Estimating the Burden of Disease

Examining the impact of changing risk factors on colorectal cancer incidence and mortality

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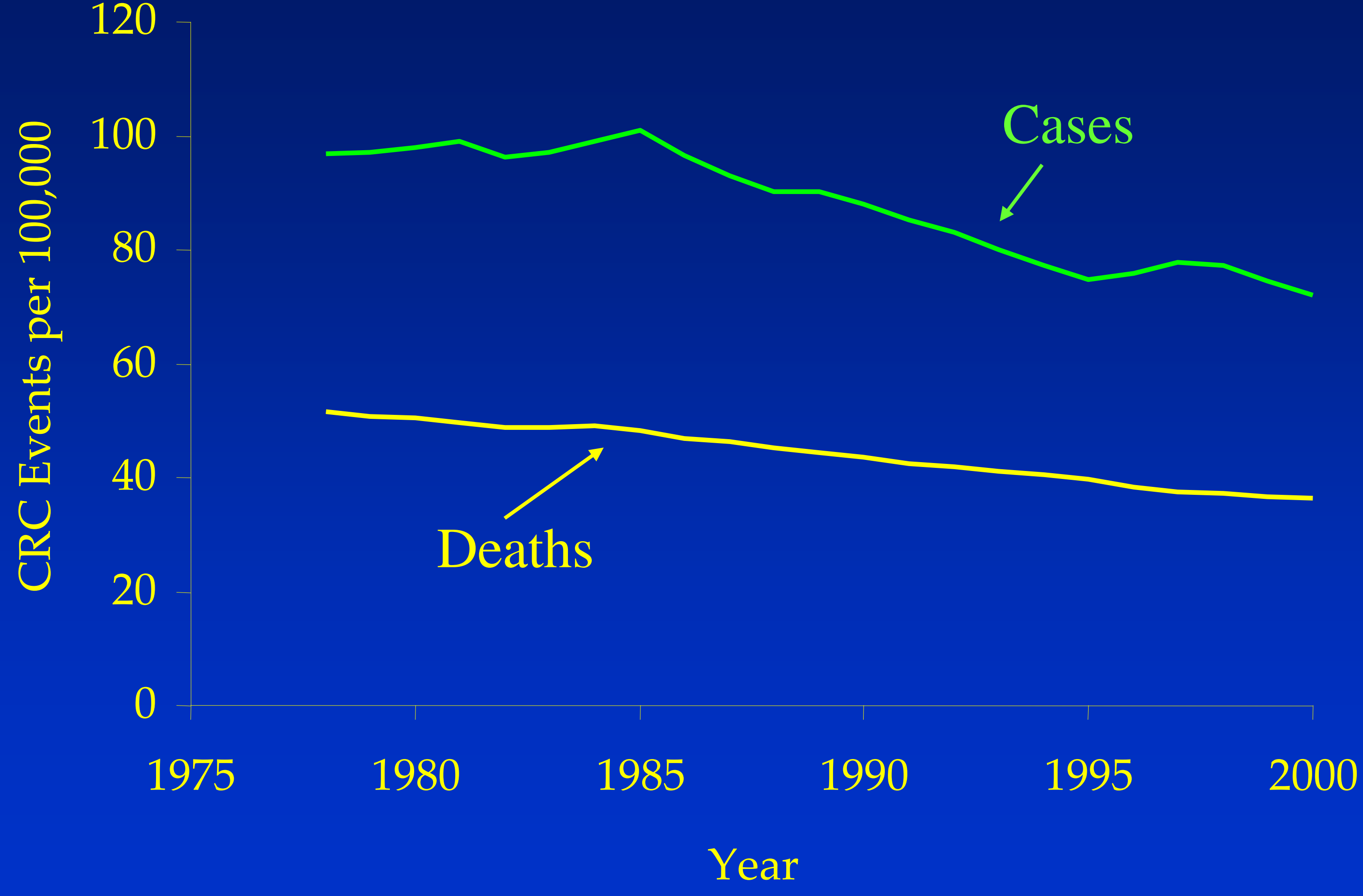
** Results presented are preliminary.

Decision-Analytic Models

- Analytical structures that represent key elements of a disease
- Goal: evaluate policies in terms of costs and health benefits (not estimation)
- Cohort models vs. population-based model
- Risk functions often incorporated

Age-standardized incidence and mortality



CRC Risk Factors

- Body mass index (BMI)
- Smoking
- Folate intake (multivitamin use)
- Physical activity
- Red meat consumption
- Fruit and vegetable consumption
- Aspirin use
- Hormone replacement therapy (HRT)

Individual Risk Functions

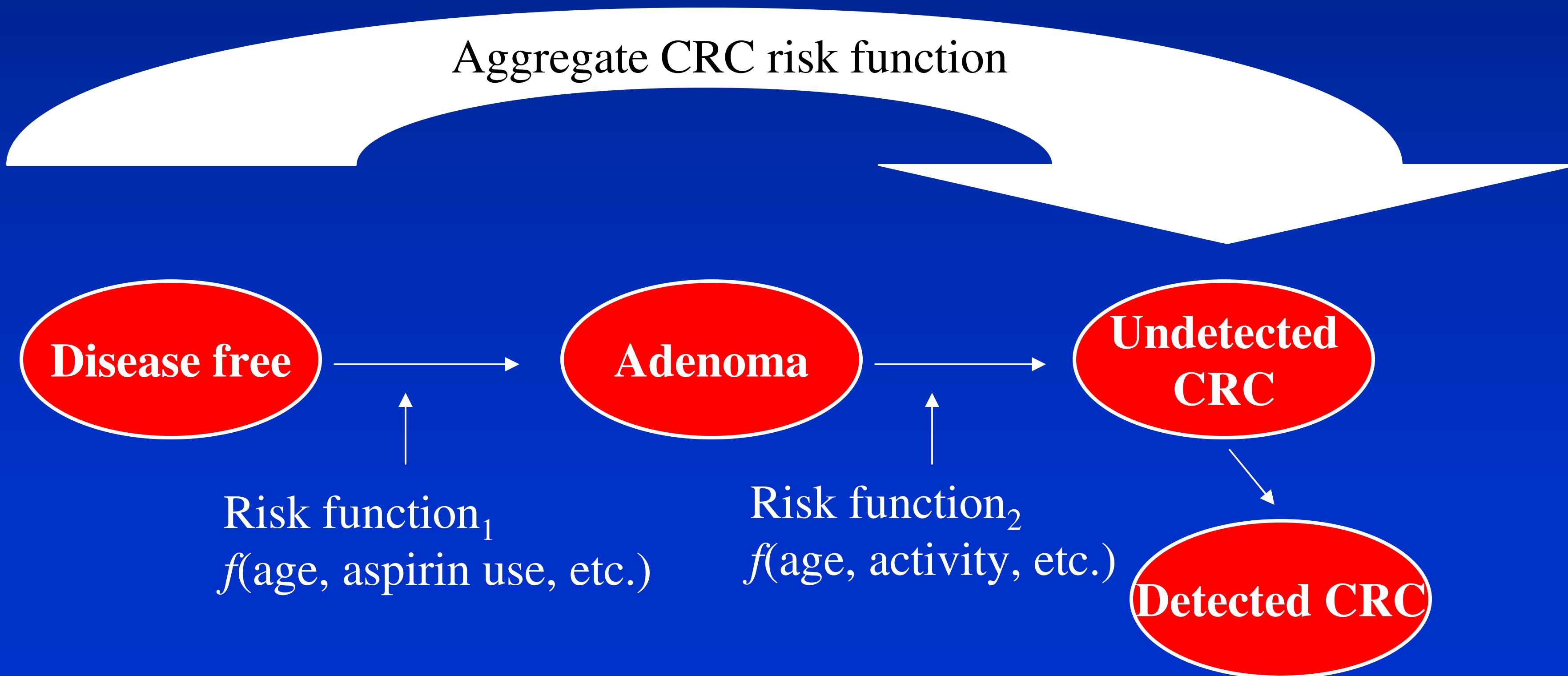
- Pr(CRC | BMI, smoking, MV use, etc.)
  - Annual risk
  - 10-year probability
- Estimate from cohort studies
  - Nurses' Health Study (NHS)
  - Health Professionals' Follow-up Study (HPFS)

NHS & HPFS Data

Multivariate logistic regression of NHS/HPFS data provide information about the relationship between risk factors and *diagnosed* (but not underlying) CRC

Stage-Specific Risk Functions

Goal: decompose the aggregate function into stage-specific risk functions



Our Approach

- Establish "observed relationship" between risk factor and *diagnosed* CRC
- Simulate incidence of CRC in hypothetical cohort that is matched to study cohort
- Use regression analysis to examine simulated relationship between risk factor and diagnosed CRC
- Calibrate ORs of simulated data analysis to those of cohort analysis

Example: 50 yo white woman

BMI = 25 kg/m^2

Non-smoker

MV user

5 met-hr/wk

2 sv/wk red meat

5 sv/dy fruit/veg

No aspirin use

No HRT use

→

Lifetime CRC risk:

4.8%

Example: 50 yo white woman

- ✓ BMI = 35 kg/m^2
- ✓ Smoker
- ✓ No MV use
- 5 met-hr/wk
- 2 sv/wk red meat
- 5 sv/dy fruit/veg
- No aspirin use
- No HRT use

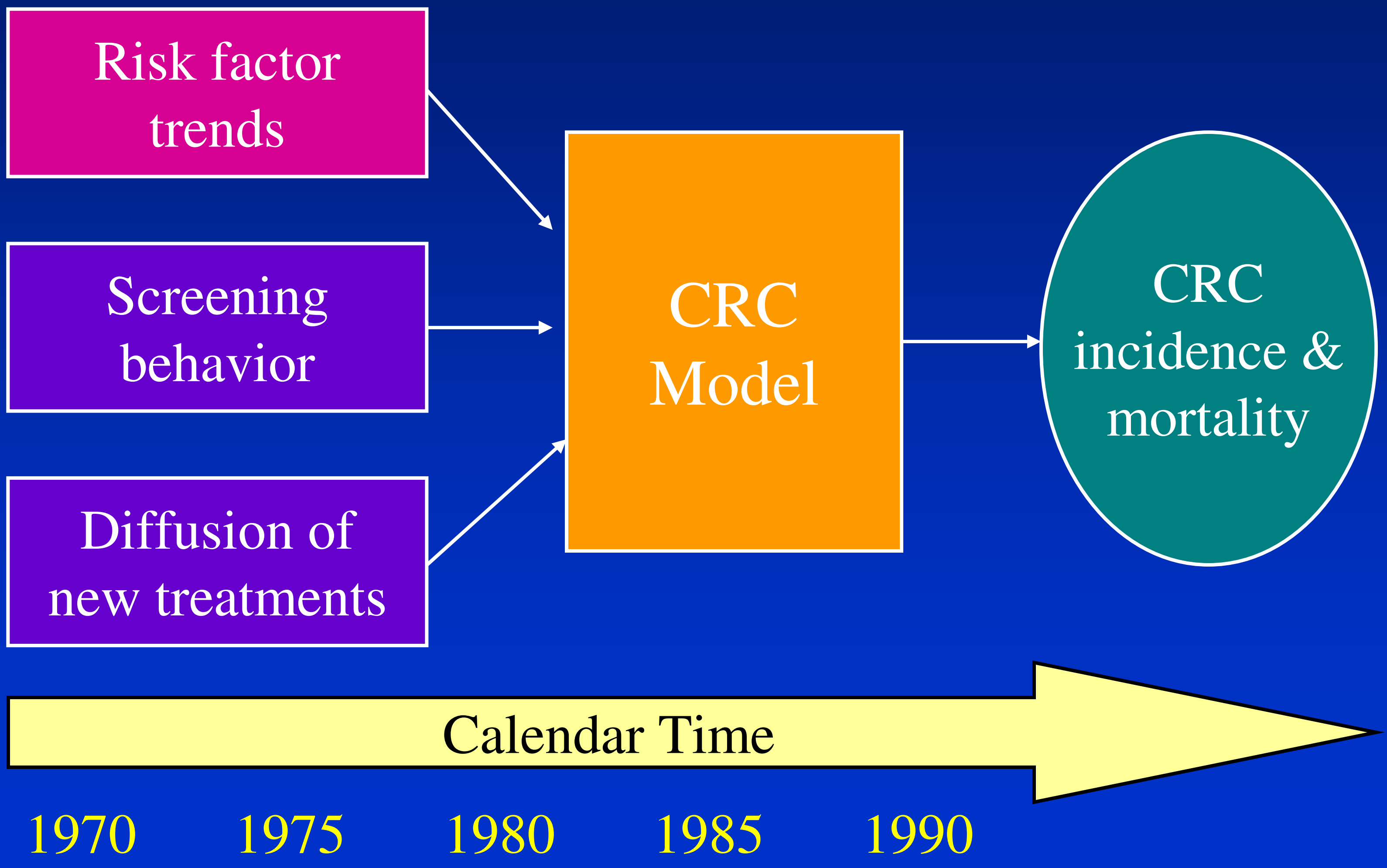
Lifetime CRC risk:

9.7%

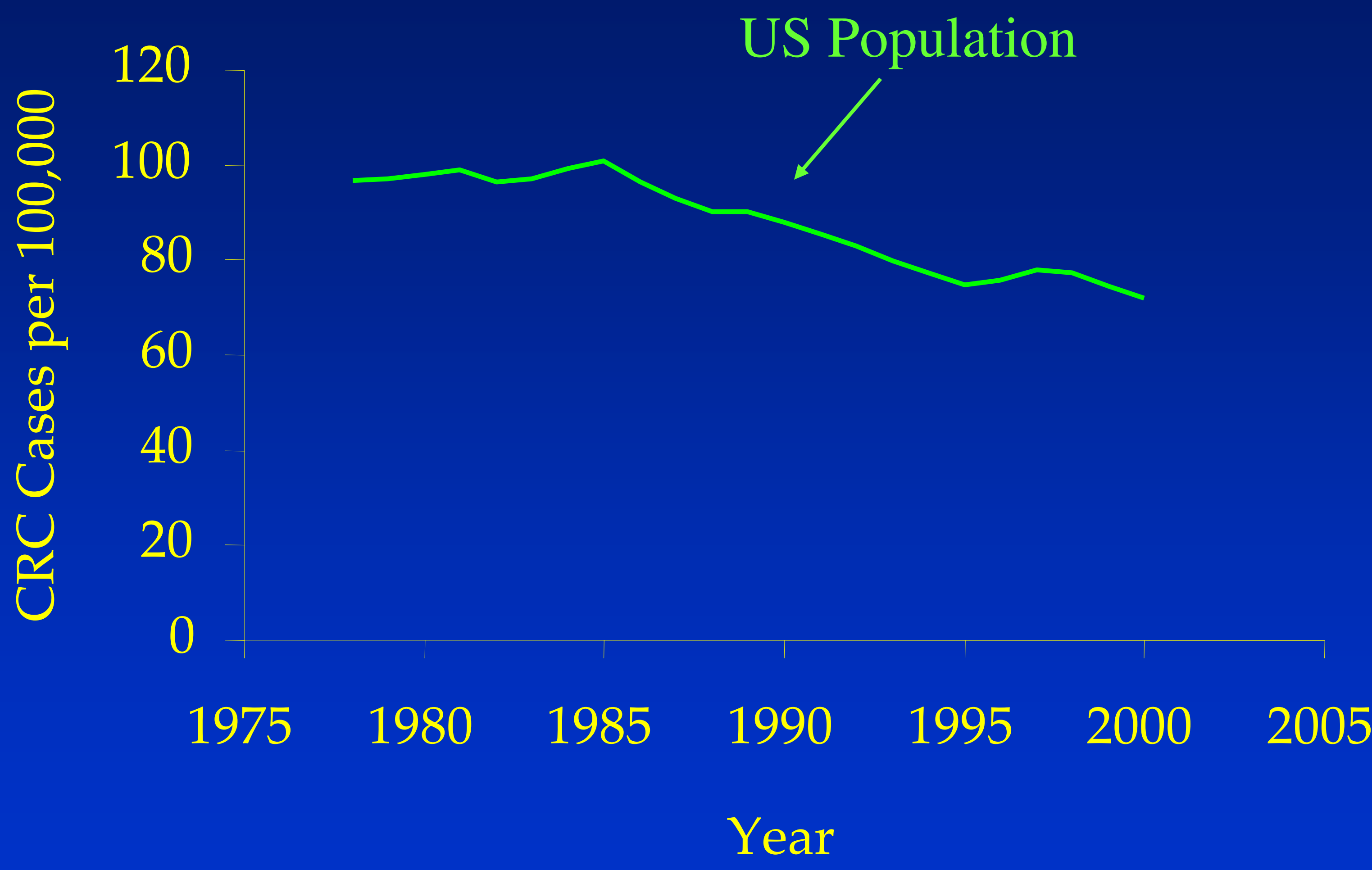
CISNET

CANCER INTERVENTION AND SURVEILLANCE MODELING NETWORK

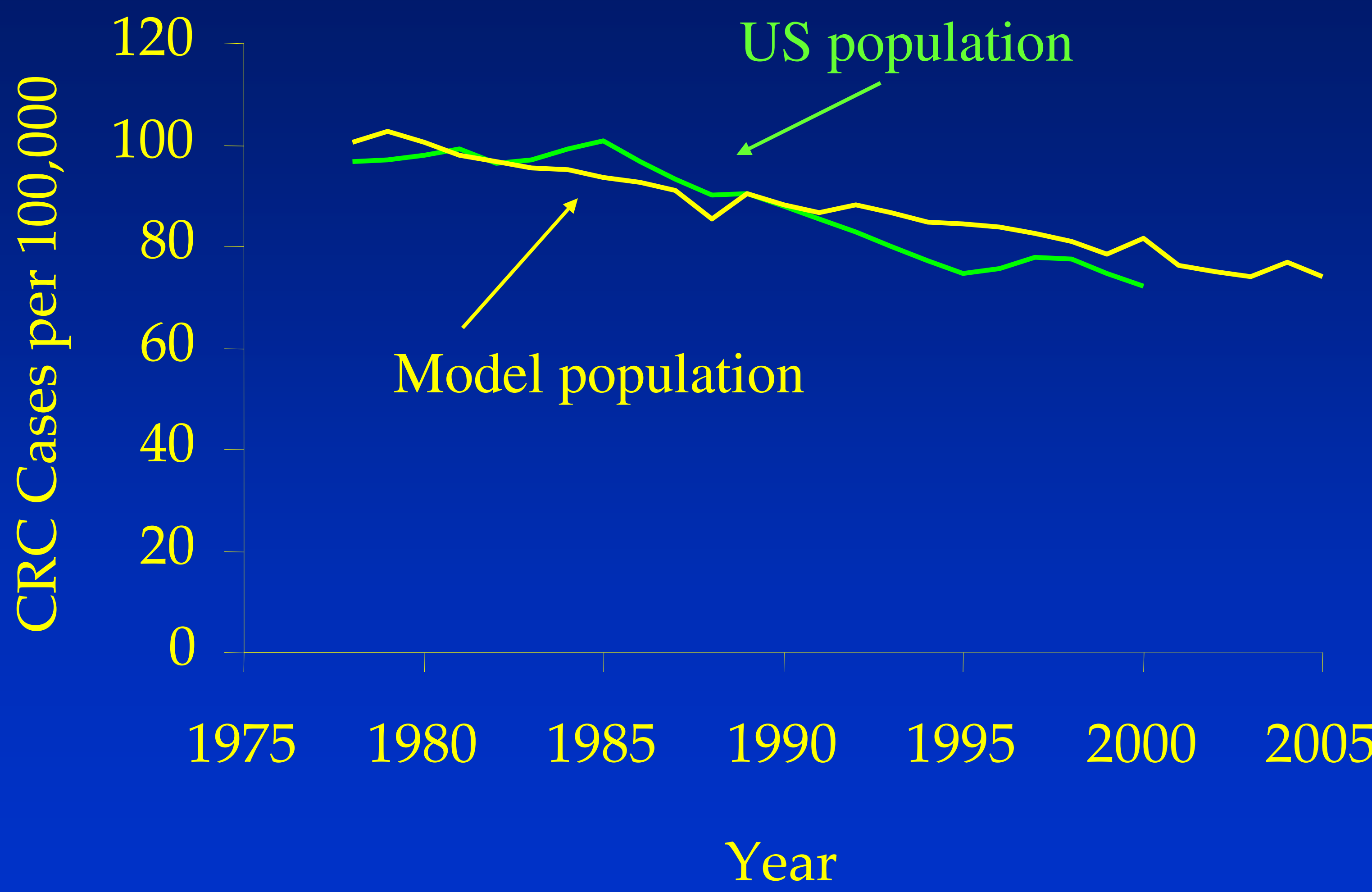
CISNET Model

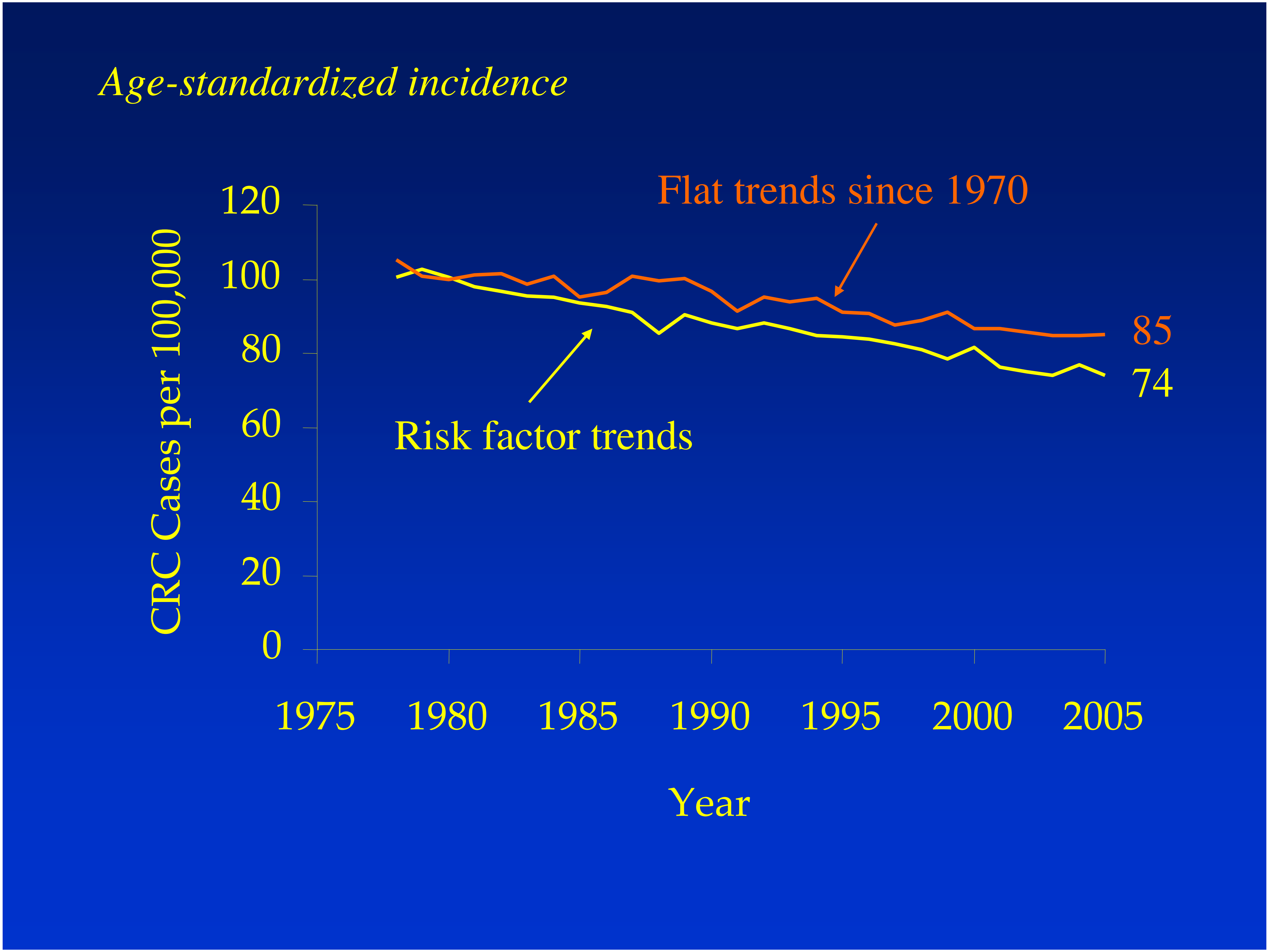


Age-standardized incidence

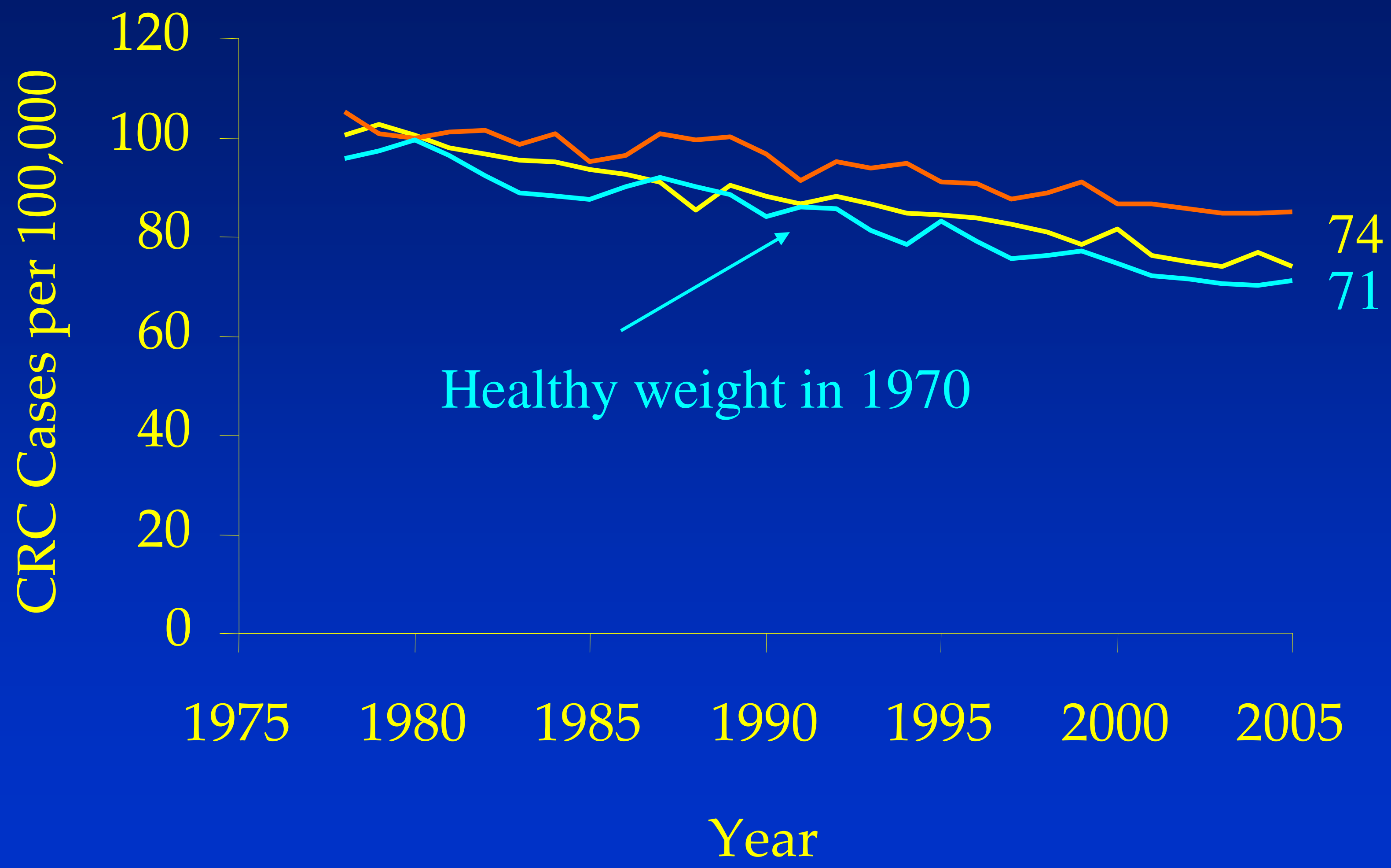


Age-standardized incidence

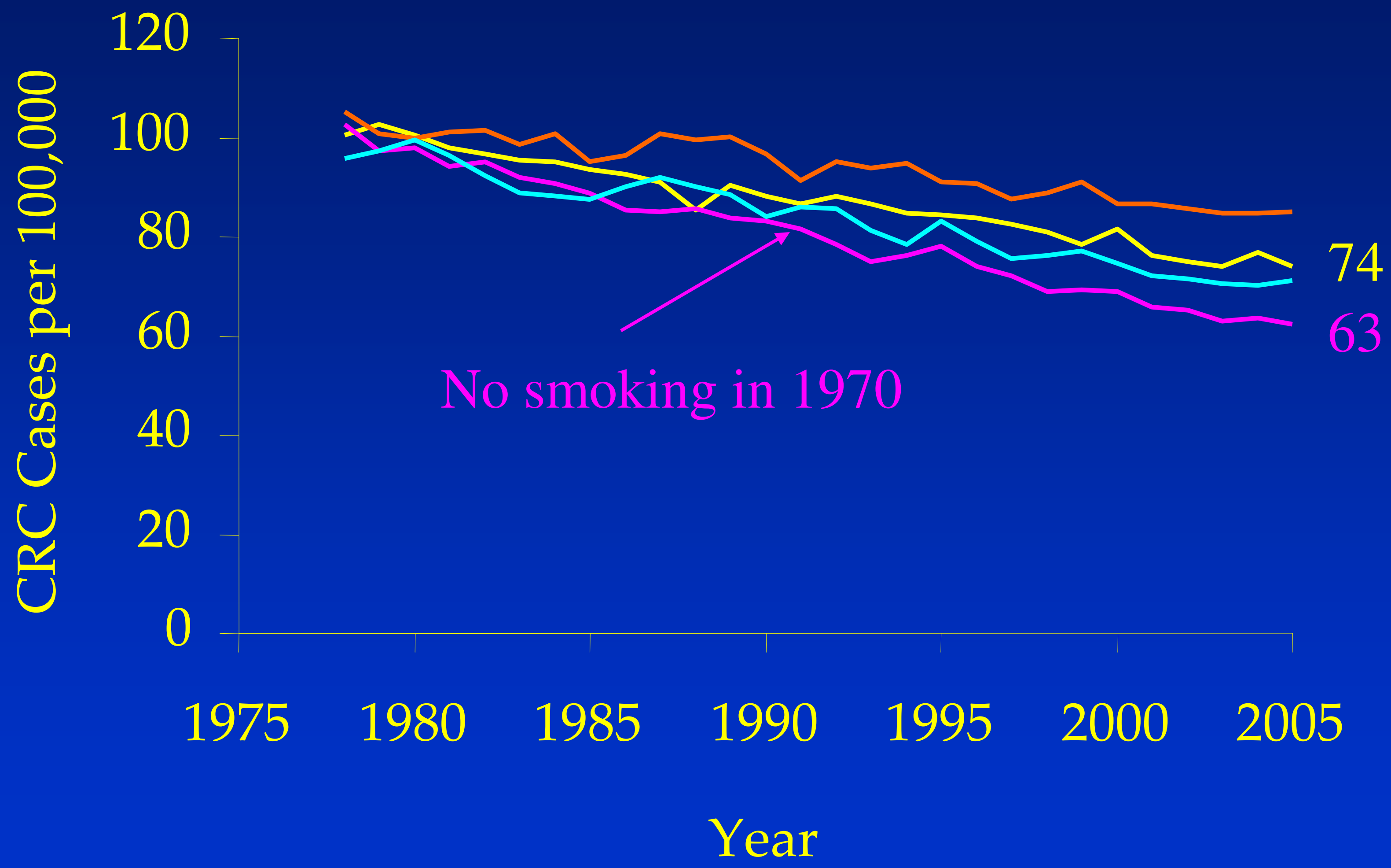


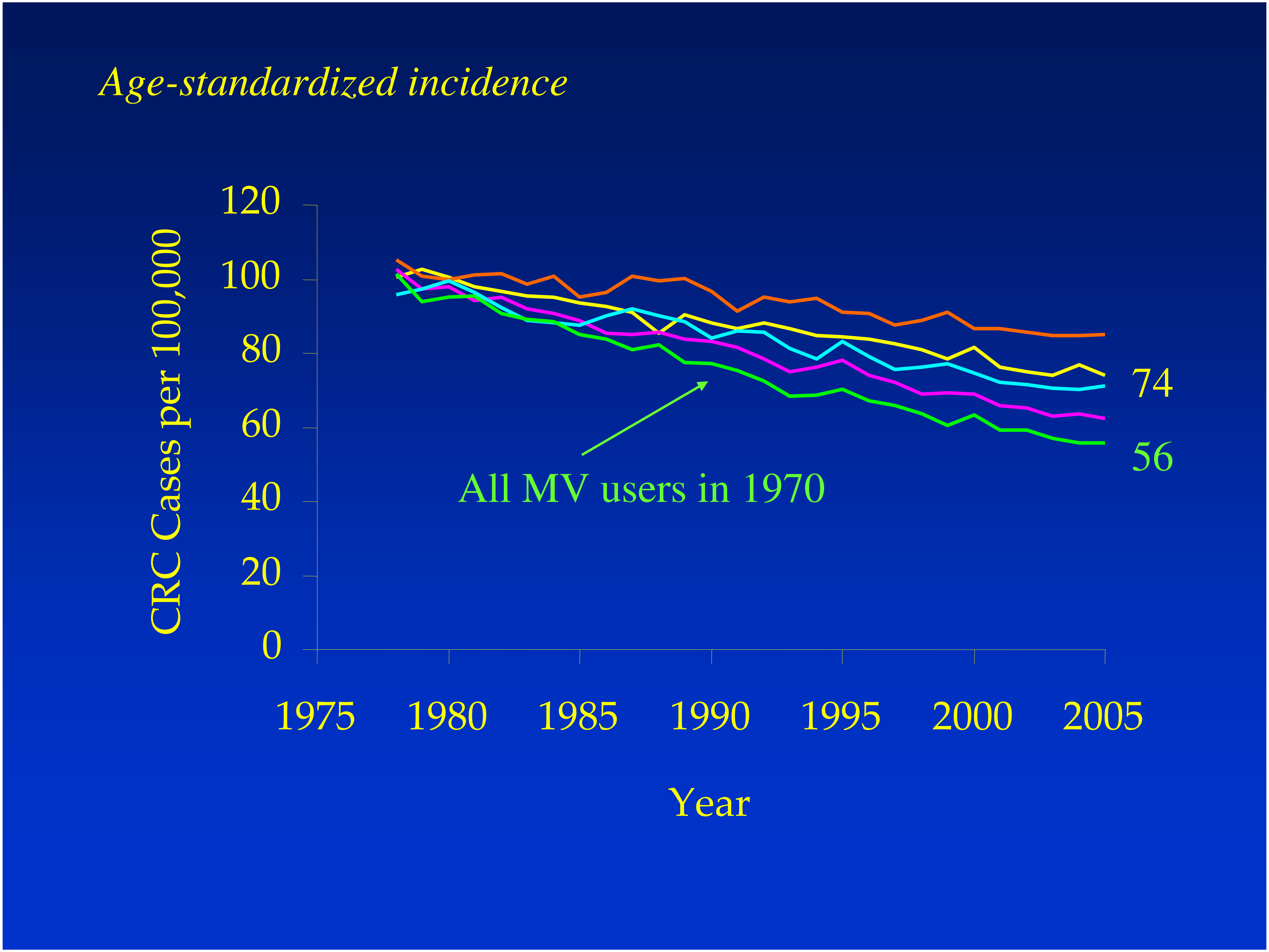

Age-standardized incidence
Flat trends since 1970
Risk factor trends
85
74
CRC Cases per 100,000
120
100
80
60
40
20
0
1975
1980
1985
1990
1995
2000
2005
Year

Age-standardized incidence

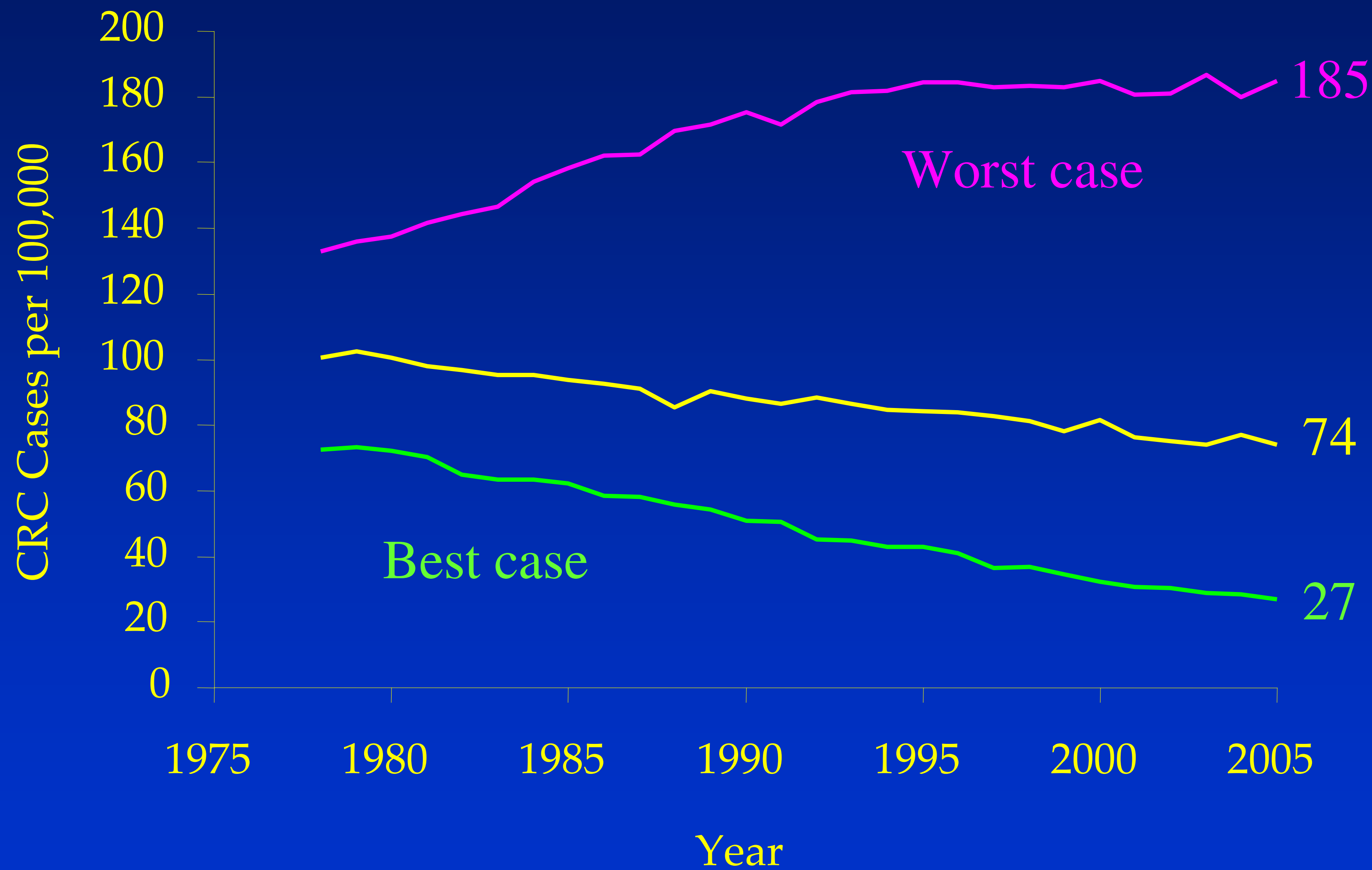


Age-standardized incidence

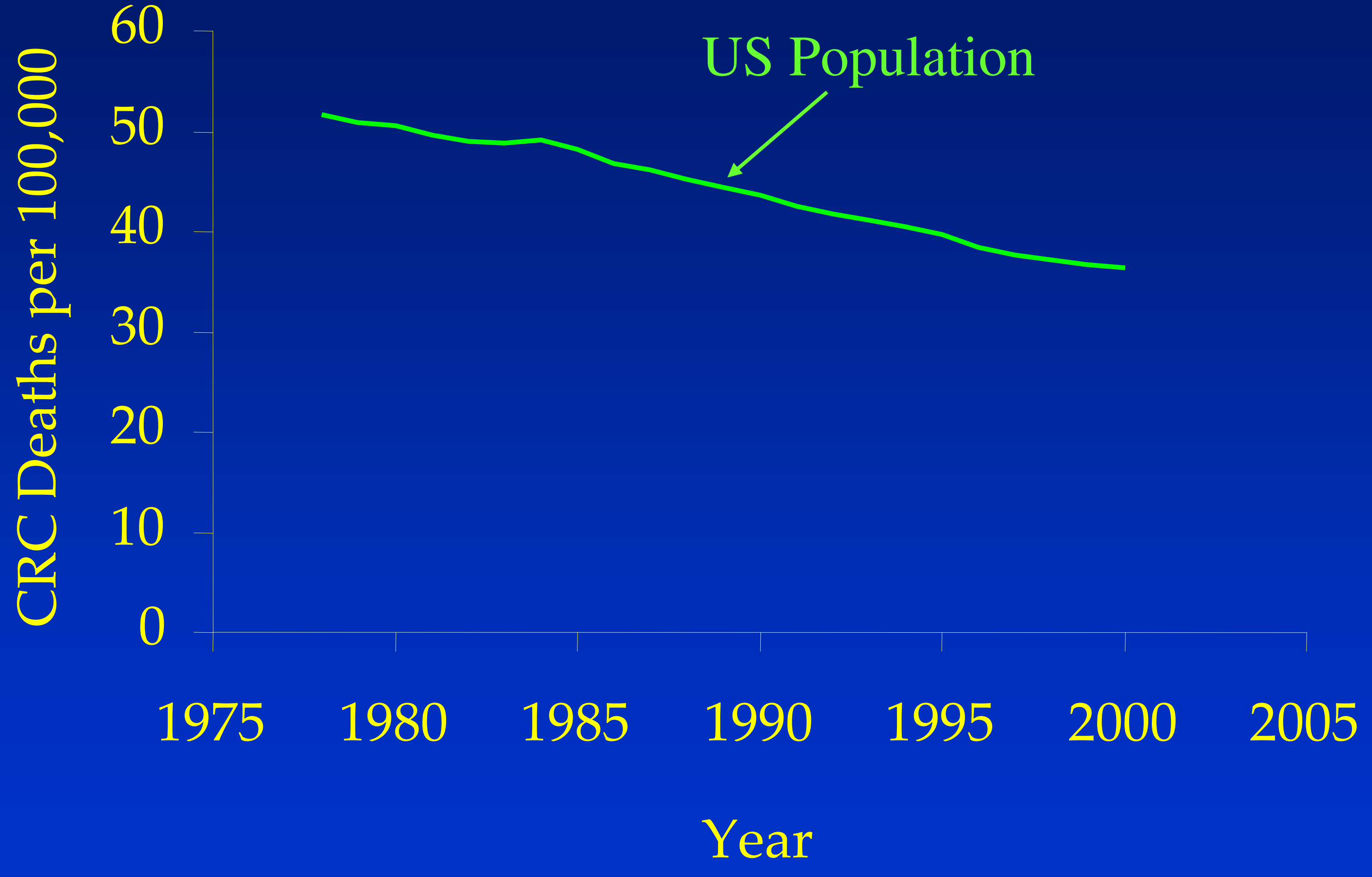



Age-standardized incidence
CRC Cases per 100,000
120
100
80
60
40
20
0
1975
1980
1985
1990
1995
2000
2005
Year
All MV users in 1970
74
56

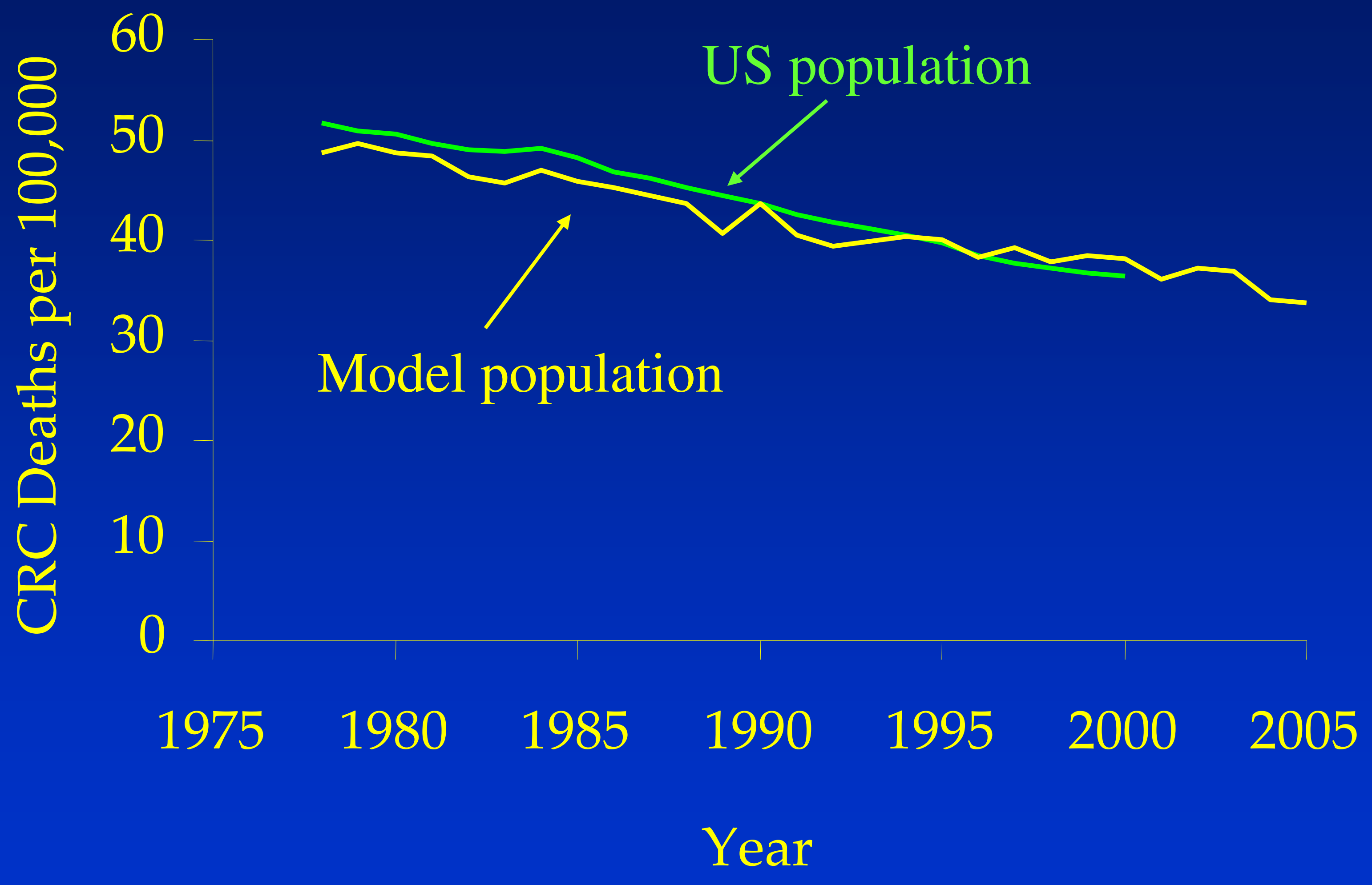
Age-standardized incidence



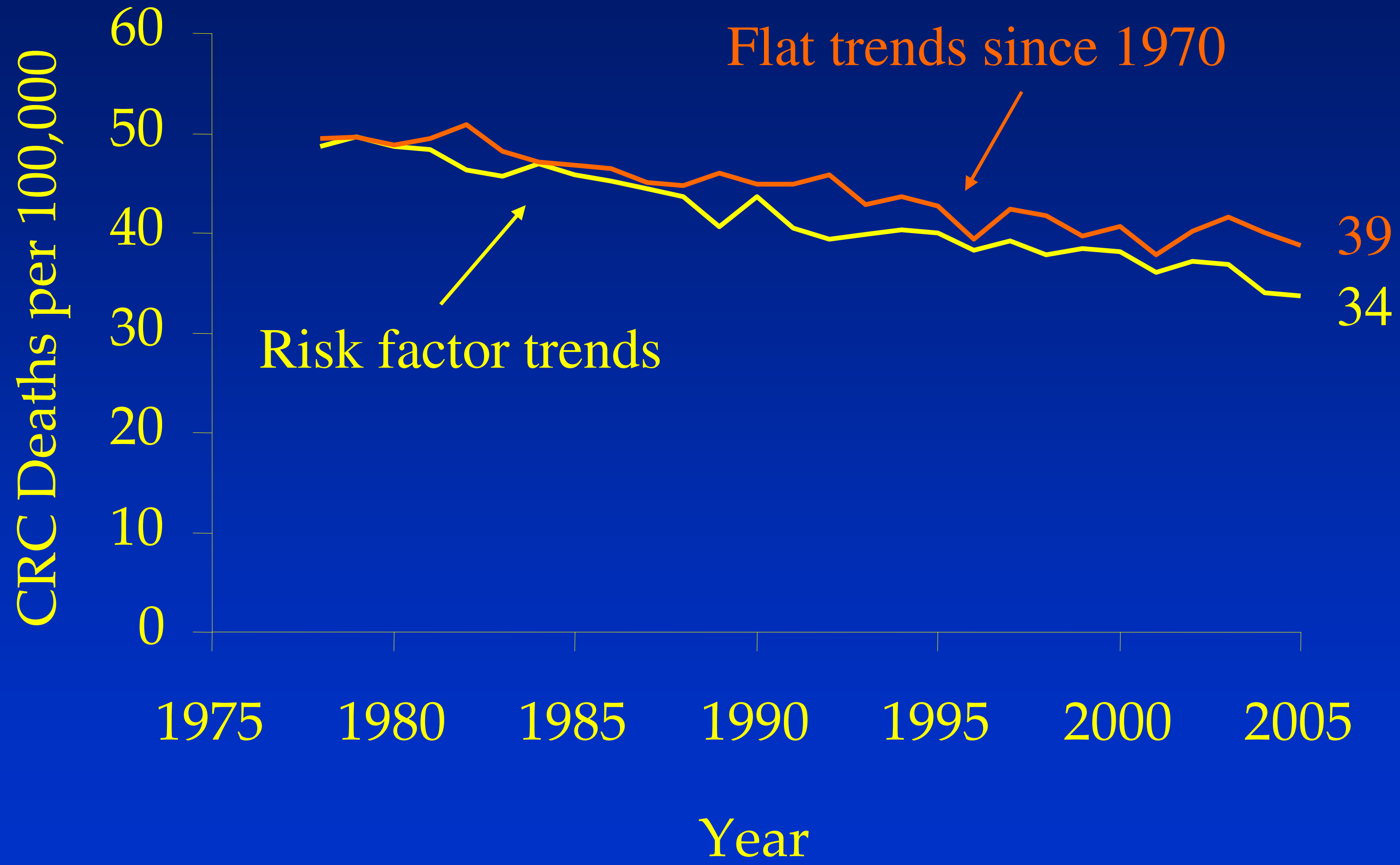
Age-standardized mortality



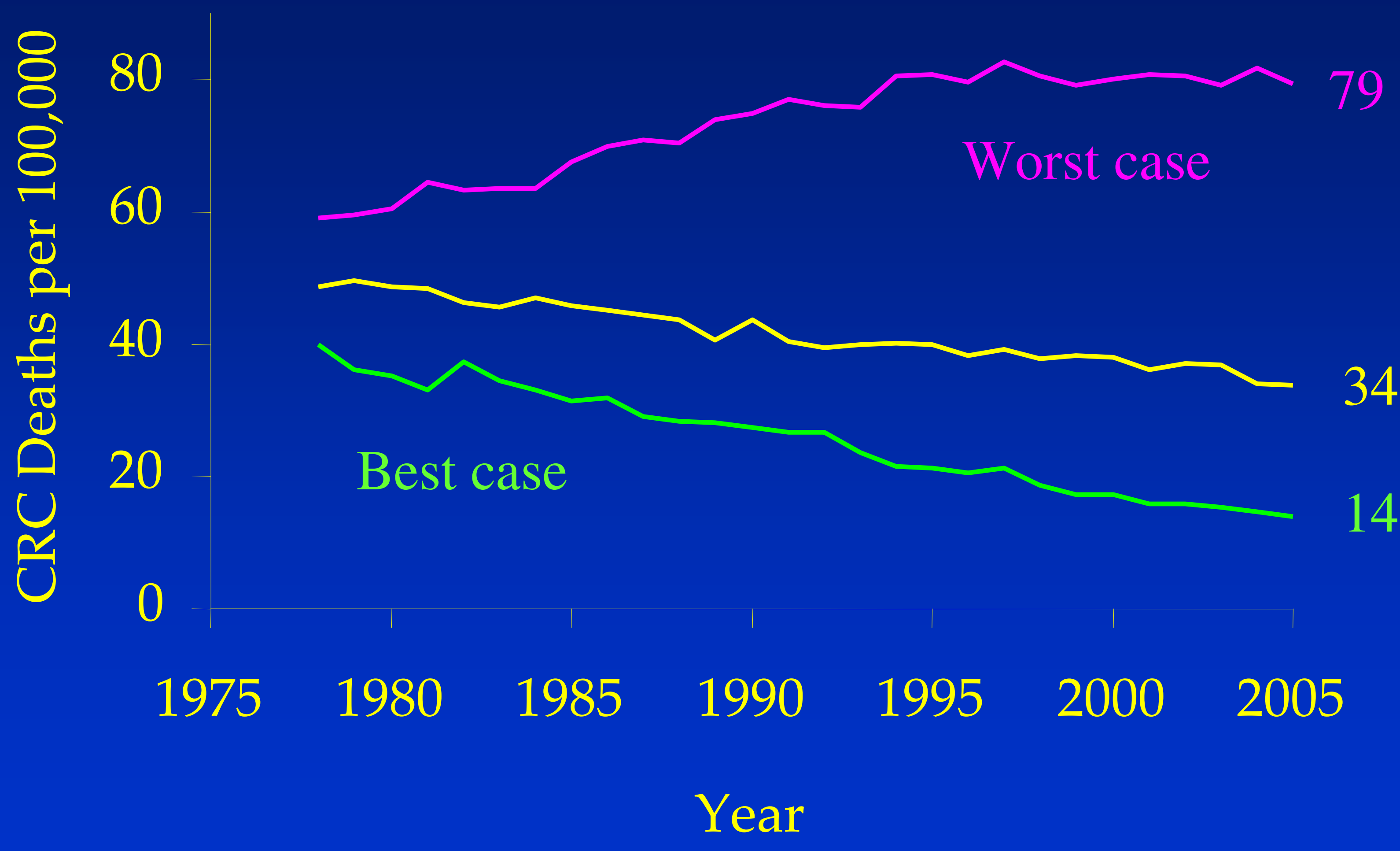
Age-standardized mortality



Age-standardized mortality



Age-standardized mortality



Concluding Remarks

- Trends in risk factors over the past 35 years account for a 13% decrease in both CRC incidence and mortality compared to "flat trends"
- Population-based simulation models provide an important tool for evaluating the impact of changing risk factors