Updates in Cancer Screening Guidelines

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Learning Objectives

1. Identify the cancer screening guidelines
   a) National Cancer Comprehension Network (NCCN)
   b) US Preventive Services Task Force (USPSFT)
   c) American Cancer Society (ACS)
   d) American Family Physician (AFP)

2. Review epidemiology of cancer types, pathophysiology, risk factors, and evidence-based screening modalities according to clinical guidelines

3. List important clinical considerations to reduce cancer risk

Cancer Screening Goals

- Goals of cancer screening
  - Test or search for specific cancer growth or cells before signs or symptoms appear
  - Increase the chance of identifying early stage cancers
  - Reduce the incidence of people who develop complications from disease
  - Prevent deaths from cancer

Cancer Screening Guidance

- Purpose of Screening Guideline Recommendations
  - Identify which type of cancers should be screened
  - Specify which testing modality should be used to screen for a particular type of cancer
  - Define which age screening should begin and end
  - Answer how often screening tests should be performed
  - Indicate what happens if the screening test shows a positive or negative result

Leading Cancer Care Healthcare Organizations

National Comprehensive Care Network

- A not-for-profit alliance of 30 cancer centers devoted to patient care, research, and education
- Mission: dedicated to improving and facilitating quality, effective, efficient, and assessable cancer care to improve patient lives
- Join world-renowned experts who treat patients with a broad spectrum of cancers to develop disease specific, supportive care, and screening guidelines,
- Provide continuing education programs and host specialty meetings

US Preventative Services Task Force

- An independent, volunteer panel of national experts in prevention and evidence-based medicine
- Mission: to improve the health of all Americans by developing evidence-based recommendations about clinical preventive services such as screenings, counseling services, and preventative medications
- The Task Force is part of the Agency for Healthcare Research and Quality (AHRQ), authorized by the U.S. Congress to provide ongoing scientific, administrative, and dissemination support
- Guidelines and recommendations are supported by the Center for Disease Control and Prevention, Division of Cancer Prevention and Control

American Cancer Society

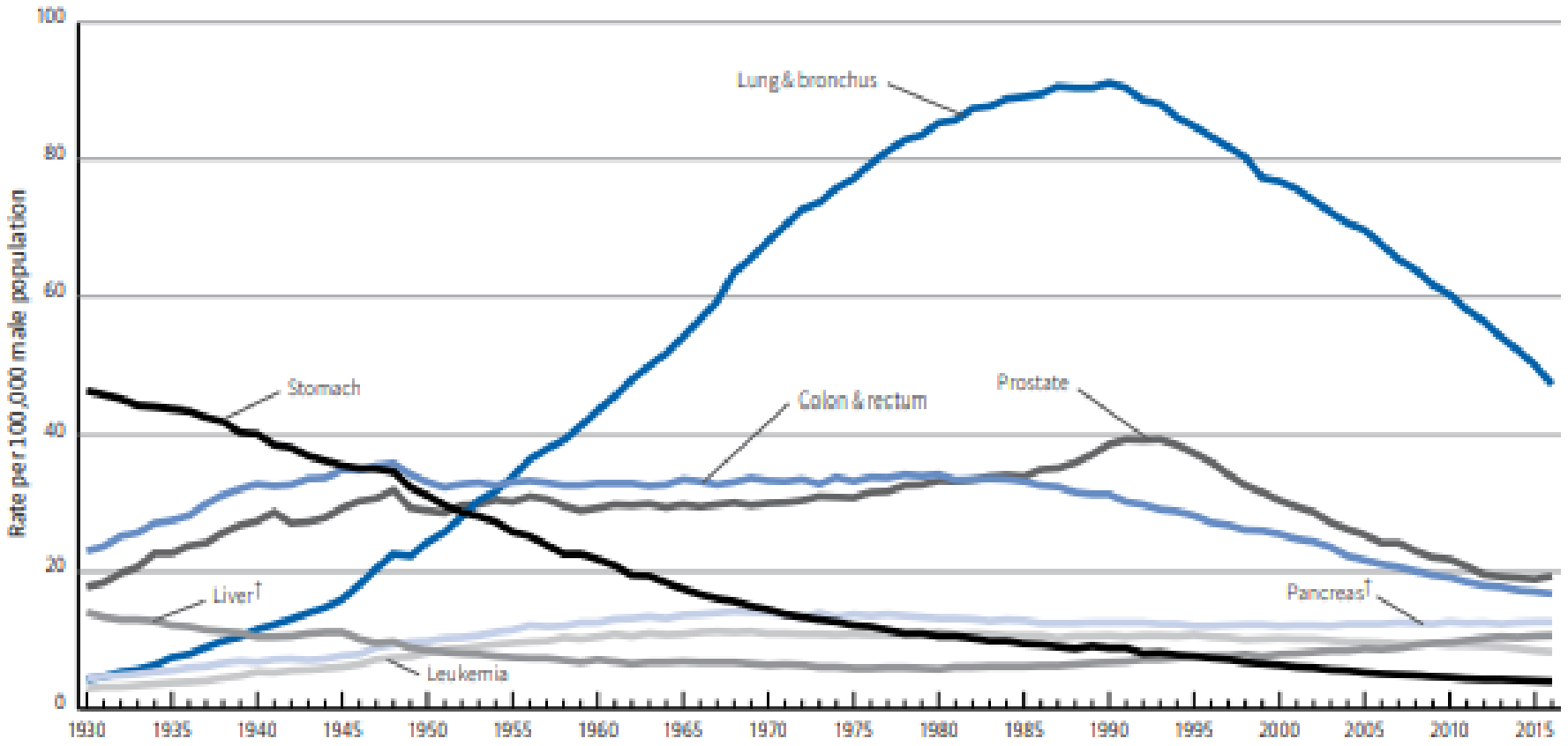
- A nationwide, community-based volunteer health organization dedicated to eliminating cancer as a major health problem
- Mission: to save lives, celebrate lives, and lead the fight for a world without cancer
- Promote healthy lifestyles and evidence based medicine to help prevent cancer
- Perform research to learn more about cancer and identify answers to how to make treatments better
- Advocate for lifesaving policy changes
- Provide emotional support and the latest cancer information to those affected by cancer

American Family Physicians

- A network of family medicine physicians and medical students nationwide who serve in the hospital, urgent care facilities, institutional residential facilities and other practice settings
- Mission: to improve the health of patients, families, and communities by serving the needs of the members with professionalism and creativity
- Provide evidence-based family medicine education

Cancer Prevalence in the United States: Males

Figure 1. Trends in Age-adjusted Cancer Death Rates* by Site, Males, US, 1930-2016

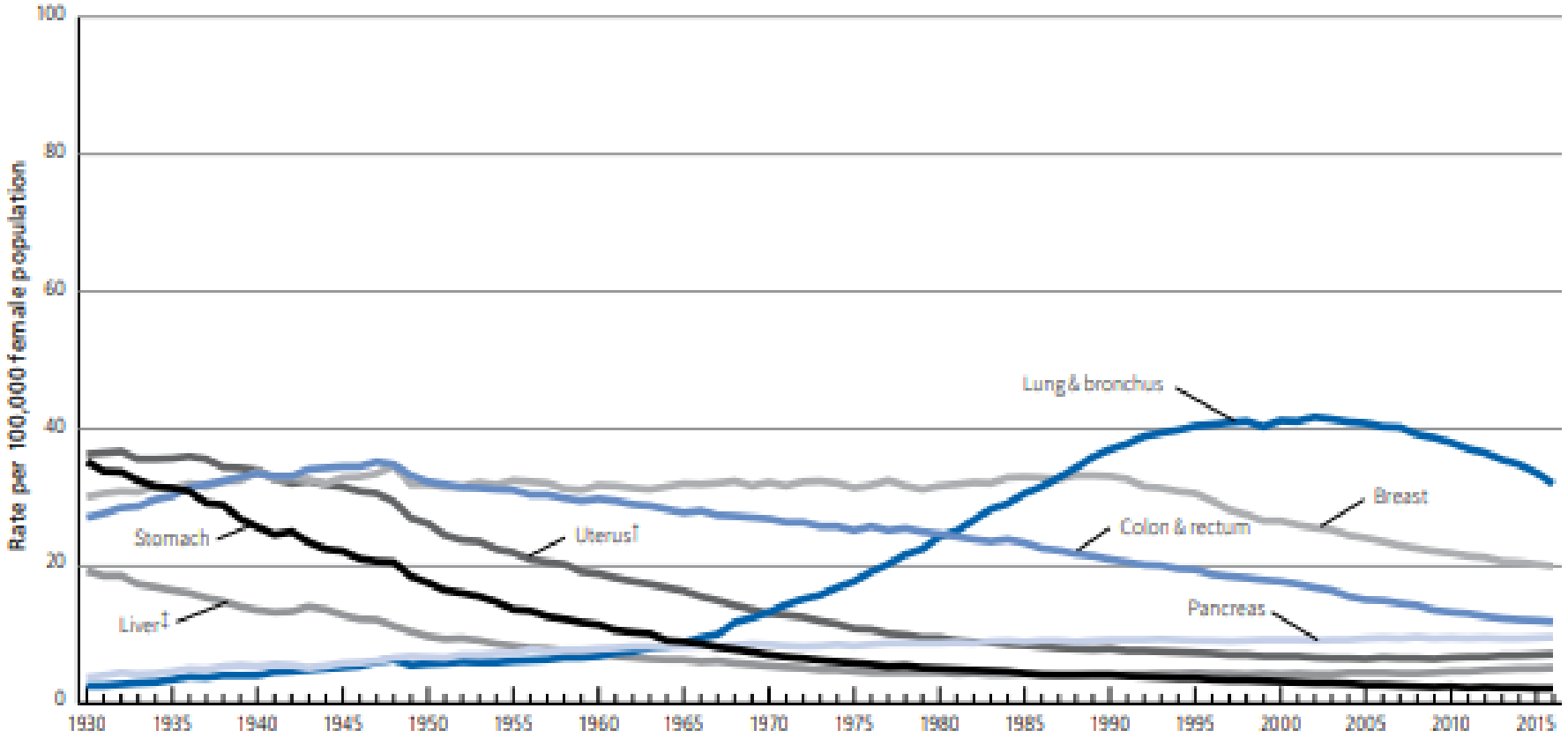


*Per 100,000, age adjusted to the 2000 US standard population. †Mortality rates for pancreatic and liver cancers are increasing.
Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung and bronchus, and colon and rectum are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2016, National Center for Health Statistics, Centers for Disease Control and Prevention.

Cancer Prevalence in the United States: Females

Figure 2. Trends in Age-adjusted Cancer Death Rates* by Site, Females, US, 1930-2016



*Per 100,000, age adjusted to the 2000 US standard population. Rates exclude deaths in Puerto Rico and other US territories. †Uterus refers to uterine cervix and uterine corpus combined. ‡The mortality rate for liver cancer is increasing.

Note: Due to changes in ICD coding, numerator information has changed over time. Rates for cancers of the liver, lung and bronchus, colon and rectum, and uterus are affected by these coding changes.

Source: US Mortality Volumes 1930 to 1959, US Mortality Data 1960 to 2016, National Center for Health Statistics, Centers for Disease Control and Prevention.

Cancer Etiology and Pathogenesis

- Cancer cells growth differ from normal cells by unregulated cell growth and becoming invasive
  - Normal cells mature into distinct cell types with specific functions, while cancer cells clones continue to divide without stopping
- With time, cancerous tumors spread into or invade nearby tissues through the blood or lymphatic system to form new tumors (metastasis)
  - Benign tumors do not spread or invade nearby tissues
- Risk factors
  - Hereditary gene mutations
  - Environmental carcinogens
- Immune regulation: proto-oncogenes, tumor suppressor genes, and DNA repair genes
- Tumor microenvironment are ways the cancer can influence normal cells and blood vessels to supply tumors of nutrients

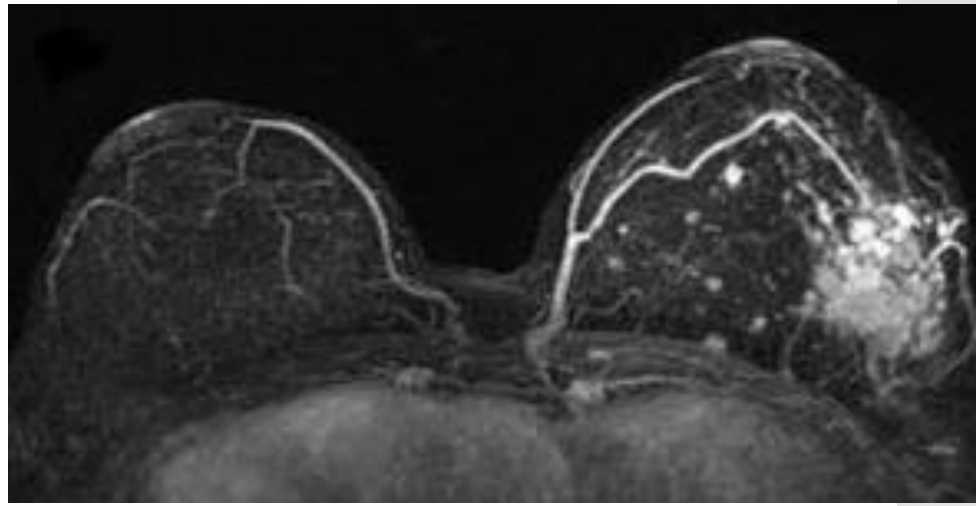
Audience Response Question 1

Which screening modality is the standard of care for breast cancer screening?

1. Computer tomography
2. Mammography
3. Tomosynthesis
4. MRI

Breast Cancer Epidemiology

- The most common cancer in the US (2019)
  - New cases per year: **271,270**
  - Deaths per year: **42,460**
- Median age of diagnosis
  - 69 years
- 5 Year Overall survival
  - Localized disease: 99%
  - Regional disease: 86%
  - Distant disease: 24%
- Increased risk population
  - African Americans
  - Family history
- Genetic mutations
  - BRCA1, BRCA2



Cancer Stat Facts: Breast Cancer. National Institutes of Health. Surveillance, Epidemiology, and End Results Program. Accessed May 1, 2020

Breast Cancer Screening Modalities

	Mammography	Tomosynthesis	MRI
Screening test	-Two X-ray images of each breast (2-dimensional image) -Most sensitive and specific	-CT scan which creates a 3-dimensional image	-MRI creates a 3-dimensional image
Place in screening	-Remains the standard of care for average risk patients and high-risk populations	-An adjunctive test used with mammography screening	-Addresses limitation of mammography in patients with dense tissue -Obtains similar sensitivity of detecting breast cancer to a mammography -An adjunctive option in high-risk populations
Limitations	-Painful, uncomfortable -Sensitivity reduced by 50% in dense tissue	-Increased radiation exposure	-Reduced specificity leading to increased false-positive results leading to benign biopsy -Requires IV contrast

Breast Cancer Screening Average Risk

	NCCN 2020
Population screened	Women ages ≥40 years
Screening modality	Mammography ± tomosynthesis (annual)
Special considerations	Does not indicate an age to stop screening

Breast Cancer Screening Average Risk

	NCCN 2020	USPTF 2016
Population screened	Women ages ≥40 years	Women ages 50 – 74 years
Screening modality	Mammography ± tomosynthesis (annual)	Mammography (every other year)
Special considerations	Does not indicate an age to stop screening	-Tomosynthesis, ultrasound, and MRI not recommended as primary screening -Patient and clinician decision to screen in ages 40 – 49

Breast Cancer Screening Average Risk

	NCCN 2020	USPTF 2016	ACS 2019
Population screened	Women ages ≥40 years	Women ages 50 – 74 years	Women ages -40 – 44 optional annual mammography -45 – 54 annual mammography - ≥ 55 mammography annual or every other year option in patients with a life expectance > 10 years
Screening modality	Mammography ± tomosynthesis (annual)	Mammography (every other year)	
Special considerations	Does not indicate an age to stop screening	-Tomosynthesis, ultrasound, and MRI not recommended as primary screening -Patient and clinician decision to screen in ages 40 – 49	

Breast Cancer Screening Average Risk

	NCCN 2020	USPTF 2016	ACS 2019	AAFP 2020
Population screened	Women ages ≥40 years	Women ages 50 – 74 years	Women ages -40 – 44 optional annual mammography -45 – 54 annual mammography - ≥ 55 mammography annual or every other year option in patients with a life expectance > 10 years	Women ages -40 – 49 personal decision to screen - 50 - 74 every other year mammography
Screening modality	Mammography ± tomosynthesis (annual)	Mammography (every other year)		
Special considerations	Does not indicate an age to stop screening	-Tomosynthesis, ultrasound, and MRI not recommended as primary screening -Patient and clinician decision to screen in ages 40 – 49		Published Feb 1, 2020. Cite the American Cancer Society's 2019 guidelines

Breast Cancer Screening Increased Risk

- Populations with increased risks of breast cancer
  - Prior history of breast cancer who have a lifetime risk ≥ 20% of breast cancer recurrence
    - Annual mammogram or breast MRI
  - Prior history of thoracic radiation between ages 10 – 30 years old
    - Begin mammogram 10 years after RT completion, but not prior to age 30 years or
    - Begin breast MRI 10 years after RT completion, but not prior to age 25 years
  - Family history of breast cancer
    - Annual mammogram or breast MRI
    - Begin 10 years prior to youngest family member diagnosis, but not earlier than 30 years old
      - Mammogram ± tomosynthesis or breast MRI

Breast Cancer Risk Reduction. National Comprehensive Network. Accessed May 29, 2020

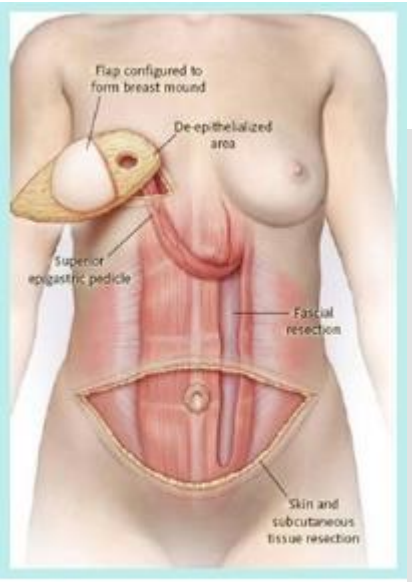
Breast Cancer Risk-Reduction Strategies

- Postmenopausal moderate risk women (≥1 risk factor) can achieve risk reduction with prophylaxis
  - SERM: tamoxifen, raloxifene
  - Aromatase inhibitor: anastrazole, exemestane
- Toxicities from prophylactic therapies
  - Raloxifene increases risk of endometrial cancer in women with an intact uterus
  - Tamoxifen increases risks of cataract development
  - All anti-estrogens can increase vasomotor symptoms (hot flashes), GI symptoms, VTE, musculoskeletal pain, stroke, TIA
  - Aromatase inhibitors may increase the risk of fractures
- Recommendation
  - Moderate benefit in increased risk patients
  - No benefit in average risk patients

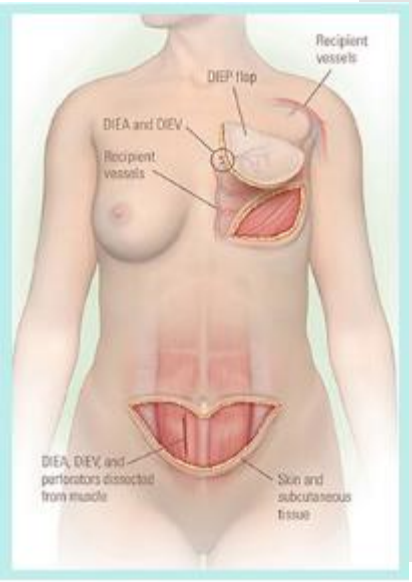
Breast Cancer Risk Reduction. National Comprehensive Network. Accessed May 29, 2020

Breast Cancer Risk-Reduction Strategies

- National Cancer Institute consider prophylactic mastectomy in women who
  - Carry a *BRCA1* or *BRCA2* gene mutation
  - Prior thoracic RT < 30 years of age
  - May be able to reduce the risk of developing breast cancer by 95%
- Women with a strong family history of breast cancer, prophylactic mastectomy can reduce the risk of breast cancer development by up to 90%.
- Immediate risks include pain, bleeding, infection, and scarring
- Long term risks may include depression or anxiety about body image, loss of sensation, losing the ability to breastfeed, and does not guarantee that breast cancer will never develop
- Surgical reconstruction is recommended to deliver and maintain viable blood supply to the skin/tissue



TRAM FLAP



DIEP FLAP

Breast Cancer Risk Reduction. National Comprehensive Network. Accessed May 29, 2020

Audience Response Question 2

Which of the following is not a requirement to screen individuals for lung cancer?

1. Age
2. Smoking pack years
3. Obesity
4. Number of years since active smoking

Lung Cancer Epidemiology

- The second most common cancer in the US (2019) amongst men and women
  - New cases per year: **228,150**
  - Deaths per year: **142,670**
- Median age of diagnosis
  - 71 years
- 5 Year Overall survival in NSCLC
  - Localized disease: 61%
  - Regional disease: 35%
  - Distant disease: 6%
- 5 Year Overall survival in SCLC
  - Localized disease: 27%
  - Regional disease: 16%
  - Distant disease: 3%

Cancer Stat Facts: Lung Cancer. National Institutes of Health. Surveillance, Epidemiology, and End Results Program. Accessed May 1, 2020

Lung Cancer Screening Modality

	Low-dose Computer Tomography (CT)
Screening test	-Cross sectional images of both (3-dimensional image) -Most sensitive and specific chest radiography
Place in screening	-Remains the standard of care for high risk patients who meet criteria for lung cancer screening -The most specific and sensitive test
Limitations	-Access to care; primary care physician recommendation -False positives; over-diagnosis -Costly

Lung Cancer Screening

	NCCN 2020
Population screened *Reserved to high-risk populations	High risk: • Age 55 – 77 and ≥ • 30 pack-yr history of smoking and • Smoking cessation < 15 yrs
Screening modality	Low-dose Computed Tomography (LDCT) (Annual)
Special considerations	No screening recommended • Moderate risk: ≥ 50 y/o and >20 yr smoking hx or second hand smoke • Low risk: < 50 yrs and or < 20 pack yr hix

Lung Cancer Screening

	NCCN 2020	USPTF 2014
Population screened *Reserved to high-risk populations	High risk: • Age 55 – 77 and ≥ • 30 pack-yr history of smoking and • Smoking cessation < 15 yrs	• Age 55 – 80 • ≥ 30 pack yr history • Currently smoking or quit < 15 yrs
Screening modality	Low-dose Computed Tomography (LDCT) (Annual)	LDCT (Annual)
Special considerations	No screening recommended • Moderate risk: ≥ 50 y/o and >20 yr smoking hx or second hand smoke • Low risk: < 50 yrs and or < 20 pack yr hix	2020 guideline draft proposes expanding screening to -ages 50-80 with a 20 pack yr history, and quit smoking < 15 yrs

Lung Cancer Screening

	NCCN 2020	USPTF 2014	ACS 2019
Population screened *Reserved to high-risk populations	High risk: • Age 55 – 77 and ≥ • 30 pack-yr history of smoking and • Smoking cessation < 15 yrs	• Age 55 – 80 • ≥ 30 pack yr history • Currently smoking or quit < 15 yrs	• Age 55 – 74 yrs in fairly good health • Currently smoking or quit ≤ 15 yrs • ≥30 pack yr
Screening modality	Low-dose Computed Tomography (LDCT) (Annual)	LDCT (Annual)	LDCT (Annual)
Special considerations	No screening recommended • Moderate risk: ≥ 50 y/o and >20 yr smoking hx or second hand smoke • Low risk: < 50 yrs and or < 20 pack yr hix	2020 guideline draft proposes expanding screening to -ages 50-80 with a 20 pack yr history, and quit smoking < 15 yrs	Highlights shared decision making and smoking cessation /counseling prior to screening

Lung Cancer Screening

	NCCN 2020	USPTF 2014	ACS 2019	AAFP/ACCP 2018
Population screened *Reserved to high-risk populations	High risk: • Age 55 – 77 and ≥ • 30 pack-yr history of smoking and • Smoking cessation < 15 yrs	• Age 55 – 80 • ≥ 30 pack yr history • Currently smoking or quit < 15 yrs	• Age 55 – 74 yrs in fairly good health • Currently smoking or quit ≤ 15 yrs • ≥30 pack yr	• Age 55 – 77 • > 30 pack yr • Currently smoking or cessation ≤ 15 yrs
Screening modality	Low-dose Computed Tomography (LDCT) (Annual)	LDCT (Annual)	LDCT (Annual)	LDCT (Annual)
Special considerations	No screening recommended • Moderate risk: ≥ 50 y/o and >20 yr smoking hx or second hand smoke • Low risk: < 50 yrs and or < 20 pack yr hix	2020 guideline draft proposes expanding screening to -ages 50-80 with a 20 pack yr history, and quit smoking < 15 yrs	Highlights shared decision making and smoking cessation /counseling prior to screening	Highlights smoking cessation treatments should be provided prior to screening

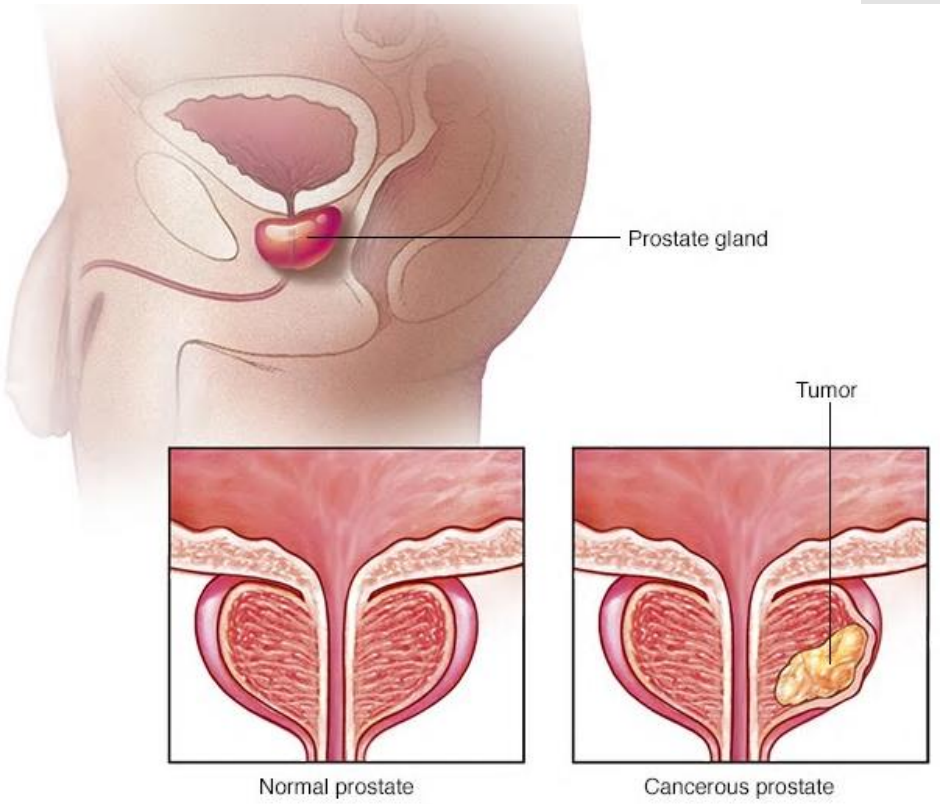
Lung Cancer Risk-Reduction Strategies

- Smoking cessation!
  - Tobacco smoking is the #1 modifiable risk factor accounting for 85% of lung cancer-related deaths
  - The relative risk for lung cancer is 20-fold higher for smokers than nonsmokers
  - 5 year lung cancer risk reduction after smoking cessation is 39%
  - Second hand smoke increases the risk for lung cancer among nonsmokers, but second-hand smoke is not a sufficient risk factor for lung cancer screening

Tindle HA, Duncan MS, Greevy RA, et al. Lifetime smoking history and risk of lung cancer: results from the Framingham Heart Study. *JNCI J Natl Cancer Inst*. 2018;110(11)

Prostate Cancer Epidemiology

- The third most common cancer in the US (2019)
  - New cases per year: **191,930**
  - Deaths per year: **33,330**
- Median age of diagnosis
  - 66 years
- 5 Year Overall survival
  - Localized disease: 76%
  - Regional disease: 13%
  - Distant disease: 6%
- Increased risk population
  - African American men (64% increased risk compared to Caucasian men)
  - BRCA1/BRCA2 mutation



Cancer Stat Facts: Prostate Cancer. National Institutes of Health. Surveillance, Epidemiology, and End Results Program. Accessed May 1, 2020

Prostate Cancer Screening Modality

	Prostate Specific Antigen (PSA)	Digital Rectal Exam (DRE)
Screening test	Serum test: PSA is a glycoprotein secreted by prostatic epithelial cells Normal PSA levels depend on age and ethnicity	Physical medical exam that checks the lower rectum and walls of the prostate for enlarged glands, tenderness, or growths
Place in screening	First line	An adjunctive test with elevated PSA (not as stand-alone screening)
Limitations	-Not a cancer specific marker -Can be elevated due to infection, recent instrumentation, ejaculation, or trauma	-Invasive procedure -Pain, bleeding -Perform by a trained professional, usually a urologist

Early Detection, Diagnosis, and Staging. American Cancer Society. Accessed May 1, 2020

Prostate Cancer Screening

	NCCN 2020
Population screened	Males ages 45 – 75 -PSA < 1 ng/ml: repeat at 2-4 yrs -PSA 1-3 ng/ml: repeat at 1-2 yrs -PSA >3 ng/ml: indication for biopsy
Screening modality	PSA – 1st DRE - adjunct
Special considerations	Offer to patients with ≥ 10 year life expectancy High risk: African American men ± BRCA mutation, begin screening at age 40

Prostate Cancer Screening

	NCCN 2020	USPTF 2018
Population screened	Males ages 45 – 75 -PSA < 1 ng/ml: repeat at 2-4 yrs -PSA 1-3 ng/ml: repeat at 1-2 yrs -PSA >3 ng/ml: indication for biopsy	Males 55 – 69 informed about benefits and harms of screening
Screening modality	PSA – 1st DRE - adjunct	PSA – 1st DRE – adjunct
Special considerations	Offer to patients with ≥ 10 year life expectancy High risk: African American men ± BRCA mutation, begin screening at age 40	Against PSA screening in ages ≥ 70

Prostate Cancer Screening

	NCCN 2020	USPTF 2018	ACS 2019
Population screened	Males ages 45 – 75 -PSA < 1 ng/ml: repeat at 2-4 yrs -PSA 1-3 ng/ml: repeat at 1-2 yrs -PSA >3 ng/ml: indication for biopsy	Males 55 – 69 informed about benefits and harms of screening	Males ≥ 50 with average risk with life expectancy ≥ 10 yrs -PSA < 2.5: every other yr -PSA>2.5: Annually
Screening modality	PSA – 1st DRE - adjunct	PSA – 1st DRE – adjunct	PSA – 1st DRE – adjunct
Special considerations	Offer to patients with ≥ 10 year life expectancy High risk: African American men ± BRCA mutation, begin screening at age 40	Against PSA screening in ages ≥ 70	Males ≥ 45 with high risk (AA; father or brother dx age ≤ 65 yrs Males ≥ 40 with more than 1 1st-degree relative

Prostate Cancer Screening

	NCCN 2020	USPTF 2018	ACS 2019	AAFP 2018
Population screened	Males ages 45 – 75 -PSA < 1 ng/ml: repeat at 2-4 yrs -PSA 1-3 ng/ml: repeat at 1-2 yrs -PSA >3 ng/ml: indication for biopsy	Males 55 – 69 informed about benefits and harms of screening	Males ≥ 50 with average risk with life expectancy ≥ 10 yrs -PSA < 2.5: every other yr -PSA>2.5: Annually	Males 55 – 69 informed about benefits and harms of screening
Screening modality	PSA – 1st DRE - adjunct	PSA – 1st DRE – adjunct	PSA – 1st DRE – adjunct	PSA – 1st DRE – adjunct
Special considerations	Offer to patients with ≥ 10 year life expectancy High risk: African American men ± BRCA mutation, begin screening at age 40	Against PSA screening in ages ≥ 70	Males ≥ 45 with high risk (AA; father or brother dx age ≤ 65 yrs Males ≥ 40 with more than 1 1st-degree relative	-Does not recommend routine screening in all men 55-69 -Against PSA screening in ages ≥ 70

Prostate Cancer Risk - Reduction Strategies

- Overall health status, and not age alone, is important when making decisions about screening
- Discussion about the pros and cons of testing should be repeated as new information about the benefits and risks of testing becomes available. Further discussions are also needed to take into account changes in a man's health, values, and preferences
- Maintaining a healthy body weight and routine physical activity
- Diet including 2.5 cups of vegetables (i.e. tomatoes, cruciferous vegetables, soy, beans, and other legumes) and fish
- Medications
  - 5-alpha reductase inhibitors for benign prostatic hypertrophy may be useful to lower prostate cancer risk
  - Aspirin may lower this of prostate cancer mortality

Can Prostate Cancer be Prevented? Causes, Risk Factors, and Prevention. American Cancer Society. Accessed May 1, 2020

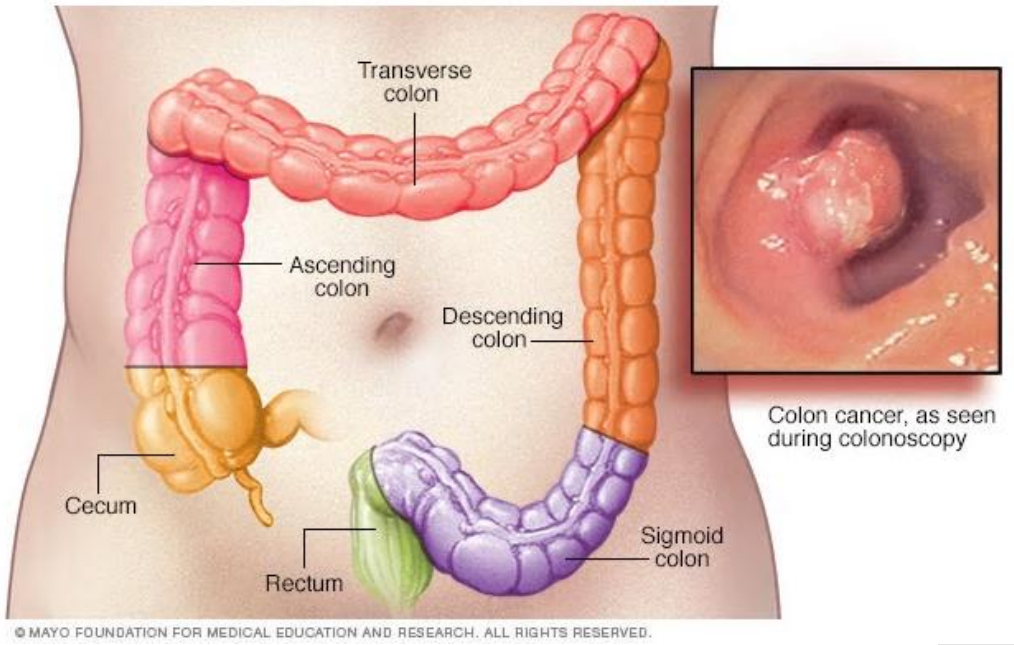
Audience Response Question 3

How often is a colonoscopy recommended for an average risk individual?

1. Every year
2. Every 2 years
3. Every 5 years
4. Every 10 years

Colorectal Cancer Epidemiology

- The forth most common cancer the US (2019)
  - New colorectal cancer cases per year: **145,600**
  - Deaths per year: **51,020**
- Median age of diagnosis
  - 67 years
- 5 Year Overall survival
  - Localized disease: 38%
  - Regional disease: 35%
  - Distant disease: 22%
- Increased risk population
  - African American men
  - Inflammatory bowel disease
  - Familial adenomatous polyposis
  - Family history



Cancer Stat Facts: Colorectal Cancer. National Institutes of Health. Surveillance, Epidemiology, and End Results Program. Accessed May 1, 2020

Structural Colorectal Cancer Screening Modalities

	Colonoscopy	Flexible Sigmoidoscopy
Screening Test	-A long flexible tube (colonoscope) is inserted into the rectum with a video camera -Can detect small and large polyps to remove for biopsy	-A thin, flexible tube (sigmoidoscope) is inserted into the rectum -Can detect large polys to take a tissue biopsy
Benefits	-Gold Standard (most specific and most sensitive) -Can visualize entire large intestine (colon) -Can collect tissue for a biopsy	-Can visualize the lower part of the large intestine (descending colon) -An option to avoid general anesthesia or risk of perforation
Limitations	-Requires highly trained personnel -Requires full bowel prep and evacuation -NPO from night before (including medications) -Requires general anesthesia -Can cause GI perforation -The most costly	-Requires full bowel prep and evacuation -NPO from night before (including medications) -Can visualize the lower third of large intestine -Is unable to detect small polyps
Detection	-Adenomatous polyps -Can biopsy tissue to study	-Adenomatous polyps -Can biopsy tissue to study

Imaging Cancer Screening Modality

	CT Colonography (Virtual Colonoscopy)
Screening Test	-Computed tomography colonography, also called a virtual colonoscopy, uses a series of X-rays to produce a 3-D image -A small, flexible tube is also put in the rectum for this test to fill the colon and rectum with air.
Benefits	-Non-invasive -Can image the entire large intestine to detect polyps -Quick and easy -Does not require sedation
Limitations	-Requires full bowel prep and evacuation -NPO from night before (including medications) -Expensive -Unable to biopsy
Detection	Can image the entire large intestine

Stool-based Screening Modalities

	Stool Guaiac Testing	Immunochemical-based Testing	FIT-DNA-based Testing
Screening Test	-Stool samples placed on special cards coated with a chemical substance to detect occult (hidden) blood -Fecal occult blood test (FOBT)	-Stool samples placed on special cards coated with a chemical substance to detect occult (hidden) blood -Fecal immunochemical test (FIT)	-Provide a full stool sample, add preservative, then mail for testing -"Cologuard" requires an Rx
Benefits	-Non-invasive -No bowel prep -Inexpensive -Usually covered by insurance -Can be done at home	-Non-invasive -No diet or med changes -More specific than FOBT -Inexpensive -Insurance coverage -Can be done at home	-Non-invasive -No diet or medication changes -Can be done at home -More specific than FOBT and FIT
Limitations	-Does not detect blood from upper GI tract -Requires a restricted diet before sampling -Can miss polyps	-Does not detect blood from upper GI tract -Can miss polyps -Risk of false positive result	-Can miss polyps and some cancers -Risk of false positive result -Fairly new; insurance coverage issues
Detection	Occult blood can be signs of polyps, ulcers, or hemorrhoids	Limited to detect blood from lower GI tract	Detects cancer DNA in stool

Colorectal Cancer Screening Average Risk

	NCCN 2020
Population screened	Age ≥ 50 yrs No history of adenoma or sessile polyps, IBD, family history, own history
Screening modality	Colonoscopy every 10 yrs Or Flexible sigmoidoscopy every 5-10 years Or Stool based test (FOBT, FIT, or FIT-DNA) every 1 year

Colorectal Cancer Screening Average Risk

	NCCN 2020	USPTF 2020
Population screened	Age ≥ 50 yrs No history of adenoma or sessile polyps, IBD, family history, own history	Age ≥ 50 yrs No history of adenoma or sessile polyps, IBD, family history, own history
Screening modality	Colonoscopy every 10 yrs Or Flexible sigmoidoscopy every 5-10 years Or Stool based test (FOBT, FIT, or FIT-DNA) every 1 year	Choice of screening strategy should be based on pt preferences, medical contraindications, pt adherence, resources for testing, follow-up and benefits and potential harms associated with each screening strategy.

Colorectal Cancer Screening Average Risk

	NCCN 2020	USPTF 2020	ACS 2020
Population screened	Age ≥ 50 yrs No history of adenoma or sessile polyps, IBD, family history, own history	Age ≥ 50 yrs No history of adenoma or sessile polyps, IBD, family history, own history	Ages ≥ 45 - 85 (qualified) Age ≥ 50 - 75 (strongly recommend)
Screening modality	Colonoscopy every 10 yrs Or Flexible sigmoidoscopy every 5-10 years Or Stool based test (FOBT, FIT, or FIT-DNA) every 1 year	Choice of screening strategy should be based on pt preferences, medical contraindications, pt adherence, resources for testing, follow-up and benefits and potential harms associated with each screening strategy.	Screening strategy can be influenced by pt edu about screening, test characteristics (ie, accuracy, degree of invasiveness, test preparation, required screening interval, cost), and clinician recommendation

Colorectal Cancer Screening Average Risk

	NCCN 2020	USPTF 2020	ACS 2020	AAFP2019
Population screened	Age ≥ 50 yrs No history of adenoma or sessile polyps, IBD, family history, own history	Age ≥ 50 yrs No history of adenoma or sessile polyps, IBD, family history, own history	Ages ≥ 45 - 85 (qualified) Age ≥ 50 - 75 (strongly recommend)	Ages ≥ 45 - 85 (qualified) Age ≥ 50 - 75 (strongly recommend)
Screening modality	Colonoscopy every 10 yrs Or Flexible sigmoidoscopy every 5-10 years Or Stool based test (FOBT, FIT, or FIT-DNA) every 1 year	Choice of screening strategy should be based on pt preferences, medical contraindications, pt adherence, resources for testing, follow-up and benefits and potential harms associated with each screening strategy.	Screening strategy can be influenced by pt edu about screening, test characteristics (ie, accuracy, degree of invasiveness, test preparation, required screening interval, cost), and clinician recommendation	Routine screening with high-sensitivity fecal testing or visual examination depending on pt preference and accessibility of the screening modality

Colorectal Cancer Screening Increased Risk

	NCCN 2020	USPTF 2020	ACS 2018	AAFP2019
Population screened	-Lynch syndrome (hereditary nonpolyposis) -Polyposis syndromes (classical familial adenomatous polyposis, MUTYH-associated polyposis, Peutz-Jeghers syndrome, Juvenile polyposis syndrome, Serrated polyposis, colonic adenomatous polyposis) -Cowden syndrome/PTEN hamartoma tumor syndrome -Li-Fraumeni syndrome			
Screening modality	Colonoscopy every 3-5 years Personal history of UC or Crohn's colitis, begin 8 yrs after onset of sx ≥ 1 1st-degree relative, begin age 40 or 10 yrs before earliest family diagnosis	States colonoscopy is the most specific, but most invasive and holds several risks. Flex sig is an alternative option Stool-based testing are non-invasive, convenient, less specific	Refers to other guidelines about high-risk populations. Does not provide recommendations for high-risk populations	Refers to other guidelines about high-risk populations. Does not provide recommendations for high-risk populations

Colorectal Cancer Screening Modalities & Average Risk Frequency

Screening	NCCN 2020	USPTF 2020	ACS 2018	AAFP2019
Colonoscopy	Every 10 years	Refers to ACS	Every 10 years	Every 10 years
Flexible sigmoidoscopy	Every 5 – 10 years	Refers to ACS	Every 5 years	Every 5 years
CT colonography	Every 5 years	Refers to ACS	Every 5 years	Every 5 years
FOBT	Annual	Refers to ACS	Annual	Annual
FIT	Annual	Refers to ACS	Annual	Annual
FIT-DNA	Interval uncertain	Refers to ACS	Every 3 years	Every 3 years

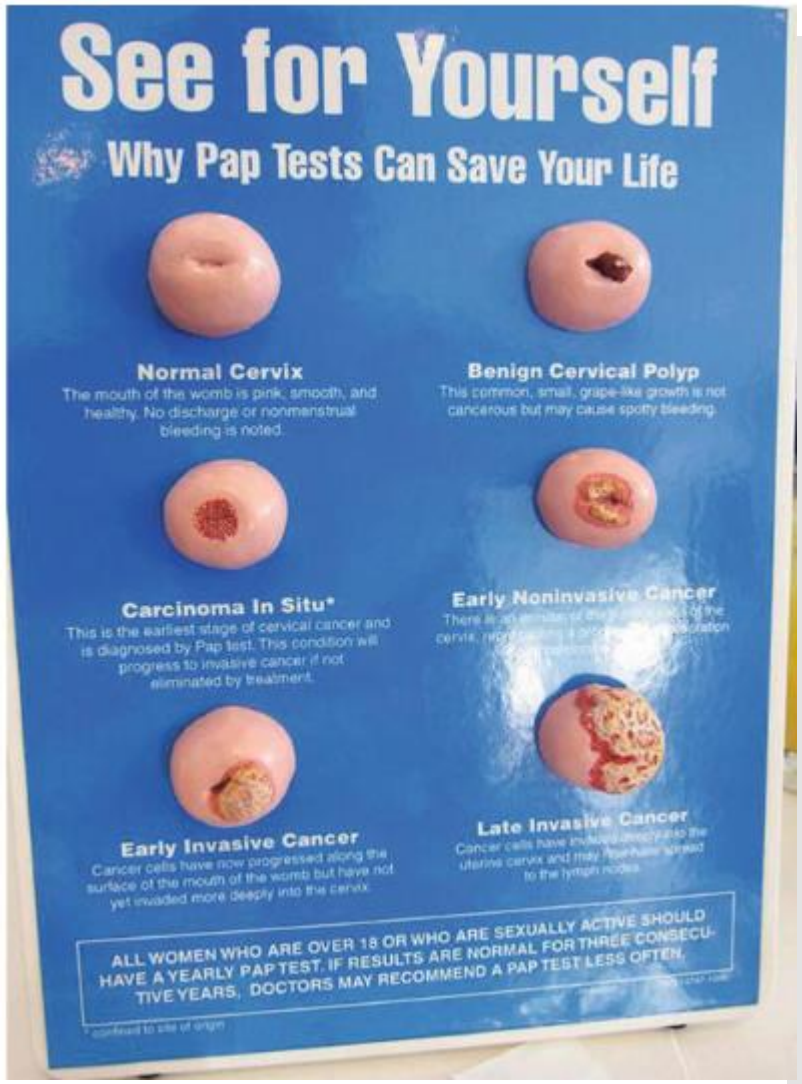
Colorectal Cancer Risk-Reduction Strategies

- Screening
  - Choosing the appropriate screening modality, decided by the patient and provider, and adherence to screening
  - Identifying colon cancer and removing polyps with subsequent therapies (chemotherapy/surgery/radiation)
- Diet
  - Increase daily fiber, fruits, vegetables, calcium and dairy
  - Limit red meats /processed meat intake
- Physical activity
  - Maintain exercise, physical activity, and a healthy weight
- Overall health
  - Maintaining overall physical health
  - Adherence to chronic medications regimens to manage cardiac disease, diabetes, coagulation disorders ect
- Anti-inflammatory
  - Aspirin for ages 50 – 69 years who are at risk for heart disease or high-risk populations (Lynch syndrome, FAP, microsatellite instable)
  - At least 10 years of aspirin therapy is needed for full benefit

Colon Cancer. Am Fam Physician. 2018 May 15;97(10):
US Preventative Task Force. National Institutes of Health.

Cervical Cancer Epidemiology

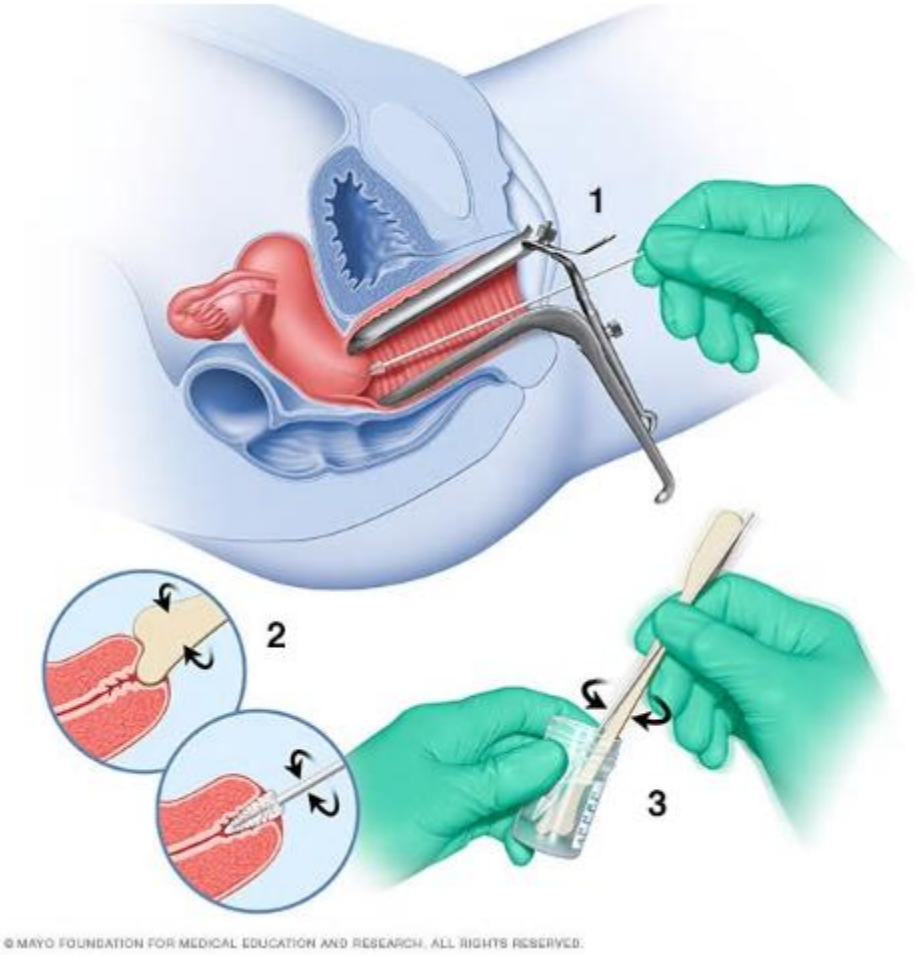
- The 20th common cancer amongst the US (2019)
  - New cases per year: **13,800**
  - Deaths per year: **4,290**
- Median age of diagnosis
  - 50 years
- 5 Year Overall survival
  - Localized disease: 44%
  - Regional disease: 36%
  - Distant disease: 16%
- Risk Factors
  - HPV infections
  - Chlamydia infection
  - Long-term use of oral contraceptives



Cancer Stat Facts: Cervical Cancer. National Institutes of Health. Surveillance, Epidemiology, and End Results Program. American Cancer Society. Accessed May 1, 2020

Cervical Cancer Screening Modality

	Papanicolaou (Pap) Smear Test
Screening test	Cytology testing -Liquid-based cytology vs. conventional (glass slide) -Signal and nucleic acid amplification
Place in screening	Preferred
Limitations	False negative reasons: -Inadequate collection of cells -A small number of abnormal cells -Blood or inflammatory cells obscuring the abnormal cells



Pap Smear. 1998-2020 Mayo Foundation for Medical Education and Research (MFMER). Accessed May 1, 2020

Cervical Cancer Screening

	ACS 2020 (NCCN supports)	USPTF/AAFP 2018
Population screened	Women ages 25-65	Women ages 21 - 65
Screening modality	Pap test cytology ± HPV test every 5 years Or pap test cytology alone every 3 years	-Pap test cytology every 3 years -HPV test every 5 years -Or co-testing every 5 years
Special considerations	Screen more often: Immunosuppressed patients (HIV, transplant, chronic immunosuppression) Recommends against screening: -Ages < 21 regardless of the age of sexual initiation or other risk factors -Ages > 65 with normal results in the past 10 yrs should stop screening -Patients who have undergone a total hysterectomy	

Cervical Cancer Risk - Reduction Strategies

- Human, recombinant papillomavirus vaccine (Gardasil9) vaccine (types 6, 11, 16, 18) or Cervarix vaccine (types 16, 18)
  - May start vaccinating at age 9 years
  - Recommended for ages < 26 years
  - Still an option for ages 26 – 45
  - Vaccination Schedule: at months 0, 2, and 6 (3 vaccine series)
- Barrier methods during intercourse
- Intrauterine device (IUD) compared to hormonal contraceptives
- Avoid smoking or smoking cessation

Cervical Cancer Causes, Risk Factors, and Prevention. American Cancer Society. Accessed May 1, 2020

Evaluation for Genetic Counseling

- Family history of particular cancers may warrant benefit from genetic counseling
- Multi-gene testing, such as next-generation sequencing (NGS) technology analyzes a set of genes associated with a specific cancer's phenotype or multiple phenotypes. Notable genes are
  - BRCA1 and BRCA2 mutation risks
    - Breast cancer
    - Ovarian cancer
    - Pancreatic cancer
    - Prostate cancer
  - Microsatellite Instability: MSH2, MLH1, MSH6, PMS2, EPCAM genes
    - Ovarian
    - Colon
    - Uterine

Genetic/Familial High-Risk Assessment: Colorectal. NCCN. Accessed May 1, 2020

Summary

1. Understand reputable health care organizations who contribute to guidance to screen for cancers
    a) National Cancer Comprehension Network
    b) US Preventive Services Task Force
    c) American Cancer Society
    d) American Family Physician
2. Evaluate epidemiology and risk factors of prevalent cancers
3. Compare evidence-based screening modalities per disease state amongst clinical guidelines
4. Discuss strategies for risk reduction