Reducing the incidence and mortality of major cancer types by drug? Facts and hopes

Introduction

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The Lifetime Probability of Developing Cancer for Women, 2006-2008*

Site	Risk
All sites†	1 in 3
Breast	1 in 8
Lung & bronchus	1 in 16
Colon & rectum	1 in 20
Uterine corpus	1 in 38
Non-Hodgkin lymphoma	1 in 51
Urinary bladder‡	1 in 87
Melanoma§	1 in 55
Ovary	1 in 71
Pancreas	1 in 69
Uterine cervix	1 in 147

* For those free of cancer at beginning of age interval.
† All Sites exclude basal and squamous cell skin cancers and in situ cancers except urinary bladder.
‡ Includes invasive and in situ cancer cases
§ Statistic for white women.
Source: DevCan: Probability of Developing or Dying of Cancer Software, Version 6.5.0 Statistical Research and Applications Branch, NCI, 2011.

The Lifetime Probability of Developing Cancer for Men, 2006-2008*

Site	Risk
All sites†	1 in 2
Prostate	1 in 6
Lung and bronchus	1 in 13
Colon and rectum	1 in 19
Urinary bladder‡	1 in 26
Melanoma§	1 in 36
Non-Hodgkin lymphoma	1 in 43
Kidney	1 in 51
Leukemia	1 in 64
Oral Cavity	1 in 69
Stomach	1 in 91

* For those free of cancer at beginning of age interval.

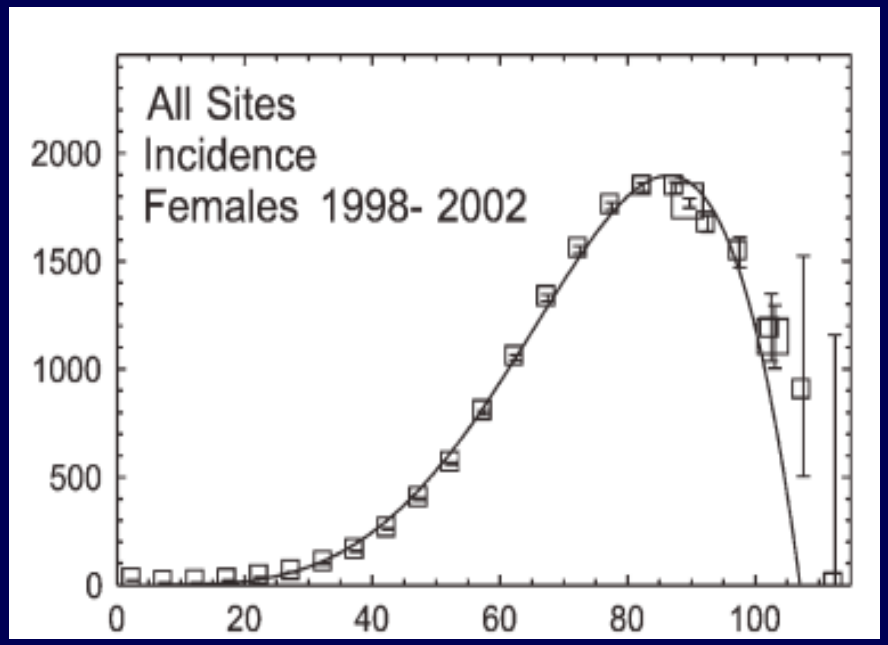
† All Sites exclude basal and squamous cell skin cancers and in situ cancers except urinary bladder.

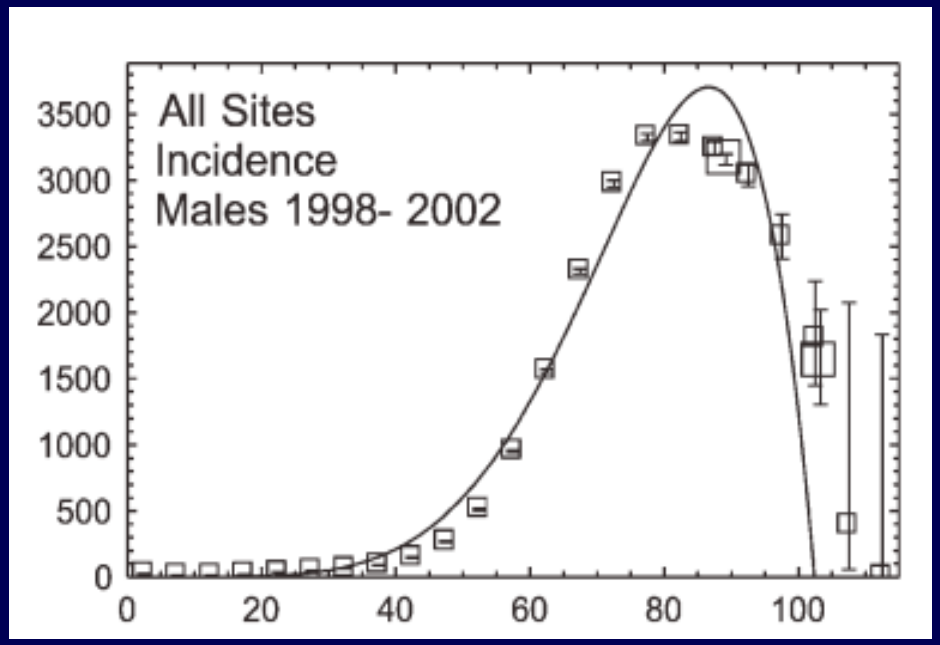
‡ Includes invasive and in situ cancer cases

§ Statistic for white men.

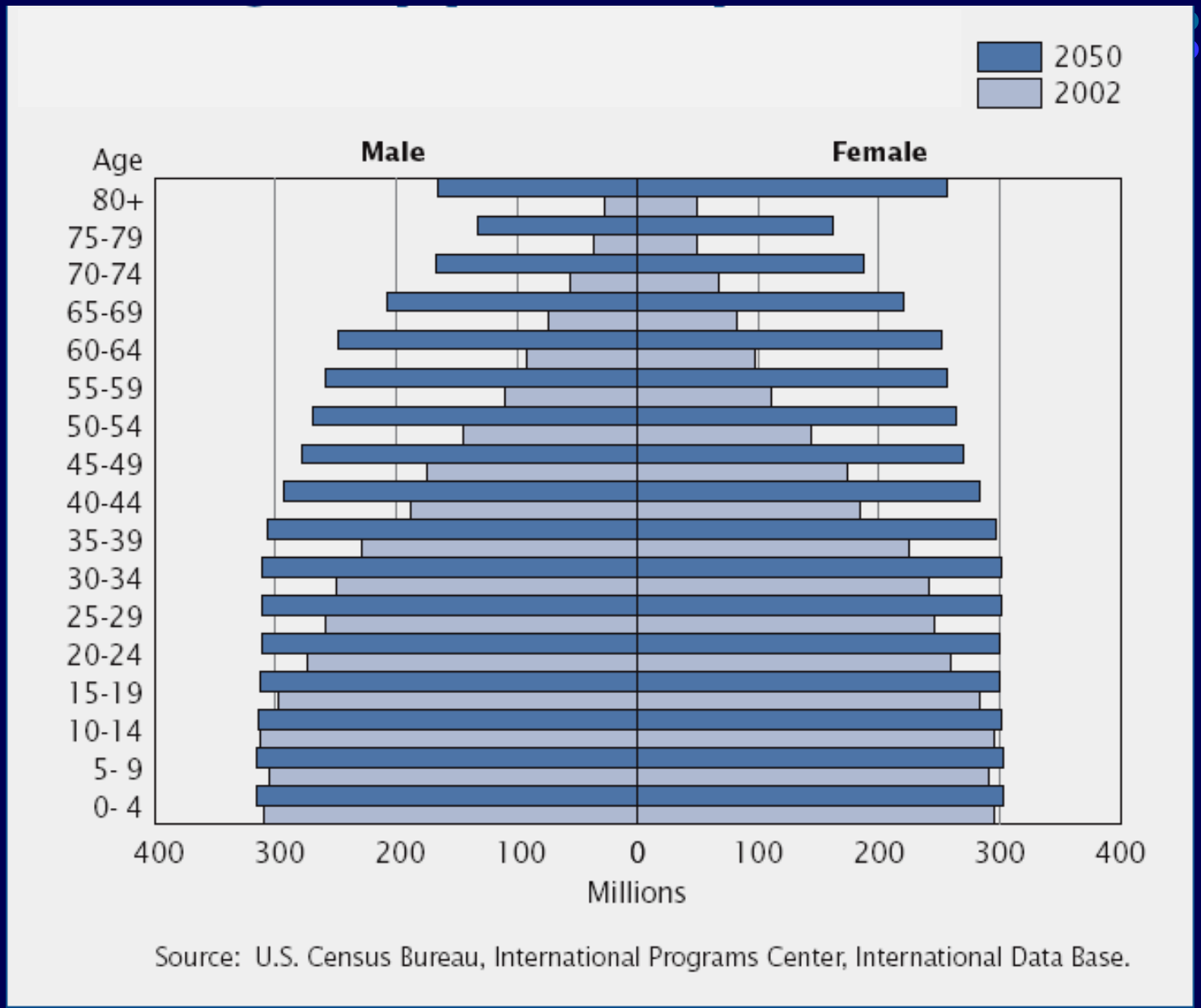
Source: DevCan: Probability of Developing or Dying of Cancer Software, Version 6.5.0 Statistical Research and Applications Branch, NCI, 2011.

Cancer is a Disease of the Elderly
Incidence Peaks at Age 80-95





The Globe's Population is Expected to Grow at Progressively Higher Rates at Higher Ages

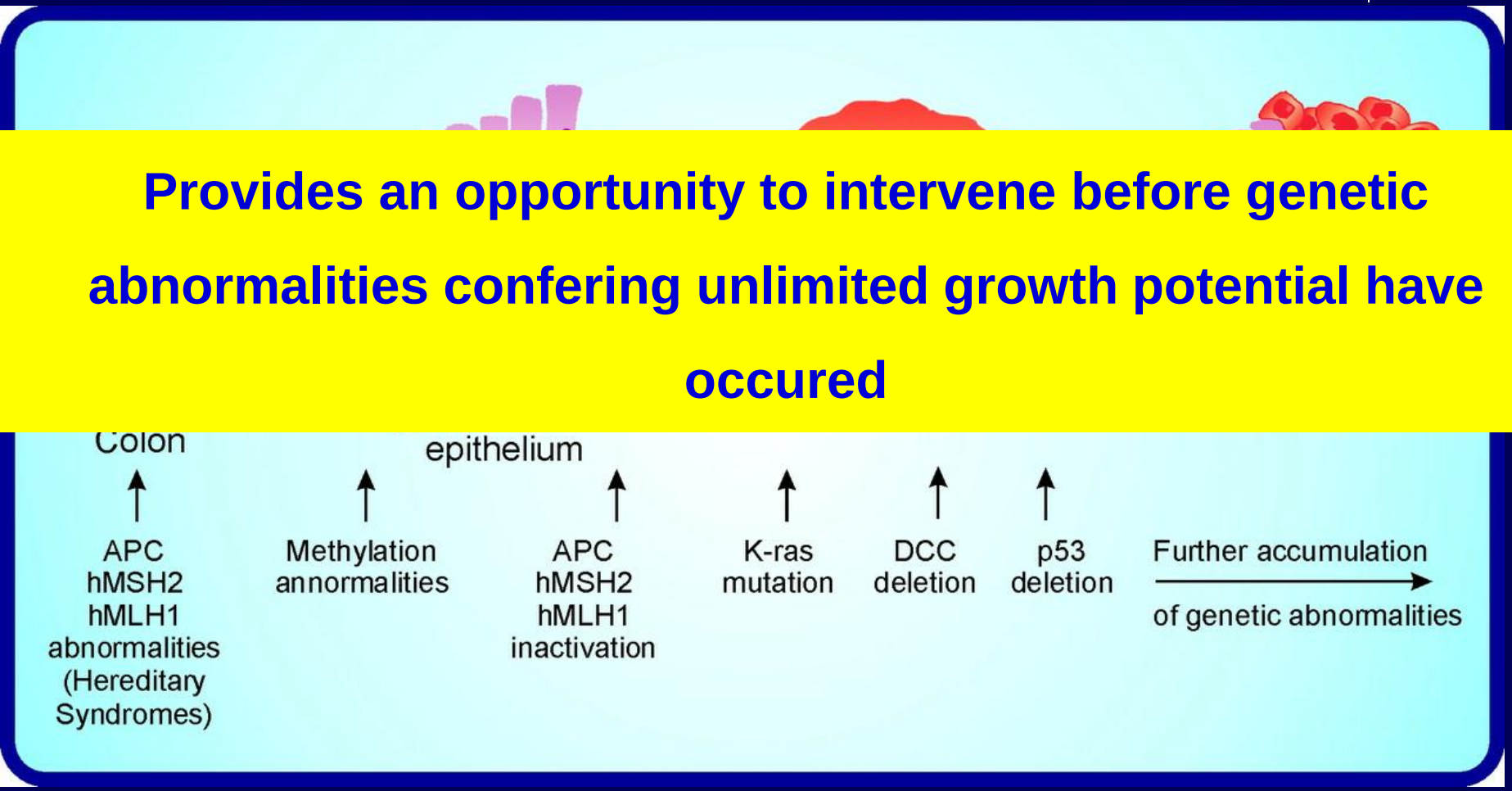


Cancer burden is growing

Year	2002	2050	% Increase 2002 - 2050
World Population	6.3 Billion	9.1 Billion	~ 50%
Elderly (> 65years)	0.426 Billion	1.550 Billion	~ 380%
Cancer Pts	10 Million	35 Million	350%

US Census Bureau, 2005, Pompei F & Wilson R, Human an Ecological Risk Assessment

Carcinogenesis is a multistep, multigenetic process usually taking years until cancer evolves



Provides an opportunity to intervene before genetic abnormalities confering unlimited growth potential have occured

Options for cancer prevention

Measures already available/known today

- Tobacco control
- Dietary measures
- UV-radiation exposure
- Control of infections
  - Helicobacter pylori
  - HPV,HBV,HCV,HHV-8
  - HTLV-1
  - Schistosoma haematobium
  - Liver flukes

  } 1.600.000 cases/year
- Environmental carcinogens
- Chemoprevention } ~ 1.000.000 cases/year

*conservative estimate for breast (RR: 30%), CRC (RR20%) and prostate cancer (RR: 20%)

Chemoprevention

Use of drugs, biologics or nutrients to inhibit, delay or reverse carcinogenesis

Sporn, 1976

Chemoprevention of Cancer

- Presently, chemoprevention is limited to anti-hormonal and anti-inflammatory drugs
  - Tamoxifen, Raloxifen, Exemestane, Finasteride,
  - Dutasteride, COX-2 inhibitors, Selenium
- The era of molecular, genetic and epigenetic medicine will reveal new targets for chemopreventive drugs
- …and new drugs will be developed

Chemoprevention of Cancer

- Chemoprevention will become one of the most important specialties in oncology