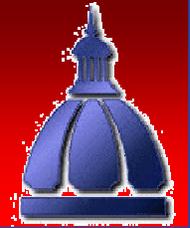


Progress in the Prevention, Early Detection, and Treatment of Cancer

Martin D. Abeloff

Marion I. Knott Professor and Director
Sidney Kimmel Comprehensive Cancer Center
at Johns Hopkins

November 15, 2006

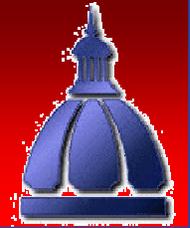


Impact of Cancer in the U.S.*

- About 1 in 2 men and 1 in 3 women will develop cancer in their lifetimes
- 1,399,790 new cancer cases in 2006
- 564,830 cancer deaths in 2006
- 77% of all cases are diagnosed after age 55

American Cancer Society, Cancer Facts & Figures 2004 and 1997; (citing NIH data)

Jemal A et al., CA Cancer J Clin CA 56: 106-130 (2006)



Cost of Cancer in the U.S.

(includes estimated costs of direct medical expenses, morbidity, and lost productivity due to premature death)

- **\$104B** in 1997
- **\$190B** in 2003
- **Substantially more than \$200B** in 2010



Cancer now top killer of Americans under 85

Heart disease drops to No. 2; deaths from both illnesses decreasing

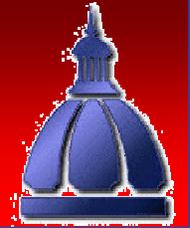
ASSOCIATED PRESS

For the first time, cancer has surpassed heart disease as the top killer of Americans under 85, health officials said yesterday.

Cancer death rates have declined about 1 percent per year since 1999, thanks to earlier detection, prevention efforts and better treatments, experts said.

Deaths from colon cancer and from lung cancer in men are particularly striking.

"They're dropping so fast that they exceed the impact of aging," which increases the likelihood of developing cancer. Five

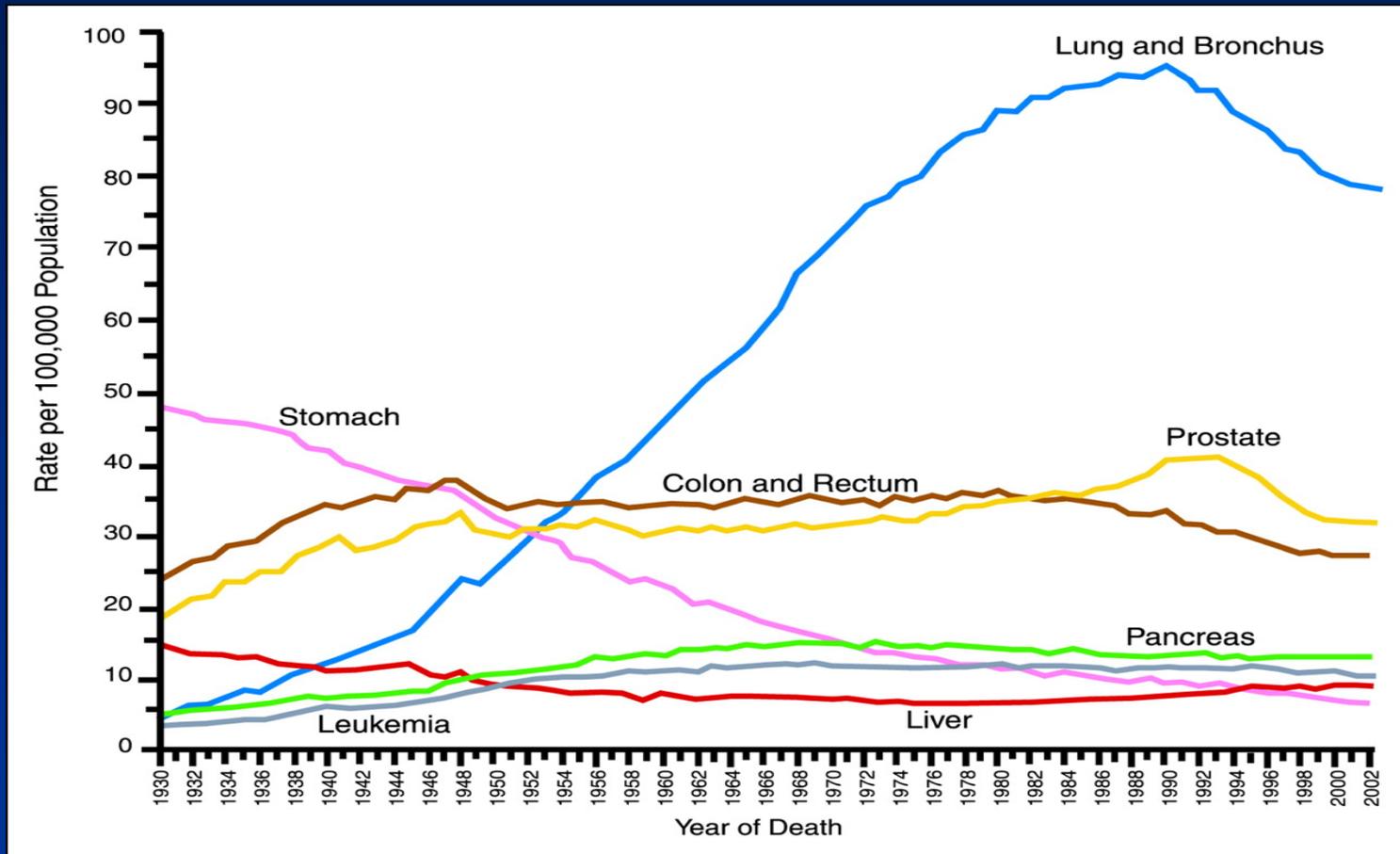


Cancer Survivors in the U.S.

- 11.8 million cancer survivors today
- Cancer survival rates approach 64% in adults (up from 40% in 1971)
- Breast, prostate, and colorectal cancer survivors comprise over 50% of all cancer survivors
- 61% of cancer survivors are age 65 and older
- The number of survivors is expected to increase with further improvements in early detection, treatment and prevention



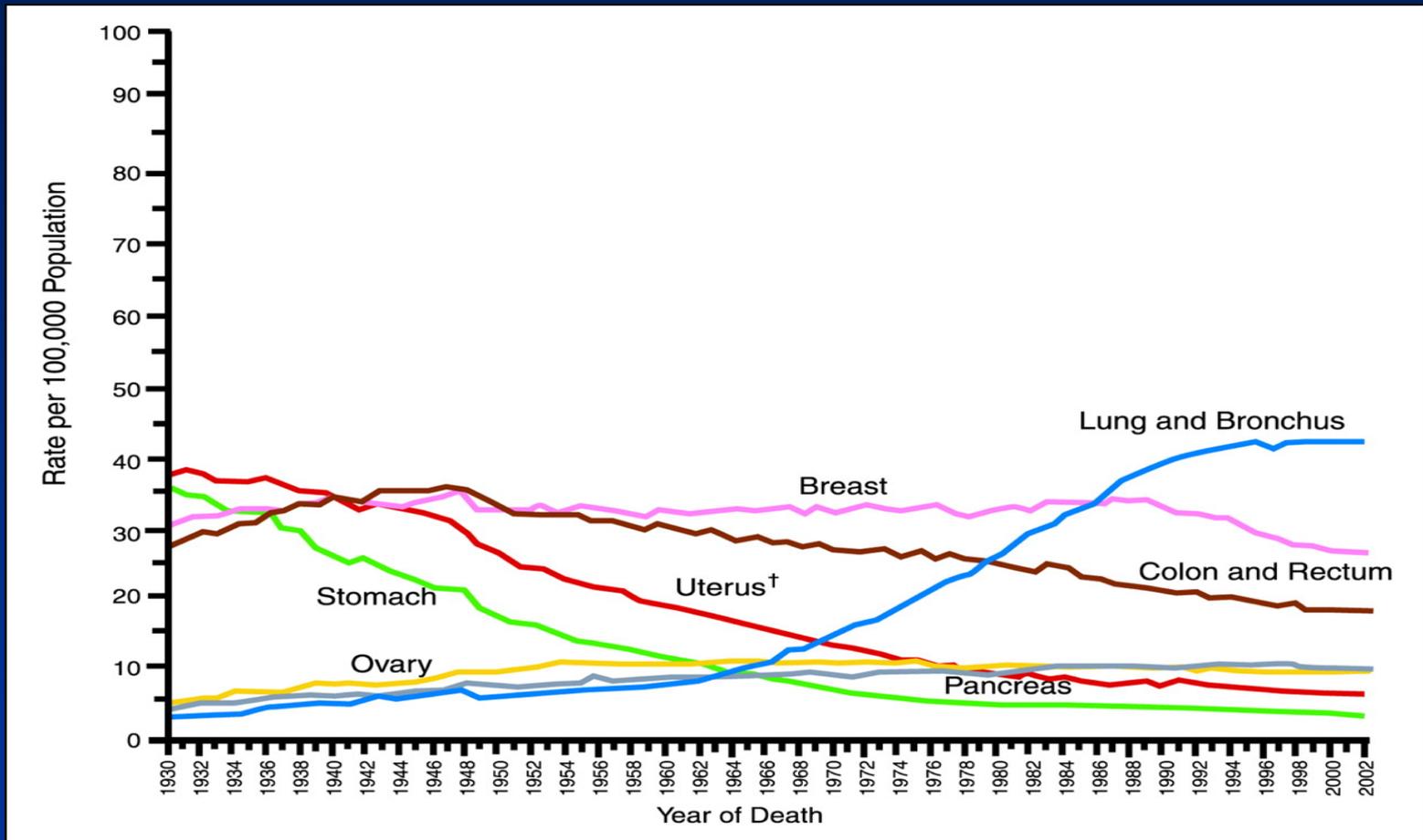
Cancer Statistics in U.S. Men - 2006



From Jemal, A. et al. CA Cancer J Clin 2006;56:106-130
Copyright ©2006 American Cancer Society



Cancer Statistics in U.S. Women - 2006



From Jemal, A. et al. CA Cancer J Clin 2006;56:106-130
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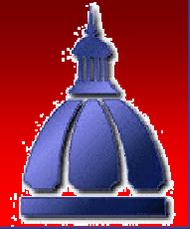
Major Advances in Cancer Prevention, Screening, Diagnosis, and Treatment during the last 50 years

- Tobacco recognized as a dominant etiology and prevention target
- Advances in early diagnosis of breast, colorectal, cervical, and (?) lung cancer
- Advances in surgery, radiation therapy, systemic therapies, imaging, and supportive care
- Revolution in biologic sciences
 - Molecular and cellular biology
 - Genomics; proteomics
 - Immunology



Major Advances in Cancer Prevention, Screening, Diagnosis, and Treatment during the last 50 years - continued

- Genetics, environment, infection-inflammation emerge as etiologies
- Prevention
 - Primary and secondary including chemoprevention (breast cancer) and cancer vaccines (cervical cancer)



The Future

- Prevention
- Earlier Diagnosis
- Greatly enhanced predictors and prognosticators with gene profiling and proteomics
- Molecularly targeted therapies including immunotherapy
- Enhance understanding and care of the elderly and underserved minorities



A draft blueprint of breast and colon cancer genomes

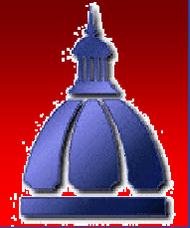
Scienceexpress

Research Article

The Consensus Coding Sequences of Human Breast and Colorectal Cancers

Tobias Sjöblom,^{1*} Siân Jones,^{1*} Laura D. Wood,^{1*} D. Williams Parsons,^{1*} Jimmy Lin,¹ Thomas Barber,¹ Diana Mandelker,¹ Rebecca J. Leary,¹ Janine Ptak,¹ Natalie Silliman,¹ Steve Szabo,¹ Phillip Buckhaults,² Christopher Farrell,² Paul Meeh,² Sanford D. Markowitz,³ Joseph Willis,⁴ Dawn Dawson,⁴ James K. V. Willson,⁵ Adi F. Gazdar,⁶ James Hartigan,⁷ Leo Wu,⁸ Changsheng Liu,⁸ Giovanni Parmigiani,⁹ Ben Ho Park,¹⁰ Kurtis E. Bachman,¹¹ Nickolas Papadopoulos,¹ Bert Vogelstein,^{1†} Kenneth W. Kinzler,^{1†} Victor E. Velculescu^{1†}

Scienceexpress / www.scienceexpress.org / 7 September 2006 / Page 1 / 10.1126/science.1133427



Summary of breast and colon cancer genome analysis

Breast and colon cancer samples (11 each)



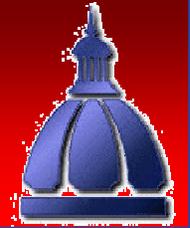
13,023 best known genes
465,000,000 bp sequence



816,986 potential mutations

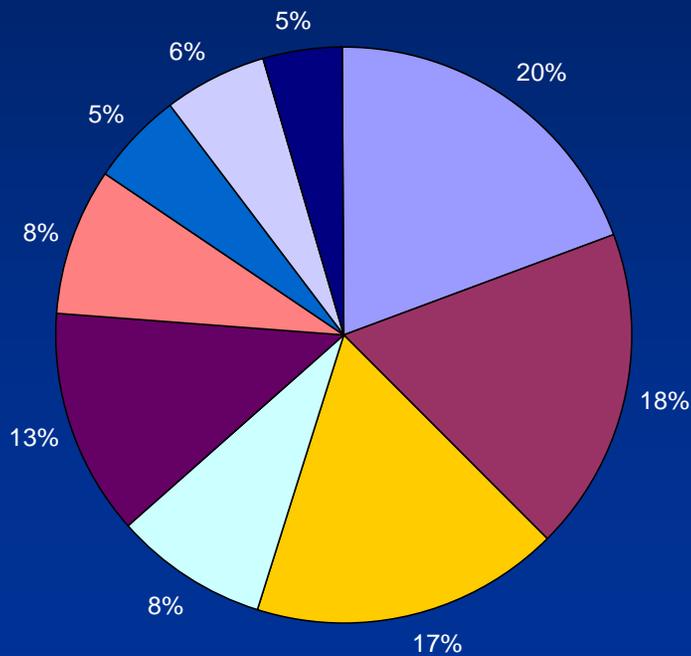


1672 *bona fide* somatic mutations
189 mutated Candidate Cancer (CAM) genes¹²

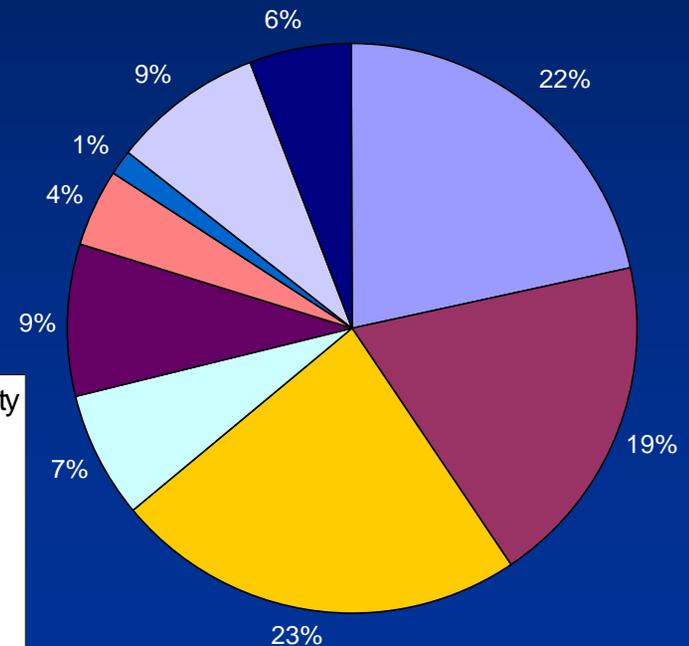


CAN-genes are involved in important cellular processes

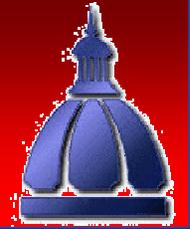
Breast cancers (n=122 genes)



Colon cancers (n=69 genes)

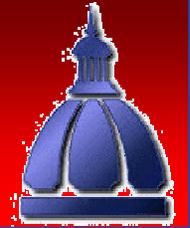


- Cellular adhesion and motility
- Transcriptional regulation
- Signal transduction
- Intracellular trafficking
- Transport
- Cellular metabolism
- RNA metabolism
- Other
- Unknown



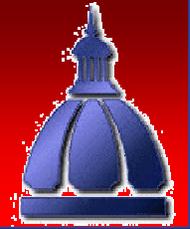
Practical applications of cancer genome blueprint

- Foundation for future research in breast and colon cancer
- Useful for developing non-invasive diagnostic tests for cancer
- Potential targets for therapies (small molecules, peptides, and immunotherapies)



Societal Challenges to Reducing Morbidity and Mortality from Cancer

- Factors underlying health disparities
- Inadequate health care system
- Ineffective response from health care and research community
- Lack of commitment from local, state, and federal government



“Poverty is a Carcinogen”

Dr. Samuel Broder, 1991



Lung and Bronchus Cancer Mortality Rates

By Year of Death - All Races, Males and Females

2015 Goals - 50% Reduction

