The Social Determinants of Cancer: A Challenge for Transdisciplinary Science

Robert A. Hiatt
University of California, San Francisco
Nancy Breen
National Cancer Institute

NCI Conference on the Science of Team Science: Assessing the Value of Transdisciplinary Research
Bethesda, MD, October 30-31, 2006

Goals of Presentation

- To encourage the wider acceptance and use of a cross-disciplinary approach to cancer research.
- To suggest that the study of the social determinants of cancer can best be studied if it is integrated into the context of a TDS approach to cancer research.

Central Challenge

- Not simply to encourage cancer-related social science research.
- To effectively integrate the study of the social determinants of cancer into a more comprehensive approach to cancer research.
- This is a necessary consequence of a Team Science approach that seeks interaction and integration of the natural and social sciences.

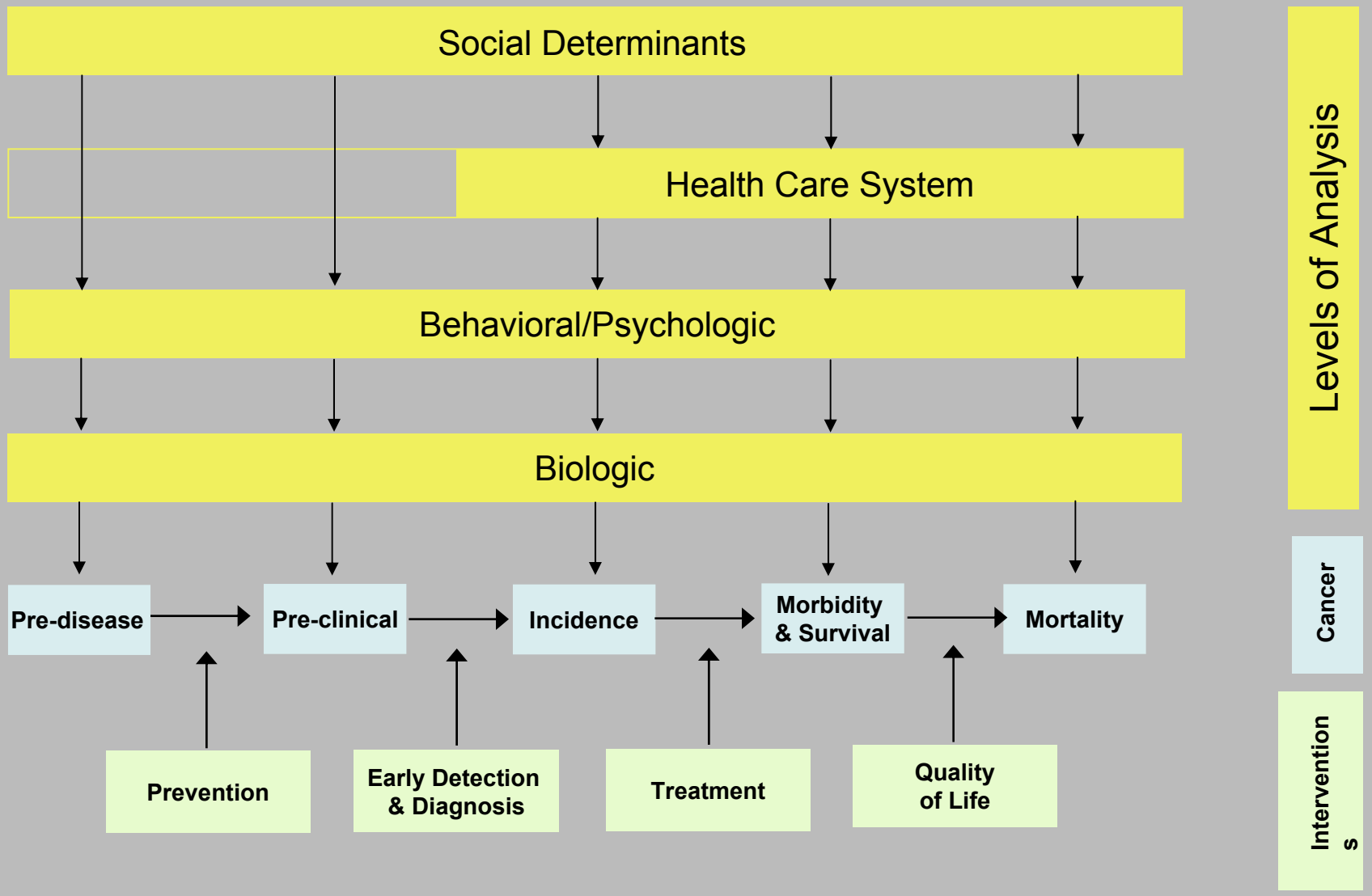
The Status Quo

- With notable exceptions, cancer research is primarily uni-disciplinary.
- There is a fairly sharp demarcation between basic and clinical research and research in the cancer-related behavioral and social sciences.
- There is little appreciation among basic and clinical scientists that behavioral and social science has much to offer.
- …and vice versa.

Social Determinants

Broadly defined to include social and economic conditions, culture, work environment, health care delivery systems, the built environment and environmental toxicants.

Social Determinants of Cancer



Framework incorporates …

- The Cancer Continuum
- Multiple Levels of Analysis
- Opportunities for Interventions

THE CANCER CONTROL CONTINUUM

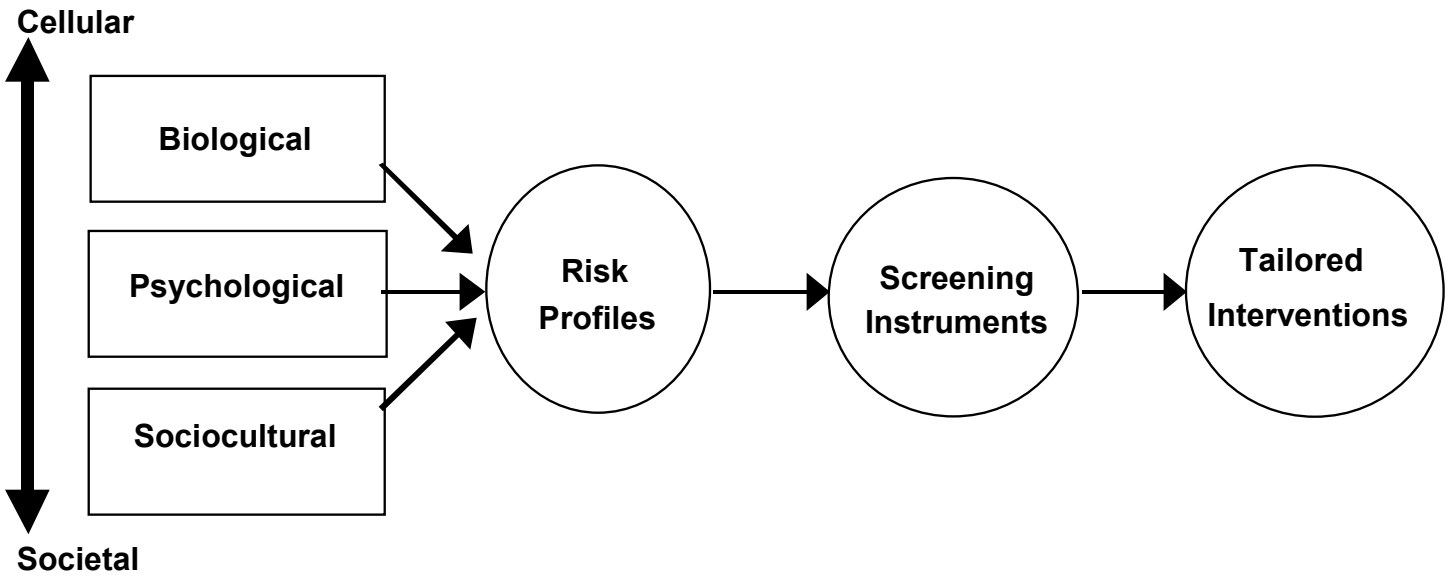
FOCUS

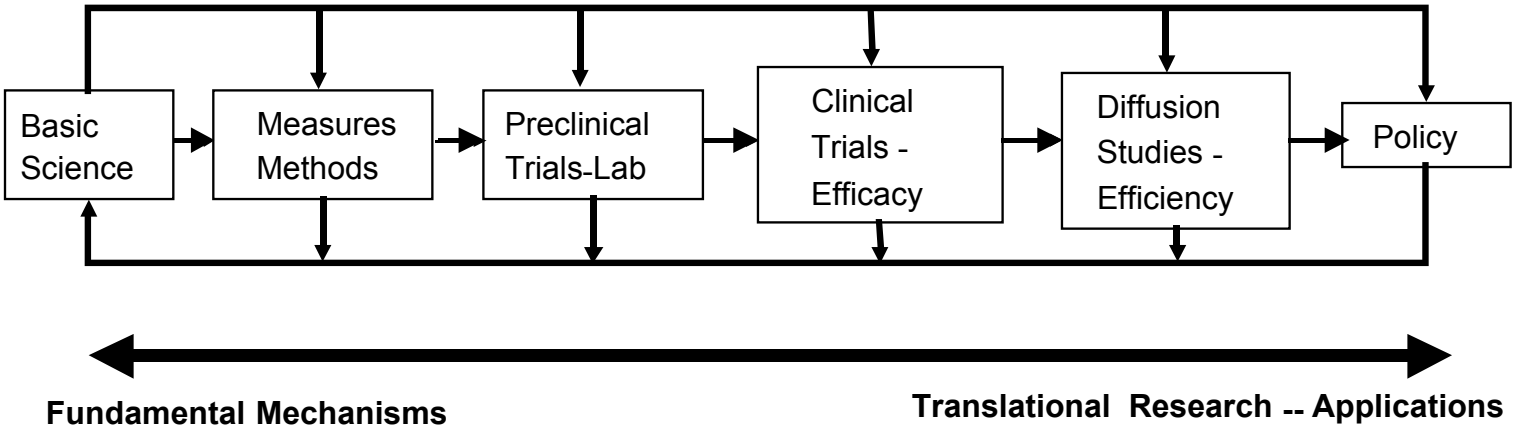
PREVENTION	DETECTION	DIAGNOSIS	TREATMENT	SURVIVORSHIP
Tobacco control	Pap test	Informed decision-making	Health services and outcomes research	Coping
Diet	Mammography			Health promotion for survivors
Physical activity	FOBT			
Sun exposure	Sigmoidoscopy			
Virus exposure	PSA			
Alcohol use				
Chemoprevention				

CROSSCUTTING ISSUES

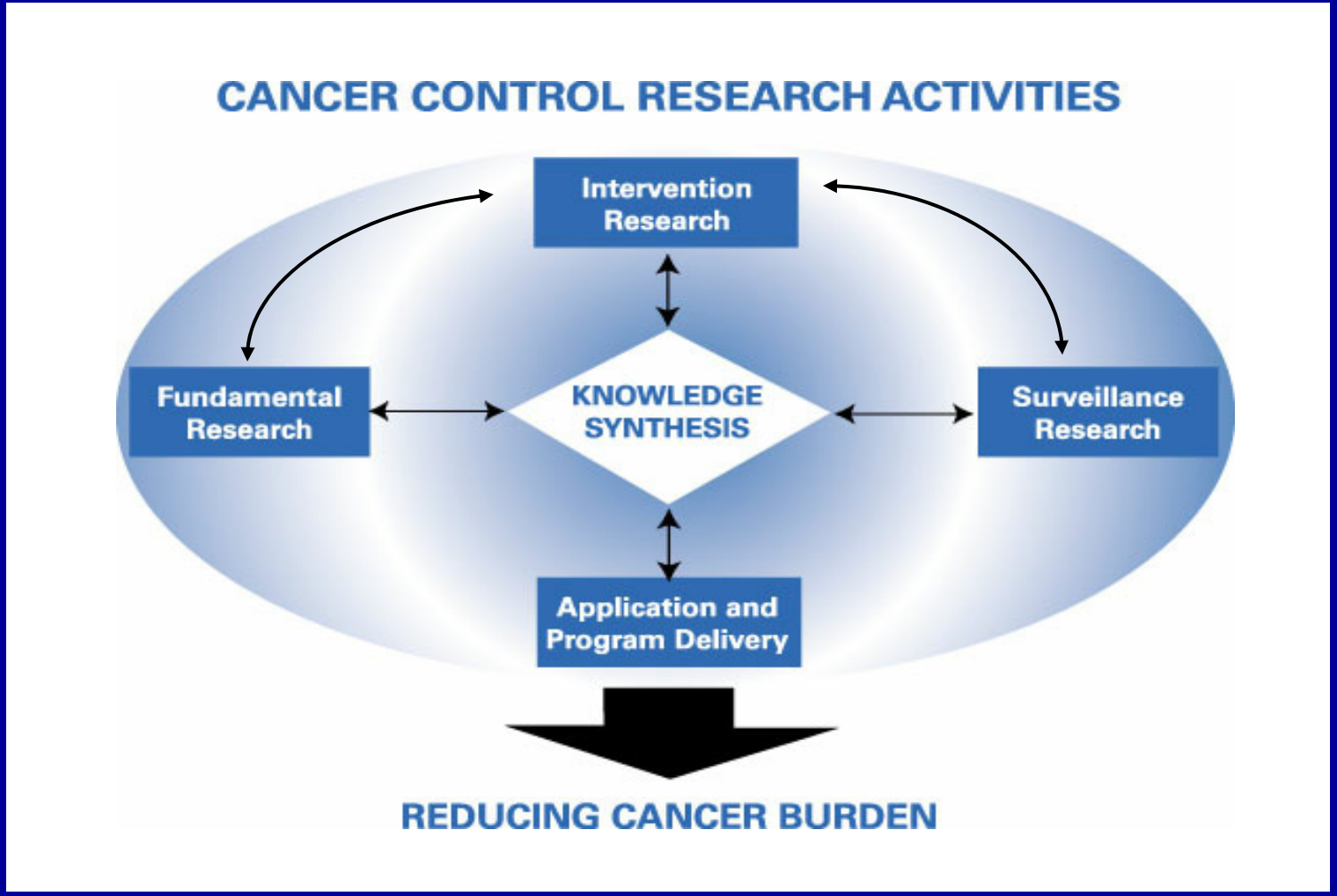
- Communications
- Surveillance
- Social Determinants of Health Disparities
- Genetic Testing
- Decision-Making
- Dissemination of Evidence-Based Interventions
- Quality of Cancer Care
- Epidemiology
- Measurement

Adapted from David B. Abrams, Brown University School of Medicine.


Cellular
Biological
Psychological
Sociocultural
Societal
Risk Profiles
Screening Instruments
Tailored Interventions


Basic Science
Measures Methods
Preclinical Trials-Lab
Clinical Trials - Efficacy
Diffusion Studies - Efficiency
Policy
Fundamental Mechanisms
Translational Research -- Applications

Dynamic Model of Cancer Control Research



Adapted from the Advisory Committee on Cancer Control, National Cancer Institute of Canada, 1994.

Translational Research

- Research that uses knowledge of human biology to develop and test the feasibility of *cancer-relevant interventions in humans* and/or determines the biological basis for observations made in individuals with cancer or *in populations at risk of cancer.*

Primary UCSF Campus Sites, Cancer-related Activities

UCSF/Parnassus

UCSF/Mt. Zion

lab research building

SFGH Medical Center

VAMC/San Francisco

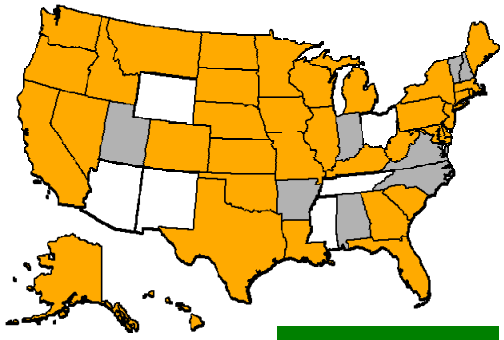
UCSF/Mission Bay

Helen Diller Family Cancer Rsch. Bldg.

Cancer Registries and Information Systems

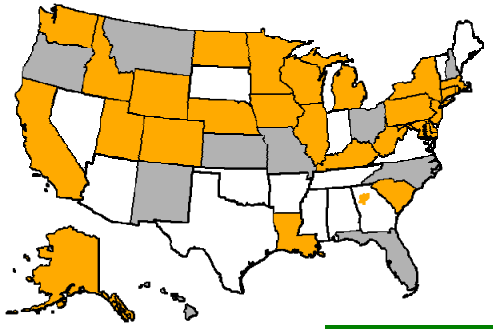
Improved coverage for population-based cancer incidence

NAACCR 1999-2003
82%

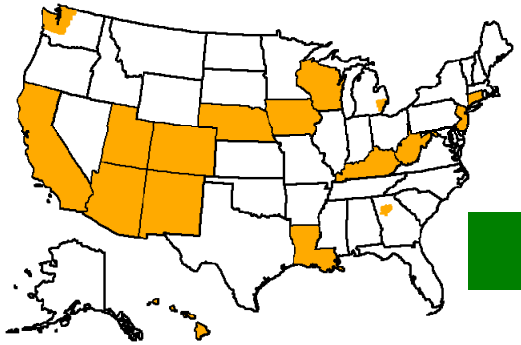


2003

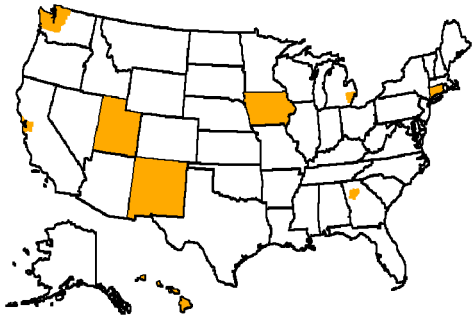
NAACCR 1995-2003
73%



1999



1995



SEER 1975- 2003
10%

Cancers, not Cancer

Cancer Incidence Trends

What's Going Up

- All Sites (f)
- Prostate
- Lung (f)
- Kidney & Renal
- Leukemia
- Melanoma
- Thyroid
- Myeloma

What's Going Down

- Lung (m)
- Colon & Rectum
- Oral Cavity & Pharynx
- Stomach
- Uterine Corpus
- Ovary
- Cervix

What's Stable

- All Sites (m)
- Breast (f)
- Pancreas (m, f)

Cancer Mortality Trends

What's Going Up

- Lung (f)
- Esophagus (m)
- Liver & IBD (m, f)

What's Going Down

- All Sites
- Lung (m)
- Colon & Rectum
- Breast (f)
- Pancreas (m)
- Prostate
- Leukemia
- NHL

What's Stable

- Ovary
- Pancreas (f)
- Kidney & Renal (m)
- Melanoma (m)

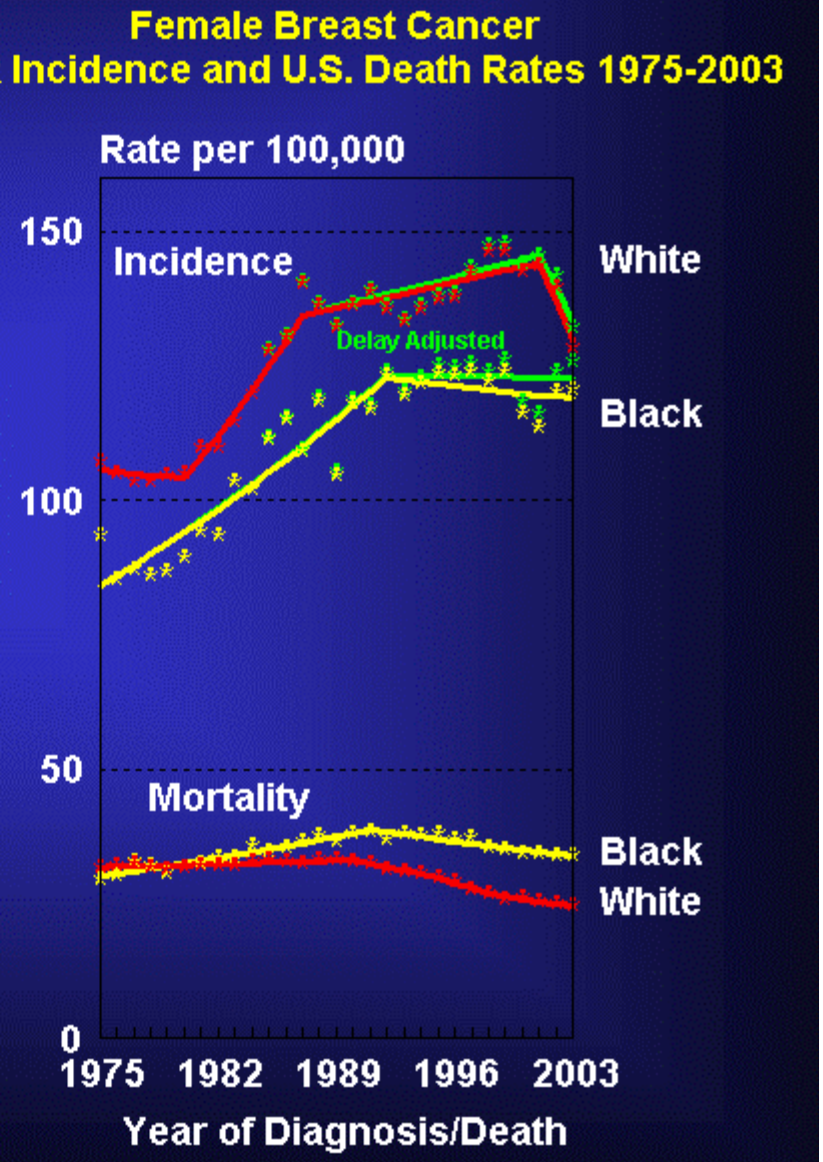
Female Breast Cancer, 1975-2003

Incidence

- Incidence rates for white women higher than for black women
- Decline (non-significant) for white women; rates level for black women

Declining mortality

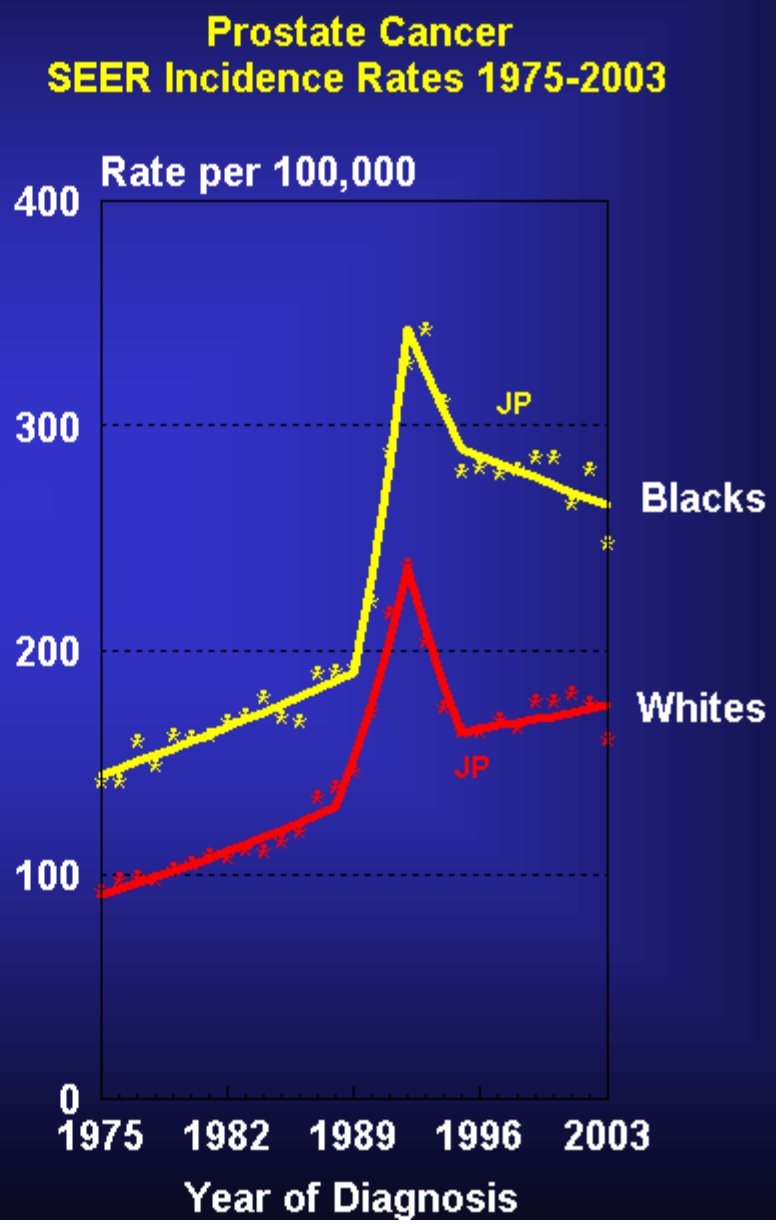
- Death rates for black women higher than for white women
- Mortality decreasing for both
- Differential in mortality widens



Prostate Cancer

Incidence:
Increase among white men and decrease of rate for black men

Black men have higher rates than white men



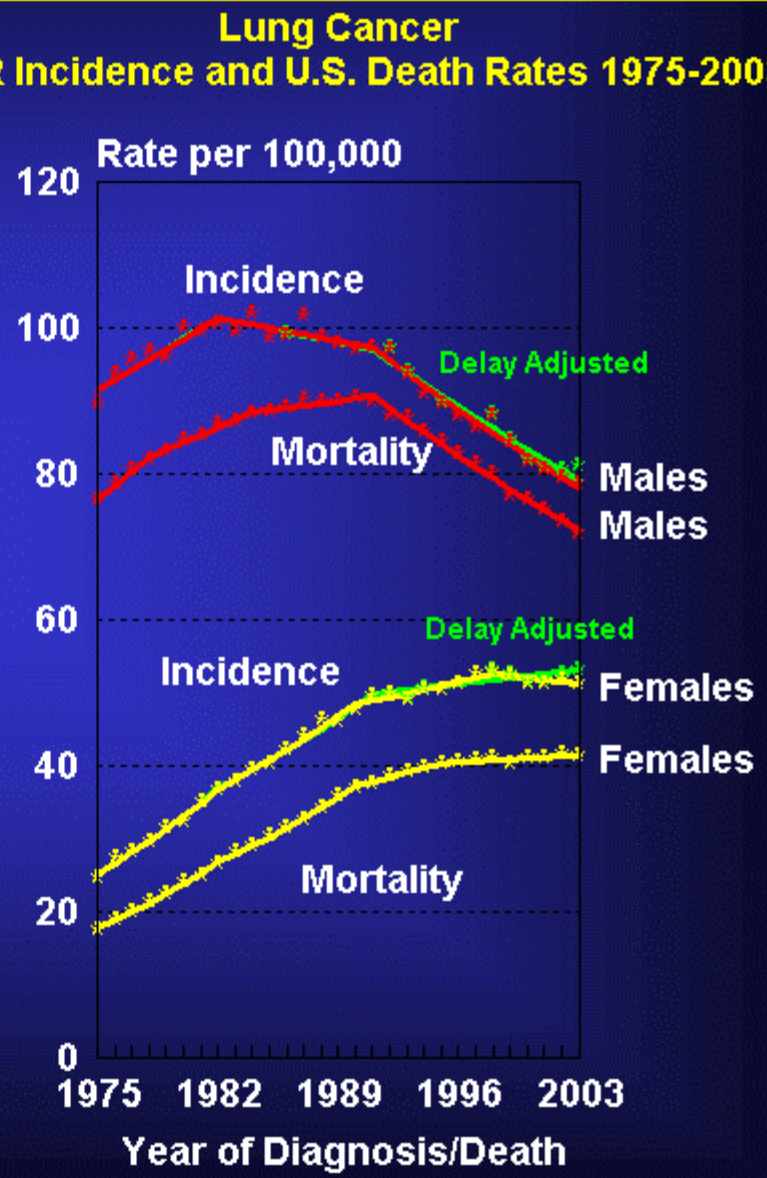
Lung Cancer, 1975-2003

Incidence

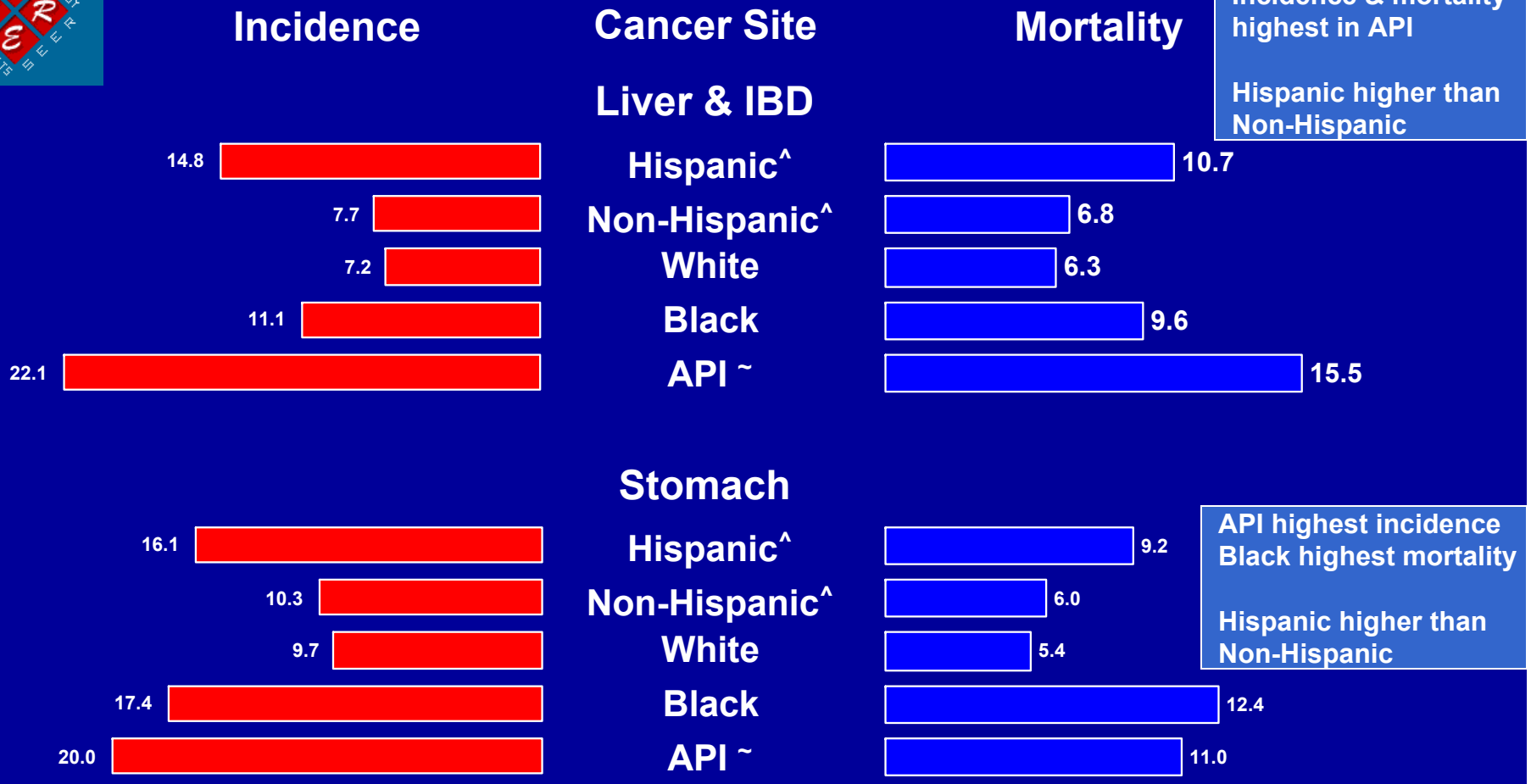
- Decline began in 1982 for men
- Long term increase for women is slowing (delay adjusted)

Mortality

- Decline for men since 1991
- Increase for women is slower since 1995



NAACCR Incidence and U.S. Death Rates#, 1999-2003, by Race/Ethnicity
Males, Liver & IBD, Stomach



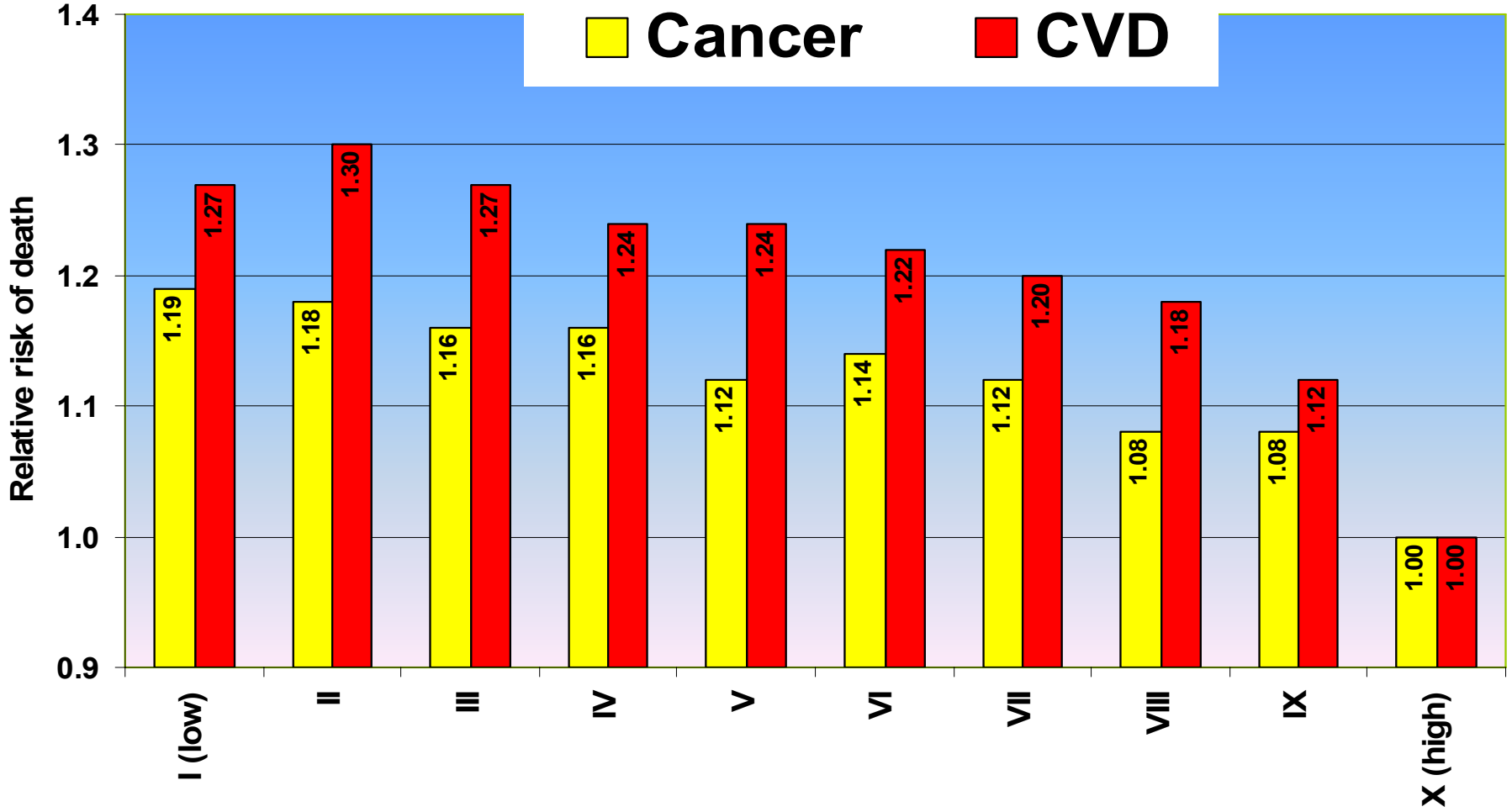
Source: Tables 4 & 5, Annual Report to the Nation on the Status of Cancer 1975-2003, Featuring Cancer Among U.S. Hispanic/Latino Populations. Cancer . October 15, 2006. Vol. 107, Issue 7. **SEER and NPCR data reported to NAACCR**.

\# Rates are per 100,000 and age-adjusted to the 2000 U.S. Std Population (19 age groups – Census P25-1130).

^ Hispanic and Non-Hispanic are not mutually exclusive from White, Blacks and Asian/Pacific Islanders.

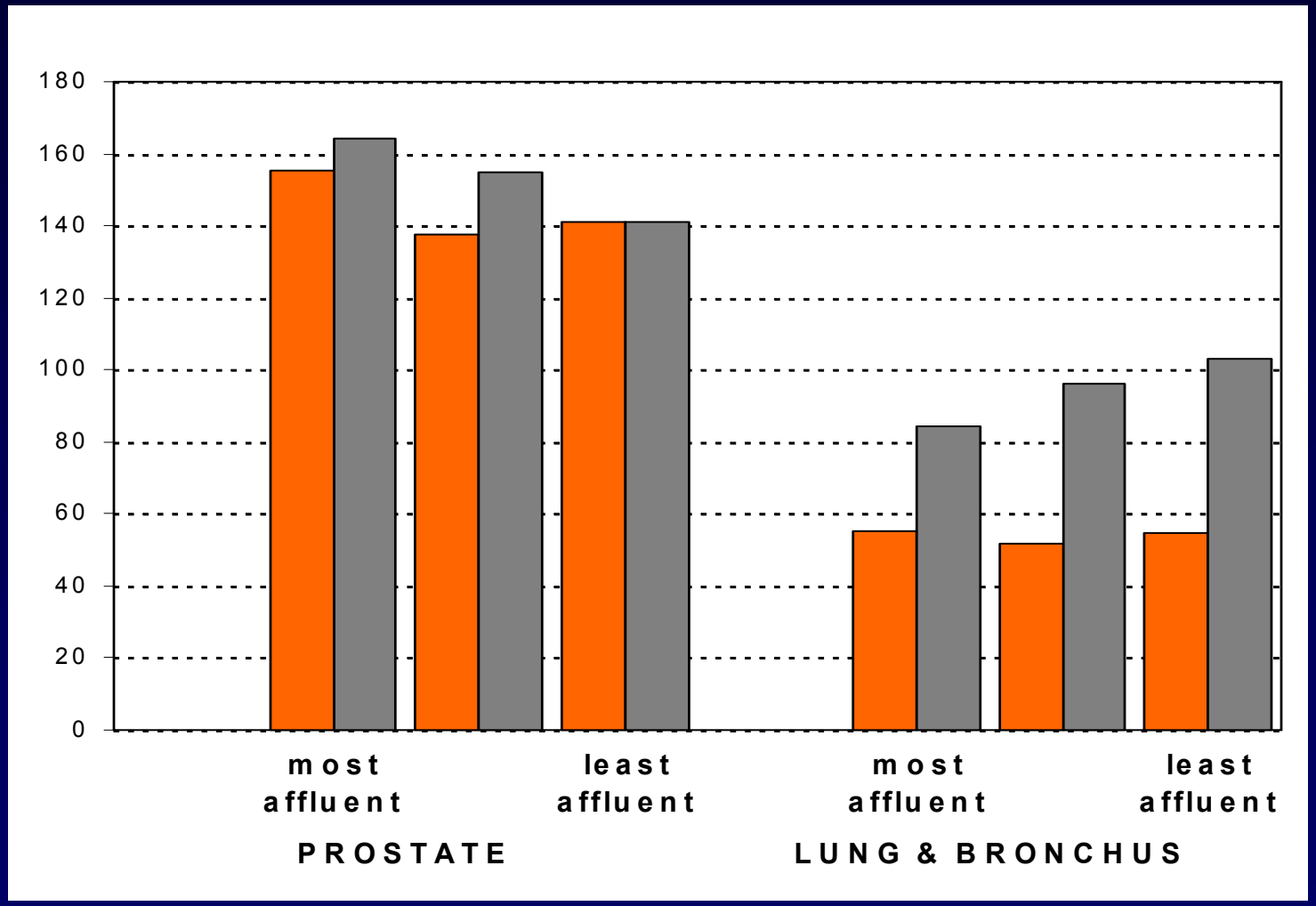
~ API = Asian/Pacific Islanders

Population Socioeconomic Gradient in US Cancer and Cardiovascular Mortality, 1990-98



Adjusted for age, racial/ethnic composition, household size, and urbanization. All relative risks are statistically significant at p<.001.

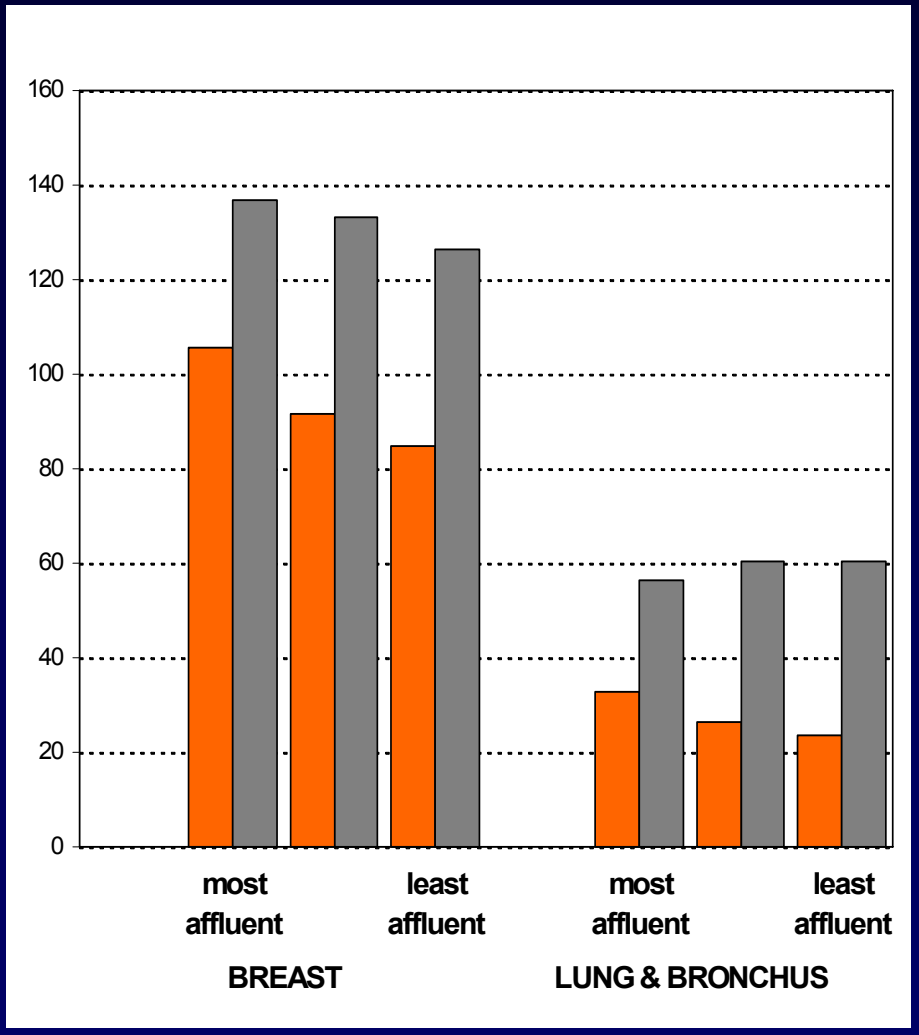
ncidence rates by county-level poverty measure - Me

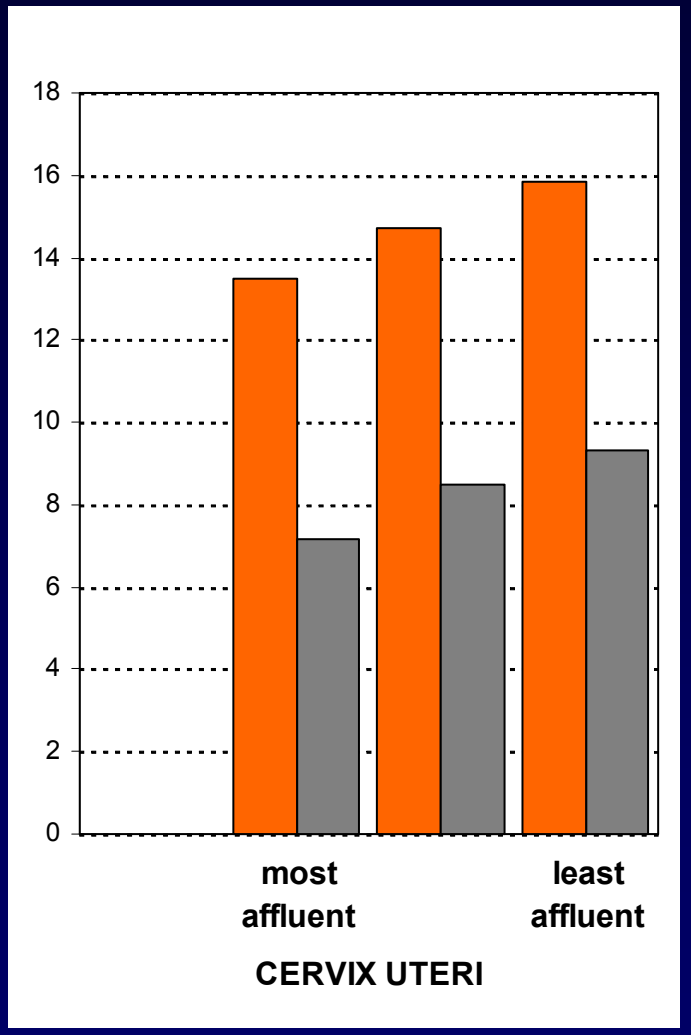


Poverty categories: <10% below poverty (most affluent), 10-19%, 20+% (least affluent).
Average annual rates for 1999-2003.

cidence rates by county-level poverty measure - Wor

Latina Non-Latina White





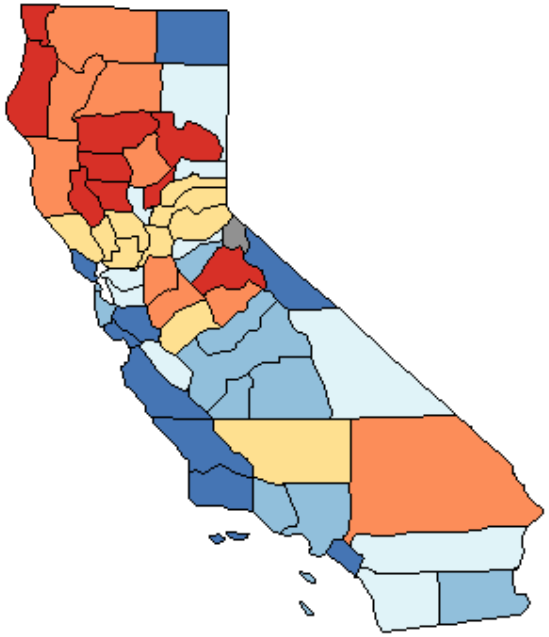
Poverty categories: <10% below poverty (most affluent), 10-19%, 20+% (least affluent).

Average annual rates for 1999-2003

Age-Adjusted Death Rates for California, 1998 - 2002

All Cancer Sites

All Races, Both Sexes, All Ages



Age-Adjusted Annual Death Rate (Deaths per 100,000)

Quantile Interval

- 206.9 to 245.2
- 195.1 to 206.8
- 186.4 to 195.0
- 179.2 to 186.3
- 173.5 to 179.1
- 154.5 to 173.4
- Suppressed[1]

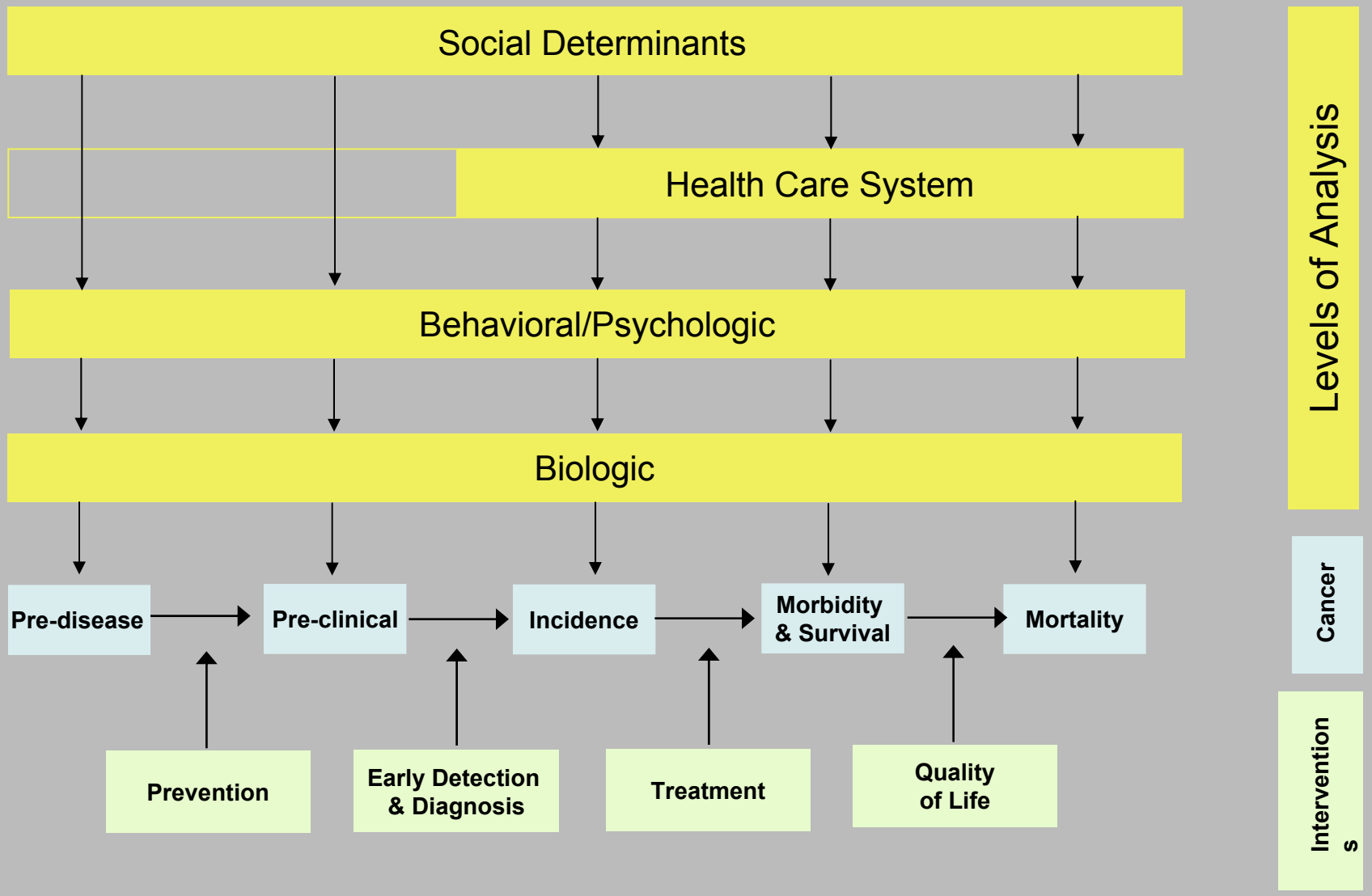
United States
Rate (95% C.I.)
197.8 (197.6 - 198.1)

California
Rate (95% C.I.)
180.9 (180.2 - 181.6)

Healthy People 2010
Goal 03-01
159.9

Created by statecancerprofiles.cancer.gov on 10/05/2005 8:47 pm.
State Cancer Registries may provide more current or more local data.
[1] Data have been suppressed to ensure confidentiality and stability of rate estimates.
Healthy People 2010 Goal 03-01 : Reduce the overall cancer death rate to 159.9.
Healthy People 2010 Objectives provided by the Centers for Disease Control and Prevention.
Source: Death data provided by the National Vital Statistics System public use data file. Death rates calculated by the National Cancer Institute using SEER*Stat. Death rates are age-adjusted to the 2000 US standard population by 5-year age groups. Population counts for denominators are based on Census populations as modified by NCI.

Social Determinants of Cancer



What are the disciplines primarily involved at each level?

Social Determinants

- Sociologists
- Anthropologists
- Epidemiologists
- Economists
- Political Scientists
- Systems theorists
- Community Psychology

Health Care Systems

- Clinicians
- Health Services Researchers
- Outcomes Researchers
- Health educators
- Hospital Administrators

Behavioral/Psychological

- Behavioral Scientists
- Epidemiology
- Psychology
- Health education/promotion

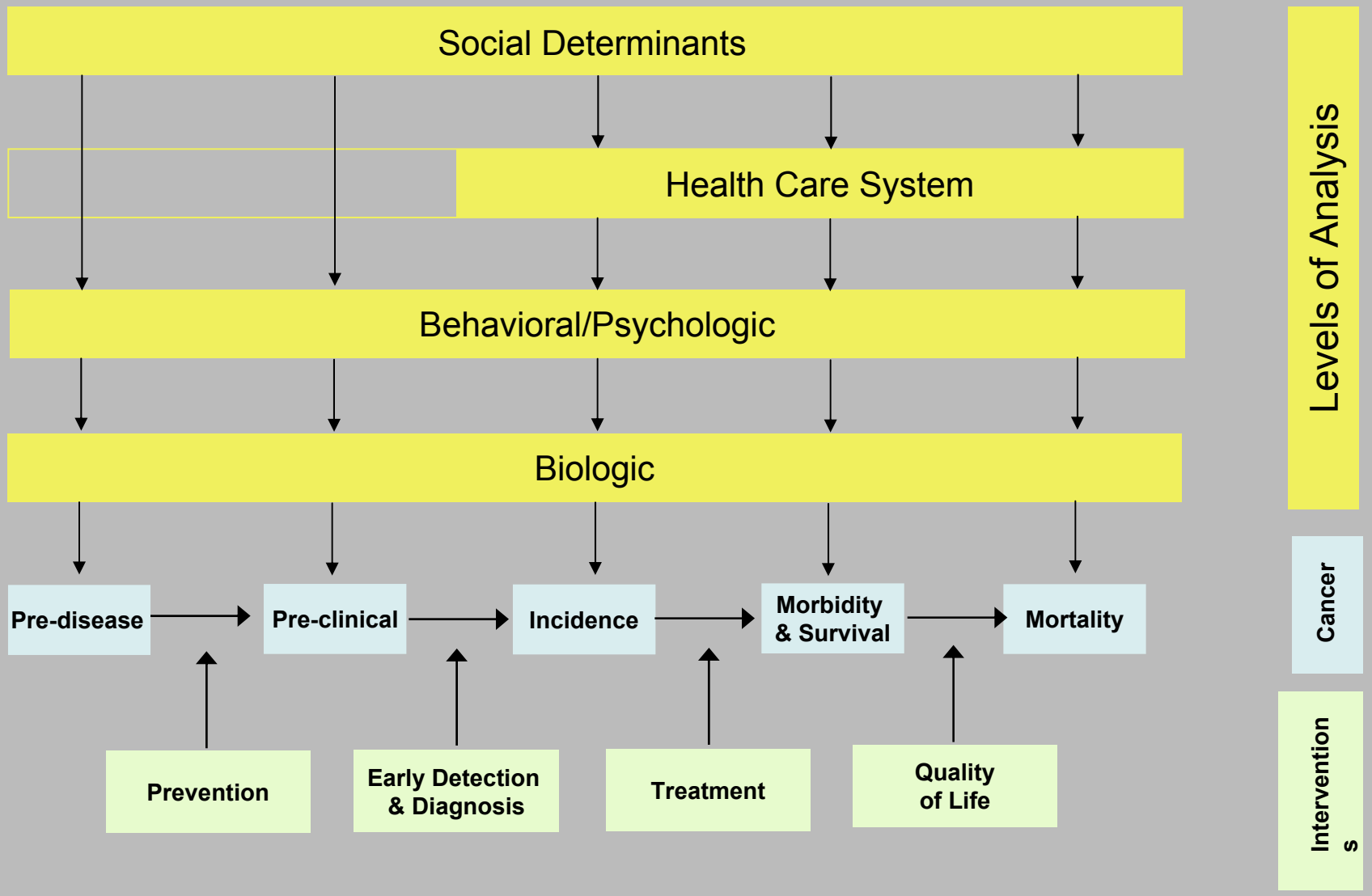
Basic

- Genetics
- Molecular and Cell biology
- Immunology
- Biochemistry
- Imaging
- Pharmacology

‘Problem’ Centered Approach

- Examples: Tobacco control, obesity reduction, pharmacogenomics, clinical trials accrual.
- Who defines the problem?
- How to sustain funding support?
- How to organize and lead?
- How to change the academic paradigm?

Social Determinants of Cancer



What are the relevant mechanisms and possible interventions?

Social Policy

- Tobacco statutes
- Farm subsidies
- Social services
- Employee benefits
- Health insurance
- Income distribution - taxes
- Physical education in schools

Sociocultural Factors

- Culture
- Immigration
- Discrimination/Racism
- Socioeconomic Status

Physical Environment

- Industrial pollution/contamination
- Environmental justice
- Built environment
- Workplace

Health Systems

- Access
- Health insurance
- Availability
- Quality of Care

Behavior

- Tobacco use
- Diet, weight and physical activity
- Sun exposure
- Screening

Biology

- Multiple aspects
  - Evading apotosis
  - Self-sufficiency in growth signals
  - Insensitivity to anti-growth signals
  - Sustained angiogenesis
  - Tissue invasion and metastasis
  - Limitless replication potential
    - » Hanahan & Weinberg, 2000

Implications for Cancer Control

- Solutions based only on discoveries in biology are inadequate.
- Individual or group behavioral change alone unlikely to be sufficient
- Cancer provides many opportunities to explore and understand social influences
- Best approach may be a TDS one that facilitates integrated discovery and application at multiple levels.

Fin

The Social Determinants of Cancer: A Challenge for Transdisciplinary Science

Robert A. Hiatt

Nancy Breen

The Science of Team Science

Bethesda, MD

October 30-31,2006