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# Modeled Estimates of the Effects of Screening: Results from the CISNET Breast Cancer Consortium

International Breast Cancer Screening Network Biennial Meeting

Kathleen Cronin
Statistical Research and Applications Branch
National Cancer Institute

May 12, 2006

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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# What Is CISNET?

- NCI Sponsored Consortium of Modelers Focused on
  - Modeling of the Impact of Cancer Control Interventions on Current and Future Population Trends in Incidence and Mortality
  - Optimal Cancer Control Planning
- 15 funded grantees in Breast, Prostate, Colorectal, and Lung Cancer
- Comparative modeling approach
  - Base Cases are joint modeling exercises

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# Breast Cancer Investigators in CISNET

Dana Farber - Marvin Zelen

Sandra J. Lee, Hui Huang, Rebecca Gelman

Erasmus University – Dik Habbema

Sita Y.G.L. Tan, Gerrit J. van Oortmarssen, Harry J. de Koning, Rob Boer

Georgetown University – Jeanne Mandelblatt

Clyde B. Schechter, K. Robin Yabroff, William Lawrence, Bin Yi, Jennifer Cullen

MD Anderson – Donald Berry

Lurdes Inoue, Mark Munsell, John Venier, Yu Shen, Greg Ball, Emma Hoy, Richard L. Theriault, Melissa Bondy

Stanford University – Sylvia Plevritis

Bronislava Signal, Peter Salzman, Peter Glynn, Jarrett Rosenberg, Sanatan Rai

University of Rochester – Andrei Yakovlev

Alexander V. Zorin, Leonid G. Hanin

University of Wisconsin – Dennis Fryback

Marjorie A. Rosenberg, Amy Trentham-Dietz, Patrick L. Remington, Natasha K. Stout,Vipat Kuruchittham

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Eric J. Feuer, Kathleen A. Cronin, Angela Mariotto

Cornerstone Systems Northwest

Lauren Clarke

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# Joint Analysis of the Seven CISNET Groups: Breast Cancer Base Case

What is the Impact of Adjuvant Therapy and Screening Mammography on US Breast Cancer Mortality: 1975-2000 ?

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# Publications

Berry et al. *N ENGL J MED* 2005;353:1784-1792

JNCI Monograph due out summer 2006

- Common inputs
- Model descriptions
- Comparisons of
  - Modeling assumptions
  - Intermediate outcomes
  - Mortality outcomes

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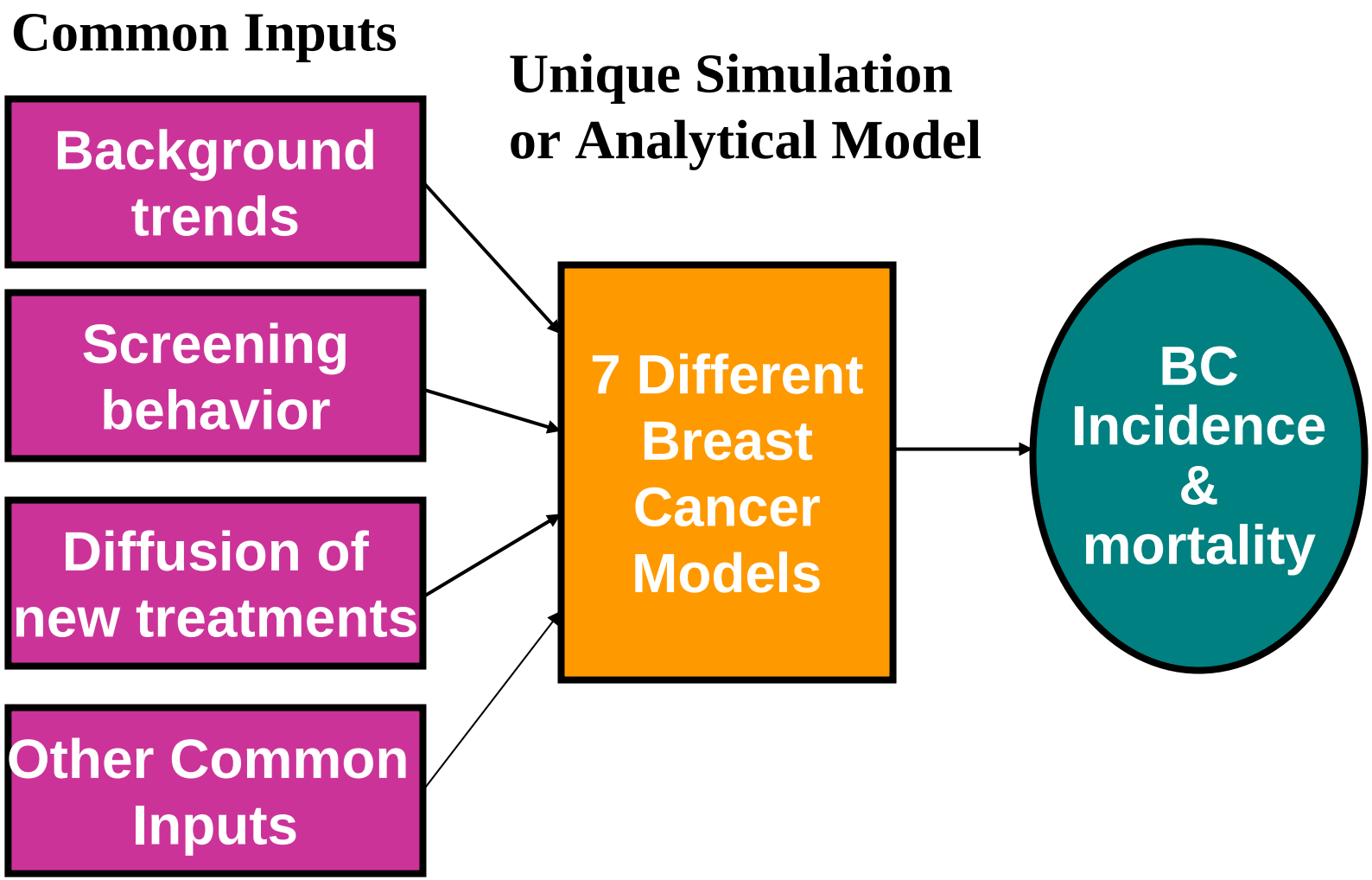
# Population Models



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# Common Inputs

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# Background Trends In Incidence

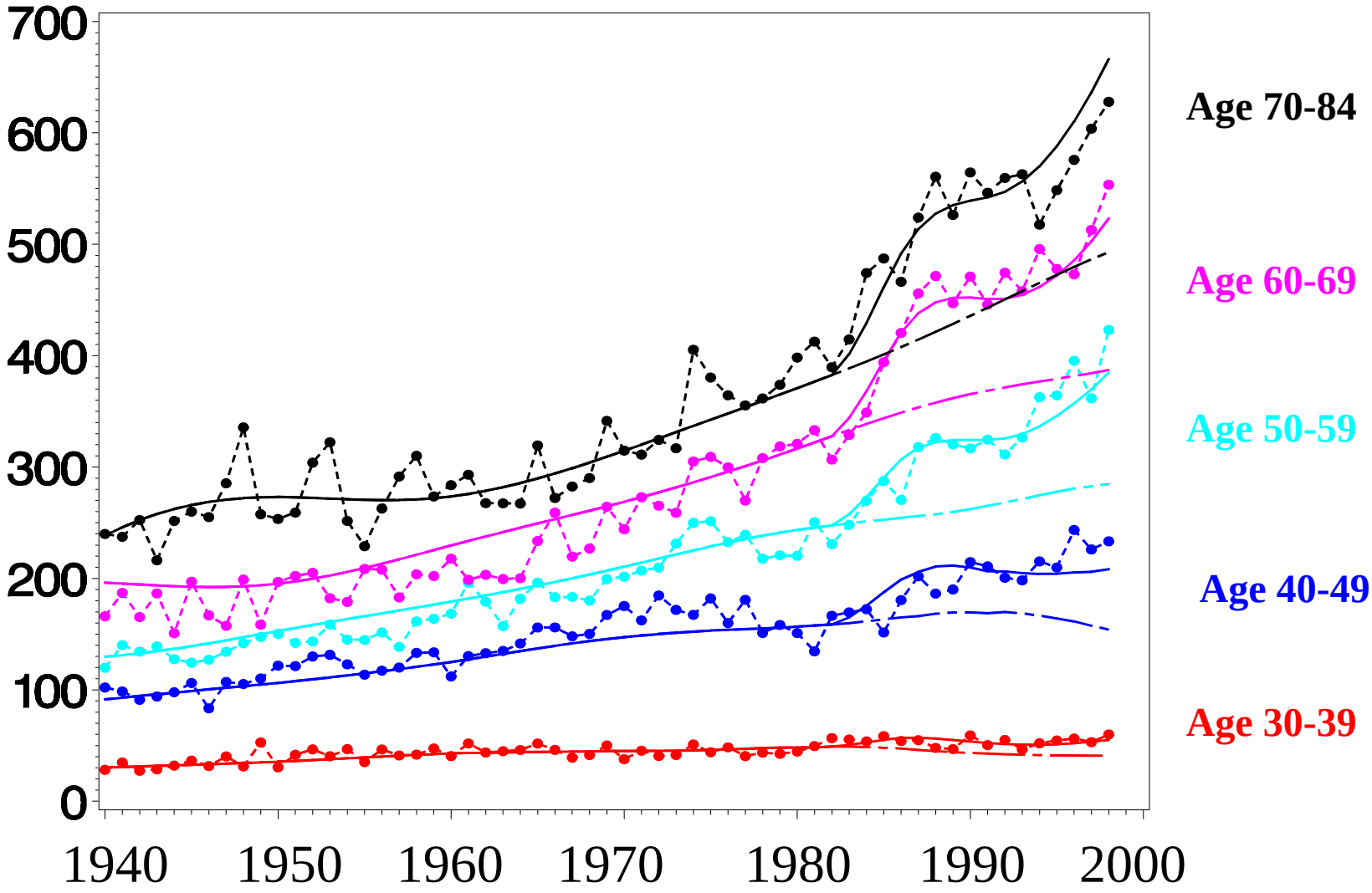
What would incidence have looked like without mammography screening?

Modeled incidence as a function of age, calendar period and birth cohort using historical Connecticut and SEER registry data.

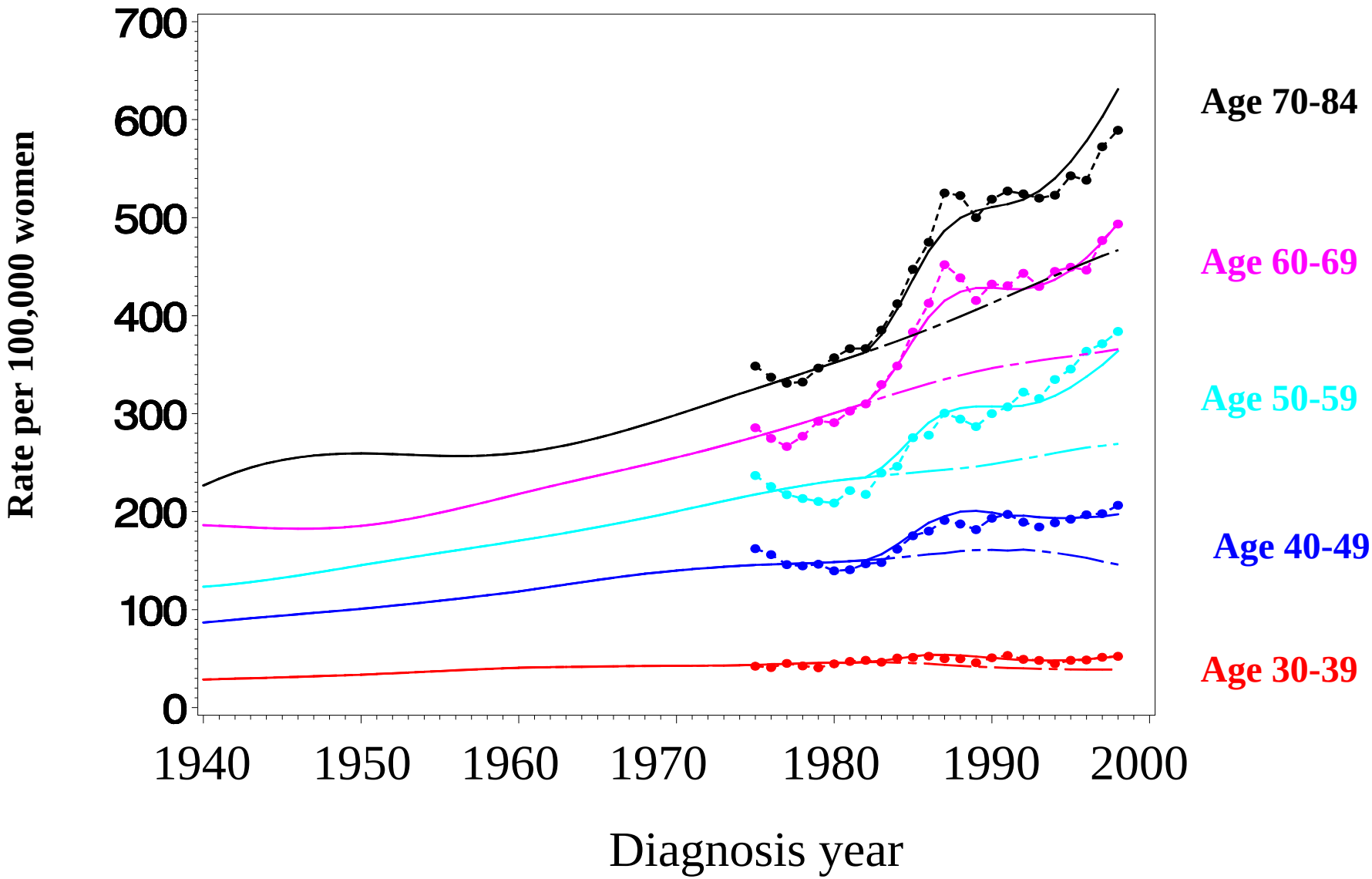
- Assume that the “calendar period” effect reflects screening
  - Age-Period-Cohort represent that observed data points
  - Age-Cohort represents incidence without screening

- JNCI Monograph

# Connecticut Breast Cancer Incidence By Age Group



# SEER Breast Cancer Incidence By Age Group Weighting for SEER



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# Screening Behaviors

How much screening is there between 1975 and 2000?

- Developed a simulation program that would generate screening histories over the course of a woman's lifetime
  - Modeled the age of first screen using survey data
  - Modeled repeat screening behaviors using longitudinal data from the breast cancer surveillance consortium

Cronin et al. The Dissemination Of Mammography In The United States. *Cancer Causes Control* 2005;16:701-712.

Program posted on CISNET site under Input Parameter Generator Interfaces (http://cisnet.cancer.gov/)

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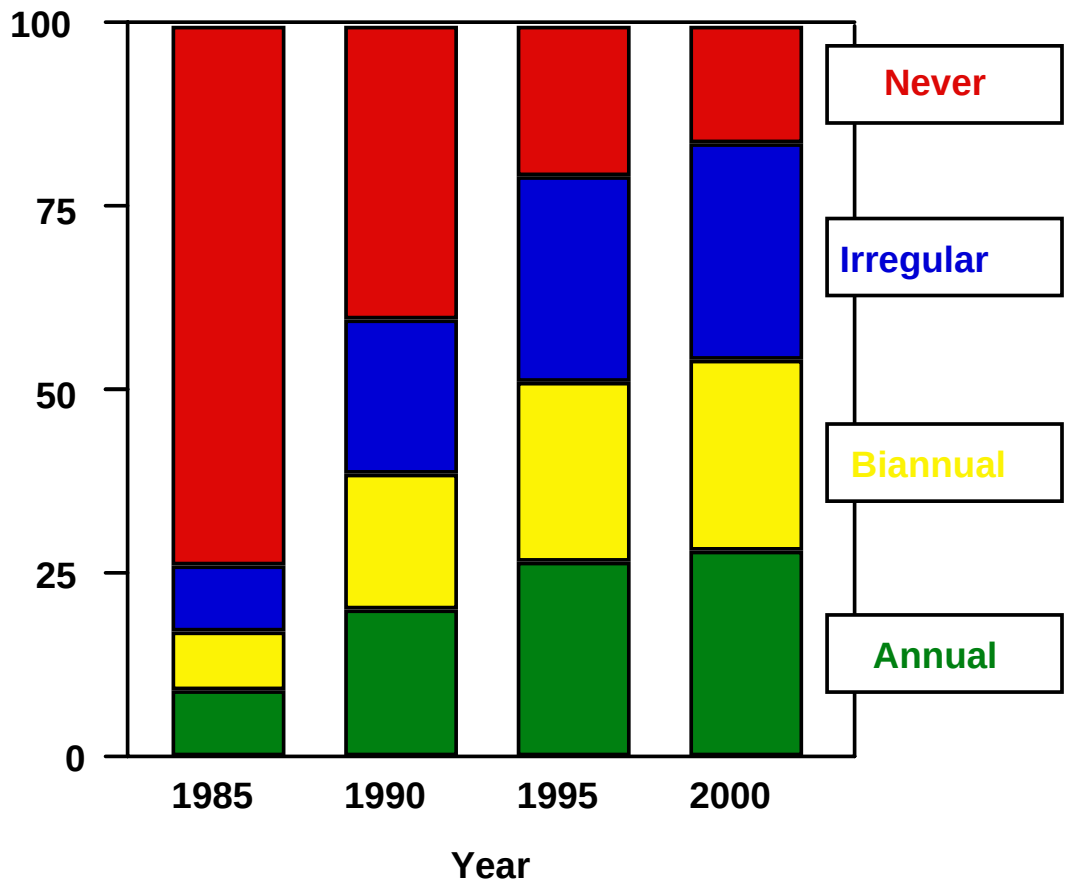
# Modeled Mammography Screening Over Time, Women age 40-79



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# Diffusion Of Adjuvant Chemotherapy and Tamoxifen

What is the usage of adjuvant chemotherapy and Tamoxifen by calendar year, age, stage and ER status?

- Modeled the use of adjuvant therapy using SEER patterns of care studies and SEER treatment information
  - Mariotto et al. Trends in use of adjuvant multi-agent chemotherapy and Tamoxifen for breast cancer in the United States: 1975-1999. J Natl Cancer Inst 2002;94:1626-34.
  - Updates in to include ER status in JNCI monograph

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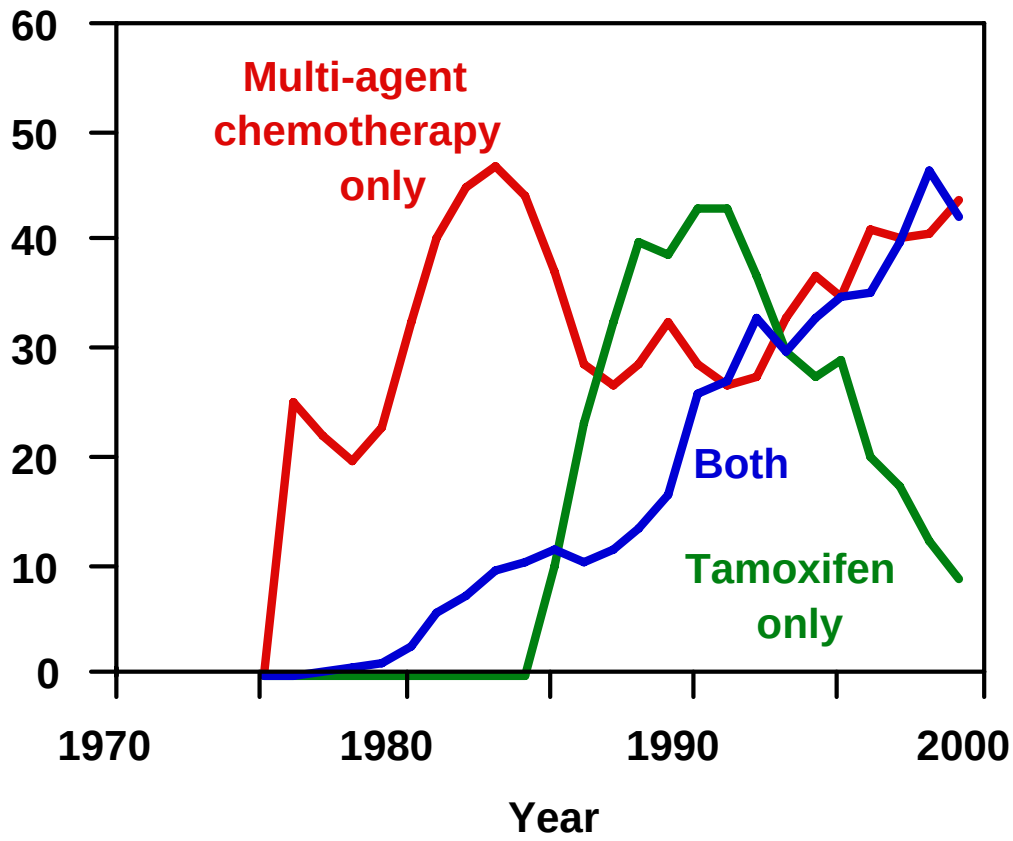
# Dissemination of Adjuvant therapy

## Women age 50-69 with node positive stage II or IIIA



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# Modeling Results

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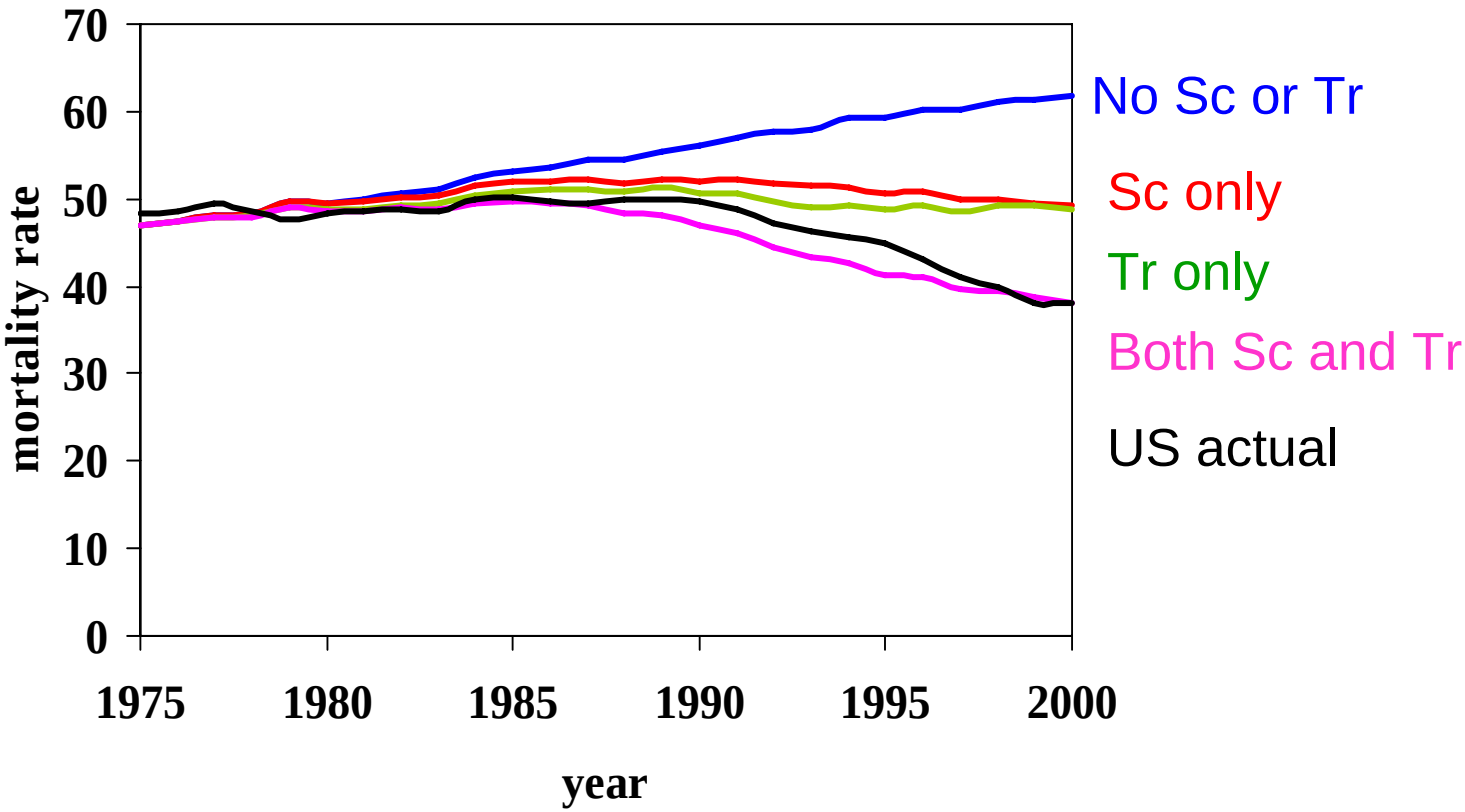
# Model Runs From One Group Mortality Rates For Women 40-79 Under Various Modeling Scenarios



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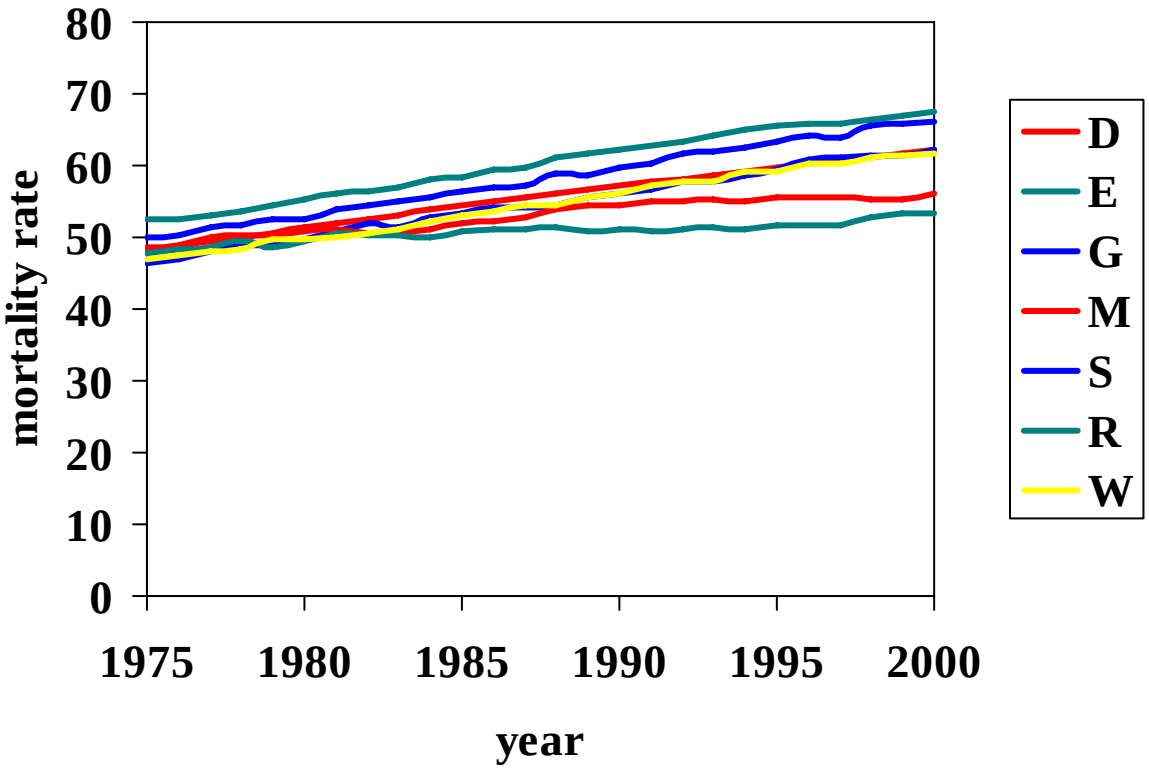
# Modeled Mortality For Women Age 40-70 Without Screening Or Adjuvant Treatment



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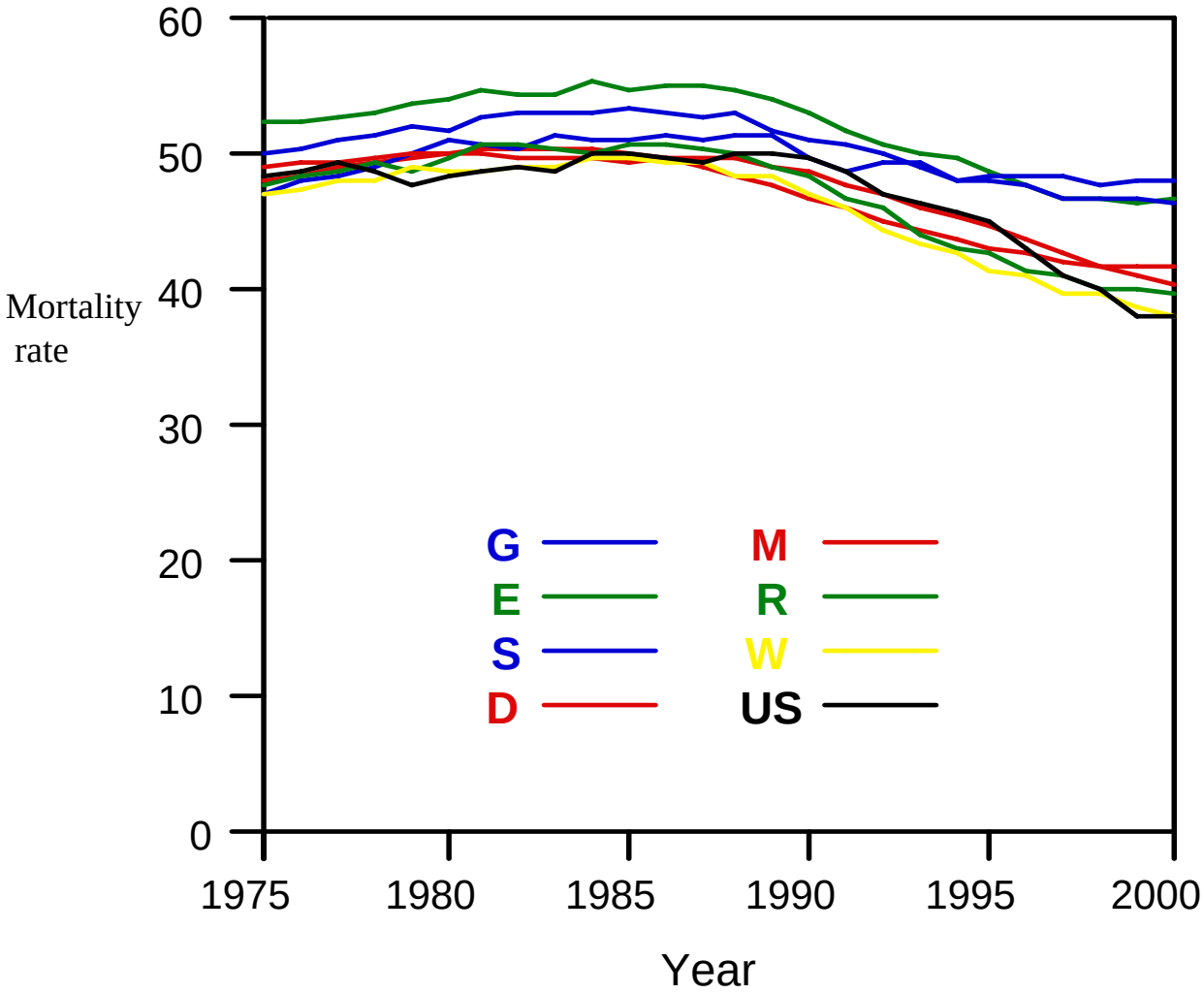
# Modeled Mortality For Women Age 40-70 With Screening and Adjuvant Treatment



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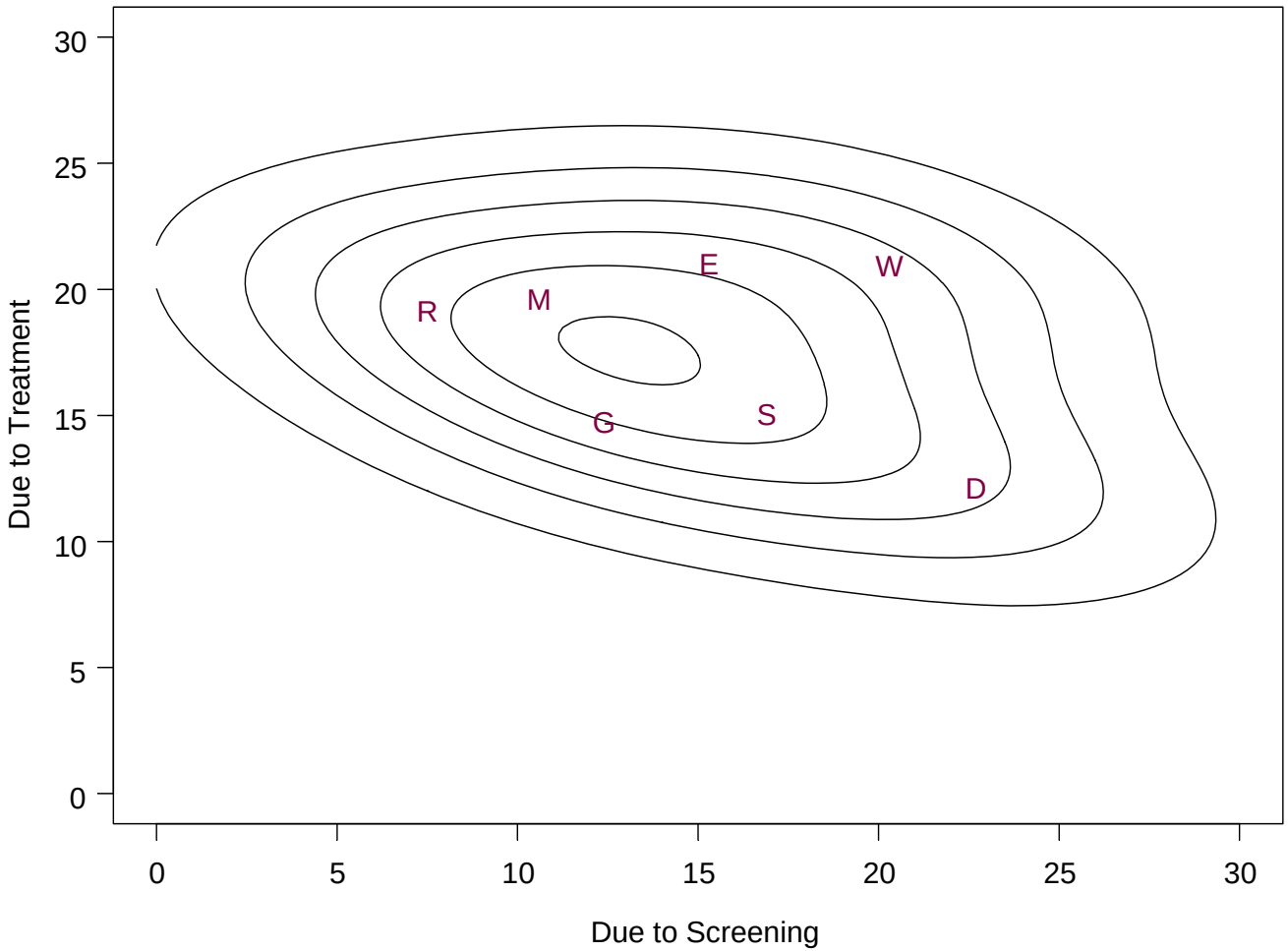
# Estimated percent decline in mortality due to screening and adjuvant therapy for the 7 models



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# Conclusions and Press Coverage

- Mammograms Validated as Key In Cancer Fight (New York Times)

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# Conclusions and Press Coverage

- Mammograms Validated as Key In Cancer Fight (New York Times)
- Mammography in question: Benefits of breast cancer screening may be small, researchers say (Chicago Tribune)
- Statistical Blitz Helps Pin Down Mammography Benefits - “An unprecedented statistical assault” (CNN – medpage today)

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# Conclusions and Press Coverage

"What seems most important is that each team found at least some benefit from mammograms. The likelihood that they are beneficial seems a lot more solid today than it did four years ago, although the size of the benefit remains in dispute"

New York Times Editorial

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# Future Work

- Individual groups are working modeling risk factors and impact on cancer incidence.
- Optimal screening schedules for the population and for high risk groups.
- Factors influencing disparities.
- Several groups are participating in modeling progress toward HP2010 goals.
- A base case II – Modeling the impact of new treatments on population breast cancer mortality rates.

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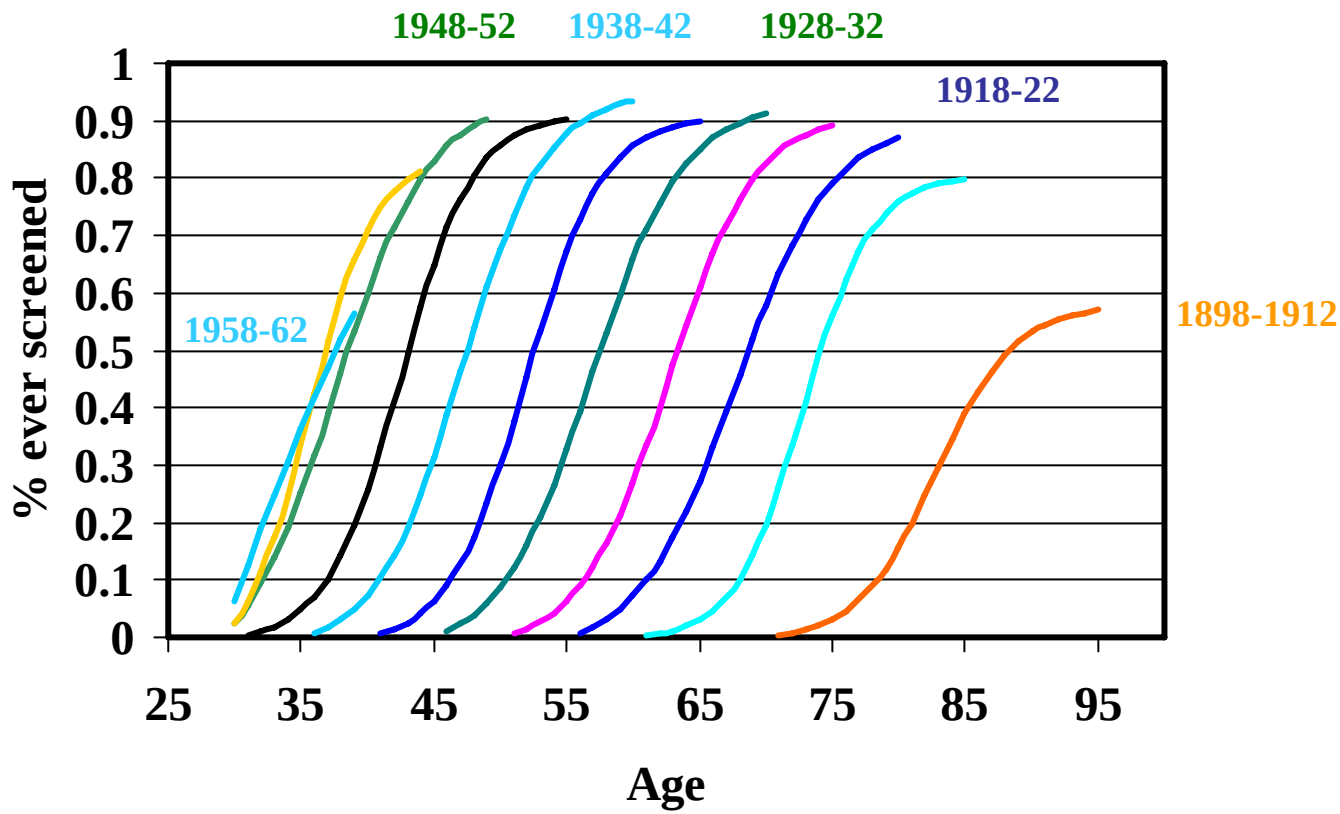
# Age of First Mammography Screening By Birth Cohort




Based on a series of NHIS surveys

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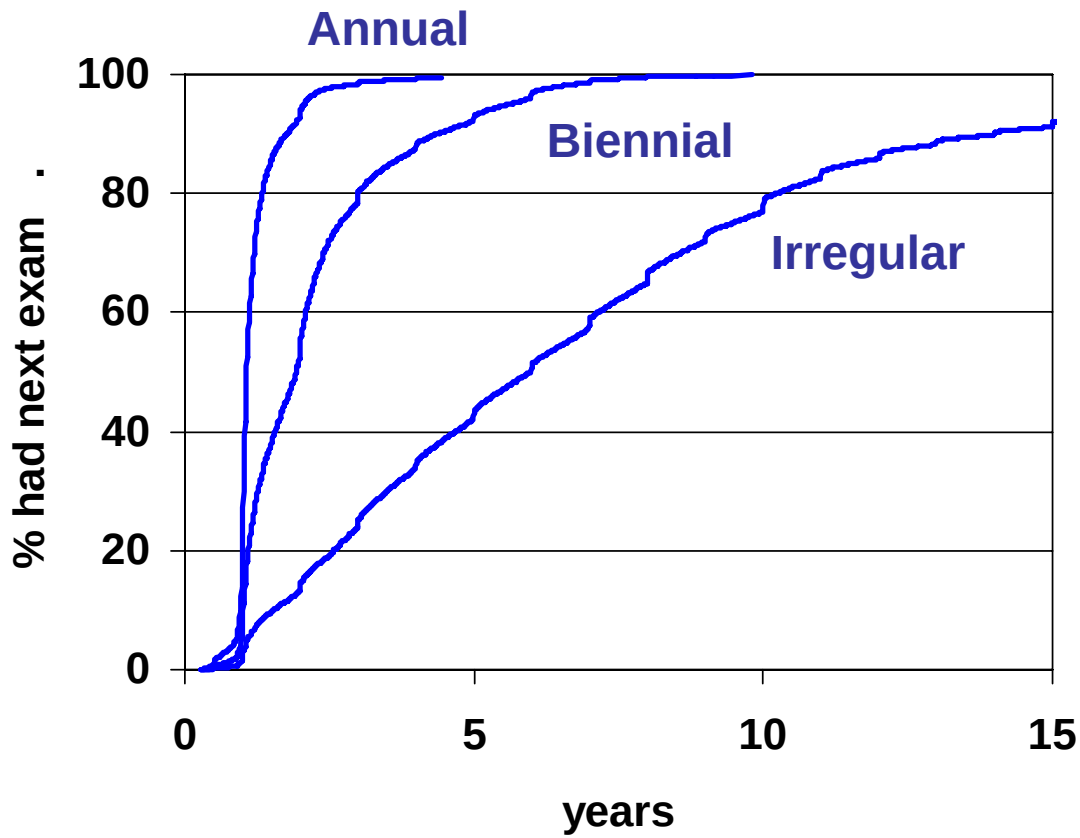
# Time Between Subsequent Screening Exams For Women age 50-59




Based on data from the Breast Cancer Surveillance Consortium

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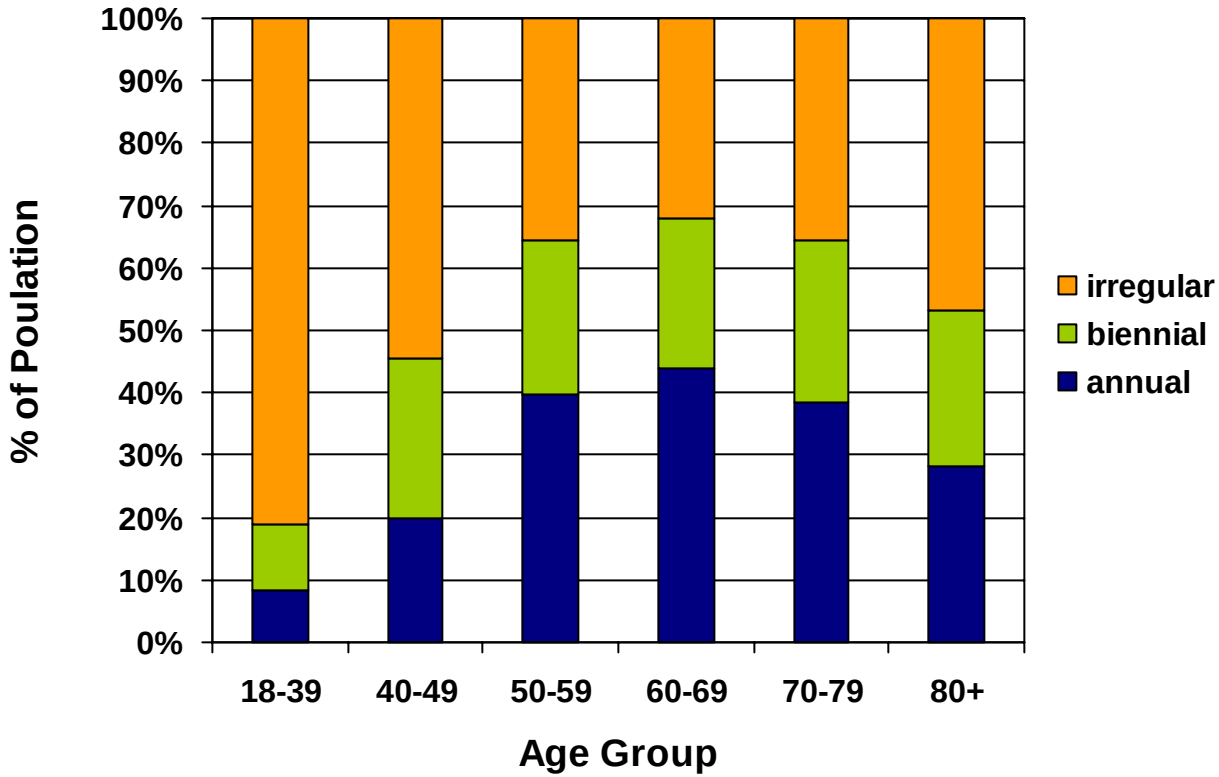
# Classification Of Screening Type By Age

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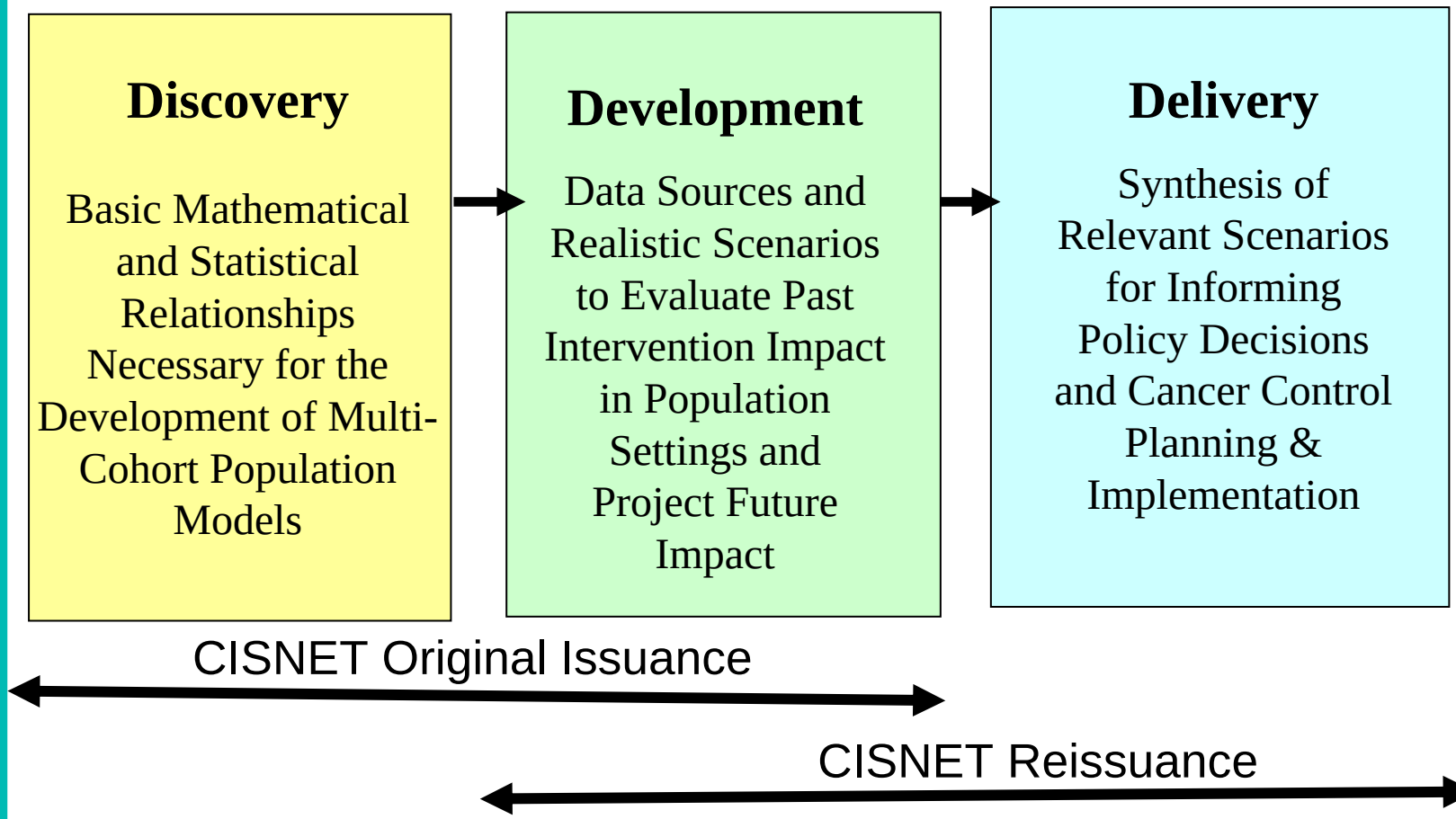
# Next Steps