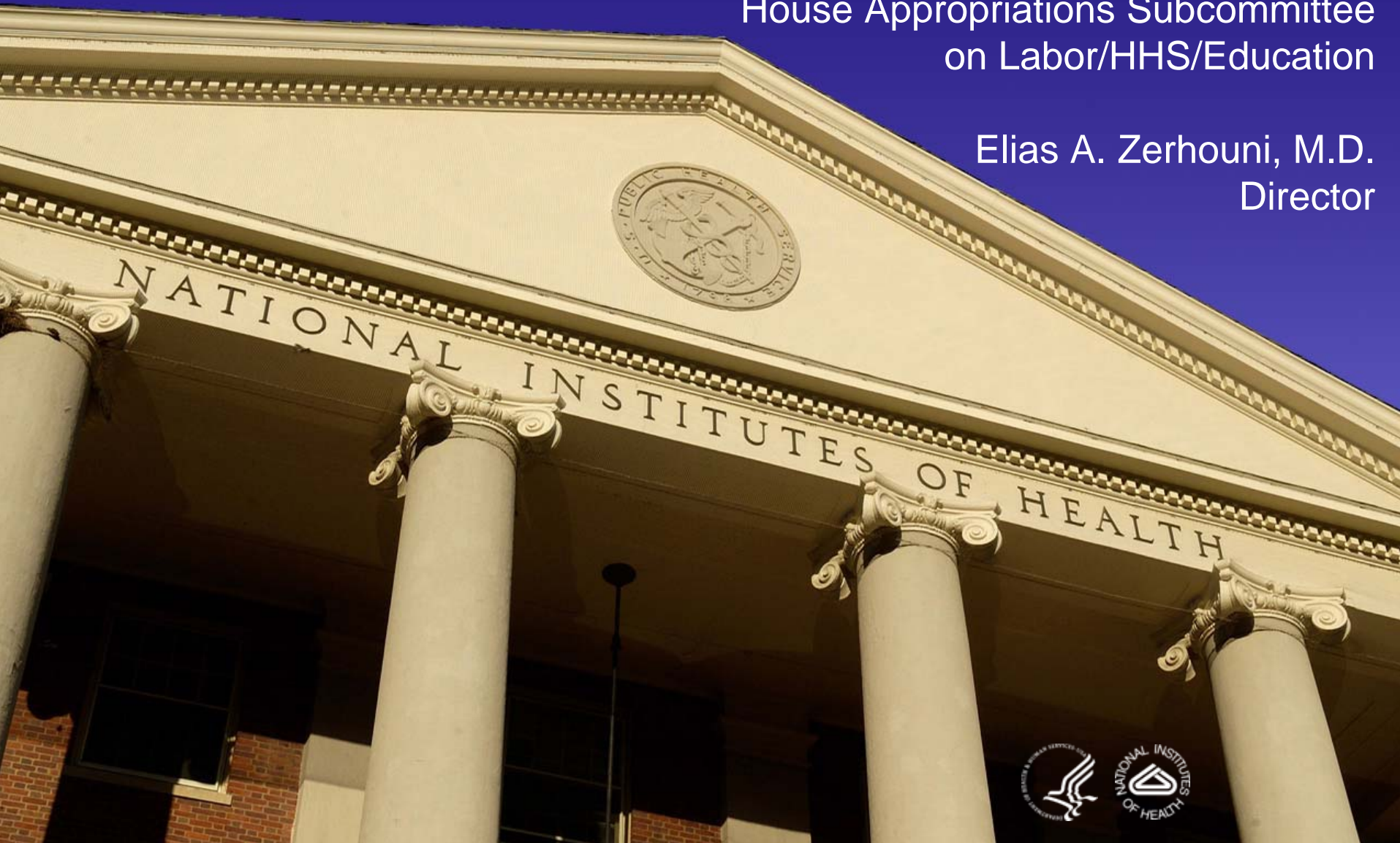


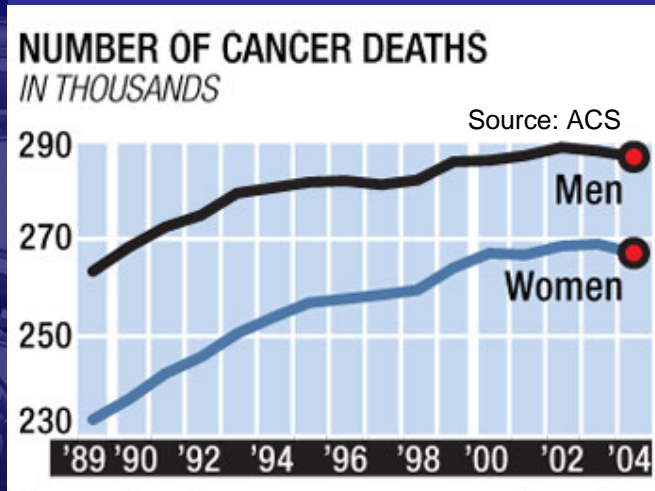
# NIH: A Vision for the Future

2008 Budget Hearings  
House Appropriations Subcommittee  
on Labor/HHS/Education

Elias A. Zerhouni, M.D.  
Director



# Due to Advances of Past 30 Years *Americans are Living Longer and Healthier*



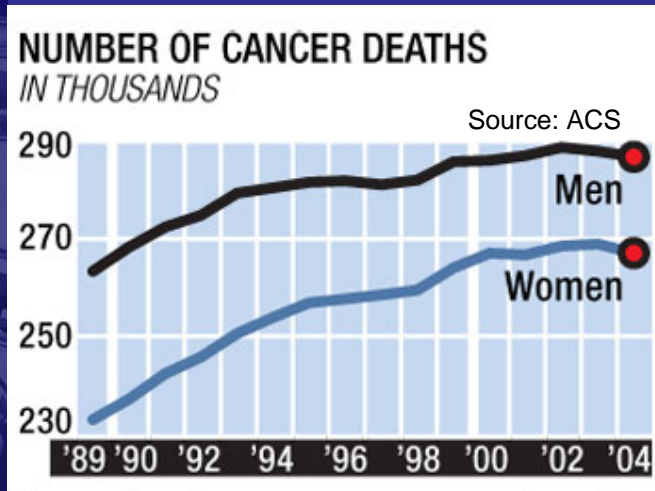
- For the second consecutive year, annual cancer deaths in the United States have fallen

Cancer investment  
per American  
**~\$9/yr**  
1974-2004



# Due to Advances of Past 30 Years

## *Americans are Living Longer and Healthier*



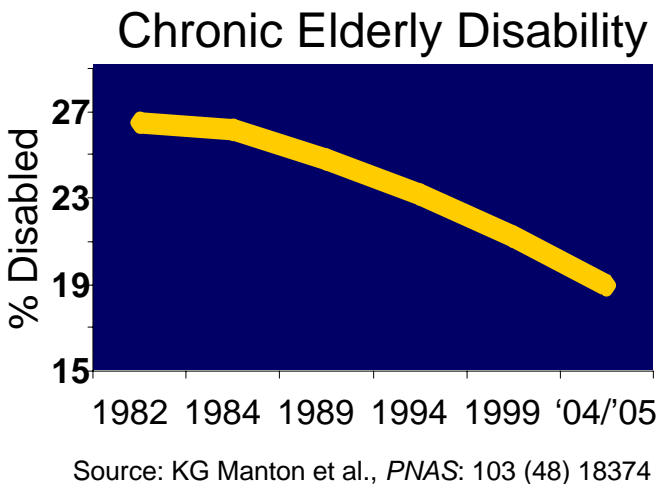
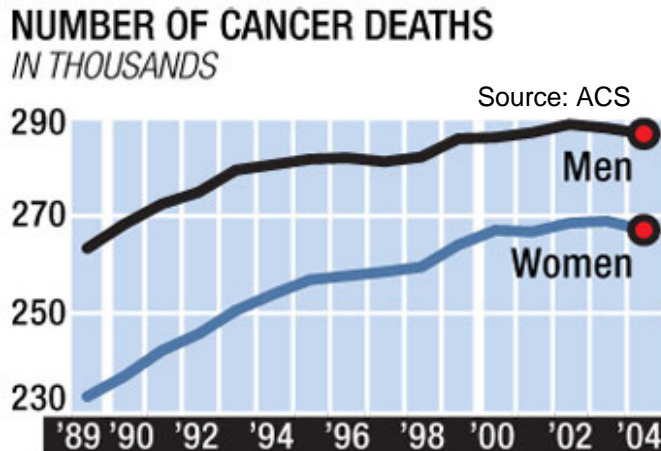
- For the second consecutive year, annual cancer deaths in the United States have fallen
- Over 60% drop in mortality for heart disease and stroke – in 2004, drop in deaths of women from Heart Disease from 1/3 to 1/4 reported



Heart disease investment  
per American  
**~\$4/yr**  
1974-2004



# Due to Advances of Past 30 Years *Americans are Living Longer and Healthier*



- For the second consecutive year, annual cancer deaths in the United States

Total NIH  
Investment  
per American  
**~\$44/yr**  
1974-2004

- Over the past 30 years, mortality for heart disease has dropped by 50% – in 2004, drop in deaths of women from Heart Disease from 1/3 to 1/4 reported
- Chronic disability among older Americans has dropped by 30% in the past 2 decades, and the rate of decline is accelerating
- Life expectancy rises to 78 years, up 6 years since 1974



# Major Factors Will Force a Transformation of Medicine and Health



- Socio-economics
- Demographics
- Landscape of disease
- Global health
- Scientific challenges and opportunities



# Evolving Public Health Challenges



Shift from Acute to Chronic Conditions



Aging Population



Health Disparities



Emerging and Re-emerging Infectious Diseases



Emerging Non-communicable Diseases - Obesity

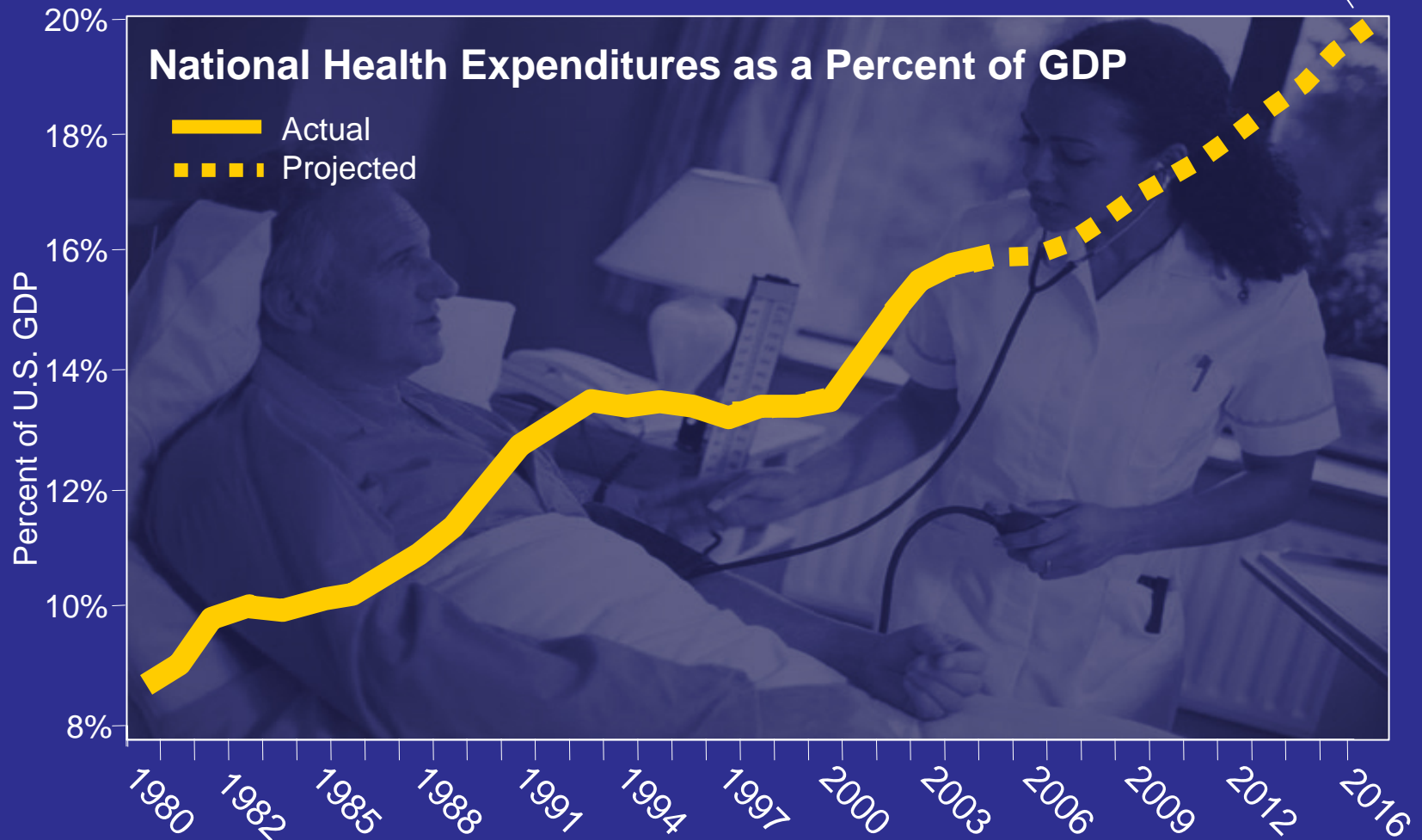


Biodefense

# Challenge of Rising U.S. Health Expenditures

*Biomedical Research Must Deliver*

**\$4.1 trillion**

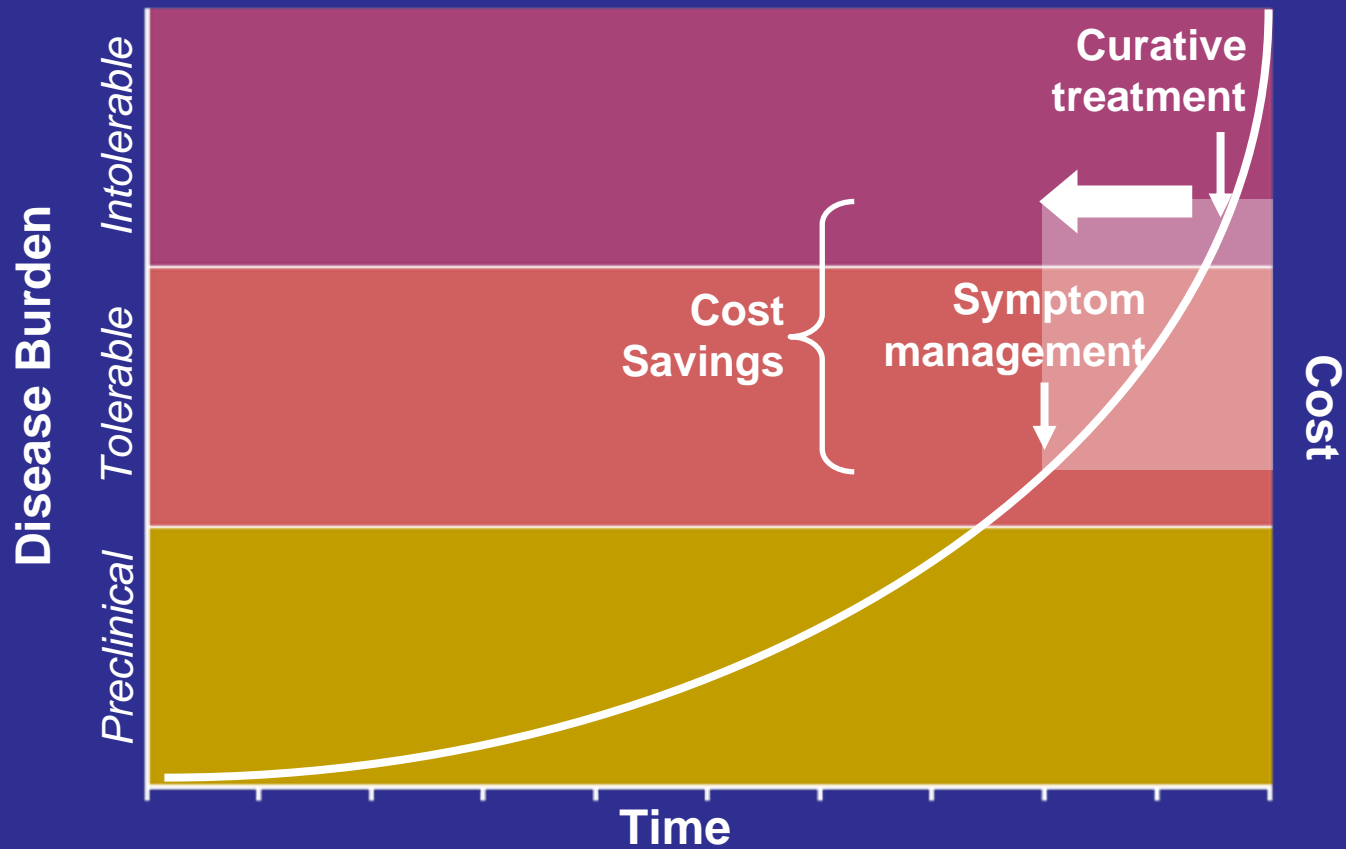


# How will NIH help meet these challenges?

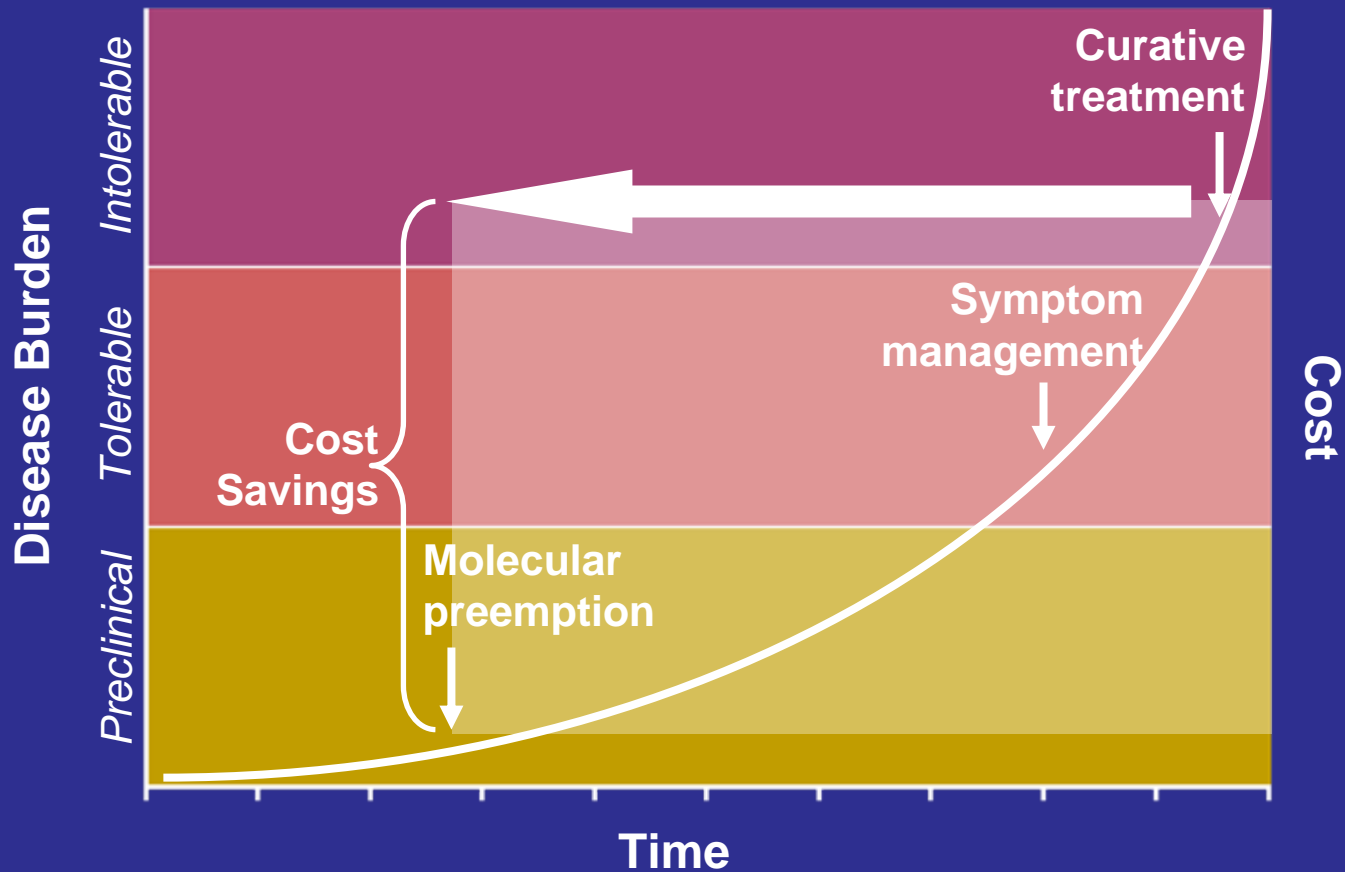




# The Current Paradigm: *Manage Disease*



# The Future Paradigm: *Preempt Disease*



# The Value of Molecular Preemption

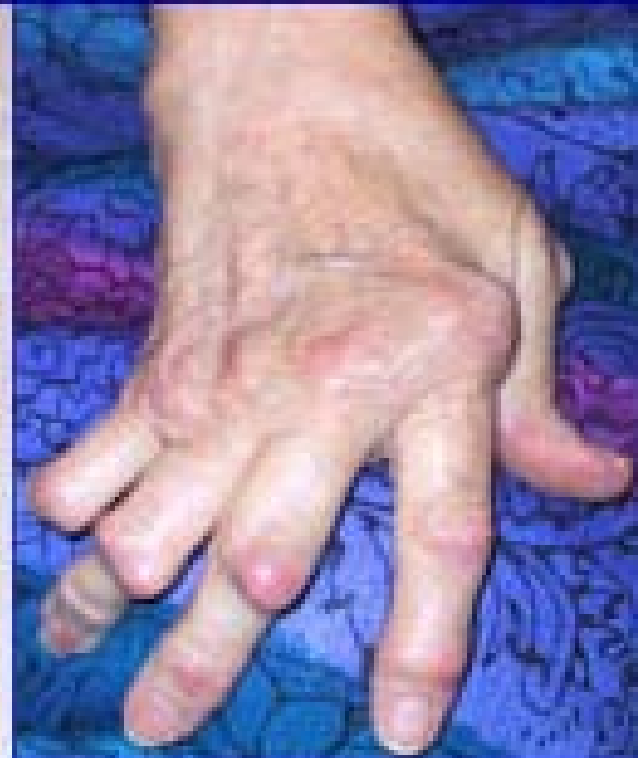
Early  
Rheumatoid Arthritis



Intermediate  
Rheumatoid Arthritis



Late  
Rheumatoid Arthritis



Courtesy of J. Cush, 2002



# The Value of Molecular Preemption

Early  
Rheumatoid Arthritis

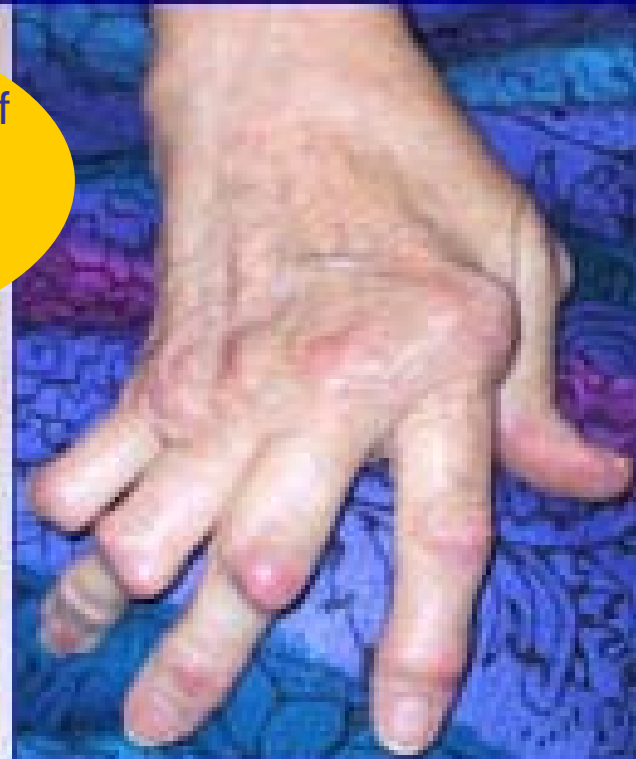


Intermediate  
Rheumatoid Arthritis



Today, a new class of anti-rheumatic drugs dramatically slows disease progression

Late  
Rheumatoid Arthritis



Courtesy of J. Cush, 2002

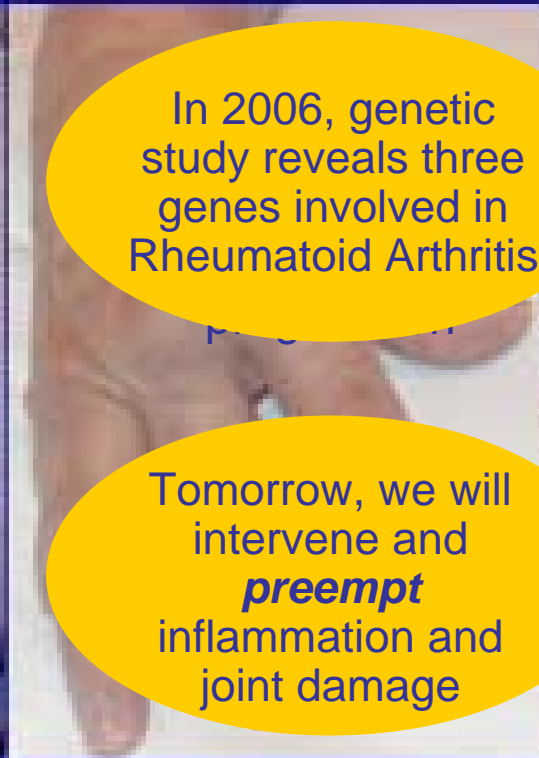


# The Value of Molecular Preemption

Early  
Rheumatoid Arthritis



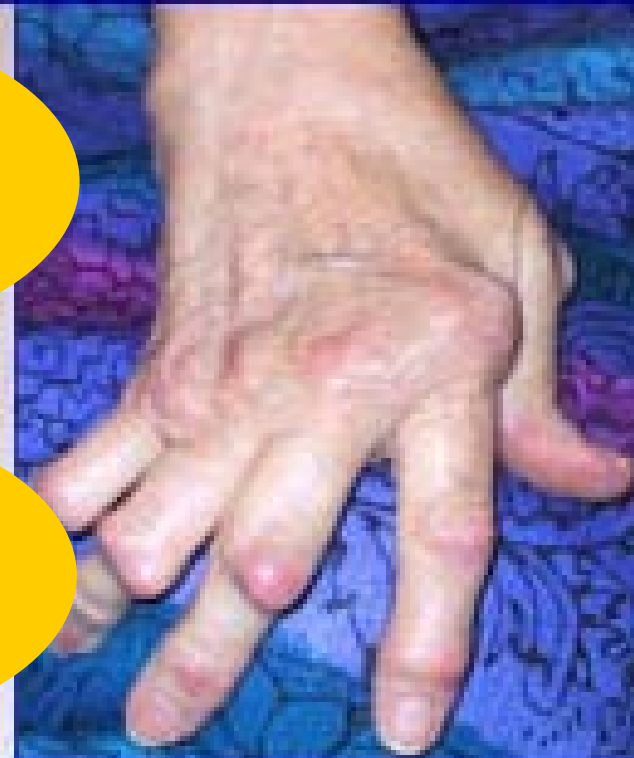
Intermediate  
Rheumatoid Arthritis



In 2006, genetic study reveals three genes involved in Rheumatoid Arthritis

Tomorrow, we will intervene and ***preempt*** inflammation and joint damage

Late  
Rheumatoid Arthritis



Courtesy of J. Cush, 2002



# The Future Paradigm: The 4 P's

*Transform Medicine from Curative to Preemptive*



Predictive ↔ Personalized ↔ Preemptive



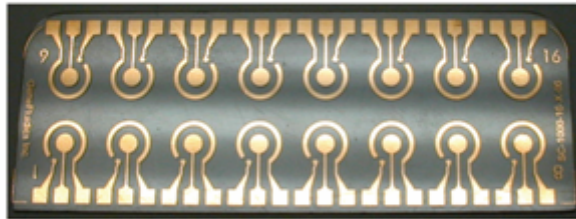
**Participatory**

Era of Precision Medicine

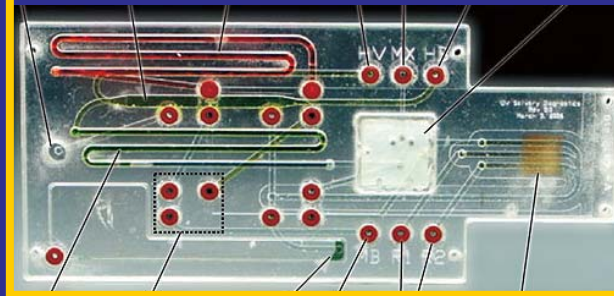


# Where Are We Today?

Biosensor Chip



Lab  
on a Chip

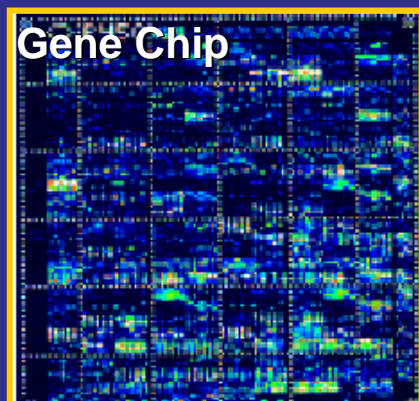


Remote  
Glucose  
Monitor



Heart Monitors

# New Discoveries Make it Possible to “Personalize” Anticoagulation Therapy



- Warfarin: An anticoagulant drug used to reduce the risk of clots causing strokes or heart attacks in millions of patients
- Take too little: clots, stroke
- Take too much: bleeding/death
- Genomic experiments revealed: two different genetic variations that predict best dose





# Preemptive: Vaccine Advances



## HPV Vaccine

- Human Papillomavirus (HPV) infects over 80% of 15–50 year old women and can cause cervical cancer
- First FDA-approved vaccine against cancer

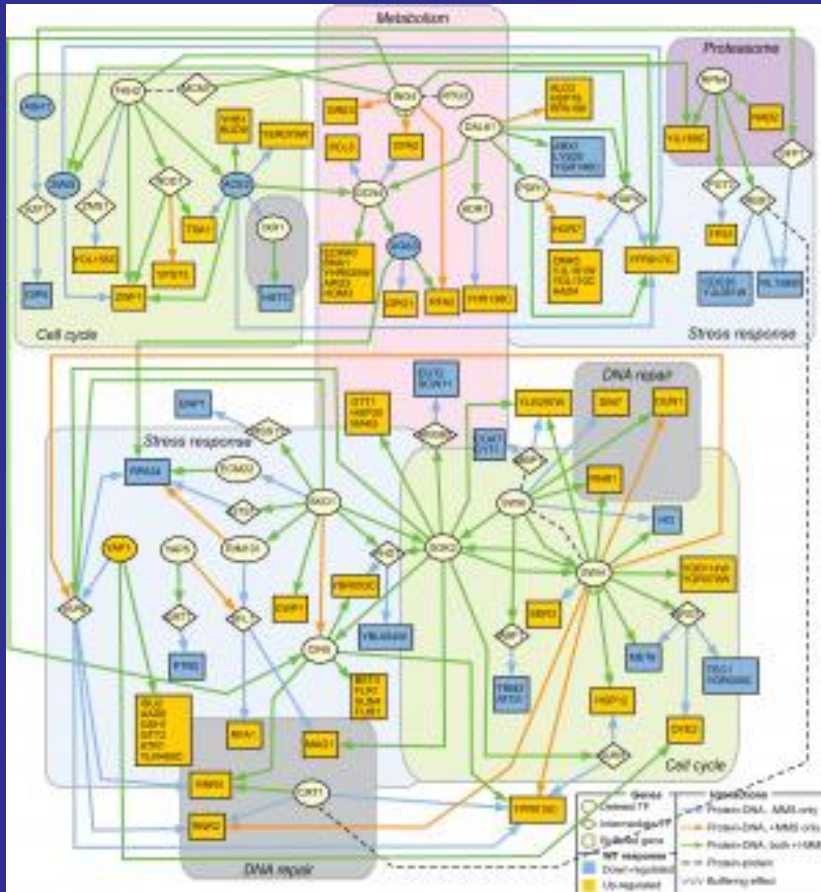


## HIV vaccine

- Large-scale Phase IIb trials opened this year
- New vaccine target identified

# Scientific Challenge: *Tackling Biological Complexity*

## Cell's Response to Damage



## Electronic Diagram

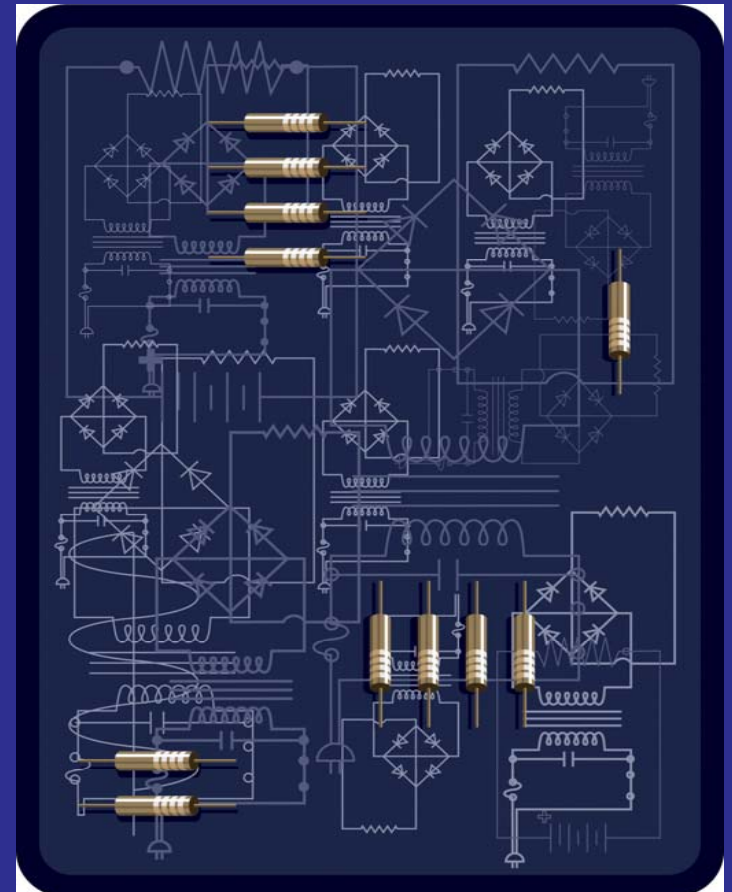


Image courtesy of UCSD



# Discoveries from Basic Research: *RNA Inteference (RNAi)*



Andrew Z. Fire



Craig C. Mello



2002  
Breakthrough  
of the year

2006  
Nobel Prize

# 21<sup>st</sup> Century Medicine and Health



- Healthy individual constantly monitoring spectrum of biomarkers
- ↓
- Healthy patient consults with doctor to assess risk should a biomarker change
- ↓
- Tailor medications and lifestyle changes to preempt disease
- ↓
- Reduce disease burden and costs



# Participatory: Community Involvement



## Jackson Heart Study

- Community participation and education
- Identify minority risk factors for cardiovascular disease



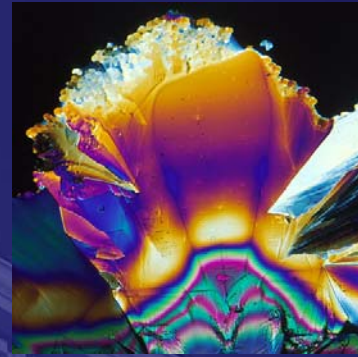
*In October 2006, NIH opened a new health information center for the public at the Jackson Medical Mall*



# What is NIH's Core Strategic Vision?

- Transform medicine and health from a *Curative* to a *Preemptive* paradigm
- Support basic research to identify the earliest molecular stages of disease in complex biological systems
- Accelerate translation of findings from the bench to the bedside to the community
- Provide the evidence and knowledge base to allow for a rational transformation of our healthcare system





# NIH *Transforming medicine and health through discovery*

