

Fall 2016

# U.S. Investments in Medical and Health Research and Development

## 2013 - 2015



**I**nvestment in medical and health research and development (R&D) in the U.S. grew by 13.3% from 2013 to 2015. Industry invested more than any other sector, representing 64.7% of total spending in 2015, followed by the federal government at 22.6%.

While there was growth overall in investment from 2013 to 2015, medical and health R&D continues to represent only a very small fraction of total U.S. health spending. In fact, our nation currently spends less than 5 cents of each health dollar on medical and health R&D (4.93%). Is that level of investment truly adequate to find the solutions to what ails us?

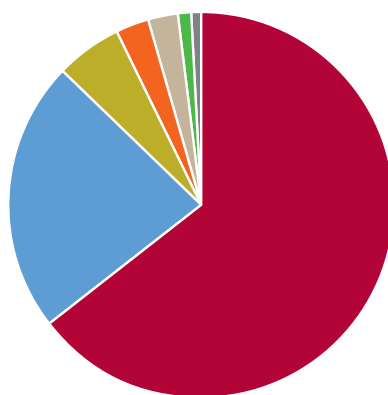
From 2013 to 2014, total U.S. investment in medical and health R&D grew by 8.3%, then slowed to 4.6% from 2014 to 2015. Slower growth in federal government investments and a decline in investments from the medical technology sector contributed to the slowed rate of growth observed from 2014 to 2015. Foundations, voluntary health associations and professional societies increased their level of investment during the three-year period. However, these funding sources represent a relatively small percentage of total R&D investment, and even with strong growth, they cannot substitute for robust and sustained federal and industry investment in R&D.

The National Institutes of Health received a \$2 billion increase in fiscal year 2016 (FY16), after many years of essentially flat or declining support. While this increase likely fueled a more robust growth rate in overall federal medical and health R&D investment in 2016, the outlook for future years remains highly uncertain. Federal policymakers should consider a comprehensive R&D strategy that draws on the power of public sector- and private sector-driven medical progress to foster health, prosperity and national security.

## In 2015:

- Total U.S. medical and health R&D was \$158.7 billion.
- Industry invested more in R&D than any other sector, totaling \$102.7 billion.
- Federal agencies invested a total of \$35.9 billion, with the National Institutes of Health accounting for \$29.6 billion.
- Research institutions, including universities and independent research institutes (IRIs), dedicated more than \$12.5 billion to R&D.
- Foundations contributed \$4.7 billion to U.S. medical and health R&D.
- Voluntary health associations, professional societies, and state and local governments invested nearly \$3 billion in medical and health R&D.

# U.S. Medical and Health R&D Expenditure, 2015



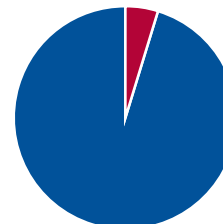
- 64.70%** Industry
- 22.62%** Federal Government
- 5.45%** Universities
- 2.95%** Foundations
- 2.47%** Independent Research Institutes
- 0.97%** State and Local Government
- 0.83%** Voluntary Health Associations & Professional Societies

## Estimated U.S. Medical and Health Research Expenditures (\$ in millions)

SECTOR	Research Segment	2013	2014	13-'14 Change	2015	14-'15 Change
	Industry (U.S. Operations)	\$89,666	\$98,097	9.40%	\$102,679	4.67%
	Federal Government	33,634	35,435	5.36%	35,924	1.38%
	Other Sources	16,807	18,260	8.65%	20,113	10.15%
	<b>Total U.S. Medical and Health R&amp;D Spending</b>	<b>\$140,107</b>	<b>\$151,792</b>	<b>8.34%</b>	<b>\$158,716</b>	<b>4.56%</b>

## Healthcare Spending versus R&D Investments (\$ in millions)

	2013	2014	2015
Total U.S. Medical and Health R&D Spending	\$140,107	\$151,792	\$158,716
Total U.S. Health Spending (health care + R&D)	\$2,973,526	\$3,137,540	\$3,222,340
<b>Medical and Health R&amp;D as % of U.S. Health Spending</b>	<b>4.71%</b>	<b>4.84%</b>	<b>4.93%</b>



U.S. Medical and Health R&D Spending **4.93%**  
 U.S. Healthcare Spending **95.07%**

“This new report on health and medical R&D investments in the U.S. reinforces the importance of sustained, robust funding from both the public and private sectors. Investment in research and innovation is critical to advance medical progress. One sector cannot do it alone. Initiatives like the cancer moonshot enable us to bring the best minds together, and collaborate to disrupt the progression of disease, treat it more effectively, find cures and ultimately prevent it. Achieving these goals requires appropriate research investments.”

**William N. Hait, M.D.**

*Ph.D., Global Head, Research & Development :: the Janssen Pharmaceutical Companies of Johnson & Johnson*

## Sector by Sector Analysis

### Industry

Industry invested more in R&D than any other sector, accounting for 64.7% of total medical and health R&D expenditures in 2015. Industry R&D grew substantially from 2013 to 2014, with a 9.4% increase in funding, but growth was halved (to 4.7%) from 2014 to 2015. There were some differences of note in the various industry sectors, in particular a decline in medical technology investment from 2014 to 2015.

#### Estimated U.S. Medical and Health Research Expenditures (\$ in millions) and Percentage of Total U.S. Spending, Industry (U.S. Operations)

	2013	% of '13 Total	2014	% of '14 Total	13-'14 Change	2015	% of '15 Total	14-'15 Change
Pharmaceutical	\$62,092	44.32%	\$67,479	44.45%	8.68%	\$72,138	45.45%	6.90%
Medical Technology	16,185	11.55%	18,222	12.00%	12.59%	17,408	10.97%	-4.47%
Biotechnology	5,168	3.69%	5,685	3.75%	10.00%	6,109	3.85%	7.47%
Other Sectors <sup>1</sup>	6,221	4.44%	6,710	4.42%	7.86%	7,024	4.43%	4.67%
<b>Industry Total</b>	<b>\$89,666</b>	<b>64.00%</b>	<b>\$98,097</b>	<b>64.63%</b>	<b>9.40%</b>	<b>\$102,679</b>	<b>64.69%</b>	<b>4.67%</b>

### Federal Government

Federal agencies invested a total of \$35.9 billion in medical and health R&D in 2015. As explored in the Discussion section of this report, federal spending grew by 5.4% from 2013 to 2014, dropping to 1.4% from 2014 to 2015. Over 82% of the federal investment in R&D is channeled through the National Institutes of Health (NIH), which funded \$29.6 billion of R&D in 2015 at universities and businesses in every state in the nation, as well as at NIH's campuses. NIH accounted for 18.7% of total U.S. medical and health R&D expenditures in 2015; each of the other federal agencies in this category contributed less than 1% to total U.S. medical and health R&D.

#### Estimated U.S. Medical and Health Research Expenditures (\$ in millions) and Percentage of Total U.S. Spending, Federal Government Agencies

	2013	of '13 % Total	2014	of '14 % Total	13-'14 Change	2015	% of '15 Total	Change 14-'15
National Institutes of Health (NIH)	\$28,215	20.14%	\$29,400	19.37%	4.20%	\$29,637	18.67%	0.81%
Department of Defense (DoD)	1,018	0.73%	1,226	0.81%	20.46%	1,194	0.75%	-2.61%
Centers for Medicare and Medicaid Services (CMS)	656	0.47%	997	0.66%	51.98%	971	0.61%	-2.61%
Food and Drug Administration (FDA)	718	0.51%	764	0.50%	6.53%	801	0.50%	4.81%
National Science Foundation (NSF)	697	0.50%	675	0.44%	-3.17%	694	0.44%	2.86%
Centers for Disease Control and Prevention (CDC)	430	0.31%	434	0.29%	0.94%	596	0.38%	37.37%
Department of Veterans Affairs (VA)	604	0.43%	553	0.36%	-8.37%	561	0.35%	1.35%
Agency for Healthcare Research and Quality (AHRQ)	430	0.31%	436	0.29%	1.40%	443	0.28%	1.61%
Department of Energy (DoE)	284	0.20%	304	0.20%	6.91%	290	0.18%	-4.44%
Patient Centered Outcomes Research Institute (PCORI) <sup>2</sup>	17	0.01%	132	0.09%	657.53%	238	0.15%	79.71%
National Aeronautics and Space Association (NASA)	147	0.10%	149	0.10%	1.84%	142	0.09%	-4.95%
Environmental Protection Agency (EPA)	126	0.09%	128	0.08%	1.64%	124	0.08%	-2.88%
Department of Transportation (DoT)	47	0.03%	49	0.03%	4.34%	45	0.03%	-7.89%
U.S. Agency for International Development	75	0.05%	41	0.03%	-45.26%	42	0.03%	2.00%
Health Resources and Services Administration (HRSA)	37	0.03%	38	0.02%	3.28%	41	0.03%	7.67%
Department of Commerce	31	0.02%	31	0.02%	-0.89%	34	0.02%	10.38%
Department of Homeland Security	26	0.02%	36	0.02%	41.33%	27	0.02%	-26.76%
Department of Agriculture	56	0.04%	20	0.01%	-63.56%	24	0.02%	19.50%
Other Health and Human Services	21	0.02%	21	0.01%	0.00%	20	0.01%	-5.66%
<b>Federal Government Total</b>	<b>\$33,634</b>	<b>24.01%</b>	<b>\$35,435</b>	<b>23.34%</b>	<b>5.36%</b>	<b>\$35,924</b>	<b>22.63%</b>	<b>1.38%</b>

## Other Sources of Medical and Health R&D Investment

### *Universities and Research Institutes*

Universities and independent research institutes (IRIs) dedicated more than \$12.5 billion of their own funds (endowment, tuition, donations, etc.) to medical and health R&D in 2015. Universities grew their investments substantially over the three-year period, increasing R&D investments by nearly 12% from 2013 to 2014 and 8% from 2014 to 2015. IRIs experienced more modest growth from 2013 to 2015, increasing investments by just over 3% each year.

### Estimated U.S. Medical and Health Research Expenditures (\$ in millions) and Percentage of Total U.S. Spending, Academic & Research Institutions

	2013	% of '13 Total	2014	% of '14 Total	13-'14 Change	2015	% of '15 Total	14-'15 Change
Universities	\$7,149	5.10%	\$8,003	5.27%	11.94%	\$8,646	5.45%	8.04%
Independent Research Institutes	3,676	2.62%	3,799	2.50%	3.34%	3,921	2.47%	3.23%
<b>Institutions Funds Total</b>	<b>\$10,825</b>	<b>7.73%</b>	<b>\$11,802</b>	<b>7.77%</b>	<b>9.03%</b>	<b>\$12,567</b>	<b>7.92%</b>	<b>6.48%</b>

### *Foundations, Voluntary Health Associations & Professional Societies, and State and Local Governments*

Foundations invested more than \$4.6 billion in 2015, accounting for nearly 3% of total U.S. expenditures on medical and health R&D that year. State and local governments invested just over \$1.5 billion in 2015, nearly 1% of total U.S. investment. Voluntary health associations and professional societies invested \$1.3 billion in 2015, accounting for 0.83% of total U.S. R&D. As explored in the Discussion section of this report, the combined growth rate for these categories was 8% from 2013 to 2014, increasing to 16.8% from 2014 to 2015.

### Estimated U.S. Medical and Health Research Expenditures (\$ in millions) and Percentage of Total U.S. Spending, Non Research-Conducting Grant Giving Entities

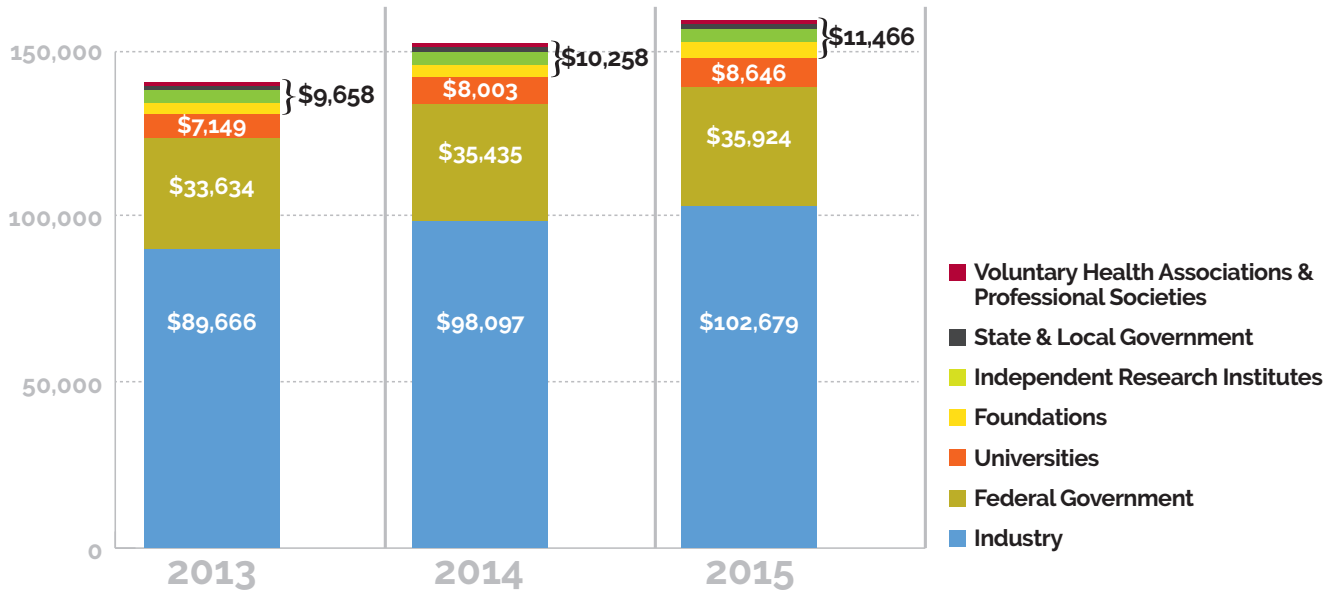
	2013	% of '13 Total	2014	% of '14 Total	13-'14 Change	2015	% of '15 Total	14-'15 Change
Foundations	\$3,353	2.39%	\$3,677	2.42%	9.66%	\$4,688	2.95%	27.50%
State and Local Government	1,413	1.01%	1,499	0.99%	6.06%	1,535	0.97%	2.43%
Voluntary Health Associations & Professional Societies	1,216	0.87%	1,283	0.85%	5.56%	1,322	0.83%	3.06%
<b>Non Research-Conducting Grant Giving Entities Total</b>	<b>\$5,982</b>	<b>4.27%</b>	<b>\$6,459</b>	<b>4.26%</b>	<b>7.97%</b>	<b>\$7,545</b>	<b>4.75%</b>	<b>16.81%</b>

“We cannot take innovation for granted. Research has the potential to transform current approaches to treating and preventing cardiovascular diseases and stroke, but this potential is lost if we fail to provide robust funding support. There is an urgent need for increased investment in medical research and development, and this cannot be achieved without the shared commitment of the federal government, the private and nonprofit sectors, and other stakeholders. Far too many patients’ lives are at stake. Research!America’s 2016 medical and health R&D investment report provides a compelling call-to-action for all of us to step up and work collaboratively toward meaningful solutions.”

### **Nancy Brown**

*Chief Executive Officer :: American Heart Association*

## Estimated U.S. Medical and Health Research Expenditures (\$ in millions)



## Discussion

Industry, including pharmaceutical, medical technology, biotechnology and health IT companies, accounted for the largest share of U.S. investment in medical and health R&D over the reporting period.

Within the industry sector, pharmaceutical companies accounted for 70.3% of the industry total in 2015, investing more than \$72 billion. While both the pharmaceutical and biotechnology sectors grew over the three-year period, the medical technology sector experienced a notable decline in investment from 2014 to 2015. This decline in expenditures likely reflects merger and acquisition activity in 2014 that consolidated R&D activities for several major players in this space. It is likely that the medical device excise tax also played a role in the decline. Recent policy changes, including the two-year suspension of the medical device tax and enhancement of the R&D tax credit (which was also made permanent in FY16), could help fuel future industry growth in medical and health R&D.

Within federal investments, there is little doubt that the constrained level of federal medical and health R&D

spending from 2013 to 2015 reflect the tight, 10-year budget caps known as “Sequestration,” imposed as part of the 2011 Budget Control Act (BCA). While the American Taxpayer Relief Act and the Bipartisan Budget Act, which were signed into law in January and December of 2013, respectively, provided some relief from BCA-imposed austerity spending during the 2013-2015 reporting period, federal appropriators were faced with tight spending caps that forced difficult budget tradeoffs.

Congress increased medical and health R&D funding from 2013 to 2014 by 5.4%, an apparent “bounce-back” from an across-the board budget cut in 2013. Despite new dollars to fight Ebola and the ramp up in R&D spending by PCORI as it established its funding priorities, overall federal medical and health R&D funding grew by a more austere 1.4% from 2014 to 2015. Looking forward, growth in federal support for medical and health R&D will likely be strong in FY16 as NIH received a \$2 billion or 6.6% increase, but growth in future years remains uncertain.

The continued year-to-year variation in federal R&D spending is emblematic of longer-term trends,<sup>3</sup> and, coupled with the potentially dampening impact of the medical device tax, reflects the lack of a strategic public-private investment framework to capitalize on the sequencing of the human genome, immunology, the mining of “big data,” and other developments that present unprecedented opportunities for rapid-pace medical progress. Our nation currently spends less than 5 cents of each health dollar on R&D. We must consider whether this level of investment is adequate to address the formidable health challenges before us.

While NIH is a major investor in the research conducted at universities and independent research institutes (IRIs), these institutions also make substantial financial contributions to medical and health research from their own resources — growing their spending over the reporting period and together investing more than \$12.5 billion in 2015 alone. This robust spending may reflect tighter competition for federal funds, with research institutions investing in individual scientists as well as their overall R&D capabilities to better position them to compete for the limited federal grants available. Though

significant, university and independent research institute investment capacity is not of a scale to compensate for limited growth in federal spending.

Private grant-giving entities, including foundations, voluntary health associations and professional societies, also increased their spending on medical and health R&D over the reporting period. These investment sources also play a comparatively small but critically important role in the research ecosystem. For example, voluntary health associations provide crucial seed funding to encourage young investigators and support high risk, high reward research. Similar to universities and IRIs, private grant-giving entities’ investment capacity is not at a scale large enough to compensate for federal or industry funding shortfalls.

Growth in foundation R&D spending (a 27.5% increase from 2014 to 2015) drove the “other sources” funding category’s 10.1% growth that year. This growth reflects significant increases in research funding from a few major foundations, including a nearly \$1 billion increase from 2014 to 2015 in global health research-related investments by the Bill and Melinda Gates Foundation.

“There is no higher priority for our nation than to maintain our longstanding leadership in biomedical research and scientific progress. We must do everything we can to ensure consistency in federal R&D funding if we are to continue to make scientific breakthroughs and new discoveries that will improve human health around the world. With an uncertain funding climate and the prospects of future cuts, we will set back progress in clinical trials of new treatments for patients in dire need of novel therapies, we will reduce staff needed to give that care and we will severely diminish the pipeline of young investigators and new research projects required for science to thrive. I applaud Research!America for producing this report on health and medical R&D investments in the U.S. It is exactly what is needed to inform policymakers and others about the implications of inadequate funding, including the loss of the next generation of scientists.”

### **E. Albert Reece, MD, PhD, MBA**

*Vice President for Medical Affairs, University of Maryland :: John Z. and Akiko K. Bowers Distinguished Professor and Dean University of Maryland School of Medicine*

## Estimated U.S. Medical and Health Research Expenditures (\$ in millions)

<b>Industry (U.S. Operations)</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Pharmaceutical	\$62,092	\$67,479	\$72,138
Medical Technology	16,185	18,222	17,408
Biotechnology	5,168	5,685	6,109
Other Sectors	6,221	6,710	7,024
<b>Industry Total</b>	<b>\$89,666</b>	<b>\$98,097</b>	<b>\$102,679</b>

<b>Federal Government</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
National Institutes of Health	\$28,215	\$29,400	\$29,637
Department of Defense	1,018	1,226	1,194
Centers for Medicare and Medicaid Services	656	997	971
Food and Drug Administration	718	764	801
National Science Foundation	697	675	694
Centers for Disease Control and Prevention	430	434	596
Department of Veterans Affairs	604	553	561
Agency for Healthcare Research and Quality	430	436	443
Department of Energy	284	304	290
Patient Centered Outcomes Research Institute	17	132	238
NASA	147	149	142
Environmental Protection Agency	126	128	124
Department of Agriculture	56	20	24
Department of Transportation	47	49	45
U.S. Agency for International Development	75	41	42
Health Resources and Services Administration	37	38	41
Department of Commerce	31	31	34
Department of Homeland Security	26	36	27
Other Health and Human Services	21	21	20
<b>Federal Government Total</b>	<b>\$33,634</b>	<b>\$35,435</b>	<b>\$35,924</b>

<b>Academic &amp; Research Institutions, Institution Funds</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Universities	\$7,149	\$8,003	\$8,646
Independent Research Institutes	3,676	3,799	3,921
<b>Institutions Total</b>	<b>\$10,825</b>	<b>\$11,802</b>	<b>\$12,567</b>

<b>Non Research-Conducting Grant Giving Entities</b>	<b>2013</b>	<b>2014</b>	<b>2015</b>
Foundations	\$3,353	\$3,677	\$4,688
State and Local Government	1,413	1,499	1,535
Voluntary Health Associations & Professional Societies	1,216	1,283	1,322
<b>Non Research-Conducting Grant Giving Entities Total</b>	<b>\$5,982</b>	<b>\$6,459</b>	<b>\$7,545</b>

<b>Total U.S. Medical and Health R&amp;D Spending</b>	<b>\$140,107</b>	<b>\$151,792</b>	<b>\$158,716</b>
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## Americans' Views on Research and Innovation

Americans care deeply about advancing research supported by both the public and private sectors. The U.S. spends less than 5 cents of each health dollar on research to prevent, cure and treat disease and disability. More than half of Americans (56%) say that is not enough, according to a public opinion survey commissioned by Research!America.<sup>4</sup> And 76% agree that basic scientific research that advances the frontiers of knowledge is necessary and should be supported by the federal government even if it brings no immediate benefits.<sup>5</sup>

Nearly two-thirds of Americans (62%) are even willing to pay an additional \$1 per week in taxes that would go towards the U.S. investing more in research to improve health.<sup>5</sup> A strong majority of Americans (89%) also recognize investing in research is important to job creation, technological breakthroughs and economic growth.<sup>4</sup> And 73% agree that increased public investment in scientific research would help grow the economy.<sup>6</sup>

Medicines available today have improved their quality of life, according to a majority of Americans (81%), and

most Americans (91%) say it is important to develop better medicines for conditions we currently treat.<sup>5</sup> When asked which sector pays for most of the research and development behind new medical advances, respondents were split. Twenty-six percent said it is consumers, 20% said government and industry respectively, 9% philanthropy, 6% academia and 20% said they don't know.<sup>4</sup>

Global leadership in R&D is a priority for most Americans (84%) who say it is important in order to bring new medicines to patients.<sup>5</sup> Public-private partnerships are critical to further research and innovation, but more than half of Americans (54%) do not believe there is enough collaboration between academic, government and industry scientists on research projects to discover and develop new medicines.<sup>5</sup>

Federal support is needed to encourage collaborations across sectors. A majority of Americans (81%) agree that Congress should support legislation that will encourage private investments in medical research.<sup>4</sup>

“Medical discovery, development and delivery requires robust and sustained investments in federal health agencies. This benefits patients, strengthens our economy and maintains our nation’s worldwide lead in medical research. NIH, FDA, CDC, AHRQ and NSF have contributed to discoveries that led to the eradication of some diseases, reduced mortality rates for others, and supported a public-private sector innovation record that is the envy of many countries. If we are to ensure research and innovation continue to keep pace with saving and improving lives, and advancing the level of scientific opportunity, federal funding must be increased and sustained. The new report on U.S. investments in research and development underscores the necessity for a stronger federal commitment to our nation’s research ecosystem.”

### **The Honorable John Edward Porter**

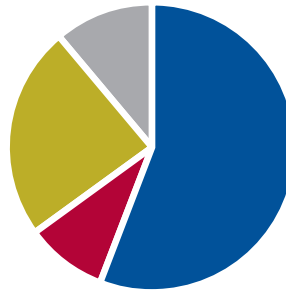
*Former U.S. Representative (1980 - 2001)*

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## Total U.S. Support for Medical and Health Research is Not Enough

The U.S. spends about 5 cents of each health dollar on research to prevent, cure and treat disease and disability. Do you think that this is too much, the right amount or not enough?

A Research!America survey conducted in partnership with Zogby Analytics in January 2016



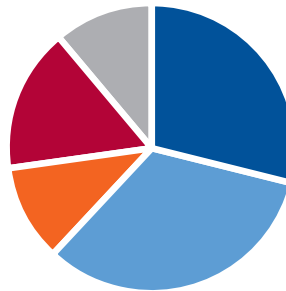
**56%** Not enough  
**9%** Too much  
**24%** Right amount  
**11%** Not sure

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## Americans Support Paying Additional Taxes to Invest in Medical and Health Research

Would you support paying an additional \$1 per week in taxes if you knew for sure that it would go towards the U.S. investing more in research to improve health?

A Research!America survey conducted in partnership with Zogby Analytics in June 2016



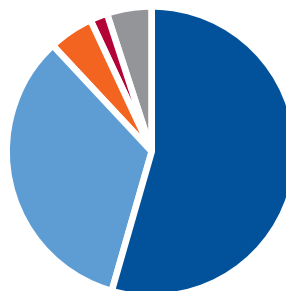
**29%** Strongly support  
**33%** Somewhat support  
**11%** Somewhat oppose  
**16%** Strongly oppose  
**11%** Not sure

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## Research is Key to Job Creation

How important is investing in research to job creation, technological breakthroughs and economic growth?

A Research!America survey conducted in partnership with Zogby Analytics in January 2016



**55%** Very important  
**34%** Somewhat important  
**5%** Not too important  
**2%** Not at all important  
**5%** Not sure

## Methodology

Total U.S. medical and health R&D was estimated over a three-year period (2013-2015) and analyzed by investor and change in spending. The terms “funding,” “expenditures,” “spending,” “investments,” and “contributions” within the context of this report have all been used interchangeably, all in reference to U.S. medical and health research and development expenditures. As no singular data sources exist for examining research funding from foundations, voluntary health associations and professional societies, and independent institutes or for obtaining the specificity required (i.e., medical and health research focus) the values contained in this analysis and report are true estimates and are intentionally kept conservative in nature.

### Industry Figures

Industry medical and health R&D expenditures were developed using the NSF-NCSES *Business Research, Development, and Innovation Survey (BRDIS)* data as the baseline. The key sectors captured in the analysis include pharmaceutical manufacturing, electro-medical equipment, medical equipment and supplies, and scientific R&D (including biotechnology, contract research organizations (CROs) and other firms performing bioscience R&D). The BRDIS data currently is available through 2013. Extensions and approximations to these data to achieve the full 2013-2015 estimates relied on additional data from Schonfeld & Associates and 10-K (annual) reporting to the U.S. Securities and Exchange Commission (SEC) of key firms in the bioscience industry. Additionally, NSF-NCSES staff responsible for the BRDIS survey provided insights into data trends.

### Federal Government Figures

Department specific medical and health research expenditures were primarily developed using the NSF-NCSES *Survey of Federal Funds for Research and Development (SFFRD)*. Research funding within the medical sciences discipline was the primary field used in this analysis. Based upon individual agency missions and efforts, other disciplines were also included such as biological sciences, other life sciences, other engineering (which includes biomedical engineering) and psychology, as appropriate. This process was supplemented or replaced for the National Science Foundation (NSF), Food and Drug Administration (FDA), Centers for Disease Control and

Prevention (CDC), Department of Energy (DoE), Centers for Medicare and Medicaid Services (CMS), Patient Centered Outcomes Research Institute (PCORI), where profiles, operations, and budget documents were used to determine research functions and related budget information. The Department of Defense (DoD) value was found using the American Association for the Advancement of Science (AAAS) budget analysis information regarding the Medical Research subcategory within its *Trends in Department of Defense Science and Technology* data series to capture broad department funding for medical and health-related research.

### University Figures

Data from the NSF-NCSES Higher Education Research and Development (HERD) Survey was used to estimate institutional internal funding (including direct institutional funding from budgets and endowments and waived indirect expenses on research grants). Combined data for all U.S. higher education institutions in the biological sciences, medical sciences, other life sciences, and bioengineering fields were used for 2013 and 2014, with an estimate developed for 2015.

### State and Local Government Figures

The NSF-NCSES HERD data for funding from state and local government to higher education institutions was used to capture this level of funding. Though there are certainly some levels of medical and health related research carried out by certain state agencies, this level and flow of funding to higher education likely represents the vast majority of such funding. Additionally, various state entities might provide tax incentives and matching funds to industry related to research efforts. However, given the limited availability of detailed information on these resources, to the extent medical and health research firms used these resources for research, the value would be captured within the industry funding metrics.

### Foundation Figures

Organizations included in this segment are philanthropic grant-awarding bodies filed as foundations with the U.S. government on official tax documents. Baseline medical and health R&D funding was developed using data from

the Foundation Center's Foundation Maps grants and recipient database with additional information gathered from the GuideStar nonprofit information database. Using historical data from the Foundation Center, and more recent and complete financial reporting (both annual reports and IRS form 990's), estimates were developed, with emphasis on the funding efforts of key major foundations (e.g., the Bill & Melinda Gates Foundation, the Virginia & D.K. Ludwig Fund for Cancer Research, the Eli & Edythe Broad Foundation) that historically have accounted for a significant majority of medical and health-related R&D funding. All funding meeting the search and estimation criteria from these U.S.-based foundations was included, regardless of where, globally, the recipients of the funding were located.

## Voluntary Health Association and Professional Society Figures

Funding estimates for U.S. Voluntary Health Associations and Professional Societies (VHS-PS) were developed from a master list of such associations developed by Research!America and based in part from data provided by the Health Research Alliance. Data was built using specified research grant funding expenditures (distinct from education, patient advocacy, or other types of ex-

penditures) as identified within the association's annual reports. Data consistency and funding magnitude for these associations was also checked against both grants received (via the Foundation Center database) and grant-ing activities (also examined in the Foundation Center database and through IRS form 990's).

## Independent Research Institute Figures

Using a sample of Independent Research Institutes drawn from the NIH RePORT database and cross-checked against/supplemented by data provided by the Association of Independent Research Institutes (AIRI), a calculation was made for each research institute to determine their total expenses (including research and any other expenses), net of contributions/grants and program service revenue, and where applicable, increased by an amount equal to additional annual internal funds (income/revenue from internal investments, endowments, or related organizations) as the basis for an annual "funding" estimate. Having developed these sample-based values for 2013-2015, a statistical approach was used to increase the combined annual values based upon the relationship of these sample institutions to the total list of NIH-funded research institutes.

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- 1 "Other Sectors" indicates medical and health R&D expenditures by companies not typically included in the bioscience industry (e.g. health R&D performed by the software and computer industry sectors).
  - 2 PCORI is not technically a federal agency, but rather a Congressionally- authorized, non-governmental, independent organization funded through the federal appropriations process. However, for this report's purposes, it was categorized as a federal agency due to its funding source.
  - 3 National Science Foundation, National Center for Science and Engineering Statistics, Survey of Federal Funds for Research and Development, Fiscal Years 2014-16. <http://www.nsf.gov/statistics/fedfunds/>. Tables 109 (FY95-FY06) and 110 (FY06-FY16).
  - 4 A Research!America survey conducted in partnership with Zogby Analytics in January 2016
  - 5 A Research!America survey conducted in partnership with Zogby Analytics in June 2016
  - 6 A Research!America survey conducted in partnership with Zogby Analytics in September 2015