Colon Cancer Screening

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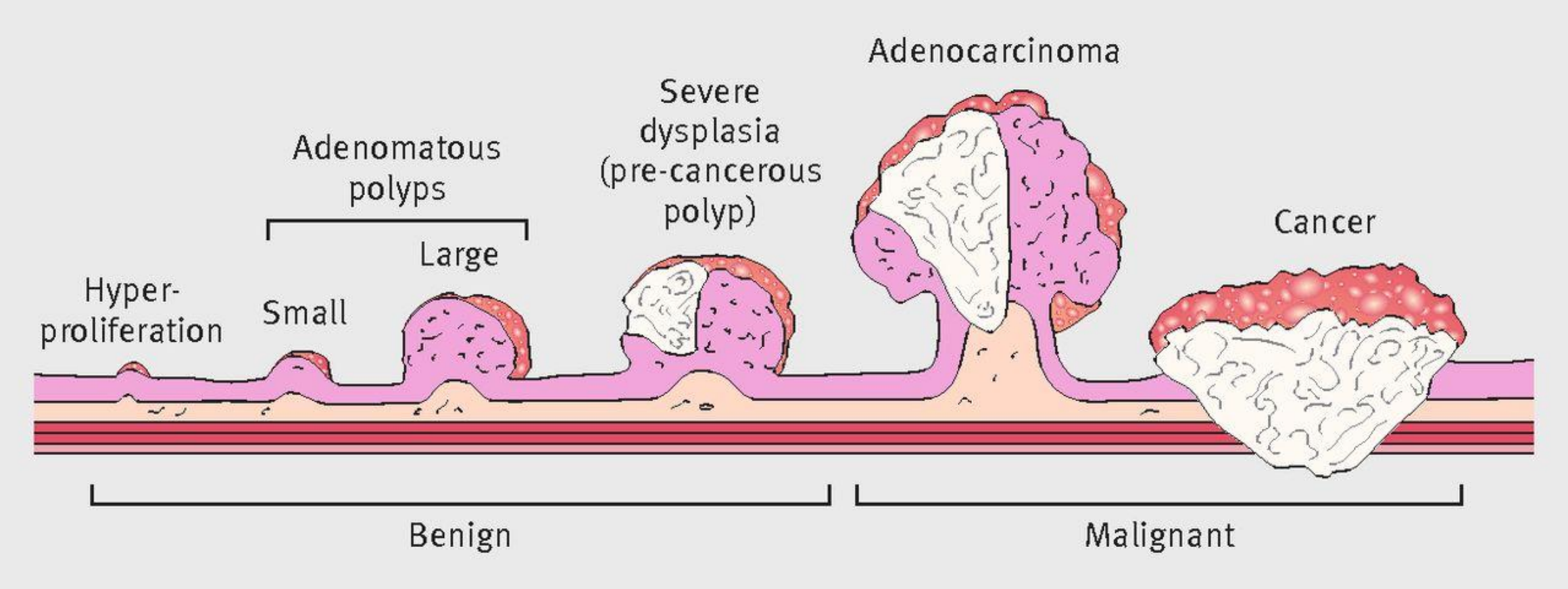
Objectives

- Describe the principles of colorectal cancer screening, including timing of first screening and follow-up intervals
- List patient populations who are at increased risk of colon cancer and the screening recommendations for each of these groups
- Describe the different screening modalities available for colon cancer and the pros and cons of the different modalities



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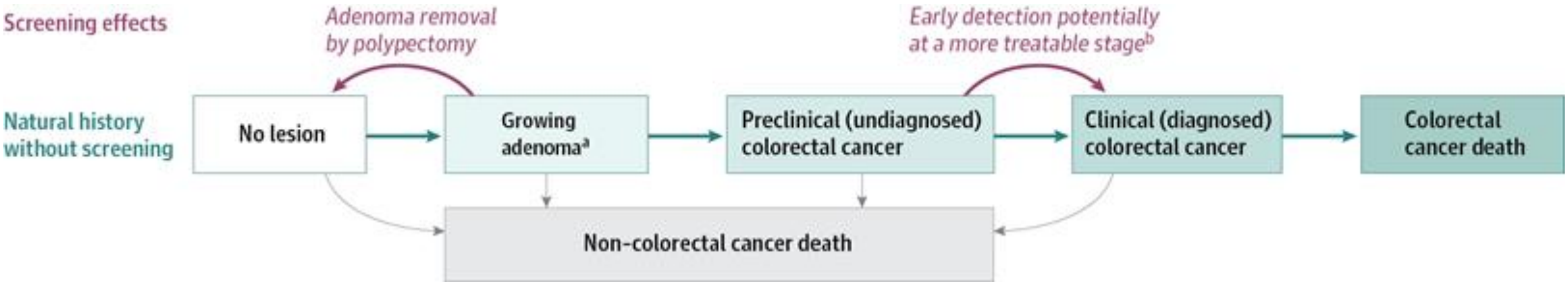

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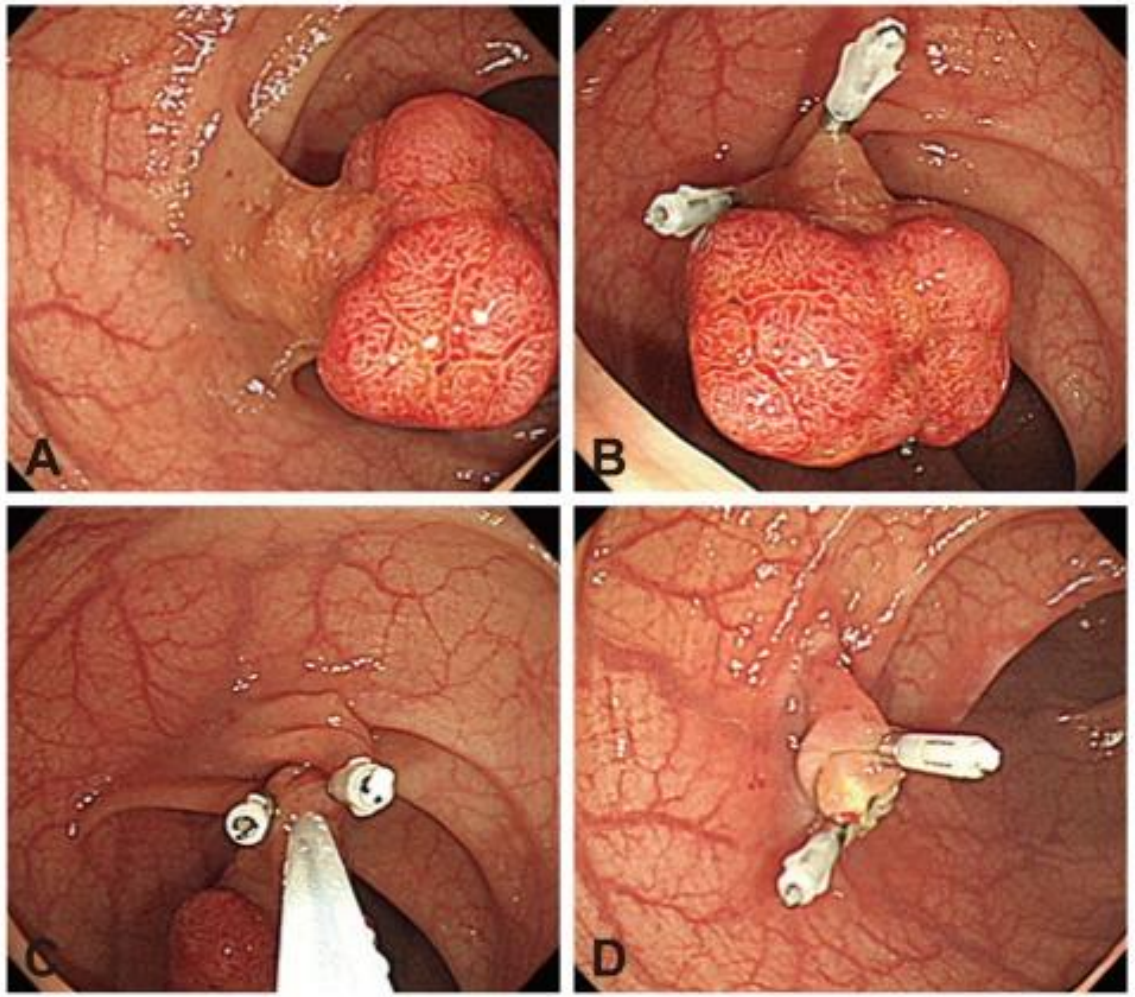

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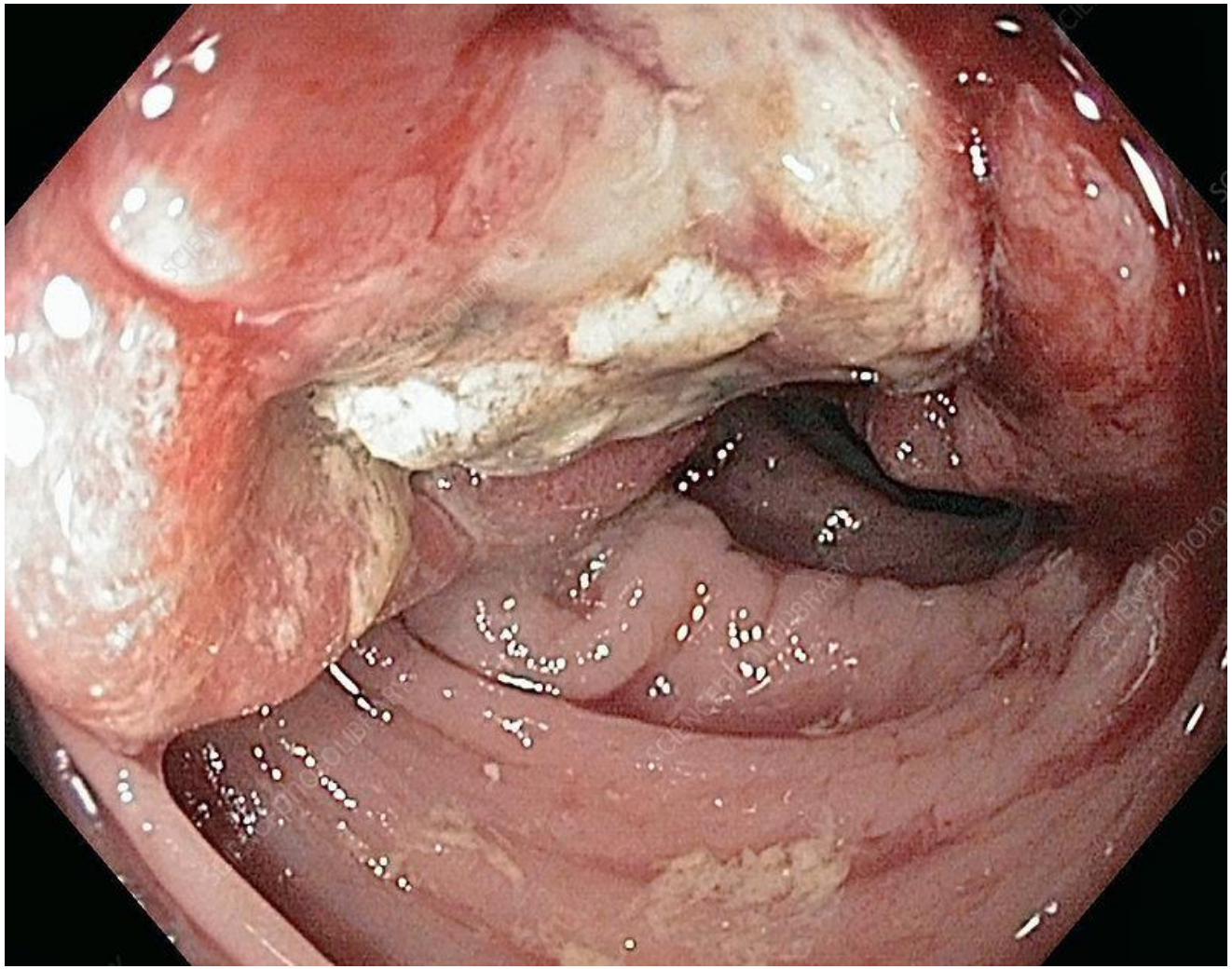

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Adenoma Detection Rate (ADR)

The proportion or percentage of screening colonoscopies in which a histologically confirmed adenoma is discovered

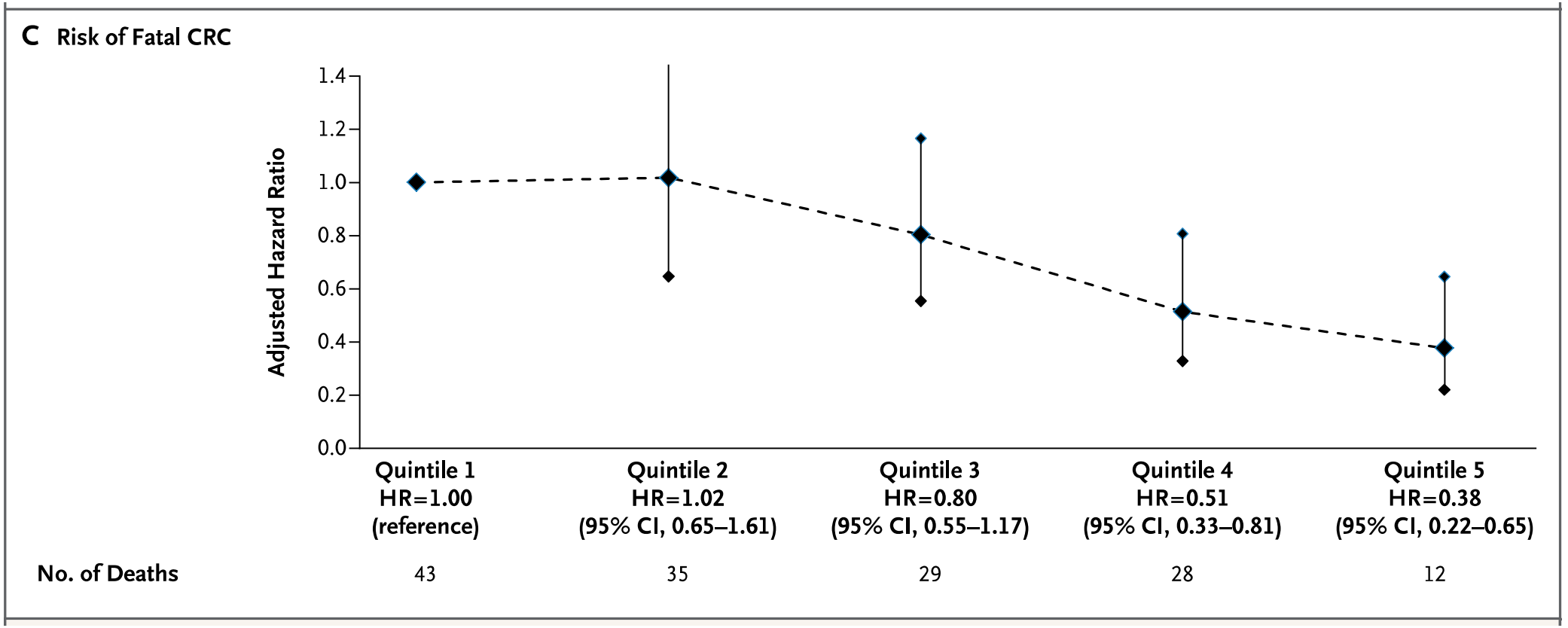
Why ADR?

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Adenoma Detection Rate and Risk of Colorectal Cancer and Death

Douglas A. Corley, M.D., Ph.D., Christopher D. Jensen, Ph.D., Amy R. Marks, M.P.H., Wei K. Zhao, M.P.H., Jeffrey K. Lee, M.D., Chyke A. Doubeni, M.D., M.P.H., Ann G. Zauber, Ph.D., Jolanda de Boer, M.B., Bruce H. Fireman, Ph.D., Joanne E. Schottinger, M.D., Virginia P. Quinn, Ph.D., Nirupa R. Ghai, Ph.D., Theodore R. Levin, M.D., and Charles P. Quesenberry, Ph.D.



Corley DA, Jensen CD, Marks AR, et al. Adenoma detection rate and risk of colorectal cancer and death. N Engl J Med. 2014;370(14):1298-306.

Why ADR?

- Higher ADR
  - Lower risk of interval CRC
  - Lower risk of interval advanced stage CRC
  - Lower risk of fatal CRC
- Goal is ADR > 25%

Corley DA, Jensen CD, Marks AR, et al. Adenoma detection rate and risk of colorectal cancer and death. N Engl J Med. 2014;370(14):1298-306.
Kaminski MF, Wieszczy P, Rupinski M. et al. Increased rate of adenoma detection associates with reduced risk of colorectal cancer and death. Gastroenterology 2017; 153: 98-105.

Definitions for Colonoscopy

- Screening
  - Average risk
  - High risk
- Surveillance
  - History of adenomatous polyps or colorectal cancer
  - IBD
- Diagnostic
  - Investigation of symptoms (bleeding, pain, change in bowel habits, etc)
  - Abnormal imaging

You are evaluating a 64 year old male in the hospital who was admitted for decompensated heart failure. He complained for abdominal pain and a CT was performed in the ER showing colon wall thickening in the right colon suggestive of inflammatory changes versus malignancy. He has never had a colonoscopy before. He denies a family history of CRC or other malignancies.

Once his heart failure is optimized, you refer him for a _____ colonoscopy.

A) Screening

B) Surveillance

C) Diagnostic

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Once his heart failure is optimized, you refer him for a _____ colonoscopy.

A) Screening

B) Surveillance

C) Diagnostic

You are seeing a 44 year old female in clinic for chronic diarrhea which is now under control. She underwent a diagnostic colonoscopy three years which was normal. Colon biopsies were obtained which were unremarkable. She has no FH of colon cancer.

You recommend a 10 year interval _____ colonoscopy

A) Screening
B) Surveillance
C) Diagnostic

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You recommend a 10 year interval _____ colonoscopy

A) Screening

B) Surveillance

C) Diagnostic

When Do We Screen?

Recommendation Summary

Population	Recommendation	Grade (What's This?)
Adults aged 50 to 75 years	The USPSTF recommends screening for colorectal cancer starting at age 50 years and continuing until age 75 years. The risks and benefits of different screening methods vary. See the Clinical Considerations section and the Table for details about screening strategies.	A
Adults aged 76 to 85 years	The decision to screen for colorectal cancer in adults aged 76 to 85 years should be an individual one, taking into account the patient's overall health and prior screening history. • Adults in this age group who have never been screened for colorectal cancer are more likely to benefit. • Screening would be most appropriate among adults who 1) are healthy enough to undergo treatment if colorectal cancer is detected and 2) do not have comorbid conditions that would significantly limit their life expectancy.	C

US Preventive Services Task Force. Screening for Colorectal Cancer: US Preventive Services Task Force Recommendation Statement. *JAMA.* 2016;315(23):2564–2575.

TABLE 1

Options in colorectal cancer prevention and detection

Prevention	Detection
Preferred:	Preferred:
Colonoscopy every 10 years	Fecal immunochemical testing every year
Alternatives:	Alternatives:
Flexible sigmoidoscopy every 5–10 years	Fecal occult blood testing every year
Computed tomographic colonography every 5 years	Fecal DNA testing every 3 years

Adapted from American College of Gastroenterology guidelines, reference 8.

Mankaney G, Sutton RA, Burke CA. Colorectal cancer screening: Choosing the right test. Cleve Clin J Med. 2019 Jun;86(6):385-392

High Risk Groups

Family history

- One 1st degree relative with CRC or advanced adenoma BEFORE age 60 (or)
  Two 1st degree relatives with CRC at any age

  - colonoscopy at age 40, or 10 years younger than earliest diagnosis in family
  - repeat every 5 years (or earlier if polyps)

Wilkins T, McMechan D, Talukder A, Herline A. Colorectal Cancer Screening and Surveillance in Individuals at Increased Risk. Am Fam Physician. 2018 Jan 15;97(2):111-116

High Risk Groups

Family history

- One 1st degree relative with CRC or advanced adenoma AFTER age 60 (or)
  Two 2nd degree relatives with CRC at any age

    - colonoscopy at 40
    - repeat every 10 years (or earlier if polyps)

Wilkins T, McMechan D, Talukder A, Herline A. Colorectal Cancer Screening and Surveillance in Individuals at Increased Risk. Am Fam Physician. 2018 Jan 15;97(2):111-116

High Risk Groups

Family history

- One 2nd or 3rd degree relative with CRC
  - average risk (start screening at 50 and follow average risk guidelines)

Wilkins T, McMechan D, Talukder A, Herline A. Colorectal Cancer Screening and Surveillance in Individuals at Increased Risk. Am Fam Physician. 2018 Jan 15;97(2):111-116

A 38-year-old woman is evaluated in follow-up after recent surgery for endometrial cancer. Her family history is significant for colon cancer in her sister (diagnosed at age 45 years) and her mother (diagnosed at age 65 years). Her maternal grandfather was diagnosed with rectal cancer at age 47 years. The patient has never had colon cancer screening with colonoscopy.

Which of the following is the most appropriate time to start colon cancer screening with colonoscopy?

A. Now
B. Age 40 years
C. Age 47 years
D. Age 50 years

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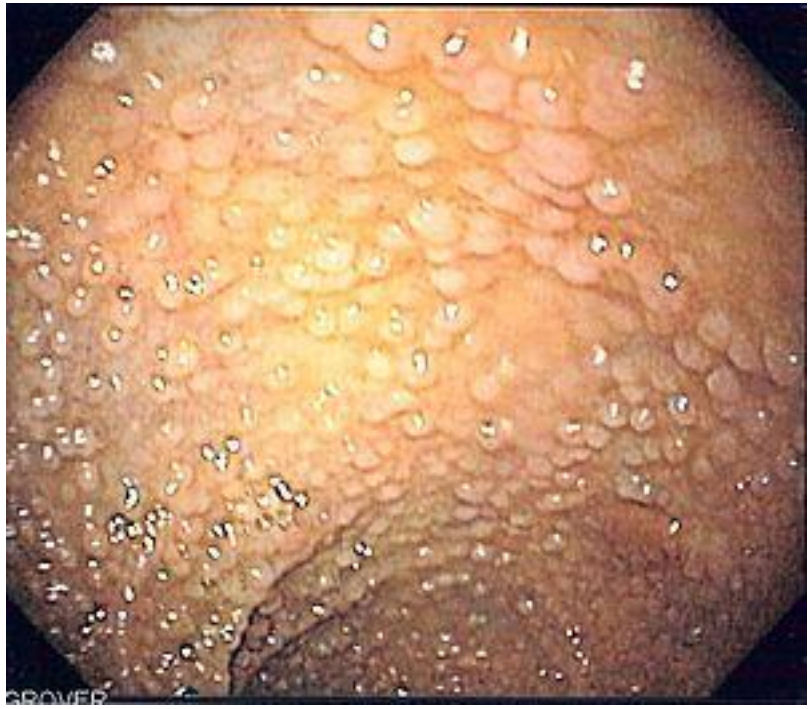
B. Age 40 years
C. Age 47 years
D. Age 50 years

High Risk Groups

FAP (Familial Adenomatous Polyposis)

- >100 colon adenomas
- Prevalence: 3 per 100,000
- Age at presentation 36 (4-72)
- Risk of CRC is 87% by age 45
- Start screening at age 10-12, with sigmoidoscopy every 1-2 years until polyp found then yearly colonoscopy
- Treatment is total colectomy



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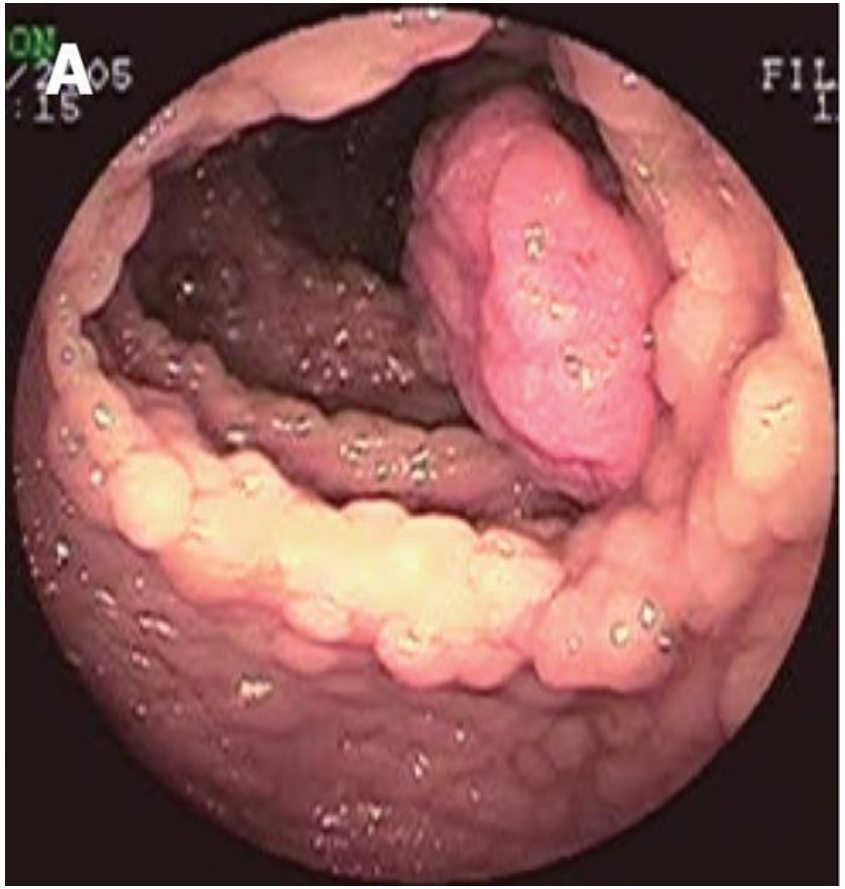
High Risk Groups



HNPCC (Hereditary Nonpolyposis Colorectal Cancer) aka Lynch Syndrome

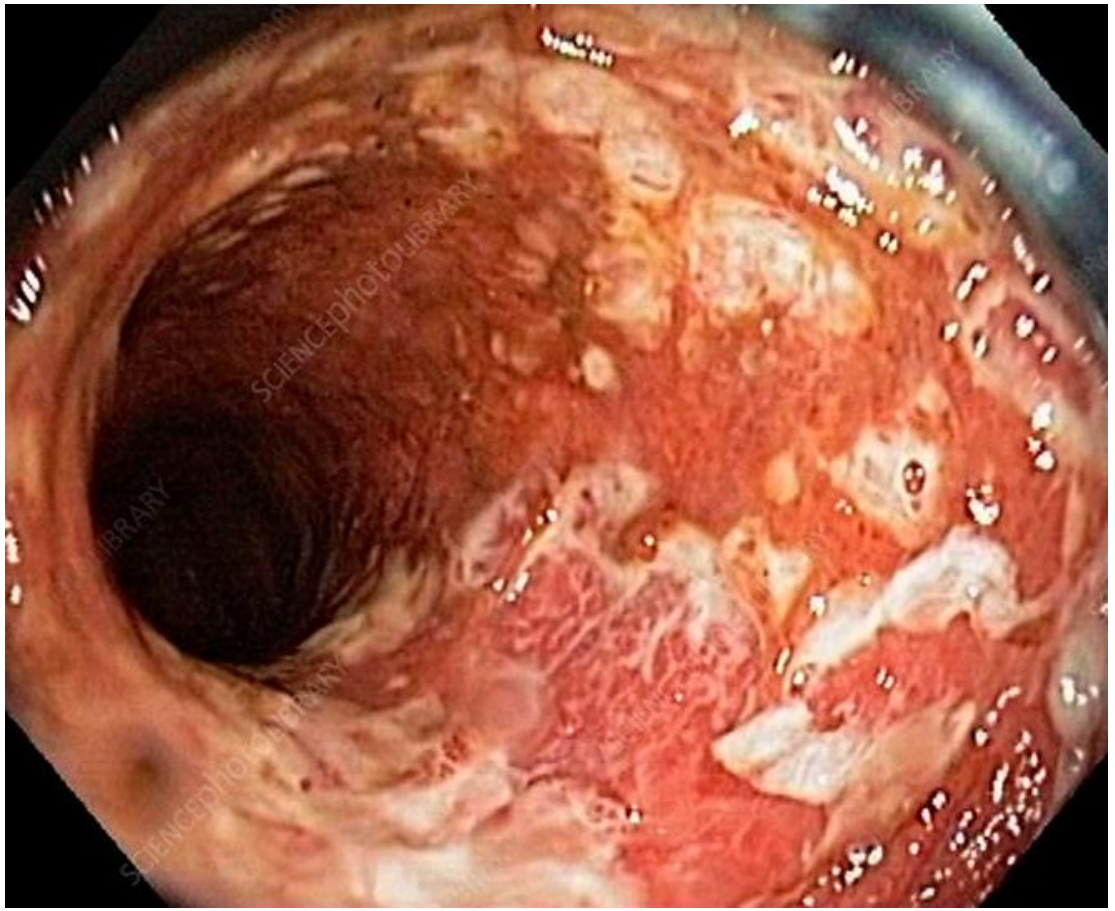
- Mutation in DNA mismatch repair gene
- Lifetime risk is 75-80%
- Average age of diagnosis = 45
- Start screening at 25, or five years before first cancer in family
- Colonoscopy every 1-2 years
- Monitor/screen for other malignancies (endometrial, gastric)

Wilkins T, McMechan D, Talukder A, Herline A. Colorectal Cancer Screening and Surveillance in Individuals at Increased Risk. Am Fam Physician. 2018 Jan 15;97(2):111-116

High Risk Groups

<u>Inflammatory Bowel Disease</u>

- Crohn's Disease or Ulcerative Colitis
- 4-5% lifetime risk of CRC
- Start screening 8 years after symptom onset, if >1/3 of the colon is involved
- Colonoscopy every 1-2 years with four quadrant biopsies
- If associated with PSC very high risk -> yearly colonoscopy
- DO NOT perform surveillance while inflamed



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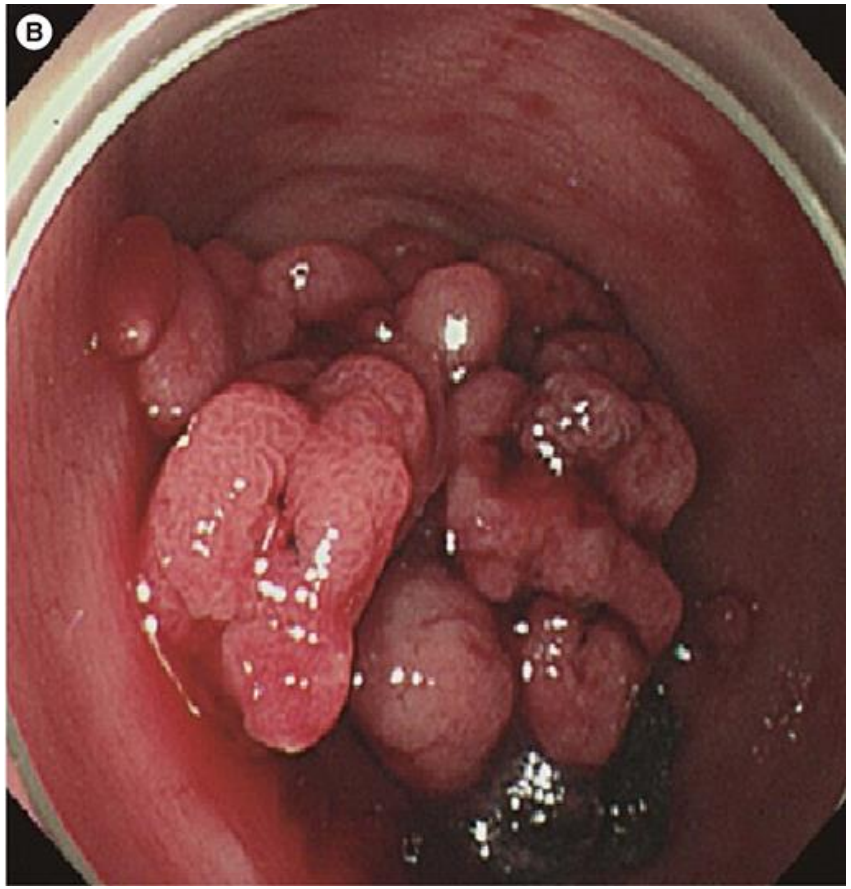
High Risk Groups

Peutz-Jeghers Syndrome

- Hamartomatous polyps
- Polyps start in first decade of life
- Start screening at age 8: EGD, colonoscopy, and video capsule endoscopy every three years



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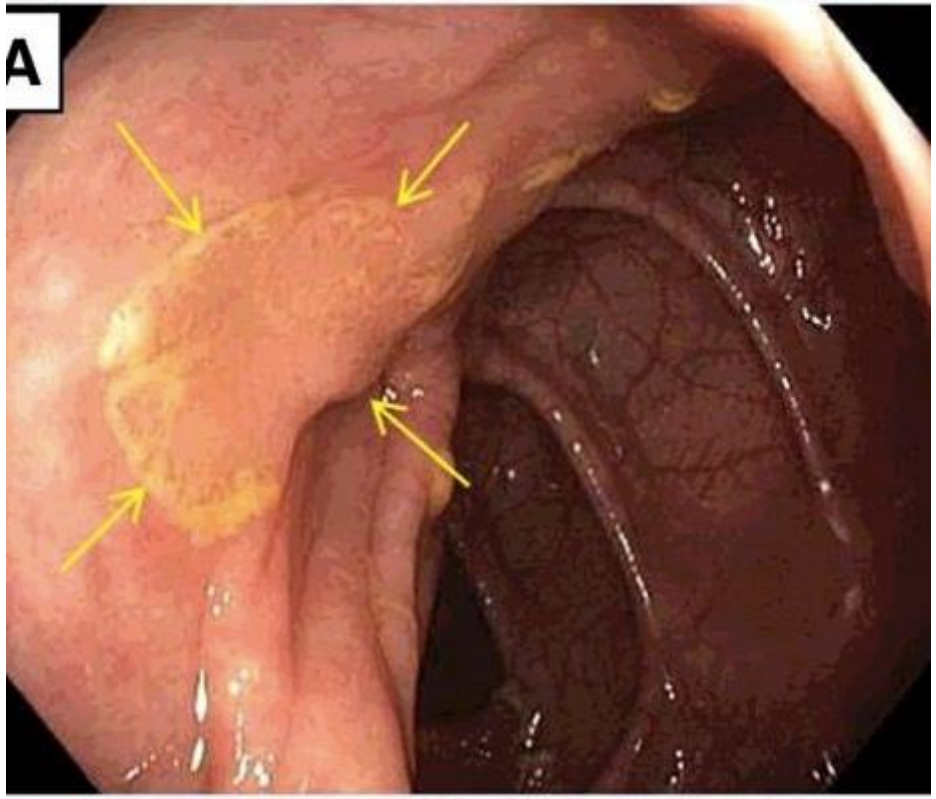
High Risk Groups

<u>Sessile Serrated Adenomatous Polyposis Syndrome</u>

- Multiple defining criteria but generally numerous serrated polyps and/or a family history of serrated polyps
- Up to 70% of patients will have CRC at time of the diagnosis
- Colonoscopy should be performed annually, and all polyps should be removed
- Consider surgery if polyps cant be controlled with colonoscopy



Wilkins T, McMechan D, Talukder A, Herline A. Colorectal Cancer Screening and Surveillance in Individuals at Increased Risk. Am Fam Physician. 2018 Jan 15;97(2):111-116

A 29-year-old man is evaluated during a routine examination. His medical history is significant for ulcerative colitis involving the entire colon, which was diagnosed 4 years ago. His symptoms responded to therapy with mesalamine and have remained in remission on this medication. His family history is significant for a maternal uncle who died of colon cancer at the age of 50 years.

Physical examination is unremarkable.

Serum alkaline phosphatase, alanine aminotransferase, and aspartate aminotransferase levels are normal.

Which of the following is the most appropriate interval at which to perform colonoscopy with biopsies in this patient?

A. Begin now and repeat annually
B. Begin in 4 years and repeat every 1 to 2 years
C. Begin in 4 years and repeat every 10 years
D. Begin at age 40 years and repeat every 5 years

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How Do We Screen?

Table. Characteristics of Colorectal Cancer Screening Strategies[a]

Screening Method	Frequency[b]	Evidence of Efficacy	Other Considerations
Stool-Based Tests			
gFOBT	Every year	RCTs with mortality end points: High-sensitivity versions (eg, Hemoccult SENSA) have superior test performance characteristics than older tests (eg, Hemoccult II)	Does not require bowel preparation, anesthesia, or transportation to and from the screening examination (test is performed at home)
FIT[c]	Every year	Test characteristic studies: Improved accuracy compared with gFOBT Can be done with a single specimen	Does not require bowel preparation, anesthesia, or transportation to and from the screening examination (test is performed at home)
FIT-DNA	Every 1 or 3 y[d]	Test characteristic studies: Specificity is lower than for FIT, resulting in more false-positive results, more diagnostic colonoscopies, and more associated adverse events per screening test Improved sensitivity compared with FIT per single screening test	There is insufficient evidence about appropriate longitudinal follow-up of abnormal findings after a negative diagnostic colonoscopy; may potentially lead to overly intensive surveillance due to provider and patient concerns over the genetic component of the test
Direct Visualization Tests			
Colonoscopy[c]	Every 10 y	Prospective cohort study with mortality end point	Requires less frequent screening Screening and diagnostic follow-up of positive findings can be performed during the same examination
CT colonography[e]	Every 5 y	Test characteristic studies	There is insufficient evidence about the potential harms of associated extracolonic findings, which are common
Flexible sigmoidoscopy	Every 5 y	RCTs with mortality end points: Modeling suggests it provides less benefit than when combined with FIT or compared with other strategies	Test availability has declined in the United States
Flexible sigmoidoscopy with FIT[c]	Flexible sigmoidoscopy every 10 y plus FIT every year	RCT with mortality end point (subgroup analysis)	Test availability has declined in the United States Potentially attractive option for patients who want endoscopic screening but want to limit exposure to colonoscopy

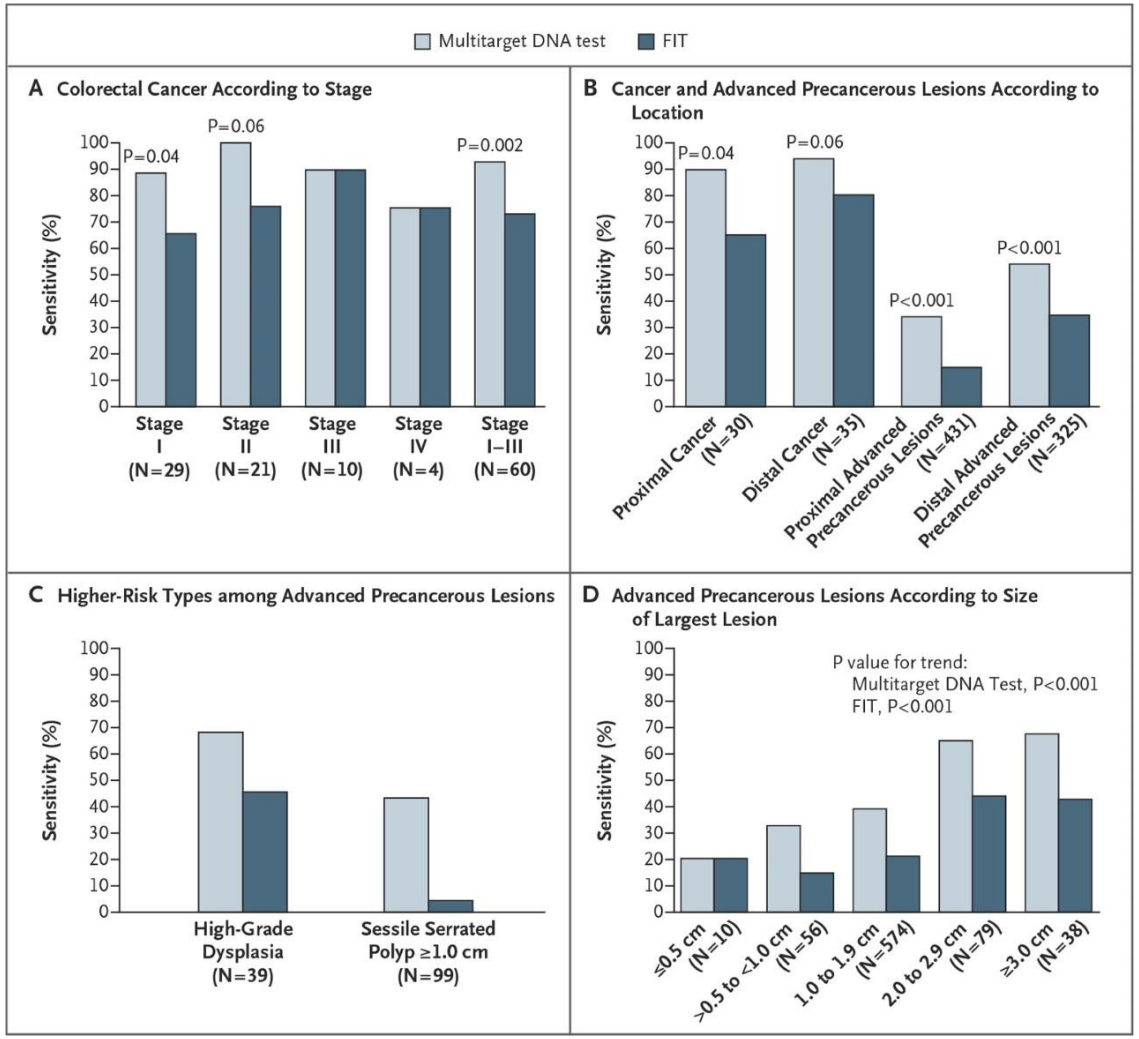
US Preventive Services Task Force. Screening for Colorectal Cancer: US Preventive Services Task Force Recommendation Statement. *JAMA.* 2016;315(23):2564–2575.

Table 1. Sensitivity and Specificity of the Multitarget Stool DNA Test and the Fecal Immunochemical Test (FIT) for the Most Advanced Findings on Colonoscopy.

Most Advanced Finding	Colonoscopy (N=9989)	Multitarget DNA Test (N=9989)		FIT (N=9989)	
		Positive Results	Sensitivity (95% CI)	Positive Results	Sensitivity (95% CI)
	no.	*no.*	%	*no.*	%
Colorectal cancer					
Any	65	60	92.3 (83.0–97.5)	48	73.8 (61.5–84.0)
Stage I to III*	60	56	93.3 (83.8–98.2)	44	73.3 (60.3–83.9)
Colorectal cancer and high-grade dysplasia	104	87	83.7 (75.1–90.2)	66	63.5 (53.5–72.7)
Advanced precancerous lesions†	757	321	42.4 (38.9–46.0)	180	23.8 (20.8–27.0)
Nonadvanced adenoma	2893	498	17.2 (15.9–18.6)	220	7.6 (6.7–8.6)
			Specificity (95% CI)		Specificity (95% CI)
All nonadvanced adenomas, non-neoplastic findings, and negative results on colonoscopy	9167	1231	86.6 (85.9–87.2)	472	94.9 (94.4–95.3)
Negative results on colonoscopy	4457	455	89.8 (88.9–90.7)	162	96.4 (95.8–96.9)

* These stages of colorectal cancer, as defined by the system recommended by the American Joint Committee on Cancer, are associated with an increased rate of cure.
† Advanced precancerous lesions include advanced adenomas and sessile serrated polyps measuring 1 cm or more.

Imperiale TF, Ransohoff DF, Itzkowitz SH. Multitarget stool DNA testing for colorectal-cancer screening. N Engl J Med. 2014 Jul 10;371(2):187-8.



Imperiale TF, Ransohoff DF, Itzkowitz SH. Multitarget stool DNA testing for colorectal-cancer screening. N Engl J Med. 2014 Jul 10;371(2):187-8.

A 50 year old Caucasian male is seen in primary clinic for routine health maintenance. He has a history of hyperlipidemia which is managed with a statin. He is otherwise in good health and denies specific complaints. His family history is notable for a father who has CAD and had an MI at 67. He has no family history of malignancy or colon polyps.

He inquires about colon cancer screening. He would like to avoid a colonoscopy if possible, but is amenable to one if necessary.

Which of the following is an appropriate strategy for colon cancer screening?

A. FIT every other year

B. CT colonography every year

C. Flexible sigmoidoscopy yearly

D. FIT-DNA every three years

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C. Flexible sigmoidoscopy yearly

D. FIT-DNA every three years

Follow Up

Follow Up After Initial Screening

- Average risk = modality based on patient choice/informed discussion
- High risk groups = colonoscopy is gold standard
- If history of polyps, stick with colonoscopy
- After age 75 (and even before), consider risks/benefits and context of individual patient

Table 1. 2012 Recommendations for Surveillance and Screening Intervals in Individuals With Baseline Average Risk

Baseline colonoscopy: most advanced finding(s)	Recommended surveillance interval (*y*)	Quality of evidence supporting the recommendation	New evidence stronger than 2006
No polyps	10	Moderate	Yes
Small (<10 mm) hyperplastic polyps in rectum or sigmoid	10	Moderate	No
1–2 small (<10 mm) tubular adenomas	5–10	Moderate	Yes
3–10 tubular adenomas	3	Moderate	Yes
>10 adenomas	<3	Moderate	No
One or more tubular adenomas ≥10 mm	3	High	Yes
One or more villous adenomas	3	Moderate	Yes
Adenoma with HGD	3	Moderate	No
Serrated lesions			
Sessile serrated polyp(s) <10 mm with no dysplasia	5	Low	NA
Sessile serrated polyp(s) ≥10 mm OR Sessile serrated polyp with dysplasia OR Traditional serrated adenoma	3	Low	NA
Serrated polyposis syndrome[a]	1	Moderate	NA

Bonnington SN, Rutter MD. Surveillance of colonic polyps: Are we getting it right? *World J Gastroenterol*. 2016 Feb 14;22(6):1925-34

A 57-year-old woman is evaluated after a recent screening colonoscopy. The colonoscopy disclosed a 12-mm polyp in the ascending colon, which was removed. No other lesions were noted. On pathology, the lesion was found to be a sessile serrated polyp.

Physical examination findings are unremarkable.

Which of the following is the most appropriate time to repeat colonoscopy?

A. 1 year
B. 3 years
C. 5 years
D. 10 years

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Which of the following is the most appropriate time to repeat colonoscopy?

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B. 3 years
C. 5 years
D. 10 years

An 83-year-old woman is evaluated as part of a yearly general medical examination, at which time she inquires about the need for a colonoscopy. She had a colonoscopy 3 years ago because of lower gastrointestinal bleeding at which time an incidentally found 8-mm polyp was removed from the transverse colon; histopathology revealed a tubular adenoma with low-grade dysplasia. She has no family history of colorectal cancer. Her personal history includes hypertension, a stroke with no residual neurologic deficits, type 2 diabetes mellitus, end-stage renal disease for which she has been receiving hemodialysis for the past 2 years, and peripheral vascular disease with a past right-sided below-the-knee amputation. Her medications include insulin, atenolol, lisinopril, aspirin, calcium acetate, sevelamer, vitamin D, erythropoietin, and a multivitamin.

On physical examination, the patient is frail; the pulse rate is 65/min, and blood pressure is 145/70 mm Hg. There are bilateral carotid bruits, a faint crescendo systolic cardiac murmur at the base, an arteriovenous fistula in the left arm, a right-sided below-the-knee amputation, and absent left lower extremity pulses. Abdominal and rectal examinations are normal. Laboratory results include hemoglobin of 10.9 g/dL (109 g/L), ferritin of 300 ng/mL (300 mg/L), and total iron binding capacity of 190 µg/dL (34.0 µmol/L).

Which of the following is the most appropriate colorectal cancer surveillance for this patient?

A. Colonoscopy now
B. Colonoscopy in 2 years
C. Fecal occult blood testing
D. Double contrast barium enema
E. Discontinuation of surveillance

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Take Home Points

- The best CRC screening tool is that which the patient accepts
- Colonoscopy has the advantage of CRC prevention by polypectomy
- Average risk screening starts at 50 and ends at 75, after which it should be an individualized approach based on life expectancy and comorbidities
- Know high risk groups and when to screen
- FIT and FIT-DNA offer less invasive and less costly strategies for detection of CRC, with the latter having a higher sensitivity
- In history of polyps, high risk groups, or IBD -> follow-up should always be with a colonoscopy

Questions?