

# National Cancer Advisory Board

## The Burden of Cancer in Immunosuppressed People in the U.S.

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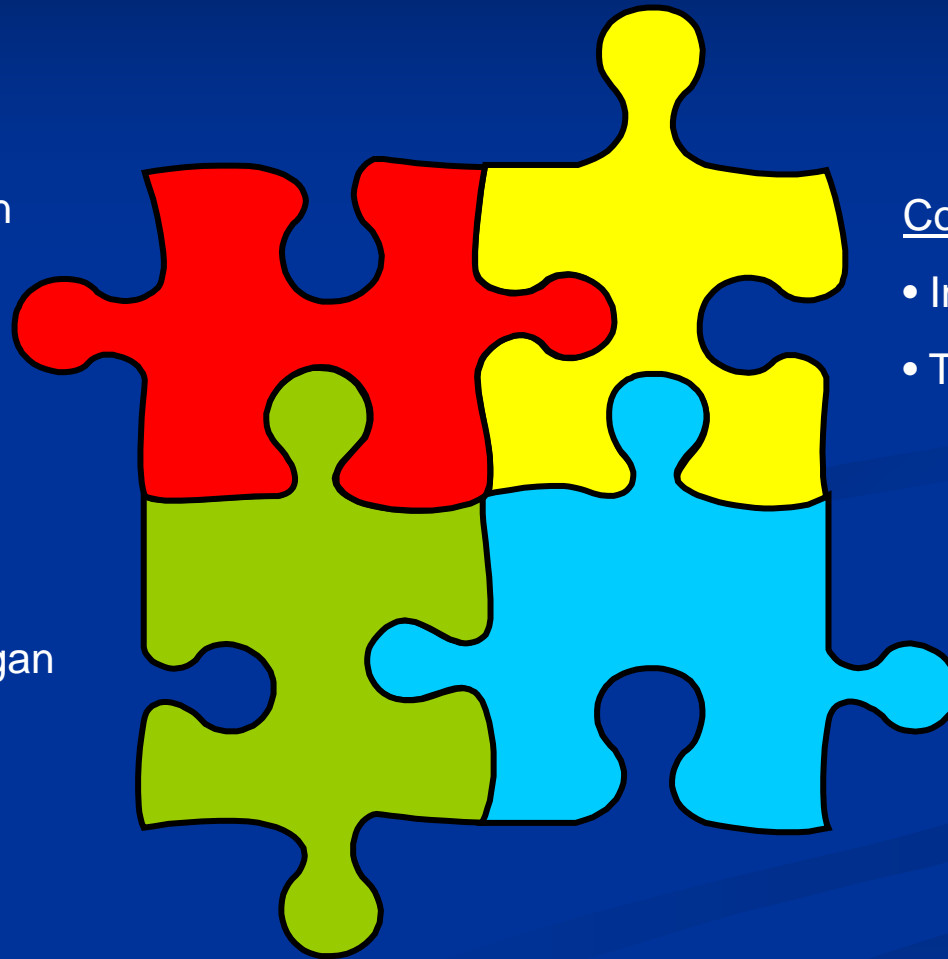
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# Background

- Immunosuppressed people have increased risk of cancer.
  - Loss of control of oncogenic viruses
  - Chronic inflammation
- HIV infection and AIDS
  - Onset of epidemic in 1980
  - Since 1996, use of highly active antiretroviral therapy (HAART) has prolonged life.
  - 1.1 million people in the U.S. living with HIV
- Solid organ transplantation
  - Life-saving therapy for end-stage organ disease
  - 27,000 transplants per year in U.S.
  - Recipients take immunosuppressive medications to prevent graft rejection.

# Cancer in HIV and transplant

Immunosuppression  
Inflammation



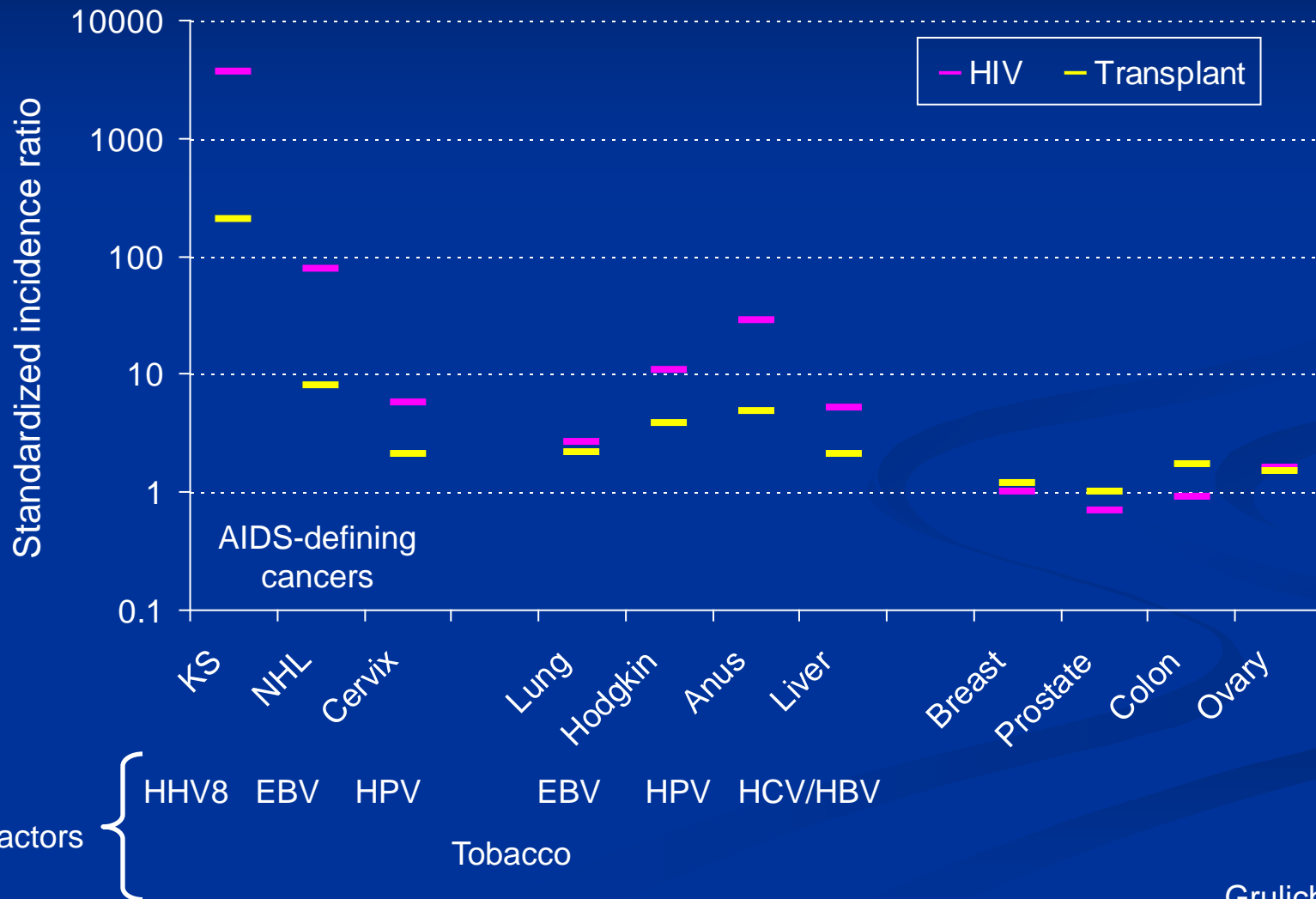
Cofactors

- Infectious agents
- Tobacco, alcohol

Transplanted organ

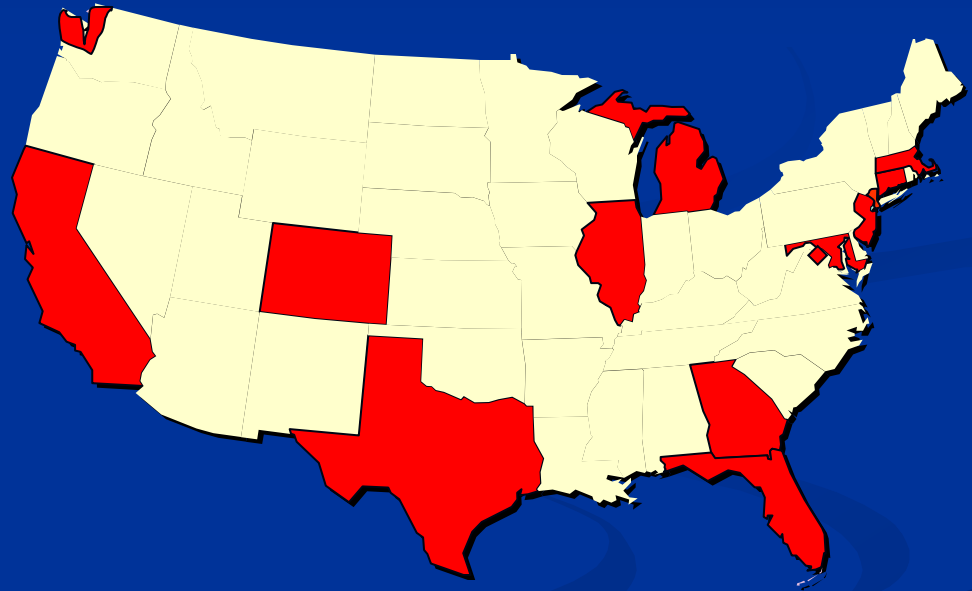
Medications

# Cancer risk in HIV and transplant



# NCI's HIV/AIDS Cancer Match Study

- Computerized linkage of HIV/AIDS and cancer registries in 14 U.S. areas
- 780,000 HIV-infected people 1980-2009
  - 630,000 AIDS cases (57% of U.S. total)
- Examine epidemiology of specific cancers
  - Compare risk with general population
  - Risk factors for cancer



# Clues to etiology: two examples

## ■ Merkel cell carcinoma

- Rare skin cancer
- Elevated incidence in HIV, transplant
- SIR=13 in people with AIDS
- Discovery of Merkel cell polyomavirus in MCC tumors

## ■ Lung cancer

- Most common non-AIDS-defining cancer in HIV-infected people
- High prevalence of smoking in HIV population (50-90%)
- SIR=3.8 among people with AIDS
- Risk higher than could be explained by smoking.
- Findings suggest HIV infection amplifies effects of tobacco.

# Evolving patterns of cancer in HIV

- Due to HAART, HIV-infected people are living longer, but immune system is not normal.
- With prolonged survival, HIV population is growing and ageing.
- Public health and research priorities informed by population-based estimates of cancer risk

# Cancer burden

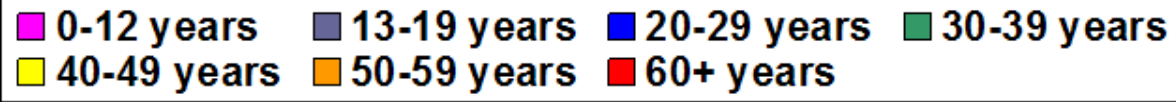
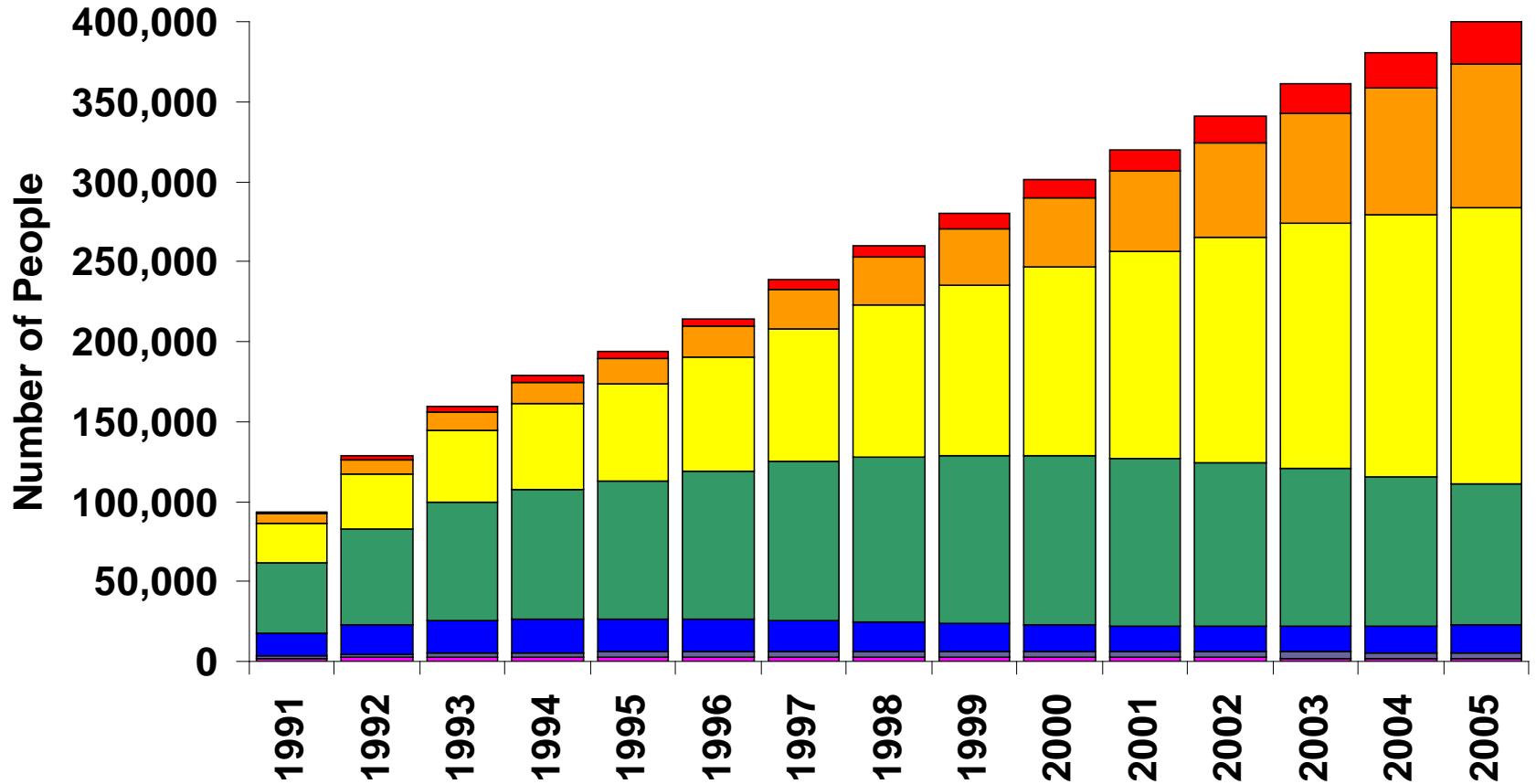
- We evaluated trends in the number of cancer cases in the U.S. AIDS population (cancer burden).
- We calculated the number of cancer cases by applying cancer rates to AIDS population at risk.

$$\text{Cancer burden} = \sum \text{rate} \times \text{person-years}$$



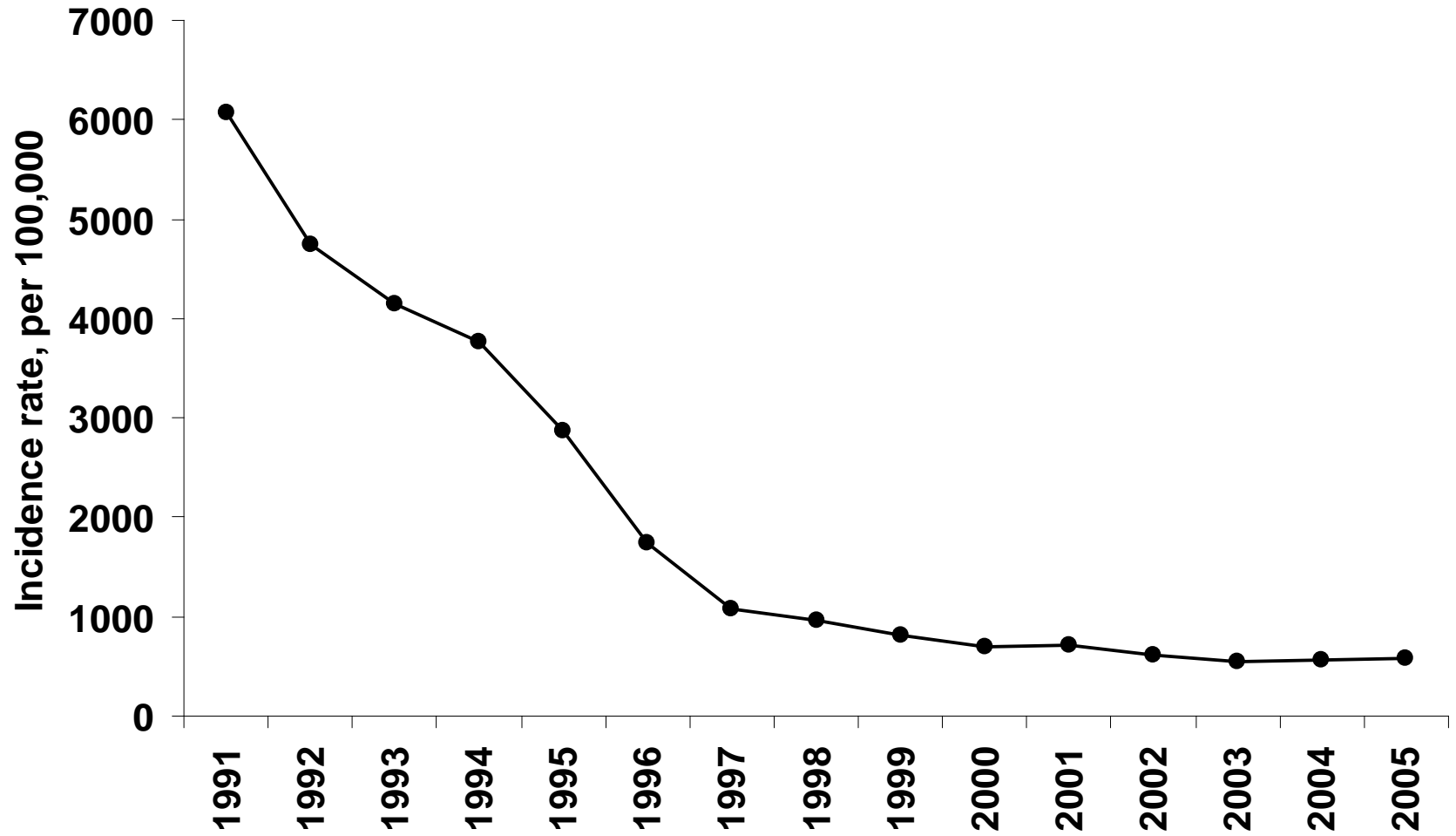


## U.S. AIDS Population by Year and Age Group

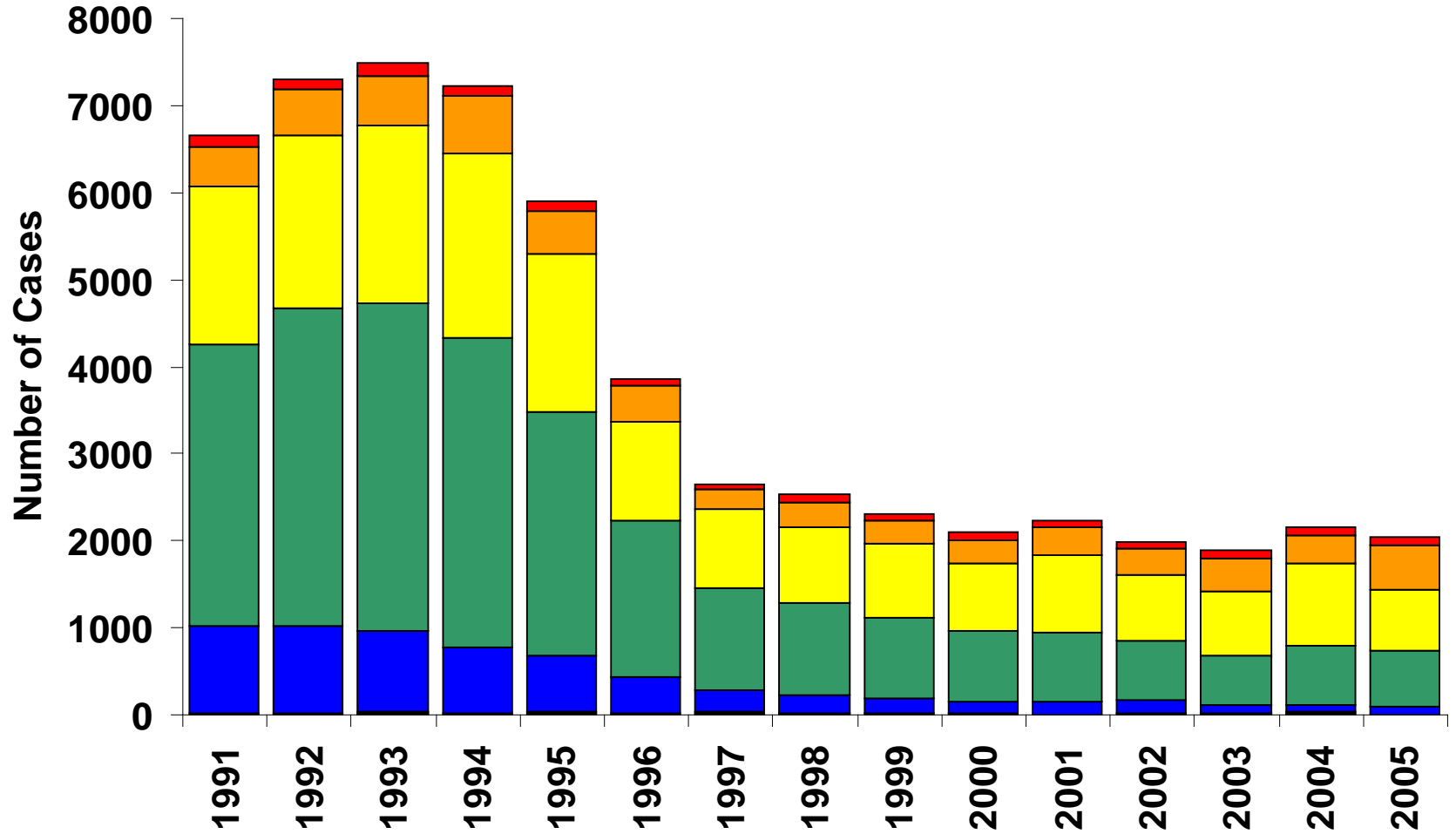


CDC data

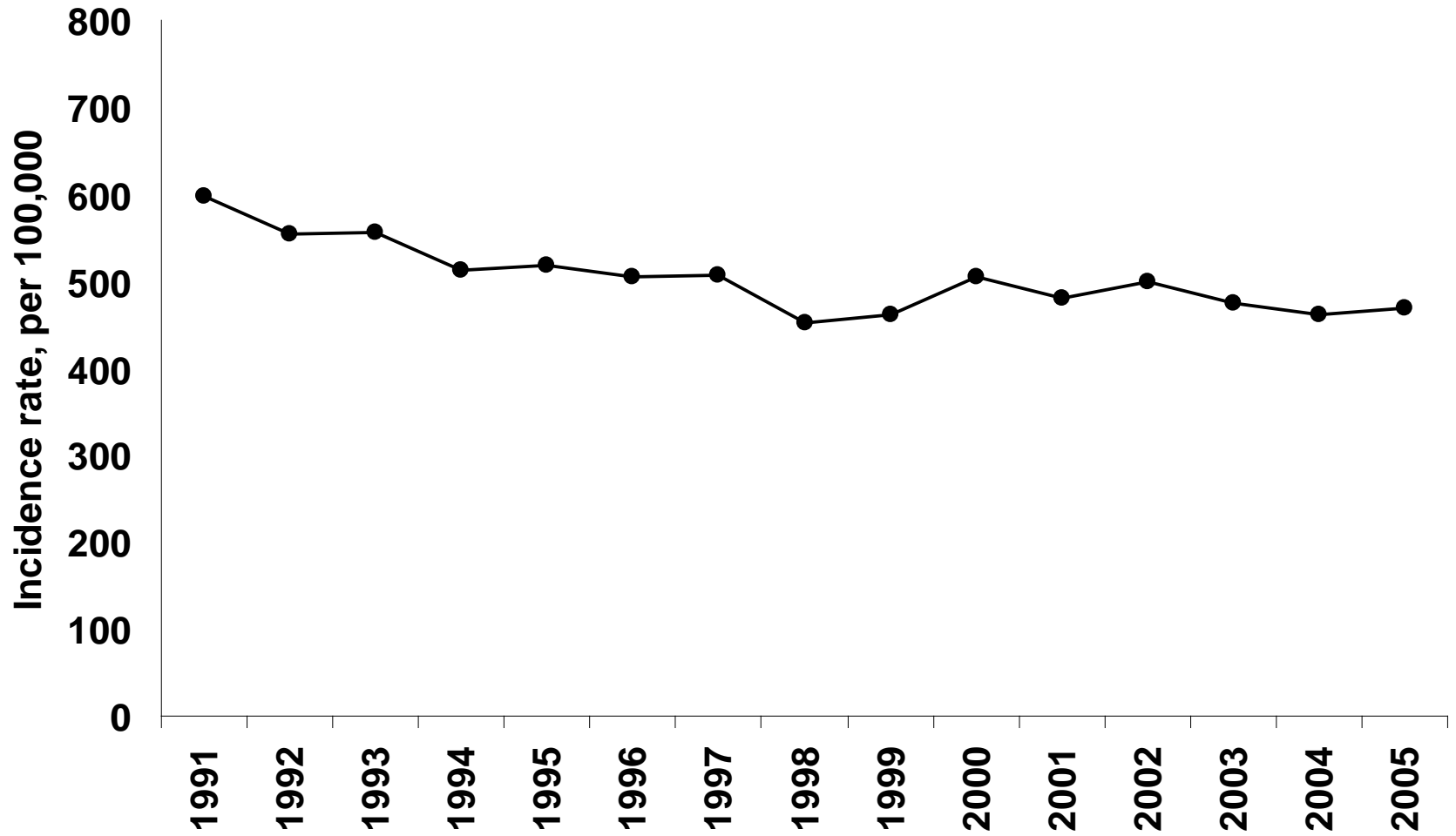
## Incidence of AIDS-defining Cancers



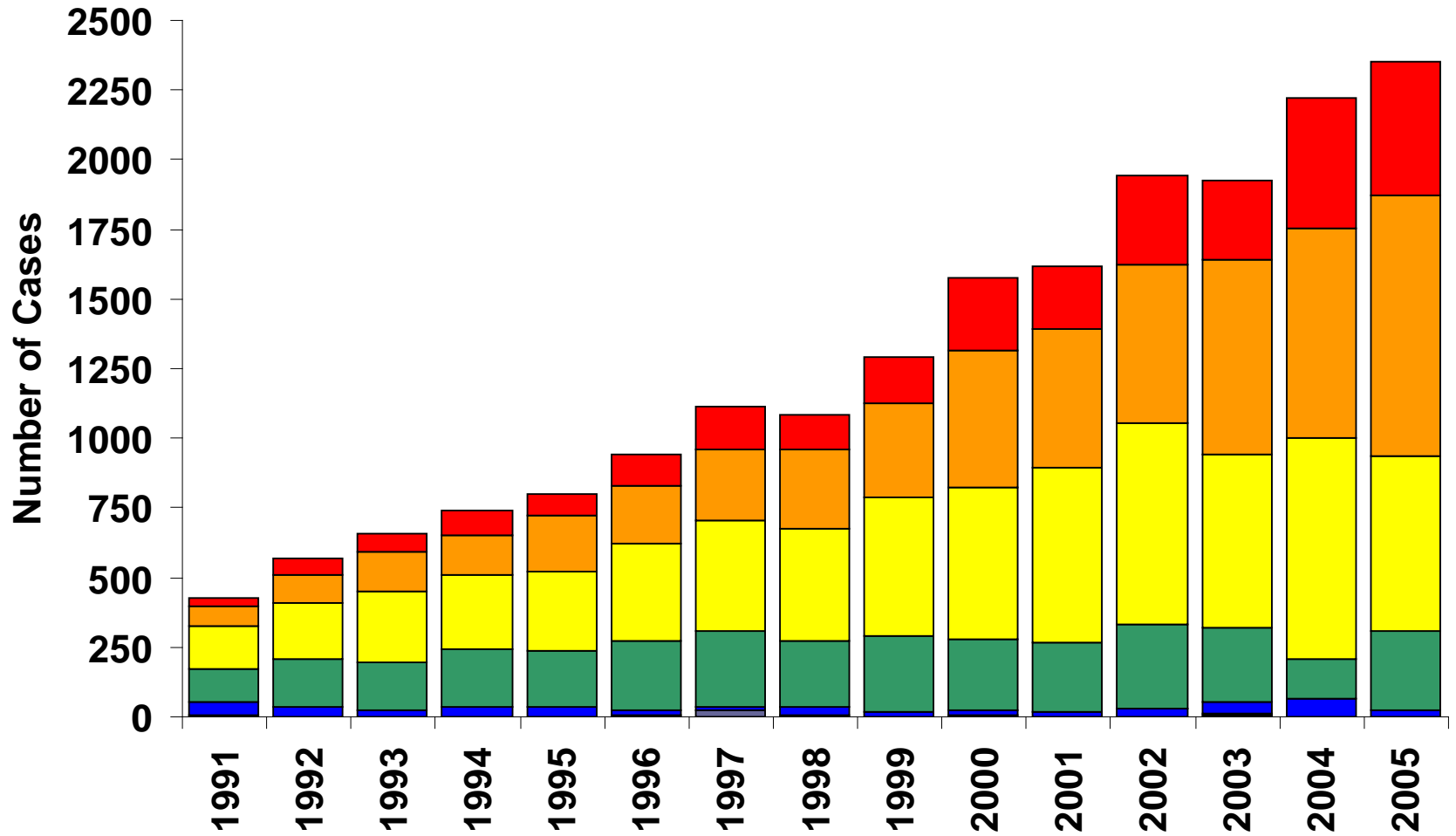
## Burden of AIDS-defining Cancers



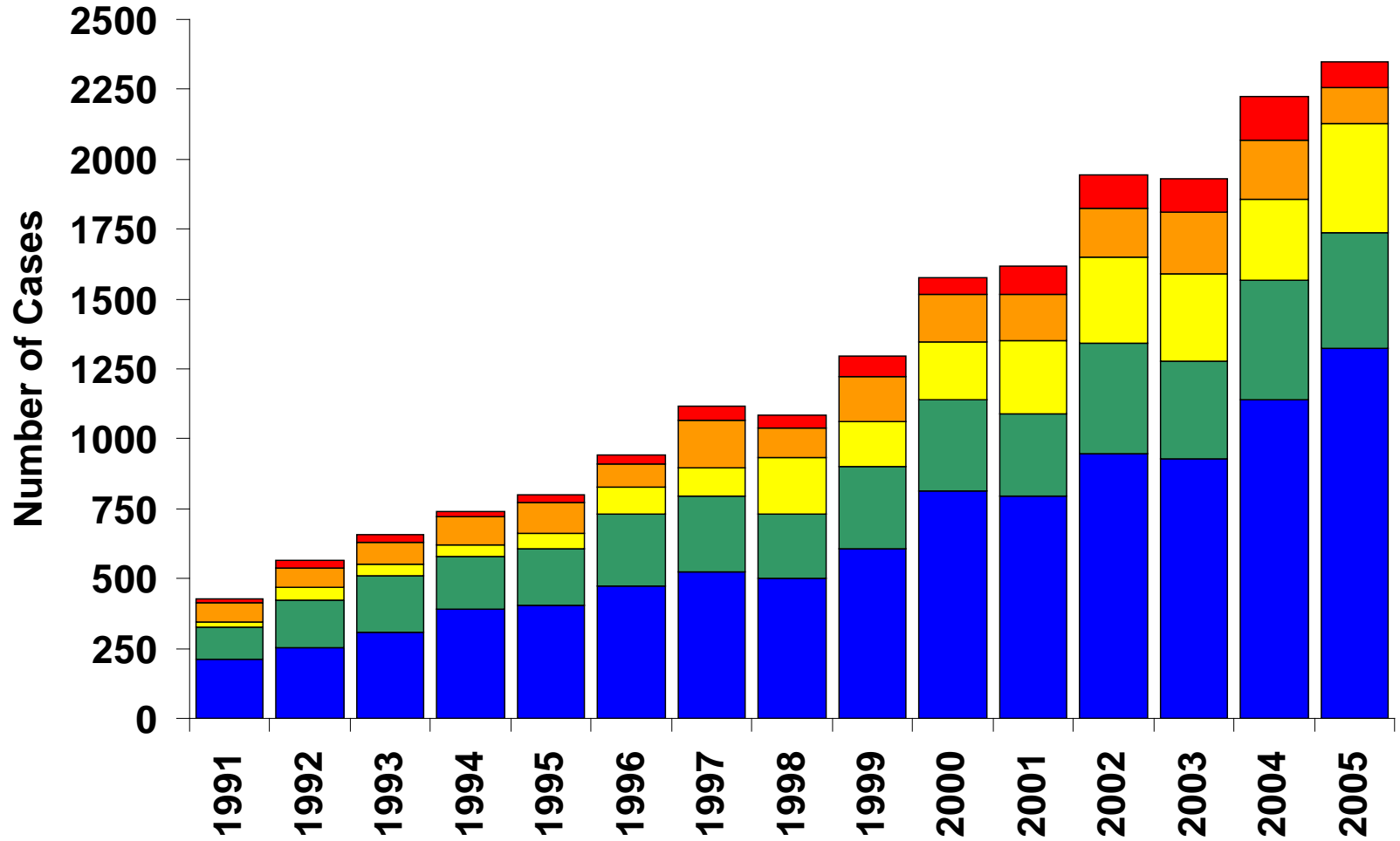
## Incidence of non-AIDS-defining Cancers



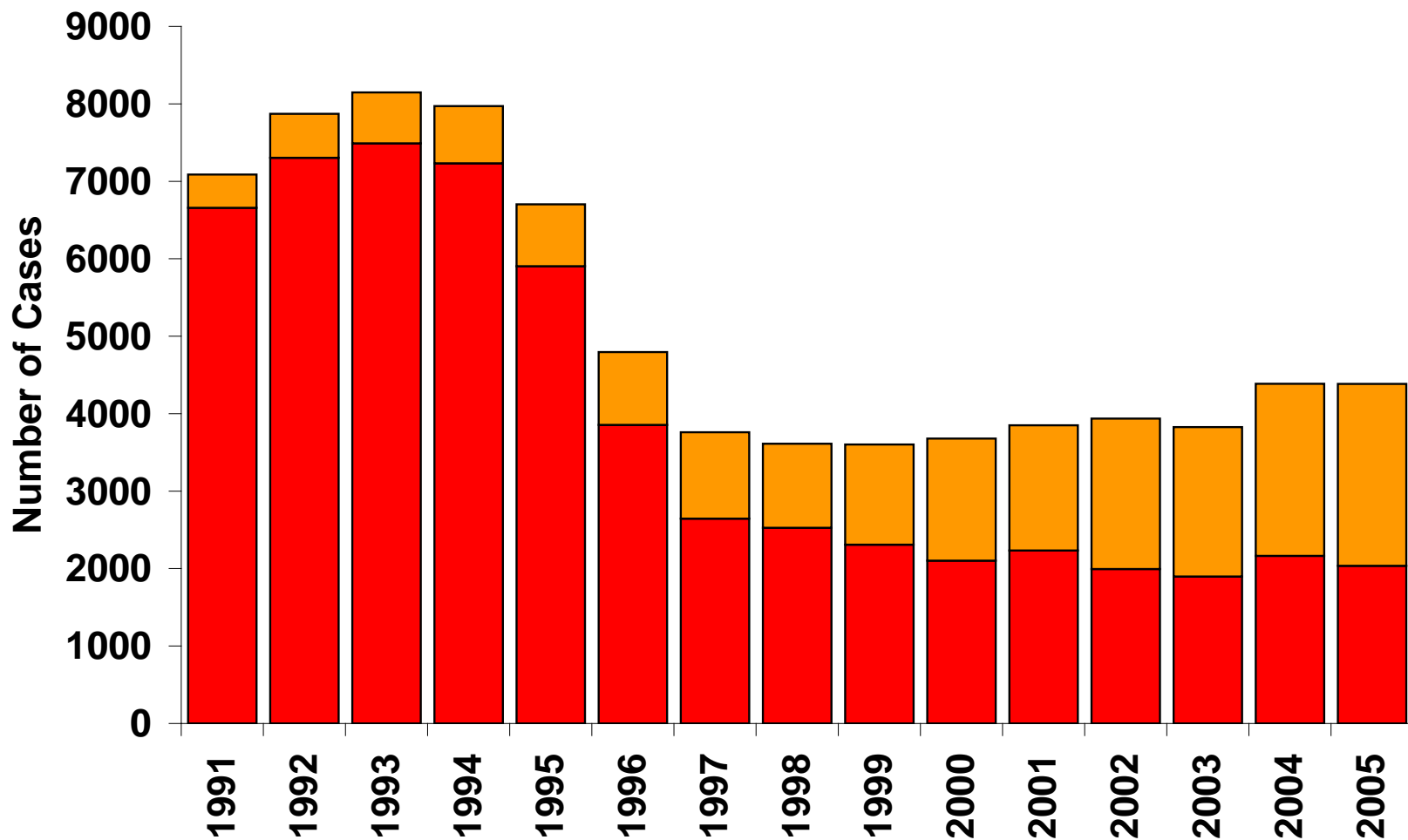
## Burden of non-AIDS-defining Cancers



## Burden of non-AIDS-defining Cancers

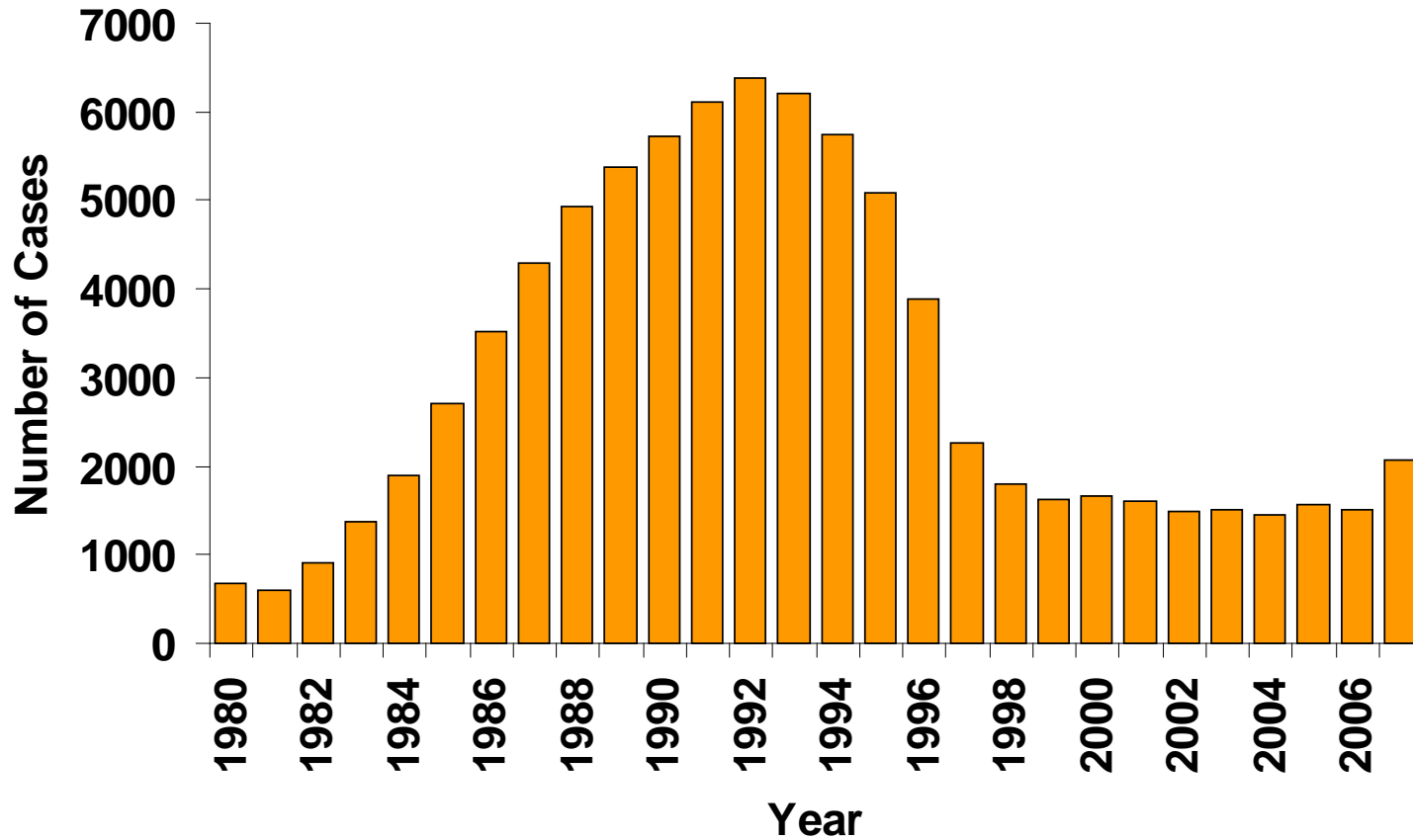


## Total Cancer Burden



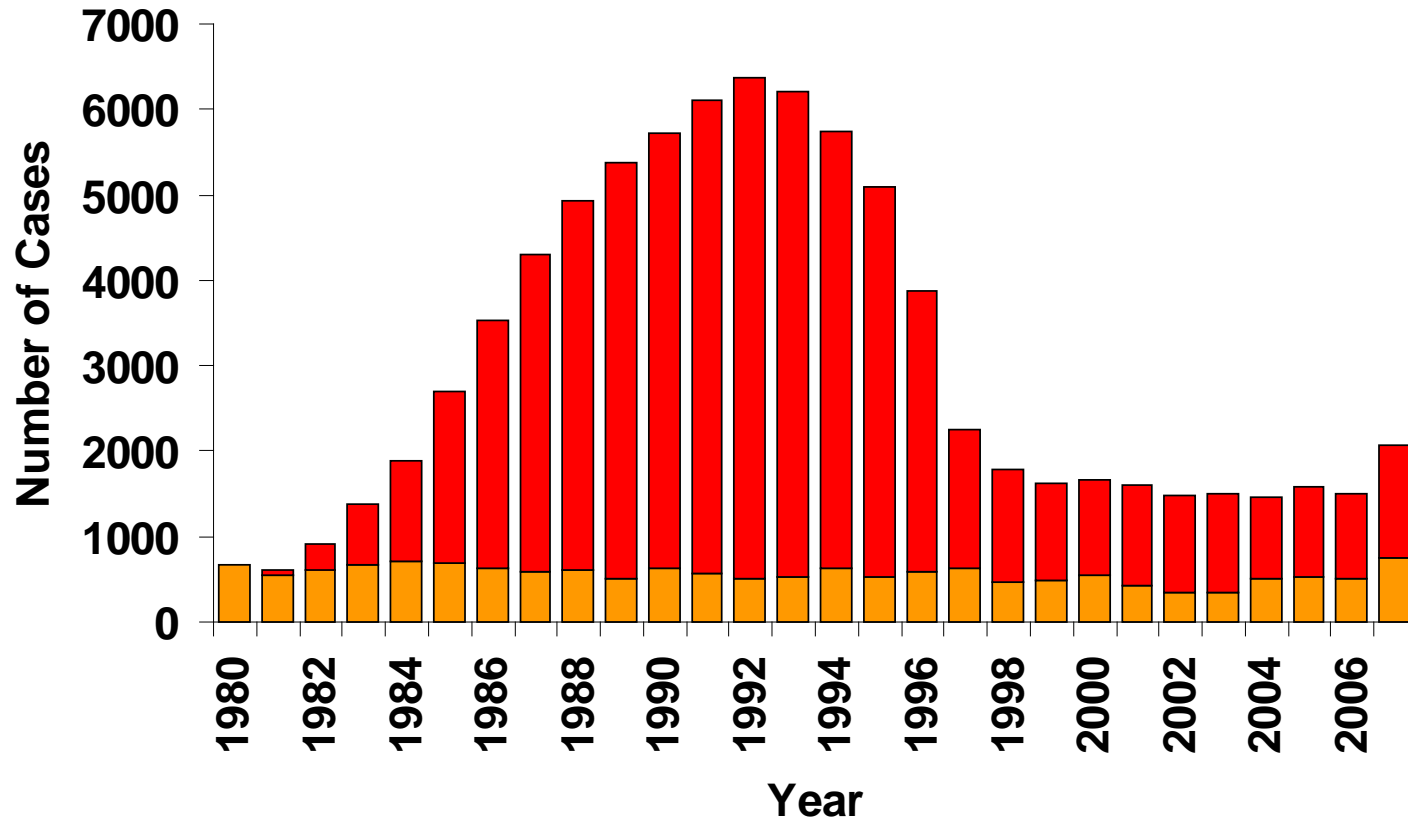
■ Non-AIDS-defining Cancers  
■ AIDS-defining Cancers

# KS cases in U.S. general population





# KS cases in U.S. general population



■ Cases with AIDS ■ Cases without AIDS

# Shifting HIV cancer burden

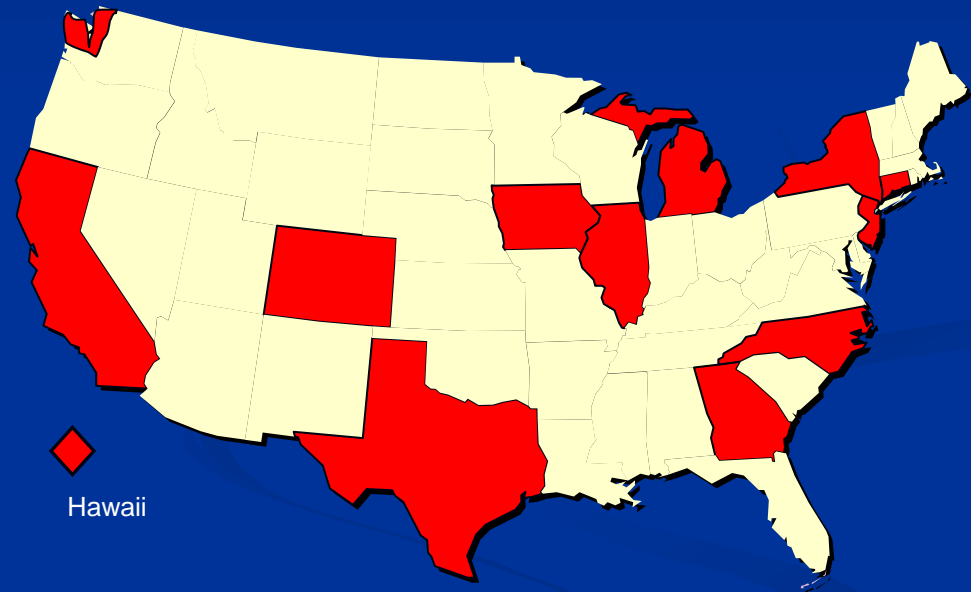
- The burden of AIDS-defining cancers has decreased over time.
- The burden of other cancers is rising sharply.
  - Parity with AIDS-defining cancers
  - With ageing, these cancers will represent increasing burden in the future.
- Understand role of HIV in pathogenesis of non-AIDS-defining cancers

# Implications for prevention

- Smoking cessation
- Prevention and treatment of HBV and HCV
- Evaluation of anal Pap smear screening

# NCI's Transplant Cancer Match Study

- Computerized linkage of U.S. transplant registry with 13 cancer registries
- 38% of all U.S. transplants 1987-2010
- Close partnership between NCI and Health Resources and Services Administration (HRSA), which oversees U.S. transplantation



# Preliminary results

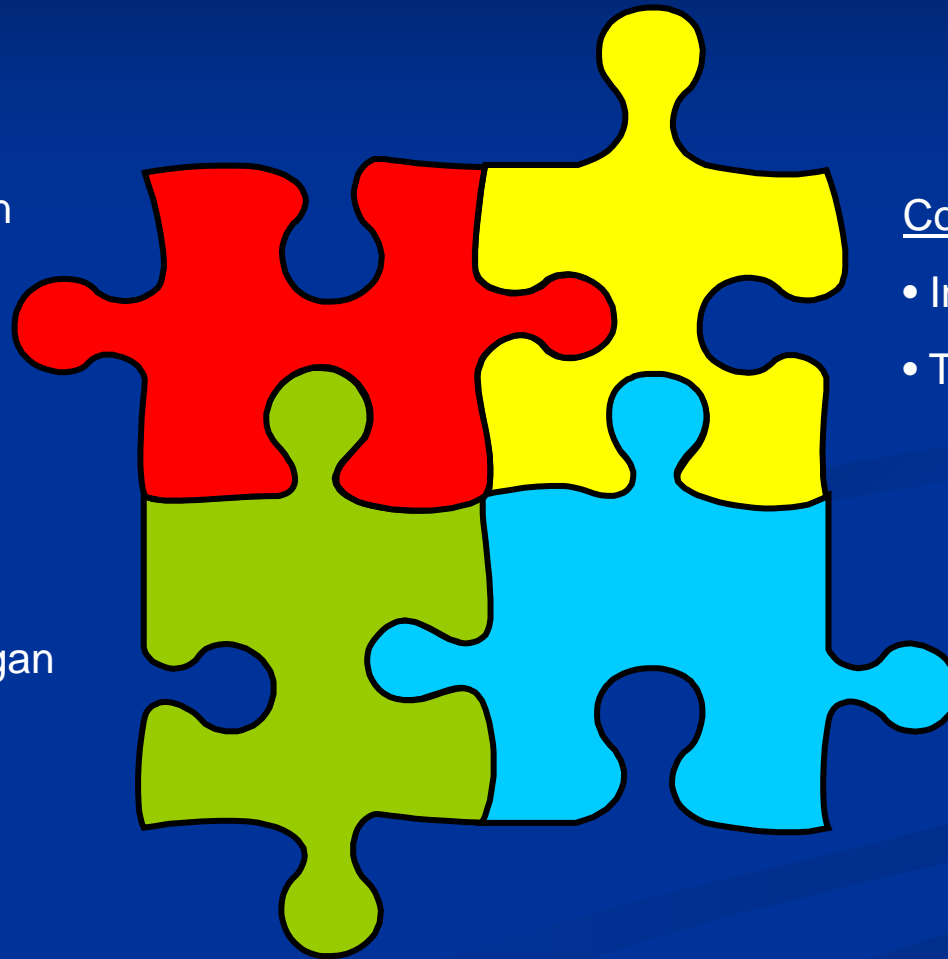
- 175,822 transplants
- 10,603 cancers
- Overall SIR = 2.08
- Analyses of specific cancers is ongoing.

# Transplant Cancer Match Study

- Describe spectrum of cancer risk
- Risk factors for cancer
  - Demographic factors
  - Characteristics of transplanted organ
  - Medical conditions
  - Viral infections
  - Immunosuppressive medications
- Risk of transmission of cancer from donors

# Cancer in HIV and transplant

Immunosuppression  
Inflammation



Cofactors

- Infectious agents
- Tobacco, alcohol

Transplanted organ

Medications

# NCI's studies of HIV and transplant

- Complementary studies allow comparison of cancer patterns between populations.
- Collaborations between NCI, other federal agencies (CDC, HRSA), and state public health authorities
- Address questions of public health and scientific importance



# Acknowledgements

- HIV/AIDS Cancer Match Study
  - CDC: Irene Hall
  - NCI: Meredith Shiels
  - HIV/AIDS and cancer registries
- Transplant Cancer Match Study
  - HRSA: Monica Lin
  - Scientific Registry of Transplant Recipients
  - Cancer registries