Screening for Colorectal Cancer

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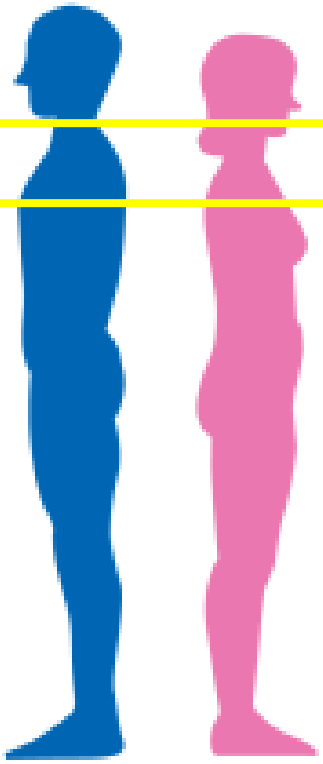
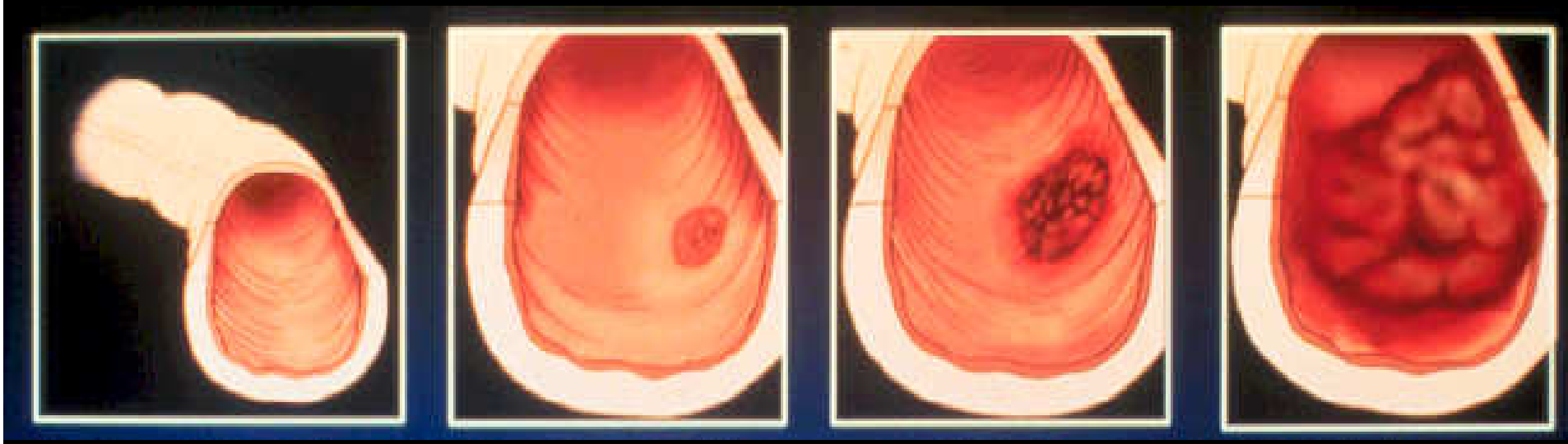
2014 Estimated US Cancer Cases

Males			Females	
Prostate	233,000		Breast	232,670
Lung & bronchus	116,000		Lung & bronchus	108,210
Colorectum	71,830		Colorectum	65,000
Urinary bladder	56,390		Uterine corpus	52,630
Melanoma of the skin	43,890		Thyroid	47,790
Kidney & renal pelvis	39,140		Non-Hodgkin lymphoma	32,530
Non-Hodgkin lymphoma	38,270		Melanoma of the skin	32,210
Oral cavity & pharynx	30,220		Kidney & renal pelvis	24,780
Leukemia	30,100		Pancreas	22,890
Liver & intrahepatic bile duct	24,600		Leukemia	22,280
All Sites	**855,220**		**All Sites**	**810,320**



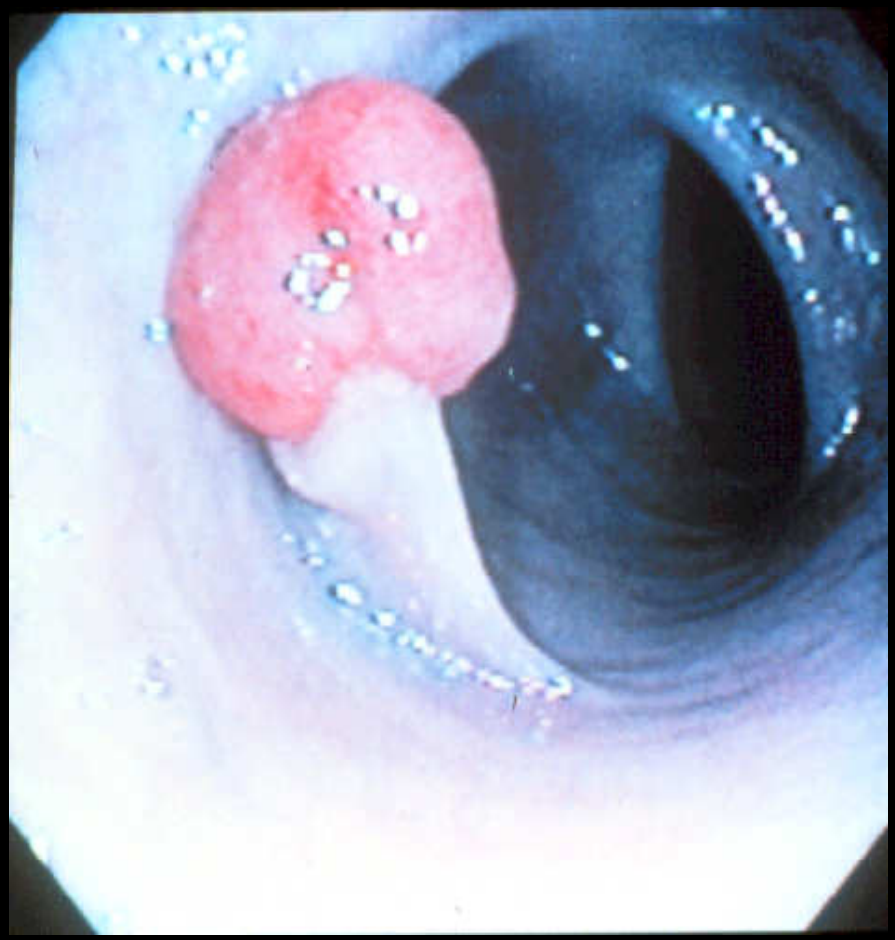
Siegel et al. CA: A cancer journal for clinicians; 2014; 64:9

Adenoma – Carcinoma Sequence

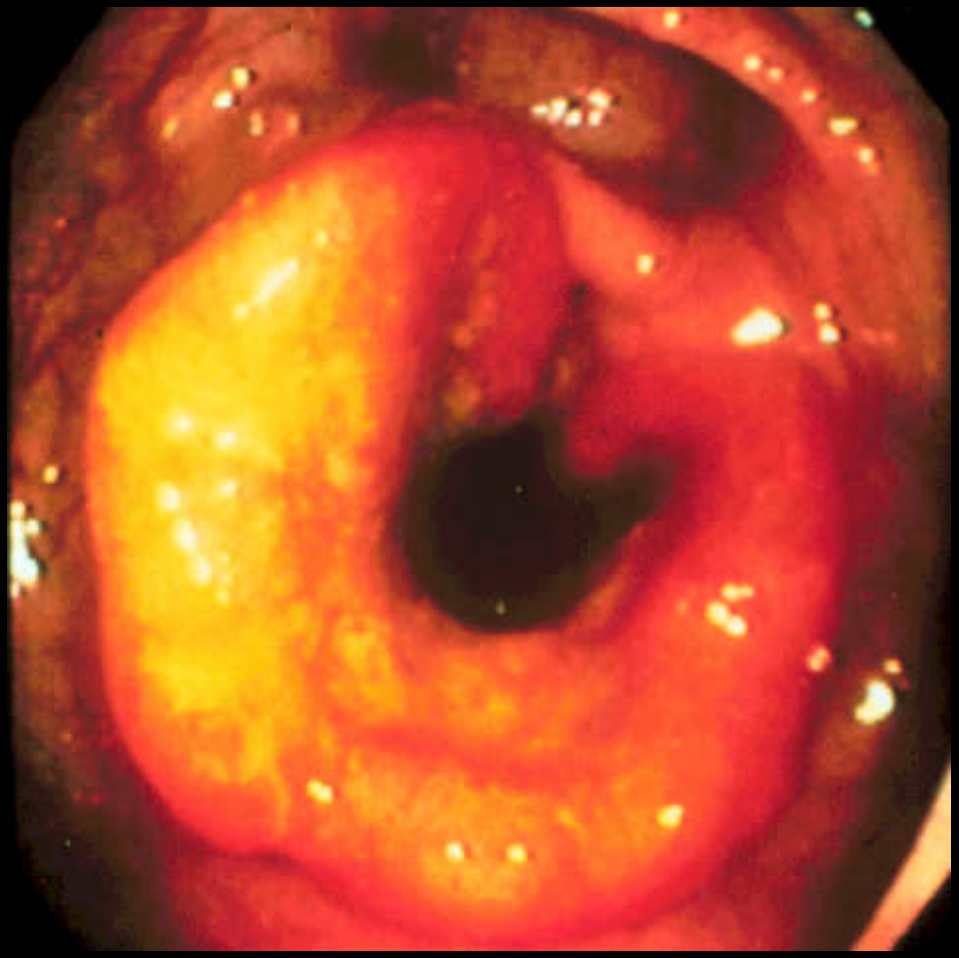


Normal Mucosa → Adenoma → Severe Dysplasia → Cancer

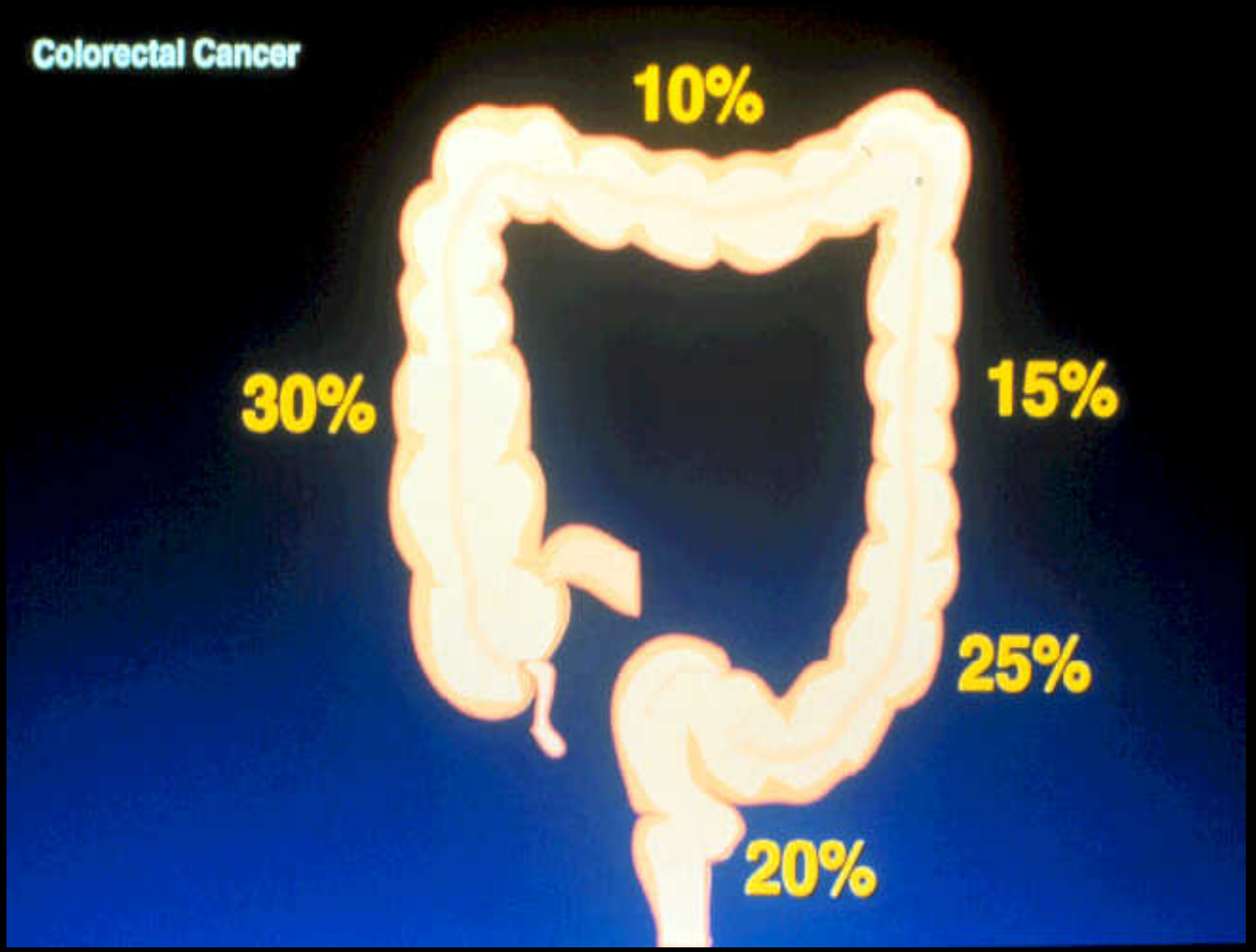
Colon Polyp



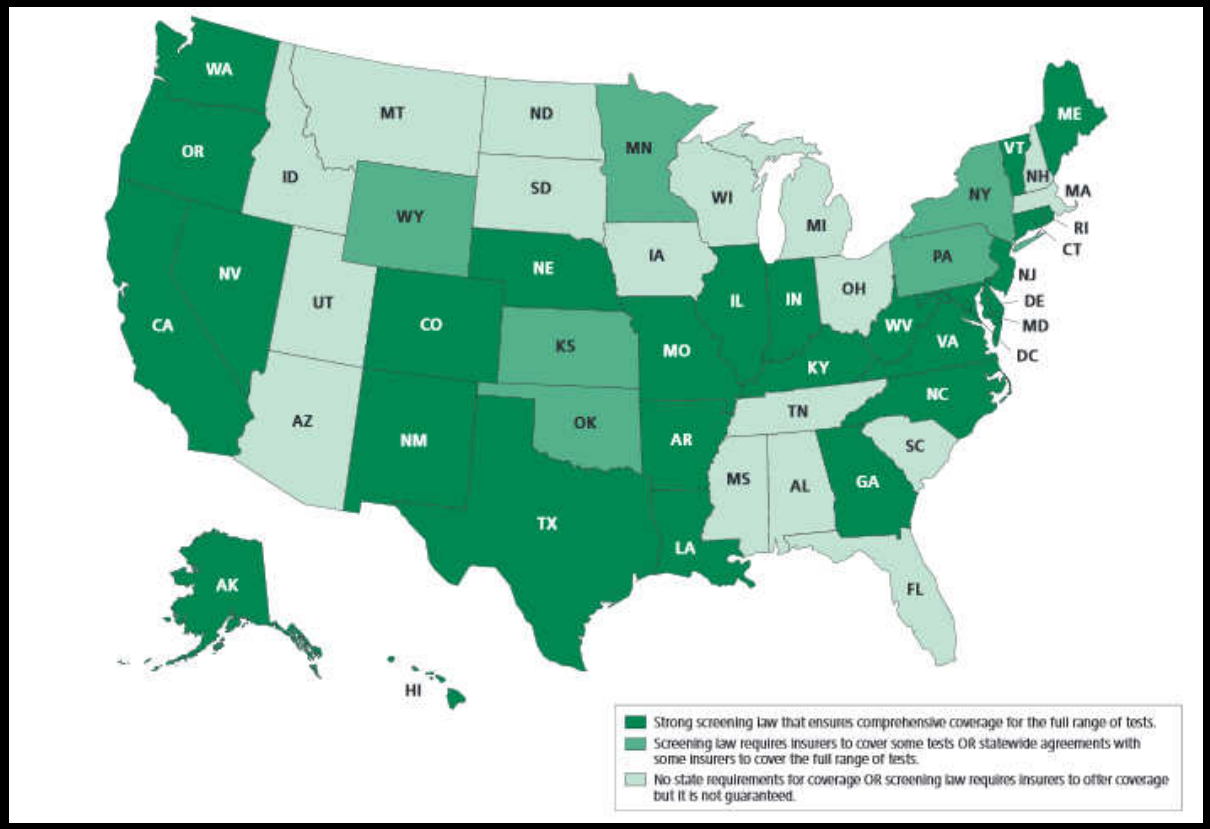
Colon Cancer



Distribution of Colorectal Cancer



Maryland is pro-colon cancer screening



Colorectal cancer screening prevalence by state, 2006-2008

Colorectal cancer facts and figures 2011-2013. http://www.cancer.org/acs/groups/content/@epidemiologysurveilance/documents/document/acspc-028323.pdf. Accessed 2/10/14

Colorectal cancer screening
First assess RISK

AVERAGE RISK INDIVIDUAL

- All patients age 50 years and older, the asymptomatic general population

HIGH RISK

- Personal history
- Family history

Colorectal Cancer Screening

Average risk

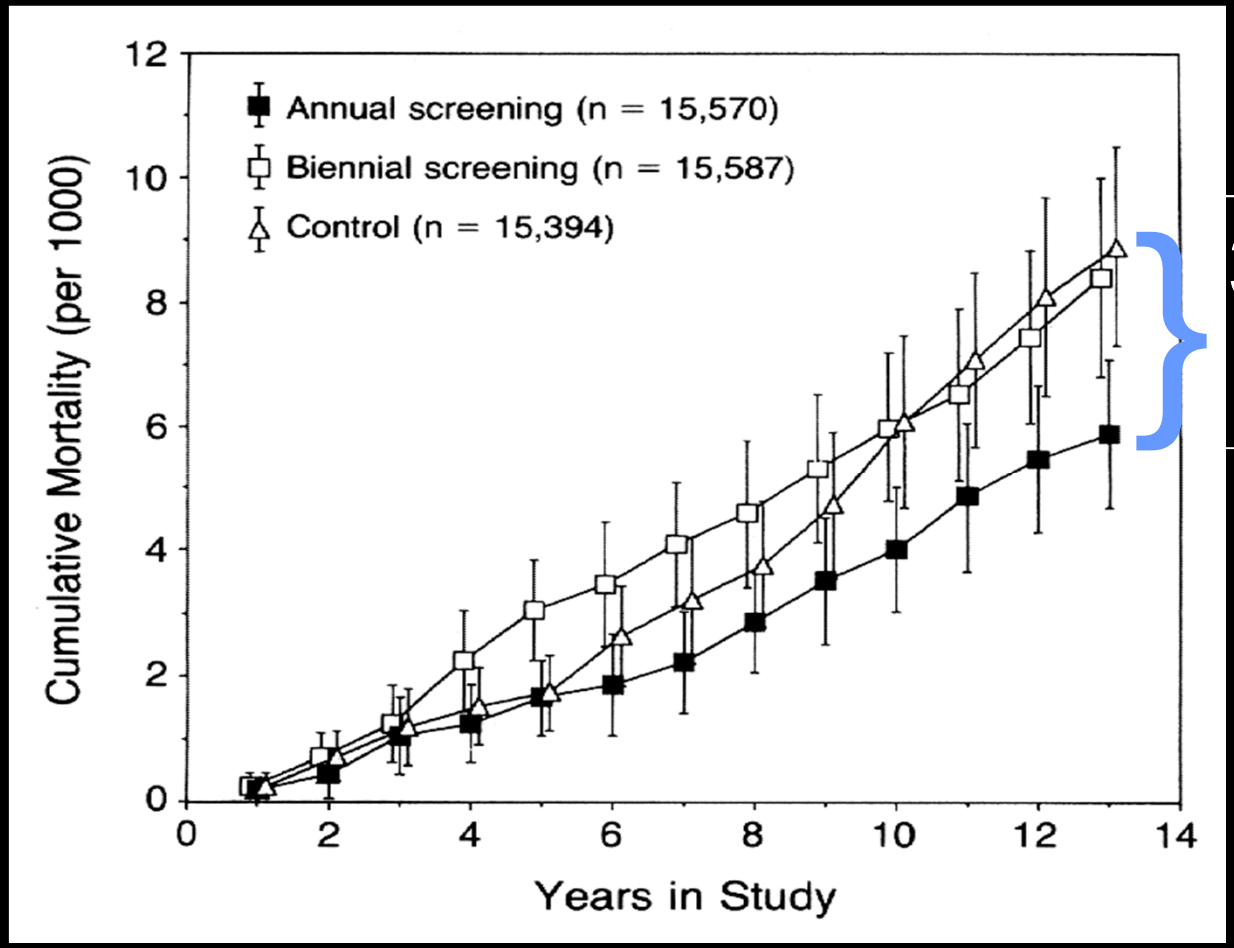
- Fecal occult blood testing (FOBT)
- Flexible sigmoidoscopy
- Barium enema
- Colonoscopy

- CT colography
- Stool genetic testing

FOBT – Clinical Issues

- Guaiac-based (gFOBT) or fecal immunochemical testing (FIT – detects human globin)
- Test multiple stools
- Diet modification is necessary (gFOBT)
- OK to test when patient is on low-dose ASA or warfarin in therapeutic range
- All positives lead to full colon evaluation (colonoscopy)
- Rehydration leads to higher sensitivity and lower specificity

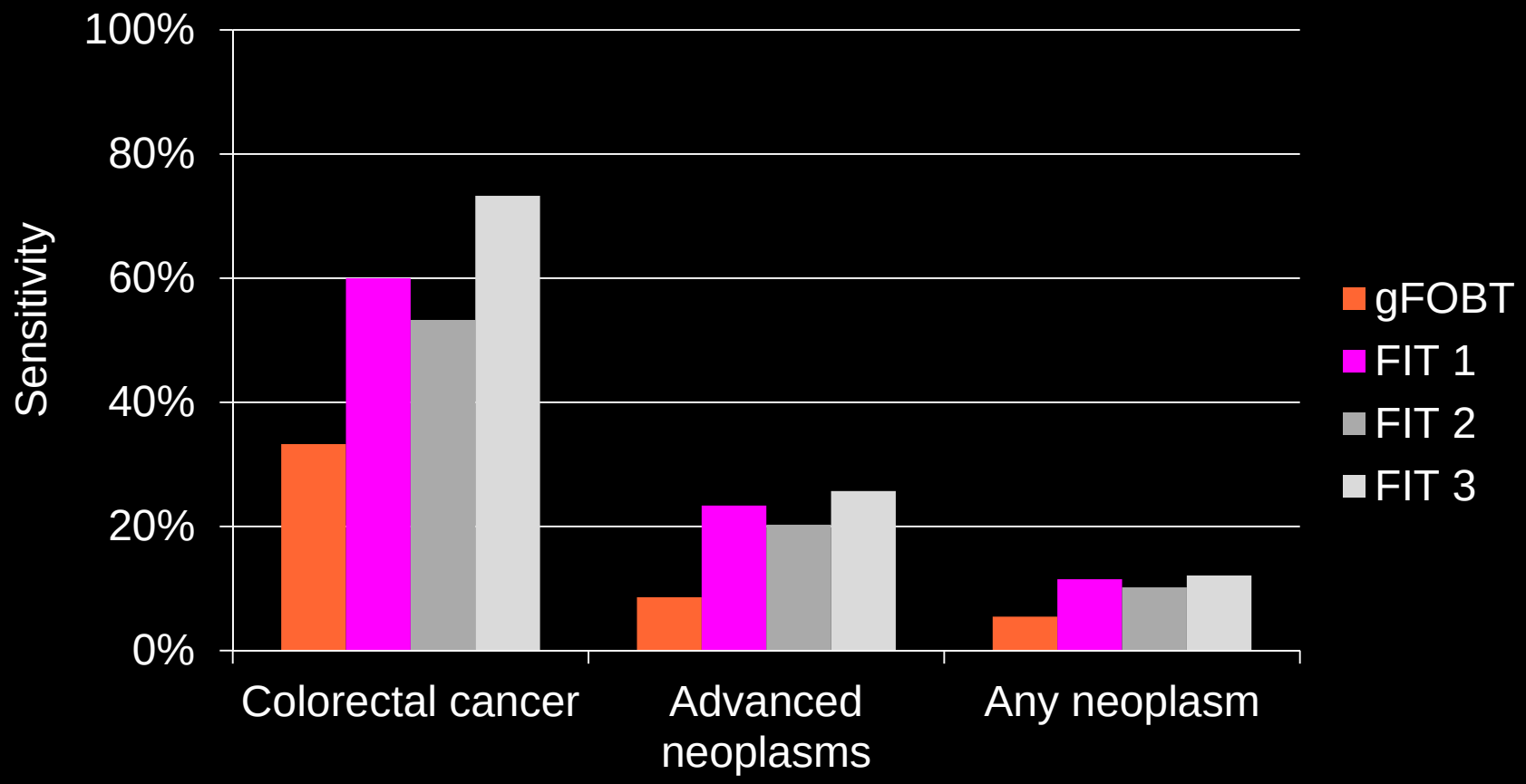
Annual FOBT Saves Lives!



33% reduction

Mandel JS et al. N Engl J Med 1993 328:1365-71.

FIT is more sensitive than gFOBT



Brenner H and Tao S. Eur J Cancer. 2013; 49:3049

Follow-up of Positive FOBT

- Colonoscopy recommended

  HOWEVER:
- Only 52% of primary care physicians would recommend colonoscopy
- Only 29% of internal medicine residents would recommend colonoscopy

Winawer et al. Gastroenterol 1997;112:584
Sharma et al. Am J Gastroenterol 2000;95:1551
Sharma et al. Am J Gastroenterol 2000;95:1914

Flexible Sigmoidoscopy

PROS:

- May be done in the office
- Inexpensive, cost-effective
- Mortality from rectal cancer reduced by 60-70% in case-control studies
- Easier bowel preparation,usually done without sedation

CONS:

- Detects only one-half of adenomas
- 40% of cancers arise proximal to splenic flexure
- 75% of proximal cancers have no adenomas distal to splenic flexure
- Often limited by discomfort, poor bowel preparation

Selby et al. N Engl J Med 1992;326:653
Rex et al. Gastrointest Endosc 1999;99:727
Newcomb et al. J Natl Canc Inst 1992;84:1572
Stewart Aust NZ J Surg 1999;69:2
Painter et al. Endoscopy 1999;3:269

Flexible Sigmoidoscopy Misses 50% of Lesions

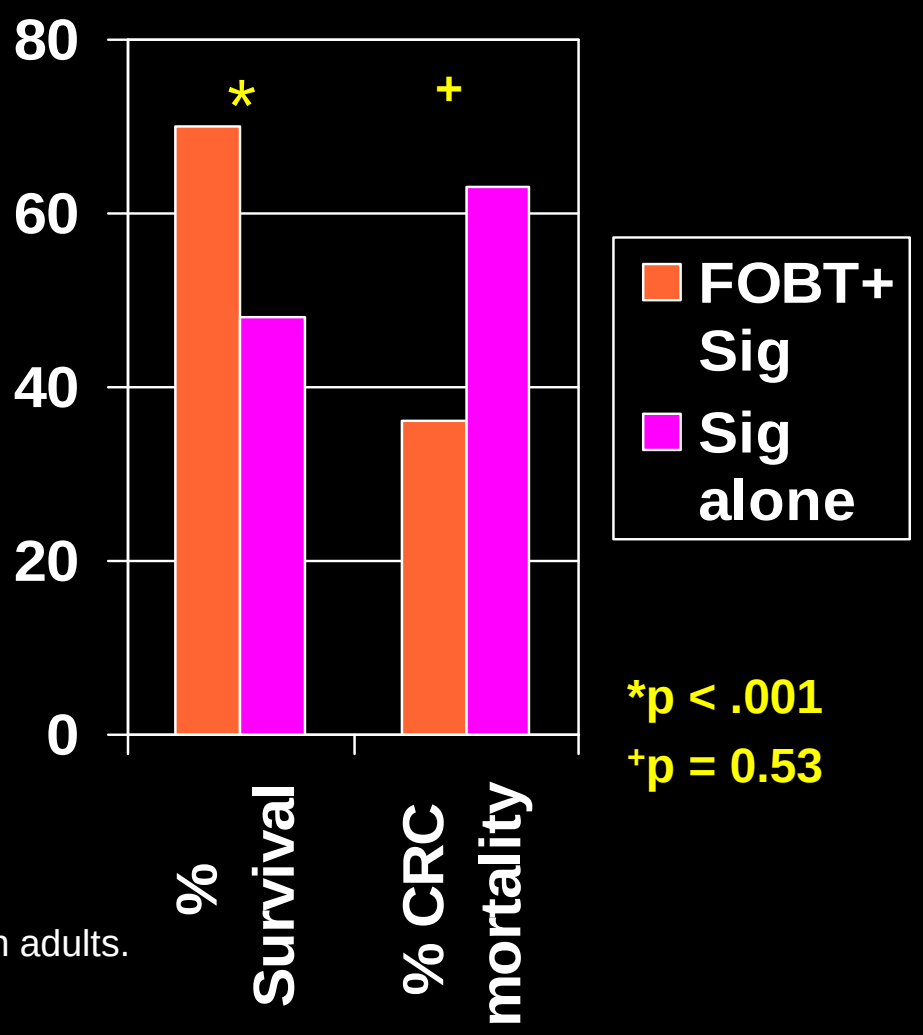
- Colonoscopy comparison studies:

  46-52% of patient with advanced proximal neoplasia (> 1 cm, villous, high-grade dysplasia or cancer) had no adenomas distal to the splenic flexure

Lieberman et al. N Engl J Med 2000; 343:162-8.
Imperiale et al. N Engl J Med 2000; 343:169-174.

Combined FOBT and Sigmoidoscopy

- Case-control trial (N=21,750) w/rigid sigmoidoscopy – improved survival
- Other trials: FS + FOBT
  - Improved yield over FOBT alone
  - Adding FOBT to FS alone may not improve yield



Winawer et al. J Natl Cancer Inst 1993;85:1311
Pignone et al. Screening for colorectal cancer in adults. http://www.ahrq.gov/clinic/serfiles.htm

FOBT + Flexible Sigmoidoscopy Misses 24% of Lesions

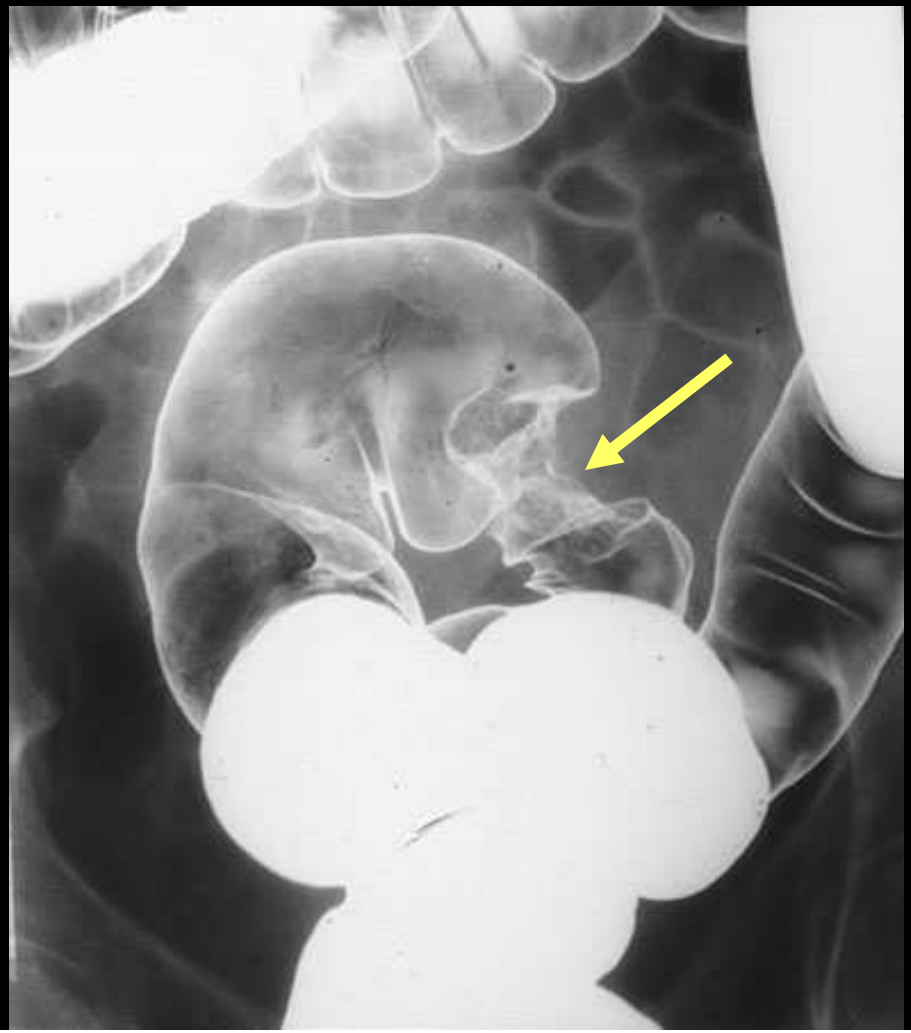
- Colonoscopy comparison studies:

  24.2% of patient with advanced proximal neoplasia (> 1 cm, villous, high-grade dysplasia or cancer) had negative FOBT and no adenomas distal to the splenic flexure.

Lieberman and Weiss. N Engl J Med 2001; 345:555-60.

Colorectal Cancer Screening: Double-Contrast Barium Enema

Colon Cancer



Double-contrast Barium Enema

PROS:

- Low cost, exams whole colon

CONS:

- Never studied as a screening test
- Missed 50% of adenomas < 1 cm in National Polyp Study
- Sensitivity for cancer n patients with positive FOBT: 50-75%
- Poor specificity; best interval unknown

Winawer et al. Gastroenterol 1997;112:599
Rex. Endoscopy 1995;27:200
Lieberman et al. N Engl J Med 2000;343:163

Colonoscopy

Colonoscopy

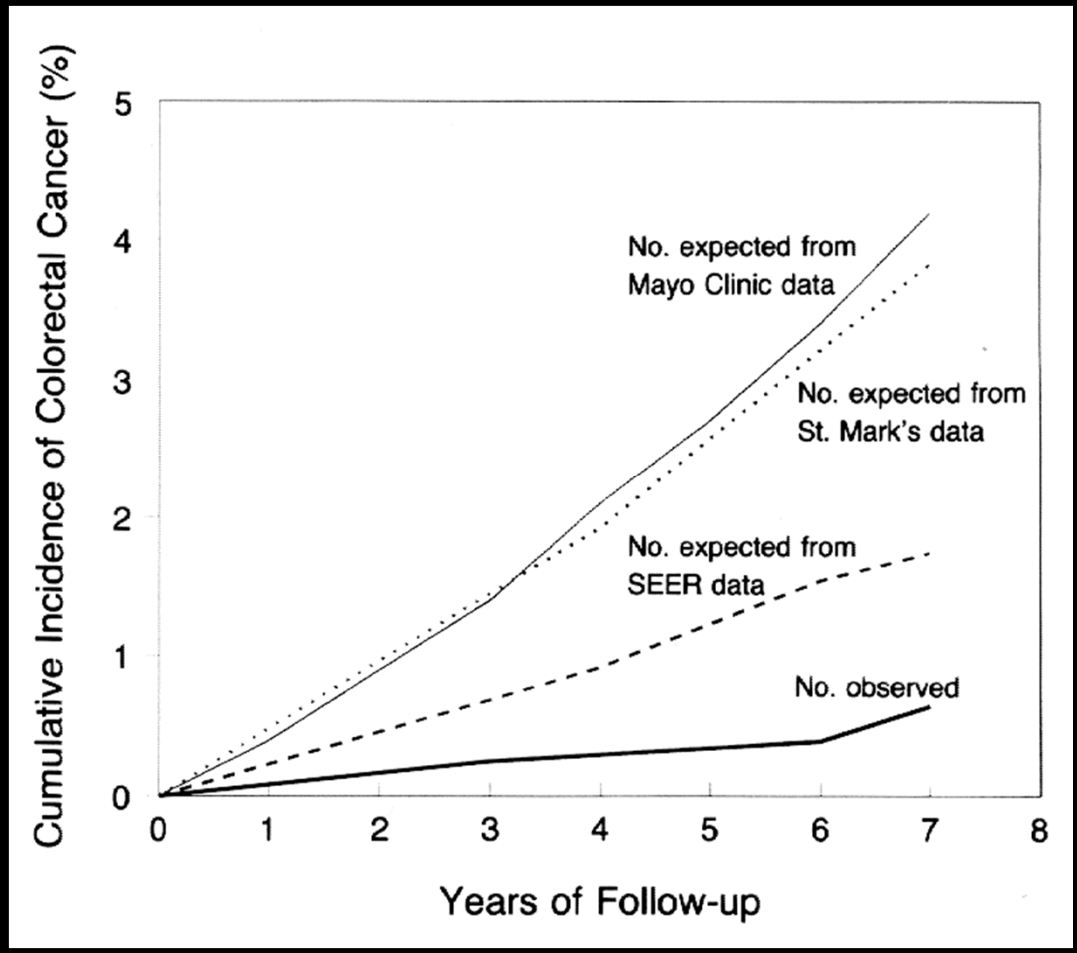
PROS:

- Exams entire colon
- Therapeutic – polyps removed at time of procedure

CONS:

- Invasive, risk of complications
- Requires bowel prep, missed work, escort home
- Incomplete procedures ~5%
- Missed polyps
- Randomized trials lacking

Colonoscopic Polypectomy Reduces Colorectal Cancer Incidence



Winawer et al. N Engl J Med 1993; 329:1977-81.

Miss Rate for Colonoscopy

	Comparison group	
	Tandem Colonoscopy	CT Colography
Adenoma ≤ 5 mm	27%	--
Adenoma 6 – 9 mm	13%	9%
Adenoma ≥ 10 mm	6%	12%

Rex et al. Gastroenterol 1997; 112:24-28.
Pickhardt et al. N Engl J Med 2003;349:2191-2200.

Colonoscopy Complications

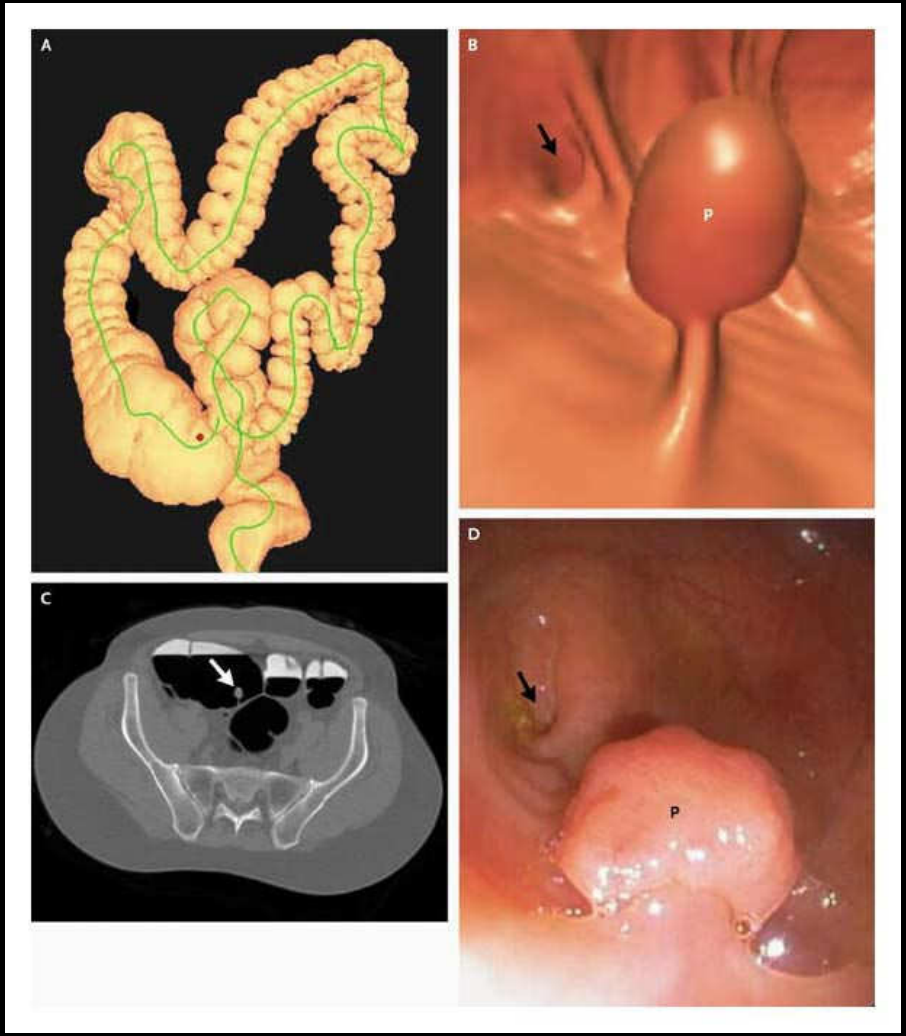
- Perforation 1-2/1000 procedures
- Bleeding 3/1000 procedures
- Mortality 1/10,000 procedures

Cost-Effectiveness of Colorectal Cancer Screening

Screening method	Cost-effectiveness ratio (cost per life-years saved)
FOBT annually	$ 5,691 - $17,805
Flexible sigmoidoscopy every 5 years	$12,477 - $19,068
FOBT annually + flexible sigmoidoscopy every 5 yrs	$13,792 - $22,518
Double contrast barium enema every 5 years	$11,168 - $25,624
Colonoscopy every 10 yrs	$ 9,038 - $22,012

Pignone et al. Ann Int Med 2002;137:96-104.

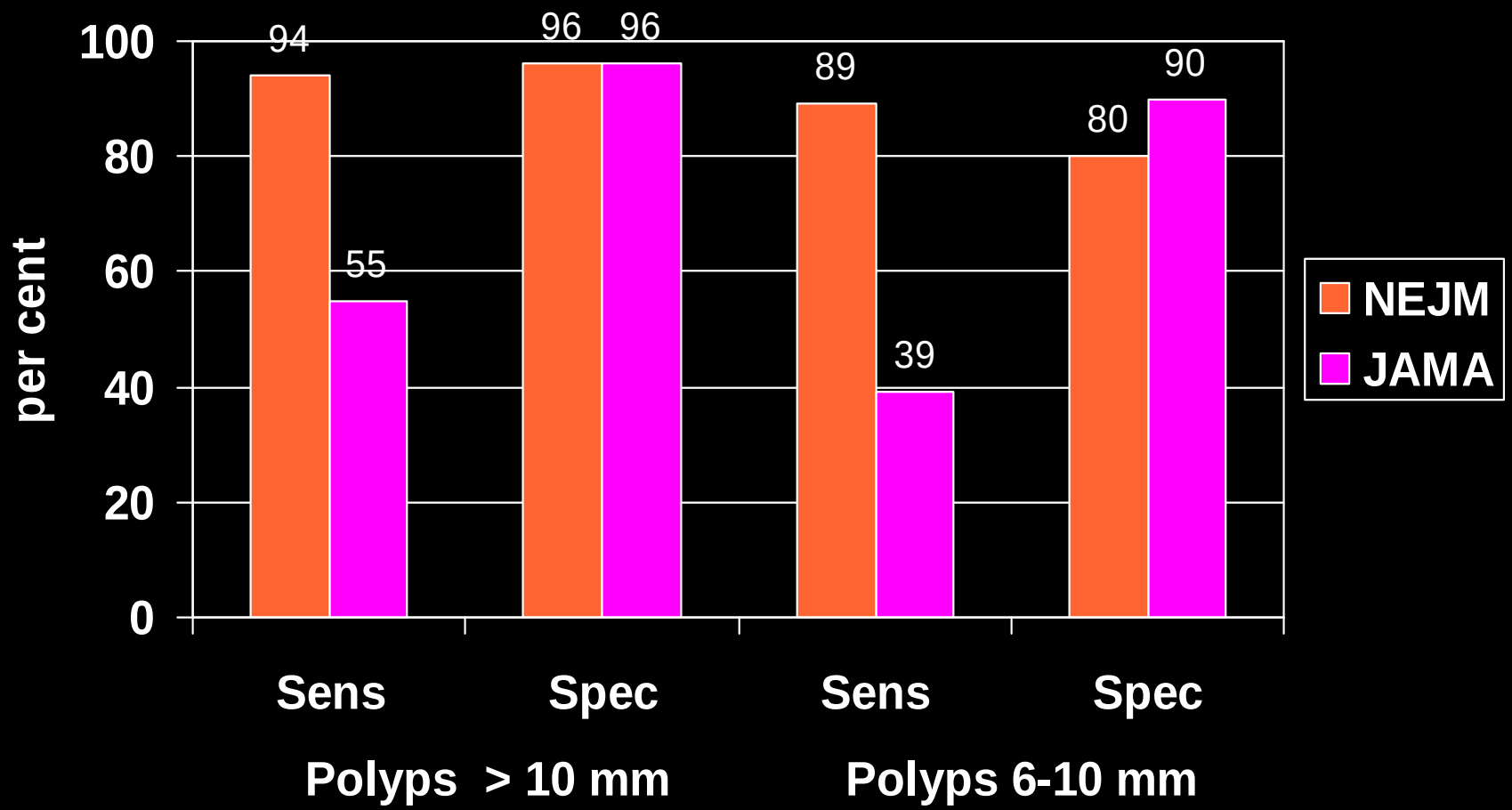
CT Colonography



Solitary 16-mm Pedunculated Cecal Polyp in a 55-Year-Old Man at Average Risk for Colorectal Neoplasia

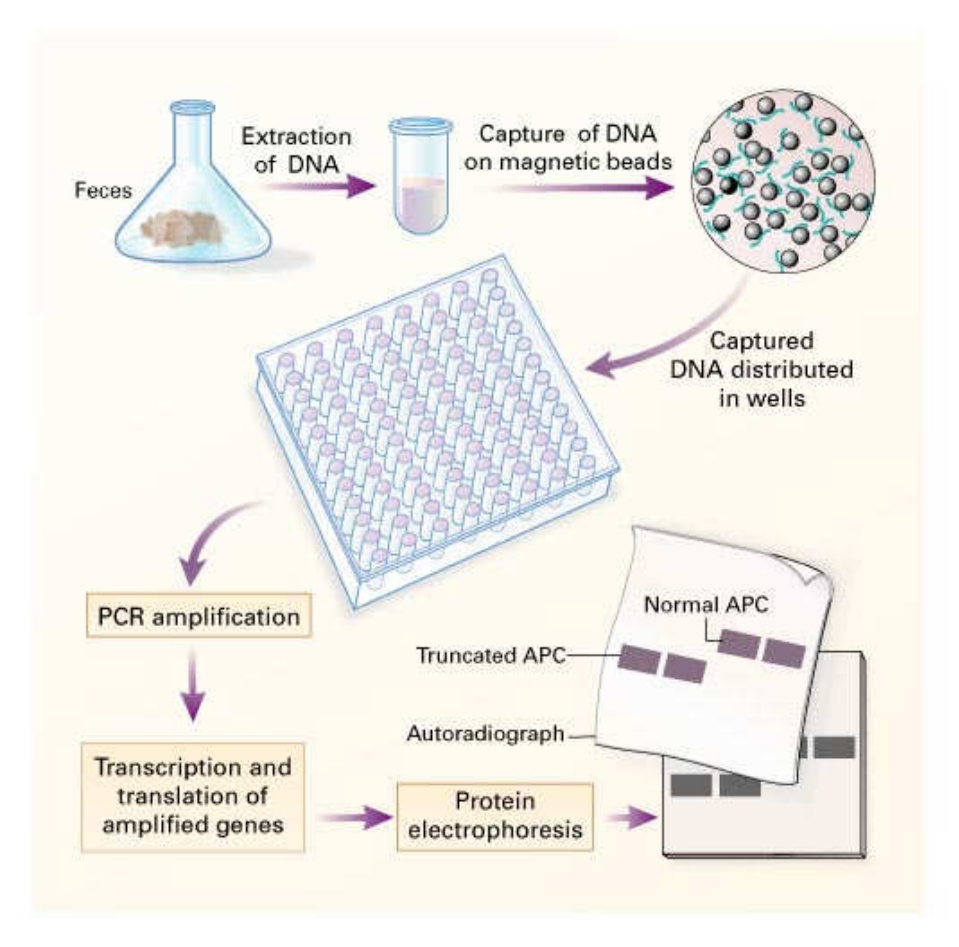
Pickhardt et al. N Engl J Med 2003;349:2191-2200

Virtual Colonoscopy Results are Variable



Pickhardt et al. N Engl J Med 2003;349:2191
Cotton et al. JAMA 2004, 291:1731

Stool DNA Testing



Schwartz. N Engl J Med 2002;346:302-4

Stool DNA Testing

- Pros
  - No sedation or preparation necessary
  - Home-based (patient mails sample)
  - No risk
- Cons
  - Not clinically available
  - Cost and frequency of exam unknown
  - False negatives occur

Colorectal Cancer Screening

Test	Interval
Detects cancer and adenomatous polyps	
Colonoscopy	Every 10 years
Flexible sigmoidoscopy	Every 5 years
CT colonography	Every 5 years
Primarily detects cancer	
Fecal occult blood testing with immunochemical test	Every year on 1-2 samples
Fecal occult blood testing with guaiac reagent	Every year on 3 samples

Barriers to Screening

- Cost and lack of access to health care
- Lack of awareness of need for colorectal cancer screening
- Inadequate communication by health care providers
- Differences between patient and provider preferences for screening
- Low levels of education and income
- Personal barriers – fear and embarrassment

Colorectal cancer facts and figures 2011-2013. http://www.cancer.org/acs/groups/content/@epidemiologysurveilance/documents/document/acspc-028323.pdf. Accessed 2/10/14