, I don't want to go to your written statement.

Mr. LENFANT. Okay.

Mr. BUYER. I want you to answer this question without——

Mr. LENFANT. The answer is that half of the people who are here in this room will die from heart disease.

Mr. BUYER. All right.

Mr. LENFANT. That is a fact. That is a fact. Now why the budget is higher than for heart disease? If I was in a position to make that decision, I would probably take half of the budget of the institute, of the NIH, for heart programs, but I am not the one to make that decision. So I just cannot answer your question.

Mr. BUYER. So must I interpret, then, by your answer that we have a disproportionate in funding for AIDS as compared to the illnesses out there?

Mr. LENFANT. No, no. I would say that the——

Mr. BUYER. Wait a second. You just said that if you were the decisionmaker, that you would prefer this investment to be in heart disease. If you think half of us in this room are going to die from heart disease and not from AIDS, why do we have the funding increases for that as compared to AIDS?

Nothing on AIDS—it is just that there are four things on this chart.

Mr. LENFANT. Well, if you look at cancer, that is a condition where you see a steady increase today of the death rate, whereas in cardiovascular disease you see a steady decline. I suppose that people who are making these decisions say, here we have an emergency, a situation which is becoming more serious year after year, and that probably influences the decision.

With regard to AIDS, that is an infectious disease. An infectious disease always leads to a sense of emergency. I think that is why you see that situation. It may be that fewer people die from AIDS than from heart disease, but AIDS is a global emergency which can affect any one of us almost at any time.

Mr. BUYER. Mr. Chairman, I am going to yield back to you, but I think Mr. Green asked a great question, along with Mr. Deal and Mr. Pickering. I think what we have here is sort of an invitation for greater scrutiny. I yield back.

Mr. BILIRAKIS. All right, the gentleman's time has expired. Mr. Brown?

Mr. BROWN. I have two things. Thanks for the extra time.

Mr. BILIRAKIS. I will ask consent for an extra 30 seconds.

Mr. BROWN. That is a unanimous consent request. I would like to submit questions. I specifically want to raise one, and we will submit it in writing and ask for your response in writing. But I just wanted to mention a brief moment the status of the graduate training and clinical investigation award, which has not yet been implemented and the eligibility requirements for the Clinical Research Loan Repayment Program. Researchers at Case Western University near my district near Cleveland and Ohio State tell me these criteria are effectively excluding many qualified students. I will submit that as a question for your response.

I want to make one more point. This is not the time to debate this in length, but I had a physician that was in my office, who works in international health, the day before yesterday. He said

unequivocally that the AIDS epidemic is the worst epidemic in human health for 600 years.

For us to question funding because, for whatever political agenda people have, to question the funding when we are doubling the NIH budget, to question any commitment, any expenditure we have on AIDS, not that we shouldn't do oversight, and I wish this agency would take more leadership, as I mentioned two or three times earlier, on things like vaccines and antibiotics.

But the politics of this issue disgusts me, frankly, the politics of the AIDS issue, when it is an epidemic, not nearly as big in this country, but the epidemic in Africa, the epidemic when AIDS and TB intersect in India, in China, in Russian prisons, in Estonian prisons, in Latvian prisons, and millions, 1100 people, as I said, a day in India die of TB. That number is going to skyrocket when AIDS hits India and China in the way that it almost inevitably will. We simply can't do enough.

We spend less than .1 percent of our GDP on foreign aid and we should be ashamed of ourselves.

Mr. BILIRAKIS. Well, you can see the reasons why we would rather not interfere in terms of the use of——

Mr. BROWN. Thank you, Mr. Chairman.

Mr. BUYER. Mr. Chairman, I would like a chance to respond to that.

Mr. BILIRAKIS. Well, this——

Mr. BUYER. Mr. Chairman——

Mr. BILIRAKIS. I don't think we ought to get into debate. This is a hearing.

Mr. BUYER. No, he's—Mr. Chairman, he's pulling me into an area in which I was not going. For him to interpret my words as though he's personally disgusted, as though I was attacking AIDS insults me.

I am referring to a chart right here, Mr. Brown. And Mr. Green asked some very good questions. Mr. Deal asked good questions. Mr. Pickering asked good questions. This is not a debate about AIDS. Diabetes was a very good thing to go over. I asked a very pertinent question here. So please don't pull me into your political disgust into some other form of agenda——

Mr. BROWN. My disgust——

Mr. BUYER. [continuing] which I find personally insulting.

Mr. BILIRAKIS. Without objection, the opening statements of all members of the subcommittee will be made a part of the record, and, as I have indicated earlier, there will be written questions submitted to you. We would appreciate a relatively prompt response to those.

I thank you both very, very much. Again, I apologize for—I thank you for your patience, but that is the kind of a day we are going through here, is running back and forth. Thank you so very much, Doctors.

Mr. LENFANT. Thank you, sir.

Mr. BILIRAKIS. The second panel consists of Dr. Robert O. Bonow, President-Elect, American Heart Association, Goldberg Distinguished Professor of Medicine, and Chief, Division of Cardiology, Northwestern University, Feinberg School of Medicine; Mr. Eric Hargis, President and CEO of the Epilepsy Foundation; Dr. Ed-

ward Sanchez, Commissioner of Texas Department of Health, and Dr. Daniel Jones, whom Mr. Pickering would like to introduce.

Would you like to do that at this point?

Mr. PICKERING. Yes, Mr. Chairman. Thank you for giving me a point of personal privilege and honor to introduce Dr. Daniel Jones from Jackson, Mississippi, who is the Vice Chancellor of the University of Mississippi Medical Center.

But he is also a family friend. He had a private practice in my home town of Laurel, Mississippi, where he treated my family as well as me as I was growing up. Not only did he practice in a small town in Mississippi and contribute to the community, I grew up attending the same church as he, but he also went overseas to Korea as a medical missionary for 7 years. For his humanitarian contributions and leadership and example, we are always very proud to point to his role in giving back not only to the community, but going overseas to help those in Korea.

We also are very proud as he now is leading the effort in Mississippi at the University of Mississippi Medical Center in a number of different areas, especially in research and in hypertension and in stroke, as he has been published and is a leading figure and voice in that area, not only for our State, but around the country.

So it is my great privilege today to introduce him, and I look forward to his testimony and the testimony of the rest of the panel.

Mr. BILIRAKIS. Thank you. Thank you, Mr. Pickering.

Mr. Green would like to add to my very brief introduction of Dr. Sanchez.

Mr. GREEN. Thank you, Mr. Chairman. I would like to welcome Dr. Sanchez, our Texas Commissioner of Health. Having served 10 years in Congress, I have worked with four different Texas Health Commissioners, and 20 years in the legislature before that, many dedicated people. Dr. Sanchez, he has been there 7 months or a little more than 7 months, but he brings an aggressiveness and innovation, I think, to the department.

I had a chance to meet him, and our staffs have worked together. So I am glad he is here today.

Thank you, Mr. Chairman.

Mr. BILIRAKIS. Thank you, Mr. Green.

Gentlemen, your written statements are a part of the record. We will set the clock at 5 minutes. I would appreciate it if you would stick as close to it as you possibly can.

Dr. Bonow, is that correct, sir?

Dr. BONOW. Bonow.

Mr. BILIRAKIS. Bonow. All right, Dr. Bonow, please proceed.

STATEMENTS OF ROBERT O. BONOW, PRESIDENT-ELECT, AMERICAN HEART ASSOCIATION; ERIC R. HARGIS, PRESIDENT AND CEO, THE EPILEPSY FOUNDATION; EDUARDO J. SANCHEZ, COMMISSIONER, TEXAS DEPARTMENT OF HEALTH; AND DANIEL JONES, VICE CHANCELLOR, UNIVERSITY MEDICAL CENTER, UNIVERSITY OF MISSISSIPPI

Mr. BONOW. Thank you, Mr. Chairman. Members of the committee, it is my great pleasure to participate in this discussion this morning. My name is Robert Bonow. I am Professor of Medicine and Chief of Cardiology at Northwestern University. I did serve 16

years as a commissioned officer in the National Heart, Lung, and Blood Institute at the NIH in Bethesda. As a volunteer member of the American Heart Association, I now serve as its President-Elect.

I would like to first thank the committee for its leadership in including the Community Access to Emergency Defibrillation Act in the bioterrorism legislation. Your action will reduce cardiac arrest deaths by providing grants to purchase AEDs and to train first-responders in their use.

Our association is devoted to fighting heart disease, stroke, and other cardiovascular diseases which are America's leading cause of death. Nearly 62 million Americans suffer from cardiovascular diseases, at an estimated cost this year of $330 billion in medical expenses and lost productivity, more costly than any other diseases.

Since Dr. Jones will focus on stroke in his testimony, I will address heart disease. Heart disease remains the number 1 killer of Americans and is the leading cause of premature, permanent disability among American workers. Our association works to increase the number of Americans who receive immediate, high-quality care for sudden cardiac arrest, heart attack, and stroke by raising awareness of their warning signs and risk factors, and the need to seek immediate medical help. These efforts touch Americans throughout the country.

We are particularly concerned about the elderly who suffer disproportionately from these diseases, yet benefit from preventative strategies. So we are leading the charge to add preventative cholesterol screening to Medicare benefits, which currently are not covered.

Our association also invests in medical research. We are unique in that our local and national research programs for investigator-initiated research are supported wholly by publicly donated money, and our programs emphasize the support of investigators in the early stages of their careers, as they strive to become successful and become competitive for NIH grants.

We do not accept Federal funds, but we do enjoy a productive relationship with the government in advancing our mission. For example, as mentioned by both Drs. Penn and Lenfant, our association has signed a Memorandum of Understanding with the Centers for Medicare and Medicaid Services, NHLBI, NINDS, and the Centers for Disease Control and Prevention. Through this partnership with the Department of Health and Human Services, we strengthen and enhance the information and services provided to the public to reduce the impact of heart disease and stroke.

Also, we work with the NIH to coordinate and enhance vital research activities by participating mutually in each other's conferences, research committees, and advisory councils. For example, I now serve on the NHLBI's Board of Extramural Advisors, and our chairman of the board serves on the NIH Directors' Council of Public Representatives.

Our association, including our extensive grassroots network and affiliates, actively advocates for the completion of the 5-year, bipartisan congressional initiative to double the NIH budget. We applaud this committee's visionary leadership in this historic effort, and we urge you to complete this initiative in fiscal year 2003.

Your action will benefit the health of all Americans for decades to come.

Thanks to your investment in NIH, exciting medical advances have benefited countless Americans suffering from heart disease and those at risk. Major advances include: cutting-edge, life-extending drugs that help prevent heart disease, including drugs to control blood pressure and cholesterol. Your investment has also produced revolutionary diagnostic tools, including exciting new imaging technologies to diagnose heart disease in its early and advanced stages, and simple blood tests that can rapidly diagnose even the smallest heart attack.

Your investment in NIH has resulted in major changes in the heart patient care. Revolutionary clot-buster drugs can reduce disability from heart attack by dissolving the blood clots that cause the attack. Small, wire-mesh stents, now used in nearly 80 percent of the 1 million angioplasty procedures performed each year to widen narrow arteries of the heart, greatly increase the success rate of these procedures.

Other breakthrough technologies include pacemakers, implantable cardiac defibrillators, AEDs, and minimally invasive surgical techniques. Advances have clearly been made in the control and treatment of heart disease and its risk factors.

However, as has already been mentioned, heart disease remains America's number 1 killer, and there still is no cure. An American dies from cardiovascular disease every 33 seconds. Much more needs to be done to address these challenges and their opportunities.

Now is the time to capitalize on our potential to understand the fundamental causes of heart disease and to develop exciting new treatments. For instance, NHLBI research has shown the strongest evidence yet that human heart muscle cells may regenerate after a heart attack. This finding opens entirely new avenues in future investigation and clinical trials for treatment of failing hearts weakened by heart attacks.

Also, implantable left ventricular assist devices and even artificial hearts show promise as replacement therapy for end-stage heart failure. Promising breakthroughs for this and other heart conditions are on the horizon with the potential to improve the quality of life for all Americans and to reduce health care costs.

Unfortunately, the NIH budget for heart disease and stroke has not kept pace with the doubling initiative, and NIH heart and stroke research remains disproportionately underfunded compared to the burden and to the many promising scientific opportunities. I will take some risk here by referring you again to the chart on page 5 of the brochure attached to my testimony. The point of my testimony is not whether or not this is disproportionate funding, but only as we double the NIH budget, we are currently not on track to double the amount of funding for heart-related research. The point is we would like the NHLBI to also share in the doubling effort for this very important disease.

Importantly, these opportunities include research into improved health care delivery systems, not just basic science or clinical trials, but developing research to deliver the health care, to allow all Americans access to our current and future research advances.

We urge Congress in the last year of this effort to provide funds necessary to ensure the NIH budget for heart disease and stroke also doubles over this 5-year period.

Thank you very much for the opportunity to be with you today.

[The prepared statement of Robert O. Bonow follows:]

PREPARED STATEMENT OF ROBERT O. BONOW, PRESIDENT-ELECT, AMERICAN HEART ASSOCIATION

Good morning, I am Robert Bonow, Goldberg Distinguished Professor of Medicine and Chief of the Division of Cardiology at Northwestern University Feinberg School of Medicine. Before joining Northwestern, I served 16 years as a commissioned officer in the U.S. Public Health Service at the National Institutes of Health's National Heart, Lung, and Blood Institute as Chief of the Nuclear Cardiology Section and Deputy Chief of the Cardiology Branch. I currently serve on the NHLBI's Board of Extramural Advisors. As a volunteer, I am President-Elect of the national American Heart Association and President of its Chicago Metro Board. The Association is the largest voluntary health organization fighting heart disease, stroke and other cardiovascular diseases.

Before I begin my discussion on NIH, I would like to thank the Committee, on behalf of the American Heart Association, for its leadership in including the Community Access to Emergency Defibrillation Act in the bioterrorism legislation awaiting the President's signature. Your action will help reduce deaths from cardiac arrest by providing grants for the purchase and placement of AEDs where cardiac arrests are likely to occur and train first responders in their use.

AMERICAN HEART ASSOCIATION: FIGHTING HEART DISEASE AND STROKE

The Association, with 22 million volunteers and supporters, is devoted to reducing disability and death from heart disease, stroke and other cardiovascular diseases, which kill nearly 960,000 Americans each year. Cardiovascular diseases account for more than 40 percent of all American deaths. Nearly 62 million Americans suffer from cardiovascular diseases, many of whom are permanently disabled. Cardiovascular diseases cost Americans more than any other disease—an estimated $330 billion in medical expenses and lost productivity this year.

Since Dr. Jones will focus on stroke in his testimony, I will address heart disease—still the No. 1 killer of Americans across racial and ethnic groups, killing more than 725,000 people of *all* ages each year. Nearly 23 million Americans live with the often disabling effects of heart disease. Heart disease is the leading cause of premature, permanent disability among American workers, accounting for nearly 20 percent of Social Security disability payments.

Our Association works to increase the number of Americans who receive immediate, high-quality care for sudden cardiac arrest, heart attack and stroke by raising awareness of the warning signs, risk factors and the need to seek immediate medical attention. Our awareness and educational efforts touch Americans in every area of their lives—at home, work, school, church and in the hospital. For example, our national, community-based initiative, Operation Heartbeat, seeks to improve the sudden cardiac arrest survival rate. Search Your Heart is a faith-based program, involving approximately 3,000 places of worship and community-based organizations. It is a prevention program that teaches at-risk Hispanics, African-Americans, and Asians to recognize and control heart disease and stroke risk factors, such as high blood pressure, high cholesterol, obesity and diabetes. Another example is Get With The Guidelines, an acute-care, hospital-based program that helps manage risk factors in heart disease patients. It strives for long-term behavioral change to help prevent subsequent heart attacks.

Also, we invest in medical research. In fiscal year 2000-2001, we expended nearly $135 million on research to increase knowledge of heart disease and stroke. Even this amount places us a distant second to the National Institutes of Health in the amount of research funding in these critical areas. However, we are unique in our research by providing both local and national resources for investigator-initiated research projects wholly supported by publicly donated money. In addition to sponsoring the highest meritorious research, we place emphasis on supporting beginning investigators as they progress to become competitive for national funding sources, such as the NIH.

PARTNERING TO ADVANCE OUR MISSION

Our Association cannot accomplish our life-saving mission alone, so we join forces with the federal government. We do not accept federal funds, but enjoy a productive relationship with the government in advancing the battle against heart disease and stroke. For example, in February 2001, the Association and four federal health agencies signed a Memorandum of Understanding. An important example in public and private sector cooperation, this agreement creates a working partnership with the Department of Health and Human Services, including the Centers for Medicare and Medicaid Services, a Centers for Disease Control and Prevention component and two NIH institutes—the National Heart, Lung, and Blood Institute and the National Institute of Neurological Disorders and Stroke. Through this partnership of shared community-based education, health promotion programs, public awareness campaigns, media information and data collection, we strengthen and enhance the information and services provided to the public to significantly reduce the exorbitant impact of heart disease, stroke and other cardiovascular diseases on our nation.

Also, we work with the NIH to coordinate and enhance vital research activities by participating in each other's national conferences, research committees and advisory councils. For example, I serve on the NHLBI's Board of Extramural Advisors and other Association volunteers have participated on the National Heart, Lung, Blood Advisory Council. Our Chairman of the Board serves on the NIH Director's Council of Public Representatives.

NIH-supported research plays an essential role in advancing the fight against heart disease. So, our Association, including our extensive grassroots network, our affiliates nationwide and more than 32,000 scientific council members, actively advocates for the completion of the five-year bipartisan congressional initiative to double the NIH budget. We laud this Committee's visionary leadership in this historic effort and urge you to complete this initiative by FY 2003. Your action will benefit the health of all Americans for decades to come.

HEART DISEASE RESEARCH ADVANCES

Thanks to your investment in NIH, exciting medical advances benefit Americans suffering from heart disease and those at risk. Several major advances follow. Cutting-edge, life-extending drugs help prevent and treat heart disease, including drugs to control blood pressure and cholesterol. Now, a simple blood test can diagnose even the smallest heart attack within six hours of symptoms. When prevention fails, revolutionary "clotbuster" drugs, such as tPA, can reduce disability from heart attack by dissolving blood clots causing the attack.

Your investment in NIH has resulted in major changes in heart patient care. For instance, stents—wire mesh tubes used to prop open an artery—are now used in nearly 80 percent of the more than 1 million angioplasty procedures performed each year to widen narrowed arteries to the heart. The use of stents as part of the angioplasty procedure significantly reduces the incidence of artery renarrowing within six months.

Also, your investment in NIH has revolutionized imaging technology to diagnose heart disease and surgical techniques to treat heart disease. You probably know someone who has benefited from the research-breakthrough of heart bypass surgery—355,000 Americans under-went this procedure in 1999. Patients who experience conventional bypass surgery to improve blood flow to the heart require several weeks to recover, but those who experience the new "minimally invasive heart bypass surgery" need a much shorter recovery period. Other amazing technologies include pacemakers, implantable cardiac defibrillators, and automatic external defibrillators.

During our Association's recent lobby day, I teamed up with numerous heart disease and stroke survivors who traveled to Washington, D.C. asking you to make America's No. 1 killer, your No. 1 health priority. Many of them are alive today due to your investment in the NIH. They are living with stents, pacemakers, implantable cardiac defibrillators, or heart transplants or have benefited from other state-of-the-art procedures.

HEART DISEASE: STILL AMERICA'S NO. 1 KILLER

Thanks to research made possible by your Committee, great strides have been made in the control of heart disease risk factors and in the treatment of heart disease. However, heart disease remains America's No. 1 killer and there is still no cure for this devastating disease. Much more needs to be done to address the mounting challenges and numerous unanswered questions about heart disease.

Now is the time to capitalize on a century of progress in understanding the causes of heart disease and in developing new treatments. According to a national expert panel supported by Congress, America's progress in reducing the death rate from cardiovascular diseases has slowed, suggesting the need for new strategies against these killers. Also, the panel reported striking differences in cardiovascular disease death rates by race/ethnicity, socio-economic status and geography.

HEART DISEASE RESEARCH OPPORTUNITIES

Promising, cost-effective breakthroughs are on the horizon, with the potential to reduce health care costs and to improve the quality of life for all Americans, including the 1.1 million who will suffer a heart attack this year and the nearly 5 million who live with the effects of heart failure. For instance, NHLBI-supported research has shown the strongest evidence to date that human heart muscle cells may regenerate after a heart attack, challenging previous beliefs that heart muscle damage from a heart attack remains permanent. Implantable left ventricular assist devices show promise as replacement therapy for end-state heart failure. This year, several patients received the first completely implantable artificial heart. Imagine what could be accomplished with more resources.

Unfortunately, despite the tremendous advances and burgeoning opportunities, the NIH budget for heart disease has not kept pace with the doubling initiative. Heart research receives 8 percent of the NIH budget. We urge Congress in the last year of this historic effort to provide funds necessary to ensure that the NIH budget for heart disease also doubles over the five-year period. NIH heart research remains disproportionately underfunded compared to the enormous burden heart disease places on our nation and the abundant promising scientific opportunities that could advance the fight against heart disease.

PREVENTING HEART DISEASE

Research findings must be translated into effective prevention programs. More resources should be made available to bring research advances to Americans. We support the conviction of Dr. Elias Zerhouni, Director of the National Institutes of Health, who noted during his United States Senate confirmation hearing on April 20, 2002 that "we still have to make discoveries to perhaps facilitate the way we deliver healthcare." For example, two separate independent panels, one convened by NHLBI, agreed that it is never too late to substantially lower heart attack risk by aggressively reducing cholesterol levels. So, we lead the charge to add preventive cholesterol screening to Medicare benefits. Now, Medicare covers cholesterol screenings only if beneficiaries already suffer from diseases associated with elevated cholesterol, such as heart disease, but does not cover screening of apparently healthy individuals to prevent heart disease.

Thank you for this opportunity to speak with you today. I will be happy to answer questions.

Mr. BILIRAKIS. Thank you so much, sir.

Mr. Hargis?

STATEMENT OF ERIC R. HARGIS

Mr. HARGIS. Thank you, Mr. Chairman and distinguished members of the subcommittee, for the opportunity to be here this morning, or actually this afternoon, and talk about NIH research and the efforts to prevent and cure disease. My name is Eric Hargis. I am the President and Chief Executive Officer of the Epilepsy Foundation. This is a topic of critical importance to the 2.3 million Americans who live with epilepsy.

Advances in medical treatment have enabled many people to live normal lives, free of seizures, and to achieve personal and professional success. These advances would not be possible without an aggressive public and private research effort. Yet, one in four of all newly diagnosed people will have persistent seizures despite treatment. More than 1 million Americans currently live with uncontrolled epilepsy.

The Epilepsy Foundation is an aggressive advocate for the doubling of the NIH budget, for an expanded epilepsy public health program, and for quality and affordable health care for all Americans. Families are desperate for a cure for epilepsy and hopeful that in the short term research will provide new and more effective treatments.

While much about the research program at NINDS could be praised, I want to single out a very successful joint effort of the NINDS and the epilepsy community. Our work together on the Curing Epilepsy Focus on the Future Conference illustrates several important principles that we believe have widespread application.

First is the value of having the institutes collaborating with professional organizations, lay organizations, individuals, and family members affected by the condition.

Second, the importance of Federal interagency coordination and cooperation.

And, third, the value of creating measures to hold the various agencies accountable for their activities and their progress.

This conference drew together experts from all parts of the scientific world, representatives of different agencies within NIH, and people with epilepsy to review the status of our current understanding of the epilepsies and to develop a framework for future directions in research. As a result of that conference, the research community has reached a dramatic turning point, and we are now able to talk about a potential cure for epilepsy.

The next step was the community's creation, under the auspices of NINDS, of the Scientific Benchmarks Implementation Plan for the next 5 years. This will guide research activities and should serve as the springboard for the development of measurable goals both for the agency itself and for other affected agencies within the NIH. However, a shortcoming of these benchmarks was the failure to do funding projections for what would be needed to accomplish this research.

One of the important aspects of the Conference on the Cure was NINDS's concerted effort to bring together multiple agencies within NIH to participate. NIH should ideally develop an interagency coordinating body to address epilepsy and its impact on all aspects of life. While we know that NINDS staff members do work with members of other agencies within NIH, this is on an informal basis, and this activity should become more formalized and systemized among the agencies.

It is also important that the Federal Government be able to account for how it has spent the large increases in funding for research that has occurred over the last 5 years. While NINDS has been helpful in answering our questions on epilepsy funding, we do not know how much the NIH has spent overall on epilepsy research. Apparently, there are no cross-agency accounting systems for making that determination.

Within NINDs, further detail and information describing and explaining the research that is being funded is needed to better educate the public about the work of NIH. This morning when we visited the NIH website to gather updated information about the level of funding, we found that, unfortunately, while there were 60 conditions listed with dollar amounts, epilepsy was not included.

NINDS should also be recognized for another innovative program that fosters partnership between the public and the private sector. The Anti-Convulsant Screening Program was begun in recognition that private industry would not pursue research for products that addressed the needs of a limited number of people. This Federal program has now had a successful history of identifying promising compounds that develop into medications for seizures. In fact, most of the medications that have been introduced in the last decade have been developed as a result of this research.

Thus, NINDS must overall be congratulated for its work and achievements in understanding of the brain and its support of research toward an ultimate cure. At the same time, NINDS needs to better address the continuing medical treatment issues of this population whose needs will not go away while cures are being sought.

NINDS very recently funded a multi-center clinical trial on early surgical interventions for temporal lobe epilepsy. We urge NINDS to do more of these types of studies, including research on bioequivalence and bioavailability among various anti-epileptic drugs, or doing research to compare the outcomes of the various new treatments to help define best practices.

These are but a few examples of clinical research projects that NIH could and should fund to a far greater extent than it does today. Again, our recent work with NINDS is really a model for bringing stakeholders together to address the future of research. That is a practice that must continue to ensure a close relationship between the needs of American citizens and the work of Federal agencies.

We congratulate NINDS for the progress they have made and look forward to being a key partner in the efforts to prevent and cure epilepsy. Again, thank you for the opportunity to testify.

[The prepared statement of Eric R. Hargis follows:]

PREPARED STATEMENT OF ERIC R. HARGIS, PRESIDENT & CHIEF EXECUTIVE OFFICER, EPILEPSY FOUNDATION

Good Morning. Thank you Mr. Chairman and Distinguished Members of the Subcommittee for the opportunity to be here this morning to talk about research at the National Institutes of Health and the efforts to prevent and cure disease. I am Eric Hargis, President and Chief Executive Officer of the Epilepsy Foundation. This is a topic of critical importance to the 2.3 million Americans who live with epilepsy.

The Epilepsy Foundation is the national organization, formed in 1968, that works for children and adults affected by seizures through research, education, advocacy and service. Approximately 181,000 new cases of seizures and epilepsy occur each year; 10% of the American population will experience a seizure in their lifetimes; 3% will develop epilepsy by age 75.

Advances in medical treatment have enabled many people to live normal lives free of seizures and to achieve personal and professional success. These advances would not be possible without an aggressive public and private research effort. Yet one in four of all newly diagnosed people will have persistent seizures despite treatment and more than one million Americans currently live with uncontrolled epilepsy. For them, epilepsy remains a formidable barrier to normal life, affecting educational attainment, employment and personal fulfillment. People with epilepsy are at risk of brain damage and increased mortality when seizures resist control. Despite a decade of economic boom and record employment, 25% of people with epilepsy are unemployed, the majority a result of their epilepsy. Stigma remains a fact of life for many with epilepsy fueling discrimination and isolating them from the mainstream of American life. Epilepsy can strike at any age but tends to impact the very young and old, often the most vulnerable segments of our population. Epilepsy can produce developmental delays and brain damage in children that can lead to a lifetime of

dependence on others and continually accruing costs to the health care system and society at large.

The Epilepsy Foundation is an aggressive advocate for the doubling of the NIH budget, for an expanded epilepsy public health program, and for quality and affordable health care for all Americans. Spending time with families who live with frequent and persistent seizures underscores the need to address each of these areas. Families are desperate for a cure for epilepsy and hopeful that in the short-term, research will provide new and more effective treatments.

While much about the research program at NINDS could be praised, I want to single out a very successful joint effort of NINDS and the epilepsy community. Our work together on the 2000 Curing Epilepsy: Focus on the Future conference illustrates several important principles that have widespread applications:

- The value of working with people with epilepsy, their family members and the organizations that represent their interests
- The importance of federal interagency coordination and cooperation
- The value of creating measures to hold the various agencies accountable for their activities and progress.

This conference drew together experts from the all parts of the scientific world, behavioral experts, representatives of different federal agencies within NIH, and people with epilepsy and family members to review the status of current understanding of the epilepsies and to develop a framework for future directions in research.

As a result of that conference we are now able to talk about a potential cure for epilepsy—a turning point in the general approach that had been taken to epilepsy since the first medications were introduced sixty years ago. The conference identified important areas where continuing research may indeed lead to a cure in the course of the next twenty years. These include advances in genetics, understanding the plasticity of the brain and epileptogenesis, insights from new imaging and electrophysiology, the potential for cell therapy, and surgical and other mechanical interventions in the brain.

After that conference, the NINDS again pulled together all stakeholders and created an epilepsy research benchmarks implementation plan for the next five years. This document will be used to guide the NINDS' activities, and should serve as the springboard for the development of measurable goals, both for the agency itself and for other affected agencies within the NIH. It is also important that progress towards these goals be assessed periodically, but certainly at least every five years, through future reviews with the participation of expert community, government and consumers. One shortcoming was the failure to do funding projections for what would be needed to accomplish the research.

One of the important aspects of the Conference on the Cure was NINDS' concerted effort to bring together multiple agencies within NIH to participate. This is an effort that needs to continue in future work of the NINDS and NIH. Coordination of activities among the various agencies must be fostered and institutionalized so that each hand knows what the other is doing and a systematic cross agency approach to epilepsy research can be implemented. NIH should ideally develop an interagency coordinating body to address conditions like epilepsy and the many neurological and other diseases that impact one in all aspects of life, so as to prevent needless overlap, inconsistency, and promote optimal research among the agencies. While we know that NINDS staff members do work with members of other agencies within NIH, this is on an informal basis, and this activity should be more formalized and systemized among the agencies.

It is also important that the federal government be able to account for how it has spent the large increases in funding for research that have occurred over the last five years. While NINDS has been helpful in answering our questions on epilepsy funding, we do not know how much NIH has spent overall through all the agencies on epilepsy research, because apparently there are no cross agency accounting systems within NIH for making that determination. Within NINDS, further detail and information describing and explaining the research that is being funded would be helpful. The Epilepsy Foundation is a logical partner that can assist NINDS in getting the word out about their good work, but we need more information from the agency.

NINDS should also be recognized for another innovative program that fosters partnerships between the public and private sector. Over the last twenty years, NINDS has made considerable progress in the identification of compounds that affect seizure generation by interfering with various channels and receptors within the brain. This has occurred through the NINDS Anti-Epileptic Drug Development program, a program begun in response to federal recognition that the private marketplace would not invest in research for products which affect limited numbers of

people. The Anti-Epileptic Drug Development program has led to the introduction of multiple new drugs for the treatment of epilepsy and has made a real difference in the lives of people with epilepsy by adding more treatment options.

The program, now called the Anticonvulsant Screening Program, has identified many compounds that should continue to be explored for their potential to treat seizures and other conditions, and we urge Congress to continue its support for this activity. An interesting and difficult side issue is whether the private marketplace will be willing and equipped to explore these risky new potential treatments. Congress should consider a broader public role in the exploration and development of new treatment, particularly for conditions that affect only a limited segment of the public. That is a discussion for another time, but we raise it here because the federal government is sitting on a potential goldmine of treatment options for a variety of conditions that should not be lost.

Thus NINDS must overall be congratulated for its work in understanding of the brain and its support of research towards a long term cure. At the same time, NINDS needs to address the continuing medical treatment issues of this population, whose needs will not go away while cures are sought. For example, NINDS recently funded a multi-center clinical trial on early surgical intervention for temporal lobe epilepsy. We urge NINDS to do more of these types of studies. Other types of outcomes research are also needed, such as a study of the efficacy of the various treatment modalities, including comparisons among them in terms of best outcomes; studies on bioequivalence and bioavailability issues among various products which are based on the same chemical compounds but which clinicians and patients will swear are different in their effectiveness in treating seizures. These are but a few examples of clinical research projects that NIH could and should fund. The private sector is generally not capable of funding this type of research, and in our view NIH could do much more to sponsor research that informs best medical practice.

I would like to conclude this morning by again stating how critically important it is for the general public to understand what NINDS is doing. Too often, the work of the NIH is a mystery to the public. NIH and its agencies could do a better job of presenting itself simply and clearly to the public, and of reaching out to stakeholders for input and guidance on its activities. As discussed earlier our recent work with NINDS is really a model for bring stakeholders together to address the future of research. That is a practice that must continue to ensure a close relationship between the needs of American citizens, and the work of the federal agencies. We congratulate NINDS for the progress they have made and look forward to being a key partner in the efforts to prevent and cure epilepsy.

Again, thank you for the opportunity to testify this morning, I am happy to answer any questions.

Mr. BILIRAKIS. Thank you very much, Mr. Hargis.

Dr. Sanchez, please proceed.

STATEMENT OF EDUARDO J. SANCHEZ

Mr. SANCHEZ. Good afternoon, Mr. Chairman and members of the Subcommittee on Health. It is an honor to appear before you today to testify about the Texas Department of Health's efforts to disseminate public health interventions that reduce the health effects and related costs of cardiovascular disease, the leading cause of death in our country.

My name is Eduardo Sanchez. I am the Texas Commissioner of Health with the Texas Department of Health.

I want to thank you, Mr. Chairman and members of this subcommittee, for your support to help improve our Nation's health and for holding this hearing. As Texas State Health Officer and family physician experienced in community-based care, I know that are many who have yet to benefit from available research on effective prevention of cardiovascular diseases and other chronic illnesses. Getting research and proven public health interventions off the shelf and into communities is vital for all Americans.

First, I want to explain why cardiovascular disease prevention is one of the Texas Department of Health's top priorities. Death, long-

term illness, disability, hospitalization, and rising costs related to treatment and lost productivity are quite literally breaking the heart and breaking the bank of our State and of this country.

Heart disease and stroke kill nearly 1 million men and women each year in the United States. This number represents more than 40 percent of all annual deaths. Sixty-one million Americans, almost 25 percent of our population, are living with some form of cardiovascular disease. Almost 6 million hospitalizations each year are due to cardiovascular disease. As you heard, the estimated annual cost of cardiovascular disease is $330 billion.

The good news is that we know how to reduce this burden, but we must put this knowledge into action. I want to share with you one example of translating research into positive public health outcomes.

We know the primary risk factors for cardiovascular disease are tobacco use, poor nutrition and obesity, and physical inactivity. These risk factors begin to have negative effects at a young age. Texas is 1 of 4 States that participated in a National Heart, Lung, and Blood Institute trial specifically designed to reduce these risk factors.

The Child and Adolescent Trial for Cardiovascular Health, or "CATCH," is the largest school-based health promotion study ever conducted in the United States that has scientifically documented positive changes in children's physical activity and dietary habits. Now it is a research-based model, and TDH is providing curricula and training for teachers, cafeteria workers, and other school personnel.

Our program evaluation shows that behavioral changes have continued 3, 5, and 7 years after the first Texas schools implemented the CATCH program. Former CATCH students have continued to eat diets low in fat and to exercise vigorously. CATCH-trained schools are still serving healthier meals than those not in the program.

CATCH is a demonstrated success, and we have renamed the program a Coordinated Approach to Child Health, still "CATCH." It has been adopted by over 1,000 Texas elementary schools with support from public and private partnerships. Although schools are already challenged with developing optimal curricula for the basics, the CATCH curriculum can integrate important life-long health lessons with those already in teachers' lesson plans.

At present, few States have comprehensive cardiovascular disease programs. If all States of the United States had comprehensive cardiovascular disease programs, then successful models such as CATCH might be introduced in schools across the country.

Preventing cardiovascular and other chronic diseases increases our quality of life and life expectancy and might help lower health care and related costs. CATCH is an example of a solidly researched public health intervention strategy that needs nationwide funding and implementation to make a real difference in Americans' lives.

Thank you for the opportunity to testify before you today.

[The prepared statement of Eduardo J. Sanchez follows:]

PREPARED STATEMENT OF EDUARDO J. SANCHEZ, COMMISSIONER OF HEALTH, TEXAS DEPARTMENT OF HEALTH

Good morning. Mr. Chairman and members of the Subcommittee on Health, it is an honor to appear before you today to testify about the Texas Department of Health's ongoing efforts to disseminate public health interventions in communities to reduce the health impact and related costs of cardiovascular disease—the leading cause of death in our country. With your permission, I would like to submit my written testimony for the record.

My name is Eduardo Sanchez, and I am the Texas Commissioner of Health. I want to thank you, Mr. Chairman, and the members of this Subcommittee for your support for improving the cardiovascular health of our nation and for holding this hearing. As the State Health Officer and a family physician experienced in community-based care, I've treated many who have yet to benefit from the available research on effective prevention of cardiovascular diseases and other chronic illnesses. Getting research and proven public health interventions "off the shelf" and into communities is vital—for all Americans.

First, I want to explain why cardiovascular disease prevention is one of the Texas Department of Health's top priorities: death, long-term illness, disability, hospitalization and rising costs related to treatment and lost productivity are, quite literally, "breaking the heart" and breaking "the bank" of this country. Heart disease and stroke are the leading causes of death in the U.S.: together, these cardiovascular diseases kill nearly one million men and women each year—this number represents more than 40% of all annual deaths in this country. Almost 25% of our population is living with some form of this disease—61 million Americans. More than 1 million Americans are disabled every year by stroke; and almost 11 million persons over age 65 report such disabilities as loss of speech or mobility—caused by heart disease and stroke. Almost 6 million hospitalizations each year are due to cardiovascular disease. For 2001, the costs—in both health care expenditures and lost productivity—are estimated at $298 billion (CDC, 2002). Both the human and economic costs are enormous. The good news is: we know how to reduce this burden; but we must put this knowledge into action. I want to share with you one example of translating research into positive public health outcomes.

We know that the primary risk factors for cardiovascular disease are: tobacco use, poor nutrition and obesity, and physical inactivity—these same risk factors also underlie the development of diabetes, cancer and other chronic diseases. Texas is one of four states that participated in a trial program specifically designed to reduce these risk factors. (The others are California, Louisiana and Minnesota.) The National Heart, Lung, and Blood Institute (NHLBI) conducted this 4-year trial of the most effective concepts and strategies distilled from previous studies that intervene on the three risk factors I mentioned earlier: sedentary lifestyle, poor dietary choices, and tobacco use. Appropriately named "CATCH", this method "catches" both the opportunity to develop healthy habits and prevents cardiovascular disease—at the earliest possible time, early childhood.

During the trial period, this acronym stood for the "Child & Adolescent Trial for Cardiovascular Health". We not only helped demonstrate the effectiveness of the research-based interventions, the Texas Department of Health is helping to disseminate this program into communities across the state. The program has garnered international attention. When results showed clear success, Texas renamed it to reflect what really happens: a "Coordinated Approach To Child Health."

Briefly, CATCH is the largest school-based health promotion study ever conducted in the United States that scientifically documented positive changes in children's physical activity and dietary habits. It is a research-based model that has proven results. The Texas Department of Health is helping diffuse this model statewide by providing curricula and training for teachers, cafeteria workers and other school personnel.

CATCH is a comprehensive, coordinated school health program for 3rd through 5th graders that introduces healthy behavior through four components: classroom curriculum, physical education, school food service, and family involvement. Though focused on those three grade levels, CATCH teaches our children what healthy food choices are, what healthy activity levels are and models other healthy behaviors for life. Three years after CATCH was implemented in Texas, students in the program reported lower fat intake and more vigorous physical activity than those in the control group. Five to seven years down the road, schools that received CATCH training were still serving meals significantly lower in total fat and saturated fat than schools not introduced to this program. Former CATCH students were also spending the same amount of time in moderate-to-vigorous physical activity as when they were in the program.

This program's effectiveness is linked not only to its comprehensive design, but with how seamlessly it fits into existing school curricula, addresses the need for physical activity, raises the health status of all school children, involves parents, cafeteria workers and entire communities, and has demonstrated long-term effectiveness. CATCH has been adopted by over 1,000 Texas elementary schools with support from local public health departments and professional and community organizations. Other states as well as 350 Department of Defense schools worldwide are piloting their own CATCH programs. All components of this program have been cited internationally as examples of "best practices."

We know that schools are already challenged with developing optimal curricula for "the basics" and ensuring that students are prepared to demonstrate their knowledge on standardized tests. The CATCH curriculum fits seamlessly into that knowledge base, and it includes a number of methods for teachers to integrate these important life-long health lessons with those already planned. One teacher commented that the curricula "... are very user-friendly (and) easy for any teacher to modify or—enrich (what he or she already has planned). It allows for individuality in each classroom." So while the program is specific in its design, it doesn't tell teachers how to teach—CATCH provides the tools that teachers need and want to help our kids grow up healthy and strong.

One of the greatest success stories in Texas comes from El Paso, an example of community investment. Collaborative efforts among school districts, the Texas Education Association, the Texas Department of Health, the American Cancer Society, the American Health Association, universities and other private and public partners have resulted in such important accomplishments as translating materials into Spanish and otherwise adapting them to be more culturally appropriate for that community. The original, 4-year initiative has grown into a 7-year program that reaches an estimated 52,000 students and their families through 83 schools in 13 school districts. Grant funds from the Paso del Norte Health Foundation (PNHF) are supporting this expansion, with an evaluation component funded by PNHF and the American Heart Association. Parents, teachers, and school principles have volunteered testimonials on the changes in children's health.

One Texas parent, "Will's mother," wrote that "(w)hen—Will was first enrolled in the program, he was a chubby guy who regularly overate. Today, his eating habits are the best of our whole family. Now Will is slender and very active. At the age of 13, he plays football, baseball, and basketball and works out with weights twice a week. Thanks for your part in this healthy metamorphosis." This statement reflects the kind of changes needed in one of "the nation's fattest cities"; Texas has 5 of the country's 50 fattest cities, according to Men's Fitness magazine. The alarming increase in childhood obesity demonstrates the urgent need for programs like CATCH—to intervene early, preventing disease before it strikes down our citizens, often in the prime of their lives.

Much of this devastation on our people, on our economy, on our quality of life—can be prevented. We know what causes cardiovascular disease; and we have solid, tested methods for helping people make wise decisions to reduce their risk for these chronic diseases, as well as improve their overall health status. Right now, few states have comprehensive cardiovascular disease programs, yet all Americans experience these health problems. Research reveals that young people, members of racial and ethnic minorities, women, and people of low socioeconomic status are most at risk for developing these problems and suffering the greatest effects (CDC, 2002). The Texas Department of Health validated that the CATCH curriculum, as implemented in Texas communities, is flexible enough to ensure cultural appropriateness and is a good, comprehensive strategy for child health.

If all states had comprehensive cardiovascular programs, then successful models—such as CATCH—can be taken directly to communities. We've known the risk factors for cardiovascular disease for over 50 years—the result of the NHLBI's long-term research on cardiovascular health, the Framingham Heart Study. We've known how to prevent the development of these risk factors for over 10 years. Preventing cardiovascular and other chronic diseases increases the quality-of-life and life expectancy. It also lowers health care and related costs. CATCH is an excellent example of solidly researched public health intervention strategies that need adequate funding to make a real difference in people's lives.

Thank you for the opportunity to testify before you today. I will be happy to answer any questions you may have.

Mr. BILIRAKIS. Thank you very much, Doctor.

Dr. Jones?

STATEMENT OF DANIEL JONES

Mr. JONES. Mr. Chairman, I would like to express my appreciation to you and the members of the subcommittee for holding this hearing on this very important issue, and thank you, Congressman Pickering, for your kind introduction and for your continued leadership.

I am here today to tell you about the enormous impact of stroke, our Nation's number 3 killer, and the opportunity to advance the fight against stroke through research. The American Heart Association and our American Stroke Association Division applauds Congress for its commitment to double the budget of the National Institutes of Health over 5 years by fiscal year 2003. Fulfillment of this commitment will help us to develop new knowledge and tools to more effectively prevent and treat stroke and other cardiovascular diseases.

Together, NIH and the stroke community have advanced our knowledge of stroke. Stroke was once viewed as an untreatable disease, but important new information shows promise for improved stroke diagnosis, treatment, rehabilitation, and prevention. Research during the last decade provided physicians new resources to prevent, diagnose, and treat stroke.

For example, NINDS-sponsored clinical trials showed the effectiveness of a clot-busting drug when administered to appropriate patients within 3 hours of the onset of symptoms of a clot-based stroke. Another series of trials found that aspirin or warfarin reduced stroke risk to 80 percent in victims of atrial fibrillation and irregular heart beat associated with 70,000 strokes each year. NHLBI-sponsored clinical trials confirmed the benefit of treatment of high blood pressure and high cholesterol as ways to prevent stroke.

The bad news is, despite this progress, stroke remains the Nation's third leading cause of death and, importantly, a major cause of disability. We must make a commitment to do more. With the aging of the population, the number of stroke patients in the United States will substantially grow in the coming decades.

Despite the overall effort to double the NIH budget, stroke research, as has been pointed out, remains disproportionately underfunded in view of the enormous burden this disease places on our Nation and the numerous scientific opportunities in the future. Presently, only 1 percent of the NIH budget is invested in stroke research and related programs.

We urge Congress to ensure that the NIH budget for stroke also doubles over the same 5-year period. An appropriation of $316 million for fiscal year 2003 is needed to accomplish this goal.

Each year over 600,000 Americans suffer a stroke, and 167,000 of them die. This devastating disease touches the lives of nearly all Americans. There are currently 4.6 million stroke survivors living in the United States, and as many as 30 percent of survivors are permanently disabled, requiring extensive and costly care. My home State of Mississippi, which is in the Stroke Belt Region, has the seventh highest stroke death rate in the Nation.

Stroke is a costly disease. Nationally, stroke is expected to cost our Nation $49.4 billion in 2002, including $30.8 billion in direct medical costs. Since a large share of these costs are paid for by

public payors like Medicare, these programs should be modernized to better address stroke.

For example, Medicare should cover the cost of preventative cholesterol screening in order to better detect stroke risk. The American Heart Association and its American Stroke Association Division has set a bold goal to reduce stroke and risk of stroke by 25 percent by the year 2010. The association, which does not accept government funding, plans to reach this goal through its continued efforts to fund stroke research, educate the public about stroke, and implement successful community-based programs.

We can reach this goal, but it will take commitment, hard work, a continued close relationship with Federal agencies like the National Institutes of Health and public and private resources. The American Stroke Association applauds the National Institute of Neurological Disorders and Stroke at the NIH for recognizing the need to do more in this area and for developing a road map for the next decade of stroke research.

We are pleased that several of the critical priorities identified by NINDS include the development of stroke center networks with sufficient infrastructure to deliver quality stroke care, improvement of data bases for collection and analysis of stroke data, and expansion of efforts to raise public awareness and train medical professionals about stroke. Accomplishing these goals will require a shared responsibility on the part of Congress and the public health community.

We encourage the members of this subcommittee to actively join our fight. We are pleased that the members of this subcommittee are committed to funding stroke research and ensuring that this research is translated into effective care.

For example, we particularly want to thank Congresswoman Lois Capps and Congressman Chip Pickering for introducing the Stroke Treatment and Ongoing Prevention Act, or Stop Stroke Act, and the chairman for his support stated today. This vital legislation will ensure that stroke is more widely recognized by the public and treated more effectively by health care providers. The Stop Stroke Act unanimously passed the Senate and currently has strong bipartisan support from 175 co-sponsors in the House.

Last, I want to take a moment to congratulate Dr. Lenfant and the National Heart, Lung, and Blood Institute on the 30th anniversary of their National High Blood Pressure Education Program that was mentioned earlier. This is one of the most successful public awareness programs in existence, and it has helped dramatically increase the interest and awareness of hypertension or high blood pressure, one of the leading risk factors for stroke.

Thank you, and I would be happy to answer any questions, and look forward to ongoing dialog with the subcommittee. Thanks.

[The prepared statement of Daniel Jones follows:]

PREPARED STATEMENT OF DANIEL JONES, AMERICAN STROKE ASSOCIATION, A DIVISION OF THE AMERICAN HEART ASSOCIATION

Thank you Congressman Pickering. I appreciate your leadership on this issue. I would also like to thank Chairman Bilirakis and the members of the Subcommittee for holding this hearing.

I am Dr. Daniel Jones, the Associate Vice Chancellor for Health Affairs and Associate Dean, School of Medicine at the University of Mississippi Medical Center. I

am also the Herbert G. Langford Professor of Medicine, the Co-director of the Division of Hypertension and Associate Director of the Center for Excellence in Cardiovascular-Renal Research. In addition, I am also an active volunteer for the American Heart Association and its American Stroke Association Division. In this capacity, I serve on the NIH National High Blood Pressure Education Program Coordinating Committee and am the chairman of the AHA International Committee.

I am here today to tell you about the enormous impact of stroke—our nation's number three killer—and the opportunity to advance the fight against stroke through research.

SIGNIFICANT ADVANCES IN THE LAST DECADE

The American Heart Association and our American Stroke Association division applaud Congress for its commitment to double the budget of the National Institutes of Health (NIH) over five years—by Fiscal Year 2003. Fulfillment of this commitment will help us develop new knowledge and tools to more effectively prevent and treat stroke and other cardiovascular diseases.

Together, NIH and the stroke community have advanced the knowledge of stroke. Stroke was once viewed as an untreatable disease. Importantly, new information shows promise for improved stroke diagnosis, treatment, rehabilitation and prevention.

Research during the last decade provided physicians new resources to prevent, diagnose and treat stroke. Highlights of selected National Institute of Neurological Disorders and Stroke (NINDS) supported stroke studies follow.

- A clinical trial showed that when administered to appropriate patients within three hours of the onset of symptoms of a clot-based stroke, tissue plasminogen activator (tPA), the only FDA-approved emergency treatment for stroke, can restore blood flow and reduce the chances of permanent disability by 33 percent. It is estimated to save $4.5 million to $5 million for every 1000 patients treated.
- A series of clinical trials found that aspirin or warfarin reduced stroke risk by up to 80 percent in victims of atrial fibrillation, an irregular heart beat that is associated with 70,000 strokes each year. Either aspirin or warfarin treatment could prevent up to 30,000 strokes each year with an annual savings of $200 million. For many atrial fibrillation victims, the less expensive, less complicated aspirin can provide sufficient protection from stroke.
- A clinical trial is evaluating medications, ticlopidine and aspirin, to prevent recurrent stroke in African-Americans. Importance of prevention and early risk factor treatment are stressed.
- Clinical trials sponsored by the National Heart, Lung and Blood Institute (NHLBI) confirmed the benefit of treatment of high blood pressure and high cholesterol as ways to prevent stroke.

STROKE IS STILL THE NATION'S NUMBER THREE KILLER

The bad news is, despite this progress, stroke remains the nation's third leading cause of death, and importantly, a major cause of disability. We must make a commitment to do more. With an aging population, the number of stroke patients in the United States will substantially grow in the coming decades.

Despite the overall effort to double the NIH budget, stroke research remains disproportionately underfunded in view of the enormous burden this disease places on our nation and the numerous scientific opportunities. Presently, only 1 percent of the NIH budget is invested in stroke research and related programs.

We urge Congress to ensure that the NIH budget for stroke also doubles over the same five-year period. An appropriation of $316 million for Fiscal Year 2003 is needed to accomplish this goal.

Each year, more than 600,000 Americans suffer a stroke and 167,000 of them die. This devastating disease touches the lives of nearly all Americans. There are currently 4.6 million stroke survivors living in the United States, and as many as 30 percent of the survivors are permanently disabled, requiring extensive and costly care.

My home state of Mississippi, which is in the stroke belt region, has the seventh highest stroke death rate in the nation. Mr. Chairman, I have included as part of my testimony a chart that illustrates the impact of stroke on each state.

Stroke is a costly disease. Nationally, stroke is expected to cost our nation $49.4 billion in 2002, including $30.8 billion in direct medical costs. Since a large share of these costs are paid for by public payors like Medicare, these programs must be modernized to better address stroke. For example, Medicare should cover the cost of preventive cholesterol screening in order to better detect stroke risk.

THE AMERICAN HEART ASSOCIATION—WE'RE PUTTING OUR HEART BEHIND FIGHTING STROKE

The American Heart Association and its American Stroke Association division have set a bold goal of reducing stroke and risk of stroke by 25 percent by the year 2010.

The Association, which does not accept government funding, plans to reach this goal through its continued efforts to fund stroke research, educate the public about stroke and implement its successful community-based programs. The Association leverages credible science, a strong reputation and a nationwide infrastructure of Affiliates to advance its mission.

We can reach this goal, but it will take commitment, hard work, a continued close partnership with federal agencies like the National Institutes of Health and public and private resources.

NIH SETS ROADMAP FOR THE FUTURE OF STROKE RESEARCH

The American Heart Association and its American Stroke Association division applauds the National Institute of Neurological Disorders and Stroke (NINDS) at the NIH for recognizing the need to do more in this area and for developing a roadmap for the next decade of stroke research.

NINDS assembled leaders in the stroke field to form the Stroke Progress Review Group to develop the strategic plan, which was released in April, 2002. Our Association plays an active role in this group. The report identifies five research priorities for the next five to ten years as well as seven priorities needed to implement this important research so that patients benefit in a meaningful and timely manner.

Several of the critical priorities identified in the NINDS report include the development of stroke center networks with sufficient infrastructure to deliver quality stroke care, improvement of databases for collection and analysis of stroke data and expansion of education and training.

TRANSLATING RESEARCH INTO IMPROVED STROKE CARE AND PREVENTION

Accomplishing these goals will help ensure that stroke research advances are translated into practice, but their fulfillment will require a shared responsibility on the part of Congress and the public health community.

We are pleased that Members of this Subcommittee are committed to funding stroke research. We ask that the Subcommittee also help ensure that this research is translated into effective stroke care and prevention by advancing legislation like the Stroke Treatment and Ongoing Prevention Act (STOP Stroke Act).

We thank Congresswoman Lois Capps and Congressman Chip Pickering for introducing this vital legislation (H.R. 3431/S.1274), which will help ensure that stroke is more widely recognized by the public and treated more effectively by healthcare providers.

The STOP Stroke Act addresses a number of barriers that prevent stroke patients from accessing quality care. These barriers include low public awareness, lack of awareness among medical professionals, lack of infrastructure and lack of data collection. Many of these barriers were also identified as priorities in the Report of the Stroke Progress Review Group, and their removal is critical to the translation of NIH stroke research advances into practice.

For example, the legislation addresses the critical need to better educate the public about stroke. Despite being the nation's number three killer, the public knows very little about stroke. Only 68 percent of the general public can name the most common stroke warning sign—sudden numbness or weakness on one side of the body. Even more alarming, those at the greatest risk—seniors, minorities and women—know the least about the stroke warning signs.

Stroke is a medical emergency and must be treated rapidly. Unfortunately, since many Americans do not recognize the stroke warning signs, stroke victims frequently wait as long as 22 hours before seeking medical attention. The treatment window for most strokes is as short as three hours from the onset of symptoms.

We look forward to continuing to work with Representatives Capps and Pickering to advance this legislation.

The STOP Stroke Act unanimously passed the Senate and currently has strong bipartisan support from 175 co-sponsors in the House, including 21 Members of this Subcommittee.

Lastly, I want to take a moment to congratulate Dr. Lenfant and the National Heart, Lung and Blood Institute on the 30th anniversary of the National High Blood Pressure Education Program. This is one of the most successful public awareness

programs in existence and has helped dramatically increase awareness of hypertension, or high blood pressure, one of the leading risk factors for stroke.

Thank you. I have included as part of my testimony several documents that provide additional background information about stroke as well as information about the American Heart Association and its American Stroke Association division, including what we are doing to fight this devastating disease.

I would be pleased to answer any of your questions and look forward to an ongoing dialogue with the Subcommittee as you address these important issues.

STROKE IN YOUR STATE

In 1999, stroke was the number 3 killer in every state but Colorado (number 4), Nevada (number 4), New Mexico (number 5) and Wyoming (number 4).

The following chart shows the number of stroke deaths in your state, your state's stroke death rate (number of deaths per 100,000 people), and your state's rank.

State	Number of Stroke Deaths* (1999)	Rank** (Highest to Lowest)	Rate*** (Deaths per 100,000)
Alabama	3,148	11	68.1
Alaska	171	20	63.7
Arizona	2,600	44	56.2
Arkansas	2,255	2	85.4
California	17,962	26	61.5
Colorado	1,834	43	56.5
Connecticut	1,933	46	52.1
Delaware	365	47	51.8
District of Columbia	297	33	60.4
Florida	10,560	48	51.3
Georgia	4,416	6	73.8
Hawaii	762	39	58.9
Idaho	771	17	65.1
Illinois	7,714	23	62.3
Indiana	4,057	9	68.8
Iowa	2,317	28	61.1
Kansas	1,841	24	62.0
Kentucky	2,710	13	67.6
Louisiana	2,684	14	67.2
Maine	879	42	57.0
Maryland	2,892	35	60.0
Massachusetts	3,548	51	49.3
Michigan	6,041	22	62.7
Minnesota	2,997	27	61.4
Mississippi	1,854	7	69.9
Missouri	3,950	18	64.5
Montana	595	31	60.6
Nebraska	1,176	37	59.6
Nevada	882	21	63.0
New Hampshire	669	29	61.0
New Jersey	4,122	50	50.1
New Mexico	817	45	53.1
New York	8,124	52	42.9
North Carolina	5,626	4	77.8
North Dakota	513	25	61.5
Ohio	7,235	34	60.2
Oklahoma	2,481	12	68.0
Oregon	2,799	5	77.2
Pennsylvania	8,600	38	58.9
Puerto Rico	1,814	40	58.5
Rhode Island	633	49	51.2
South Carolina	2,974	1	86.0
South Dakota	547	32	60.5
Tennessee	4,103	3	78.3
Texas	10,414	16	66.3
Utah	869	30	60.9
Vermont	344	41	58.4
Virginia	4,110	8	69.3
Washington	3,718	10	68.1

State	Number of Stroke Deaths* (1999)	Rank** (Highest to Lowest)	Rate*** (Deaths per 100,000)
West Virginia	1,323	36	59.6
Wisconsin	3,869	15	66.3
Wyoming	265	19	63.9

*Source: National Center for Health Statistics: National Vital Statistics Reports for 1999. Age adjustments are based on the 2000 standards.

**The rank is based on the state death rate and is listed from highest (1) to lowest (52). For the purposes of the chart, the District of Columbia and Puerto Rico are listed and ranked as states.

***Source: National Center For Health Statistics compressed mortality file for the years 1996 to 1998.

As a division of the American Heart Association, the American Stroke Association's mission is to reduce disability and death from stroke through research, education, fundraising, and advocacy. The American Stroke Association leverages credible science, a strong reputation, and a nationwide infrastructure of Affiliates to advance its mission. The American Stroke Association's goal is to reduce stroke and stroke risk by 25 percent by the year 2010.

PROGRAMS, PRODUCTS AND SERVICES

The American Stroke Association's initiatives are delivered through three primary categories:

I. Primary Prevention of Stroke

- The American Stroke Association produces **educational materials,** including brochures and videos, for both professional and consumer audiences, with a high level of focus on women, African Americans and seniors.
- **Search Your Heart** is an educational program designed to reach African Americans in a church setting, which encourages church members to change their lifestyles in order to build heart-healthy bodies. The program contains several activity kits, including a module called Stomp Out Stroke, that are designed to educate people about risk factors and warning signs.

II. Acute Care/The Acute Event

- **Operation Stroke**—Created in 1997, Operation Stroke is a comprehensive community initiative that pulls together local resources necessary to provide optimal care for those experiencing a stroke.
- **Acute Stroke Treatment Program (ASTP)**—This implementation resource was developed as the tool for the Brain Attack Coalition's Guidelines for Primary Stroke Centers, published in the *Journal of the American Medical Association* (JAMA), which the American Stroke Association co-authored. Since its launch, more than 3,000 kits have been distributed to hospitals across the United States, and the ASTP is considered the premier resource for implementing primary stroke centers.
- The need for rapid action is communicated to consumers through national **media and call-to-action campaigns,** radio public service announcements and national alliances with other organizations that can impact care at the time of an acute event.
- **Stroke: When Minutes Matter,** is a senior education program designed to help seniors identify the stroke warning signs and to respond promptly by calling 9-1-1. Pilot results showed 10-15 percent improvement (between pre- and post-tests) in senior recognition of stroke warning signs.

III. Secondary Prevention and Post-Stroke Rehabilitation

- **Get with the Guidelines** is a Web-based initiative delivered at the hospital level to develop hospital-based protocols to implement primary and secondary prevention guidelines for cardiovascular disease and stroke. The stroke module is currently in pilot with the Patient Management Tool (a Web-based data collection tool also used to support some states in the Paul Coverdell stroke registry pilot).
- The American Stroke Association provides valuable resources for stroke survivors and caregivers, including:
  - 1. *Stroke Connection* magazine;
  - 2. A toll-free "**Warmline**" (888-4-STROKE) staffed by stroke survivors and caregivers; and
  - 3. **Support Group Registry** of more than 2,000 support groups nationwide.

PROFESSIONAL RESOURCES

- Attended by more than 2,400 people, the American Stroke Association's **International Stroke Conference** provides an educational experience for neurologists, surgeons, physicians, nurses and allied health professionals. The conference, which highlights major advances in fundamental and clinical stroke-related research, is considered among the most successful and prestigious stroke conferences in the world.
- *Stroke: A Journal of the American Heart Association* is the premier scientific journal for those involved in the care of stroke patients.
- The **Stroke Trials Directory** is a one-of-a-kind Web site that contains descriptions of completed and ongoing stroke therapeutic trials, positive and negative.
- The **Satellite Broadcast on Acute Stroke,** one of a series of live, interactive satellite professional education broadcasts, reached more than 4,500 healthcare professionals simultaneously. The Emerging Science broadcast reached more than 8,600 health care professionals simultaneously. Future topics may include Secondary Prevention and Comprehensive Stroke Centers.
- Healthcare professionals and others interested in stroke can sign up to receive a quarterly email communication, the *Stroke Information Alliance,* to keep up with the latest activities and initiatives of the American Stroke Association (by sending email information to strokeinfo@heart.org)
- Stroke volunteers and alliances may also keep up-to-date through our Extranet community located at www.strokecommunities.org

NATIONAL STRATEGIC ALLIANCES

In order to align goals and strategies at a national level to fight against heart disease and stroke, the American Heart Association and American Stroke Association recently signed an historic Memorandum of Understanding, considered a milestone in public and private sector cooperation, with:

- Centers for Disease Control;
- National Heart, Lung and Blood Institute;
- National Institute of Neurological Diseases and Stroke;
- Office of Disease Prevention and Health Promotion; and
- Centers for Medicare and Medicaid Services

These collaborative efforts, coupled with the organization's ability to work through more than 2,000 local offices, provides a strong basis for delivering stroke messages to consumers and professionals across the United States.

AMERICAN HEART ASSOCIATION/AMERICAN STROKE ASSOCIATION IDENTIFIED STROKE RESEARCH OPPORTUNITIES

Improved Treatments for Stroke

Blood clots or bleeding into the brain can cause strokes. tPA use has dramatically improved treatment of clot-caused strokes when administered within three hours of the onset of stroke symptoms. Using coils, balloons and stents in arteries in the brain has dramatically prevented bleeding and strokes in small numbers of patients. However, many challenges to improving treatment remain. Strokes often are not recognized quickly. They can start with mild or confusing symptoms, or in the middle of the night. Also, techniques for treating strokes, other than using tPA, require extensive training for safe and effective use and so are often not available. Therefore, a compelling need exists to develop medications, devices and techniques to accomplish three specific but broad goals: 1) more effective stroke treatment; 2) safer treatment than is now available that can be administered later after stroke onset than is possible now; and 3) treatment that can be used more widely, in more patients, by more doctors.

Limiting Damage Due to Interruption in Blood Flow and Restoration of Blood Flow

Strokes damage the brain by depriving affected areas of blood and oxygen. If blood flow is restored quickly after a stroke occurs—for example, by using tPA—this damage is prevented. Even if certain areas are not completely deprived of blood, or are only without blood for a few hours, they may not recover when blood flow is restored. Much research has focused on damage caused when parts of the brain do not receive blood. But so far there has been little practical progress. Further research is needed to develop ways to 1) prevent damage to cells around the area deprived of blood, 2) prolong the time that areas of the brain can be partially deprived of blood and still recover and 3) help damaged brain cells recover. This will require a better understanding of how brain cells respond to injury and developing new drugs to help in prevention, preservation and healing. Treatments based on reopen-

ing brain blood vessels are often complicated by bleeding into the brain, when blood flow is re-established. Studies are needed to understand why such bleeding occurs and how best to prevent it.

Brain Imaging Techniques

To be considered for tPA, a patient must undergo imaging studies within three hours of the onset of stroke symptoms to 1) confirm that the symptoms stem from a stroke and 2) determine that the stroke results from a blood clot, not bleeding. Thus, an imaging technique must quickly provide information about stroke. Efforts must be directed toward 1) advancing the technology of imaging techniques to reduce the time to obtain images and improve image quality, and 2) investigating and expanding imaging to other applications that directly impact stroke care, such as telemedicine. Telemedicine is implementing radiological and communications technology to facilitate treatment of stroke patients in communities without immediate access to adequate emergency care.

Stroke Risk Factors

The devastating impact of stroke will continue until proven methods and techniques prevent its long-term debilitating effects. After researchers identify and understand how risk factors predispose someone to stroke, more people at high risk for stroke can be identified, evaluated and treated to prevent a future stroke.

Stroke and Dementia

Research on dementia has focused on Alzheimer's disease, but some of dementia in the elderly stems from stroke. Dementia remains a contributing factor in the overall outcome and quality of life of stroke survivors and of patients with high blood pressure. Lesions in the brain and some of its blood vessels can cause dementia either by producing multiple strokes (multi-infarct dementia) or by producing lesions in the white matter of the brain (leukoaraiosis). More research must define risk factors for multiple strokes, its underlying causes and effective preventive measures. Furthermore, more clinical and basic research is needed to characterize the risk factors for leukoaraiosis and to define its causes and potential treatments.

Functional Recovery from Stroke

More Americans are expected to suffer from stroke as the "baby boomer" population ages. Managing high-risk patients and evaluating a stroke in progress must continue to focus on predicting and improving functional recovery from stroke.

Stroke Education and Awareness

Studies underscore the importance of comprehensive and effective educational efforts to increase public awareness of stroke. They emphasize three important steps in improving stroke outcome: educating the public about stroke risk factors, recognizing stroke warning signs and seeking emergency medical attention. Several audiences must be targeted: the public, especially high-risk populations (blacks, elderly, diabetics), stroke survivors, healthcare professionals, emergency medical personnel, hospital administrators, civic leaders and government officials. Primary stroke center recommendations published by the Brain Attack Coalition in the June 21, 2000 Journal of the American Medical Association clearly define recommendations for hospitals to implement stroke centers, teams and other programs to improve stroke treatment.

Genomics and Proteomics in Stroke

The factors that predispose someone to stroke are complex. They are influenced by multiple genes interacting with each other and the environment. Recent advances in genomics and proteomics help identify genes and their protein products involved in developing brain blood vessel disease and stroke. Knowledge of these genes will help scientists and physicians use an individual's genetic makeup to identify subgroups of the population at risk for stroke, establish which groups are most likely to benefit from specific treatments, and provide the scientific basis for developing innovative approaches to treat and prevent stroke. Important opportunities for research include 1) developing new technologies for studying the differing patterns of gene expression of normal and diseased cells and tissues and 2) measuring interactions between genetic variants and specific environmental changes to identify genes that modify the impact of the environment on brain blood vessel disease.

Proteomics builds on and complements knowledge gained from genomics and genetic screening approaches. It helps provide a functional understanding of how genes regulate the blood vessels. It also allows investigators to identify alterations in protein structure and function that lead to brain blood vessel disease and stroke. Genomic and proteomic studies are often complex and require sophisticated analyt-

ical tools to store and analyze data. So studies involving multiple investigators and centers and ways to share data among investigators should be encouraged.

FREQUENTLY ASKED QUESTIONS

What is a stroke?

Stroke is a cardiovascular disease that affects the blood vessels supplying blood to the brain. A stroke occurs when a blood vessel responsible for supplying the brain with oxygen and nutrients bursts or becomes excessively clogged by a blood clot or some other particle.

What are the types of stroke?

There are two main types of stroke: ischemic strokes and hemmorrahagic strokes.

- **Ischemic strokes** are caused by blood clots that form and block blood flow to the brain. Ischemic strokes are most common and account for 80 percent of all strokes.
- **Hemmorrahagic strokes** are caused by a break in an artery in the brain, causing blood to fill the area and damage the surrounding tissue.

What is a TIA (transient ischemic attack) or "mini stroke"?

A TIA is a sudden but temporary interruption of the blood supply to the brain resulting in symptoms that last from several minutes to several hours, but not more than 24 hours.

What are the effects of stroke?

Strokes affect people in different ways, depending on the type of the stroke, the area of the brain affected and the extent of the brain injury. Strokes can cause devastating disability, including:

- Paralysis or muscle weakness
- Difficulty in speaking or swallowing
- Blindness
- Cognitive impairment or memory loss
- Incontinence

How can stroke be prevented?

The American Heart Association has identified several factors that increase the risk of stroke. The more risk factors a person has, the greater the chance that he or she will have a stroke. The best way to prevent a stroke is to reduce the controllable risk factors, which include:

- High blood pressure
- Tobacco use
- High cholesterol levels
- Obesity
- Physical inactivity

There are also a number of uncontrollable risk factors for stroke including age, gender, race, family history of heart disease, stroke or diabetes.

What are the stroke warning signs?

The most common warning signs of stroke include the following:

- Sudden numbness or weakness of the face, arm or leg, often on one side of the body.
- Sudden confusion, trouble speaking or understanding.
- Sudden trouble seeing in one or both eyes.
- Sudden trouble walking, dizziness, loss of balance or coordination.
- Sudden severe headache with no known cause.

Not all of these warning signs occur in every stroke. If some signs begin to occur, don't wait. Get help immediately. Stroke is a medical emergency.

How is stroke currently treated?

Depending on the type and severity, stroke can be treated through surgery, drugs, acute hospital care and rehabilitation. If the stroke is caused by a blood clot (ischemic stroke), clot-busting drugs can sometimes be used to dissolve the clot. This treatment, which was approved by the Food and Drug Administration in 1996, is a significant advance in the war against stroke.

For clot-busting drugs to be effective, treatment must be started within three hours of the onset of the stroke. Therefore, it's critical that care1ivers, medical professionals and the public recognize stroke as a medical emergency and respond immediately. Unfortunately, for a number of reasons, only 3 to 5 percent of patients who could benefit from these drugs actually receive the treatment.

Can stroke survivors be rehabilitated?

Besides being the third leading cause of death in the United States, stroke is a leading cause of serious, long-term disability. Many survivors are left with mental and physical disabilities of varying severity, and nearly all stroke survivors can benefit from an appropriately structured and comprehensive rehabilitation program. People with the least impairment are likely to benefit from rehabilitation the most. Sometimes even modest gains can mean the difference between staying in an institution and returning home. The goal of rehabilitation is to increase independence and improve physical abilities. Rehabilitation is most successful if initiated early.

In addition to current treatments and therapies, there are many promising medical advances on the horizon. What is the goal of these new treatments?

A number of new stroke technologies are in development. The primary objectives of these medical advances are to more effectively remove blood clots that cause stroke and to extend the therapeutic window.

- New drug therapies are under development that would, like current treatments, dissolve blood clots. Physicians hope to improve the performance of these drugs by delivering them directly to the blood clot through small tubes threaded directly into arteries or the brain itself. Researchers are also trying to develop very small mechanical devices that can be delivered through these small tubes to break-up or remove blood clots.
- Once a blood clot occurs and a portion of the brain is starved of blood, a series of chemical reactions take place. Many of these chemical reactions occur in the first few hours of a stroke and actually cause most of the damage to the brain. This short time frame means that many patients are not able to receive treatment in time to prevent significant brain injury. Researchers hope to develop drugs that stop or delay these chemical reactions, prevent permanent damage to the brain and expand the therapeutic window so that there is more time to provide treatment.

Mr. BILIRAKIS. Thank you. Thank you very much, Dr. Jones.

Dr. Bonow, certainly because of your past experience on the research staff at the institute, you're more than anybody here, I guess, in a unique position to explain to us how NIH research activities translate to patients and their providers. In the process of formulating your answer, I wish you would maybe expand my question, so that you can expand your answer, to go into the public advocacy organizations such as your organization, such as Mr. Hargis' organization, in terms of their relationship with NIH, in terms of interacting with NIH, and their having difficulty interacting with NIH, et cetera. Please proceed, sir.

Mr. BONOW. Thank you, Mr. Chairman. I do have a unique perspective, both on the inside and outside, as a researcher and currently as somewhat of an administrator over a large number of cardiologists who are seeking NIH grants.

I do believe that I can reassure the committee that, from my perspective, the administrative components of the National Institutes of Health are doing a good job. There is a large attention to basic research, but basic research is vital, getting to some of the issues raised in the previous panel. New drug development only comes when there is an understanding of the fundamental mechanisms of disease. You can develop a whole new class of drugs when you know what is going on in the cell, on the cell membrane. If we have cell regeneration, perhaps there are drugs that can be developed to simulate this. So the basic science is critically important.

Translating that to clinical research is equally important. Intramurally, getting back to one of the questions I believe from Mr. Deal this morning, much of the research done in Bethesda is patient-based research. My 16 years there was spent, at least 14 years, involved in clinical trials in patients with either new drugs,

new diagnostic tests, new indications for surgical advances, and so forth. I believe that is vitally important to continue this focused research in a very heady research environment, unencumbered by the rest of the issues that someone in a medical school environment must deal with in trying to accomplish research.

On the other hand, one needs to be able to translate research in a protected environment like the NIH into the real world, and this is where the clinical trials become very important. In the current year of cardiovascular disease research, much of the clinical trials are being performed by drug companies. This is very important. This is the way we advance our understanding of drugs.

But I believe the federally funded clinical trials are preeminent in their objectivity, their research accomplishments. Negative results are published equally with positive results without bias. These trials are fundamentally important.

I do believe that the process by which clinical trials get developed and approved and implemented is a good one with appropriate peer review by external reviewers. So, therefore, I think that component is fine.

The other component you raise of how this now gets implemented into outcomes and improvement in patient care is something the NIH does focus on, perhaps could focus on more, and perhaps better. But it can only do so in partnership with other agencies, I think, like CDC, or perhaps at the state level with state departments, such as Dr. Sanchez mentioned, partnerships with NIH and public health groups.

Mr. BILIRAKIS. Is that being done on an adequate basis?

Mr. BONOW. Well, as has been discussed in the first panel, the Memorandum of Understanding I think is critical. This is an official liaison between these Federal agencies. We in the American Heart Association are part of this as well, and we are proud to be. It does help to translate things beyond the research arena into outcomes or outcomes-based research, and then perhaps it can actually improve care nationwide.

The CDC I believe should be focused on. I know it is not the topic for today's discussion, but CDC's chronic disease program, which can address cardiovascular disease and stroke at the state level, would require more funding to implement this nationwide. Currently, only six States are receiving full support from CDC to implement chronic disease programs, including cardiovascular disease and stroke. I would like to see more funding going to the CDC chronic disease components to do this.

My district in Chicago for African American men has the third worst mortality rates in the country for cardiovascular disease. We are not doing enough to translate what we already know works. It is not new research; it is old research. What already works, but to implement that effectively and at the community level. To answer your question, I don't believe we are focusing on this enough.

This also leads, I guess, to your final question, which is how the private agencies or groups before you today could help because we are focusing on this, too. We can't do it alone. We need to have partnerships with other peer groups. We work with the American College of Cardiology, the American Diabetes Association, but in

partnership with the Federal agencies, I believe we can get the job done.

Mr. BILIRAKIS. My time has expired, and we have a series of votes coming up. So we should finish up, would like to finish up, because I don't want to keep you that long.

Mr. Hargis, I intended to ask you basically the same question, and consider that question asked, but will you respond in writing to us——

Mr. HARGIS. Certainly.

Mr. BILIRAKIS. [continuing] regarding it? I would like to know your experience with NIH in terms of your relationship with them. Can you interact with them? Do they listen to you? You know, things of that nature.

Obviously, we think the world of them in general, but we also want to make sure that they are spending the taxpayers' dollars the right way, and that the organizations such as yours, since you spend so much time on these particular epilepsy and heart and all these other diseases, we want to make sure that they listen; if not necessarily go along with it all the time, at least are listening.

All right, I will now yield to Mr. Brown.

Mr. BROWN. Thank you, Mr. Chairman. I will do better than I did the last time you yielded to me. Thank you.

Dr. Sanchez, just one pretty simple question: We have talked at length about translating basic research into basic health through both panels, in large part through the development of prescription drugs and antibiotics. I was interested in your discussion about translating basic research into prevention.

Tell us, if you would, in my State of Ohio we have, I believe Columbus has some of the highest diabetes mortality rates in the country. Diabetes is a serious problem, obviously, everywhere. Ohio, you are at the top of the list by most measurements.

Tell us, if you would, a little more about what you have done through the Texas Department of Health in terms of obesity and exercise and diet, and all the issues that clearly make the diabetes probably the worst.

Mr. SANCHEZ. Sure. As was stated, I have been Commissioner of Health for about 7 months, and one of the first things that we did at TDA when I came on board was to have a discussion internally and with external partners about what might be Texas Department of Health priorities. The top five priorities for the Texas Department of Health are fitness promotion, in other words, obesity prevention, improving our immunization rates in our State, eliminating health disparities in our State, not just racial and ethnic but geographic disparities—we have great geographic disparities in our State—enhancing our public health preparedness, and then, last, as a State agency whose charge is to dispense public funds, look at improving our business practices.

So far as obesity goes, we've got a number of programs. CATCH, which you heard about, is one. We feel that focusing at least some of our attention on children is very important in terms of the continuum and the upstream benefits of addressing lifestyle issues early on in life, before they become so ingrained as in someone like me, and try to get people early in life.

We have a Texas Diabetes Council in Texas that works in collaboration with the Texas Department of Health. It is a legislatively created entity. That is entity that is doing interventions at the community level and at the practice level to try to improve our ability to prevent diabetes and our ability to improve the management of diabetes by physicians.

Those programs are tailored for the community. A program in the Lower Rio Grande Valley, where 90 percent of the population is Hispanic and a substantial percentage of the population speaks Spanish, is going to look very different from a diabetes community program based in Dallas, for example.

With regards to physical activity, the Texas Department of Health is now a part of the Governor's Council on Physical Fitness, and we are in the very initial stages of defining an agenda with regard to physical fitness.

We also have a Cardiovascular Council that has created a State plan that was only published May 2002. We can provide that for this committee. That sets out a short-term and long-term agenda to address cardiovascular disease in our State.

One thing that I will say is obesity is one of our priorities because we feel that obesity prevention, if we were to do it properly, we would be preventing cardiovascular disease, diabetes, some forms of cancer, arthritis, and the list literally goes on and on. Our sense is that we should try to promote fitness, and in so doing we would address some of these more disease-specific issues, not to say that they aren't important, but at the Texas Department of Health we are trying to take of an upstream primary prevention approach in conjunction with already-existing secondary prevention approaches.

I hope that answered your question.

Mr. BILIRAKIS. I thank the gentleman. Mr. Pickering?

Mr. PICKERING. Mr. Chairman, I know our time is running short, and I want to submit for the record to Dr. Jones some questions for the record, to make sure that we get the full benefit as a committee from the very important research that you are doing at the University of Mississippi Medical Center as it relates to these issues of heart, cardiovascular, hypertension, stroke, and what that means for the Stroke Belt, what it means for a State like Mississippi, and especially in the African American community. We know that those findings can be very important not only to Mississippi, but for the rest of the country.

But I would like to ask you a couple of different things. You stated in your testimony a very aggressive objective of reducing stroke incidences by 25 percent by the year 2010. Without the legislation that has passed the Senate unanimously, has 175 co-sponsors in the House, introduced by Mrs. Capps and myself here in the House, can you meet that objective? If you do not have the resources that that legislation calls for, can you meet that goal?

Mr. JONES. No, we can't. As I said in my statement, this will take a partnership, and all of us need to work together. You have unique resources that we need to raise awareness both at the public level and at the professional level about stroke. There has been a true revolution in the management of stroke in the last few years, but we really must move forward to implement that. We can

stop the devastating effect of stroke in individuals if they can receive modern treatment in an appropriate time fashion, but we have a lot to do in public awareness, in professional awareness, and in changing access to health care to make that happen.

Mr. PICKERING. Let me follow up. One of the key components of meeting that objective as well is to have the physicians that can treat stroke, In Mississippi we are in a state of crisis as it relates to the availability and the number of neurosurgeons. Now that has several components, but one of the key causes to the flight of neurosurgeons from Mississippi and the inability to recruit neurosurgeons to Mississippi is the condition that we now face in the tort or medical malpractice arena.

Another piece of legislation that is coming before this subcommittee and before this committee and Congress in the coming days will be an effort that I co-sponsored, that Congressmen Cox and Greenwood and others have sponsored, that would limit medical malpractice liability. We are seeing in Mississippi 400 doctors leave our State. We are not being able to recruit others. We have seen 14 medical malpractice insurers go down to one insurance. We are seeing a quadrupling of insurance premiums for our small rural hospitals.

Would you also support that effort, and how critical is that to your overall effort to bring good health to Mississippi and to make progress on heart and stroke disease?

Mr. JONES. Thank you for that question and for your interest. The word "crisis" is overused sometimes, but this is a true crisis. It is a crisis in several States now, 5, 6, 10, depending on how you define it, but it is a crisis that is spreading across our country.

I would like to couch this in terms of what we are talking about today for cardiovascular disease management and particularly stroke management. Access to care is a critical issue. You have heard testimony from several that we have new treatments that are effective if they are implemented within 3 hours. In a rural state like Mississippi, like Texas, where people have to go to receive that wonderful new treatment is really important. As part of a comprehensive stroke team, neurosurgeons are a vital part.

In Mississippi the Mississippi Neurosurgical Association has on the public record said that 30 percent of the neurosurgeons have left Mississippi. Now that is beginning with a total of 38 neurosurgeons. That is a scarce resource in a State that has the seventh highest stroke rate in the country. There are parts of Mississippi now where on some evenings and on some weekends, if you experience a problem where you need a neurosurgeon, you may have to travel 200 or 300 miles to have that. If you add up that 3 hours, it is a magic 3 hours for the initiation of treatment of stroke.

Our patients are confused about what they should do, about where they should go when they get to hospitals and they don't have adequate coverage. It is a real crisis in health care.

Access to care is an important part of this issue of improving the treatment of stroke, and I thank you for your interest in that. I plead with you to bring some solution to that. If you don't care enough about physicians, and physicians are not always easy to love, care about our patients and providing access to care for our patients.

Mr. PICKERING. Mr. Chairman, let me just close real quick with, in my earlier questions——

Mr. BILIRAKIS. We don't want to miss these votes.

Mr. PICKERING. I know. In my earlier questions I did not intend to set up any type of competition on research among the various priorities that we have. I simply want to find consensus on a very important issue that is important to my State, and from a personal point of view, having both a grandmother die of heart disease and a grandfather who passed away after a series of strokes. This affects all of our families.

We just want to get the resources and the priorities and objectives to be able to give you the resources you need. Thank you for coming here today.

Mr. BILIRAKIS. Hopefully, we can do that, and are doing that, on a bipartisan basis. This increase of funding, doubling the funding for NIH over 5 years, we make an awful lot of promises from up here, and many of them we just can't fulfill, but that is one we did, and we are very proud of it.

The hearing now is terminated. I very much appreciate your being here. We have learned a lot from you. I know if we had more time, we would probably learn even more from you, but there will be a series of questions. We would like to hear from you. We would like to hear from you on this, particularly the one that I had asked. Again, anything, even if it hasn't been a question that has been asked, if you feel that you have anything to offer that might be helpful in these regards, please feel free to submit that information to the committee.

Thank you very much.

[Whereupon, at 12:59 p.m., the subcommittee was adjourned.]