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Disclosures

During the past two years, Goldman has received research support from: Amgen, Blue Cross Blue Shield of Arizona, Bristol Myers Squibb, Cedars-Sinai Health System, Edwards Lifesciences, Gates Ventures, Genentech, Gilead Sciences, GRAIL, Johnson & Johnson, Kaiser Family Foundation, National Railway Labor Conference, National Institutes of Health, Novartis, Pfizer, Roche, and Walgreens Boots Alliance. He has served as a paid scientific advisor to Biogen, GRAIL, and the National Railway Labor Conference. He holds equity in EntityRisk. He received travel support from The Aspen Institute.

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Median annual cost of treating MS

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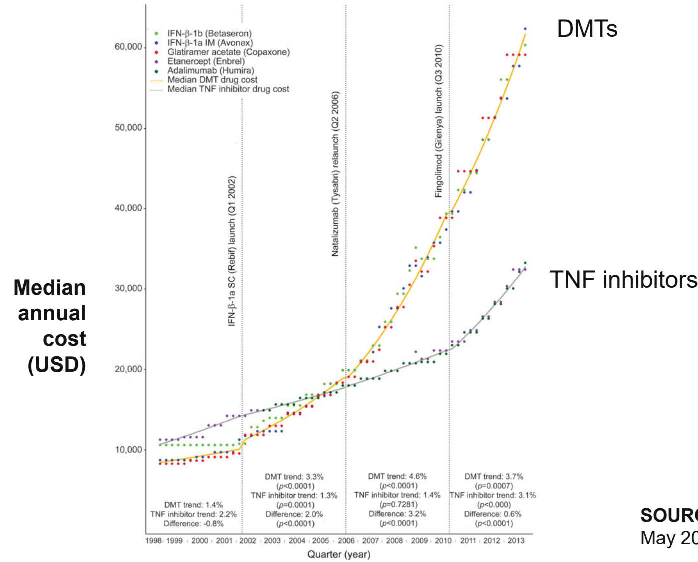

Disease-modifying therapies (DMTs) are interferon (IFN)-β-1b, IFN-β-1a IM, and glatiramer acetate and tumor necrosis factor (TNF) inhibitors are etanercept and adalimumab. Trends are % change in median annual cost per quarter. With the exception of the first (baseline) period, p values reflect changes in trend from one period to the next. Complete model results are reported in appendix e-1.

SOURCE: Hartung et al., *Neurology* May 2015; Figure 2.

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Four health policy lessons

1. Rethink what we mean by the "price"
2. Consider the long-term impact on innovation
3. Link price to patient outcomes
4. Take patient heterogeneity seriously

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We debate the wrong prices

- **Arguments runs as follows:**
  - Cancer care is expensive
  - Cancer care does not improve mortality much
  - Aggressive treatment reduces quality of life

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Doctors Denounce Cancer Drug Prices of $100,000 a Year

Eric Gaillard/Reuters

Chemotherapy drugs being prepared at a cancer treatment center in Nice, France.

By ANDREW POLLACK

Published: April 25, 2013

With the cost of some lifesaving cancer drugs exceeding $100,000 a year, more than 100 influential cancer specialists from around the world have taken the unusual step of banding together in hopes of persuading some leading pharmaceutical companies to bring prices

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Consider bevacizumab (Avastin®) to treat colorectal cancer

- **Median survival gain:** ~4 months
- **Additional treatment costs:** ~$60,000

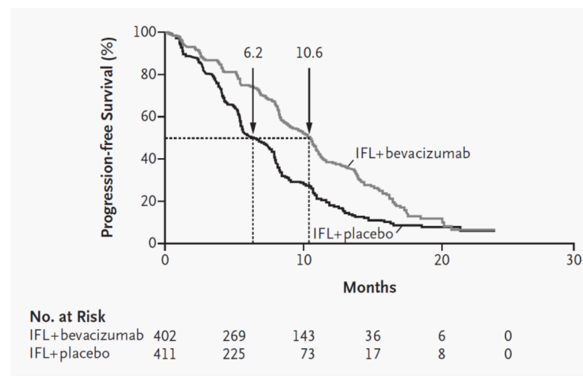

Figure 2. Kaplan–Meier Estimates of Progression-free Survival.

Source: Hurwitz et al, *NEJM*

$$ICER \approx \frac{\Delta Costs}{\Delta Efficacy} \approx \frac{\$60,000}{1/3 \text{ yr}} = \$180,000 \text{ per yr}$$

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UK regulators did not recommend Avastin coverage

- Value = QALY gain X QALY value = 1/3 yr X $60,000 = $20,000
- Cost = $60,000
- For each £1 spent, UK society gets £ 0.33 back

But where does this value come from?

"NICE does not recommend bevacizumab in combination…for people with metastatic colorectal cancer."

--NICE Technology Appraisal (TA212)

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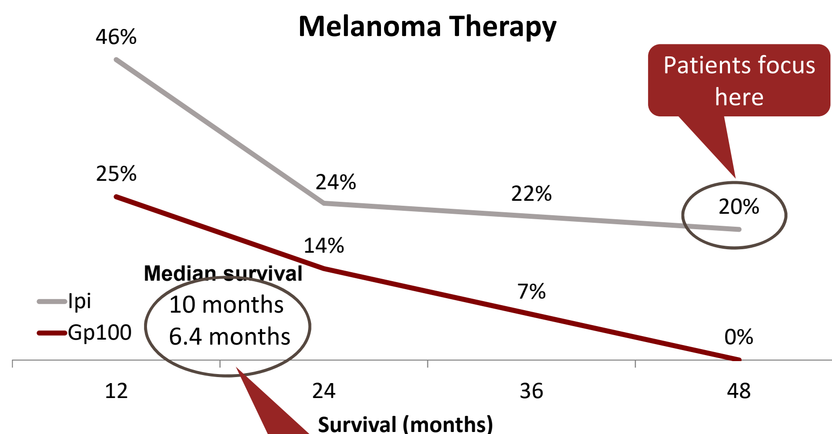
Value of cancer treatment greater than traditional HTA would suggest



SOURCE: Hodi et al, 2010, *NEJM*.

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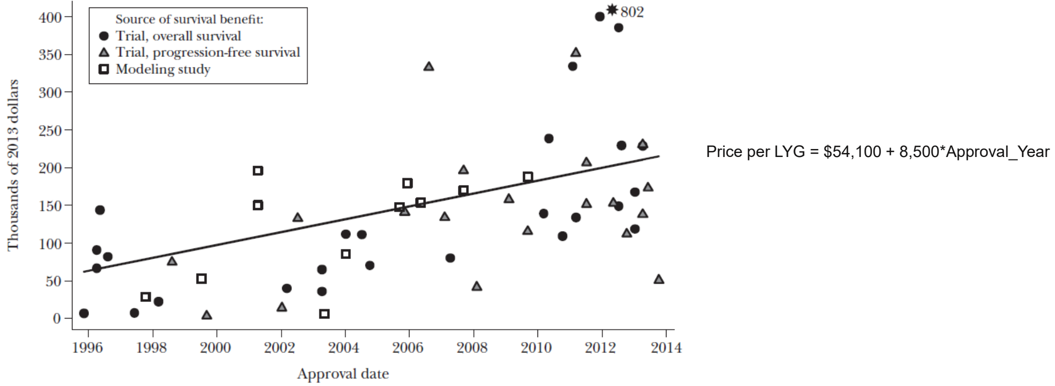
A similar story arises with cancer launch prices



Price per LYG = $54,100 + 8,500*Approval_Year

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Source: Howard, Bach, Berndt, Conti. "Pricing in the Market for Anticancer Drugs." *Journal of Economic Perspectives,* 2015.

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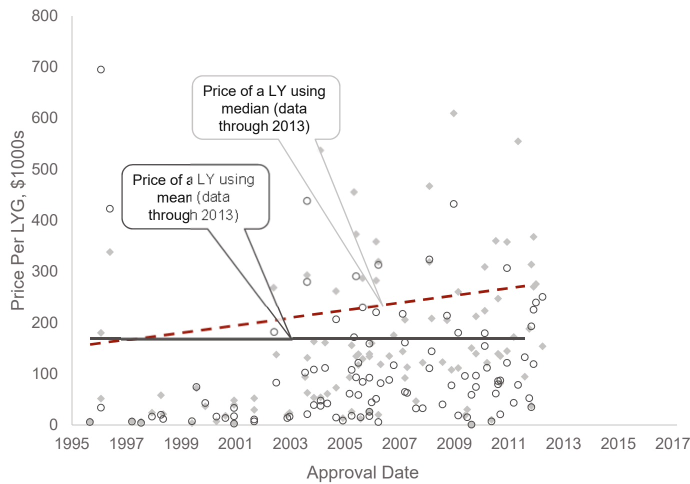
But the story changes when we use what patients care about, i.e., mean life expectancy



Source: Chen, Xu, Conti, Jena, Goldman. "Trends in the price per median and mean life year gained among newly approved cancer therapies 1995-2017." *Value in Health,* forthcoming.

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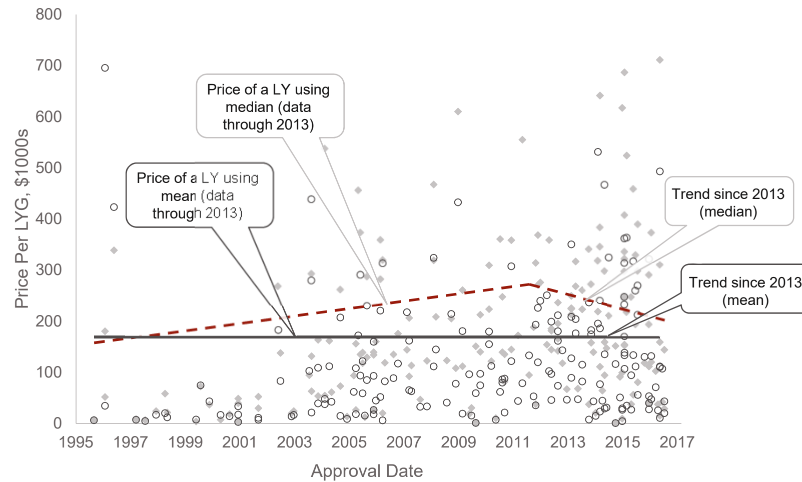
We also see in more recent years that there is no change in the 'true' price



Source: Chen, Xu, Conti, Jena, Goldman. "Trends in the price per median and mean life year gained among newly approved cancer therapies 1995-2017." *Value in Health,* forthcoming.

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Four health policy lessons

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The innovation - access dilemma

Short Run

Society wants unfettered access to new treatments
- Markups limit access
- Prices should be set at cost of production

Long Run

Society wants innovators to develop new treatments
- Pharmaceutical R&D is especially risky
- Financial incentives needed to reward risk
- Patents, market exclusivity, research subsidies

SOURCE: Citizen Vox / Dorry Samuels

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Industry and economists know there is a strong relationship between market power and innovation

Evidence comes from multiple sources:

1. **Cross-national**
2. **Within country natural-experiments (based on policy changes)**
3. **Presumptively exogenous variation in demand**

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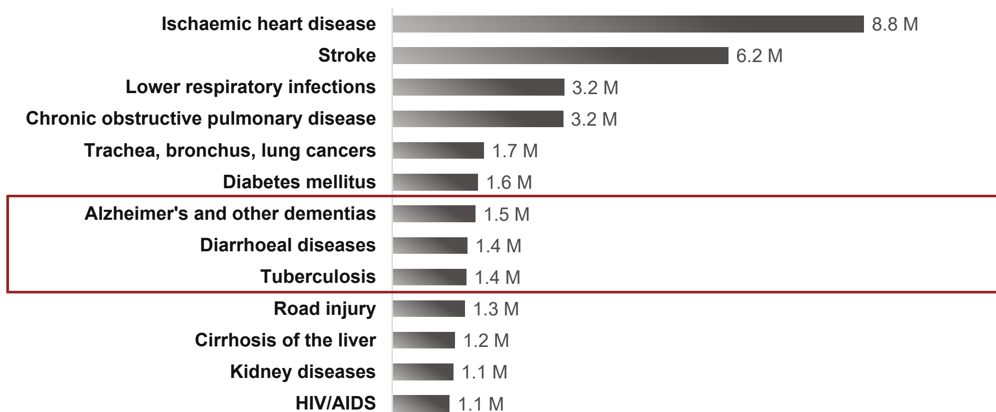
Dementia kills about 1.5 million people globally — about the same as diarrhea and tuberculosis



Source: World Health Organization

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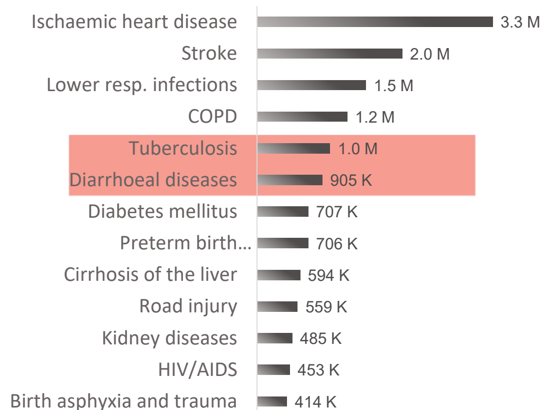
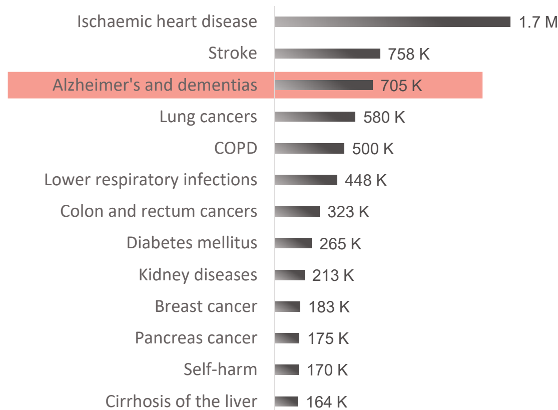
But the distribution of the disease burden differs dramatically by income





Source: World Health Organization

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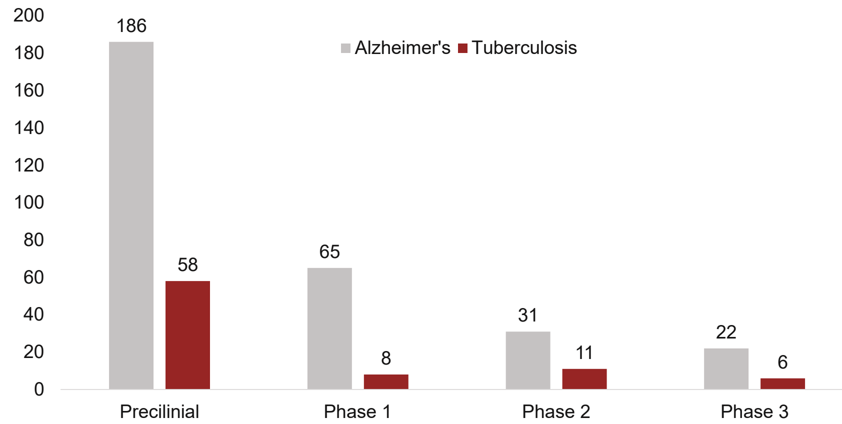
More R&D for Alzheimer's than TB



Source: PharmaProjects, 2017.

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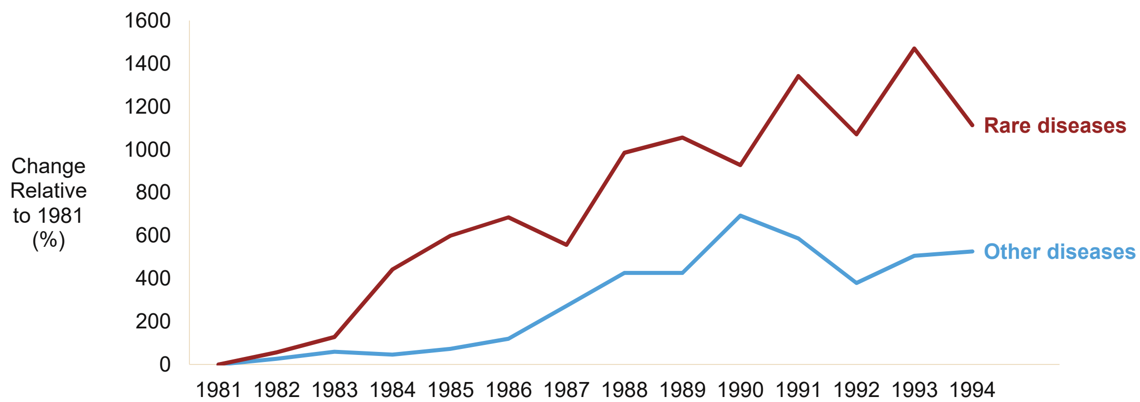
The 1982 US Orphan Drug Act increased development for rare diseases



Source: W. Yin, *Journal of Health Economics*, 2008 (Figure 1).

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This dilemma played out dramatically with HIV

- One of the most devastating diseases globally
- New technology emerged in the mid-1990's revolutionizing care
  - Highly active antiretroviral therapy (HAART)
- Protests over the high price of HAART

SOURCE: Ecumenical Advocacy Alliance / Paul Jeffrey

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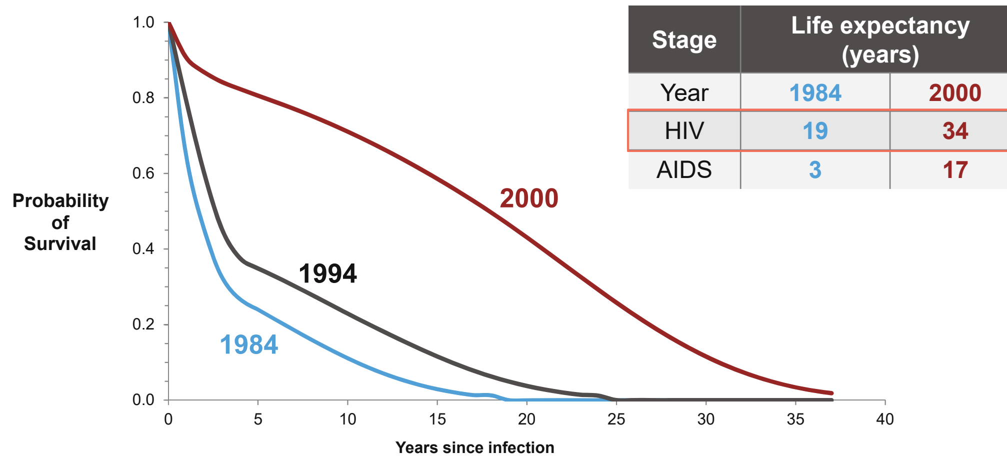
HAART had a dramatic impact on survival



Stage	Life expectancy (years)	
Year	1984	2000
HIV	19	34
AIDS	3	17

SOURCE: Philipson T and Jena AB. Who Benefits from New Medical Technologies? Estimates of Consumer and Producer Surpluses for HIV/AIDS Drugs. *Forum for Health Economics and Policy.* 2006;9(2).

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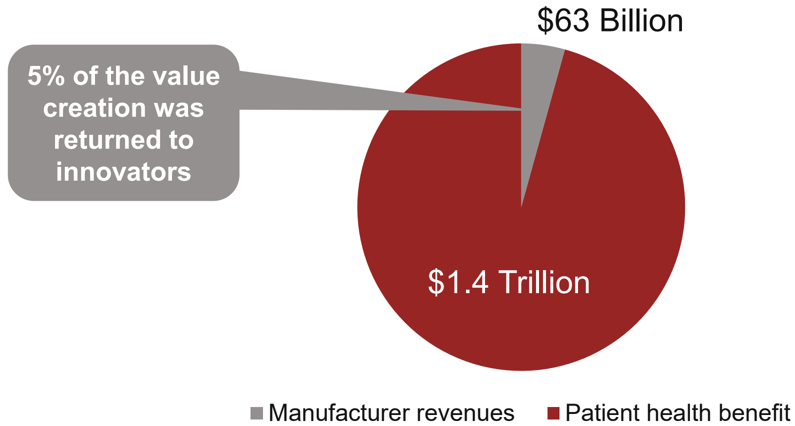
Most of the benefits of HAART flowed to patients



SOURCE: Philipson T and Jena AB. Who Benefits from New Medical Technologies? Estimates of Consumer and Producer Surpluses for HIV/AIDS Drugs. *Forum for Health Economics and Policy.* 2006;9(2).

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We need to think like investors

The New York Times A Long View on Health Care: Think Like an Investor

By GINA KOLATA MAY 21, 2012

"We think of health care as an expense, but we really should be thinking of health care as an investment. We should invest where we have the greatest return...but the way we do it now, no one has an incentive to invest with a long-term return."

--Dana Goldman

SOURCE: Dana Goldman, PhD, Director of Schaeffer Center for Health Policy & Economics, 5-21-12 NYT Interview

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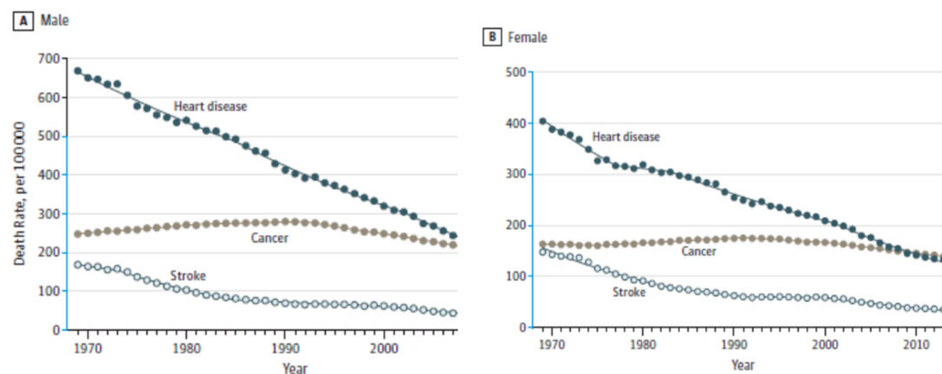
We have made great progress in treating heart disease

Age-Standardized Death Rates, Various Causes



Source: Ma, J., E. Ward, R. Siegel et al. "Temporal trends in Mortality in the United States, 1969-2013," *JAMA*. 2015;314(16):1731-1739.

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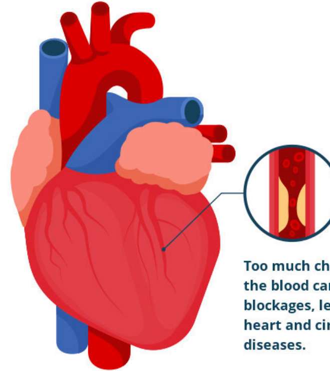
Cholesterol lowering is a key reason



- Statins inhibit an enzyme, HMGCR, that produces low density lipoproteins (LDLs)

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Cholesterol-lowering drugs are a major contributor

By David C. Grabowski, Darius N. Lakdawalla, Dana P. Goldman, Michael Eber, Larry Z. Liu, Tamer Abdelgawad, Andreas Kuznik, Michael E. Chernew, and Tomas Philipson

The Large Social Value Resulting From Use Of Statins Warrants Steps To Improve Adherence And Broaden Treatment

ABSTRACT Statins are considered a clinically important breakthrough for the treatment of cardiovascular disease. However, their social value at the US population level has not previously been studied. From an economic perspective, social value measures the quantity of resources—in monetary terms—that society would be willing to give up in order to retain the survival gains resulting from statin therapy. Using combined population and clinical data, this article calculates statins' social value to consumers, or the value of survival benefits above actual payments for the drug, and to producers, or drug revenues, for the period 1987–2008. National survey data suggest that statin therapy reduced low-density lipoprotein levels by 18.8 percent, which translated into roughly 40,000 fewer deaths, 60,000 fewer hospitalizations for heart attacks, and 22,000 fewer hospitalizations for strokes in 2008. For people starting statin therapy in 1987–2008, consumers captured $947.4 billion (76 percent) of the total social value of the survival gains. Even greater consumer benefits could be achieved in the future if statins were prescribed in full compliance with cholesterol guidelines and patients adhered to prescribed regimens. In addition, statin costs are declining because of patent expirations. Policy makers should consider interventions at the patient and provider levels to encourage both therapy for untreated patients with high cholesterol and greater adherence after therapy is initiated.

- Benefits of statins:
  - 40,000 fewer deaths
  - 80,000 fewer hospitalizations
- $950 billion in value
  - 25% to manufacturers

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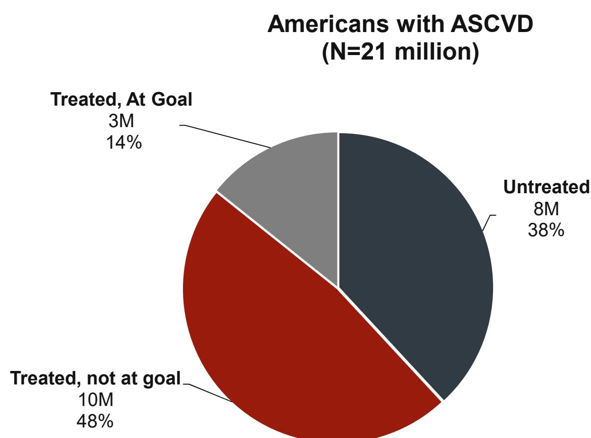
But millions with atherosclerotic disease are still not at goal



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Source: Jena et al "Value of improved lipid control in patients at high risk for adverse cardiac events", AJMC, 2016.

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A new class of drugs, PCSK9 inhibitors, can help

Are PCSK9 inhibitors about to take off?

27th May 2019

by
Richa Munjal

The promise of a new era of cholesterol management, heralded by the launch of highly effective PCSK9 inhibitors, has been complicated by significant barriers to uptake of the next-generation products in multiple markets.

These obstacles partly reflect initial premium pricing of the two available PCSK9 inhibitors, Praluent (alirocumab) and Repatha (evolocumab). Price differentials have been all the more marked given the established reliability of low-cost, genericised statins as a tool for lowering cholesterol.

The New York Times

These Cholesterol-Reducers May Save Lives. So Why Aren't Heart Patients Getting Them?

Powerful PCSK9 inhibitors were supposed to revolutionize care for cardiac patients. But insurers and other payers balked at sky-high prices.

By Gina Kolata

Oct. 2, 2018

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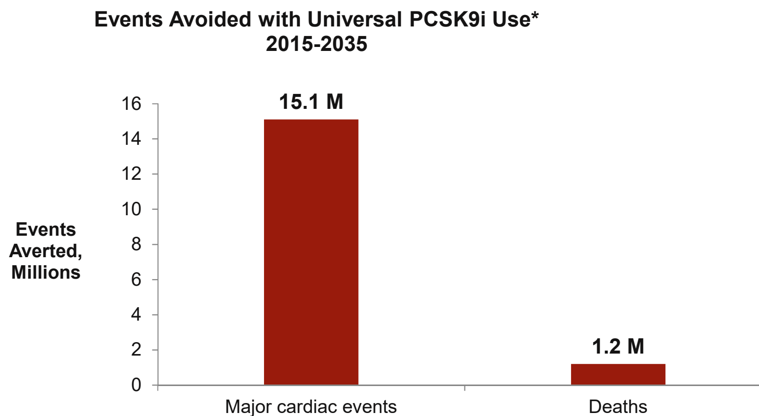
Universal uptake could substantially reduce cardiovascular morbidity and mortality



*Assumes 100% uptake of PCSK9i from 2015-2035 for eligible population with conservative efficacy —59% drop in LDL from PCSK9i use (Nazarene 2015).

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Source: Jena et al "Value of improved lipid control in patients at high risk for adverse cardiac events", AJMC, 2016.

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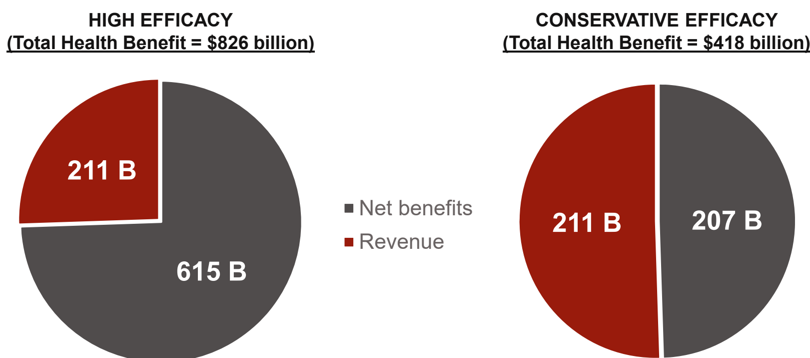
The Value Story With Real-World Uptake (20 year horizon)



NOTE: Models assume prices follow a typical lifecycle of a drug, as in Van Nuys et al (forthcoming).

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Novel contracting can solve this problem

- **Link payment to outcomes**
  - **Short-term: cholesterol reduction**
  - **Long-term: rates of major adverse events**
- **Prices could even vary across risk groups – no longer one set price for all patients**

Annals of Internal Medicine — IDEAS AND OPINIONS

Outcomes-Based Pricing as a Tool to Ensure Access to Novel but Expensive Biopharmaceuticals

Daniel M. Blumenthal, MD, MBA; Dana P. Goldman, PhD; and Anupam B. Jena, MD, PhD

In many areas of health care, insurers are increasingly tying reimbursement to patient outcomes to promote accountability for care. However, biopharmaceuticals have largely been divorced from these efforts, despite their growing use and high costs. This model must change for 2 reasons. First, there is a wave of new biopharmaceuticals to treat common, costly chronic diseases; second, there is uncertainty about their real-world efficacy. Without new pricing models, insurers and manufacturers will remain at odds about reimbursement, leaving physicians and patients stuck in the middle.

Perhaps nowhere is this issue more salient than with proprotein convertase subtilisin/kexin type 9 (PCSK9) inhibitors, a new class of monoclonal antibody lipid-lowering therapies. Two PCSK9 inhibitors–

There are better ways to provide treatment access at a reasonable cost. Current utilization management policies restrict access to patients who are *anticipated* to derive the greatest benefit. Outcomes-based pricing, which uses real-world clinical outcomes to determine a drug's efficacy and fair price, would reimburse on the basis of *actual* benefit. This pricing model is analogous to pay-for-performance in other areas of health care and for some drugs outside the United States (7). Manufacturers would offer discounts with an agreement for additional payments triggered by prospectively observed clinical end points. In return, insurers would add preferential formulary placement and discontinue utilization management. Both parties would agree on clinical outcomes, including surrogate markers of efficacy, clinical events, hospitalizations, and

Source: Blumenthal, Goldman, Jena. *Annals of Internal Medicine*, 2017

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Four health policy lessons

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Comparative effectiveness has a long history at the federal level

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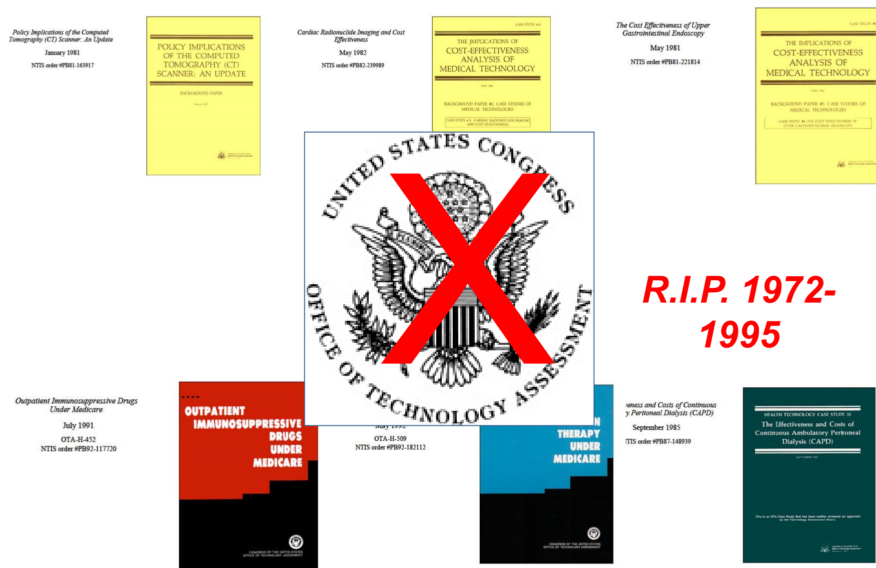

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Comparative effectiveness research drives access to treatment

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CER affects beliefs about 'product quality'

- Better performers in CER studies are perceived as higher quality
- Worse performers perceived as lower quality

Beliefs about quality help drive demand

- Patients and physicians prefer better quality
- Payers policies can create 'multiplier effect': CER winners get lower copayments, better coverage

But what happens if patients are not homogeneous?

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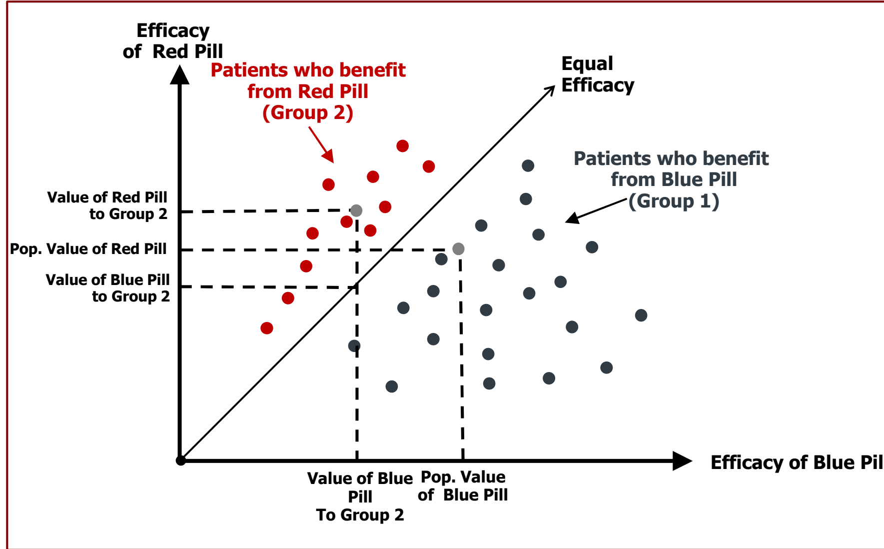
Patient heterogeneity diminishes the benefit of CER



Note: Assumes Blue and Red pills cost the same.

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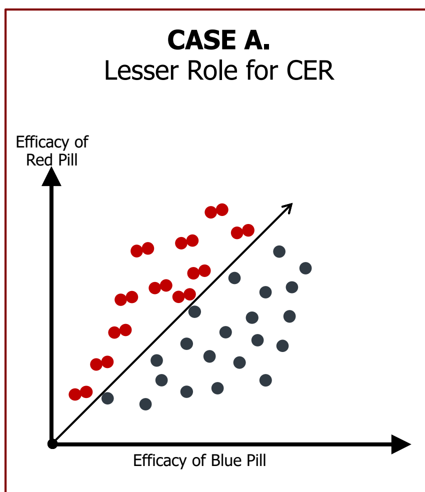
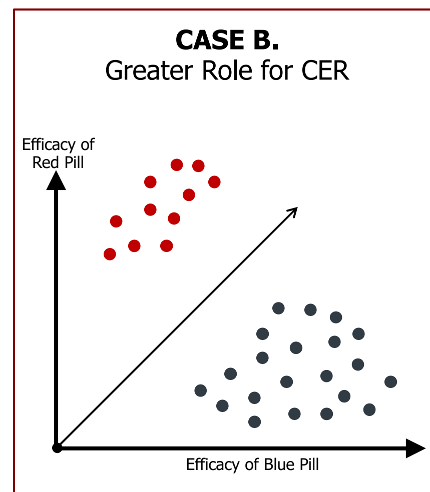
Value of CER depends on the ability to differentiate the populations

CASE A.
Lesser Role for CER



CASE B.
Greater Role for CER



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