PART 1: Medicines Benefit Patients, Health Care Systems, and Economies
Medicines Benefit Patients, Health Care Systems, and Economies

**Patients**
Patients all around the world are living longer, healthier, and more productive lives.

**Health Care Systems**
Medicines can put health care systems on more sustainable paths by reducing need for more expensive services.

**Economies**
The biopharmaceutical industry creates jobs, R&D investment, and medicines that improve worker productivity.
Patients all around the world are living longer, healthier, and more productive lives.
Medicines Have Significantly Increased Chances of Survival

Cancer
New therapies have contributed to significant declines in cancer mortality rates around the world since its peak in 1991

Today, 2 out of 3 people diagnosed with cancer survive at least 5 years

Approximately 83% of survival gains in cancer are attributable to new treatments

Percent Decline in Cancer Mortality Rates Since 1991
1991 to 2014 – All Cancers

- Canada: 23%
- EU5: 23%
- USA: 27%
- Mexico: 18%
- Korea: 12%
- Japan: 19%
- Australia: 26%

Source: Health Advances analysis; 1WHO Mortality Database (accessed January 2017); 2American Cancer Society Cancer Statistics Center; 3Sun et al., 2008, “The determinants of recent gains in cancer survival: an analysis of the surveillance, epidemiology, and end results (SEER) database,” Journal of Clinical Oncology.
Medicines Are Some of the Most Powerful Tools to Treat and Cure Deadly Diseases

HEPATITIS C VIRUS

The leading cause of liver transplants and the reason liver cancer is on the rise – is now curable in more than 90% of treated patients with only 8-12 weeks of treatment.

+133% cure rate increase for patients in Europe¹

<table>
<thead>
<tr>
<th>Generation</th>
<th>Cure Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Generation (1999-2010)</td>
<td>41% Cure Rate 48 Weeks*</td>
</tr>
<tr>
<td>2nd Generation (2011-2013)</td>
<td>63-80% Cure Rate 24-48 Weeks*</td>
</tr>
<tr>
<td>3rd Generation (2013-2014)</td>
<td>90% Cure Rate 12 Weeks*</td>
</tr>
<tr>
<td>4th Generation (2014-2015)</td>
<td>95-96% Cure Rate 8-12 Weeks*</td>
</tr>
</tbody>
</table>

IMPROVED TOLERANCE AND EASE OF TREATMENT

- Interferon and Ribavirin (IFN-R) Injection
- Protease Inhibitors with IFN Injection
- Polymerase Inhibitors with IFN Injection
- Oral Combination Therapies

*Treatment duration. Note: European Medicines Agency approval dates. Cure rates based upon clinical trial results reported in US Food and Drug Administration labels for: interferon; telaprevir; boceprevir; simeprevir; sofosbuvir; sofosbuvir and ledipasvir combination; and ombratavir, paritaprevir, ritonavir, and dasabuvir combination. Source: PhRMA, 2014, 25 years of progress against hepatitis C; PhRMA, 2015, Biopharmaceutical research industry profile.
Medicines Are Transforming the Treatment of Many Chronic Diseases

**Cardiovascular Disease**

Innovative biopharmaceutical companies are currently developing 190 medicines to treat heart disease, stroke and other cardiovascular diseases. New PCSK9 inhibitors have revolutionized high cholesterol treatment.\(^1\)

**Diabetes**

Between 2000 and 2012, new therapies contributed to a 48% and 31% decline in the diabetes death rate in Korea and Canada, respectively.\(^2\)

**Rheumatoid Arthritis**

The recent introduction of disease-modifying therapies has dramatically improved the lives of patients and caregivers by slowing and sometimes even reversing negative physical symptoms of the disease.\(^3\)

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Death rates for non-communicable diseases declined nearly 20% in the EU5, Australia, Canada and Japan from 2000 to 2012.

Note: The four main types of chronic diseases defined by WHO are cardiovascular diseases (e.g. heart attacks and stroke), cancers, chronic respiratory diseases (e.g. chronic obstructed pulmonary disease and asthma) and diabetes.

Source: Health Advances analysis; \(^1\)US Food and Drug Administration; \(^2\)WHO Mortality Database (accessed February 2016); \(^3\)Kremer, 2006; "COMET’s path, and the new biologics in rheumatoid arthritis." Lancet.
Vaccines Are Helping to Win the Fight Against Communicable Diseases

In England, infant deaths declined 79% from 2012 to 2013 as a result of a maternal pertussis vaccination program.

Italy was the first industrialized country to introduce a program for routine vaccination against hepatitis B virus (HBV); this program led to an 82% decline in the incidence of HBV from 1991 to 2010.

In Mexico, the introduction of the rotavirus vaccine in 2007 led to a 46% reduction in annual diarrhea-related mortality among children under five.

Medicines Have Transformed HIV/AIDS From a Death Sentence to a Manageable Disease

The number of deaths from HIV/AIDS has dropped by 85% since its peak in 1995 in the USA and EU5.

HIV/AIDS Age-Standardized Death Rates (ASDR) By Country

- USA: -88%
- SPAIN: -92%
- ITALY: -87%
- FRANCE: -94%
- CANADA: -87%
- AUSTRALIA: -88%
- GERMANY: -82%
- UNITED KINGDOM: -73%

Source: Health Advances analysis; 1 WHO Mortality Database (accessed February 2016).
Biopharmaceutical Companies Have Driven
A Decade of Advances in Medicines

2005
• First new kidney cancer medicine in over a decade
• 3 new therapies for diabetes

2007
• New class of medicines to treat high blood pressure
• First treatment for fibromyalgia

2009
• First treatment for peripheral T-cell lymphoma
• First new medicine for gout in 40 years

2011
• First lupus drug in 50 years
• 2 new personalized medicines

2013
• 2 new personalized medicines to treat the most dangerous forms of skin cancer
• A new oral treatment for multiple sclerosis

2015
• 2 new drugs for difficult-to-treat forms of high cholesterol
• New cystic fibrosis treatment for patients with a genetic mutation that is the most common cause of the disease

2006
• First vaccine for the prevention of cervical cancer
• First medicine for chronic chest pain in 20 years
• First once-a-day HIV medicine

2008
• A new type of treatment for Crohn’s disease
• The first medicine for symptoms of Huntington’s disease

2010
• 2 new multiple sclerosis drugs
• First therapeutic cancer vaccine

2012
• First drug to target root cause of cystic fibrosis
• First drug to treat Cushing’s disease

2014
• Oral treatments for HepC provide cure rates upwards of 90%
• 17 new drugs to treat patients with rare diseases

Note: Dates of innovation provided by the US Food and Drug Administration.
Source: US Food and Drug Administration, Drugs@FDA: FDA approved drug products (accessed April 2016).
Improved Understanding of Disease and Personalized Medicines Have Increased Patient Survival

Personalized medicines have improved the outlook for patients with blood cancers in Europe

- Chronic Lymphocytic Leukemia: 5-year survival rates have grown to 70%
- Hodgkin’s Lymphoma: 5-year survival rates have grown to 80%

Today, 230 medicines are in development for blood cancers in Europe

- ~40 Unique Leukemia types identified
- ~50 Unique Lymphoma types identified

*Medicines in Phase I through Phase III for the treatment of all types of leukemia and lymphoma.
Source: 1 National Cancer Institute SEER Cancer Statistics Review; 2 Eurocare 5 Database on cancer survival in Europe; 3 PharmaProjects (accessed February 2016).
Biopharmaceutical Companies Have Made Continued Progress Against Rare Diseases

There are approximately 7,000 different rare diseases worldwide.

1 in 10 individuals in the USA and Europe are living with a rare disease.

Growth in Orphan Drug Approvals

Note: 2016 data is still undergoing audit as of January 2017.
Medicines Often Demonstrate Far Greater Benefits than Understood at Initial Approval

Cancer medicines demonstrate **increasing clinical value over time** long after initial approval.

Note: Representation of the change in clinical value over time in the US as additional data and evidence became available for bortezomib. Source: Boston Healthcare Associates, 2015, The value of innovation in oncology: recognizing emerging benefits over time.
More Than 7,000 Medicines Are in Development Around the World

Medicines in Development

- **Cancers**: 1,813
- **Cardiovascular Disorders**: 599
- **Diabetes**: 475
- **HIV/AIDS**: 159
- **Immunological Disorders**: 1,120
- **Infectious Diseases**: 1,256
- **Mental Health Disorders**: 511
- **Neurological Disorders**: 1,329

Note: Each product is counted exactly once, regardless of the number of indications pursued. Source: Adis R&D Insight Database.
VALUE OF MEDICINES

Value to Health Care Systems

Medicines can put health care systems on more sustainable paths by reducing need for more expensive services.
Medicines Provide Critical Savings for Health Care Systems

The US health care system could save $215 billion annually if medicines were used properly¹

In Europe, medication non-adherence costs governments an estimated €125 billion and contributes to the premature deaths of nearly 200,000 Europeans a year²

Medicines Reduce Spending on Hospitalizations and Other Health Services

1.6-2.1 million

The number of influenza cases averted with the current use of seasonal influenza vaccination in Europe

€250-330 million

Total influenza-related costs saved annually from averted GP visits, hospitalizations, and lost days of work as a result of the current use of seasonal influenza vaccination in Europe

New Cardiovascular Medicines Led to Direct Savings on Hospitalizations in 20 OECD Countries*, 1995-2004

Per capita expenditure on cardiovascular hospitalizations would have been $89 (70%) higher in 2004 had new cardiovascular medicines not been introduced in the period 1995–2004

*Countries include Australia, Austria, Belgium, Canada, Czech Republic, Finland, France, Germany, Hungary, Italy, Japan, Korea, New Zealand, Norway, Poland, Slovak Republic, Spain, Switzerland, Turkey, UK and US.

New Medicines Are Part of the Solution to Hold Down Future Health Care Costs

$376 billion
Costs avoided by 2050 from the development of a new medicine that delays the onset of Alzheimer’s disease¹ by just five years

In the UK, a treatment delaying the onset of dementia by 5 years* would result in:
- 666,000 fewer people with dementia
- 566,000 fewer informal cares required
- £21.2 billion reduction in the cost of dementia²

€22 billion
Savings in Germany by 2040 from the development of new medicine that halts the progression of Parkinson’s Disease (PD)³

€3.9 billion
Savings if medicine slows progression by 20%

*Study duration and savings modeled through 2050 for an intervention that would delay the onset of dementia by 5 years and would become available in 2020. Source: Health Advances analysis; ¹Alzheimer’s Association; ²Alzheimer’s Research UK, 2014, Defeat dementia: The evidence and a vision for action; ³Johnson, 2012, “Economic value of slowing Parkinson’s disease in Germany: modeling progression through Hoehn and Yahr stages,” ISPOR 15th Annual European Congress.
VALUE OF MEDICINES

Value to Economies

The biopharmaceutical industry creates jobs, R&D investment, and medicines that improve worker productivity.
The Innovative Biopharmaceutical Industry Has a Major Impact on Economies

Jobs across the US, EU5, Japan, Korea, Mexico, Canada, and Australia

1,600,000
direct jobs

6,400,000
jobs downstream

8 million
TOTAL JOBS

Innovative Biopharmaceutical Industry

Vendors and Suppliers

US
4,500,000
jobs

EU5
1,700,000
jobs

JAPAN
630,000
jobs

KOREA
440,000
jobs

MEXICO
680,000
jobs

CANADA
80,000
jobs

AUSTRALIA
64,000
jobs

The Biopharmaceutical Sector Is the Single Largest Funder of Business R&D in the World

The Biopharmaceutical Sector Adds the Most Value to the Economy per Employee

Gross Value Added per Employee in Europe, 2012

- Biopharmaceuticals: €147,000
- Chemicals & Chemical Products: €81,000
- Motor Vehicles: €66,000
- Computer, Electronic, & Optical Products: €61,000
- Machinery & Equipment: €57,000
- Paper & Paper Products: €55,000
- Electrical Equipment: €51,000
- Basic Metals: €50,000
- Repair & Installation of Machinery: €48,000
- Food Products: €45,000
- Textiles: €36,000
- Furniture: €32,000
- Wearing Apparel: €30,000

Biopharmaceuticals employees in Europe are generating 80% more value per employee than other industries.

Note: Gross value added is defined as the gross income from operating activities per employee in the EU-28 and Norway. Source: Health Advances analysis; Eurostat Database (accessed February 2016).
Biopharmaceutical Companies Have Invested Billions to Bring Innovative Therapies to Market

Worldwide Pharmaceutical R&D Investment

Over $1.4 trillion in R&D since 2006

Another $1 trillion in the next six years

“The most important challenge facing the global research community is ensuring that populations regard its contributions as positive, responsible and legitimate. R&D policy is not just about throwing money at scientists and engineers – it is also about ensuring that their innovations can be brought into use, which is a quite different challenge.”

– DOMESTIC CORPORATION, UK (DECEMBER 2013)

Source: Health Advances analysis; EvaluatePharma, 2016, World preview; Battelle, 2014, Global R&D funding forecast.
Biopharmaceutical Companies Do the Vast Majority of Research to Translate Basic Science into New Medicines

While basic science is often initiated in academia, biopharmaceutical firms provide the necessary critical mass, expertise, and experience needed to develop new medicines.

Source: 1 Total National Institutes of Health (NIH) spending is for fiscal year 2015. In addition to funding for basic and applied research, the total NIH budget includes funding in support of prevention (e.g., suicide prevention), diagnostics and medical devices, Superfund Research Program activities, training and education (e.g., dental), program evaluation, management and support, buildings and facilities, and other activities. 2 PhRMA member companies’ R&D spending is estimated for calendar year 2015. PhRMA member companies account for the majority of private biopharmaceutical R&D spending. Nonmember company data are not included.
Innovative Medicines Address Health Needs While Also Supporting Economic Growth

POOR HEALTH IS A MAJOR CAUSE OF WORKPLACE PRODUCTIVITY LOSS

- $34.2 billion lost
  - Depression: $10.3 billion
  - Allergy: $2.4 billion
  - Hypertension: $4.4 billion
  - Diabetes: $4.1 billion
  - Asthma: $7.2 billion
  - Other: $5.8 billion

Total cost of productivity loss due to presenteeism in Australia, 2009-2010

NOVEL TREATMENTS ALLOW PATIENTS TO WORK LONGER AND MORE PRODUCTIVELY

- Ability to work 31 weeks longer and earn €26,000 more than a patient on conventional therapy

When comparing worker productivity for European, Australian, and Canadian patients with rheumatoid arthritis (RA), researchers found that patients were able to work longer and earn more money when treated with a novel biologic rather than conventional therapy* over the study period of 2 years.

Note: Conventional therapy refers to conventional disease-modifying anti-rheumatic drugs. Presenteeism is the act of attending work while sick.
Chronic Disease Is a Health and Economic Issue

The Canadian economy loses $190 billion annually due to chronic disease: $90 billion on treatment and $100 billion on lost productivity\(^1\)

The Australian economy loses 537,000 full-time person years and 47,000 part-time person years annually due to chronic diseases, reducing productivity by 10%\(^2,3\)

Note: Costs to Canadian economy are in Canadian dollars. Lost person years from chronic disease include workforce non-participation, absenteeism, and death.

Innovative New Therapies Have Enabled Patients to Continue Contributing to Society

Cancer

Cancer survivors are 1.4 times more likely to be unemployed than healthy individuals\(^1\), however

4 out of 5 cancer patients around the world today are returning to work following diagnosis due to innovative therapies\(^2\)

NETHERLANDS
83% of working individuals diagnosed with head and neck cancer returned to work, and most often within 6 months after treatment\(^5\)

FRANCE
82% of working women diagnosed with breast cancer returned to work after a median sick leave of 10.8 months\(^4\)

JAPAN
81% of patients diagnosed with cancer returned to work within 12 months of their initial sick leave\(^3\)

Note: In all three studies, return to work included full-time and part-time work.
Industry-Sponsored Clinical Trials Contribute Significant Value to the Countries in Which They Are Located

In 2015, the biopharmaceutical industry sponsored 9,059 clinical trials around the world.

Note: Represents all Phase 0 through Phase IV clinical trials registered with ClinicalTrials.gov Database in 2015. Source: Health Advances analysis; ClinicalTrials.gov Database (accessed February 2016).
PART 2: Putting Prescription Medicine Spending in Context
Societies Face Significant Challenges Expanding Access to Health Care While Managing Constrained Budgets

- Aging Population
- Persistence of Risk Factors
- Growing Chronic Disease Burden
- Political and Economic Pressures
- Constrained Budgets
Increasing Prevalence of Chronic Disease Is the Main Driver of Rising Health Care Costs

3 out of 5 Canadian adults have a chronic disease and rates are increasing by 14% each year\(^1\)

The prevalence of chronic diseases in the US will grow 42% from 2003 to 2023, significantly increasing health care costs\(^2\)

Nearly all Europeans will suffer from a chronic condition before retirement\(^3\)

<table>
<thead>
<tr>
<th>Chronic Disease</th>
<th>2003 Costs</th>
<th>2023 Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>$1,300B</td>
<td>$4,200B</td>
</tr>
<tr>
<td>Cancers</td>
<td>$319B</td>
<td>$1,106B</td>
</tr>
<tr>
<td>Hypertension</td>
<td>$312B</td>
<td>$927B</td>
</tr>
<tr>
<td>Diabetes</td>
<td>$132B</td>
<td>$430B</td>
</tr>
</tbody>
</table>

Two thirds of Canada’s direct health care costs are spent on chronic disease, amounting to $190 billion annually\(^1\)

Three quarters of Europe’s health care bill is spent on chronic disease, amounting to €700 billion annually\(^2\)

Source: Health Advances analysis; \(^1\)Public Health Agency of Canada, 2013, Against the growing burden of disease; \(^2\)Bodenheimer, 2009, “Confronting the growing burden of chronic disease,” Health Affairs; \(^3\)The Economist Intelligence Unit, 2012, Never too early: Tackling chronic disease to extend healthy life years.
Spending on Prescription Medicines Is a Small Share of Total Health Care Spending

Note: Total health care spending includes hospital care, physician and clinical services, home health and nursing home care, government administration and net cost of private health insurance, dental, home health and other professional services as well as durable medical equipment.

Source: Health Advances analysis; OECD Health Statistics Database (accessed February 2016); Altarum Institute, 2015, A ten year projection of the prescription drug share of national health expenditures including non-retail; ABPI analysis of UK National Health Service data. Farmindustria analysis of Italian Medicines Agency (AIFA) and National Institute for Statistics (Istat) data.
Spending on Prescription Medicines Is Not the Driver of Total Health Care Expenditure Growth

Other health care expenditures are growing faster than prescription medicine expenditures

Average Annual Growth in Per Capita Health Care Expenditure across OECD Countries, 2001-2014

Note: Countries include Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Japan, Korea, Latvia, Luxembourg, Mexico, Norway, Poland, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, UK and US.

Source: Health Advances analysis; OECD Health Statistics Database (accessed October 2016).
Growth in Other Health Care Services Will Be Ten Times Prescription Medicine Spending Growth through Next Decade

Projected Cumulative Growth in Health Care Spending across OECD Countries

### Putting Spending on Prescription Medicines in Perspective across Key Developed Markets

**Expenditure on hospital care across countries is 3-6 times the total spending on prescription medicines.**

<table>
<thead>
<tr>
<th>Country</th>
<th>Total Spending on Hospital Care, 2014</th>
<th>Total Spending on Prescription Medicines, 2014</th>
<th>Ratio (Hospital Care / Prescription Medicines)</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>$1,786B</td>
<td>$277B</td>
<td>6.4</td>
</tr>
<tr>
<td>Japan</td>
<td>$271B</td>
<td>$82B</td>
<td>3.3</td>
</tr>
<tr>
<td>Germany</td>
<td>$191B</td>
<td>$49B</td>
<td>3.9</td>
</tr>
<tr>
<td>France</td>
<td>$124B</td>
<td>$34B</td>
<td>3.6</td>
</tr>
<tr>
<td>UK</td>
<td>$117B</td>
<td>$29B</td>
<td>4.0</td>
</tr>
<tr>
<td>Italy</td>
<td>$92B</td>
<td>$29B</td>
<td>3.2</td>
</tr>
<tr>
<td>Canada</td>
<td>$70B</td>
<td>$22B</td>
<td>3.2</td>
</tr>
<tr>
<td>Spain</td>
<td>$73B</td>
<td>$16B</td>
<td>4.6</td>
</tr>
</tbody>
</table>

Note: Top seven countries ranked by total health care spending in the OECD. Hospital care includes all curative and rehabilitative care. Pharmaceutical spending for Japan is from 2013, the most recent year reported.

Source: Health Advances analysis; OECD Health Statistics Database (accessed October 2016); ABPI analysis of UK National Health Service data; Farmindustria analysis of Italian Medicines Agency (AIFA) and Italian National Institute for Statistics (Istat) data.
Cancer Medicines Are a Small Share of Treatment Costs

Spending on cancer medicines across the EU represents only 1% of Overall Health Care Spending... 

Total Health care Spending 99%

Cancer Drugs 1%

...and only 1/4 of Total Spending on Cancer Care

**Case Study**

**Critics Proved Wrong on Hepatitis C Medicine Spending in the US**

<table>
<thead>
<tr>
<th>What US Payers Claimed Would Happen</th>
<th>What Actually Happened</th>
</tr>
</thead>
<tbody>
<tr>
<td>“What they have done with this particular drug will break the country… it will make pharmacy benefits no longer sustainable. Companies just aren’t going to be able to handle paying for this drug.”</td>
<td>“The price is sufficiently low that we can go to our clients and say that they can treat every patient with hepatitis C.”</td>
</tr>
<tr>
<td>–Express Scripts (April 2014)</td>
<td>–Express Scripts (January 2015)</td>
</tr>
<tr>
<td>“This pricing, which Gilead attempts to justify as the cost of medical advancement, will have a tsunami effect across our entire health care system.”</td>
<td>“We are receiving market-leading rates from both companies. Neither company wanted to be left off the formulary.”</td>
</tr>
<tr>
<td>–America’s Health Insurance Plans (July 2014)</td>
<td>–Prime Therapeutics (January 2015)</td>
</tr>
<tr>
<td>“Competitive market forces and hard-nosed bargaining” make ‘tremendously effective’ new hepatitis C medicines not just more accessible to ailing patients – but also offer good value to the US health care system.”</td>
<td>“Competitive market forces and hard-nosed bargaining” make ‘tremendously effective’ new hepatitis C medicines not just more accessible to ailing patients – but also offer good value to the US health care system.”</td>
</tr>
</tbody>
</table>
## Case Study
**Critics Proved Wrong on New High Cholesterol Medicine Spending**

<table>
<thead>
<tr>
<th>What Critics Claimed Would Happen</th>
<th>What Actually Happened</th>
</tr>
</thead>
<tbody>
<tr>
<td>“These drugs are not only expensive but they present a financial challenge to the health care industry.”</td>
<td>“We are in a situation where we can bargain with the drug manufacturers to get a significant discount in return for an exclusive deal.”</td>
</tr>
<tr>
<td>“While these drugs are being viewed as breakthroughs, they also have the potential to wreck financial havoc on clients who do not proactively manage.”</td>
<td>“We were able over the course of tough negotiations to get good economics on both products.”</td>
</tr>
<tr>
<td>– Express Scripts (July 2015)</td>
<td>– Express Scripts (October 2015)</td>
</tr>
<tr>
<td>“Given the number of people potentially eligible for treatment with PCSK9 will number in the millions, the potential overall expenditures by payers are huge.”</td>
<td>“We feel very confident we can manage this and this won’t mess up our clients’ budgets in 2016.”</td>
</tr>
<tr>
<td>– CVS Health (July 2015)</td>
<td>– Express Scripts (October 2015)</td>
</tr>
<tr>
<td>“Imagine if everyone on statins in the UK, around seven million, changed to PCSK9 inhibitors. This would cost £56 billion pounds a year. A tidy little sum. Half of the entire NHS budget.”</td>
<td></td>
</tr>
<tr>
<td>– Dr. Malcomn Kendrik, UK General Practitioner (December 2015)</td>
<td></td>
</tr>
</tbody>
</table>
The Pharmaceutical Life Cycle
Promotes Innovation and Long Term Savings

Innovators pave the way for low cost generics to enter the market

ILLUSTRATIVE PHARMACEUTICAL LIFE CYCLE

1. Significant investment to research and develop a new medicine
2. Limited period to earn returns on investment
3. Low cost generics available for many years

Preclinical & Clinical Development
Brand Medicine
Generics Enter Market

10 to 15 years on average
12.5 years on average before generic entry

Brand Drug Approved
Generics Approved

Most brand medicines face competition from other brands long before a generic enters the market
Savings from the Pharmaceutical Life Cycle Reduce Treatment Costs for the Most Common Conditions

Innovator biopharmaceutical companies produce medical advances leading to improved health and eventually lower cost generics that bring long-term value.

Daily Cost of Top-10 Therapeutic Classes Most Commonly Used by Medicare Part D Enrollees

Since 2006, the daily cost for the top-10 therapy areas in Medicare Part D has fallen by nearly half, and projections show that the daily cost of therapy will drop again by more than a third by 2017.

Note: The ten therapeutic classes most commonly used by Part D enrollees in 2006 were lipid regulators, angiotensin-converting enzyme inhibitors, calcium channel blockers, beta blockers, proton pump inhibitors, thyroid hormone, angiotensin II, codeine and combination products, antidepressants and seizure disorder medications.

Source: Kleinrock, 2013, Daily cost of Medicare Part D, IMS Institute for Health Care Informatics.
Medical Procedures Become More Expensive Over Time, But Cost Containment Is Built into the Pharmaceutical Life Cycle

Two Approaches to Cardiovascular Disease Management in the United States

Medical Procedure
Percutaneous Coronary Angioplasty (PTCA)

2005: $47,962
2013: $79,391

Pharmaceutical Intervention
Atorvastatin 10mg

2005: $2.13
2013: $0.18
2014: $0.15

Significant Cost Decline: -93%

Source: Average hospital charges for atorvastatin 10mg data adapted from HCUP Hospital Charge database 2005 and 2013; IMS National Sales Perspective invoice price in 2005 (branded Lipitor), 2013 (generic), and 2014 (generic).
Safe and Effective Biosimilars Can Lead to Long Term Cost Savings

Biosimilar entry decreased the average cost of therapy in Europe

Note: Countries include Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Finland, France, Germany, Hungary, Ireland, Italy, Norway, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and UK. HGH = Human Growth Hormone (somatropin), EPO = Erythropoietin, G-CSF = Granulocyte Colony-Stimulating Factor.

Source: Health Advances analysis; IMS Institute for Health Care Informatics, 2014, Assessing biosimilar uptake and competition in European markets.
$230 Billion of Developed Market Brand Sales Are Projected to Face Generic Competition from 2015 to 2020

Projections underscore cost savings from the pharmaceutical lifecycle

Pre-expiry Value of Branded Products at Risk, 2011-2020

Note: Pre-expiry spending is the actual and estimated spending in the 12 months prior to loss of exclusivity (LOE) and is shown for developed markets only. Estimates are based on patent expiry dates or expected generic and biosimilar availability, and historic analogues where available. Biologics and small molecules are modeled separately. Biologic brand losses are based on any non-original biologic competitor, regardless of approval type. Source: IMS Institute for Health Care Informatics, 2015, Global Medicines Use in 2020: Outlook and Implications.
Greater Use of Generics in Many Countries Could Produce Additional Cost Savings

While Nearly 9 out of every 10 US prescriptions are filled with generics, other developed markets are not taking advantage of potential generic Cost Savings.

Source: IMS National Sales Perspectives and IMS MIDAS audited data.
Many Countries Could Achieve Lower Costs With a More Competitive Generics Market

Prices in Many Markets Do Not Fall as Far or as Fast as Those in the U.S.

Change in Average Price per Molecule Following Generic Entry
2009-2014

PART 3: Challenges and Opportunities in the Marketplace
The Economics of Medicine Has Changed Markedly in Recent Years

### Biopharmaceutical Innovation

#### THE SCIENCE IS HARDER AND MORE COSTLY
- Researchers targeting more complex diseases
- Rise of personalized medicine
- Higher regulatory hurdles
- Longer, more complex trials
- Genomics and molecular medicine are complex new frontiers
- Increased costs of R&D

#### THE MARKET IS RISKIER AND TOUGHER
- Ad-hoc fiscal austerity measures
- Greater cost-sharing and coverage restrictions
- Complex HTA processes delaying or denying patient access to the best care
- Eroding intellectual property protections
- Increased reference pricing and parallel trade
- Payers mandating off-label use to reduce costs
The Biopharmaceutical Research and Development Process

From drug discovery to regulatory approval, developing a new medicine on average takes **10 to 15 years** and costs **$2.6 billion**.
The Cost to Develop a New Medicine
More Than Doubled Over the Past Decade

Average Cost to Develop an Approved Medicine – Including Setbacks

KEY DRIVERS INCLUDE:
• Increased trial complexity and regulatory burdens
• Increased focus on areas where science is difficult and failure risks high
• Expanded research burden to meet payer demands

Note: In constant 2013 dollars.
Source: Tufts Center for the Study of Drug Development.
Returns on Biopharmaceutical R&D Continue to Decline

Projected Return on Late-Stage Pipelines of Leading Biopharmaceutical Companies

- 2010: 10.1%
- 2011: 7.6%
- 2012: 7.3%
- 2013: 4.8%
- 2014: 5.5%
- 2015: 4.2%
- 2016: 3.7%

Source: Deloitte, 2016, Measuring the return from pharmaceutical innovation.
Despite Inherent Risk and Challenges of Drug Development, New Treatments and Cures Are Giving Hope to Patients

Pharmaceutical development in the US led to 21 breakthrough therapy approvals in 2015\(^1\)… which have the ability to change the lives of millions of patients

<table>
<thead>
<tr>
<th>Disease</th>
<th>US Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Small Cell Lung Cancer</td>
<td>350,000(^2)</td>
</tr>
<tr>
<td>Multiple Myeloma</td>
<td>90,000(^3)</td>
</tr>
<tr>
<td>Cystic Fibrosis</td>
<td>30,000(^4)</td>
</tr>
<tr>
<td>Diabetic Retinopathy</td>
<td>7.7 million(^5)</td>
</tr>
</tbody>
</table>

And there are 7,000 more medicines in development

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Notes:
- Based on US prevalence rates.
- Source: Health Advances analysis; \(^1\)US Food and Drug Administration, 2015, CDER breakthrough therapy designation approvals as of December 31, 2015; \(^2\)American Cancer Society, 2015, Lung cancer report; \(^3\)SEER Cancer Statistics Database (accessed March 2016); \(^4\)Cystic Fibrosis Foundation website; \(^5\)National Eye Institute website.
Industry-Sponsored Early Access Programs Mitigate Delays from Lengthy Regulatory and Reimbursement Review Processes

Average Months of Delay in National Patient Access Following Drug Approval

3 6 9 12 15 18

JAPAN  GERMANY  SWEDEN  BRAZIL  NETHERLANDS  UK  ITALY  FRANCE  SPAIN

FRANCE

Over 12,000 patients received new medicines in 2014 through industry-sponsored early access programs in collaboration with the French ATU (temporary authorization for use) program.

UNITED KINGDOM

Early access to a new medicine for patients suffering from melanoma was approved four months before market authorization was granted.

Industry Helps Patients Get New Medicines Despite Process Delays

Note: Timelines for EU5 countries are based on products with first sales in 2014. Timelines for Spain, Italy, UK, and France represent time to reimbursement approval. Additional time may be required in Italy and Spain for regional or local negotiations. Timeline for Japan may range from 2-3 months based on publicly-available descriptions of the reimbursement approval process.

The Challenges Facing Health Care Systems and Innovators Must Be Addressed through Successful Collaboration

The Innovative Medicines Initiative (IMI) is the world's largest public-private initiative in the life sciences. IMI 2, a joint undertaking between the European Union and EFPIA, will support collaborative research projects and build networks of industrial and academic experts to boost pharmaceutical innovation in Europe.

Better quality measurement and value assessment tools
Outcomes-based incentives and innovative financing
Appropriate use of medicines

International Experience Shows that Key Policies Are Needed to Promote Value-Based Health Care

Industry Supports Pragmatic Solutions to Address Cost Concerns
Initiatives Focused on Health Outcomes Instead of Only Cost Containment Can Improve Quality of Care and Reduce Overall Costs

A recent study in Sweden targeting disease management found that patients enrolled in a heart failure program involving regular follow-up* with specialized nurses led to 30% reduced costs and improved outcomes through fewer hospital admissions and GP visits.

*Regular follow-up included frequent phone and in-person contact with nurses and physicians to optimize patient’s heart failure treatment according to current guidelines, as well as receipt of information about heart failure from a validated computer-based awareness program.

Medicines Are Part of the Solution and More Can Be Done Together

**Governments, Providers, and Payers**

- **Improve Efficiency**
  Look at all health care costs, reduce administrative costs and waste, and improve efficiency

- **Pay for Value**
  Support evidence-based care and empowered patients and providers, backed by sound research and quality measures

- **Find Solutions**
  Avoid blanket policies that chill investment, and collaborate to find new approaches

**Biopharmaceutical Companies**

Continue developing innovative therapies, promote medication adherence, and maintain efforts to support broad patient access