Preface

The Silver Book: Chronic Disease and Medical Innovation in an Aging Nation is a unique almanac of references that the not-profit Alliance for Aging Research has compiled to spotlight the impact of chronic disease on our aging population and health care system, and the significant impact medical breakthroughs will have on future health care use and expenditures. Much of the information on this topic is buried in dense and detailed reports and peer-reviewed papers and is spread out among many important publications. The Silver Book brings together statistics and data culled from over 130 of these reports and articles from more than 85 agencies, organizations, and experts. The information is presented in an easy-to-use format that we hope brings it to the fingertips of those shaping public policy.

The Silver Book is organized into three main sections: 1) Cost of Chronic Disease: The Human and Economic Burden; 2) The Growing Older Population: The Silver Tsunami; and 3) Innovative Medical Research: Investing in Science. Each section includes charts, statistics, and key findings that together paint a comprehensive picture of chronic disease spending and the potential mediating effects of medical innovation. The information focuses on the elderly population, those most prone to chronic disease, and on the leading drivers of chronic disease spending—cardiovascular disease, cancer, neurological diseases, and diabetes. [Information pertaining specifically to the older population is noted in silver type]. All of the sources are cited so that users may easily integrate them into their presentations and work, as well as to find additional information.

The information from The Silver Book, plus additional resources, can be found online at www.agingresearch.org. This information is updated on a regular basis to keep data current and to provide an authoritative resource for policymakers and advocates. Please e-mail us at SilverBook@agingresearch.org if you have additional studies that should be considered for The Silver Book Online.
Chronic Disease and Medical Innovation in an Aging Nation

The Silver Book

Preface

Introduction

Cost of Chronic Disease: The Human and Economic Burden

- Chronic Disease
  - Prevalence and Incidence of Chronic Disease
  - Age—A Major Risk Factor
  - The Burden of Chronic Disease
    - The Human Burden
    - The Economic Burden
  - The Future Cost of Chronic Disease
- Cancer
  - Prevalence and Incidence of Cancer
  - Age—A Major Risk Factor
  - The Burden of Cancer
    - The Human Burden
    - The Economic Burden
  - The Future Cost of Cancer
- Cardiovascular Disease: Heart Disease and Stroke
  - Prevalence and Incidence of Cardiovascular Disease
  - Age—A Major Risk Factor
  - The Burden of Cardiovascular Disease
    - The Human Burden
    - The Economic Burden
  - The Future Cost of Cardiovascular Disease
- Diabetes
  - Prevalence and Incidence of Diabetes
  - Age—A Major Risk Factor
  - The Burden of Diabetes
    - The Human Burden
    - The Economic Burden
  - The Future Cost of Diabetes
<table>
<thead>
<tr>
<th>Topic</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neurological Disease: Alzheimer's and Parkinson's Diseases</td>
<td>20</td>
</tr>
<tr>
<td>Prevalence and Incidence of Neurological Disease</td>
<td>20</td>
</tr>
<tr>
<td>Age—A Major Risk Factor</td>
<td>20</td>
</tr>
<tr>
<td>The Burden of Neurological Disease</td>
<td>20</td>
</tr>
<tr>
<td>The Human Burden</td>
<td>20</td>
</tr>
<tr>
<td>The Economic Burden</td>
<td>21</td>
</tr>
<tr>
<td>The Future Cost of Neurological Disease</td>
<td>21</td>
</tr>
<tr>
<td>The Growing Older Population: The Silver Tsunami</td>
<td>22</td>
</tr>
<tr>
<td>Today's Older Population</td>
<td>23</td>
</tr>
<tr>
<td>Life Expectancy</td>
<td>24</td>
</tr>
<tr>
<td>Future Demographics</td>
<td>24</td>
</tr>
<tr>
<td>Innovative Medical Research: Investing in Science</td>
<td>25</td>
</tr>
<tr>
<td>Chronic Disease</td>
<td>26</td>
</tr>
<tr>
<td>The Human Value</td>
<td>26</td>
</tr>
<tr>
<td>The Economic Value</td>
<td>26</td>
</tr>
<tr>
<td>The Future Value</td>
<td>27</td>
</tr>
<tr>
<td>Cancer</td>
<td>28</td>
</tr>
<tr>
<td>The Human Value</td>
<td>28</td>
</tr>
<tr>
<td>The Economic Value</td>
<td>29</td>
</tr>
<tr>
<td>The Future Value</td>
<td>29</td>
</tr>
<tr>
<td>Cardiovascular Disease: Heart Disease and Stroke</td>
<td>30</td>
</tr>
<tr>
<td>The Human Value</td>
<td>30</td>
</tr>
<tr>
<td>The Economic Value</td>
<td>31</td>
</tr>
<tr>
<td>The Future Value</td>
<td>32</td>
</tr>
<tr>
<td>Diabetes</td>
<td>33</td>
</tr>
<tr>
<td>The Human Value</td>
<td>33</td>
</tr>
<tr>
<td>The Economic Value</td>
<td>34</td>
</tr>
<tr>
<td>The Future Value</td>
<td>34</td>
</tr>
<tr>
<td>Neurological Disease: Alzheimer's and Parkinson's Diseases</td>
<td>35</td>
</tr>
<tr>
<td>The Human Value</td>
<td>35</td>
</tr>
<tr>
<td>The Economic Value</td>
<td>35</td>
</tr>
<tr>
<td>The Future Value</td>
<td>36</td>
</tr>
<tr>
<td>Conclusion</td>
<td>37</td>
</tr>
<tr>
<td>References</td>
<td>38</td>
</tr>
</tbody>
</table>
Introduction

By far, the two trends of greatest consequence for American health in the twenty-first century are the rapid aging of the population and the emergence of new technologies that could redefine old age for millions of people. To better understand these mega-trends, and to point the way for sound decision making in health care and technology policy, the nonprofit Alliance for Aging Research has compiled The Silver Book: Chronic Disease and Medical Innovation in an Aging Nation, an almanac that draws upon scores of authoritative studies and analyses by the government, industry, private organizations, and prominent economists. While not exhaustive, the information was gathered from a wide array of sources and provides an accurate snapshot of the human and economic burden of chronic disease and the potential value of medical innovation.

Health expenditures in the United States reached $1.9 trillion in 2004 and were increasing by close to eight percent per year. Not surprisingly, national attention is increasingly turning to the shape of our health care system. Health care cost increases exceeding inflation and employer health insurance premiums running to the double digits have captured the attention of corporate America, policymakers, and the public at large. High health costs add to the numbers of uninsured, make American industry less competitive in the global market, and threaten the stability of public programs that provide care to the elderly and the poor. While many factors drive these costs, the most important driver is the high cost of chronic disease in our aging nation.

Our society is both aging and living longer. Average life expectancy in the United States has increased by more than 50 percent since 1900, reaching an average of 77.4 years at birth. The first baby boomer will qualify for Medicare benefits in less than five years, and the aging of the baby boom generation will double the number of Americans age 65 and older to some 74 million by 2030. Unfortunately, life after age 65 for most people means an increasing risk of developing age-related chronic diseases. The Silver Book provides ready access to data on those risks and on the effects of chronic disease on the elderly. This almanac presents data focused on some of the diseases that most disproportionately affect the elderly—cardiovascular disease, cancer, type 2 diabetes, and neurological diseases such as Alzheimer’s and Parkinson’s diseases.

While policy makers and others who influence health care consider an array of options to cope with these conflicting trends, it is important to remember that reducing the cost of care without first addressing the impact of disease will likely exacerbate future expenditures. Therefore, The Silver Book goes beyond enumerating the impact of age-related diseases and draws upon studies and input from experts that show the current value of medical innovation, as well as predict the impact of future technology on health and costs in the twenty-first century.

We at the Alliance for Aging Research hope that this almanac will be a ready and trusted resource for thought-leaders. We also provide this compilation online and aim to keep it current in the hopes that it will continue to inform decision making and policy innovations important to our aging society.

Daniel Perry
Executive Director
Alliance for Aging Research
The Human and Economic Burden

Cost of Chronic Disease

While medical innovation and public health gains in the past century have been measurable in leaps and bounds, significant progress against acute disease has revealed an equally enormous challenge—chronic disease on an unprecedented scale. People are living longer than ever before and are increasingly facing chronic conditions that often require ongoing, expensive medical care. The toll imposed by chronic disease is high and paid in both human and economic terms.

Those living with chronic disease often experience a significant reduction in their quality of life as physical, emotional, and financial burdens take their toll. Even worse, almost half of those with a chronic condition have more than one. With chronic disease often come functional limitations, dependency, and increased medical bills. Cardiovascular disease, cancer, neurological disease, and diabetes account for a hugely disproportionate share of the U.S. health care burden, and with chronic disease prevalence expected to grow at a faster rate than the population as a whole, the forecast is daunting.

Chronic conditions tend to strike later in life and therefore disproportionately affect the elderly population. Vulnerability to chronic disease increases exponentially after middle age, as the risk for many age-related conditions doubles every five to seven years after age 50. By age 65, nearly nine out of ten people have at least one chronic condition. This is emphasized by the fact that almost all Medicare spending is on behalf of those with at least one chronic disease.

Chronic disease also consumes far more than its share of our nation’s health care resources. People with chronic illnesses visit their doctors more, stay longer in hospitals, and take more prescription drugs. Increasing medical costs and loss of productivity are leaving our nation with an enormous health care bill. With the senior population growing at a rapid rate, the portion of our population most vulnerable to chronic disease is further exacerbating health care costs.
Chronic Disease

Prevalence and Incidence of Chronic Disease

- Chronic disease is the leading cause of death and disability among Americans and accounts for 70% of all deaths in the United States.
  
  National Center for Chronic Disease Prevention and Health Promotion, *Chronic Disease Overview*

- Almost half of all Americans have a chronic condition.
  
  National Center for Policy Analysis, *Consumer Driven Health Care*

- Five chronic diseases—heart disease, cancer, stroke, chronic obstructive pulmonary disease, and diabetes—account for more than two-thirds of all deaths.
  
  National Center for Chronic Disease Prevention and Health Promotion 2004, *The Burden of Chronic Diseases and Their Risk Factors*

Age—A Major Risk Factor

- About 80% of the senior population has one or more chronic conditions. Because of these conditions, 25% of them are limited in their ability to perform activities of daily living.
  
  Goldman et al. 2005, *The Value of Elderly Disease Prevention*

- The number of older Americans with chronic disabilities increased from around 6.2 million in 1984 to 6.8 million in 1999.
  
  Federal Interagency Forum on Aging-Related Statistics 2004, *Older Americans*

- Older Adults are More Likely to Have Multiple Chronic Conditions
  
  Partnership for Solutions 2004, *Chronic Conditions: Making the case for ongoing care*
The Burden of Chronic Disease

The Human Burden

- People with Chronic Conditions Are the Heaviest Users of Health Care Services

- People with Chronic Illnesses and Activity Limitations Fill More Prescriptions

- People with Multiple Chronic Conditions Are Much More Likely to be Hospitalized
With Limitations
No Limitations

Percent of People with Inpatient Stay

Number of Chronic Conditions

Average Annual Number of Physician Visits Per Person

Number of Chronic Conditions

One Quarter of Individuals with Chronic Illness Also Have Activity Limitations

People with Multiple Chronic Illnesses Are More Likely to Have Activity Limitations

Partnership for Solutions 2004, Chronic Conditions: Making the case for ongoing care

Partnership for Solutions 2004, Chronic Conditions: Making the case for ongoing care
In 2002, older people made up 13% of the U.S. population, yet accounted for 36% of all hospital stays, 49% of all days of hospital care, and 50% of all physician hours. 

Alliance for Aging Research 2002, Medical Never-Never Land

The average 75-year-old suffers from three chronic conditions and takes five prescription medications. 

Merck Institute of Aging and Health 2004, The State of Aging and Health in America

Medicare beneficiaries with five or more chronic conditions see an average of 14 different physicians in a year. 

Alliance for Health Reform 2004, Covering Health Issues

Medicare beneficiaries with four or more chronic conditions are 99 times more likely to be admitted to the hospital for ambulatory care sensitive conditions than Medicare beneficiaries without chronic conditions. 

Wolff, Starfield, and Anderson 2002, Prevalence, Expenditures, and Complications of Multiple Chronic Conditions in the Elderly

Chronic conditions limit the activities of about 12 million seniors who live at home. 

National Center for Chronic Disease Prevention and Health Promotion 2005, Healthy Aging

Percentage of Medicare Enrollees Age 65 and Over Who are Unable to Perform Certain Physical Functions, by Sex, 1991 and 2002

Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans
Cost of Chronic Disease: The Human and Economic Burden

![Chart showing age-adjusted percentage of Medicare enrollees age 65 and over who are chronically disabled, by level and category of disability, 1984, 1989, 1994, and 1999.]

- Stays in skilled nursing facilities increased from 28 per 1,000 Medicare enrollees in 1992, to 69 per 1,000 in 2001.
  - Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans

![Chart showing distribution of Medicare enrollees ages 65 and over receiving personal care for a chronic disability, by type of care, 1984, 1989, 1994, and 1999.]

---

Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans
The Economic Burden

- People with Chronic Conditions Account for 83 Percent of All Health Care Spending

- More than Three-Fifths of Health Care Spending Is on Behalf of People with Multiple Chronic Conditions

- Compared to individuals with no chronic conditions, the average per capita spending for someone with one chronic condition is more than 2.5 times greater; with three chronic conditions is more than seven times greater; and with five or more chronic conditions is close to 15 times greater.

- In 2003, heart disease, stroke, cancer, diabetes and Alzheimer’s disease cost an estimated $771 billion.
  Research!America 2005, Investment in Research Saves Lives and Money

- The health care costs of a 65-year-old are typically four times greater than those of a 40-year-old.
  National Center for Chronic Disease Prevention and Health Promotion 2005, Healthy Aging

- 99% of Medicare spending is on behalf of beneficiaries with at least one chronic condition. 96% of Medicare spending is on behalf of beneficiaries with multiple chronic conditions.
  Partnership for Solutions 2004, Chronic Conditions: Making the case for ongoing care

- Two-thirds of Medicare expenditures are for the 9.5 million beneficiaries who have five or more chronic conditions.
  Medical News Today 2005, Coping with Multiple Chronic Conditions

- The United States spends more than $26 billion annually on additional health care costs for people over 65 who lose their ability to live independently over the course of a single year.
  Alliance for Aging Research 1999, Independence for Older Americans

- People with Chronic Conditions Account for 83 Percent of All Health Care Spending

- Cost of Care for Those Who Lose Independence

- More than Three-Fifths of Health Care Spending Is on Behalf of People with Multiple Chronic Conditions

- Compared to individuals with no chronic conditions, the average per capita spending for someone with one chronic condition is more than 2.5 times greater; with three chronic conditions is more than seven times greater; and with five or more chronic conditions is close to 15 times greater.

- Partnership for Solutions 2004, Chronic Conditions: Making the case for ongoing care
The Future Cost of Chronic Disease

Between 2000 and 2030, the number of Americans with one or more chronic conditions will increase by 37%—46 million people.
Partnership for Solutions 2004, Chronic Conditions: Making the case for ongoing care

By 2020, 81 million people will have two or more chronic conditions.
Partnership for Solutions 2002, Chronic Conditions: Making the case for ongoing care

By 2030, half of the U.S. population will have one or more chronic conditions.
Partnership for Solutions 2004, Chronic Conditions: Making the case for ongoing care

It is projected that by 2020 the U.S. will spend $685 billion a year in direct medical costs for persons with chronic diseases, and by 2050—$906 billion.
Hoffman and Rice 1996, Chronic Care in America

By 2030, 20% of the population will be people age 65 and older with chronic conditions.
Partnership for Solutions 2004, Chronic Conditions: Making the case for ongoing care

Spending on long-term care services for the elderly is projected to increase at least two and a half times by 2050—to $379 billion.
United States General Accounting Office 2002, Long-Term Care
Cancer

Prevalence and Incidence of Cancer

- More than 18 million new cases of cancer have been diagnosed in the United States since 1990.
  American Cancer Society 2004, Cancer Facts and Figures

- Approximately 1.37 million new cancer cases were expected to be diagnosed in 2005.
  American Cancer Society 2005, Cancer Facts and Figures

- The National Cancer Institute estimated that in January 2001, there were approximately 9.8 million Americans with a history of cancer.
  American Cancer Society 2005, Cancer Facts and Figures

- American men have approximately a one-in-two lifetime risk of developing cancer. American women have approximately a one-in-three lifetime risk.
  American Cancer Society 2005, Cancer Facts and Figures

Age—A Major Risk Factor

- Age is the major risk factor for cancer—about 76% of all cancers are diagnosed in individuals age 55 and over.
  American Cancer Society 2005, Cancer Facts and Figures

- The incidence of colorectal cancer is more than 50 times higher in people ages 60-79 than in those under 40. 91% of new cases and 94% of deaths from colorectal cancer occur in individuals 50 and older.
  American Cancer Society 2005, Colorectal Cancer Facts and Figures

- A woman’s risk of breast cancer increases with age—about 80% of breast cancer cases occur in women over age 50.
  National Institute on Aging, Age Page: Cancer facts for people over 50

- Age is the greatest risk factor for prostate cancer with more than 70% of all cases diagnosed in men age 65 and older.
  Prostate Cancer Foundation

The Burden of Cancer

The Human Burden

- In 2002, cancer patients made 25.3 million office visits to their physicians.
  Woodwell and Cherry 2004, National Ambulatory Medical Care Survey

- In 2002, cancer patients made 2.1 million visits to hospital outpatient departments.
  Hing and Middleton 2004, National Hospital Ambulatory Medical Care Survey

- 45% percent of middle-age men who have been diagnosed with cancer in the last year have recurring pain. 41% percent of middle-age women with a history of cancer experience recurring pain.
  Pfizer 2005, The Burden of Cancer in American Adults

- 1.3 million cancer patients were discharged from hospital inpatient stays in 2003. More than 650,000 of them were over 65.
  DeFrances, Hall, and Podgornik 2005, National Hospital Discharge Survey

- Less than 20% of 65-year-olds who have been diagnosed with cancer are free of comorbidities and physical limitations.
  Joyce et al. 2005, The Lifetime Burden of Chronic Disease among the Elderly

- 43% percent of older men and 45% of older women with a history of cancer report some type of activity limitation.
  Pfizer 2005, The Burden of Cancer in American Adults
The Economic Burden

- The National Institutes of Health estimated the overall cost of cancer in 2004 was $189.8 billion. This figure includes $69.4 billion in direct medical costs, $16.9 billion in indirect morbidity costs, and $103.5 billion in indirect mortality costs.
  American Cancer Society 2005, Cancer Facts and Figures

- Colorectal cancer treatment costs about $6.5 billion per year; breast cancer treatment costs nearly $7 billion per year; and cervical cancer treatment costs around $2 billion per year.

- Direct annual spending for prostate cancer is $3.6 billion.
  Pfizer 2005, The Burden of Cancer in American Adults

- The annual national cost of informal caregiving for cancer patients is an estimated $1 billion.
  Hayman et al. 2001, Estimating the Cost of Informal Caregiving for Elderly Patients with Cancer

- Every year, $38.4 billion of direct medical services is spent on cancer-associated care for community-dwelling adults.
  Pfizer 2005, The Burden of Cancer in American Adults

The Future Cost of Cancer

- Current patterns predict a doubling of cancer diagnosis from 1.3 million in 2000 to 2.6 million in 2050. At the same time, the number of cancer patients who are age 85 and older is expected to increase four-fold.
  Edwards et al. 2002, Annual Report to the Nation on the Status of Cancer

- Between 1992 and 2050, the annual number of colon cancer-related admissions for people age 60 and older is projected to increase from 192,000 to 448,000.
  Seifelden and Hantsch 1999, The Economic Burden Associated with Colon Cancer in the United States

- By 2015, more than 300,000 new prostate cancer cases will be diagnosed each year—a 50% increase from 2004.
  Prostate Cancer Foundation

- If current trends continue, by 2050 breast cancer incidence will have increased by approximately 60%, and colon cancer incidence will have increased by more than 100%.
  Prostate Cancer Foundation
Cardiovascular Disease: *Heart Disease and Stroke*

### Prevalence and Incidence of Cardiovascular Disease

- **Almost 25% of the population—61 million Americans—have some form of cardiovascular disease.**
  
  *National Center for Chronic Disease Prevention and Health Promotion, Preventing Heart Disease and Stroke*

- **Every year, about 1.5 million Americans suffer a heart attack.**
  
  *American Heart Association*

- **2.6% of all Americans have suffered a heart attack at some point in their lives.**
  
  *MEDTAP International 2004, The Value of Investment in Health Care*

- **Approximately 700,000 Americans were expected to have a stroke in 2005.**
  
  *American Heart Association 2005, Heart Disease and Stroke Statistics*

- **4.5 million Americans are stroke survivors.**
  
  *American Stroke Association*

### Age—A Major Risk Factor

- **More than 71 million Americans have one or more types of cardiovascular disease. An estimated 27.4 million of them are age 65 and older.**
  
  *American Heart Association 2006, Heart Disease and Stroke Statistics*

- **65% of Americans will have some form of cardiovascular disease by retirement age.**
  
  *Research!America 2005, Investment in Research Saves Lives and Money*

- **The average age for a first heart attack is 65.8 years for men and 70.4 years for women.**
  
  *National Center for Chronic Disease Prevention and Health Promotion 2004, Heart Disease Burden*

- **88% of those who die from stroke are age 65 and older. For those over 55, the incidence of stroke more than doubles each decade.**
  
  *Alliance for Aging Research 2004, Task Force on Aging: Research and funding*

### Prevalence of Cardiovascular Diseases in Americans Age 20 and Older by Age and Sex

*American Heart Association 2006, Heart Disease and Stroke Statistics*

### Prevalence of Stroke by Age and Sex

*American Heart Association 2006, Heart Disease and Stroke Statistics*
The Burden of Cardiovascular Disease

The Human Burden

- Ten million Americans are disabled as a result of stroke and heart disease.
  National Center for Chronic Disease Prevention and Health Promotion, Preventing Heart Disease and Stroke

- More than 6 million hospitalizations a year are due to cardiovascular disease.
  National Center for Chronic Disease Prevention and Health Promotion, Preventing Heart Disease and Stroke

- Within six years of a recognized heart attack, about 22% of men and 46% of women will be disabled with heart failure.
  American Heart Association 2006, Heart Disease and Stroke Statistics

- Approximately 66% of heart attack patients do not make a complete recovery.
  National Center for Chronic Disease Prevention and Health Promotion 2004, The Burden of Chronic Diseases and Their Risk Factors

- 71.5% of 65-year-olds with coronary heart disease have three or more comorbidities and physical limitations—only 3.8% have none.
  Joyce et al. 2005, The Lifetime Burden of Chronic Disease among the Elderly

- Stroke is the leading cause of disability in adults in the United States.
  MEDTAP International 2004, The Value of Investment in Health Care

- 20% of stroke survivors require institutional care within three months after onset and 15% to 30% are permanently disabled.
  Hurst 2002, The Heart, Arteries and Veins

- Only 2.7% of 65-year-olds who have experienced a stroke are free of comorbidities and physical limitations—66.4% have three or more.
  Joyce et al. 2005, The Lifetime Burden of Chronic Disease among the Elderly

- A study of ischemic stroke survivors who were at least 65-years-old found that at six months post-stroke 50% had some one-sided paralysis, 30% were unable to walk without some assistance, 26% were dependent in activities of daily living, 19% had aphasia, 35% had symptoms of depression, and 26% were institutionalized in a nursing home.
  National Heart, Lung, and Blood Institute, Framingham Heart Study
The Economic Burden

Estimated Direct and Indirect Costs (in Billions of Dollars) of Cardiovascular Diseases and Stroke

- **Heart Disease**: $254.8
- **Coronary Heart Disease**: $142.1
- **Stroke**: $56.8
- **Hypertensive Disease**: $59.7
- **Congestive Heart Failure**: $27.9
- **Total CVD**: $393.5

* Totals do not add up due to rounding.

The Future Cost of Cardiovascular Disease

- **Between 2010 and 2030**, the number of survivors of heart disease is expected to grow at a much faster rate than the U.S. population as a whole.
  
  National Center for Chronic Disease Prevention and Health Promotion, A Public Health Action Plan to Prevent Heart Disease and Stroke

- **A recent study demonstrated** that the cost of treating cardiovascular disease could rise by 64% to 84% by 2025.
  
  Steinwachs et al. 2000, The Future of Cardiology

- **Coronary artery disease accounts for 51%** of all heart disease, and if no preventative drugs are made available, is projected to cost the nation $75.8 billion by 2025, up from $51.9 billion in 1999.
  
  Steinwachs et al. 2000, The Future of Cardiology

- **By 2050**, more than 1 million Americans will have a first stroke every year. This represents a 167% increase among men and a 140% increase among women, from 1998 incidence rates.
  
  American Heart Association 1998, Incidence of Stroke to Skyrocket Well Into the 21st Century

- **Ischemic strokes will rise to over 850,000** by 2050, and between 1998 and 2050, the incidence of strokes caused by bleeding in the brain will nearly double.
  
  American Heart Association 1998, Incidence of Stroke to Skyrocket Well Into the 21st Century

- **The estimated direct and indirect cost of cardiovascular disease in 2006** is $403.1 billion.
  
  American Heart Association 2006, Heart Disease and Stroke Statistics

- **In 1999**, Medicare spent more than $26 billion on inpatient hospital costs for cardiovascular disease patients.
  
  Alliance for Aging Research 2003, Task Force on Aging Research Funding

- **The estimated direct and indirect cost of stroke in 2006** is $59.9 billion.
  
  American Heart Association 2006, Heart Disease and Stroke Statistics

- **The conditions and disabilities associated with stroke cost the United States between $30 billion and $40 billion a year.**
  
  MEDTAP International 2004, The Value of Investment in Health Care

- **The average cost of care for a patient up to 90 days post-stroke is $15,000.**
  
  The University Hospital, Stroke Statistics

The Economic Burden

The Future Cost of Cardiovascular Disease
Diabetes

Prevalence and Incidence of Diabetes

- Diabetes is the sixth leading cause of death by disease in the United States and a leading cause of heart disease and stroke.
  Alliance for Aging Research 2004, Task Force on Aging: Research and funding

- About 1.5 million new cases of diabetes were diagnosed in people age 20 and older in 2005.
  Centers for Disease Control and Prevention 2005, National Diabetes Fact Sheet

- 20.8 million people—7% of the population—have diabetes.
  Centers for Disease Control and Prevention 2005, National Diabetes Fact Sheet

- Approximately 6.2 million people are unaware that they have diabetes.
  Centers for Disease Control and Prevention 2005, National Diabetes Fact Sheet

Age—A Major Risk Factor

- Approximately half of all diabetes cases are in people over age 55.
  Alliance for Aging Research 2004, Task Force on Aging: Research and funding

- 20.9% of the population age 60 and older—10.3 million people—have diabetes.
  National Center for Health Statistics 2005, Health

The Burden of Diabetes

The Human Burden

- Diabetes was the cause of approximately 2.3 million hospital admissions, 14 million hospital days, and 70 million nursing home days in 1997.
  Goldman et al. 2005, The Value of Elderly Disease Prevention

- Diabetes is the leading cause of kidney disease, adult-onset blindness, and lower limb amputations. It is also a significant cause of heart disease and stroke.
  American Diabetes Association, Federal Legislative Priorities for the 109th Congress

- Diabetes is the leading cause of kidney failure; in 2002, it accounted for 44% of new cases.
  Centers for Disease Control and Prevention 2005, National Diabetes Fact Sheet

- Approximately 60% to 70% of diabetics have mild to severe forms of nervous system damage causing impaired sensation or pain in the extremities, slowed digestion, carpal tunnel syndrome, and other nerve problems. Almost 30% of diabetics 40 years and older have impaired sensation in their feet.
  Centers for Disease Control and Prevention 2005, National Diabetes Fact Sheet

- Nearly 82,000 people with diabetes had lower-limb amputations in 2002.
  American Diabetes Association, Complications of Diabetes in the United States

- 17 million Americans—approximately 6% of the population—have type 2 diabetes, the most common form of diabetes.
  MEDTAP International 2004, The Value of Investment in Health Care

- 41 million people have pre-diabetes, a condition that puts them at risk of developing diabetes because of higher-than-normal blood glucose levels.
  American Diabetes Association, Total Prevalence of Diabetes & Pre-Diabetes

- Diabetes prevalence in the United States increased by more than 60% between 1990 and 2001.
  American Diabetes Association
Diabetic retinopathy causes between 12,000 and 24,000 new cases of blindness every year.
American Diabetes Association, Complications of Diabetes in the United States

One in every 10 health care dollars is spent on diabetes and its complications.
American Diabetes Association, Federal Legislative Priorities for the 109th Congress

Diabetes cost $132 billion in direct and indirect costs, in 2002 dollars. This did not include the costs of its complications.
American Diabetes Association, National Diabetes Fact Sheet

In 2002, people with diabetes had medical expenditures that were 2.4 times higher than those without the disease.
American Diabetes Association 2003, Economic Costs of Diabetes

The number of Americans with diabetes is growing at a rate of 8% a year.
American Diabetes Association, Federal Legislative Priorities for the 109th Congress

Conservative estimates predict that diabetes prevalence will increase 165% between 2000 and 2050.
Boyle et al. 2001, Projections of Diabetes Burden Through 2050

By 2030, more than 30 million Americans could have diabetes—71% higher than in 2000.
Wild et al. 2004, Global Prevalence of Diabetes

Without intervention, one in three people born in 2000 will develop diabetes during their lifetime.
U.S. Department of Health and Human Services 2004, Revised Definition Means Millions More Have Pre-Diabetes

48.5% of 65-year-olds with diabetes have three or more comorbidities and physical limitations—less than 10% have none.
Joyce et al. 2005, The Lifetime Burden of Chronic Disease among the Elderly

In 2002, the nation spent $13,243 on every person with diabetes, compared to only $2,650 on every person without diabetes.
American Diabetes Association 2003, Economic Costs of Diabetes

Diabetes consumes 25% of Medicare’s annual budget.
Research!America 2005, Investment in Research Saves Lives and Money

In 2002, the cost of medications to treat diabetes was $7.3 billion.
PhRMA 2003, Diabetes and Pharmaceutical Spending

Diabetic eye diseases consume 25% of eye disease-related health care services.
The Picture of Value: Medical Imaging, Medical Imaging Helps Employers Defeat Diabetic Eye Disease

The annual cost of diabetes, in 2002 dollars, could rise to an estimated $156 billion by 2010, and $192 billion by 2020.
American Diabetes Association 2003, Economic Costs of Diabetes in the U.S.

The costs of complications for type 2 diabetics over a 30-year period are estimated at $47,240 per patient.
Caro, Ward, and O’Brien 2002, Lifetime Costs of Complications Resulting from Type 2 Diabetes

The number of people age 75 and older with diabetes is projected to increase from 2 million in 2000 to 8.6 million in 2050.
Boyle et al. 2001, Projection of Diabetes Burden

An estimated 41 million people between the ages of 40 and 74 have pre-diabetes, and most will develop type 2 diabetes within 10 years.
American Diabetes Association, Pre-Diabetes
Neurological Disease: *Alzheimer’s and Parkinson’s Diseases*

### Prevalence and Incidence of Neurological Disease

- **Alzheimer’s Disease**
  - 4.5 million Americans suffer from Alzheimer’s disease. That number has more than doubled since 1980. 
  - Hebert et al. 2003, *Alzheimer Disease in the US Population*
  - 360,000 new cases of Alzheimer’s disease are diagnosed every year—980 every day, 40 every hour. 
  - Cummings and Cole 2002, *Alzheimer Disease*
  - Parkinson’s disease is the second most common neurodegenerative disease in the United States, second only to Alzheimer’s disease. 
  - National Institute of Neurological Disorders and Stroke 2004, *Parkinson’s Disease*

- **Parkinson’s Disease**
  - As many as 1 million Americans suffer from Parkinson’s disease. 
  - Parkinson’s Disease Foundation, *Ten Frequently Asked Questions about Parkinson’s Disease*
  - Every nine minutes a new Parkinson’s case is diagnosed—60,000 new cases every year. 
  - Parkinson’s Action Network, *About Parkinson’s Disease*

### Age—A Major Risk Factor

- The greatest risk factor for Alzheimer’s disease is age. One in 10 people over 65, and nearly half of those over 85, have the disease. 
  - Alzheimer’s Association, *Statistics About Alzheimer’s Disease*

- Beneficiaries with Alzheimer’s disease account for 34% of Medicare spending but make up only 12.8% of the 65 and older population. 
  - The Levin Group 2004, *Saving Lives, Saving Money*

### The Burden of Neurological Disease

#### The Human Burden

- Alzheimer’s disease advances at widely different rates and the length of the illness can vary from three to 20 years. The areas of the brain that control memory and thinking skills are affected first. As the disease progresses, cells die in other areas of the brain, leaving the person eventually needing complete care. 
  - Alzheimer’s Association

- Almost half of all people with Alzheimer’s disease have four or more chronic conditions. 
  - Partnership for Solutions 2002, *Alzheimer’s Disease: The impact of multiple chronic conditions*

- Approximately three quarters of Alzheimer’s patients are admitted to a nursing home within five years of diagnosis. 
  - PhRMA 2004, *Medicines Reduce the Burden of Alzheimer’s Disease*

- Parkinson’s disease affects one in every 100 people over the age of 60. 
  - Alliance for Aging Research, *Aging Statistics*

- The average age of onset for Parkinson’s is 60-years-old. 
  - Parkinson’s Action Network, *What is Parkinson’s Disease?*

- By the time symptoms of Parkinson’s disease are apparent, as much as 80% of dopamine-producing cells have been damaged. 

- As Parkinson’s progresses, substantial disability—including the inability to maintain balance, walk, speak, and move—makes assisted living and nursing home care necessary. 
  - Parkinson’s Action Network, *About Parkinson’s Disease*

- An estimated 38% of Parkinson’s patients suffer from falls; 13% fall more than once a week. 
  - Parkinson’s Action Network, *About Parkinson’s Disease*
The Economic Burden

- Alzheimer's disease is draining more than $100 billion annually from the nation’s economy, costing American businesses $61 billion a year.
  
  Alliance for Aging Research 2004, Task Force on Aging: Research and funding

- The cost of care for a person with Alzheimer's disease in a facility is approximately $64,000 per year.
  
  Alliance for Aging Research 2004, Task Force on Aging: Research and funding

- Medicare spends $91 billion each year on caring for those with Alzheimer’s disease.
  
  Alzheimer's Association

- State and federal Medicaid spending on nursing home care for beneficiaries with Alzheimer’s disease was $19 billion in 2000.
  
  The Lewin Group 2004, Saving Lives, Saving Money

- Parkinson's disease costs our society at least $25 billion annually.
  
  Parkinson’s Action Network, About Parkinson’s Disease

- Drug therapy for Parkinson’s disease costs more than $6 billion a year. Costs such as rehabilitation and home care can run as high as $150,000 per patient per year.
  
  Mayo Clinic, Parkinson's Disease Information

- The costs for assisted living and nursing home care of a single Parkinson’s patient can cost as much as $100,000 per year.
  
  Parkinson’s Action Network, About Parkinson’s Disease

The Future Cost of Neurological Disease

- By 2050 as many as 16 million people could be affected by Alzheimer's disease.
  
  Hebert et al. 2003, Alzheimer Disease in the U.S. Population

- As the United States population ages, researchers estimate that the prevalence of Alzheimer's disease will come close to quadrupling over the next 50 years, when one in 45 people may be living with the disease.
  
  Brookmeyer, Gray, and Kawas 1998, Projections of Alzheimer’s Disease in the United States

- The number of Medicare claims for Alzheimer's disease treatment grew by 250% during the 1990s, and is expected to increase by 300% over the next 10 years.
  
  Peck 2004, Alzheimer’s Disease Costs Expected to Triple

- Medicare spending for those with Alzheimer’s disease will triple by 2015—to $189 billion from $62 billion in 2000. By 2050, Medicare will be spending more than $1 trillion on beneficiaries with Alzheimer's and related dementias.
  
  The Lewin Group 2004, Saving Lives, Saving Money

- According to the U.S. Census Bureau, the prevalence of Parkinson’s disease will grow to between 1.3 million and 1.7 million by 2040.
  
  Lilenfeld and Perl 1993, Projected Neurodegenerative Disease Mortality in the United States
The United States is experiencing a longevity revolution and as the baby boomers approach retirement age, they are touching off an age wave that will double the number of Americans over age 65 to more than 70 million. Individual life expectancy is also increasing and the older population is growing much more rapidly than the entire population of the United States. The prevalence of chronic disease within our senior population has already resulted in increased national health care spending, high rates of disability, and much human suffering. The problem, then, only stands to become exponentially worse as our elderly population grows.
Today’s Older Population

- One out of every eight people—approximately 12.4% of the population—is an older person.
  
  Administration on Aging 2004, A Profile of Older Americans

- Every day, more than 6,000 Americans celebrate their 65th birthday.
  
  Alliance for Aging Research 1999, Independence for Older Americans

- In 2004, there were an estimated 60,800 centenarians (those age 100 and older) in the United States.
  
  United States Census Bureau, National Population Estimates

- Since 1900, the 65 and older population has doubled three times.
  
  Friedland and Summer 2005, Demography Is Not Destiny

- During the twentieth century, the population of oldest-old Americans (those age 85 and older) grew from just over 100,000 to 4.2 million.
  
  Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans

- The number of people age 100 and older increased 36% between 1990 and 2003—growing from 37,306 to 50,639.
  
  Administration on Aging 2004, A Profile of Older Americans
**Life Expectancy**

- During the twentieth century, life expectancy at birth increased from 48 to 74 years for men and from 51 to almost 80 years for women.
  
  National Center for Health Statistics 2004, Health

- The average life expectancy of those who reach age 65 is close to 18 additional years, six years longer than it was in 1900.
  
  Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans

- During the twentieth century, life expectancy at birth increased from 48 to 74 years for men and from 51 to almost 80 years for women.
  
  National Center for Health Statistics 2004, Health

- During the twentieth century, life expectancy at birth increased from 48 to 74 years for men and from 51 to almost 80 years for women.
  
  National Center for Health Statistics 2004, Health

**Future Demographics**

- On January 1, 2011, as the baby boomers begin to celebrate their 65th birthdays, 10,000 people will turn 65 every day—this will continue for 20 years.
  
  Alliance for Aging Research

- By 2030, the number of older Americans is projected to have more than doubled to over 70 million—representing nearly 20% of the population.
  
  Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans

- By 2045, the number of centenarians in the United States is projected to reach 757,000.
  
  United States Census Bureau, Projections of the Total Resident Population

- On January 1, 2011, as the baby boomers begin to celebrate their 65th birthdays, 10,000 people will turn 65 every day—this will continue for 20 years.
  
  Alliance for Aging Research

- By 2030, the number of older Americans is projected to have more than doubled to over 70 million—representing nearly 20% of the population.
  
  Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans

- By 2045, the number of centenarians in the United States is projected to reach 757,000.
  
  United States Census Bureau, Projections of the Total Resident Population

**The Growing Older Population**

- The average life expectancy of those who reach age 65 is close to 18 additional years, six years longer than it was in 1900.
  
  Federal Interagency Forum on Aging-Related Statistics 2004, Older Americans
As our elderly population grows, the extreme strain of chronic disease on our society will only worsen. In the next 25 years, the number of Americans with chronic diseases is projected to reach 46 million. Cardiovascular disease, cancer, neurological disease, and diabetes are only going to become more pervasive, affecting an increasing percentage of the population as our elderly demographics explode.

The good news is that advances from innovation in medical research are transforming health care and helping us to live longer, healthier lives. Many of us can look forward to old age as an exciting new chapter in our lives, instead of a period of frailty and dependence. Medical innovation has already proven its value in not only improving the length and quality of life, but also in helping to contain medical costs. Resulting improvements in health care often far outweigh increased spending—every dollar invested in health care produces up to three dollars in health care gains. We must be sure to consider both the financial and human impact medical innovation can have on the burden of chronic disease. Short-sighted efforts to reduce spending often target the initial expenses of investing in medical innovation, ignoring the remarkable returns.
The Economic Value

- Between 1980 and 2000, annual age adjusted per person health care costs increased by $2,254 (102%) but were accompanied by significant health gains including
  - A 16% decline in annual death rates;
  - A 4% increase in life expectancy from birth;
  - A 25% decline in disability rates for people over 65-years-old; and
  - A 56% decline in the number of hospital days.

- The United States would have spent $634 billion less on health care in 2000 without many of the improvements in health and the associated investments that were seen between 1980 and 2000. However, there would have been 470,000 more deaths, 2.3 million more disabled, and 206 million more days in the hospital.

- Increased longevity added about $3.2 trillion per year to national wealth between 1970 and 2000, an uncounted value equal to approximately half of the average annual GDP during that period.

- During the twentieth century, cumulative gains in life expectancy, for both men and women, were worth over $1.2 million per person.

- According to Dr. David Cutler of Harvard, current health technologies return, on average, $4 in approximate life value for every medical dollar spent.

The Human Value


- The share of elderly with impairments in their ability to live independently went down between 1% and 1.5% annually between 1984 and 2004 compared to the historical annual decline in chronic disability of 0.6% between 1910 and 1985.

The Economic Value

The Human Value
A $1 increase in spending on pharmaceuticals is associated with a $3.65 reduction in hospital-care expenditures.  
Lichtenberg 1996, Do (More and Better) Drugs Keep People out of Hospitals?

Every $1 invested in newer medications saves $7 in other costs.  
Lichtenberg 2002, Benefits and Costs of Newer Drugs

Spending $11,000 on general medical care adds an average of one year of life. Spending only $1,345 on pharmaceutical research and development yields the same return.  
Lichtenberg 1996, Do (More and Better) Drugs Keep People out of Hospitals?

Analysis suggests that in the past 20 years, each additional dollar spent on health care services produced health gains valued at between $2.40 and $3.  
MEDITAP International 2004, The Value of Investment in Health Care

The Future Value

Medicare could save $26 billion per year if currently healthy older people were able to remain fully independent over the course of a single year.  
Alliance for Aging Research 1999, Independence for Older Americans

Using newer drugs could lower overall health expenses by as much as $111 per person, per condition, for the general population, and $155 for Medicare beneficiaries.  
Lichtenberg 2002, Benefits and Costs of Newer Drugs
Cancer

The Human Value

"Knowing that his disease had a high cure rate, Ben Dacus felt a sense of security at a time of great uncertainty. In 1988 he was diagnosed with Hodgkin’s disease.

Strangely enough, Ben’s reaction to his diagnosis was one of relief.

‘I was relieved to know my illness had a name, and because of the high cure rate, I never really feared that I was going to die. Hodgkin’s had a long history of research, and doctors had been treating it successfully for many years.’

When radiation treatments didn’t work, Ben was devastated. But to his relief chemotherapy afforded him a rapid recovery.

Looking back on his illness, Ben says he is thankful for medical research. ‘It didn’t occur to me at the time I was going through treatment to consider how medical research had brought treatment methods to the point it had. But I was thankful to live in a day and age when cancer is treatable. If it had been the 1950s, I would have died four years later.’"

Research!America 2005, Investment in Research Saves Lives and Money

- Cancer mortality declined more than two percent in 2003, a continuation of the decline that began in 1990.
  National Center for Health Statistics 2005, Health

- The five-year survival rate for all cancers diagnosed between 1995 and 2000 was 64%, up from 50% between 1974 and 1976.
  American Cancer Society 2005, Cancer Facts and Figures

- Treating cancer patients with oral medicine versus intravenous chemotherapy resulted in a two-thirds reduction in hospital time and a greater than 50% reduction in costly medication side effects.
  Twelves 2001, Oral Chemotherapy Saves Resources and Time

- Intensity modulated radiation therapy (IMRT) precisely maps and targets tumors with better tumor control and fewer side effects than other forms of radiation. In one study, IMRT increased the success rate of tumor reduction from 43% to 96% and reduced complications from 10% to 2%.
  Brown 2002, Cancer in the Crosshairs

- A 2002 study found that image-guided percutaneous needle biopsies are between three and seven times more cost-effective than open surgical biopsies, require a shorter procedure time, result in fewer infections, and allow earlier treatment if cancer is found.
  Jelinek et al. 2002, Diagnosis of Primary Bone Tumors with Image-Guided Percutaneous Biopsy

Research!America 2005, Investment in Research Saves Lives and Money
The Economic Value

- A drug for testicular cancer that cost an estimated $56 million to develop led to a sharp increase in survival rate and an annual return of $166 million in treatment savings.
  Research!America 2005, Investment In Research Saves Lives and Money

- Every additional dollar spent on overall breast cancer treatment has produced health gains valued at $4.80.
  MEDTAP International 2004, The Value of Investment in Health Care

- Surgical biopsy for lumps in the breast was found by one study to cost two and a half to three times more than image-guided core-needle biopsy ($698 versus $243).
  Burkhardt and Sunshine 1999, Core-Needle and Surgical Breast Biopsy

- Every additional dollar spent on newer, less toxic hormonal therapy for breast cancer patients has produced health gains valued at between $27.03 and $36.81.
  MEDTAP International 2004, The Value of Investment in Health Care

- Use of tamoxifen, a drug used to treat breast cancer, has resulted in a direct cost savings of $41,372 per year of life gained in women 35- to 49-years-old, $68,349 in women 50- to 59-years-old, and $74,981 in women 60 to 69.
  Joint Economic Committee 2000, The Benefits of Medical Research and the Role of NIH

- Virtual colonoscopy is more efficient at detecting cancerous polyps than standard colonoscopy without imaging, and costs $500–$1,500 less.
  The Picture of Value: Medical Imaging, Virtual Colonoscopy

- A drug that can reduce the risk of breast cancer in high-risk women costs approximately $1,050 per year. The average cost per year for surgery or other invasive methods of treating breast cancer is $14,000.
  PHRMA 2001, The Value of Medicines

The Future Value

- Medical research that resulted in a one-fifth reduction in deaths from cancer would be worth $10 trillion to Americans—double the national debt.
  The Lasker Foundation 2000, Exceptional Returns

- A modest 1% reduction in cancer mortality would be worth close to $500 billion. A cure for cancer (if one is feasible) would be worth around $50 trillion.
  Murphy and Topel 2005, The Value of Health and Longevity

- Widespread use of cancer vaccines could result in a cure of melanoma/renal cell carcinomas and a 25% boost in survival for all other cancers.
  Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

- Widespread use of selective estrogen receptor modulators could result in an approximately 30% decrease in breast cancer.
  Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

- A new DNA-based test for cervical cancer could save an estimated $1 billion a year by providing more accurate diagnoses.
  AdvaMed, Medical Technology: Saves and improves lives

- Widespread use of telomerase inhibitors could result in a 50% cure rate and a 25% prolongation of life for 50% of eligible patients with solid tumors.
  Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

- If the one million surgical breast biopsies performed annually were instead performed using image-guided needle core biopsy, the total savings could be $1.6 billion a year.
  Burkhardt and Sunshine 1999, Core-Needle and Surgical Breast Biopsy
Cardiovascular Disease: Heart Disease and Stroke

The Human Value

“Sherri Selph was 41 when she was first diagnosed with second-stage congestive heart failure. However, her rapidly diminishing health led to a diagnosis of end-stage heart disease. A heart transplant was not an option. Survival statistics for patients with Sherri’s condition are grim. Even with the best treatment available, only 50 percent of heart failure patients live beyond a year.

Her doctor suggested that Sherri enroll in [a] clinical trial….Sherri soon became a patient and a member of the group that received an implantable heart pump.

The results were immediate. Four days after receiving her heart pump Sherri was back on her feet. ‘I could not believe it. The pump had given me back my life,’ she said. ‘Without this procedure, I would not have lived to see my youngest grandson who is now two and a half years old.’

…Sherri is now back in South Carolina with her heart pump and her five grand-children—who prefer that she stay right where she is.”

Research!America 2005, Investment in Research Saves Lives and Money

About two-thirds of reduced mortality from cardiovascular disease is a result of medical interventions.
Cutler 2004, Are the Benefits of Medicine Worth What We Pay for It?

Increased use of non-acute medications in primary and secondary prevention explains about one-third of the total reduction in cardiovascular disease mortality since 1950.
Cutler 2004, Your Money or Your Life?

Mortality rates in the first three months after a heart attack have fallen by about 75%.
Cutler 2004, Are the Benefits of Medicine Worth What We Pay for It?

Since 1950, reduction in heart disease mortality has added more than three and a half years to the expected lifetimes of both men and women.
Murphy and Topel 2005, The Value of Health and Longevity

About 70 percent of the survival improvement in heart attack mortality resulted from changes in technology.
Cutler and McClellan 2001, Is Technological Change in Medicine Worth It?

Glycoprotein inhibitors have been shown to reduce the risk of death, a second heart attack, or the need for revascularization by 48% to 52% in patients who have suffered a first heart attack.
MEDTAP International 2004, The Value of Investment in Health Care

Primary angioplasty reduces 30-day mortality risk by 34% to 50%.
MEDTAP International 2004, The Value of Investment in Health Care

Statin treatment soon after an acute heart attack reduces the risk of fatal heart disease or a recurrent heart attack by 24%.
MEDTAP International 2004, The Value of Investment in Health Care

Death Rates for Coronary Heart Disease, 1950-1998
CHD accounted for 460,000 deaths in 1998.

National Center for Chronic Disease Prevention and Health Promotion 2003, The Burden of Chronic Disease and the Future of Public Health
Use of beta blockers to treat high blood pressure in congestive heart failure patients reduced death rates by 35%.

Winslow 2001, GlaxoSmithKline's Coreg Benefits Heart Patients in Two Big Studies

A blood thinning drug was found to reduce the risk of heart attack, stroke, and cardiovascular disease by 20% in patients with acute coronary syndrome when given in addition to aspirin.

Salim et al. 2001, Effects of Clopidogrel

Between 1980 and 2000, stroke mortality rates fell from 96.2 to 60.8 per 100,000 persons.

MEDTAP International 2004, The Value of Investment in Health Care

Ischemic stroke patients treated with t-PA (a drug used to treat blood clots) within three hours of onset are 33% more likely to be free of disability three months after treatment.

Broderick 1998, Practical Considerations in the Early Treatment of Ischemic Stroke

Because of reduced mortality rates, the number of stroke survivors who are non-institutionalized increased from 2.0 to 2.4 million between 1980 and 1991.

MEDTAP International 2004, The Value of Investment in Health Care

The Economic Value

For every dollar spent on cardiovascular medical treatments, a return of $4 is realized.

Cutler 2004, Your Money or Your Life?

The value of a 10% reduction in mortality from cardiovascular disease equals $5,725 billion in 2004 dollars.

Murphy and Topel 2005, The Value of Health and Longevity

During the 1970s and 1980s, the gains associated with the prevention and treatment of cardiovascular disease totaled $31 trillion.

The Lasker Foundation 2000, Exceptional Returns

Between 1984 and 1998, the cost of treating heart attack patients rose $10,000. However, medical technology increased the life expectancy of heart attack patients by an average of one year—a value of $70,000 and a net benefit of $60,000.

Cutler and McClellan 2001, Is Technological Change in Medicine Worth It?

Every $1 spent on technological innovations in heart attack care has produced an estimated $7 gain.

Cutler and McClellan 2001, Is Technological Change in Medicine Worth It?

Coronary stenting costs $15,000—significantly less than the $27,000 cost of open bypass surgery.

AdvaMed, Medical Technology: Saves and improves lives

Performing renal angioplasty to unclog arteries costs $6,000 less than performing a surgical bypass operation. When post-procedure costs are factored in, it costs $14,000 less. The performance of renal angioplasty also takes an average of three hours less than bypass surgery and reduces hospital stays by over two weeks.

Xue et al. 1999, Outcome and Cost Comparison of Percutaneous Transluminal Renal Angioplasty, Renal Arterial Stent Placement, and Renal Arterial Bypass Grafting

Every additional dollar spent on the routine use of beta-blockers (versus under-use) in acute heart attack patients has produced health gains valued as high as $38.44.

MEDTAP International 2004, The Value of Investment in Health Care

According to the National Institutes of Health, use of the clot-busting drug t-PA saves $4,400 per patient in hospitalization and nursing home costs.

Houston 2004, Innovative Drugs Cost Patients Less in the Long Run

Use of ACE inhibitor drugs for people with congestive heart failure helped avoid $9,000 per person in hospital costs over a three-year period and reduced deaths by 16%.

The SOLVD Investigators 1991, Effect of Enalapril
A year-long study of patients with congestive heart failure found that increased use of medicines increased pharmaceutical costs by 60%; however, hospital costs declined by 78%, producing a net savings of $9.3 million. The ability of patients to perform activities of daily living went up 15% and the death rate dropped from an expected 25% to 10%.

Managed Healthcare 1998, Provide Education About Congestive Heart Failure and Pump Up Your Savings

Spending $1,000 per year on anticoagulants can save $100,000 in hospital costs for care of a person disabled by a stroke.

Giorgianni, Grana, and Scipioni 2001, Global Impact of Innovations on Chronic Disease in the Genomics Era

Every additional dollar spent on antiplatelet therapy versus aspirin for the prevention of stroke in high-risk patients has produced health gains valued between $2 and $6.

MEDTAP International 2004, The Value of Investment in Health Care

Every additional dollar spent on the overall treatment of stroke has produced health gains valued at $1.55.

MEDTAP International 2004, The Value of Investment in Health Care

Development and widespread use of left ventricular assist devices could result in a 50% decrease in heart failure-related hospitalizations.

Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

Initiating and continuing beta-blocker use in most first-time heart attack survivors for 20 years would result in 72,000 fewer coronary heart disease deaths, 62,000 fewer heart attacks, and 447,000 gained life-years. Additionally, it would save up to $18 million.

Phillips et al. 2000, Health and Economic Benefits of Increased Beta-Blocker Use

The projected economic value of eliminating deaths from heart disease is approximately $48 trillion.

Murphy and Topel 2003, Measuring the Gains from Medical Research

Widespread use of pacemaker/defibrillators to control atrial fibrillation could result in a 50% decrease in stroke.

Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

Development of a neuroprotective drug could potentially reduce disability from stroke by 50%.

Goldman et al. 2005, Consequences of Health Trends and Medical Innovation for the Future Elderly

Treating acute stroke with drugs that minimize cell death could result in a median decrease in disability of 30%. Treatment with stem cell transplants could result in a median decrease in disability of 25%.

Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

The projected economic value of eliminating deaths from stroke is $7.6 trillion.

Murphy and Topel 2003, Measuring the Gains from Medical Research

Greater use of clot-busting drug t-PA in ischemic stroke patients could save the health care system over $100 million a year.

National Institute of Neurological Disorders and Stroke 1998, New Stroke Treatment Likely to Decrease Health Care Costs and Increase Quality of Life

The Future Value
A study by the Diabetes Prevention Program found that the use of the drug metformin by high-risk patients reduced the risk of development of type 2 diabetes by 31%.

National Diabetes Information Clearinghouse, Diabetes Prevention Program

Blood pressure control in diabetics reduces the risk of cardiovascular disease by 33% to 50%, and the risk of microvascular complications by approximately 33%.

Centers for Disease Control and Prevention 2005, National Diabetes Fact Sheet

Detection and treatment of diabetic eye disease with laser therapy can reduce development of severe vision loss by an estimated 50% to 60%.

Centers for Disease Control and Prevention 2005, National Diabetes Fact Sheet

Diabetes

The Human Value

“A suffering from diabetes for nearly 20 years, Paul faced a number of complications from the disease, including neuropathy—a profound numbness of the limbs that primarily affects the lower extremities.

The loss of feeling in the limbs, particularly the feet, contributes to the high rate of chronic wounds faced by those with diabetes. Calluses build up and often ulcerate—meaning the tissue erodes and can become infected—before the patient notices. By then, it is extremely difficult to treat the wounds effectively. An estimated 15 percent of patients with diabetes will develop a lower extremity ulcer during the course of their disease.

Paul was one of those patients. About ten years after being diagnosed with diabetes, drainage and odor from the wound on his foot drew his attention for the first time—he never felt any pain associated with it. For the next eight to ten years, Paul received regular, conventional treatment in his doctor’s office for the wound, but it failed to heal...

The bodies of diabetic patients are so compromised in terms of blood flow that when there is a wound, it requires extraordinary measures to initiate healing...

Researchers and doctors understood this problem and developed a new medical technology that combines living, fast-growing human cells with a high-tech mesh to create a growth-promoting skin substitute...

The ground breaking treatment Paul received offers great promise. The process...has been successful in even seemingly hopeless cases like Paul's. Equally important for patients and payers, this healing procedure can take weeks, rather than years, meaning patients can return to their lives, and payers are not faced with an open-ended and often fruitless treatment process.”

Advamed, New Hope for Diabetic Foot Ulcers
The Economic Value

- The value of a 10% reduction in mortality from diabetes is $486 billion in 2004 dollars.  
  Murphy and Topel 2005, The Value of Health and Longevity

- Every additional dollar spent on the overall treatment of type 2 diabetes has produced health gains valued at $1.49.  
  MEDTAP International 2004, The Value of Investment in Health Care

- Laser treatments save up to $1.6 billion per year through prevention and treatment of blindness in diabetics.  
  Research!America 2005, Investment in Research Saves Lives and Money

- Every additional dollar spent on intensive blood glucose control for newly diagnosed type 2 diabetic patients has produced health gains valued at $3.77.  
  MEDTAP International 2004, The Value of Investment in Health Care

- Every additional dollar spent on screening and treating diabetic eye disease in type 2 diabetics on insulin has produced health gains valued at $36.  
  MEDTAP International 2004, The Value of Investment in Health Care

- Every additional dollar spent on statin therapy for diabetes patients without cardiovascular disease has produced health gains valued between $7 and $31.  
  MEDTAP International 2004, The Value of Investment in Health Care

The Future Value

- Widespread use of diabetes prevention drugs that enhance insulin sensitivity could result in a 50% prevention of type 2 diabetes over a 10–15 year period.  
  Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

- One economic model predicts that if type 1 and type 2 diabetics had begun Captopril (a drug that controls blood pressure and delays the onset of kidney failure) treatment in 1995, the aggregate health care cost savings in 1999 would have been $189 million and in 2004 would have been $475 million—a present value cumulative cost savings of $2.4 billion for those 10 years.  
  Rodby, Firth, and Lewis 1996, An Economic Analysis of Captopril in the Treatment of Diabetic Nephropathy

- The U.S. could save up to $2.5 billion by preventing diabetes-related hospitalizations. Much of these savings would come from Medicare with preventable hospital costs of $1.3 billion, and Medicaid with preventable hospital costs of $386 million.  
  Agency for Healthcare Research and Quality 2005, Economic and Health Costs of Diabetes

- Shifting to home-based dialysis could save between $750 million and $1.6 billion in health care costs.  
  AdvaMed 2001, Cost of Diabetes, Promise of New Technologies
Neurological Disease: Alzheimer's and Parkinson's Diseases

The Human Value

“Willena is 75 and was diagnosed with Alzheimer’s disease five years ago. Her daughter and primary caregiver, Wanda Richardson, believes that her mother went undiagnosed for at least 15 years prior to that time. Willena’s family was told by an emergency room doctor that she had Alzheimer’s disease after she wandered away one morning and turned up at the neighborhood doughnut shop in her night clothes. She had displayed odd behaviors for many years says Wanda, 38, who now provides full-time care for her mother. Willena requires 24-hour supervision. The smallest tasks have become test of endurance for her. Wanda explains, ‘She does not respond to me anymore. It takes two hours to even get her ready for the day.’ Wanda’s life has changed as dramatically as her mother’s. She only works part-time now and her personal life is on hold. Mostly, she worries about her young son and how he is affected by her severely restricted life. Wanda realizes that her mother will not get better and may live this way for years. ‘There needs to be more research done. We need a cure. I might be next,’ Wanda says.”

Research!America 2005, Investment in Research Saves Lives and Money

The Economic Value

- A recent study showed that memantine, a medicine approved to treat moderate-to-severe Alzheimer’s, significantly slows cognitive decline and reduces the need for caregiving by 45.8 hours per month.
  Reisberg et al. 2003, Memantine in Moderate-to-Severe Alzheimer’s Disease

- Donepezil, a cholinesterase inhibitor, has been found to slow progression of Alzheimer’s disease in its early stages, delaying the need for nursing home care by an average of 30 months.
  Provenzano et al. 2001, Delays in Nursing Home Placement for Patients with Alzheimer’s Disease Associated with Donepezil May Have Care Cost Saving Implications

- Deep brain stimulation, an electrical signal delivered deep inside the brain, provides significant symptomatic relief for Parkinson’s patients whose medication is no longer effective.
  Parkinson’s Action Network, About Parkinson’s Disease

- Electrical stimulation of a portion of the thalamus, guided with MRI, can rapidly and dramatically reduce tremors from Parkinson’s.
  AdvaMed, Medical Technology and Assistive Devices

- A clinical trial in Europe found that treating Alzheimer’s patients with an Alzheimer’s drug reduced annual treatment costs by $1,000 per patient.
  PhRMA Japan 2000, Acept Reduces Annual Treatment Cost

- Galantamine, a cholinesterase inhibitor, delays Alzheimer’s patients’ need for full-time care, with overall cost savings estimated between $323 and $4,256 per patient.
  Cara et al. 2003, Rational Choice of Cholinesterase Inhibitor for the Treatment of Alzheimer’s

- Positron emission tomography (PET) is an effective tool in detecting and monitoring Parkinson’s disease. Because it can eliminate the need for other, more invasive diagnostic procedures and detect the disease earlier, it also significantly reduces health care costs.
  AdvaMed, Medical Technology and Assistive Devices

- In one study, deep-brain stimulation for Parkinson’s patients significantly reduced their required dosages of antiparkinsonian medications, consequently decreasing their medication costs by 32% one year after surgery, and 39% two years after.
  Charles et al. 2004, Deep Brain Stimulation of the Subthalamic Nucleus Reduces Antiparkinsonian Medication Costs
The Future Value

- Use of existing or new drugs/compounds for Alzheimer’s prevention could result in a delay of onset of between two and five years.
  Shekelle et al. 2000, Identifying Potential Health Care Innovations for the Elderly of the Future

- Delaying the onset of Alzheimer’s by only five years could reduce the number of people with Alzheimer’s by almost 50% after 50 years.
  Brookmeyer, Gray, and Kawas 1998, Projections of Alzheimer’s Disease in the United States and the Public Health Impact of Delaying Disease Onset

- Delaying the onset and progression of the disease would reduce the projected number of people with moderate to severe cases of the disease to 4.4 million instead of 10.3 million in 2050.
  The Lewin Group 2004, Saving Lives, Saving Money

- Delaying the onset of Alzheimer’s disease by just five years could save $50 billion per year.
  Alzheimer’s Association

- Research breakthroughs that slow the onset and progression of Alzheimer’s disease could achieve annual Medicare savings of $51 billion by 2015, $126 billion by 2025, and $444 billion by 2050.
  The Lewin Group 2004, Saving Lives, Saving Money

- A $1 billion-investment in Alzheimer’s research that led to research breakthroughs by 2010 could have a 10-to-1 return by 2015, and a 90-to-1 return by 2050.
  The Lewin Group 2004, Saving Lives, Saving Money

- Based on rates of admission in 1998, delaying admission of Alzheimer’s patients to nursing homes by one month could save as much as $1.12 billion a year.
  Leon, Cheng, and Neumann 1998, Alzheimer’s Disease Care

- In one study, despite a four-fold increase in prescription drug spending, overall health spending for Alzheimer’s patients undergoing drug therapy went down by one-third.
  Hill et al. 2002, The Effect of Donepezil Therapy on Health Costs in a Medicare Managed Care Plan

- Researchers have found how to manipulate embryonic stem cells to form dopamine-producing brain cells. This new source of cells could someday be used to replace cells lost to Parkinson’s.
  Perrier et al. 2004, Derivation of Midbrain Dopamine Neurons from Human Embryonic Stem Cells

- According to one Parkinson’s expert, a 10% slowing of Parkinson’s disease progression would save $327 million per year.
  Parkinson’s Action Network, About Parkinson’s Disease

- Nineteen new medicines are currently in development for the treatment of Parkinson’s disease.
  PhRMA, New Medicines in Development Database
Conclusion

When The Silver Book was first conceived, our intent was to cull facts and figures from the multitude of relevant reports and studies, creating a comprehensive resource that would outline the burden of chronic disease and highlight the value of innovation in reducing that burden. What we found is that while the information highlighted here paints an accurate picture, it is just the tip of the iceberg. As we brought the magnitude of this problem into focus, we also found that there are many gaps in the available data. We hope that the identification of these gaps will encourage future studies on these issues.

In order to share additional information that could not fit within the printed version of The Silver Book and to keep the almanac updated as future studies are produced, the Alliance for Aging Research is developing an interactive, online resource that will allow experts to provide information, keeping it current and comprehensive. Please visit our website to learn more about The Silver Book Online—www.agingresearch.org.

We hope that The Silver Book will become an important tool in shifting the dialogue from cutting costs to investing in science and innovation. The steadily increasing prevalence of chronic conditions begins a new battle in our country’s war against disease. As we address the cost of this war we must balance our concerns about reducing costs with the need to provide quality care and a long-term vision that will ultimately result in decreased health care costs, both personal and economic. We must consider how today’s investments will bring enormous health and economic returns tomorrow. Investments in medical innovation have been proven to pay for themselves many times over through decreased medical expenses and increased productivity. Medical innovation is vital in containing the impending health care crisis and ensuring the future of our nation’s health.
References


Cutler, David M. and Mark McClellan. 2001. Is Technological Change in Medicine Worth It? Health Affairs 20, no.5:11-29.


www.nber.org/papers/W11405.


What is Parkinson’s Disease? www.parkinsonsaction.org/about-parkinsons.html.


PhRMA. New Medicines In Development Database. www.phrma.org/newmedsdb/drugs.cfm


The Picture of Value: Medical Imaging. www.medicalimaging.org/

Medical Imaging Helps Employers Defeat Diabetic Eye Disease. www.medicalimaging.org/workerproductivity/diabetes.cfm


Prostate Cancer Foundation. www.prostatecancerfoundation.org


United States Census Bureau. www.census.gov/


Projections of the Total Resident Population by 5-Year Age Groups, Race, and Hispanic Origin with Special Age Categories: Middle Series, 2025 to 2045. www.census.gov/populationprojec tions/nationsummarymp-14-1.pdf.


United States General Accounting Office. 2002. Long-Term Care: Aging Baby Boom Generation Will Increase Demand and Burden on Federal and State Budgets. Testimony of David M. Walker before the Special Committee on Aging.


Acknowledgements:

The Alliance extends its thanks to the following experts for reviewing *The Silver Book*:

- **David Cutler**, PhD, Otto Eckstein Professor of Applied Economics, Harvard University
- **Dana P. Goldman**, PhD, Director and RAND Chair in Health Economics, RAND Corporation; Adjunct Professor of Radiology and Health Services, UCLA