



Cancer Screenings: Promote, Act, and Educate

Brittany Strelow, DMSc, PA-C, MS

Assistant Professor of Medicine

<https://www.linkedin.com/in/brittany-strelow-dmsc-ms-pa-c-46510644/>

Disclosures

EXACT Sciences PA Advisory Council

Disclosures

References to Off-label or investigational usage(s) of pharmaceuticals or instruments:

- None



Objectives

- ▶ Review U.S. and world rates of breast, cervical, and colon cancer
- ▶ Outline the United States Preventative Task Force (USPTF) and American Cancer Society recommendations for breast, cervical, and colon cancer screening
- ▶ Explain epidemiology, etiology, prevention, and patient education regarding breast, cervical, and colon cancer
- ▶ Hypothesize possible interventions to improve patient education and cancer screening rates in the U.S.

Cancer Screenings



BREAST



COLON



CERVICAL

Review

Etiology

Epidemiology

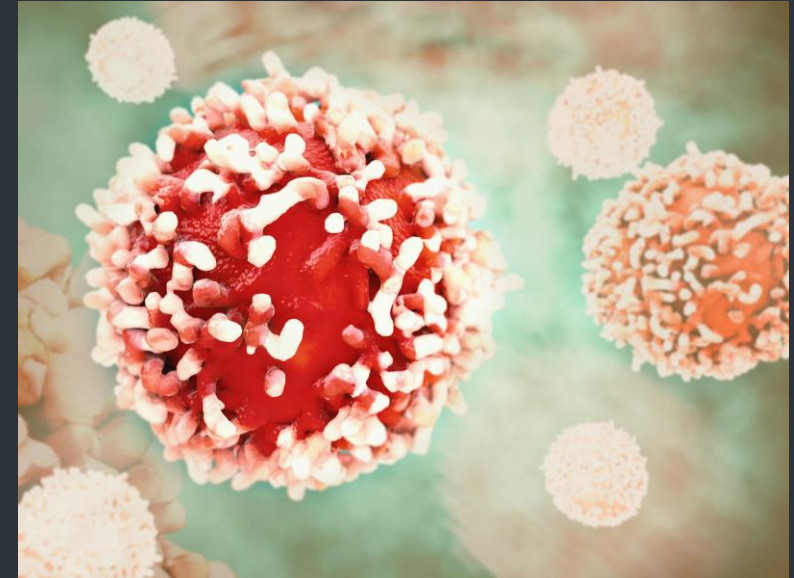
Risk Factors

Signs & Symptoms

Diagnosis

Treatment

Prevention



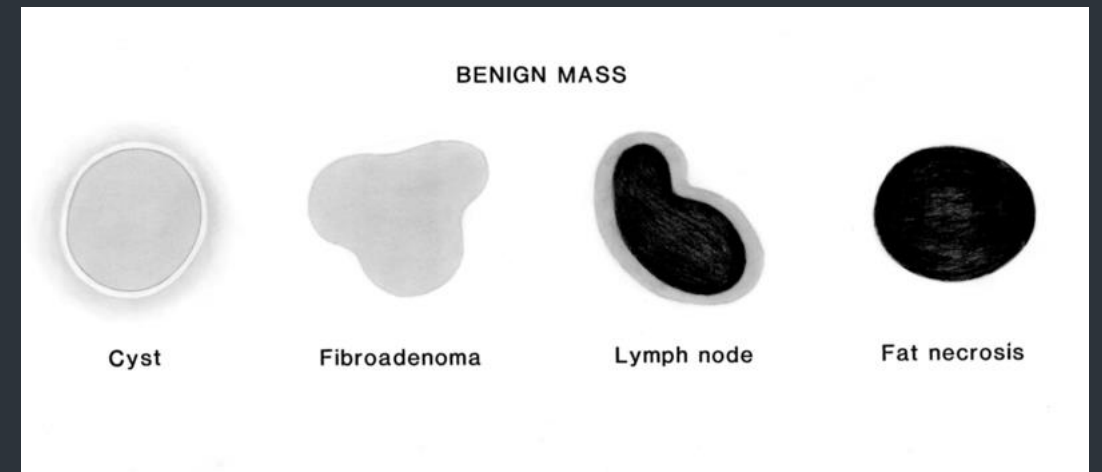
Breast Masses - Etiology

Benign

- Fibroadenoma
- Cyst
- Fibrocystic changes
- Galactocele
- Fat Necrosis
- Breast Abscess

Malignant

- Invasive
- Non-invasive





Breast Cancer - Epidemiology

- Most Common
- Highest:
 - North America
 - Australia/New Zealand
 - Western/Northern Europe
- Lowest:
 - Asia
 - Sub-Saharan Africa



Breast Cancer – Risk Factors

- Increasing age
- Female Sex
- Race/Ethnicity
- Obesity
- Tall Stature
- Benign Breast Disease
- Dense Breast Tissue
- Bone Mineral Density
- Hormonal Factors
- Reproductive Factors
 - Early Menarche
 - Later Menopause
 - Nulliparity
 - First Full-term pregnancy
- Personal history of breast cancer
- Family history of breast cancer
- Alcohol Consumption
- Smoking
- Exposure to Ionizing Radiation

Breast Cancer – Early Screening

Family history of breast cancer

Personal history of breast cancer

Personal history of breast biopsy

Chest radiation



Breast Cancer - Screening

- ▶ Asymptomatic
 - ▶ Annual Mammography
 - ▶ 40-49 years
 - ▶ >50 years
- ▶ Discontinuation
 - ▶ Age > 75
 - ▶ Expected life span is <10 years



Breast Cancer Screening: Risk versus Benefit

➤ Benefits:

- Reduction in breast cancer deaths



➤ Harm

- Overdiagnosis
- False-negative results
- False-positive results



Breast Cancer – Breast Density

- BI-RADS
 - A
 - Fatty
 - B
 - Scattered Fibroglandular
 - C
 - Heterogeneously Dense
 - D
 - Extremely Dense



Breast Cancer – Options

- Mammography
 - Digital Breast Tomosynthesis
- MRI
 - BRCA Variant Carrier
 - Other Variants
 - 1st degree relative of a BRCA variant carrier
 - Lifetime risk of >20%
 - Radiation to Chest
- Supplemental Screening
 - Digital breast tomosynthesis
 - MRI
 - Contrast-enhanced digital mammography (CEDM)
 - Molecular breast imaging (MBI)

- ▶ Low Income
- ▶ Uninsured
- ▶ Underinsured
 - ▶ National Breast and Cervical Cancer Early Detection Program (NBCCEDP)

Breast Cancer -
Resources



Breast Cancer – Signs & Symptoms

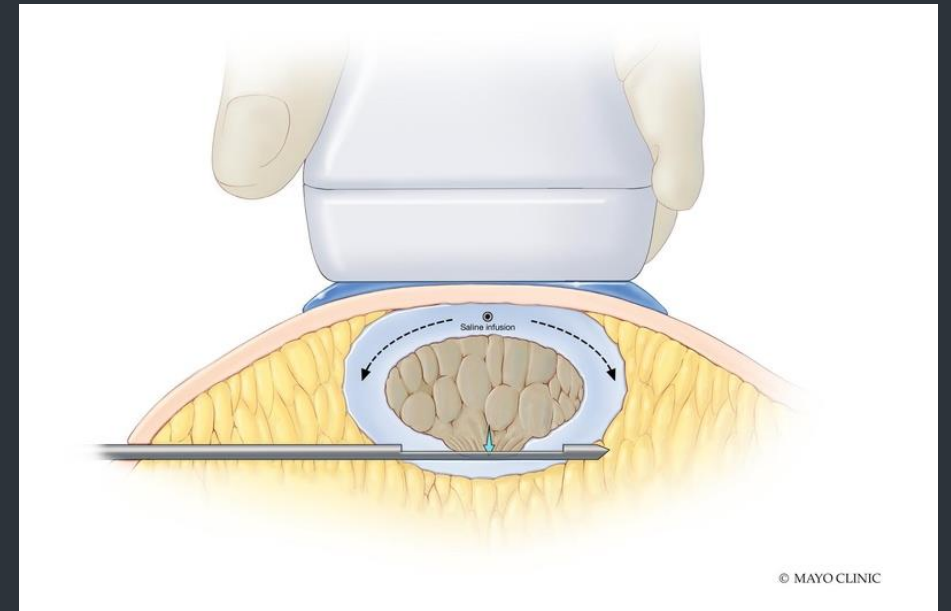
- Abnormal Mammogram
 - None
- Breast Mass
- Axillary Mass
- Skin Changes
- Back Pain
- Leg Pain
- Abdominal Pain
- Nausea
- Jaundice
- Shortness of Breath
- Cough

Breast Cancer - Diagnosis

Mammography



Breast Ultrasound





Breast
Cancer -
Diagnosis

Infiltrating Ductal Carcinoma

Infiltrating Lobular Carcinoma

Mixed ductal/lobular carcinoma

Luminal subtypes

HER2-enriched

Basal subtypes

Breast Cancer - Treatment

- Hormone Receptor Status
- TNM staging system
- Surgical Resection
- Neoadjuvant therapy
- Radiation Therapy





Breast Cancer – Genetic Counseling

Family

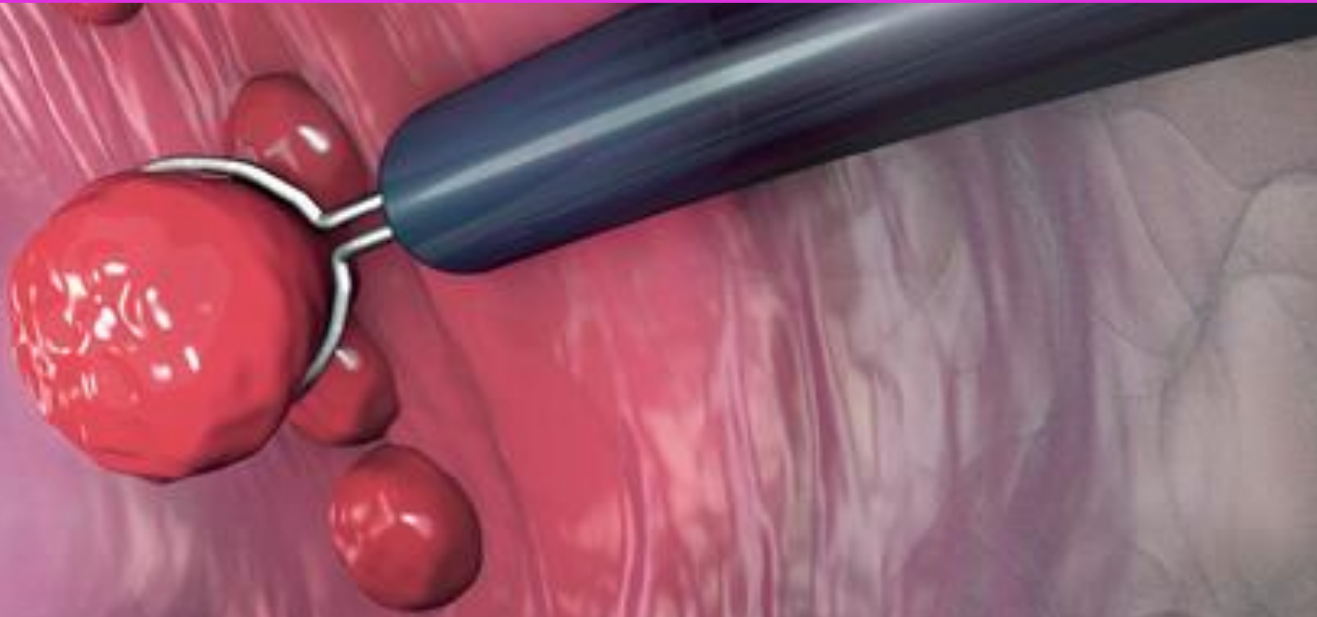
Breast Cancer - Prevention

- Breastfeeding
- Physical activity
- Weight loss in postmenopause
- Low-fat diet
- Chemoprevention
- Surgical prevention



Colon Cancer - Etiology

- Anatomic
- Vascular
- Inflammatory
- Neoplastic



Colon Cancer - Epidemiology

- ▶ Male > Female
- ▶ 3rd most common men
- ▶ 2nd most common women
- ▶ Geographic:
 - ▶ Australia/New Zealand
 - ▶ Europe
 - ▶ North America





Colon Cancer – Risk Factors

- ▶ Age
- ▶ Hereditary CRC syndromes
- ▶ Personal history
 - ▶ CRC
 - ▶ Adenomatous polyps
- ▶ Family history
 - ▶ CRC
 - ▶ Adenomatous polyps
- ▶ Inflammatory bowel disease
- ▶ Radiation
- ▶ Cystic Fibrosis
- ▶ Race
- ▶ Sex
- ▶ Acromegaly
- ▶ Renal Transplantation
- ▶ Possible Contributors:
 - ▶ Obesity
 - ▶ Diabetes
 - ▶ Red Meat
 - ▶ Tobacco
 - ▶ Alcohol
 - ▶ Androgen Deprivation Therapy
 - ▶ Cholecystectomy

Colon Cancer - Screening

- ▶ Asymptomatic
 - ▶ Age > 45
- ▶ Discontinuation
 - ▶ Age > 75
 - ▶ Expected life span is <10 years
 - ▶ Prior testing results





Colon Cancer Screening: Risk versus Benefit

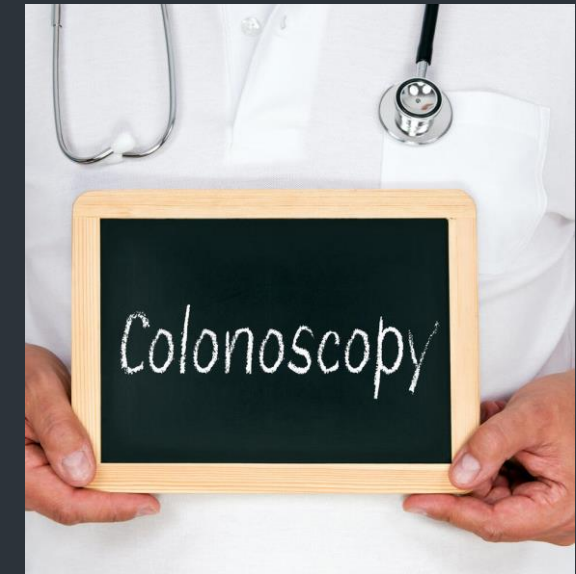
➤ Benefits:

- Decreased mortality rates
- Improve prognosis
- Remove premalignant polyps

➤ Harm

- Perforation
- Overdiagnosis
- False-negative results
- False-positive results

Colon Cancer – Options



- Colonoscopy
 - Every 10 years
 - Surveillance
- Multitarget stool DNA testing
 - Every 3 years
- Fecal immunochemical testing
 - Annually
- Computed tomography colonography
 - Every 5 years



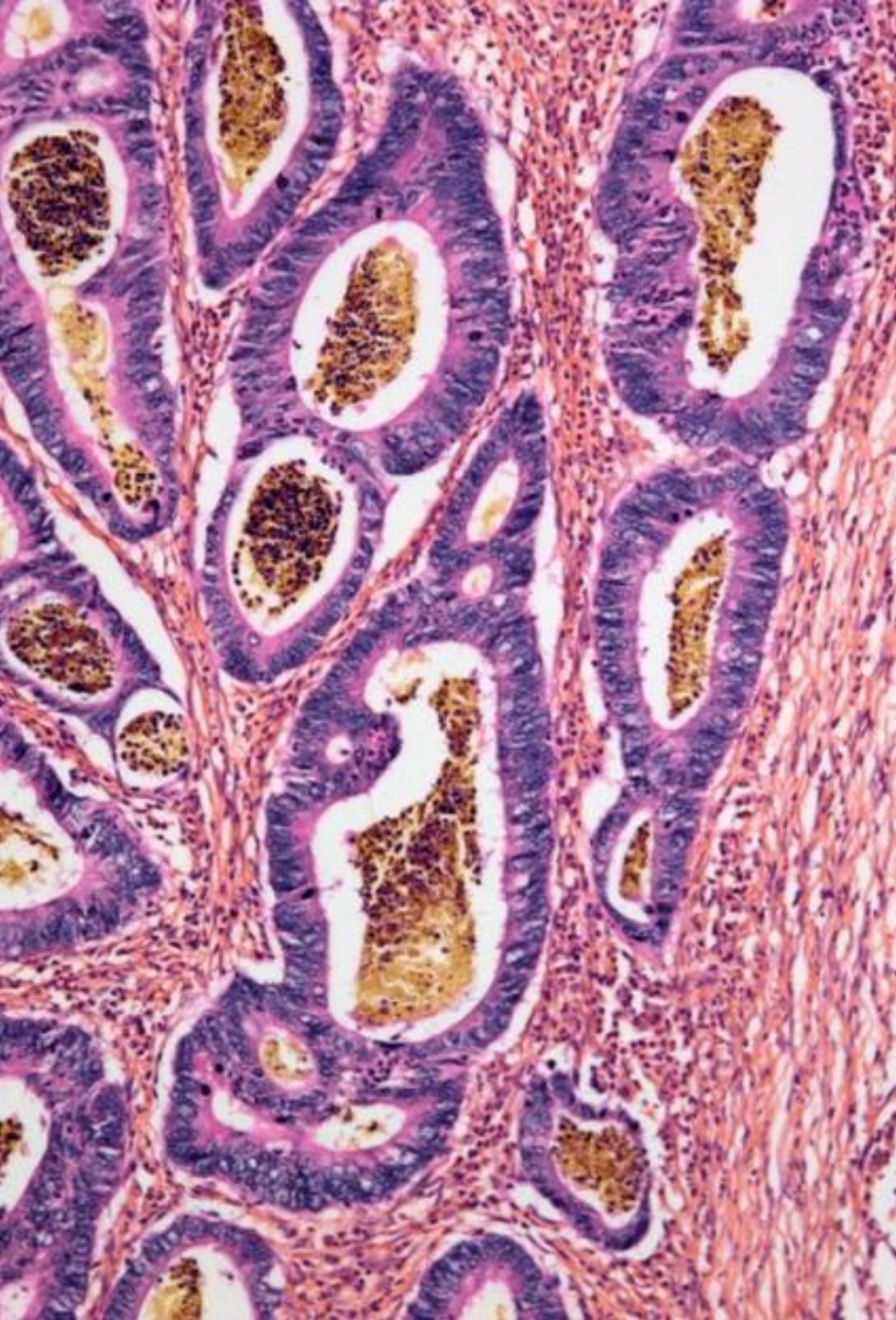
How to Get a Good Prep

- ▶ Factors:
 - ▶ Age > 65 years
 - ▶ Obesity
 - ▶ Diabetes
 - ▶ History of prior colon surgery
 - ▶ Chronic narcotic use
 - ▶ Chronic constipation
 - ▶ Prior poor prep

Prep Options



- ▶ GoLytely
- ▶ MoviPrep
- ▶ PLENVU
- ▶ Suprep
- ▶ MiraLAX/Gatorade



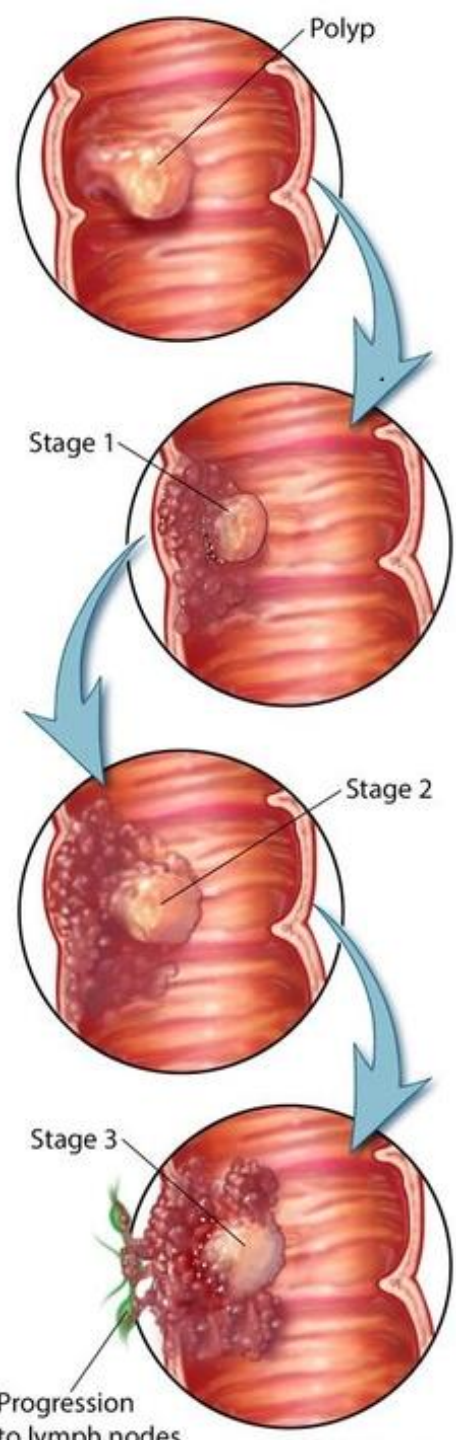
Colon Cancer – Signs & Symptoms

- ▶ Asymptomatic
- ▶ Change in bowel habits
- ▶ Melena
- ▶ Rectal bleeding
- ▶ Rectal mass
- ▶ Iron deficiency anemia
- ▶ Abdominal pain
- ▶ Abdominal distention
- ▶ Nausea/vomiting

Colon Cancer - Diagnosis

- Colonoscopy
- Tumor Markers
- Computed tomography colonography
- Blood based tests:
 - Metyhlated circulating DNA markers
 - Blood-based microRNAs
 - Cell-free DNA
- Biopsy





Colon Polyp - Diagnosis

- ▶ Inflammatory
- ▶ Hamartomatous
- ▶ Sessile Serrated Lesions
- ▶ Adenomatous Polyps
- ▶ Submucosal

Colon Cancer - Treatment

- TNM Staging
- Tumor Markers
- Colonoscopy
- Radiographic imaging
- Family History
- Surgical Resection
- Neoadjuvant therapy
- Radiation Therapy



Colon Cancer – Genetic Counseling

➤ Family





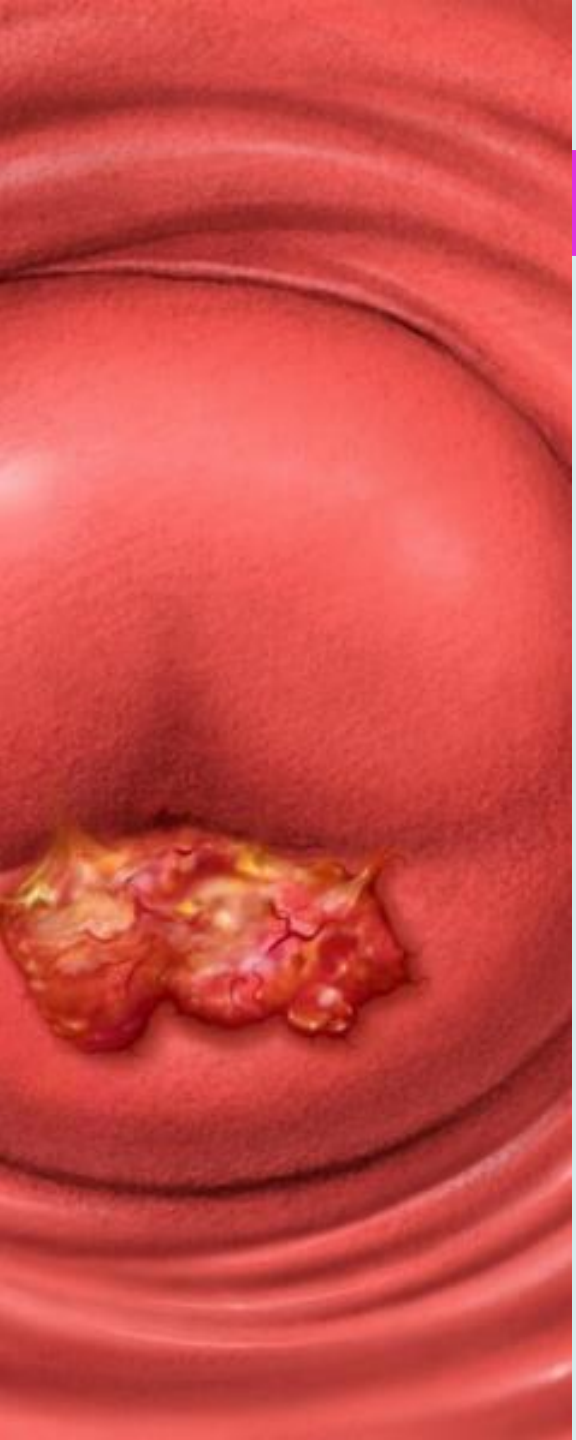
Colon Cancer - Prevention

- Physical Activity
- Diet
- Fiber
- Resistant Starch
- Folic Acid and Folate
- Vitamin B6
- Calcium
- Vitamin D
- Magnesium
- Garlic
- Fish Consumption
- Coffee Intake
- Aspirin/NSAIDs
- Chemoprevention
- Hormone Therapy
- Statins

Cervical Cancer – Etiology

➔ HPV

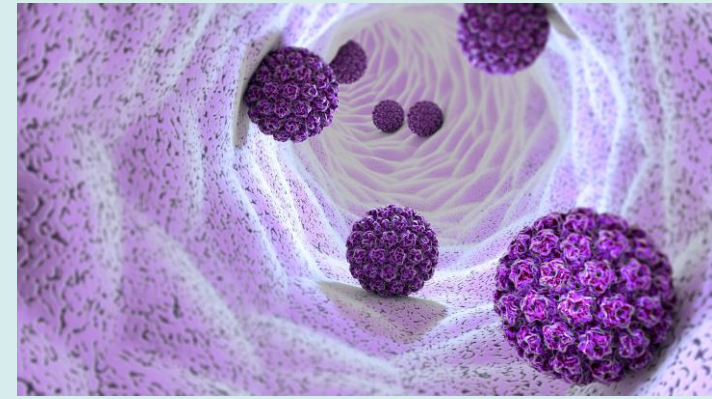




Cervical Cancer – Epidemiology

- ▶ 4th most common cancer
- ▶ Resource-limited regions
- ▶ Geographical:
 - ▶ Africa
 - ▶ Central America
- ▶ Black > White
- ▶ 50 years
- ▶ Low vaccination rates

Cervical Cancer – Risk Factors



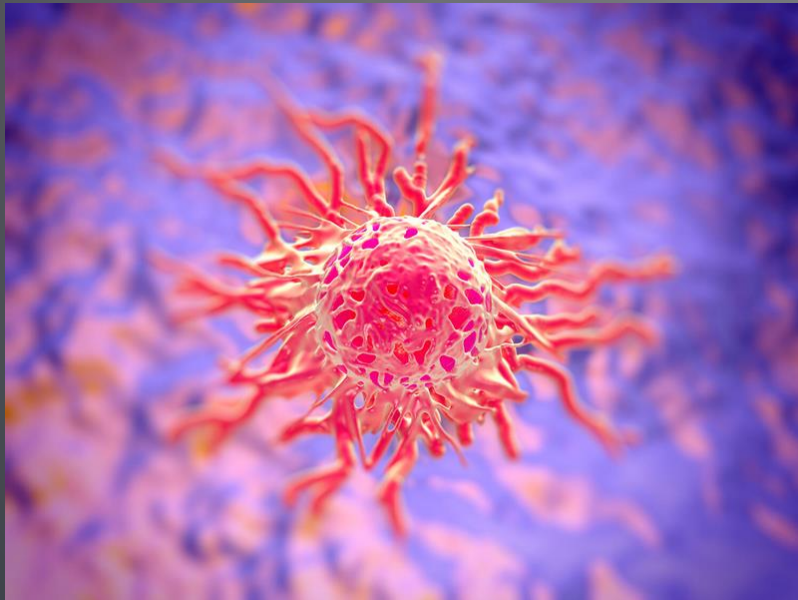
➤ HPV

- Early onset sexual activity
- Multiple sexual partners
- History of sexually transmitted infections
- Early age at first birth
- History of vulvar or vaginal neoplasia
- Immunosuppression

- Low socioeconomic status
- Oral contraceptive use
- Cigarette smoking
- Genetics
- Partners not circumcised

Cervical Cancer – Screening

- Screen Age 21-65
- Immunocompromised
- Primary high-risk HPV screening with reflex cervical cytology
- Cervical cytology with HPV co-test
- Cervical cytology with reflex HPV
- HPV swab



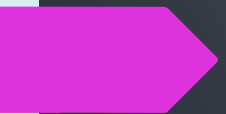
Cervical Cancer – Signs & Symptoms

- Irregular Bleeding
- Postcoital Bleeding



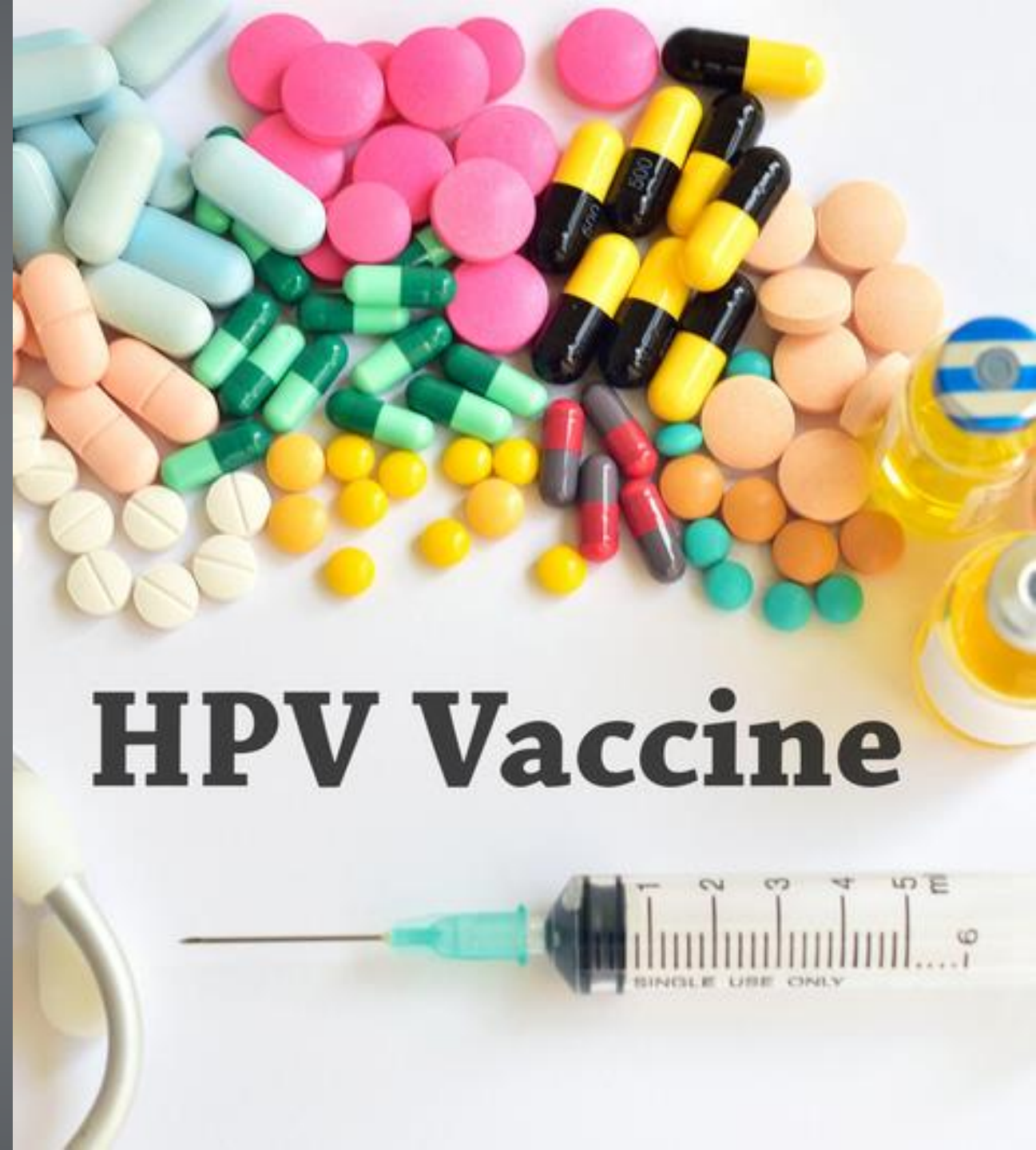
Cervical Cancer – Diagnosis

- Cervical Cytology
- Pelvic Exam
- Biopsy
- Colposcopy



Cervical Cancer – Treatment

- ▶ FIGO Staging
- ▶ Surgery
- ▶ Radiation
- ▶ Adjuvant Therapy



Cervical Cancer – Prevention

➤ Vaccination

- Protects against strains of HPV

- Types 6, 11, 16, 18, 31, 33, 45, 52, 58

- Routine Schedule:

- Ages 11-14: 2 dose

- Ages 11 to 14: 3 doses


- Catch up Schedule

- Up to age 26

- Risk based schedule:

- 27 to 45 years

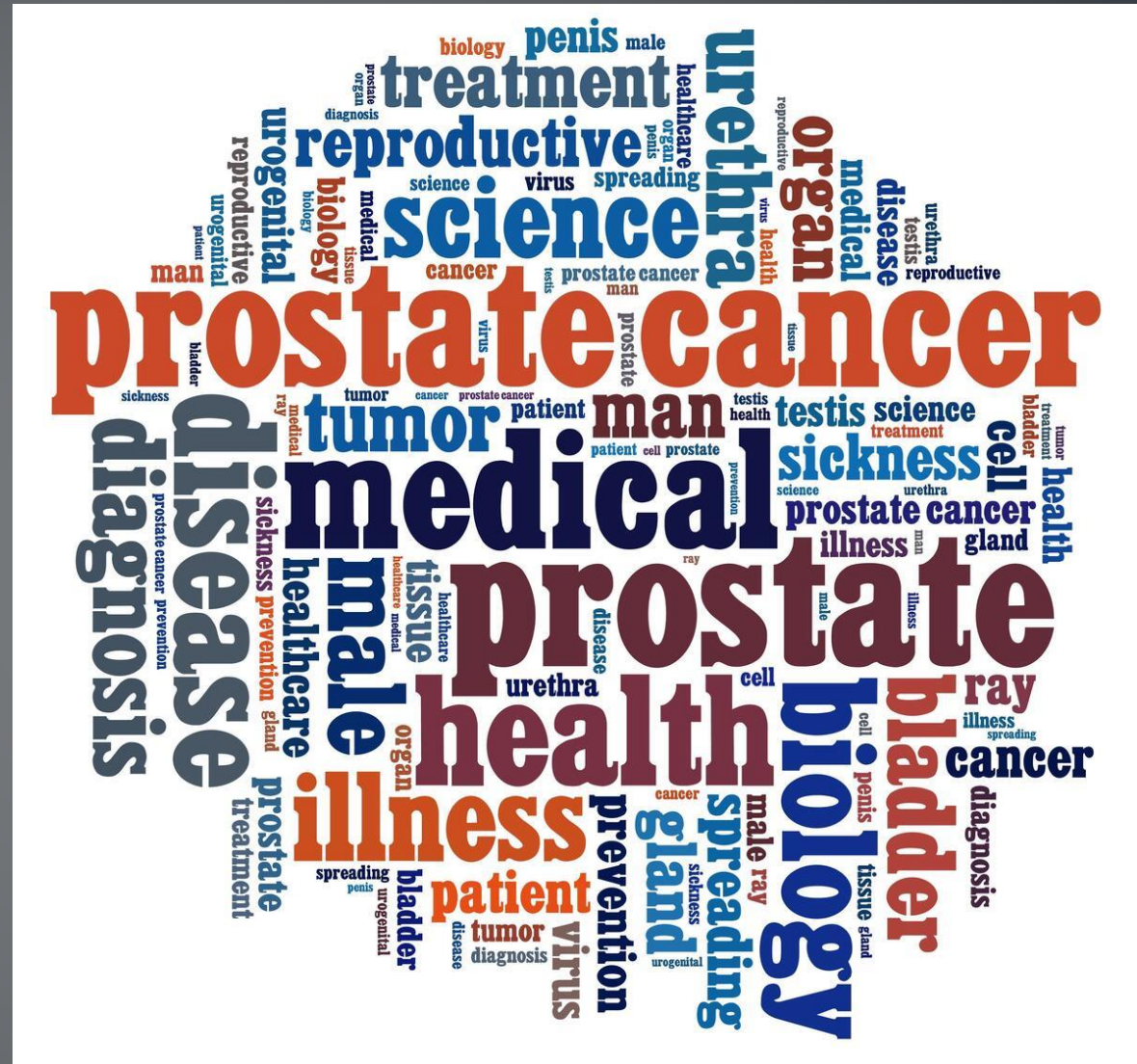


- 
- ▶ Low Income
 - ▶ Uninsured
 - ▶ Underinsured
 - ▶ National Breast and Cervical Cancer Early Detection Program (NBCCEDP)

Cervical
Cancer -
Resources

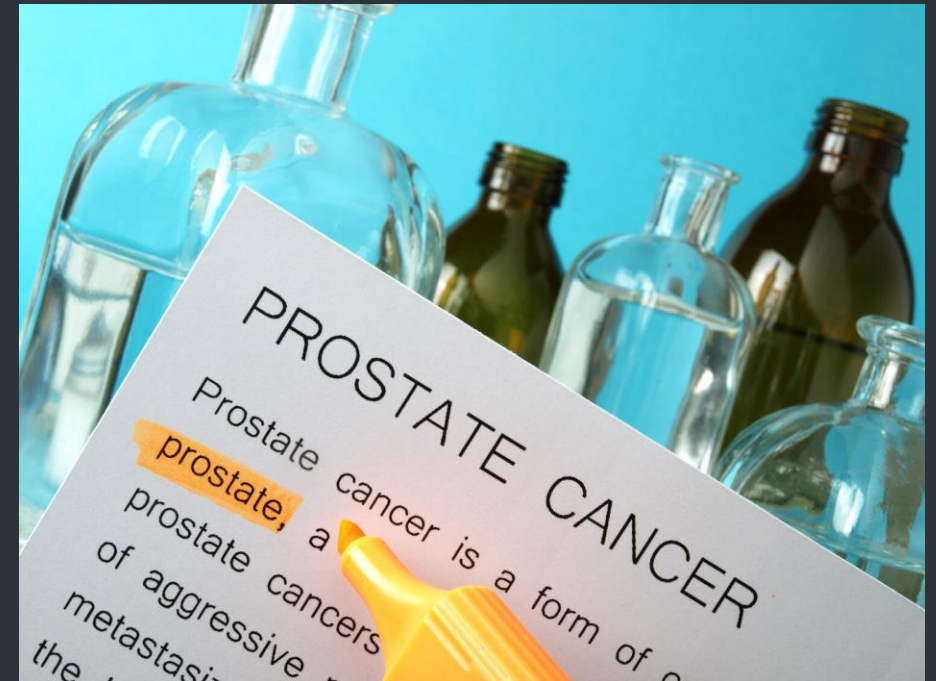
Prostate Cancer

➔ 2nd most common cancer in males



Prostate Cancer – Risk Factors

- Increasing age
- African American males
- Family history of prostate cancer
- Family history of breast cancer
- Known *BRCA1* or *BRCA2* mutation
- Polygenic risk score (PRS)
- Prior prostate biopsy



Prostate Cancer – Screening



- ▶ Controversial
- ▶ Age 40-45
 - ▶ Race
 - ▶ Family history
- ▶ Age > 50
 - ▶ Annual
- ▶ Discontinue
 - ▶ Age > 69

- Prostate-specific antigen (PSA)
- Digital rectal exam (DRE)



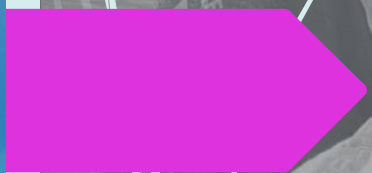
References

- ▶ Sung H, Ferlay J, Siegel RL, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA Cancer J Clin* 2021; 71:209.
- ▶ Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. *CA Cancer J Clin* 2019; 69:7.
- ▶ Toriola AT, Colditz GA. Trends in breast cancer incidence and mortality in the United States: implications for prevention. *Breast Cancer Res Treat* 2013; 138:665.
- ▶ Esserman LJ, Shieh Y, Rutgers EJ, et al. Impact of mammographic screening on the detection of good and poor prognosis breast cancers. *Breast Cancer Res Treat* 2011; 130:725.
- ▶ Conant EF, Barlow WE, Herschorn SD, et al. Association of Digital Breast Tomosynthesis vs Digital Mammography With Cancer Detection and Recall Rates by Age and Breast Density. *JAMA Oncol* 2019; 5:635.
- ▶ Moreno CC, Mittal PK, Sullivan PS, et al. Colorectal Cancer Initial Diagnosis: Screening Colonoscopy, Diagnostic Colonoscopy, or Emergent Surgery, and Tumor Stage and Size at Initial Presentation. *Clin Colorectal Cancer* 2016; 15:67.
- ▶ Singh S, Singh PP, Murad MH, et al. Prevalence, risk factors, and outcomes of interval colorectal cancers: a systematic review and meta-analysis. *Am J Gastroenterol* 2014; 109:1375.
- ▶ Fedewa SA, Flanders WD, Ward KC, et al. Racial and Ethnic Disparities in Interval Colorectal Cancer Incidence: A Population-Based Cohort Study. *Ann Intern Med* 2017; 166:857.
- ▶ Pullens HJ, van Leeuwen MS, Laheij RJ, et al. CT-colonography after incomplete colonoscopy: what is the diagnostic yield? *Dis Colon Rectum* 2013; 56:593.
- ▶ U.S. Preventive Services Task Force. Screening for colorectal cancer: U.S. Preventive Services Task Force recommendation statement. *Ann Intern Med* 2008; 149:627.
- ▶ Koh, W. J., Abu-Rustum, N. R., Bean, S., Bradley, K., Campos, S. M., Cho, K. R., Chon, H. S., Chu, C., Clark, R., Cohn, D., Crispens, M. A., Damast, S., Dorigo, O., Eifel, P. J., Fisher, C. M., Frederick, P., Gaffney, D. K., Han, E., Huh, W. K., Lurain, J. R., ... Scavone, J. L. (2019). Cervical Cancer, Version 3.2019, NCCN Clinical Practice Guidelines in Oncology. *Journal of the National Comprehensive Cancer Network : JNCCN*, 17(1), 64–84. <https://doi.org/10.6004/jnccn.2019.0001>
- ▶ Fontham, E. T. H., Wolf, A. M. D., Church, T. R., Etzioni, R., Flowers, C. R., Herzig, A., . . . Smith, R. A. (2020). Cervical cancer screening for individuals at average risk: 2020 guideline update from the american cancer society. *CA: A Cancer Journal for Clinicians*, 70(5), 321-346. doi:10.3322/caac.21628



References

- ▶ WHO | new guidelines for the screening and treatment of cervical cancer. WHO Web site. <http://www.who.int/reproductivehealth/topics/cancers/guidelines/en/>. Updated 2021. Accessed June 27, 2021.
- ▶ Final update summary: Cervical cancer: Screening. U.S. preventive services task force. <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/cervical-cancer-screening>. Updated 2018.
- ▶ Cervical cancer. National Cancer Institute Web site. <https://www.cancer.gov/types/cervical/hp>. Updated 2021. Accessed June 27, 2021.
- ▶ Endeshaw M, Clarke T, Senkomago V, Saraiya M. Cervical cancer screening among women by birthplace and percent of lifetime living in the united states. *J Low Genit Tract Dis*. 2018;22(4):280-287. Accessed Dec 6, 2018. doi: 10.1097/LGT.0000000000000422.
- ▶ Malmgren, Parikh, Atwood, Kaplan. Impact of Mammography Detection on the Course of Breast Cancer in Women Aged 40–49 Years. *Radiology* 2012 262:3, 797-806
- ▶ Fontham, E. T. H., Wolf, A. M. D., Church, T. R., Etzioni, R., Flowers, C. R., Herzig, A., Smith, R. A. (2020). Cervical cancer screening for individuals at average risk: 2020 guideline update from the american cancer society. *CA: A Cancer Journal for Clinicians*, 70(5), 321-346. doi:10.3322/caac.21628
- ▶ Final update summary: Cervical cancer: Screening. U.S. preventive services task force. <https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/cervical-cancer-screening>. Updated 2018.
- ▶ Wolf AMD, Fontham ETH, Church TR, et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA: A Cancer Journal for Clinicians*.
- ▶ Smith RA, Andrews KS, Brooks D, Fedewa SA, Manassaram-Baptiste D, Saslow D, Wender RC. Cancer screening in the United States, 2019: A review of current American Cancer Society guidelines and current issues in cancer screening. *CA Cancer J Clin*. 2019 May;69(3):184-210. doi: 10.3322/caac.21557. Epub 2019 Mar 15. PMID: 30875085.
- ▶ Imperiale TF, Ransohoff DF, Itzkowitz SH, Levin TR, Lavin P, Lidgard GP, Ahlquist DA, Berger BM. Multitarget stool DNA testing for colorectal-cancer screening. *N Engl J Med*. 2014 Apr 3;370(14):1287-97. doi: 10.1056/NEJMoa1311194. Epub 2014 Mar 19. PMID: 24645800.



Thank you

Strelow.Brittany@mayo.edu

<https://www.linkedin.com/in/brittany-strelow-dmsc-ms-pa-c-46510644/>