



International Association for the
Study of Insurance Economics

Études et Dossiers

Études et Dossiers No. 305

**3rd Health and Ageing Conference on
Longevity – a Medical and Actuarial Challenge**

**Hosted and co-organised by
GE Insurance Solutions**

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**Working Paper Series of
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Layout & Distribution: Pascal Clerc

Advances in Longevity and the Role of Pharmaceuticals

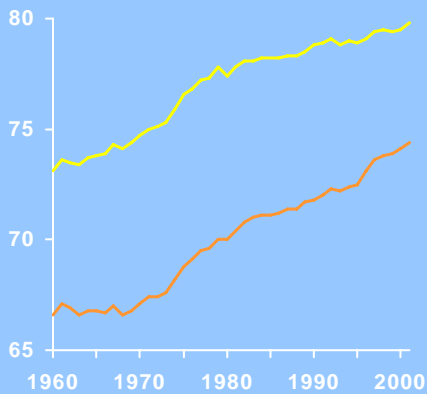
Stephan Mumenthaler

Agenda

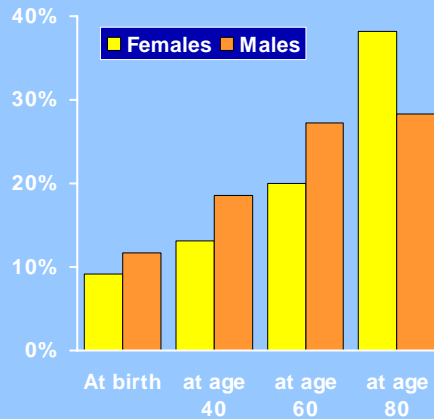
- **Increasing Life Expectancy: Facts and Figures**
- **Contribution of Pharmaceuticals**
- **Value of Medicine**
- **Cost of Illness and Potential Return on Investment**
- **Ageing and Sustainability**
- **Q & A**

People Live Much Longer

Development of U.S. life expectancy Years at birth



Life expectancy U.S. Population Percentage change 1960-2001



Source: OECD Health Data, 2004.

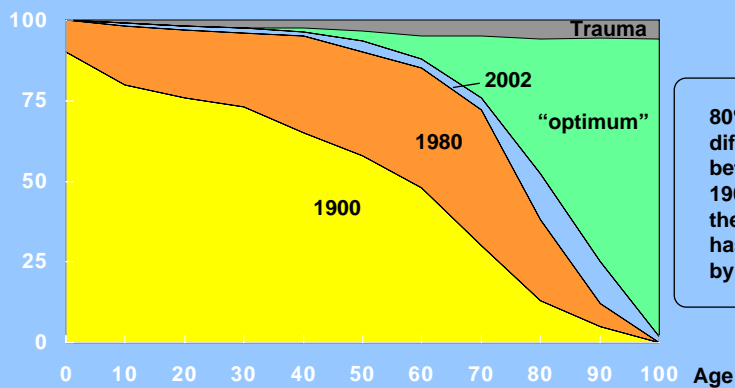
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The Survival Curve Becomes More and More Rectangular

Survivals per age group

in %

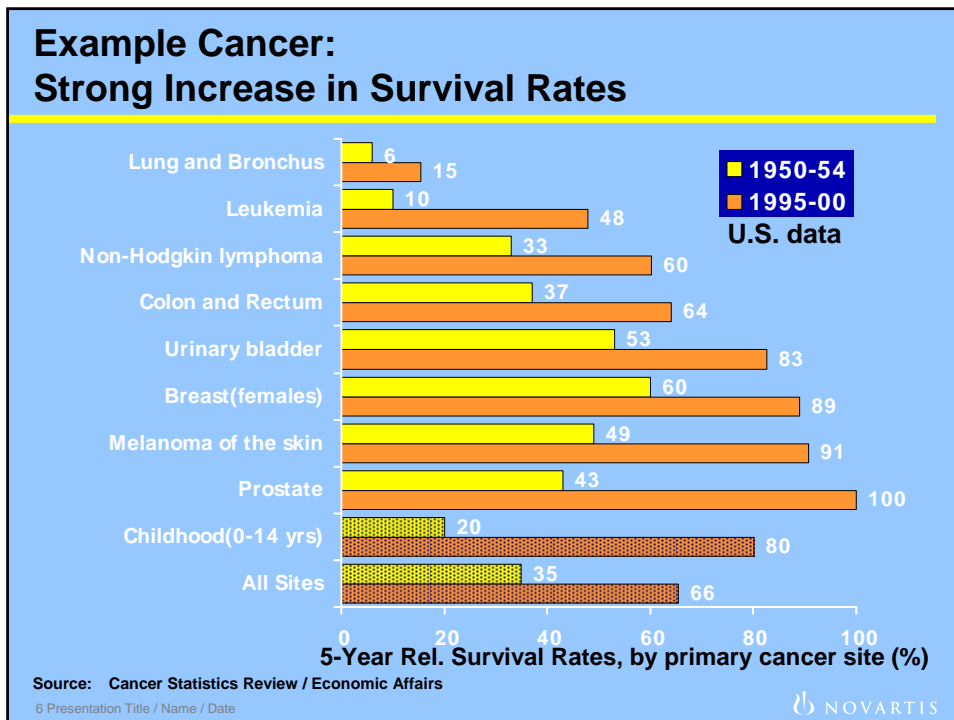
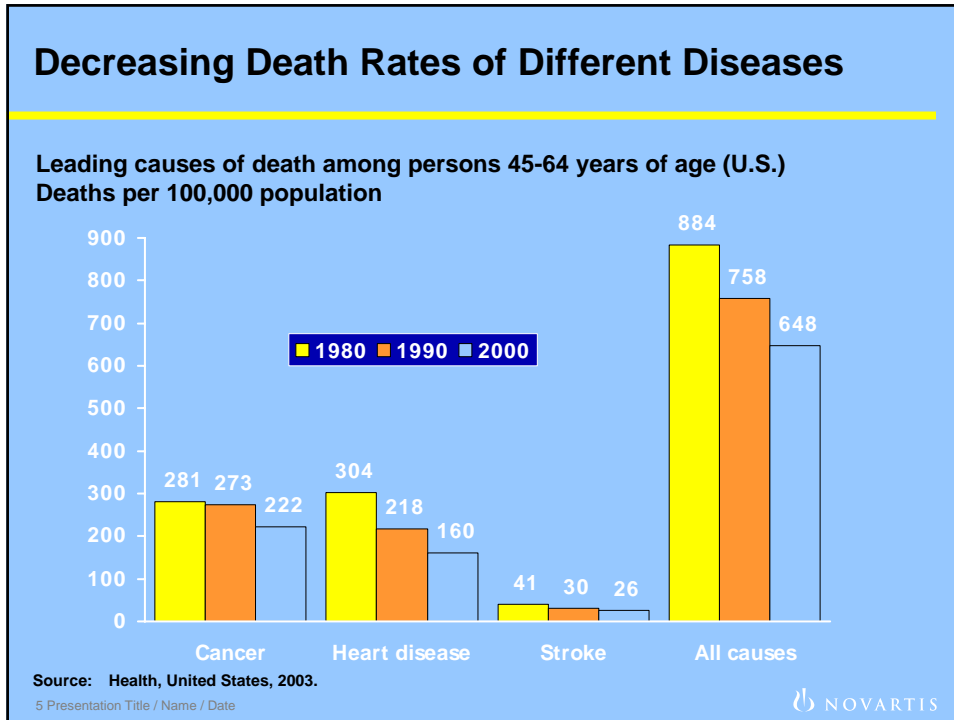


80% of the difference between the 1900 curve and the optimum has been gained by 2002

Source: James Fries, "Aging, Natural Death, and the Compression of Morbidity" in New England Journal of Medicine (1980, vol. 303), CSC 2004

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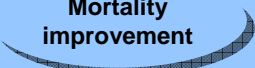
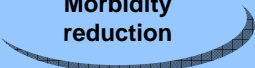
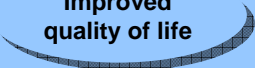

Pharmaceuticals Are Efficient in Addressing Illness

- **Pharmaceuticals are the most convenient medical treatment**
 - Easy to use
 - Self-treatment is possible
 - Accelerate the healing process
 - Relief from pain
- **Pharmaceutical treatment is cost-saving**
 - Avoids expensive operations
 - Shortens the stay in hospitals
 - Decreases number of consultations

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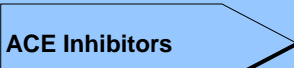


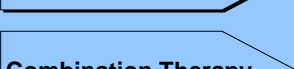


Industry's Value Proposition Remains Strong

<p>Mortality improvement</p> 	<ul style="list-style-type: none"> • Saving lives
<p>Morbidity reduction</p> 	<ul style="list-style-type: none"> • Shortened duration of disease
<p>Improved quality of life</p> 	<ul style="list-style-type: none"> • Decrease in chronic disability • Improved efficacy / side effect profiles
<p>Positive economic impact</p> 	<ul style="list-style-type: none"> • Reduction in overall healthcare costs • Improvement in worker's productivity

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Benefits of Medicines to Patients: Example – Treatment of Cardiovascular Diseases

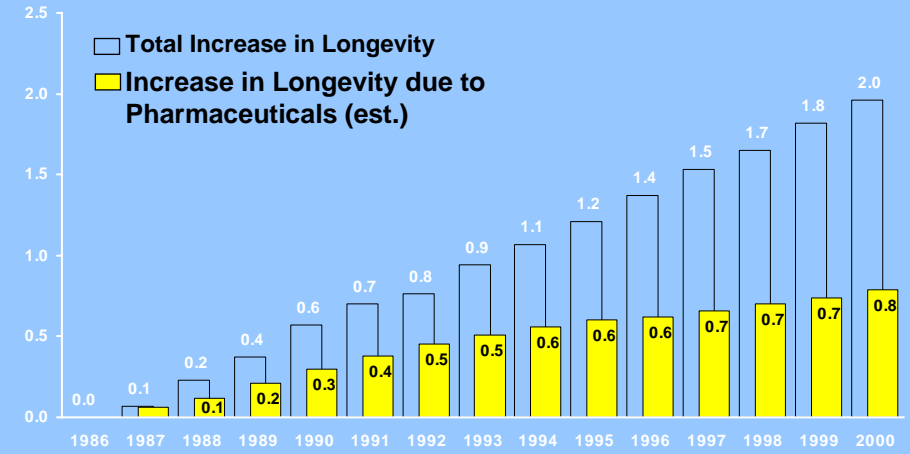
<p>Beta Blockers</p> 	<ul style="list-style-type: none"> • 23% reduction in long-term risk of death • Improve bypass operation survival rates
<p>ACE Inhibitors</p> 	<ul style="list-style-type: none"> • 22% reduction in risk of death from heart attack and stroke, 30% reduction in stroke events, 29% reduction in coronary heart disease events
<p>Calcium Antagonists</p> 	<ul style="list-style-type: none"> • 39% reduction in stroke events • 28% reduction in major cardiovascular events
<p>Statins</p> 	<ul style="list-style-type: none"> • 30% reduction in risk of death • 60% reduction in risk of heart attack • 17-30% reduction in stroke events
<p>Combination Therapy</p> 	<ul style="list-style-type: none"> • 72-87% reduction in risk of death when using a combination of anti-plateleters, beta blockers, ACE inhibitors and statins

Source: Adapted from NERA, The human And Economic Value of Pharmaceutical Innovation and Opportunities for the NHS. A Report for the ABPI. May 2004; Blood Pressure Lowering Treatment Trialists' Collaboration, Effects of ACE inhibitors, calcium antagonists, and other blood-pressure drugs: results of prospectively designed overviews of randomized trials. The Lancet, Vol. 256, 2000.

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New Pharmaceuticals Contributed Approximately 40 % to the Increase of Life Expectancy since 1986

Cumulative Advantage in U.S. Life Expectancy at Birth Years



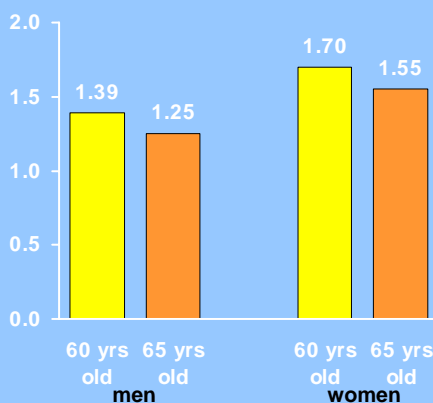
Source : Frank Lichtenberg, NBER, EE.UU., 2003

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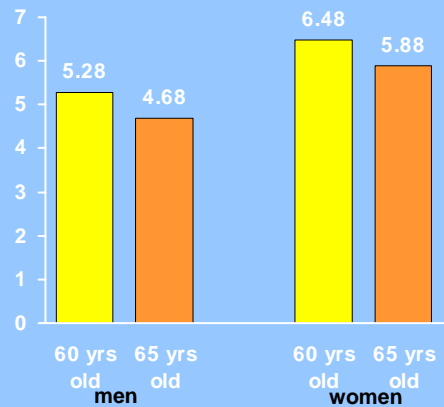


Higher Pharmaceutical Expenditure Has a Big Impact on Life Expectancy

Estimated effect of an additional dollar spent on pharmaceuticals (days gained)¹



Estimated effect of an increase of pharmaceutical consumption by 1% of BIP (months gained)



¹ Effect of 1\$ spent in 1985 on additional days of life expected in 1997, average of OECD.
Source: Shaw, Horrace, Vogel (2005); N/EA.

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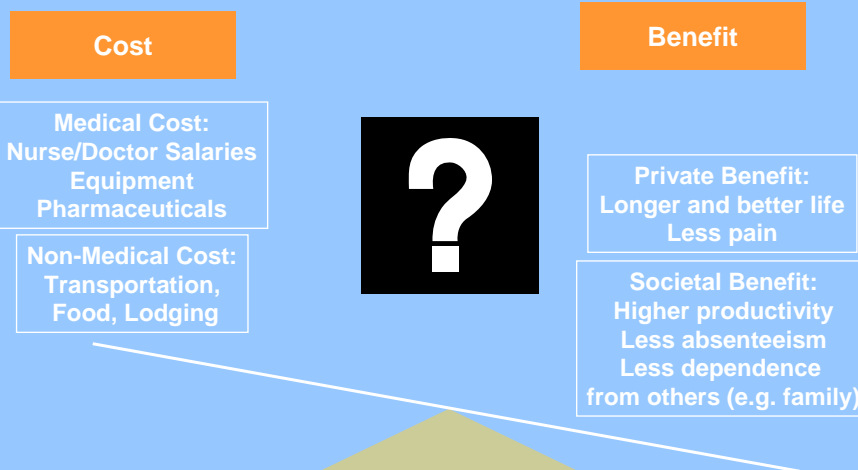
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Assessing Cost and Benefit of Medical Treatment



Lowest cost-benefit ratio = Most efficient treatment

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How to Assess the Return on Investment?

- While it is relatively easy to estimate the cost of a treatment (investment), it is much more difficult to compare it to its gains (return)
- The benefit of a new treatment can be
 - lower mortality
 - higher quality of life
 - reduced morbidity
 - higher productivity
- To be comparable with the cost these effects must be evaluated in monetary terms

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Evaluation of Investment in Health Care (1)

Types of Benefits	Non-Financial Measure of Value	Financial Measure of Value
Mortality	Additional years of life	Value of additional years of life to patients and their families
Quality of life	Improvement on quality of life scales: <ul style="list-style-type: none"> -health perceptions and general well-being -social function -psychological/cognitive function -physical function -degree of impairment Reduction in specific side effects QALYs (when combined with additional years of life)	Value of quality adjusted life years (QALYs) to patients and their families Value to patients of specific product features and benefits


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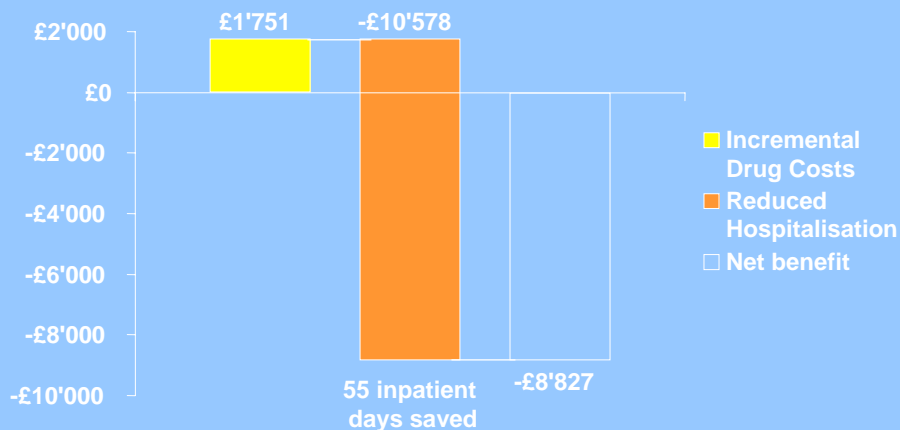
Evaluation of Investment in Health Care (2)

Types of Benefits	Non-Financial Measure of Value	Financial Measure of Value
Morbidity	<p>Fewer episodes of illness</p> <p>Fewer hospitalizations / hospital days for those episodes</p>	<p>Lower total costs to health care system</p> <ul style="list-style-type: none"> - Lower out of pocket costs to patients and their families - Lower employer costs for health insurance - Lower health plan costs
Pro-ductivity	<p>Additional years of work and household income</p> <p>Lower rates of absenteeism, "presenteeism" and worker turnover</p> <p>Reduced burdens on caregivers</p> <p>Higher educational and skill attainment for patients and their families</p>	<p>Value of additional years of work and household income</p> <p>Value of enhanced work productivity to patients and employers, including value of higher output, lower costs for training and replacement workers</p> <p>Lifetime human capital value of higher educational and skill attainment for patients, caregivers and offspring</p>

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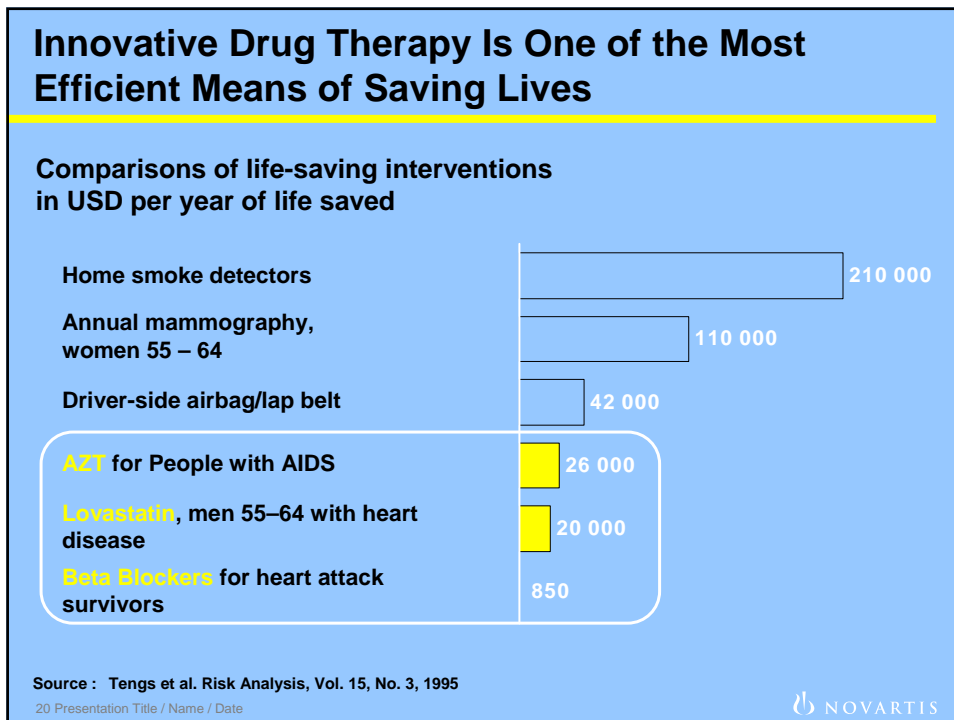
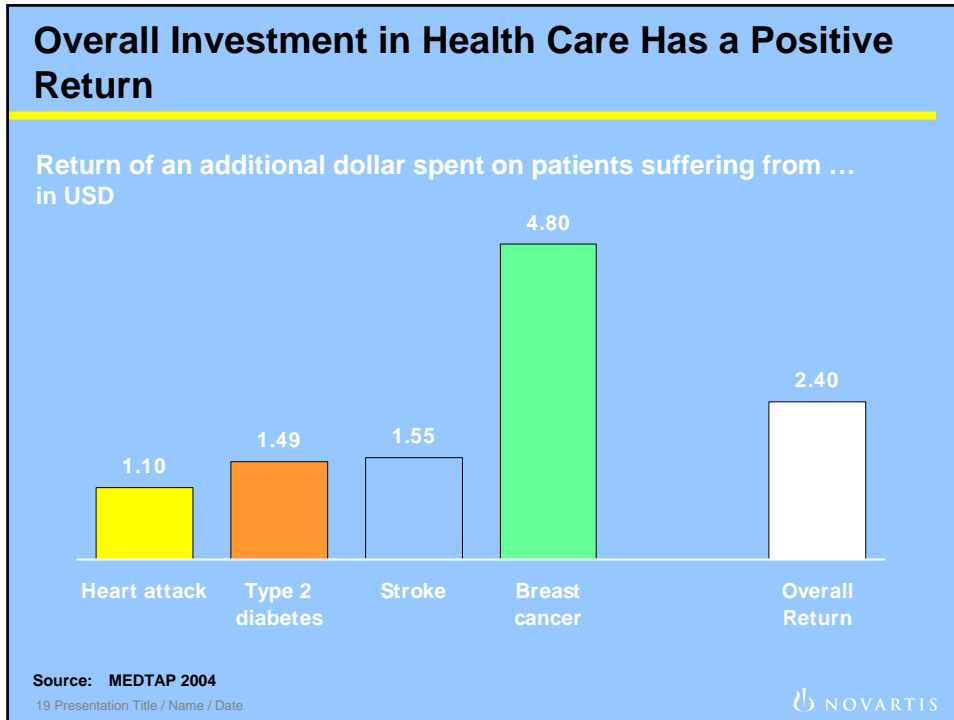
Example: Use of Clozaril in treatment resistant Schizophrenia results in significant cost-savings

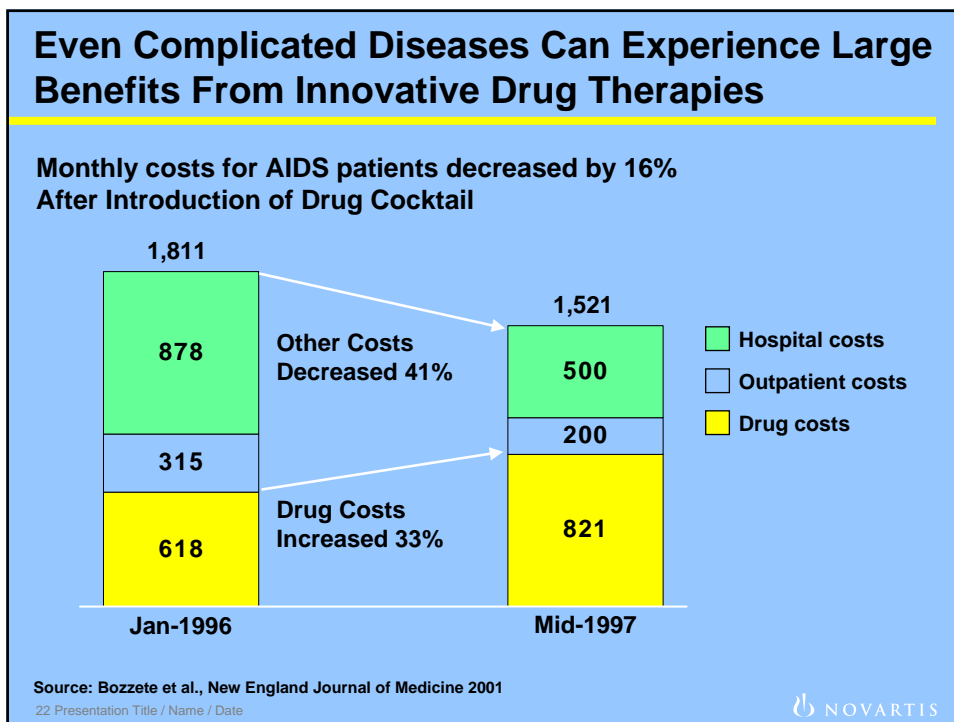
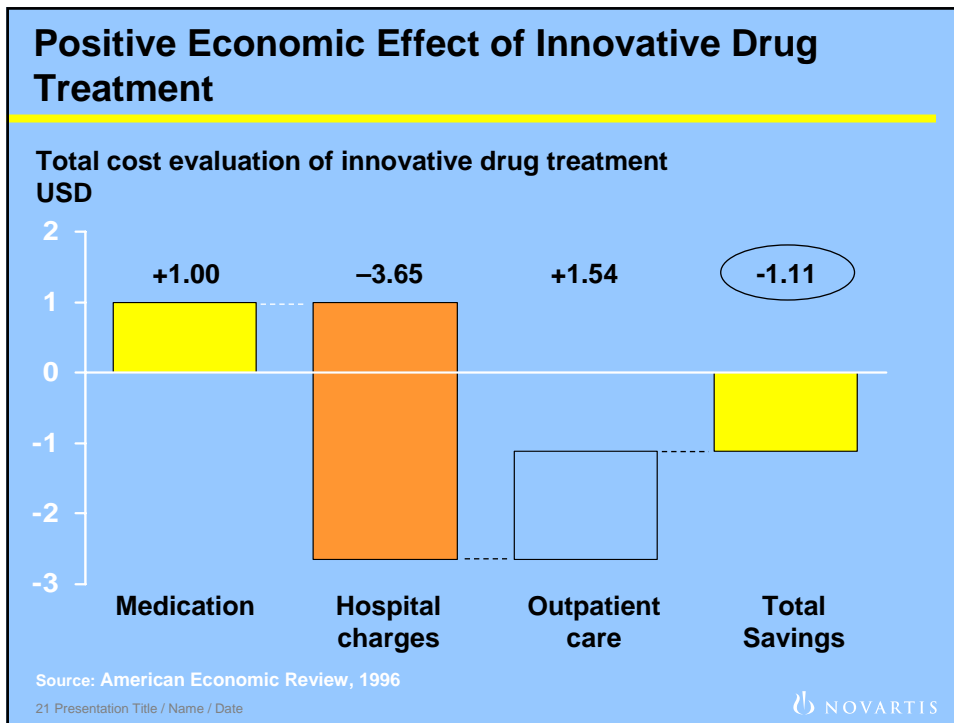


Knapp M et al, 2002, reported in NICE, 2002

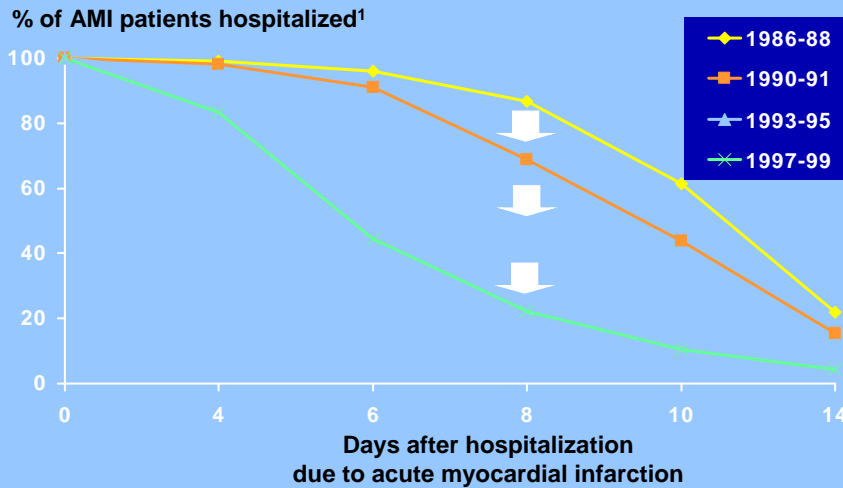
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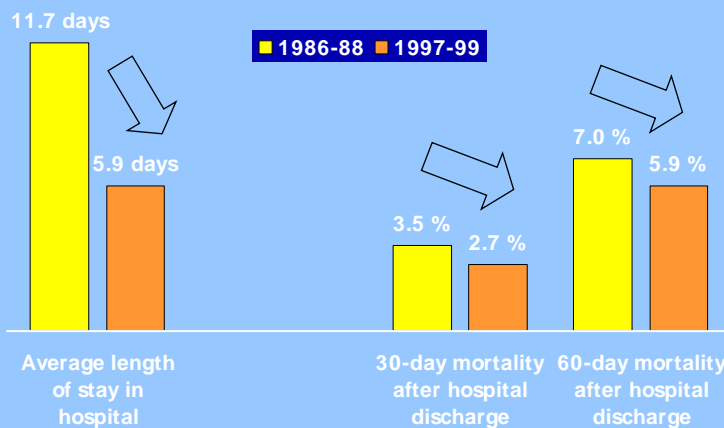


Shorter Hospital Stay after Heart Attacks ...



¹ 4551 patients discharged after AMI from all greater Worcester, Mass, hospitals.
 Source: Spencer et al. (2004): Declining Length of Hospital Stay for AMI and Postdischarge Outcomes, Arch Intern Med

... and Reduced Mortality after Hospital Discharge



Source: Spencer et al. (2004): Declining Length of Hospital Stay for AMI and Postdischarge Outcomes, Archives of Internal Medicine / Novartis Economic Affairs

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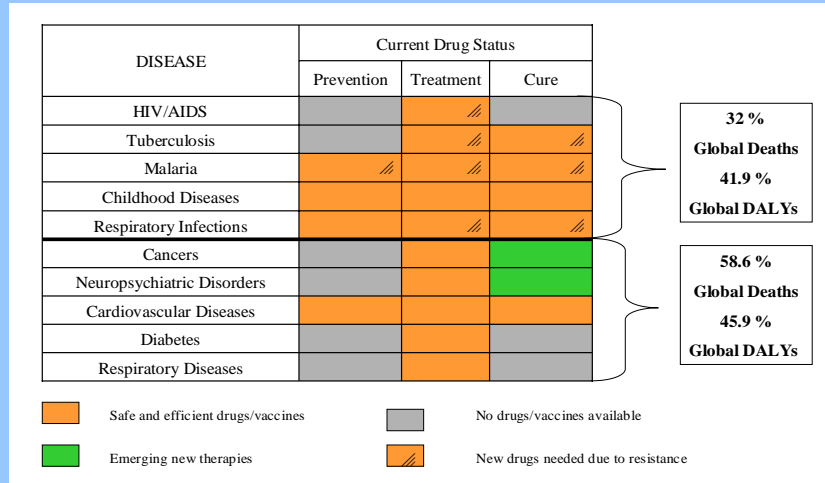
Why Do We Still Need Medical Progress?

- **Illness and disease are costly**
 - to patients (medical cost, pain),
 - to their family (caring, fear),
 - to society (reduced productivity, absenteeism).
- **Medical progress allows earlier prevention of an eventual outbreak of costly diseases**
- **Medical progress allows faster healing and more efficient treatment**
- **People respond differently to drugs. Targeted treatment can take this into account**
- **Growing resistance to treatments (e.g. antibiotics)**
- **Mutation and emergence of new viruses (e.g. HIV/AIDS, SARS, Avian Influenza)**

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Need for Pharmaceutical Innovation



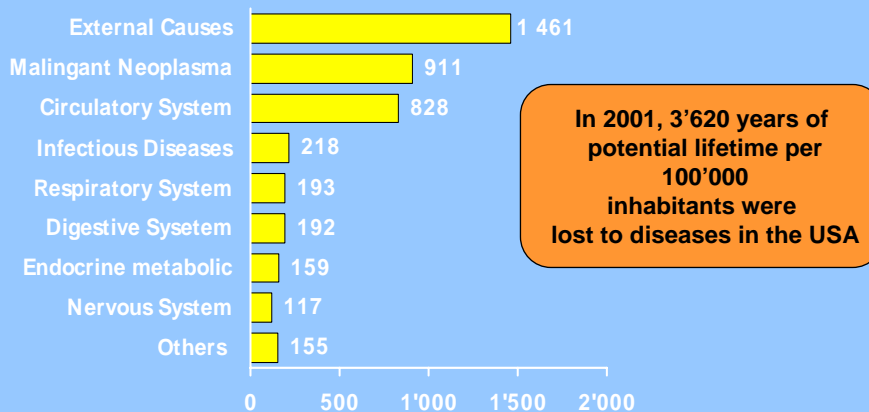
Source: IFPMA, March 2004

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Years Lifetime Lost in the USA

Potential years of lifetime lost <70, per 100'000 population

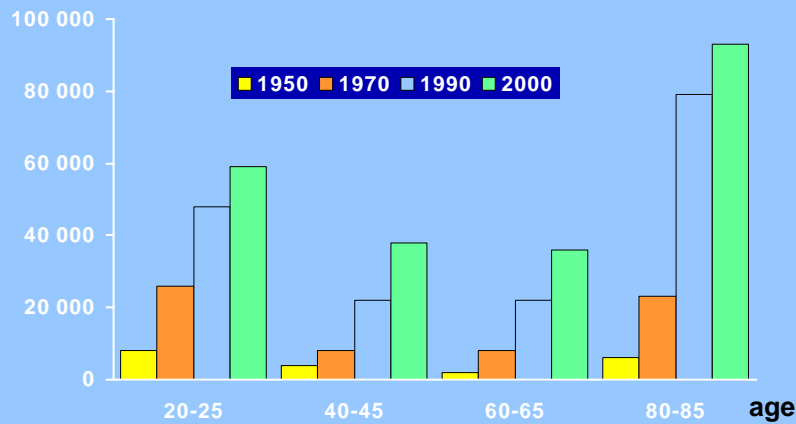


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However, the Cost of Saving a Life Year Is Increasing

Marginal Cost of saving an additional life year
2000 USD



Source: R.E. Hall and C.I. Jones (2004): The Value of Life and the Rise in Health Spending. NBER WP No. 10737.

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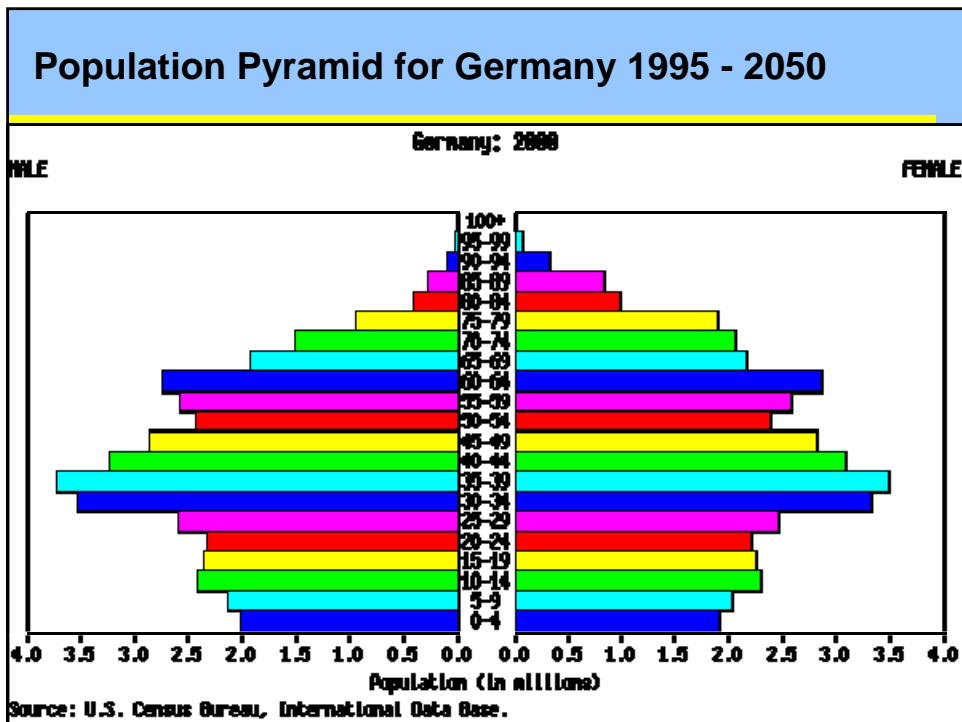
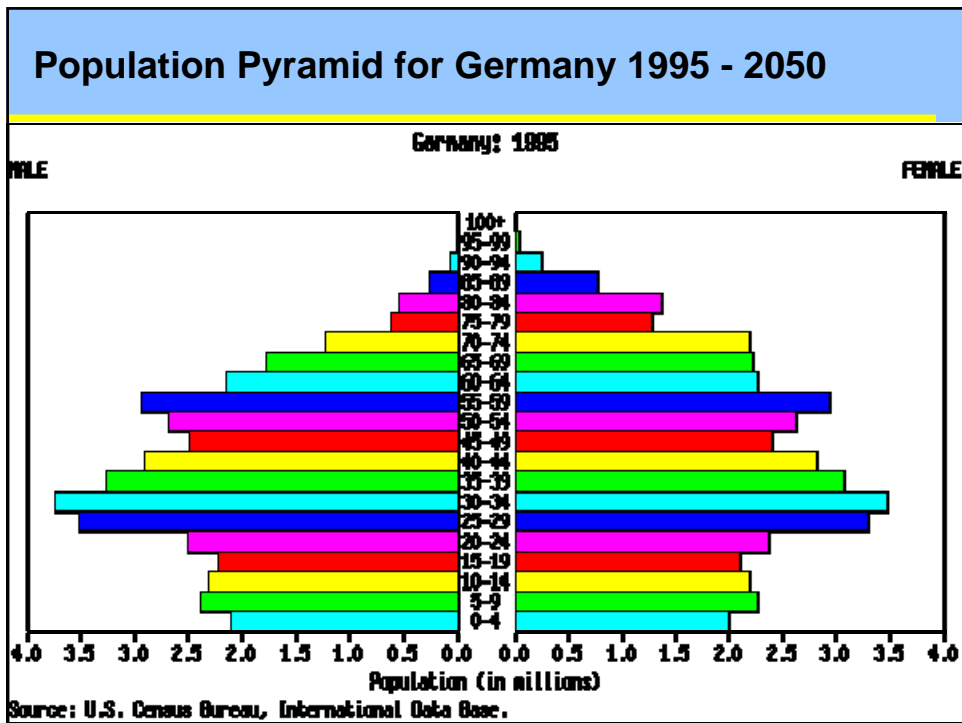


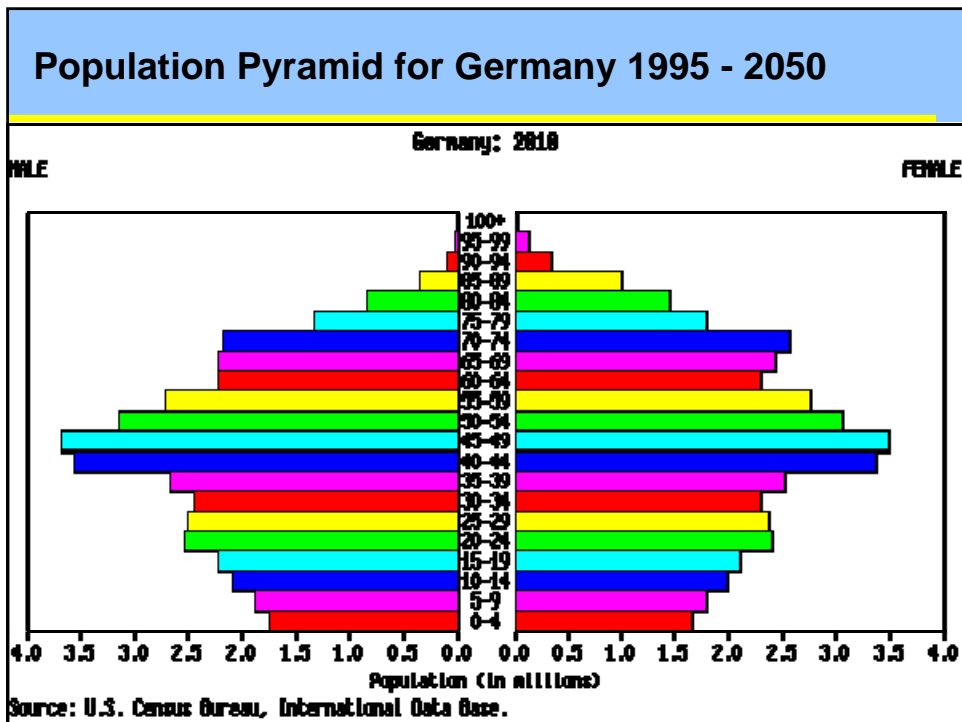
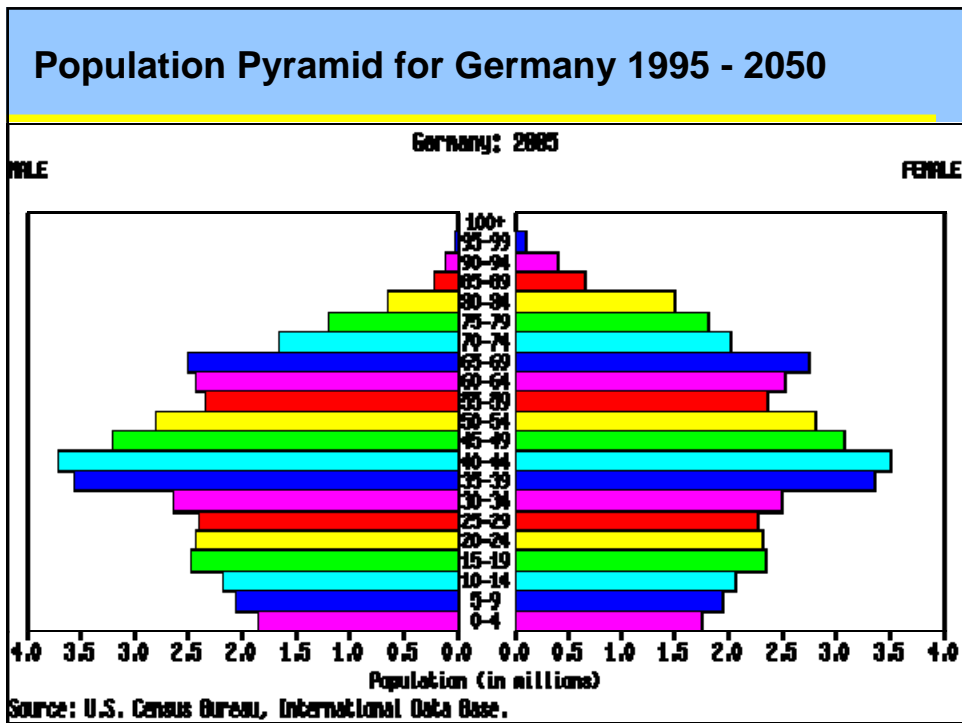
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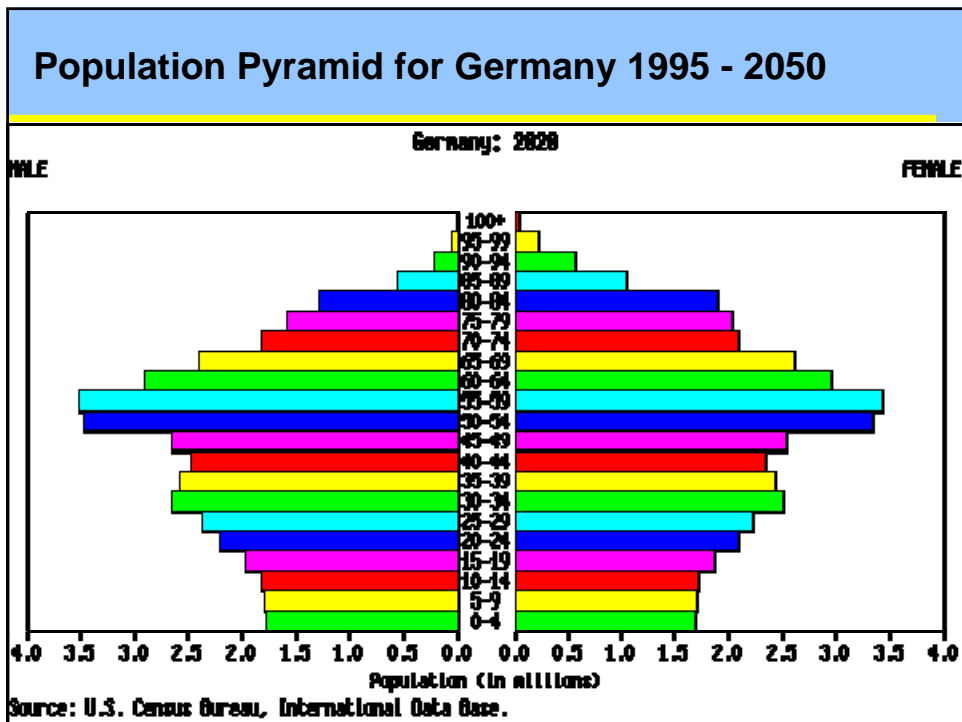
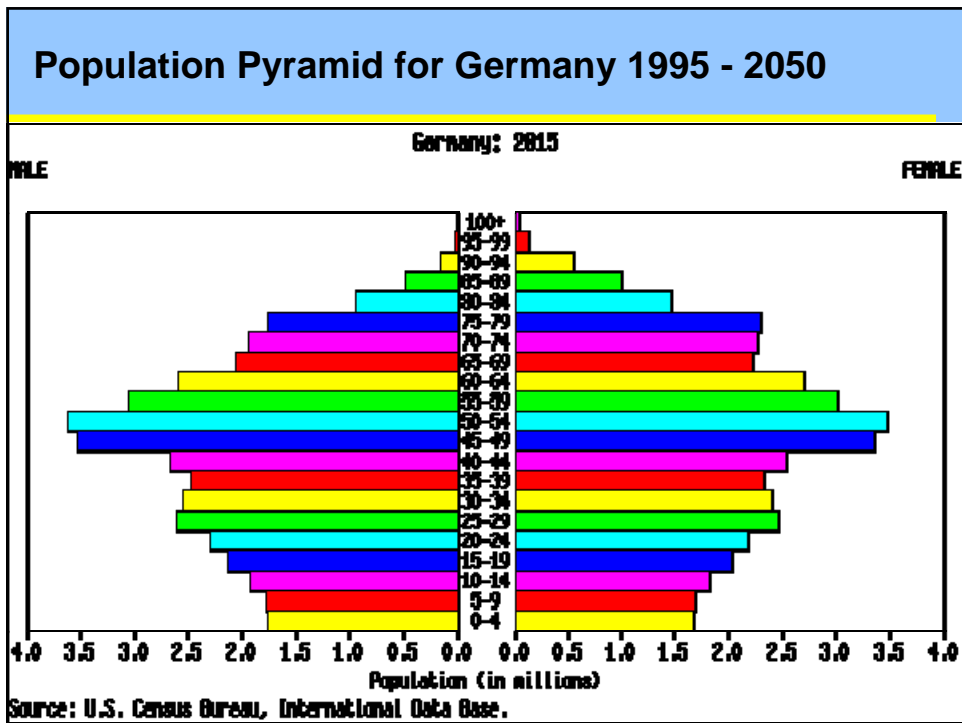
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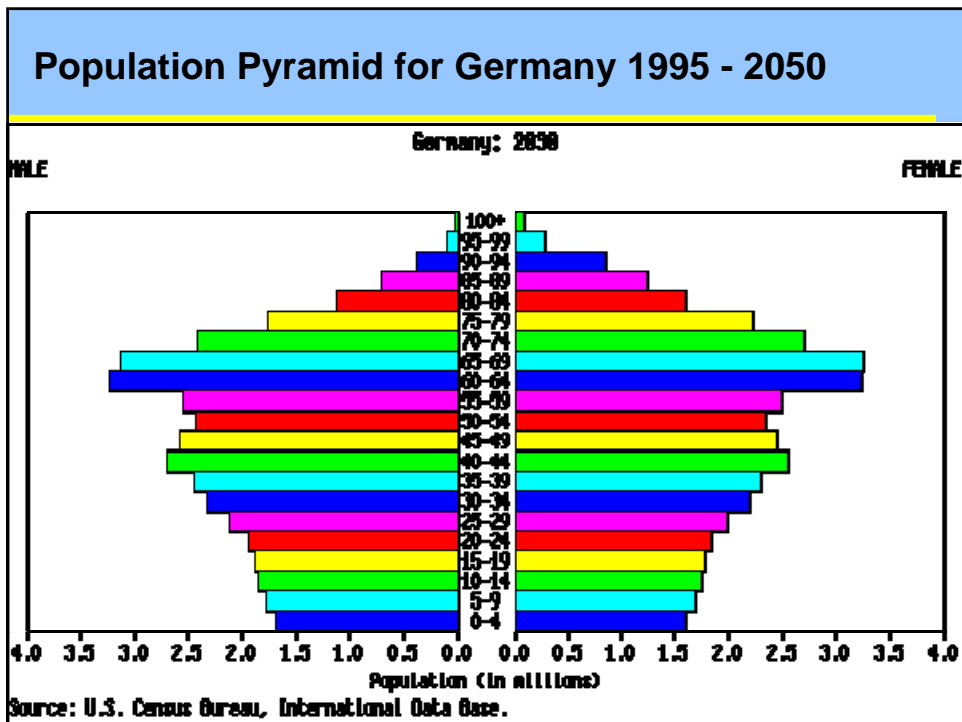
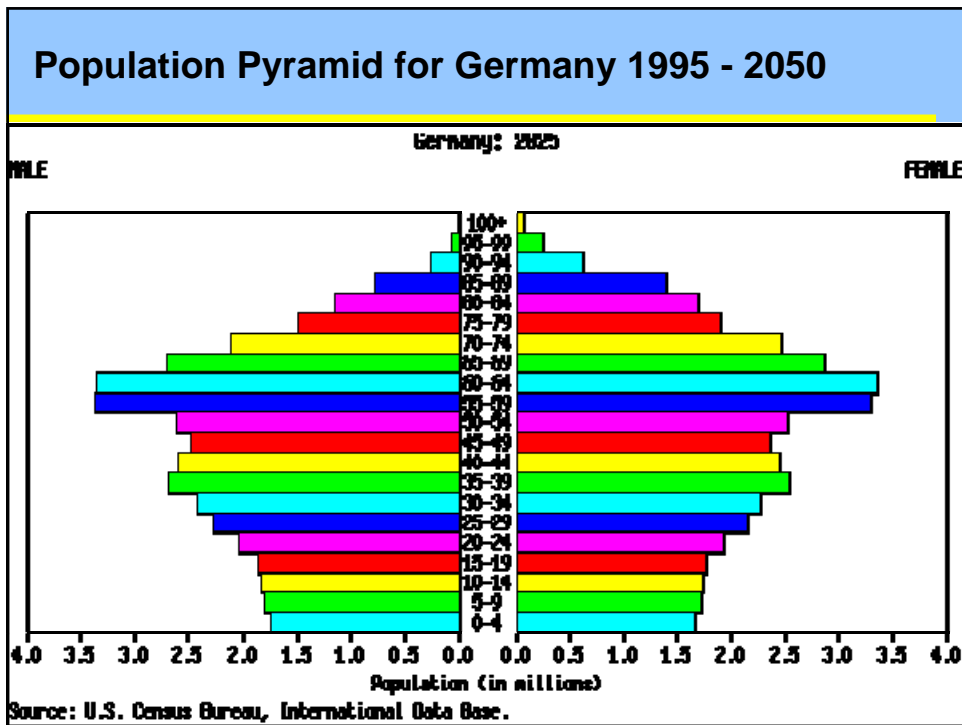
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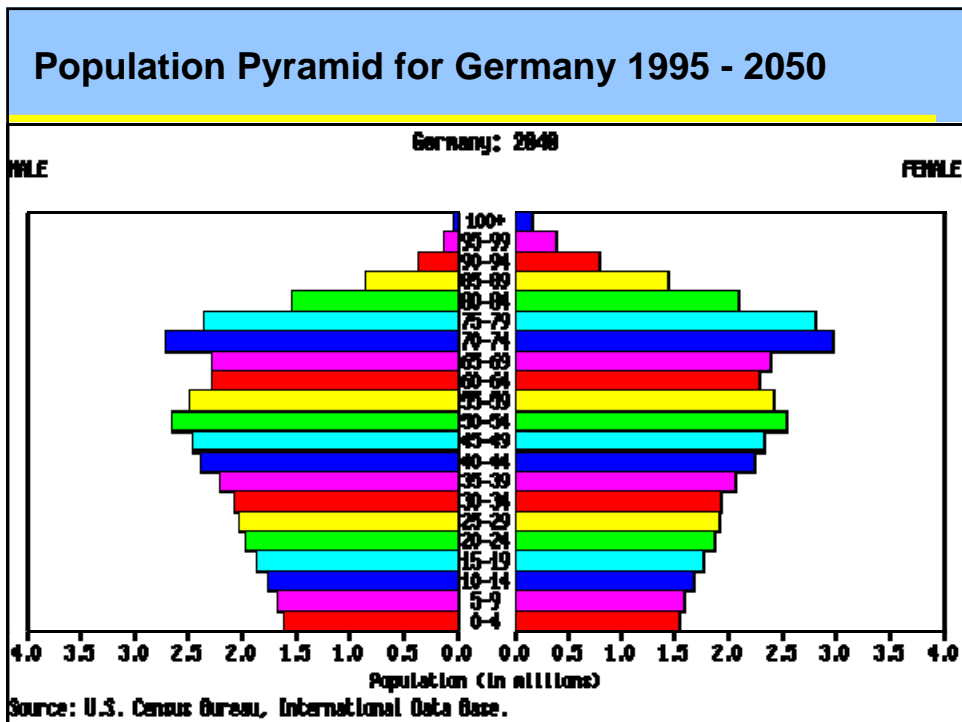
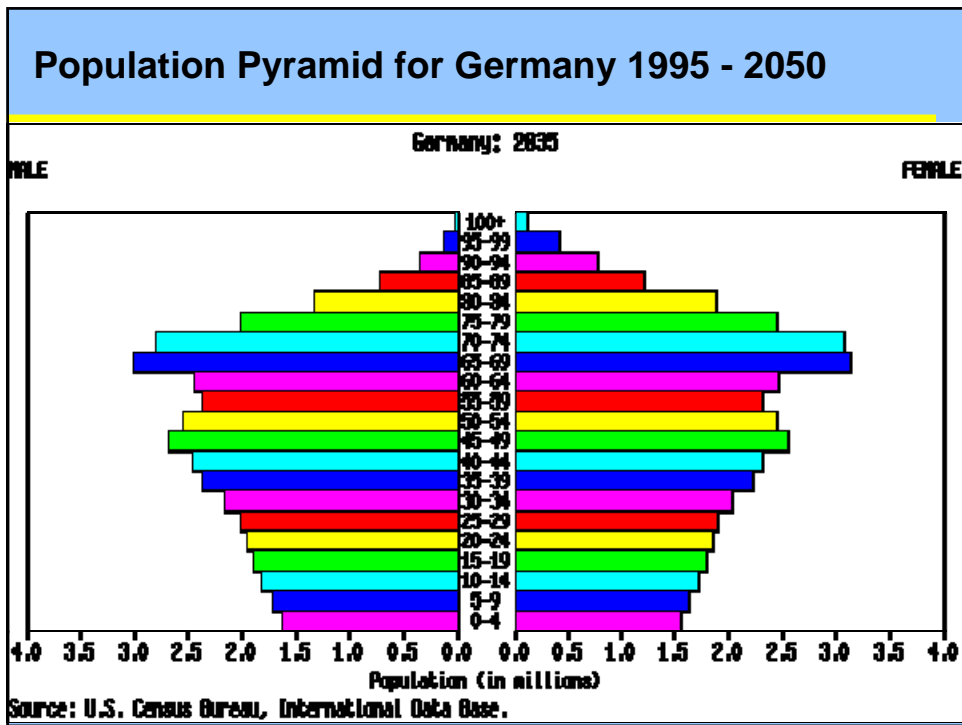


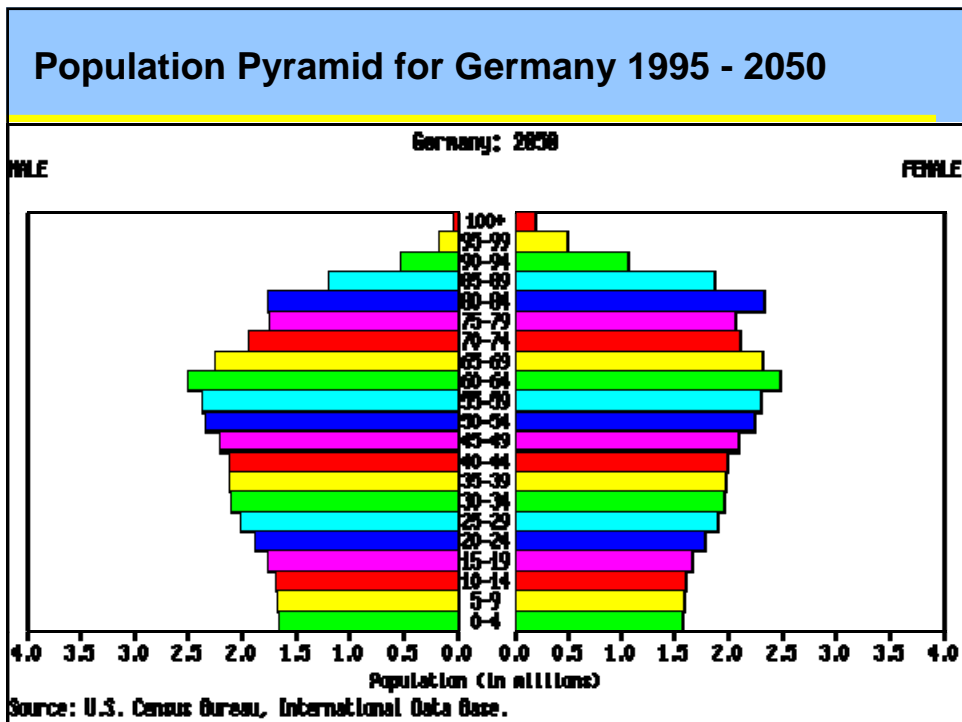
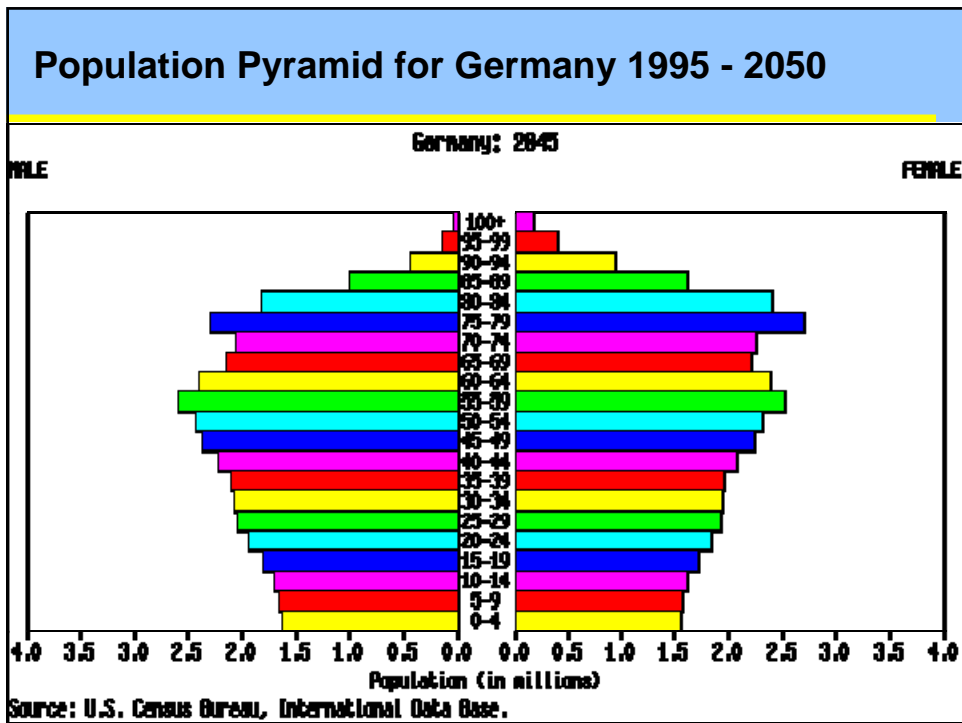


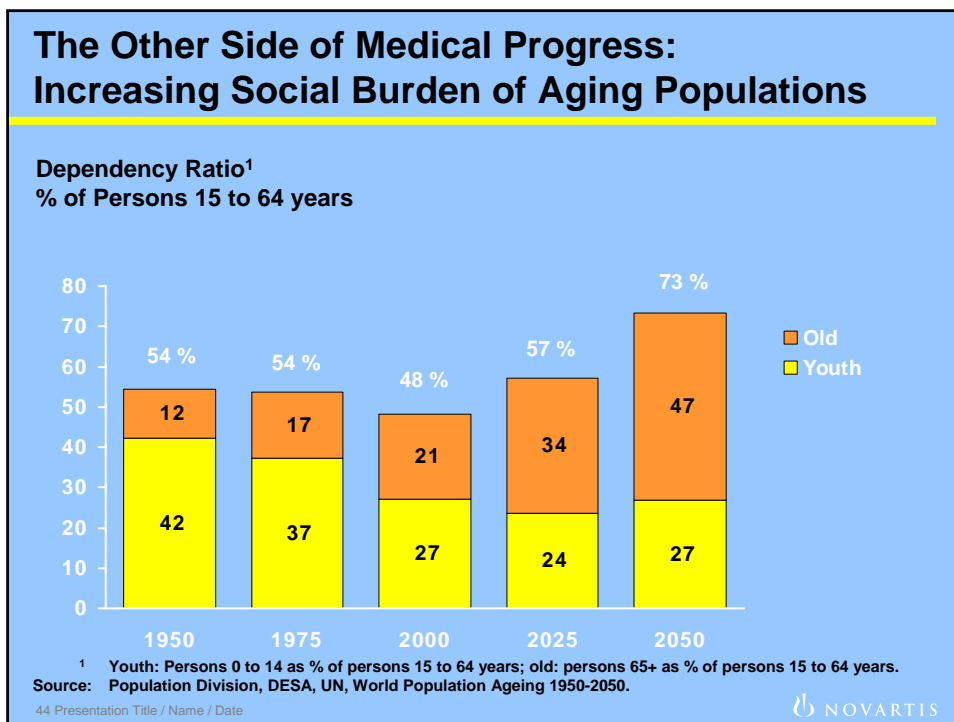
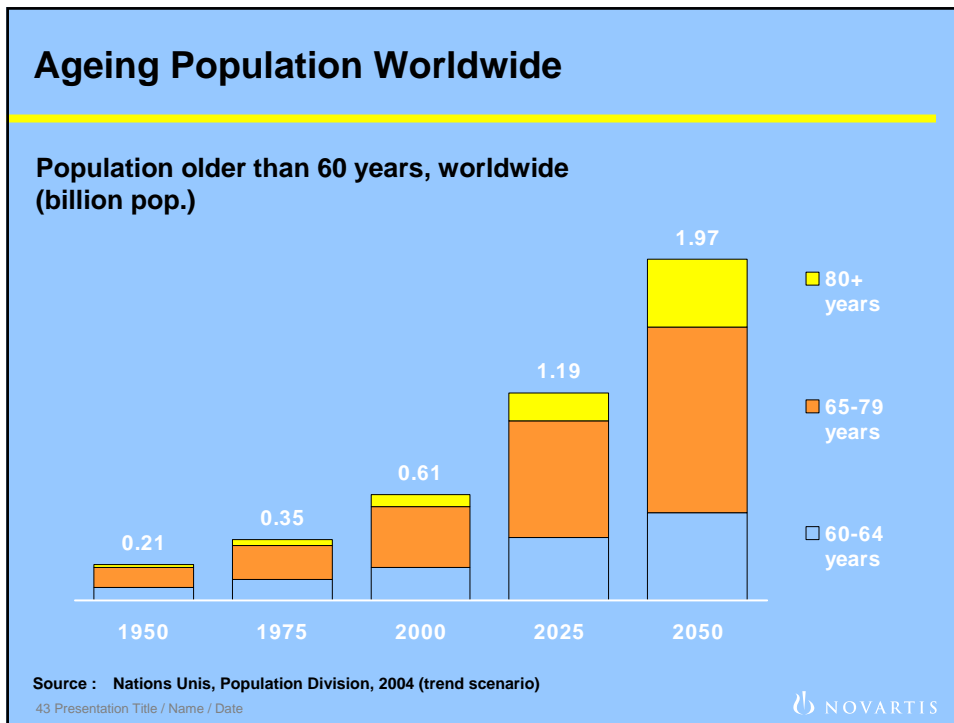






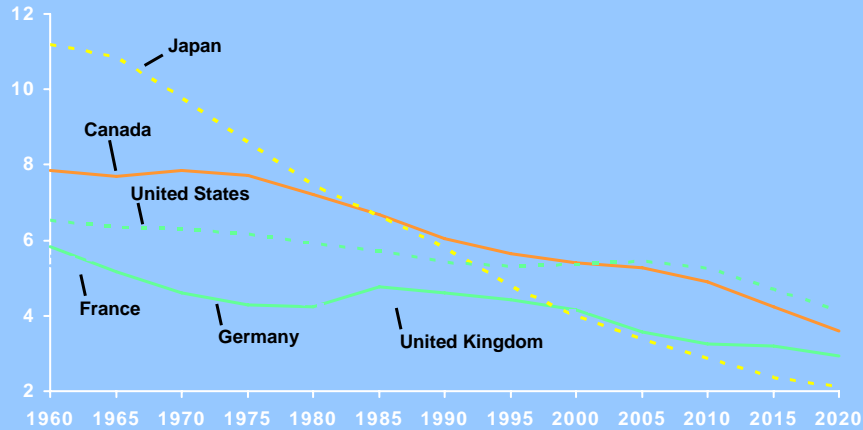






Drastic Fall of Potential Workers per Elderly

Number of potential workers per elderly person
Ratio of persons ages 15-64 to persons age 65 and older, 1960 – 2020



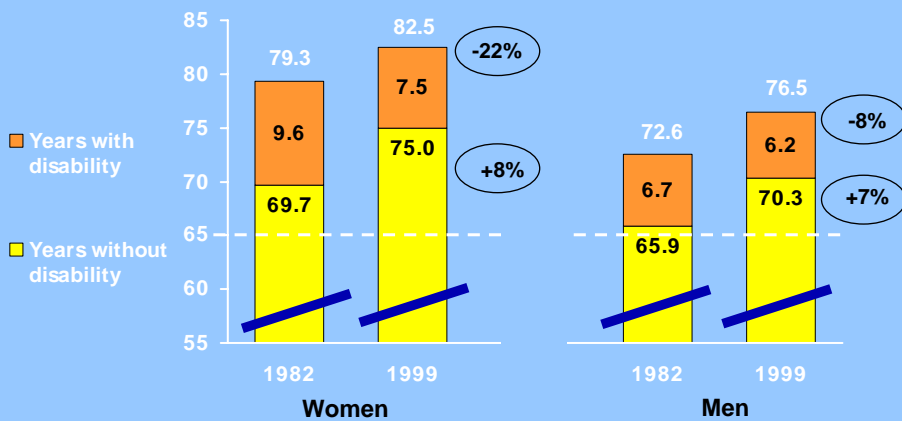
Source: Anderson and Hussey in Health Affairs (May/June 2000); UN Population Division (World Population Prospects, 2004 Revision)

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At the Same Time, the Elderly Are More Healthy and Could Potentially Work Longer

Total and Healthy life expectancy, Switzerland
Years



Source: Prof. Francois Höpflinger (2003), Bisig, Gutzwiler, Federal Office of Statistics /EA / Novartis International

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A Long Healthy Life Is Key to Sustainability

- Life expectancy has been increasing steadily for a long time
 - Pharmaceuticals play a major role in this development; they reduce mortality and improve quality of life in the most efficient way
 - While healthy ageing is a goal in itself, there are concerns about the sustainability of social systems
 - Healthy seniors need not to be dependent on society, but can actually support it
- ➔ Improving the health of the elderly is part of the solution, not of the problem!

“The key point is to recognise that expenditure on health should not be seen just as an economic cost, but as a positive, forward-looking investment”

David Byrne
European Commissioner for Health and Consumer Protection

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