

Prospects for Medical Advances Affecting the Elderly

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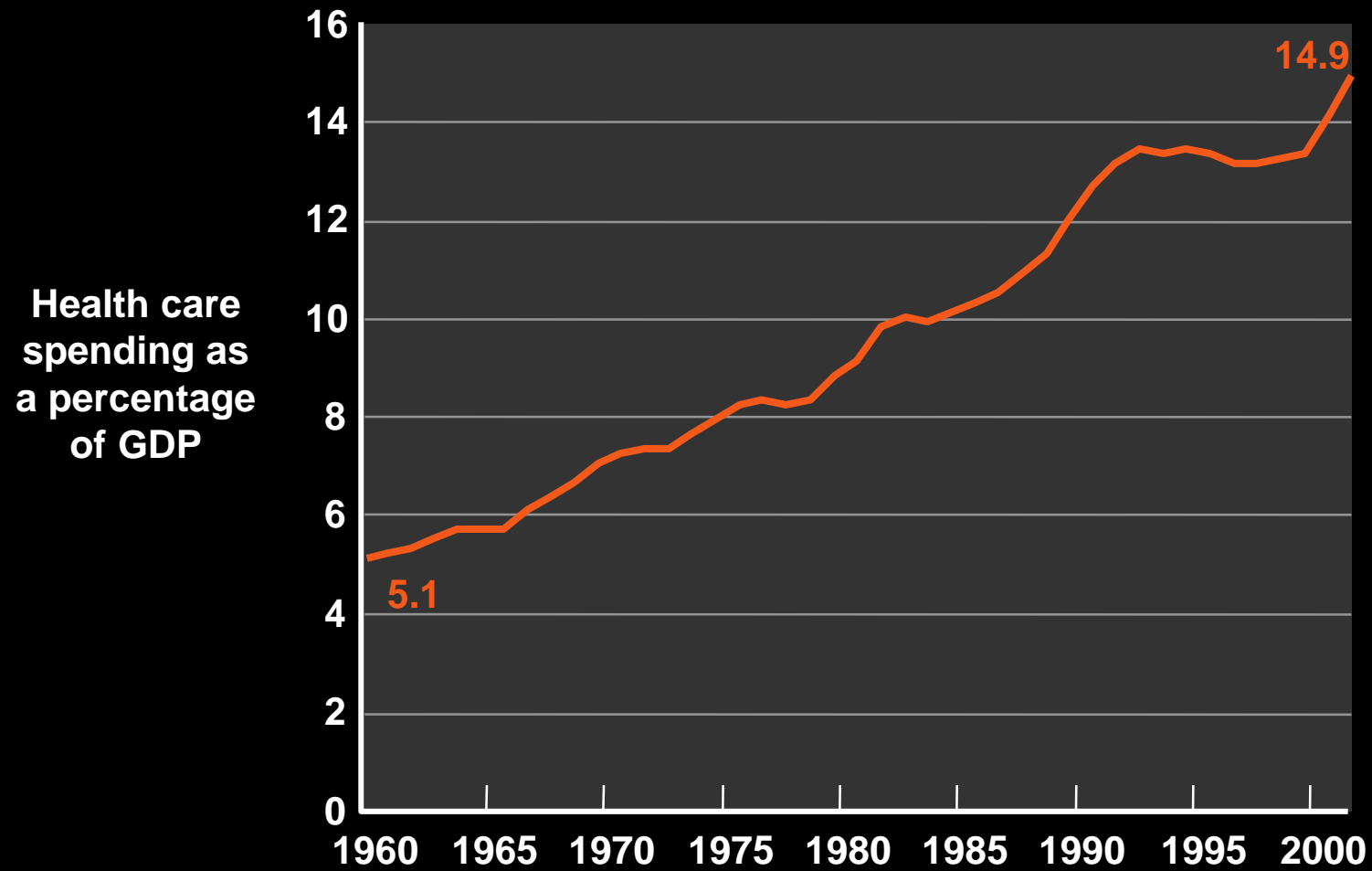
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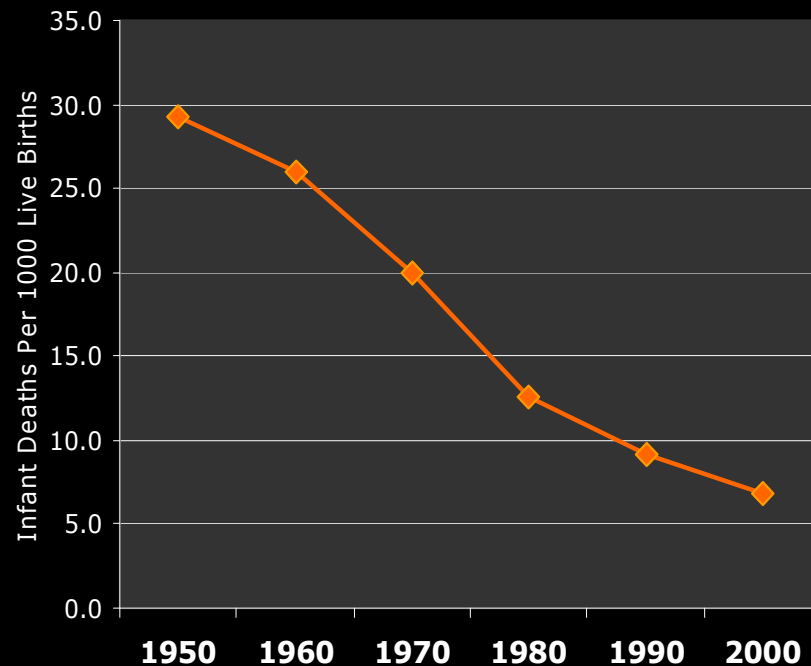
Health Care Spending is Rising as a Share of Economic Output



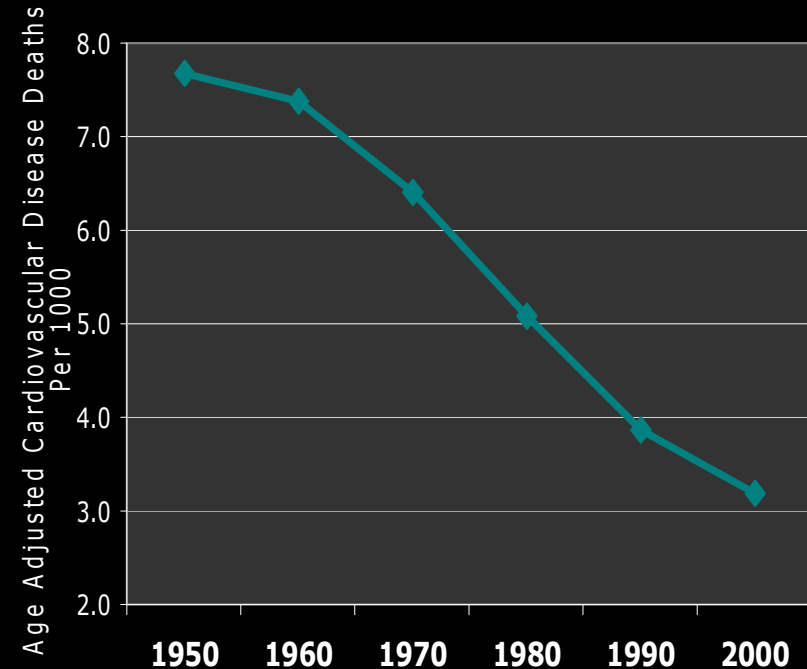
Source: Centers for Medicare & Medicaid Services, 2004.

On Average, Spending Is Worth It

Infant mortality



Cardiovascular disease

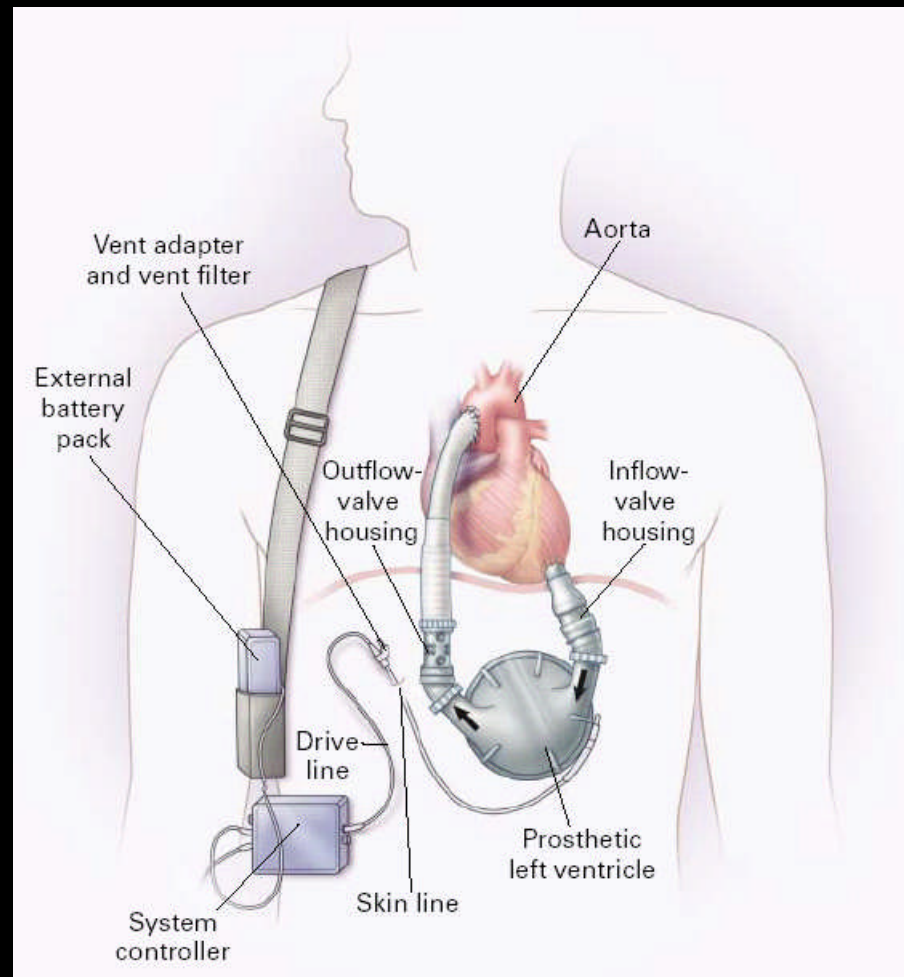


Note: Infants are under 1 year; Cardiovascular disease includes diseases of the heart and cerebrovascular diseases.

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System: Arias E, Anderson RN, Kung HC, Murphy SL, Kochanek KD. Deaths: Final data for 2001. National vital statistics reports. vol 52 no 3. Hyattsville, Maryland: National Center for Health Statistics. 2003. Table 22, 29: ftp://ftp.cdc.gov/pub/Health_Statistics/NCHS/Publications/Health_US/hus03/

But Will Emerging Technologies Be Worth the Cost?

The Left Ventricular Assist Device



Source: Rose et al, *New Engl. J. of Med.*, 345(20);2001, Figure 1.

Research Objectives

- **Identify the key biomedical innovations and health trends likely to affect the elderly over the next 30 years**
- **Model the effects on:**
 - **Spending**
 - **Disease**
 - **Functional status**

Convened Panels of Experts from Around the Country

- **Identified key breakthroughs in 3 clinical areas:**
 - **Cardiovascular disease**
 - **Neurological disorders**
 - **Cancer / biology of aging***
- **Fourth panel of geriatricians and social scientists**

* Combined since cancer is now closely linked with the aging process at the cellular level.

Example: **Intraventricular Defibrillators**

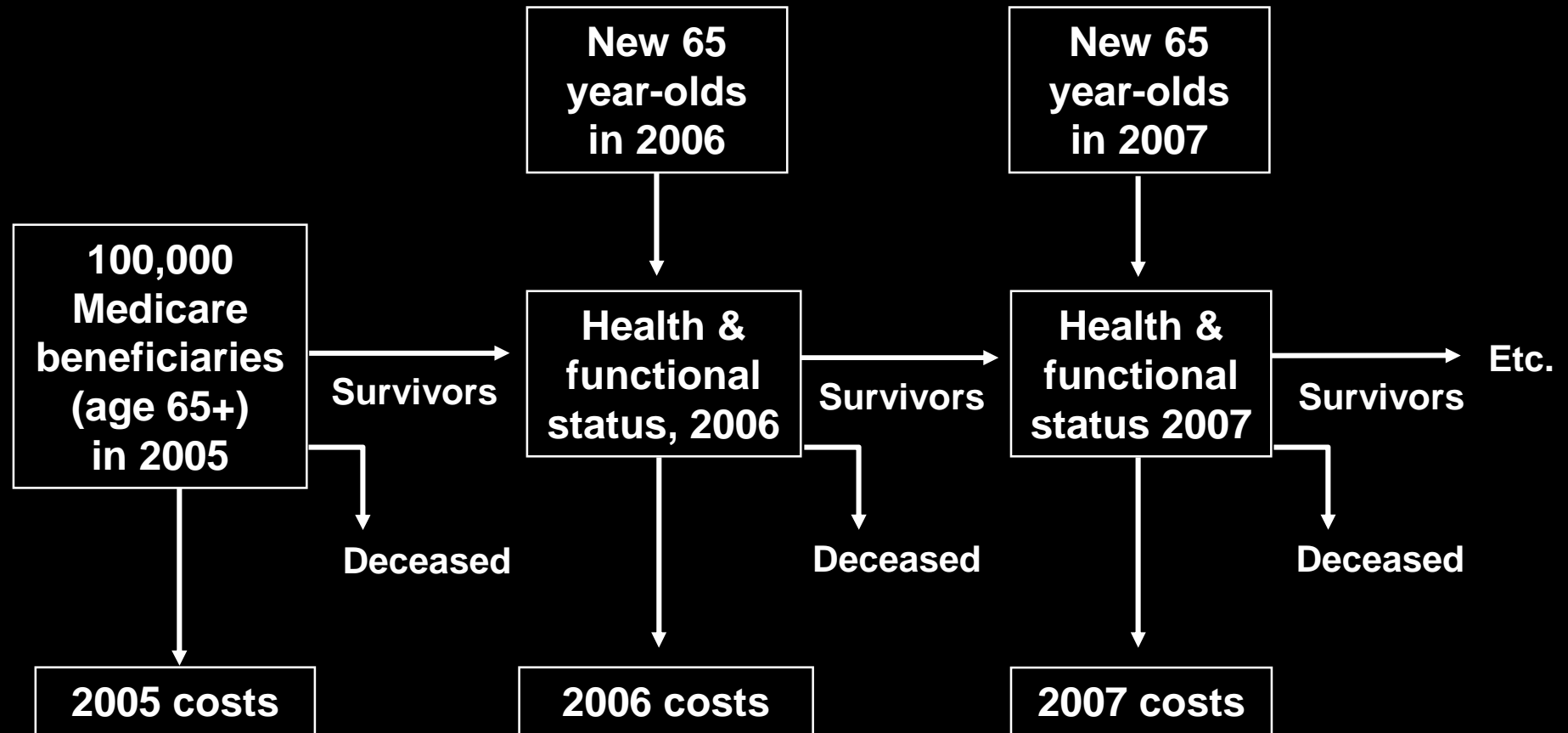
Target: 50% of patients with heart failure
50% of patients post AMI
20% of patients with cardiomyopathy } ~3.5 million
in 2004

Likelihood: 30% in 10 yrs
30-40% in 20 yrs

Impact: Life expectancy of people with heart failure
increases 6-10 months
No impact on hospitalizations

Cost: \$35,000 - \$40,000 per case

Our Model Tracks Individuals Over Time

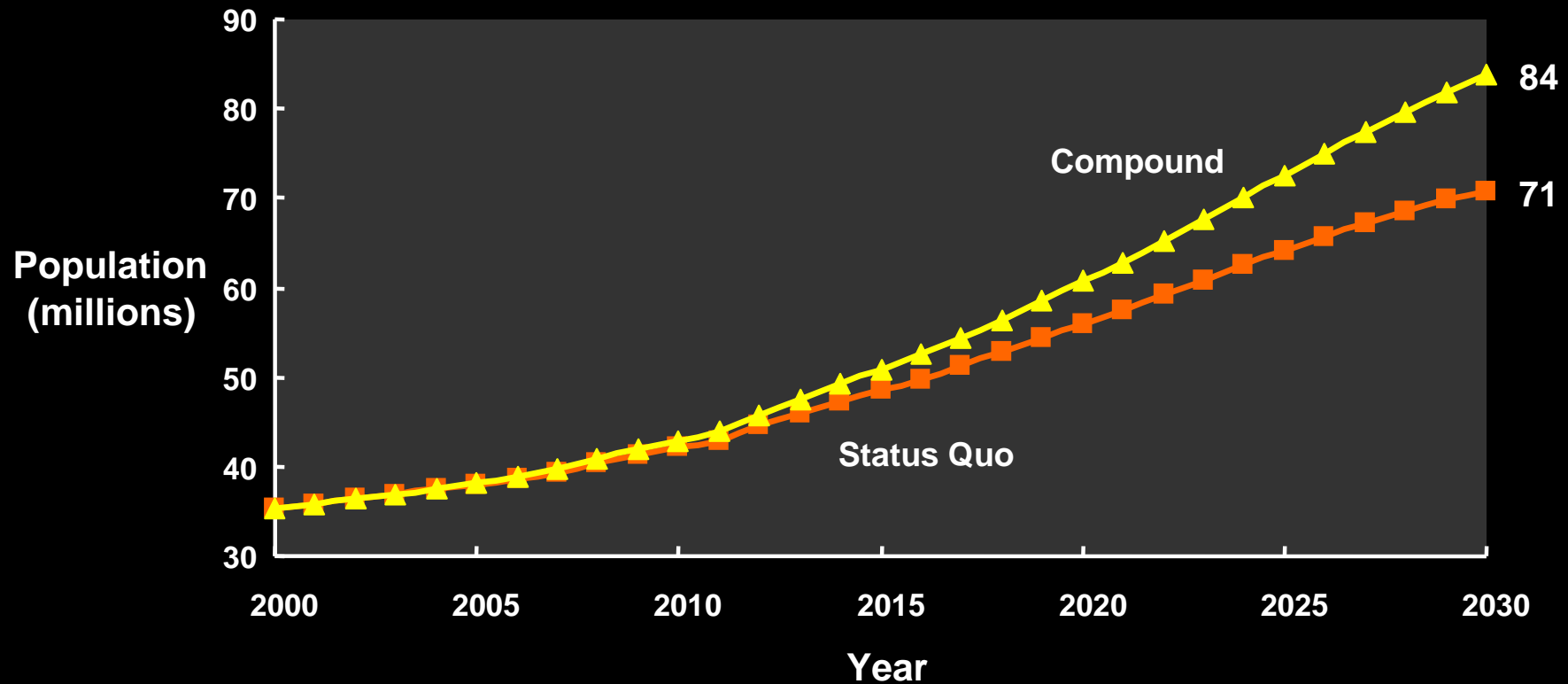


Example 1: Compound to Extend Lifespan

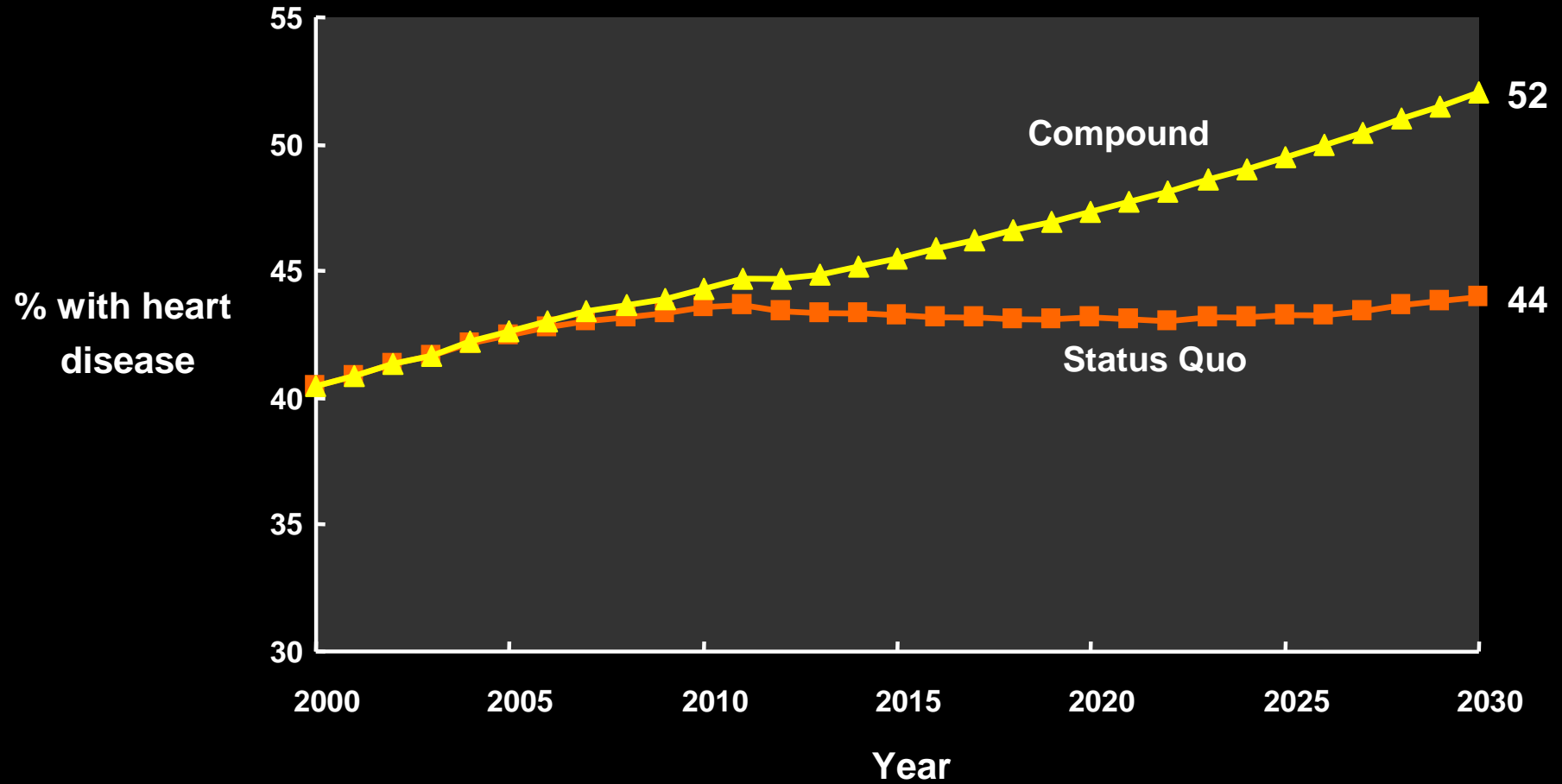
- **Overwhelming biomedical evidence that reducing caloric intake of animals by 30% increases life expectancy by 25%**
 - **Chemical compounds can mimic this behavior in rodents**
- **Such a pill could emerge for humans**
 - **Taken by everyone at a cost similar to nutritional supplements (\$1/day)**
 - **Hazard of death decreases by 63% (equivalent to extending life by 15 years)**

Aged Population Would Grow by 13 Million by 2030

Total Number of Elderly (65+)

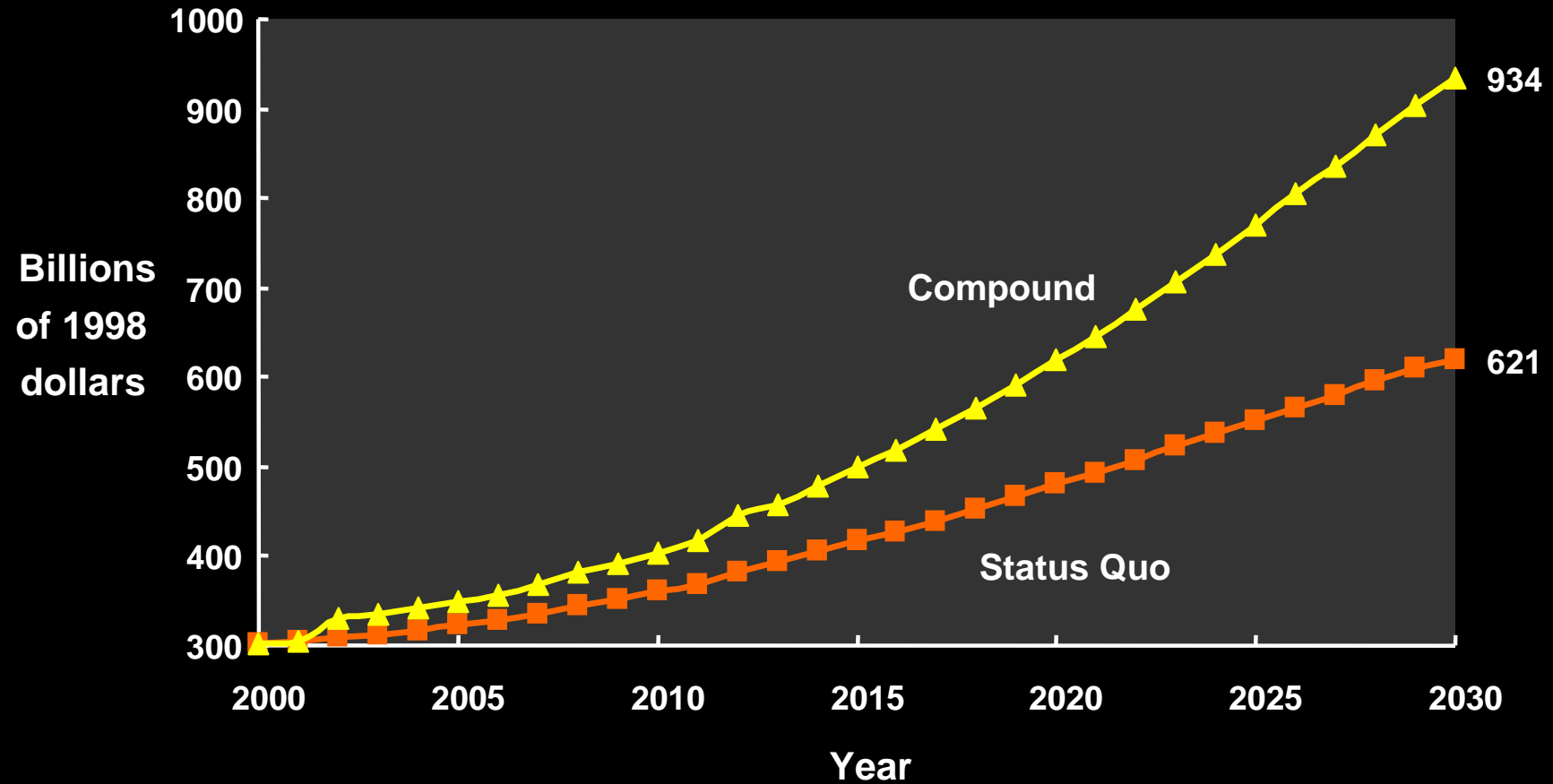


Much More Heart Disease



Health Care Spending Would Be 70% Higher in 2030

Elderly Health Care Spending



Society Faces Substantial Technological Risk In Elderly Medical Spending

Technology	Increase in medical spending* (%)	Cost per additional life-year
Anti-aging compound (healthy)	13.8	8,790
Anti-aging compound (unhealthy)	70.4	29,785

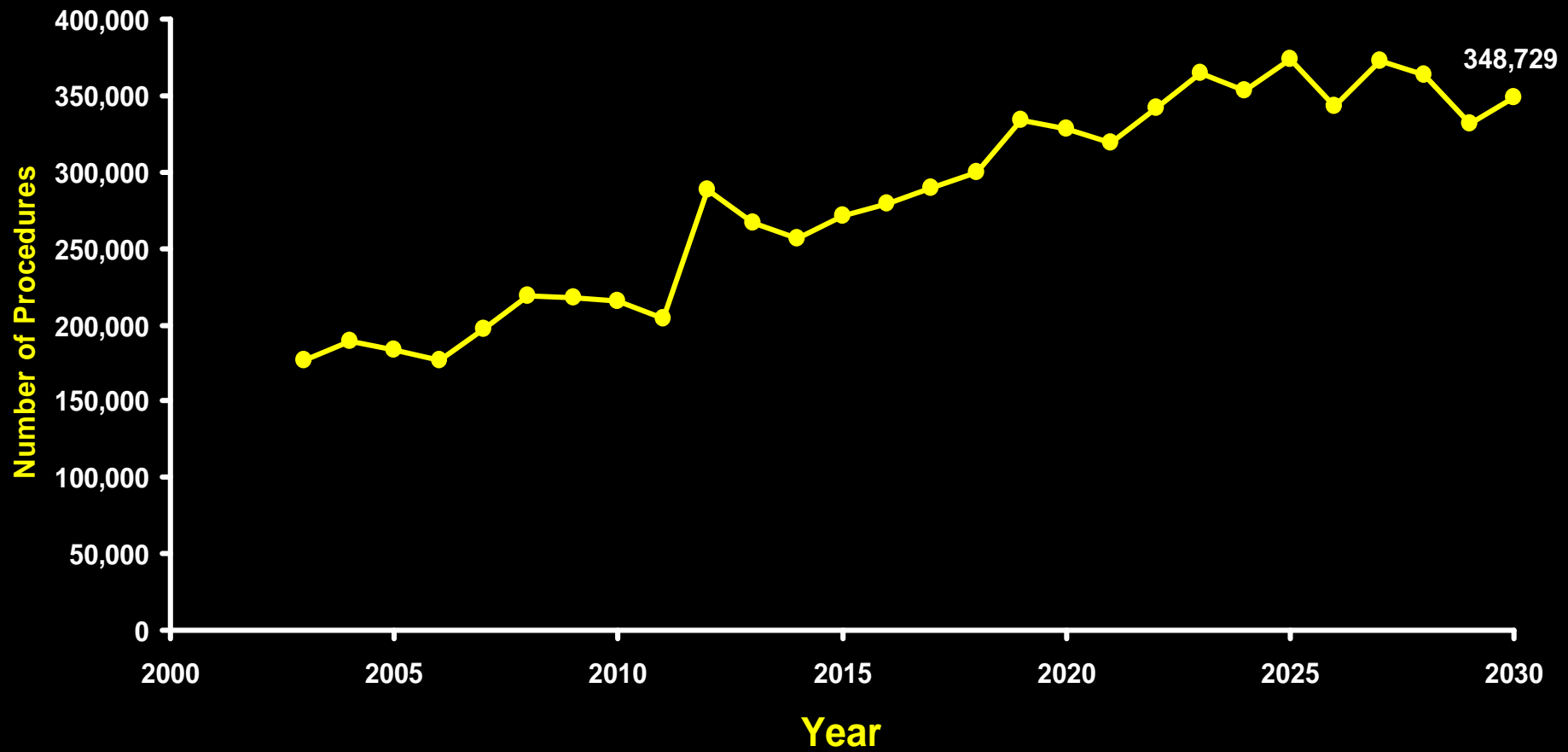
*Increase in 2030 health care spending relative to status quo without the technology.

Source: Goldman et al, *Health Affairs*, forthcoming

Example 2: Intraventricular Cardioverter Defibrillators

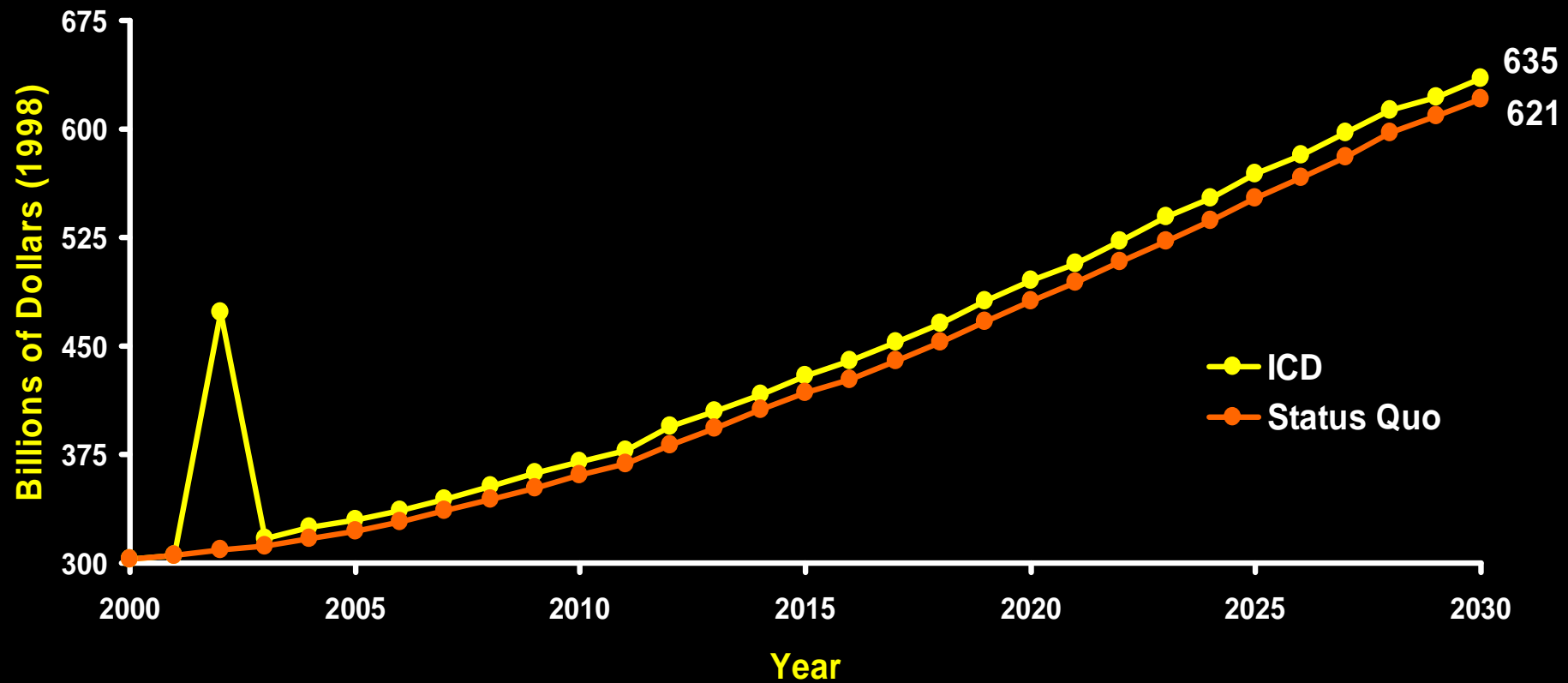
- **Currently used to treat patients with life-threatening arrhythmias**
 - **Shocks heart to restore natural rhythm**
 - **26,000 procedures in 1988**
 - **\$35,000 per procedure**
- **Scenario would expand their use**
 - **Implant in 50% of patients with heart failure or myocardial infarction**
 - **Reduces risk of death by 10%**
- **Panel told us 35% chance of such an expansion**

Will Reach 350,000 Procedures Annually by 2030



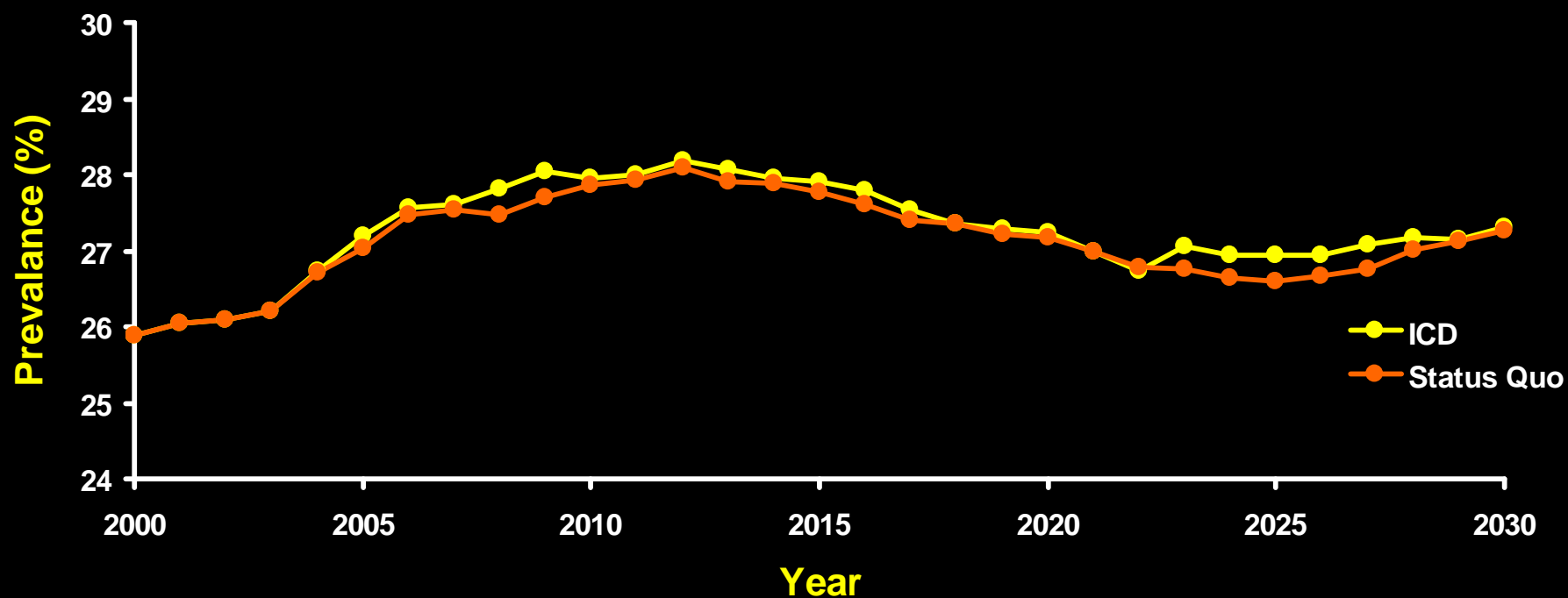
Will Add About \$20 - \$25 Billion Annually to Health Spending in Steady-State

Elderly Health Care Spending



Little Change in Functional Status for the Elderly Population

Elderly With Any Functional Impairment



Society Faces Substantial Technological Risk In Elderly Medical Spending

Technology	Increase in medical spending* (%)	Cost per additional life-year
Anti-aging compound (healthy)	13.8	8,790
Anti-aging compound (unhealthy)	70.4	29,785
Implantable cardio-defibrillators	3.7	103,095

*Increase in 2030 health care spending relative to status quo without the technology.

Source: Goldman et al, *Health Affairs*, forthcoming

Society Faces Substantial Technological Risk In Elderly Medical Spending

Technology	Increase in medical spending* (%)	Cost per additional life-year
Anti-aging compound (healthy)	13.8	8,790
Cancer vaccines	0.4	18,236
Treatment of acute stroke	0.4	21,905
Anti-aging compound (unhealthy)	70.4	29,785
Telomerase inhibitors (cancer)	0.5	61,884
Implantable cardio-defibrillators	3.7	103,095
Antiangiogenesis (cancer)	8.0	498,809
Left ventricular assist devices	2.3	511,962
Pacemaker for atrial fibrillation	2.3	1,403,740

*Increase in 2030 health care spending relative to status quo without the technology.

Source: Goldman et al, *Health Affairs*, forthcoming

Key Findings

- **Substantial technological risk in Medicare**
 - Not just demographic risk caused by the aging of baby boomers
- **Living longer is valuable, but not because it saves money**
 - Curing any one disease will not fix the problem
 - Obesity may be an important exception
- **Challenge is to figure out how we get treatment to the patients who most need it**