NCI Board of Scientific Advisors

November 7, 2008

Cancer Intervention and Surveillance Modeling Network (CISNET)

Colorectal Cancer Working Group

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Memorial Sloan-Kettering Cancer Center

Objectives

- Microsimulation modeling for colorectal cancer
- Summarize scientific achievements
- Highlight collaborative research results

Colorectal CISNET Collaborators

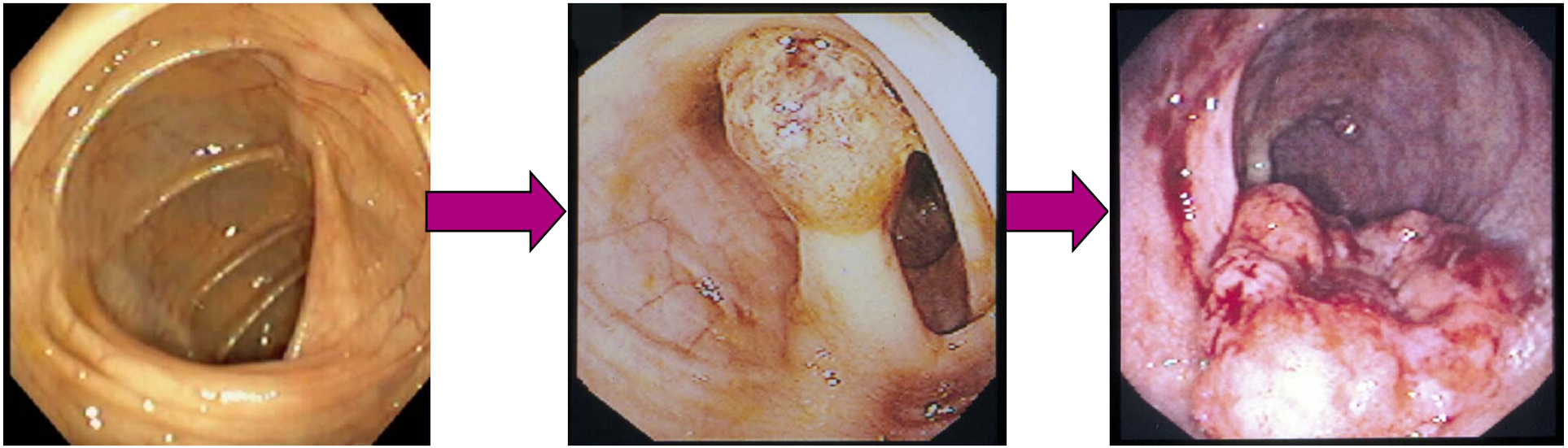
Grantees

- MISCAN: Memorial Sloan-Kettering and ErasmusMC
  Ann Zauber, Marjolein van Ballegooijen, Iris Lansdorp-Vogelaar, Rob Boer, and Deb Schrag
- SimCRC: University of Minnesota, Mass Gen Hospital
  Karen Kuntz, Amy Knudsen, and Deb Schrag
- CRC-Spin: Group Health Cooperative
  Carolyn Rutter and Diana Miglioretti
- CRC Coordinating Center
  Ann Zauber, Marjolein van Ballegooijen, Iris Lansdorp-Vogelaar

Affiliates

- Georg Luebeck (Fred Hutchinson), Scott Ramsey (Fred Hutchinson), Dave Vanness (University of Wisconsin)

Adenoma to Carcinoma Pathway



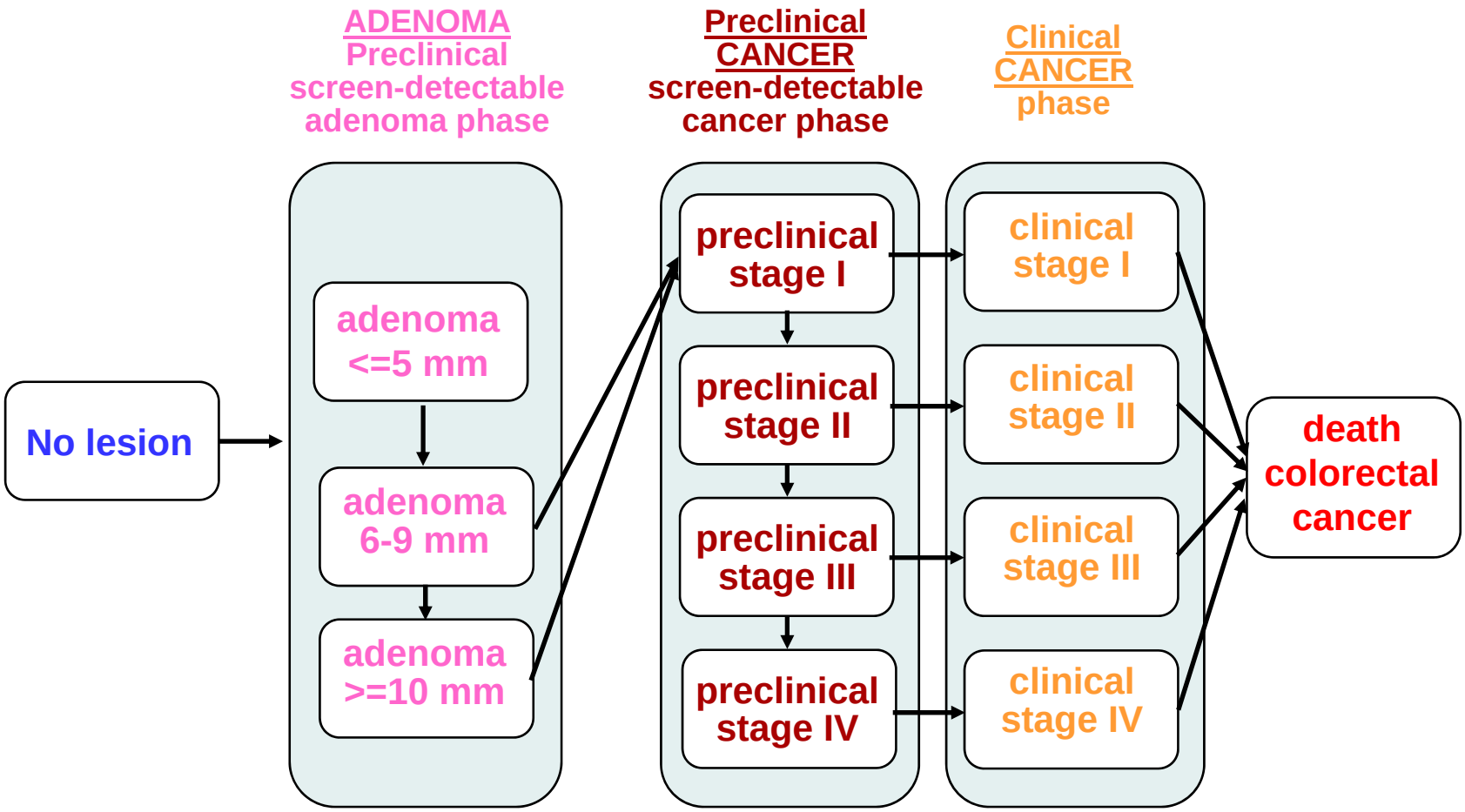
Normal Epithelium

Small Adenoma

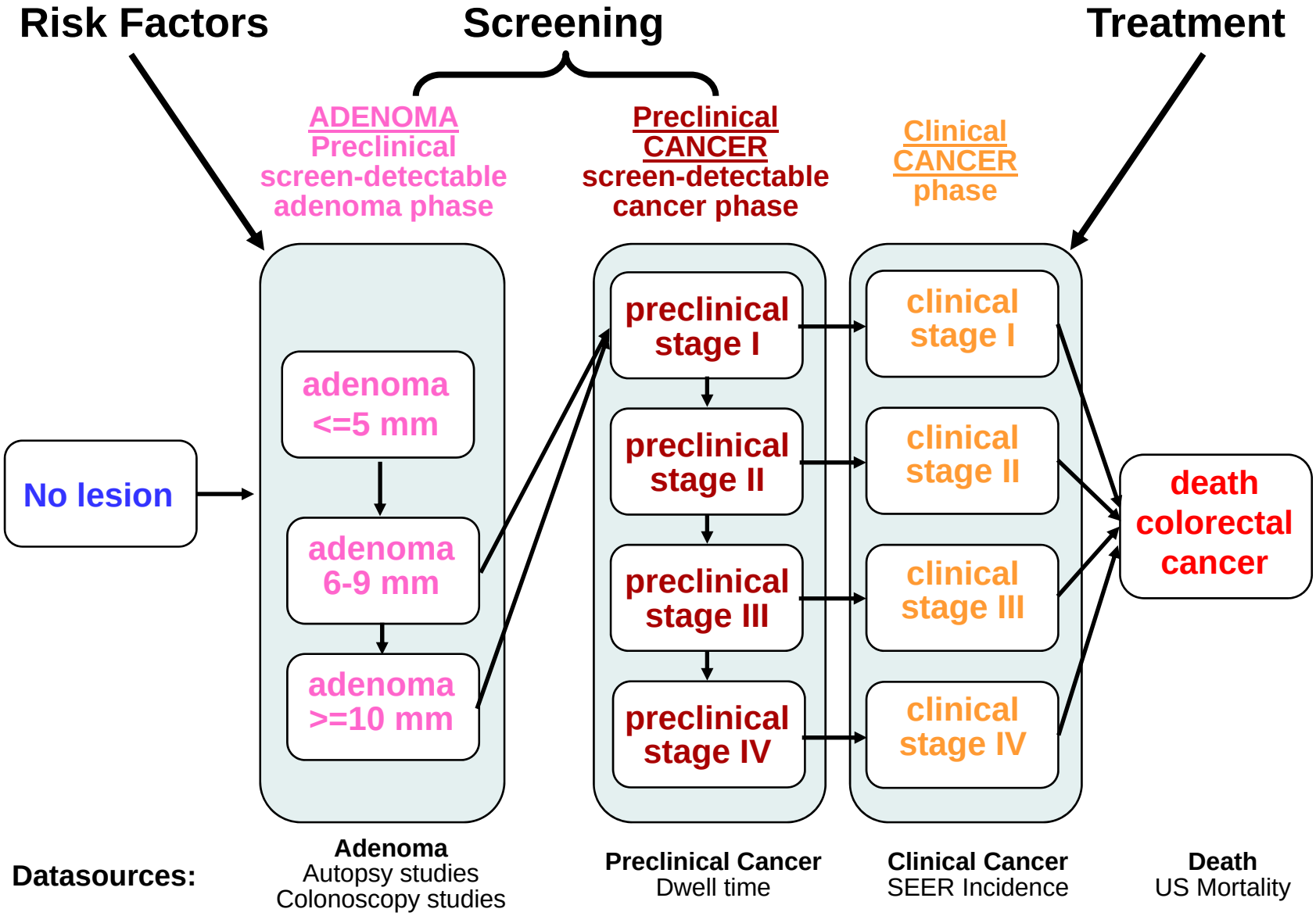
Advanced Adenoma

Colorectal Cancer

Natural History of Colorectal Cancer



Interventions on Colorectal Cancer



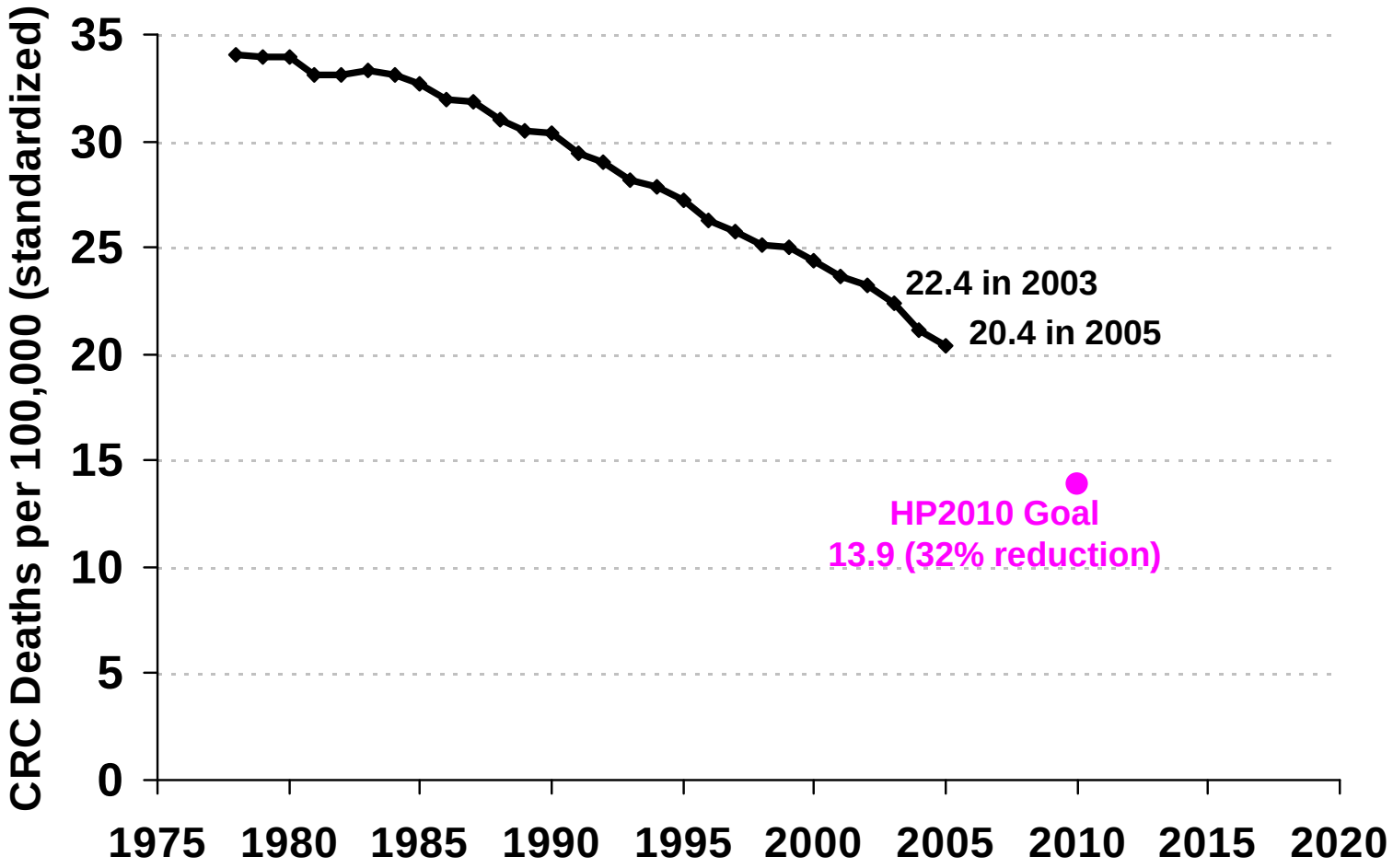
CRC CISNET Accomplishments

- Natural history
  - Adenoma growth rates and the implications for evaluation of colorectal screening
- Screening intervention – *Maximize the Benefit of Screening*
  - Decision analysis for age to begin, age to stop, and intervals of screening *Annals of Internal Medicine Nov 2008 – United States Preventive Services Task Force*
  - Potential cost savings for Medicare if CRC screening increases in ages 50-64: potential costs for Medicaid and private insurers –*CDC, NCI, CMS*
  - Technology assessment to support National Coverage Determinations for fecal immunochemical test (FIT), stool DNA, and CT-colonography – *CMS and AHRQ*
  - Cost-effectiveness analysis of CT-colonography in National CT Colonography Trial – *ACRIN 6664*
- Treatment interventions
  - Quality of care measures for CRC treatment - *National Quality Forum Cancer Care Quality Measurement Project*

I. How much can cancer control interventions reduce colorectal cancer mortality by 2020?

Healthy People
Cancer Workgroup

Colorectal Cancer Mortality – White Men
Healthy People 2010 goal



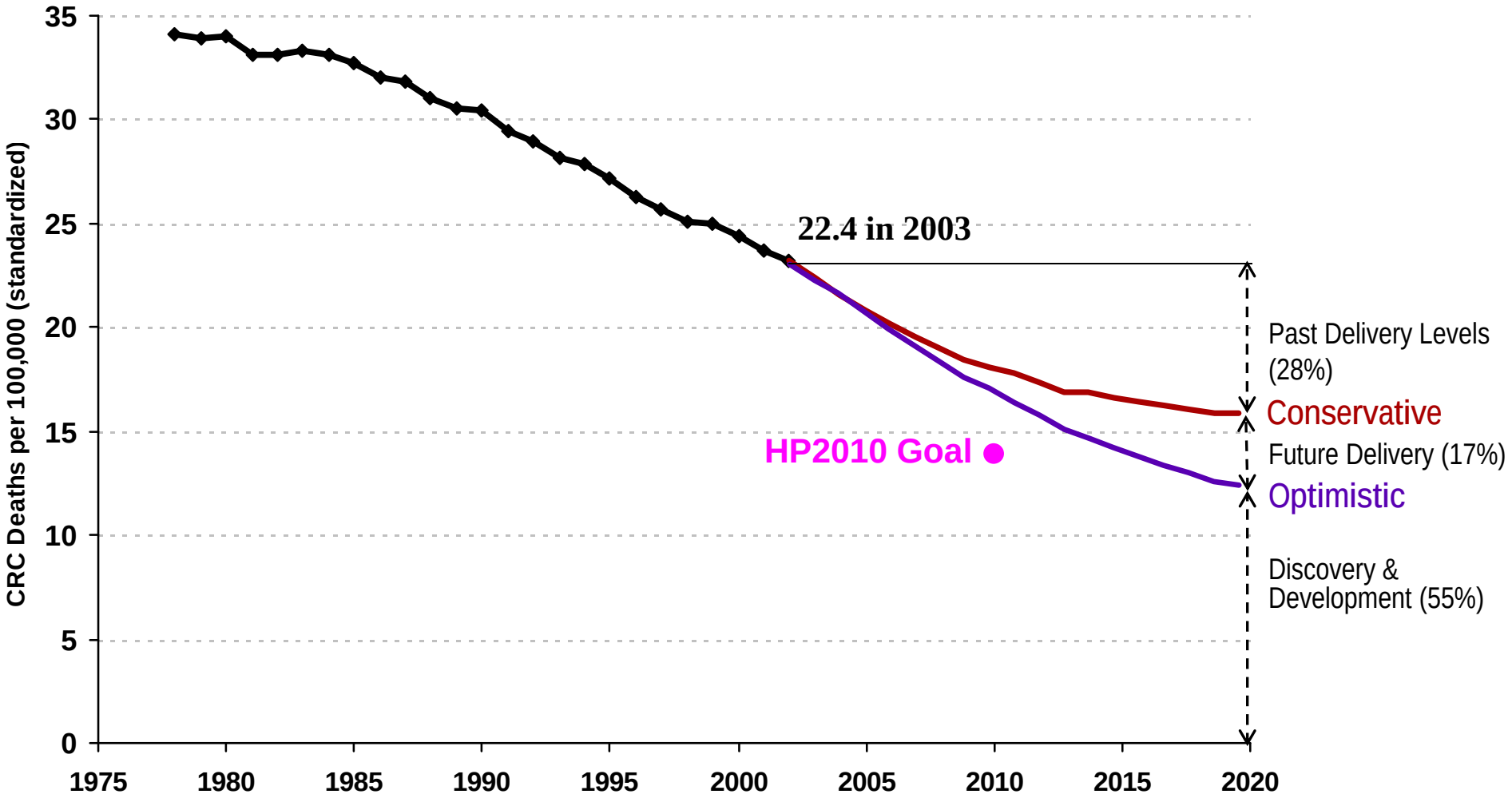
Upstream Interventions on Colorectal Cancer

- Risk Factors:
  - Smoking, Obesity, Red Meat
  - Physical Activity, Multivitamin Use, Aspirin, Fruit and Vegetable Consumption, Hormone Replacement Therapy
- Screening:
  - FOBT, Endoscopy (Sigmoidoscopy / Colonoscopy)
- Treatment:
  - Stage II and III Adjuvant Chemo, Stage IV Chemo

Scenarios Modeled for 2005-2020 for Upstream Interventions on Colorectal Cancer

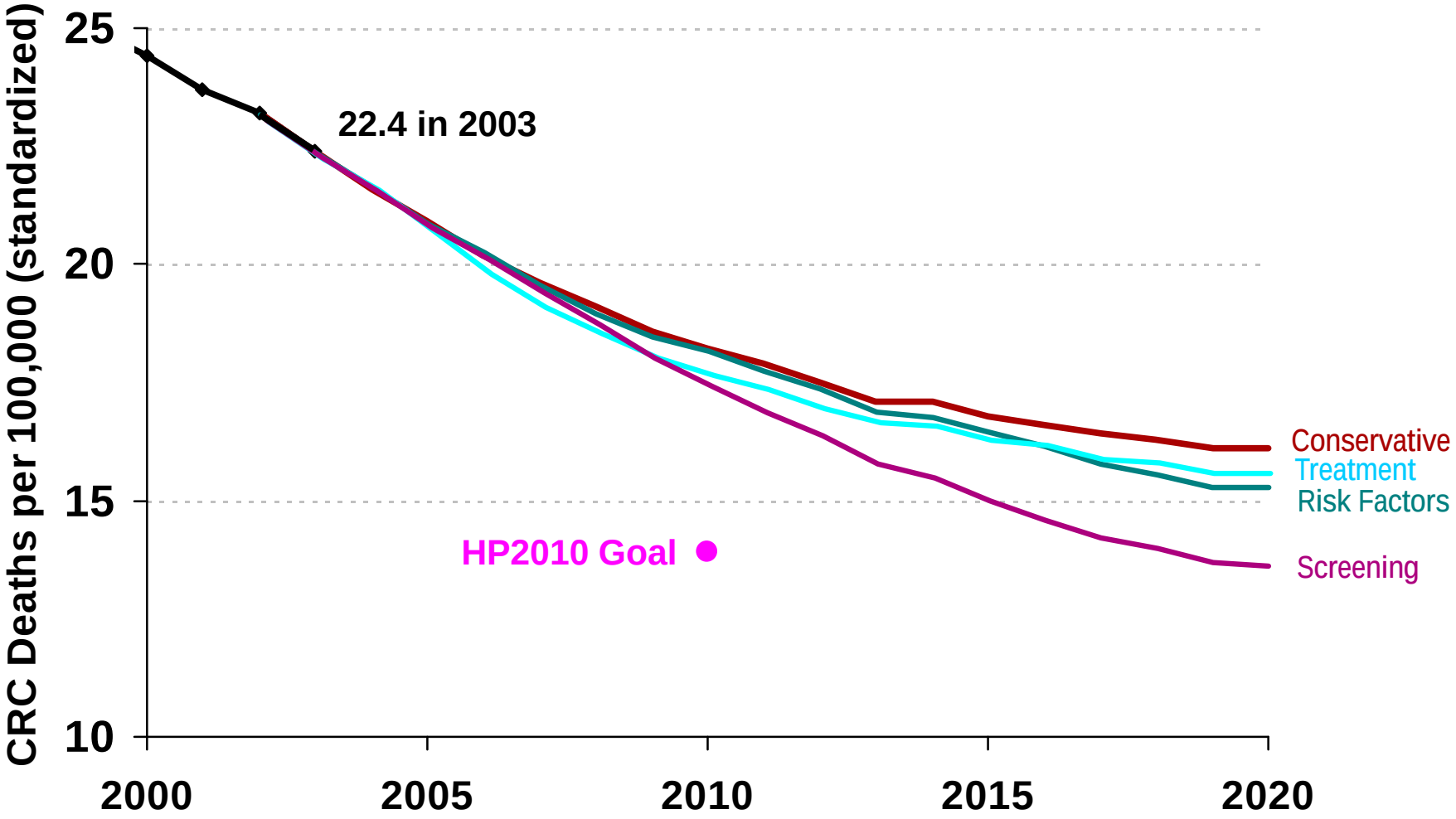
SCENARIO	*DESCRIPTION*
CONSERVATIVE	**Upstream factors remain at levels achieved in 2005**
OPTIMISTIC	**Difficult but feasible "best case" levels of upstream factors**

What is the Potential Mortality Impact of Meeting Optimistic Goals for the Delivery of Screening, Treatment, and Prevention by 2020?



White Men – MISCAN Model

What is the contribution of screening, treatment and risk factors to the mortality decline?



White Men – MISCAN Model

Colorectal Cancer Mortality Projections Web Site

http://cisnet.cancer.gov/projections/colorectal/

National Cancer Institute | U.S. National Institutes of Health | www.cancer.gov

Colorectal Cancer Mortality Projections

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- Projection Scenarios
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Modeling the impact of cancer control efforts on US colorectal cancer mortality

Our purpose is to inform cancer control planning and public policy discussion.

The NCI's Cancer Intervention and Surveillance Modeling Network (CISNET) developed this Web site to help cancer control planners, program staff and policy makers consider the impact of risk factor reduction, increased early detection, and increased access to optimal treatment on future colorectal cancer mortality rates.

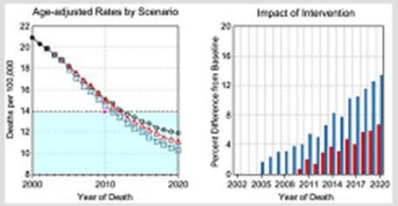
This site shows the results of simulation modeling—computer simulations of colorectal disease progression in a population with the characteristics of the US population. Use this information to:

- see how **policy** options to increase cancer prevention, screening, and access to state-of-the-science treatment can affect future mortality trends.
- help determine **cancer control program** priority areas for new intervention investments.
- identify **research** questions and opportunities.

To get started:

- Watch and listen to our Introductory Tutorial (Flash - 1:10 min.).
- View Key Findings to answer important questions about how best to reduce CRC mortality.
- Explore the Interactive Graphs to view and compare results of the simulation models.

Interactive CRC Mortality Graphs



Create charts and graphs projecting future trends in CRC mortality based on results from simulation models. Results are presented as the percent decline in mortality and deaths per 100,000.

Suggested Citation: Colorectal Cancer Mortality Projections, National Cancer Institute, NIH, DHHS, Bethesda, MD, December 2007, http://cisnet.cancer.gov/projections/colorectal/.

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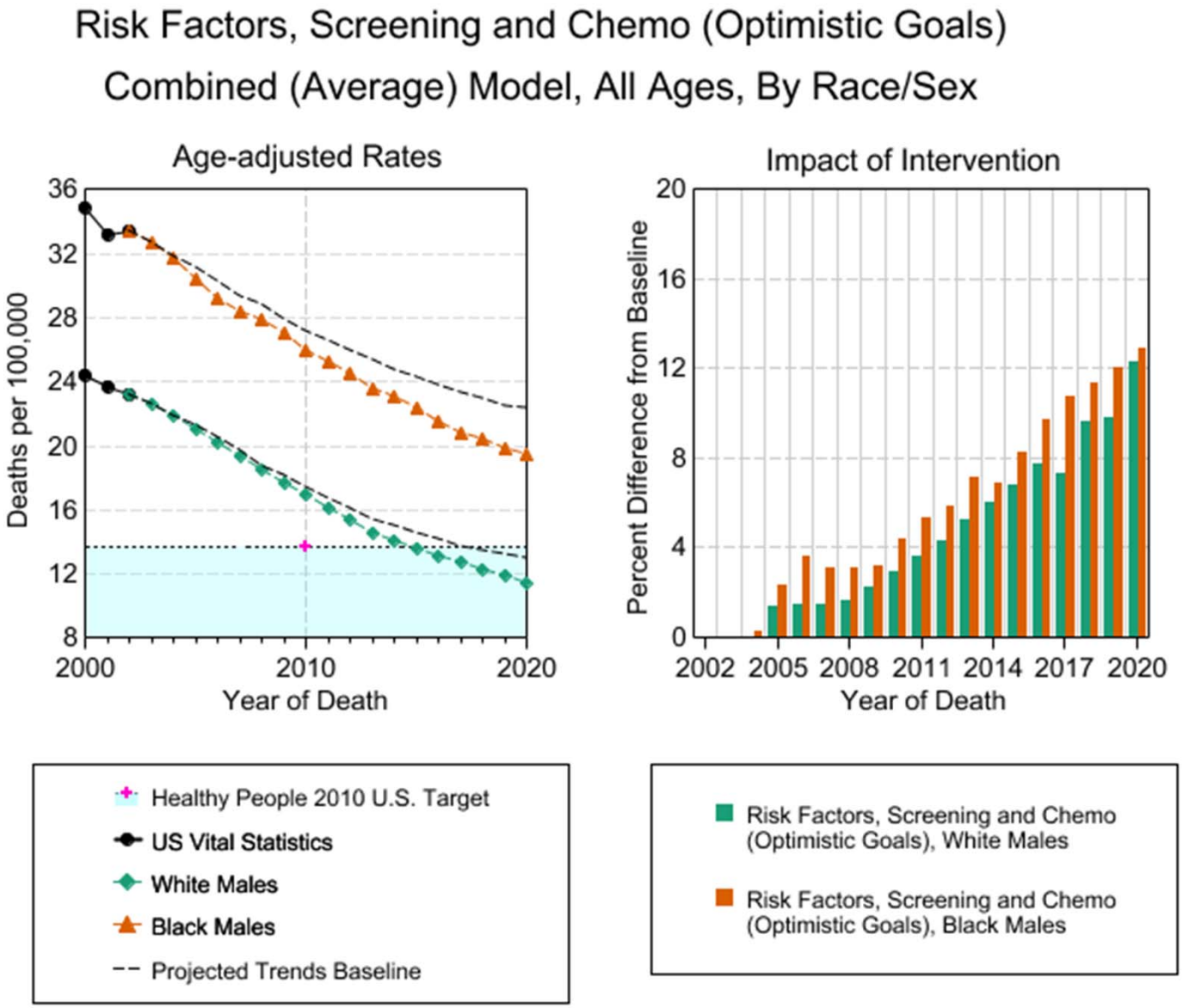
For a printable summary of the Colorectal Cancer Mortality Projections Web Site, download the Fact Sheet (PDF).

Last modified: January 03, 2008

Accessibility | Privacy Policies

CISNET | National Cancer Institute | USA.gov

Compare Race and Gender Groups



Some Conclusions

- Fuller utilization of already developed technologies can get us almost half way to eliminating CRC mortality by 2020
- Without an aggressive sustained approach to continuing the increased uptake of current interventions, the CRC mortality reduction would be half the effect (~25%)
- Screening is the best short to medium term cancer control opportunity
  - Risk factor modification is a long term investment with benefits across a wide range of diseases
  - Increased treatment utilization has an almost immediate but modest benefit: whites already have high usage levels, more room for improvement in blacks
- Whites will reach or exceed the HP2010 goal by 2015 – it is unlikely for blacks. **Some of the best cancer control opportunities are for reducing health disparities.**

II. How can modeling inform decisions by evaluating emerging technologies?

What CMS reimbursement for a new CRC test?

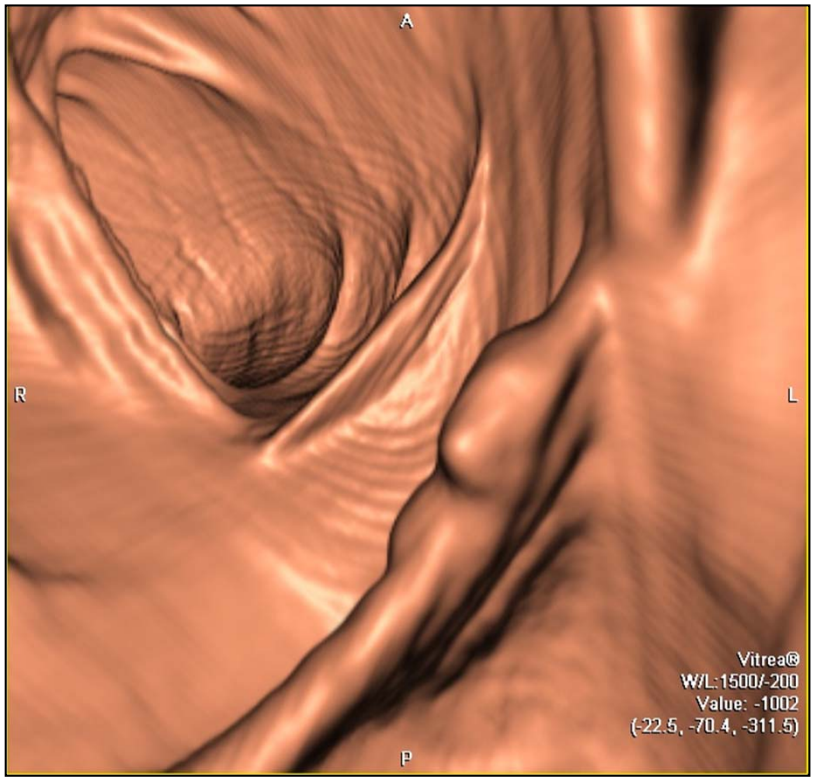
$4.54	$22.22	$34 to 51
		Stool DNA test ($350-$850 in practice)
Guaiac FOBT	Fecal immuno-chemical test (FIT)	

FIT: http://www.cms.hhs.gov/mcd/viewtechassess.asp?where=index&tid=20

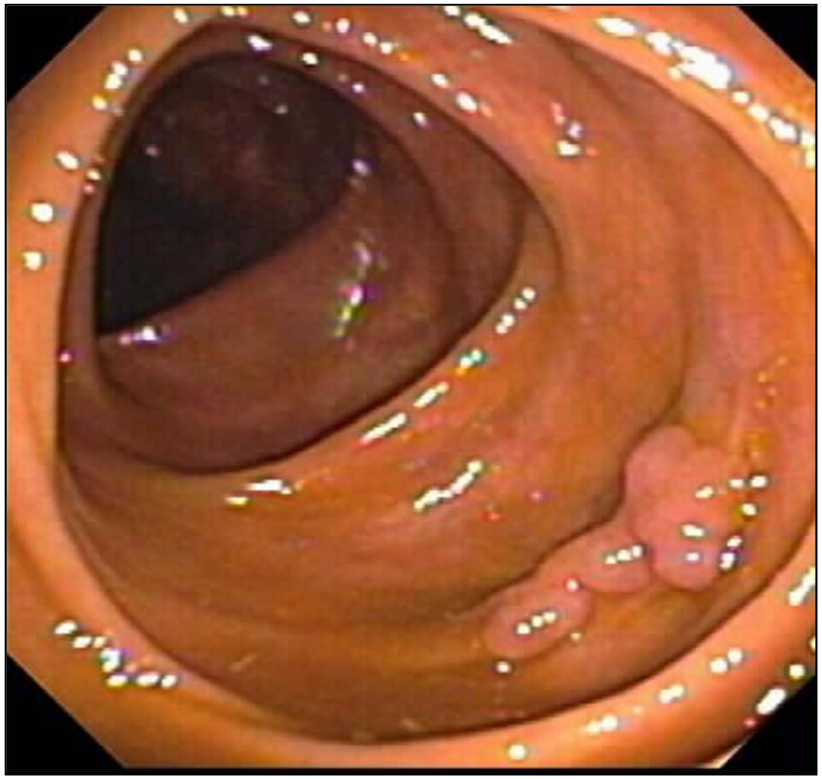
Stool DNA: https://www.cms.hhs.gov/mcd/viewtechassess.asp?id=212

CT Colonography (CTC) or Virtual Colonoscopy

CTC Image



Optical Colonoscopy

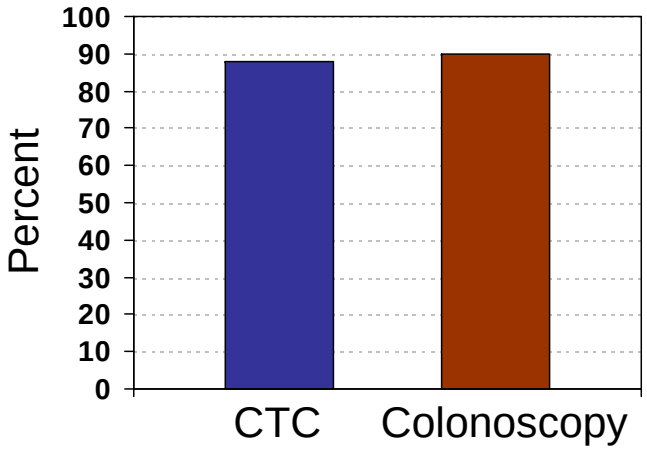


18 mm sessile lesion in transverse colon

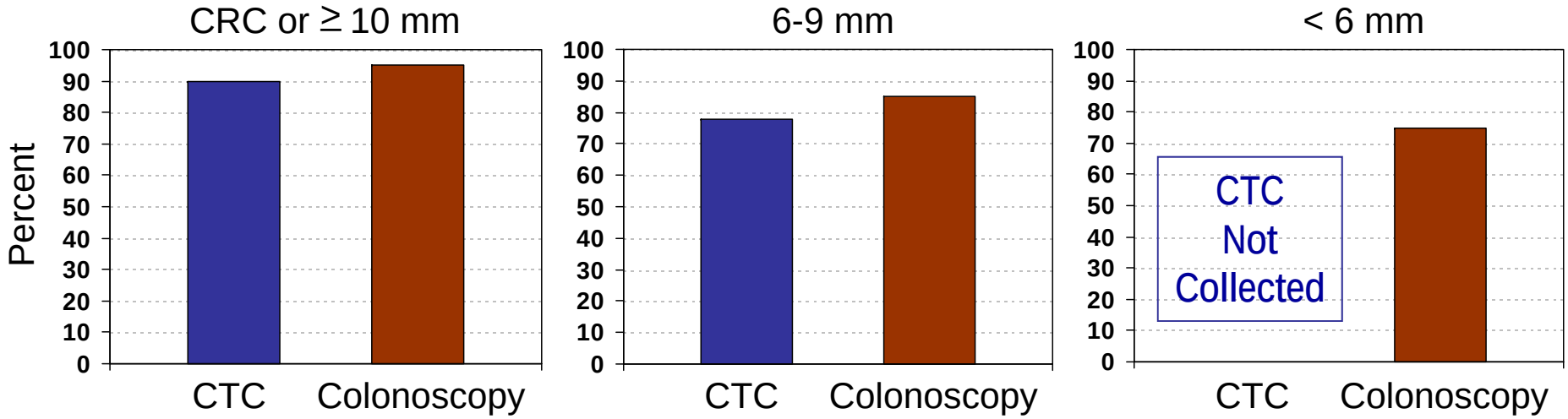
Courtesy of Beth McFarland, MD

Sensitivity and Specificity of CT-colonography and Colonoscopy

Specificity



CRC and Adenoma Sensitivity by Size



CISNET microsimulation modeling addresses issues in CTC screening

- Unknown natural history of small adenomas
  - What size polyps should be referred for colonoscopy?
    - ≥ 6 mm recommended, ≥ 10 mm possible?
    - Lesions < 6 mm not reported by CTC
- Repeat CTC screening interval
  - 5, 10 years, other?
- Better adherence to CTC than other CRC screen tests?
  - Pro: Minimally invasive, whole colon, high sensitivity, no sedation
  - Con: Full cathartic prep (not virtual), stool tagging, perforation risk, radiation dose, extracolonic findings, < 6 mm lesions not reported, positives referred for colonoscopy

CISNET Modeling Uniquely Positioned to Evaluate CTC

- Measures to be evaluated by modeling
  - Life years gained, cost-effectiveness, and screening strategies
- Cost-effectiveness analysis of National CT-Colonography Trial (*ACRIN 6664)*
- Technology assessment of CT-Colonography for National Medical Determination- *CMS and AHRQ*

Thank you!

NEXT:
Ruth Etzioni for
Prostate
CISNET