Colon Cancer Screening

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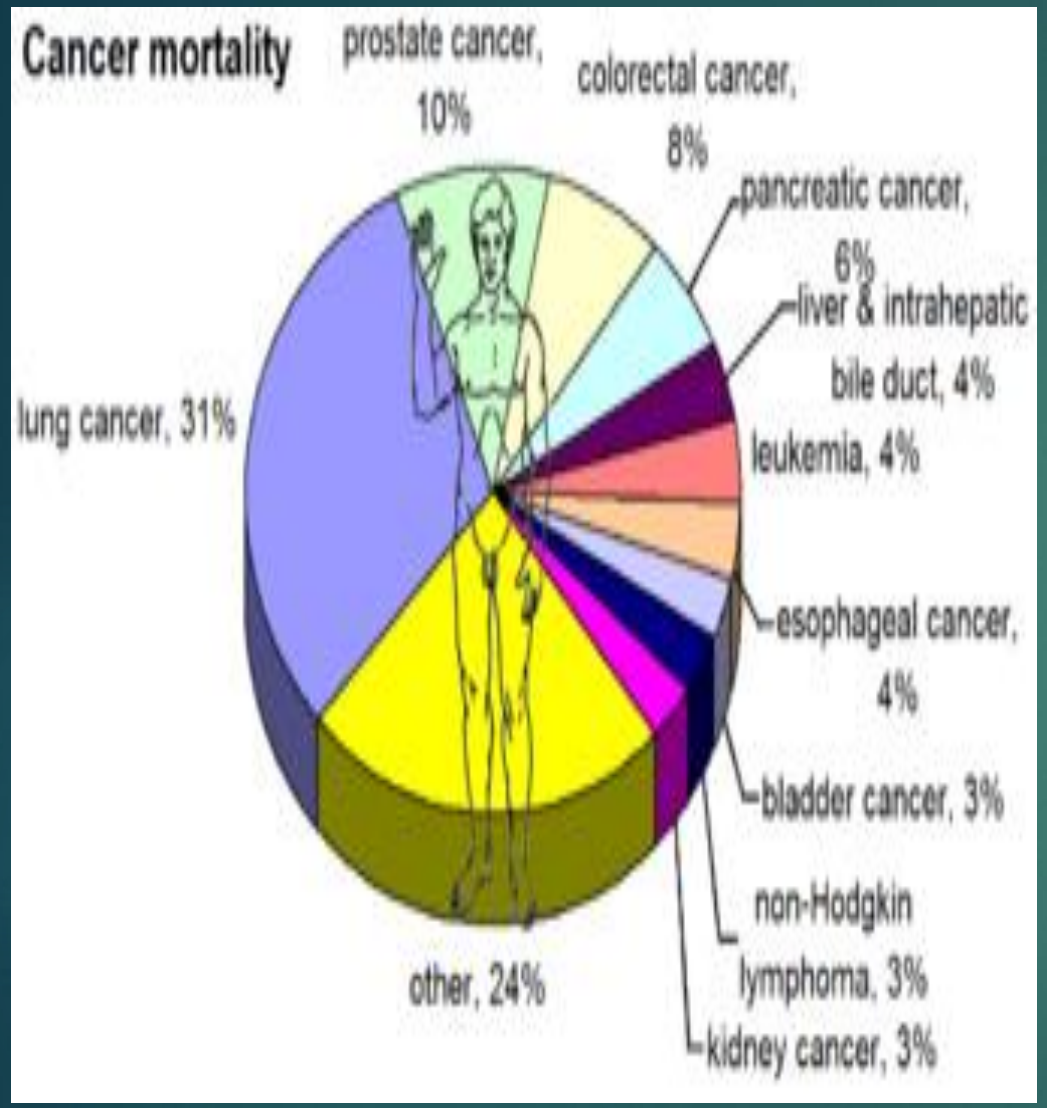
-Colorectal cancer (CRC) is a common and lethal cancer.

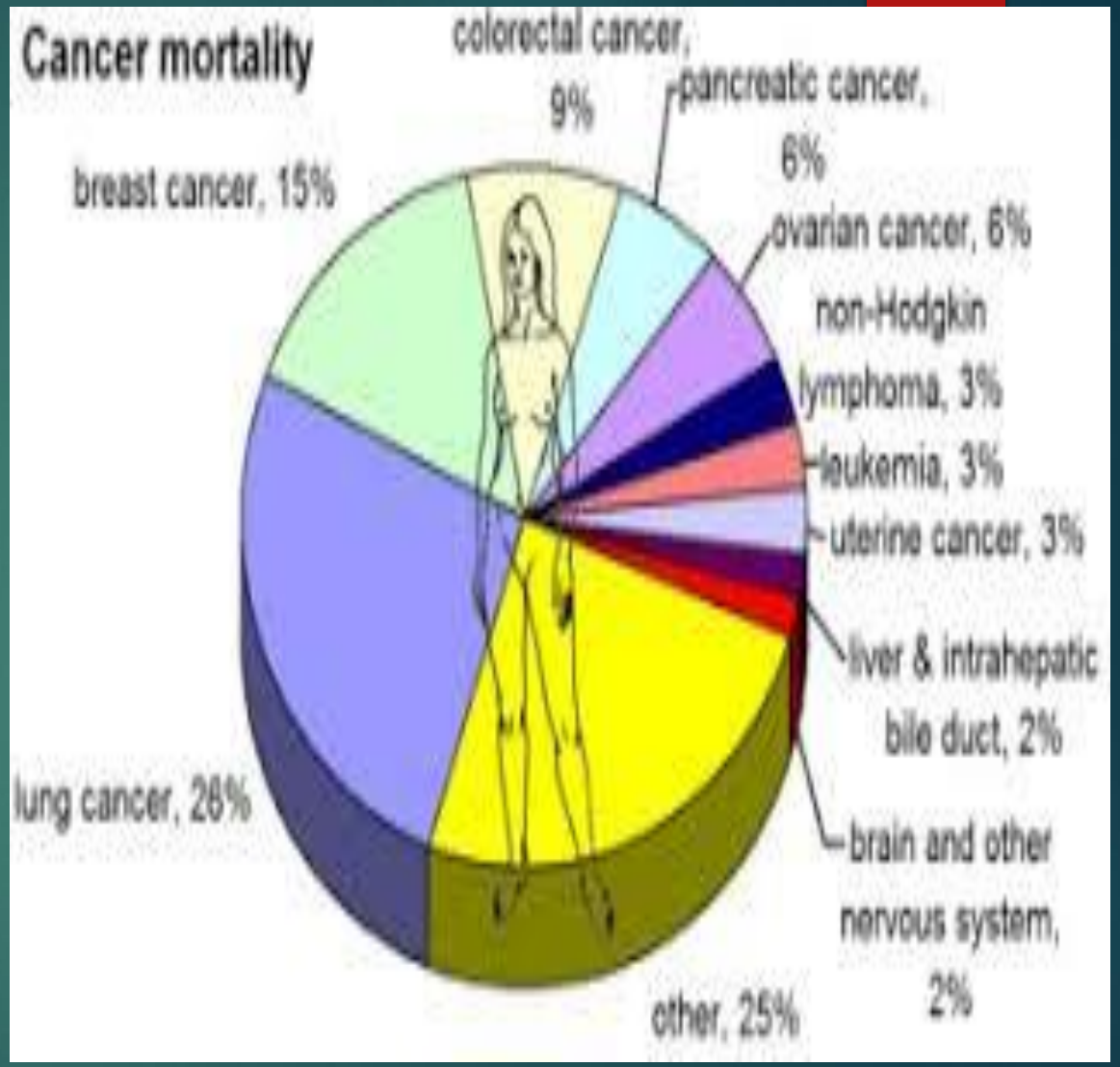
-It has the highest incidence among GI cancers in the US, estimated to be newly diagnosed in about 142,000 patients in 2015, and remains the third most common cause of cancer deaths in men and women (behind lung cancer and prostate for men and lung and breast cancer for women), with about 50,000 deaths estimated in 2015.

Incidence and Mortality of Gastrointestinal Cancers in the United States, 2012

Cancer	Incidence	Male incidence	Female incidence	Deaths
Esophageal*	17,460	13,950	3,510	15,070
Gastric	21,320	13,020	8,300	10,540
Small Intestine	8,070	4,380	3,690	1,150
Pancreas	43,920	22,090	21,830	37,390
Liver and intra-hepatic duct	28,720	21,370	7,350	20,550
Gallbladder and other biliary	9,810	4,480	5,330	3,200
Colorectal	143,460	73,420	70,040	51,690

*Includes squamous and adenocarcinoma. Adapted from Siegel R, Naishadham D, and Jemal A. Cancer Statistics, 2012. *CA Cancer J Clin* 2012;62:10–29.


Cancer mortality
prostate cancer, 10%
colorectal cancer, 8%
pancreatic cancer, 6%
liver & intrahepatic bile duct, 4%
leukemia, 4%
esophageal cancer, 4%
bladder cancer, 3%
non-Hodgkin lymphoma, 3%
kidney cancer, 3%
other, 24%
lung cancer, 31%

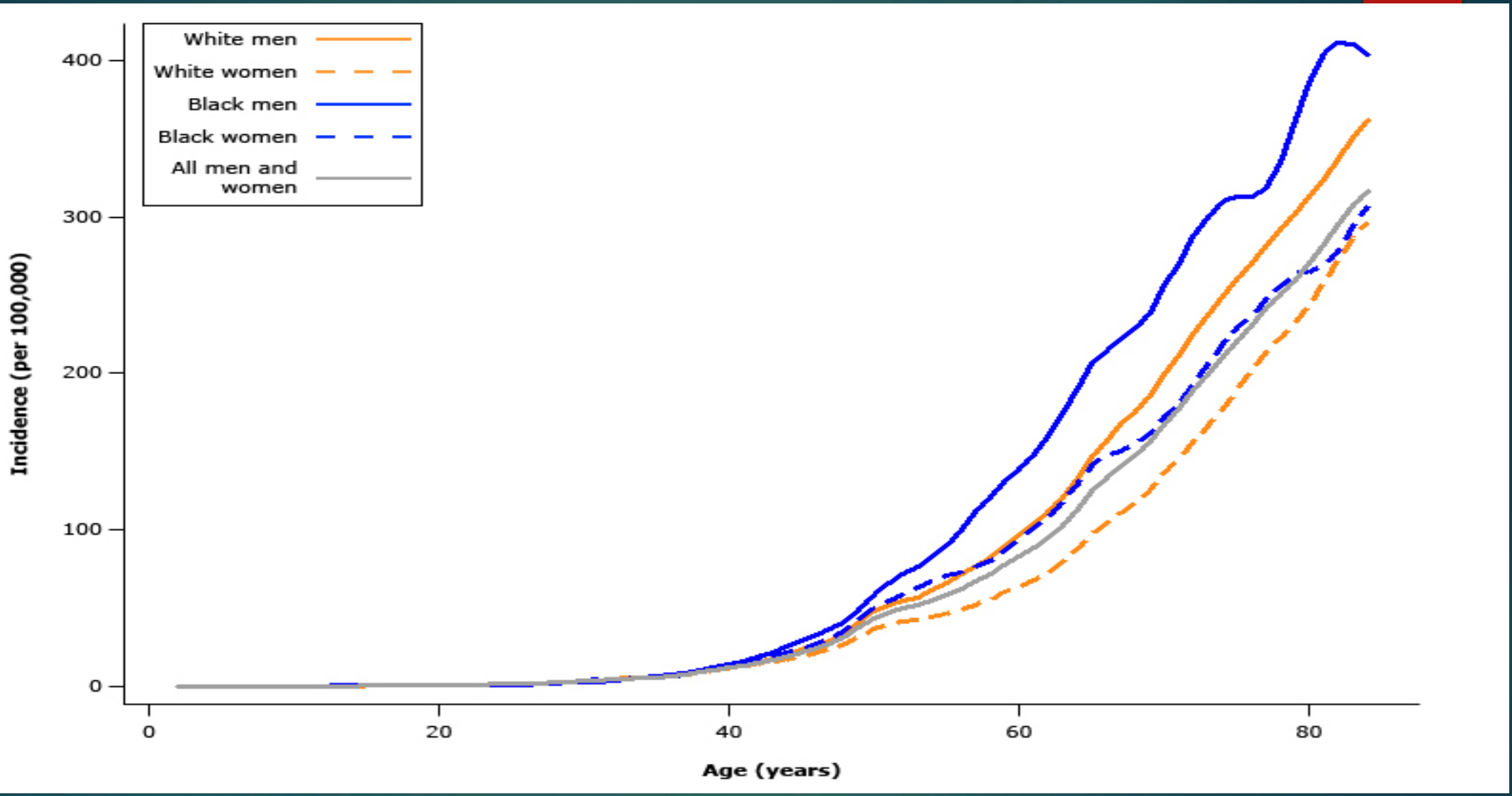

Cancer mortality
colorectal cancer, 9%
pancreatic cancer, 6%
ovarian cancer, 6%
non-Hodgkin lymphoma, 3%
leukemia, 3%
uterine cancer, 3%
liver & intrahepatic bile duct, 2%
brain and other nervous system, 2%
other, 25%
lung cancer, 26%
breast cancer, 15%

-Screening provides benefit because removal of premalignant adenomas can prevent CRC and removal of localized cancer may prevent CRC-related death.

-CRC is infrequent before age 40; the incidence rises progressively thereafter to 3.7/1000 per year by age 80.

-A key risk factor is age, with dramatic increases in CRC incidence after age 50, and thus this age has been used to initiate screening due to the asymptomatic nature of CRC development in average-risk individuals.

-Distal CRCs are more common than proximal cancers until about age 70, when proximal cancers begin to outnumber distal cancers.
-Another key risk factor is family history.


White men
White women
Black men
Black women
All men and women
400
300
200
100
0
Incidence (per 100,000)
0
20
40
60
80
Age (years)

-Sporadic CRC refers to average risk individuals who develop the disease without any significant family history, with an average age of discovery at age 68. Sporadic CRCs account for two-thirds of all CRCs.

-Familial CRC refers to higher risk individuals with a family history of CRC, or other cancers associated with a specific syndrome, and accounts for one-third of all CRCs.

Patients with familial CRC typically present at a younger age than those with sporadic disease, and usually require surveillance to prevent or detect CRC at an early stage.

Lifetime Risk for Colorectal Cancer (CRC) adapted from Johns et al.

Family history or syndrome	Lifetime risk for CRC
Lifetime risk in US (not strictly average risk population) (American Cancer Society 2012)	5.1%
One first-degree relative, any age, with CRC	~11%
Two second-degree relatives, any age, with CRC	~15%
One first-degree relative age <45 with CRC	~20%
Lynch syndrome	80%
Familial adenomatous polyposis	100%

Some Environmental Links with Colorectal Cancer

For development of colorectal cancer	Protective against colorectal cancer
Red meat diet	Diet high in fish, or vegetables, or dairy, or fruit
High fat diet	Selenium
Tobacco	Calcium, vitamin D
Alcohol	Aspirin, nonsteroidal anti-inflammatory drugs
High BMI	Fiber ?
Lack of physical activity	Statins ?
Diabetes mellitus	
Menopause	

Screening is the process of detecting early-stage CRCs and precancerous lesions in asymptomatic people with no prior history of cancer or precancerous lesions.

Surveillance, interval use of colonoscopy in patients with previously detected CRC or precancerous lesions and interval colonoscopy in patients performed to detect dysplasia in persons with inflammatory bowel disease affecting the colon.

CRC screening tests are ranked in 3 tiers based on performance features, costs, and practical considerations.

- First-tier tests: colonoscopy every 10 years and annual fecal immunochemical test (FIT).
- Second-tier tests: CT colonography every 5 years, the FIT– fecal DNA test every 3 years, and flexible sigmoidoscopy every 5 to 10 years.
- Third-tier test: Capsule Colonoscopy every 5 years.

Histologic classification of colorectal polyps:

- I. Conventional adenomas
- a. Dysplasia grade : i. High grade ii. Low grade
- b. Villousity i. Tubular ii. Tubulovillous iii. Villous
- II. Serrated lesions
- a. Hyperplastic polyps (not considered precancerous)
- b. Sessile serrated polyp
- i. Without cytologic dysplasia
- ii. With cytologic dysplasia
- c. Traditional serrated adenoma

- The distribution of adenomas is relatively even throughout the colon, although adenomas with a flat or depressed morphology are distributed more to the proximal colon and pedunculated lesions more to the distal colon.

- “**advanced** ” adenoma, defined as a lesion 1 cm in size or having high-grade dysplasia or villous elements.

- Hyperplastic polyps are usually small lesions and are distributed toward the distal colon.
- SSPs are common (found in 8%-9% of screening colonoscopies) and are distributed toward the proximal colon compared with conventional adenomas

SPECIFIC SCREENING TESTS

- **Colonoscopy**

Advantages

- High sensitivity for cancer and precancerous lesions
- Single session diagnosis and treatment, and long intervals between examinations (10 years) in subjects with normal examinations.
- Reductions in incidence and mortality 80% in the distal colon and 40% to 60% in the proximal colon.

Disadvantages

- The need for thorough bowel cleansing
- Higher risk of perforation

- Higher risk of aspiration pneumonitis, a small risk of splenic injury requiring splenectomy, and a greater risk of postprocedural bleeding compared with other screening tests.

A meta-analysis of population-based studies found risks of **perforation**, **bleeding**, and **death** of 0.5 per 1000, 2.6 per 1000, and 2.9 per 100,000.

- **Fecal immunochemical test**

Advantages

Noninvasive nature, sensitivity for cancer of 79% in 1 meta-analysis, fair sensitivity for advanced adenomas (approximately 30%),low cost.

Disadvantages

Need for repeated testing, which can be problematic and poor or no sensitivity for serrated class precursor lesions.

FIT–fecal DNA test

The FDA approved a CRC screening test that is a combination of a FIT and markers for abnormal DNA.

Advantages

The highest single-time testing sensitivity for cancer of any noninvasive, nonimaging CRC screening test.

Disadvantages

Substantial decrease in specificity (86.6%) compared with 96% for the FIT test alone, and high cost relative to FIT.

Annual FIT is more effective and less costly than FIT– fecal DNA every 3 years, so the FIT– fecal DNA test is unlikely to replace FIT.

- **CT colonography**
  - **Advantages**

Lower risk of perforation compared with colonoscopy

Sensitivity of 82% to 92% for adenomas 1 cm in size.

  - **Disadvantages**

The use of bowel preparation

Detection of extracolonic findings.

Radiation exposure

Flexible sigmoidoscopy

Reduction in distal colon or rectosigmoid cancer incidence and/or mortality of 29% to 76% with flexible sigmoidoscopy.

Flexible sigmoidoscopy can prevent a small fraction (14%) of proximal colon cancers

Advantages

Lower cost and risk compared with colonoscopy, a more limited bowel preparation, and no need for sedation.

Disadvantages

Lower benefit in protection against right-sided colon cancer compared with the level of protection achieved in using colonoscopy.

Capsule colonoscopy

Approved by the FDA for imaging the proximal colon in patients with previous incomplete colonoscopies and more recently for patients who need colorectal imaging but who are not candidates for colonoscopy or sedation.

Advantages

Achievement of endoscopic imaging without an invasive procedure and avoiding the risks of colonoscopy.

Disadvantages

Bowel preparation is more extensive than that for colonoscopy.

Recommendations

- Persons with 1 first-degree relative with CRC or a documented advanced adenoma diagnosed at age <60 years or with 2 first-degree relatives with CRC and/or documented advanced adenomas undergo colonoscopy every 5 years beginning 10 years younger than the age at which the youngest first-degree relative was diagnosed or age 40, whichever is earlier .

- Persons with 1 first-degree relative diagnosed with CRC or a documented advanced adenoma at age 60 years begin screening at age 40. The options for screening and the recommended intervals are the same as those for average-risk persons.

- Persons with 1 or more first degree relatives with CRC or documented advanced adenomas, for whom we recommend colonoscopy, should be offered annual FIT if they decline colonoscopy
- Screening begin in non– African American average-risk persons at age 50 years

- screening begin in African Americans at age 45 years

- Adults age < 50 years with colorectal bleeding symptoms (hematochezia, unexplained iron deficiency anemia, melena with a negative upper endoscopy) undergo colonoscopy or an to determine a bleeding cause, initiate treatment, and complete follow-up to determine resolution of bleeding.

- Persons who are up to date with screening and have negative prior screening tests, particularly colonoscopy, consider stopping screening at age 75 years or when life expectancy is less than 10 years.

- Persons without prior screening should be considered for screening up to age 85, depending on consideration of their age and comorbidities.

Postpolypectomy Surveillance

Adenomatous Polyps	Interval to Next Colonoscopy
1-2 <10-mm tubular adenomas	5-10 years
3-10 adenomas, ≥10 mm, villous histology, or high-grade dysplasia	3 years
≥10 adenomas on single examination	<3 years; a genetic cause of disease should be investigated
Serrated Polyps	
<10-mm rectosigmoid hyperplastic polyps	10 years
SSP <10 mm	5 years
SSP ≥10 mm or SSP with dysplasia or TSA	3 years
Serrated polyposis syndrome	1 year

A 52-year-old man is evaluated for colon cancer screening. He feels well with no symptoms. His uncle experienced respiratory arrest with sedation during a screening colonoscopy, and the patient is adamant that he will not undergo colonoscopy. There is no family history of colon cancer or colon polyps.

On physical examination, vital signs are normal. The remainder of the physical examination is normal.

Which of the following is the most appropriate strategy for colon cancer screening in this patient?

A **CT colonography every 10 years**

B **Fecal immunochemical testing every year**

C **Flexible sigmoidoscopy every 5 years with fecal occult blood testing every year**

D **Stool DNA testing every year**

A 62-year-old man is evaluated after a recent screening colonoscopy. The colonoscopy disclosed a 3-mm sigmoid polyp and an 8-mm hepatic flexure polyp, both of which were removed. On pathology, the sigmoid polyp is noted to be a hyperplastic polyp, and the hepatic flexure polyp is found to be a tubulovillous adenoma with high-grade dysplasia.

Physical examination findings are unremarkable.

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

A **3 to 6 months**

B **1 year**

C **3 years**

D **5 years**

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**

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**

A 45-year-old man is evaluated during a routine examination. He feels well. He reports no weight loss, visible blood in the stool, or suspicious stool changes, and there is no family history of colorectal or gastric cancer. He takes no medications.

On physical examination, vital signs are normal. The remainder of the physical examination is unremarkable.

According to U.S. Preventive Services Task Force recommendations, which of the following is the most appropriate strategy for colorectal cancer screening in this patient?

A **Initiate screening now**

B **Initiate screening in 1 year**

C **Initiate screening at age 50 years**

D **No screening is needed**

Thank You