disease to occur before intervening. I will share with you the strategic vision of NIH and discuss the many management innovations we have implemented to ensure optimal stewardship of taxpayers' resources.

Selected Accomplishments of NIH and their Impact on Health

The achievements of NIH and our private sector partners in medical research are difficult to overstate. According to the latest report on the Nation's health from the Centers for Disease Control and Prevention (CDC), life expectancy continues to rise, now at an unprecedented 78 years for the total U.S. population. Since 1950, the age-adjusted death rate for the total population declined by a remarkable 43 percent. Life expectancy has increased by one year in every five for the past 30 years. Americans are not only living longer, they are healthier. For instance, the disability rate of American seniors dropped by almost 30 percent in the past 20 years, owing to a range of scientific advances.

The following are samples of the many advances driven by the investment in NIH.

Advances in Cardiovascular Disease and Stroke

Thirty years ago, it was common for a man or woman to suddenly die of a heart attack or stroke between the ages of 50 and 60. Had this trend continued unabated, today more than 1.6 million lives would have been lost per year. Fortunately, today the toll is much less. The death rates from cardiovascular disease have declined by 63 percent and by 70 percent for stroke

targets. The estimated total cumulative investment at the NCI per American over the past 30 years, including the doubling period, is about $258, or about $9 per American per year over the entire period.

Advances in HIV/AIDS

Without the development and testing of antiretroviral drugs, there would be no hope for patients with HIV/AIDS. The development of Highly Active Antiretroviral Therapies primarily resulted from the work of a large cadre of NIH-supported scientists and their counterparts in the pharmaceutical industry. Their discoveries about the cellular mechanisms of the disease have transformed AIDS into a manageable disease, preventing hundreds of thousands of hospitalizations and early deaths. To date, 21 antiretroviral drugs and 4 combination formulations have been approved by the FDA. Many more less toxic AIDS drugs are currently in development. Today, fewer than 50 HIV-infected babies are born each year in the United States, sparing 16,000 to 20,000 children from AIDS through the use of antiretroviral drugs to prevent mother-to-child transmission. Mother-to-child transmission rates in developing countries have declined by 40 percent with the use of drug therapy. With the introduction of these new drugs, economists estimate the aggregate potential value of improved survival has been nearly $400 billion for those infected through 2000. They estimate the aggregate potential value for all past and future cohorts of individuals infected with HIV is almost $1.4 trillion.

With the additional resources provided during the doubling of the NIH budget, we launched the Vaccine Production Program (VPP) Laboratory to efficiently translate candidate research vaccines, including HIV vaccines, into useable products. Since its inception in 2001, this program has overseen the manufacture of over 29 bulk pharmaceutical compounds formulated into 14 different vaccine products for HIV, as well as West Nile, SARS and Ebola Virus, and expanded our network of clinical trial sites across the globe. This program is enabling NIH to serve the needs of the American people in an age of global risks of infectious diseases.

Advances Against the Threat of Pandemic Influenza

Thanks to fundamental advances in viral genomics and genetic engineering, NIH has been able to help in the development of countermeasures against both seasonal and pandemic influenza viruses. We now have a vaccine against the H5N1 virus and will develop a second one in conjunction with CDC. Without such a vaccine, and others under development and testing, we would be completely defenseless against the potential pandemic that threatens the entire world. We are investing in research and development to hasten the production process by converting from egg-based to cell culture-based vaccines. We are developing novel vaccine approaches using a variety of molecular biological techniques, and we launched discovery efforts for new anti-viral compounds against pandemic flu. We initiated a project to identify the genomes of thousands of human and avian influenza viruses, and, to date, 831 influenza genome sequences from human isolates have been deposited in NIH’s GenBank, allowing researchers across the world to better understand influenza viruses and develop countermeasures.

Development of Biodefense Research

Sine 2001, NIH has directed more than $10 billion toward protecting the American public from bioterrorism. The 2001 intentional release of anthrax underscored the reality of a bioterrorism threat posed by other Category A agents such as smallpox, plague, tularemia, hemorrhagic fevers, and botulinum toxin. NIH responded swiftly. Promising vaccine candidates for Ebola and smallpox are currently in clinical trials. Identification of the three-dimensional structure of the anthrax toxin complex is fueling the search for compounds that block the toxin's effects, and the discovery of the key mechanism of Ebola virus cell entry prompted experiments demonstrating that Ebola infection could be blocked in laboratory tests. We continue to build a national biodefense research infrastructure that will position the Nation to respond even more quickly and precisely to bioterrorism.

Advances in Diabetes and Related Illnesses

Nearly 21 million Americans have diabetes, a disease that can cause damage to multiple organs and lead to death. Without NIH research

technologies like CAT scanning, MRI or ultrasonography for the development of new microsurgical techniques. These minimally invasive therapies are changing the fate of many patients, including patients with Parkinson's disease, through deep brain stimulation. These new techniques are also promising to revolutionize the treatment of epilepsy, a disease that affects over 2.7 million Americans. As we move forward with such research, we expect that surgery will become less invasive, more precise and less dangerous, with far less operative complications.

Advances in Health Information for Scientists and the Public

The National Library of Medicine of the NIH provides the American public with high quality, reliable information. The NIH web sites (www.nih.gov) are now recognized by independent organizations as the most successful health related web sites, with over 2 million queries per day. Millions of patients and their families regularly consult NIH web sites for up to date information in English and Spanish, a capability made entirely possible by the doubling of the NIH budget. The web-based ClinicalTrials.gov represents a landmark effort to provide information to patients and physicians across the country on NIH-funded clinical trials.

NIH also leads the research field in developing information technology for biomedical research. No biomedical scientist develops a project without first consulting the suite of powerful informational research tools available through the NIH National Library of Medicine's PubMed, a growing digital archive of peer-reviewed research articles and scientific databases.

New Research Tools

NIH researchers have pioneered powerful new research tools and methods such as high throughput DNA sequencing, protein identification with mass spectrometry, gene expression arrays, the determination of thousands of new protein structures, and imaging technologies which were simply unavailable before the doubling of the NIH budget. A great illustration of the impact of these advances has been the identification of the cause of the SARS virus in less than a month and the current tracking of pandemic flu viruses. These tools have greatly accelerated the research process itself, spurred progress and spawned new discoveries in all areas of biomedical research. Perhaps nowhere else have these technological advances in imaging and genotyping elicited more excitement than in the field of mental and behavioral health, elucidating genes linked to schizophrenia, depression, bipolar disorder and anxiety. These discoveries are allowing for the first time direct visualization of brain struct

from NIH funded research, more than 300 new drug products and vaccines targeting more than 200 diseases — including various cancers, Alzheimer's disease, heart disease, diabetes, multiple sclerosis, AIDS and arthritis — are in clinical trials. These outcomes are accomplished through the on-going network of successful collaborations with our colleagues in private industry.

The Changing Landscape of Disease

Disease and injury are constant threats to humankind and are never static. New diseases can emerge at an

responses, we can envision the ability to precisely target treatment on a personalized basis. Ultimately, this individualized approach, completely different than how we treat patients today, will allow us to preempt disease before it occurs.

Consider, for instance, how better predictive and personalized treatments could improve the safety and effectiveness of drugs. As we know, drugs do not fall into the “one size fits all” category. The same drug can help one patient and harm another. Recent research shows that we will be increasingly able to know which patients will benefit from treatment and which patients might be harmed. This field of study is known as pharmacogenetics. Using the latest genomic data, enabled by the doubling of the NIH budget, the NIH established a Pharmacogenetic Research Network which is studying the interactions of drugs and molecules as well as the biological processes that eliminate compounds from the body. In the first five years of this program, the researchers in this network made numerous discoveries.

For example, they learned that 10 percent of the North American population exhibits a genetic variation that puts them at high risk for life-threatening reactions to irinotecan, a cancer drug. We now know that patients with this variation should be given lower than prescribed doses of this successful drug, thus potentially saving their lives.

NIH researchers also discovered variations in a gene involved in the body’s response to more than half of all medications. Understanding these differences could explain critical individual as well as racial and ethnic differences in drug responses. Other genetic variations discovered by the NIH network will have an impact on asthma treatment, the risk of sudden death from irregular heartbeats and the proper use of blood thinning medications to avoid deadly bleeding complications.

In another example of emerging personalized medicine, cancer researchers have developed a test that helps determine the risk of recurrence for women who were treated for early stage, estrogen-dependent breast cancer. This information can help a woman and her doctor decide whether she should receive chemotherapy in addition to standard hormonal therapy. This test has the potential to change medical practice by sparing tens of thousands of women each year the unnecessary and harmful side effects associated with chemotherapy at large potential cost savings.

Rapid Advances in the Genomic Era

Because of a hundred fold reduction in the cost of genomic technology, we can now study, at affordable costs, the differences between patients who have a disease and their normal counterparts. Recently, this revolutionary approach led to the discovery of two previously unsuspected factors that can identify who is at risk and how to protect patients

reinforce these accomplishments, NIH is establishing a new office within the Office of the Director — the Office of Portfolio Analysis and Strategic

short of spectacular. Thanks to the support of Congress, we are able, through our science, to respond in record time to emerging threats such as SARS, Pandemic Flu and biodefense needs. We have learned how to decrease the incidence of many diseases and other disabilities for old and young Americans. The estimated total cumulative investment at the NIH per American over the past 30 years including the doubling period is about $1,334 or about $44 per American per year over the entire period. In return, Americans have ga