UTAH SOCIETY OF HEALTH-SYSTEM PHARMACISTS

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Prevention Intervention Comprehension:
Understanding cancer preventative pharmacologic agents

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Disclosure

Relevant Financial Conflicts of Interest
- CE Presenter, Kelsey Turcotte:
  - None
- CE mentor, Courtney Cavalieri:
  - None

Off-Label Uses of Medications

Vitamin E, Beta carotene, N-acetylcyteine, Exemestane, Anastrozole, Letrozole, Aspirin, Vitamin D

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"An ounce of prevention is worth a pound of cure."

-Benjamin Franklin

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Pharmacist Objectives

- Identify medications and supplements that may be utilized as cancer-preventative pharmacologic agents (CPPAs)
- Review lung, breast, colon, and prostate cancer risk factors and screening suggestions based on current guidelines
- Distinguish between evidence based and non-evidence based CPPAs
- Formulate a recommendation for CPPAs based on a patient's characteristics

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Technician Objectives

- Recall medications that have evidence of cancer-preventative pharmacologic agents (CPPAs)
- Distinguish CPPAs that can be obtained over the counter versus through a prescription
- Identify patients that may be candidates for pharmacist counseling regarding the use of CPPAs
- Recognize resources used to determine risk factors and screening suggestions for lung, breast, colon, and prostate cancers

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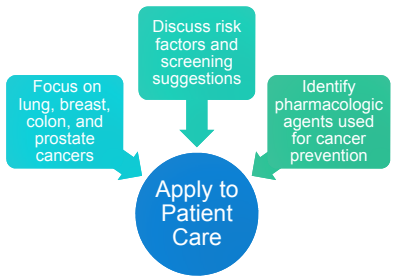
Roadmap for Today



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Lung Cancer

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Risk Factors

- Smoking history
- Smoking exposure (second hand smoke)
- Radon exposure
- Occupational exposure (radioactive ores, inhaled chemicals, diesel exhaust)
- Cancer history
- Family history of lung cancer (1st degree relatives)
- Disease history (COPD or pulmonary fibrosis)
- Lung cancer survivors

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National Comprehensive Cancer Network, Lung Cancer Screening Version 2.2019, available from www.nccn.org.
Lung Cancer Risk Factors. American Cancer Society. https://www.cancer.org/cancer/lung-cancer/prevention-and-early-detection/risk-factors.html. Last revised February 16, 2016. Accessed September 15, 2018.

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Risk Status

High risk

- Group 1: Age 55-74 **AND** ≥30 pack-year history of smoking **AND** smoking cessation <15 y
- Group 2: Age ≥50 **AND** ≥20 pack-year history of smoking **AND** Additional factors that correlate with ≥1.3% risk of lung cancer

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National Comprehensive Cancer Network, Lung Cancer Screening Version 2.2019, available from www.nccn.org.
Final Update Summary: Lung Cancer: Screening. U.S. Preventive Services Task Force. July 2015. https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening

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Risk Status

Moderate risk

- Age ≥50 **AND** ≥20 pack-year history of smoking or second hand smoke exposure with no additional risk factors

Low risk

- Age <50 **and/or** <20 pack-year history

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National Comprehensive Cancer Network, Lung Cancer Screening Version 2.2019, available from www.nccn.org.
Final Update Summary: Lung Cancer: Screening. U.S. Preventive Services Task Force. July 2015. https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening

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Risk Status

NCCN Guidelines recommend screening for high risk Groups 1 & 2

High risk

- Group 1: Age 55-74 **AND** ≥30 pack-year history of smoking **AND** *smoking cessation* <15 y
- Group 2: Age ≥50 **AND** ≥20 pack-year history of smoking **AND** Additional factors that correlate with ≥1.3% risk of lung cancer

Moderate risk

- Age ≥50 **AND** ≥20 pack-year history of smoking or second hand smoke exposure with no additional risk factors

Low risk

- Age <50 **and/or** <20 pack-year history

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Final Update Summary: Lung Cancer: Screening. U.S. Preventive Services Task Force. July 2015. https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening

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Risk Status

USPSTF Clinical Summary recommends screening for high risk Groups 1

High risk	• Group 1: Age 55-74 **AND** ≥30 pack-year history of smoking **AND** smoking cessation <15 y Group 2: Age ≥50 **AND** ≥20 pack-year history of smoking **AND** Additional factors that correlate with ≥1.3% risk of lung cancer
Moderate risk	• Age ≥50 **AND** ≥20 pack-year history of smoking or second hand smoke exposure with no additional risk factors
Low risk	• Age <50 **and/or** <20 pack-year history

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National Comprehensive Cancer Network, Lung Cancer Screening Version 2.2019, available from www.nccn.org.
Final Update Summary: Lung Cancer Screening. U.S. Preventive Services Task Force. July 2015. https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening.

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Lung Cancer Screening

Benefits	Risks

• Decreased lung cancer mortality
• Quality of life
  • Reduction on disease-related mortality
  • Reduction in treatment-related morbidity
  • Improvement in healthy lifestyles
  • Reduction in anxiety/psychosocial burden
• Discovery of other significant occult health risks
	• Futile detection of small aggressive tumors or indolent disease
	• Quality of life
	• Physical complications from workup
	• False-positive/negative results
	• Unnecessary testing and procedures
	• Radiation exposure
	• Cost
	• Incidental lesions

National Comprehensive Cancer Network, Lung Cancer Screening Version 2.2019, available from www.nccn.org.

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Lung Cancer Screening Suggestions

High Risk Status Patients

Shared patient/physician decision-making

Low-dose CT annually

National Comprehensive Cancer Network, Lung Cancer Screening Version 2.2019, available from www.nccn.org.
Final Update Summary: Lung Cancer Screening. U.S. Preventive Services Task Force. July 2015. https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening.

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Lung Cancer Chemopreventive Studies

Vit E and beta carotene on incidence of lung cancer, 1994

Vit E and antioxidants lung cancer progression in mice, 2014

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The Effect of Vitamin E and Beta Carotene on the Incidence of Lung Cancer and Other Cancers in Male Smokers

Heinonen et al	Alpha-Tocopherol, Beta Carotene Cancer Prevention Study Group
Design	Randomized, double-blind, placebo-controlled primary-prevention trial in 29133 male smokers age 50 to 69 years old from southwest Finland over 5-8 years
Outcomes	Incidence of lung cancer development in male smokers given vitamin E, beta carotene, or placebo
Results	• No reduction in incidence of lung cancer among men who received Vit E (-2% change; 95% CI, -14 to 12%, P = 0.8) • Observed a higher incidence of lung cancer among the men who received beta carotene than among those who did not (18% change in incidence,95% CI, 3-36%, P = 0.01) starting at 18 months and increasing progressively after; Mortality was also increased in this group (P= 0.08) • Incidence of other cancers: Fewer cases of prostate cancer diagnosed in vitamin E group than those who did not receive vitamin E
Conclusions	• There was no reduction in lung cancer incidence with vitamin E or beta carotene • These supplements may actually have harmful as well as beneficial effects, determined by chance

N Engl J Med. 1994; 330(15): 1029-1035.

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Antioxidants Accelerate Lung Cancer Progression in Mice

Sayin et al	
Design Summary	• Induced multifocal tumors via inhalation of *Cre* adenovirus to activate K-RAS^{G12D} or B-RAF^{V600E} expression in lung epithelial cells • Administered N-acetylcysteine in the drinking water or vitamin E in the diet of mice • Outcome: antioxidant effects on lung epithelial tumors
Conclusions	• Histological examination revealed more advanced tumors in mice treated with NAC or vitamin E than control mice • N-acetyl cysteine and vitamin E increase tumor cell proliferation by reducing ROS, DNA damage, and p53 expression in mouse and human lung tumor cells

Sci Transl Med. 2014; 6(221): 221ra15.

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Evidence Based Preventative Medications Recommendations

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Other Evidence Based Preventative Recommendations

Smoking Cessation
- Medications
  - Varenicline (Rx), bupropion (Rx), nicotine replacement therapy (OTC)*
- Support groups
- Behavior therapy

Radon mitigation
- Home testing
- Radon reduction for high levels ≥4 pCi/L

*all FDA approved for smoking cessation

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National Comprehensive Cancer Network, Lung Cancer Screening Version 2.2019, available from www.nccn.org.
Final Update Summary: Lung Cancer: Screening. U.S. Preventive Services Task Force. July 2015. https://www.uspreventiveservicestaskforce.org/Page/Document/UpdateSummaryFinal/lung-cancer-screening.
Consumer's Guide to Radon Reduction: How to Fix Your Home. United States Environmental Protection Agency. December 2016. https://www.epa.gov/radon/consumers-guide-radon-reduction-how-fix-your-home

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Breast Cancer

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Risk Factors

- Female gender
- Increasing patient age
- Family history of breast cancer at a young age
- Early menarche
- Late menopause
- Older age at first live childbirth (breast cancer type specific)
- Prolonged hormone replacement therapy
- Previous exposure to therapeutic chest wall irradiation
- Benign proliferative breast density
- Increased mammographic breast density
- Genetic mutations such as *BRCA 1/2* genes
- Drinking alcohol
- Obesity or overweight
- Sedentary lifestyle
- Birth Control (?)
- Certain types of breast implants

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National Comprehensive Cancer Network, Breast Cancer Guidelines Version 1.2018, available from www.nccn.org.
Lifestyle-related Breast Cancer Risk Factors. American Cancer Society. https://www.cancer.org/cancer/breast-cancer/risk-and-prevention/lifestyle-related-breast-cancer-risk-factors.html. Last revised Sept 6, 2017.

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Breast Cancer Screening Considerations

- Lifetime risk ≥20%
  - NCCN Guidelines for Breast Cancer Risk Reduction
  - +Risk model dependent on family history
- NCCN Guidelines for Breast Cancer Screening and Diagnosis
- Patient *desires* risk-reducing therapy
- Life expectancy ≥10 y
- Premenopausal or Postmenopausal

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National Comprehensive Cancer Network, Breast Cancer Risk Reduction Guidelines Version 2.2018, available from www.nccn.org.

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Screening and Diagnosis- Risk Assessment

Familial/genetic factors

- Known genetic predisposition (BRCA 1/2, p53, PTEN, other gene mutation)

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National Comprehensive Cancer Network, Breast Cancer Risk Reduction Guidelines Version 2.2018, available from www.nccn.org.

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Screening and Diagnosis - Risk Assessment

Other factors (one or more)

- A known mutation in a cancer susceptibility within the family
- ≥2 breast cancer primaries in a single family
- ≥2 individuals with breast cancer primaries on the same side of the family with at least one diagnosed ≤50y
- Ovarian/fallopian tube or primary peritoneal cancer
- Male breast cancer
- First or second degree relative with breast cancer ≤45 years
- Family history of three or more: breast, pancreatic, prostate cancer ≥7), melanoma, sarcoma, adrenocortical carcinoma, brain tumors, leukemia, diffuse gastric cancer, colon cancer, endometrial cancer, thyroid cancer, kidney cancer, dermatologic manifestations, and/or macrocephaly, hamartomatous polyps of GI tract, or can include multiple primary cancers in same individual

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National Comprehensive Cancer Network, Breast Cancer Risk Reduction Guidelines Version 2.2018, available from www.nccn.org.

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Breast Cancer Screening Considerations

- Lifetime risk ≥20%
  - NCCN Guidelines for Breast Cancer Risk Reduction
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- NCCN Guidelines for Breast Cancer Screening and Diagnosis
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National Comprehensive Cancer Network, Breast Cancer Risk Reduction Guidelines Version 2.2018, available from www.nccn.org.

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Breast Cancer Preventative Pharmacologic Therapies

- Selective Estrogen Receptor Modulators
- Aromatase Inhibitors

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Breast Cancer Preventative Pharmacologic Therapies

STAR	MORE	BCPT	CORE
Study of Tamoxifen and Raloxifene	Multiple Outcomes of Raloxifene Evaluation	NSABP Breast Cancer Prevention Trial	Continuing Outcomes Relevant to Evista

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Breast Cancer SERM Study Conclusions

STAR	MORE	BCPT	CORE
Tamoxifen and raloxifene effective at reducing risk of invasive BC in postmenopausal women	Raloxifene shown to reduce risk of both *in situ* and invasive BC by 65%	Tamoxifen reduced BC incidence in healthy *BRCA2* carriers, but not *BRCA1* carriers (at 35y +)	Raloxifene effective at reducing invasive BC in postmenopausal women with osteoporosis

Expert Rev Anticancer Ther. 2009;9(1):51-60. *Ann N Y Acad Sci* 2001; 949: 134-42. *Ann N Y Acad Sci.* 2001 Dec; 949:99-108. *J Natl Cancer Inst* 2004; 96(23): 1751- 1761.

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The Role of Tamoxifen in Breast Cancer Prevention (BCPT)

Wolmark et al	
Design	Randomized, double-blind, prospective trial; 13,388 women aged 35 years and older at increased risk of development of breast cancer (BC) (5-year predicted incidence ≥1.66% (Gail model)) received 5 years tamoxifen or placebo
Outcomes	Invasive breast cancer incidence
Results	• At 69 months: 175 events of invasive breast cancer in the placebo group and 89 in the tamoxifen-treated group (49% reduction, P<0.00001) • Adverse events included increased risk of endometrial cancer and vascular events in the tamoxifen group

Ann N Y Acad Sci. 2001 Dec; 949:99-108.

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The Role of Tamoxifen in Breast Cancer Prevention (BCPT) Wolmark et al.

Conclusions

- **Tamoxifen does reduce BC development in healthy BRCA1-carriers but not in BCRA2-carriers**
- **Tamoxifen was most effective at reducing estrogen receptor (ER)-positive breast cancers**
- **Tamoxifen may induce more virulent breast cancers (ER negative) and more virulent endometrial cancers**

Ann N Y Acad Sci. 2001 Dec; 949:99-108.

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Breast Cancer AI* Study Conclusions

ATAC

- Anastrozole in postmenopausal women w/ invasive BC non-significantly reduced risk of contralateral BCs vs tamoxifen
- Also produced significant reduction in contralateral BCs in women w/ HR+ first cancers

BIG 1-98

- BC reoccurrence lower in postmenopausal women on letrozole (L) for 5 years over women randomized to take tamoxifen (T), sequential T followed by L, and sequential L followed by T

MAP .3

- Exemestane reduced relative incidence of invasive BC by 65% vs placebo

IBIS-II

- Anastrozole more effective at preventing high-grade tumors vs intermediate or low grade tumors

*Aromatase Inhibitors listed are used off-label for breast cancer risk-reduction; Letrozole is not labeled or off-label for this indication

Lancet 2002; 359:2131-39. *N Engl J Med* 2005; 353(26): 2747-57. *N Engl J Med* 2011; 365(25): 2381-2319. *Lancet* 2014; 383: 1041-48.

Breast Cancer Risk-Reducing Summary

Premenopausal	Postmenopausal	Everyone
• Clinical Trial • Tamoxifen for 5 years (Rx, category 1)	• Clinical Trial • Tamoxifen for 5 years (Rx, category 1) • Raloxifene (Rx, category 1) • Aromatase inhibitors (Rx, category 1)	• Non-pharmacologic strategies

*All medications are FDA approved for breast cancer reduction in the specific populations listed

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National Comprehensive Cancer Network, Breast Cancer Risk Reduction Guidelines Version 2.2018, available from www.nccn.org.
National Comprehensive Cancer Network, Breast Cancer Guidelines Version 2.2015, available from www.nccn.org.

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Breast Cancer Risk-Reducing Non-pharmacologic Therapy

National Comprehensive Cancer Network, Breast Cancer Risk Reduction Guidelines Version 2.2018, available from www.nccn.org.

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Colon Cancer

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Risk Factors

- Lynch Syndrome
- Inflammatory bowel disease (ulcerative colitis, Crohn's disease)
- Smoking
- Consumption of red and processed meats
- Dietary habits
- Alcohol consumption
- Diabetes mellitus
- Low levels of physical activity
- Metabolic syndrome
- Obesity/high body mass index (BMI)

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National Comprehensive Cancer Network, Colon Cancer Guidelines Version 3.2018, available from www.nccn.org.
Wolf AM et al. Colorectal cancer screening for average-risk adults: 2018 guidelines update from the American Cancer Society. *CA Cancer J Clin* 2018; 68: 250-281.

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Risk Screening

Average Risk
- Age ≥45 years old (American Cancer Society) or ≥50 y (NCCN)
- No history of adenoma or sessile serrated polyp or colorectal cancer (CRC)
- No history of inflammatory bowel disease
- Negative family history for CRC or confirmed advanced adenoma

National Comprehensive Cancer Network, Colon Cancer Screening Guidelines Version 1.2018, available from www.nccn.org.
Wolf AM et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA Cancer J Clin* 2018; 68: 250-281.
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Risk Screening

Increased Risk
- Personal history of adenoma or sessile serrated polyp or CRC
- Inflammatory bowel disease or positive family history

High-risk Syndromes
- Lynch syndrome
- Polyposis syndromes
- Cowden syndrome/PTEN harmartoma tumor syndrome
- Li-Fraumeni syndrome

National Comprehensive Cancer Network, Colon Cancer Screening Guidelines Version 1.2018, available from www.nccn.org.
Wolf AM et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA Cancer J Clin* 2018; 68: 250-281.
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High-risk Syndromes
- Lynch syndrome
- Polyposis syndromes
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- Li-Fraumeni syndrome

NCCN Guidelines for Genetic/Familial High-Risk Assessment
Require monitoring by a qualified physician and more advanced testing

National Comprehensive Cancer Network, Colon Cancer Screening Guidelines Version 1.2018, available from www.nccn.org.
Wolf AM et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA Cancer J Clin* 2018; 68: 250-281.
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- Age ≥45 years old (American Cancer Society) or ≥50 y (NCCN)
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- Negative family history for CRC or confirmed advanced adenoma

Increased Risk
- Personal history of adenoma or sessile serrated polyp or CRC
- Inflammatory bowel disease or positive family history

Colonoscopy every 3-10 years, depending on risk factor

High-risk Syndromes
- Lynch syndrome
- Polyposis syndromes
- Cowden syndrome/PTEN harmartoma tumor syndrome
- Li-Fraumeni syndrome

NCCN Guidelines for Genetic/Familial High-Risk Assessment
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Wolf AM et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA Cancer J Clin* 2018; 68: 250-281.
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Increased Risk Screening

Increased Risk
- Repeat colonoscopy every 3-10 years, depending on clinical findings
- IBD: begin surveillance via colonoscopy 8 years after onset
- Family history
  - At least one first-degree relative with colorectal adenocarcinoma at any age: Colonoscopy at 40 years or 10 years before earliest diagnosis of CRC
  - At least one second degree relative with colorectal adenocarinoma aged <50 y: Colonoscopy at age 50 years
  - First degree relative with confirmed advanced adenoma: Colonoscopy beginning at age 40 years or at age of onset of adenoma in relative, whichever is first

National Comprehensive Cancer Network, Colon Cancer Screening Guidelines Version 1.2018, available from www.nccn.org.
Wolf AM et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA Cancer J Clin* 2018; 68: 250-281.
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Risk Screening

Average Risk
- Age ≥45 years old (American Cancer Society) or ≥50 y (NCCN)
- No history of adenoma or sessile serrated polyp or colorectal cancer (CRC)
- No history of inflammatory bowel disease
- Negative family history for CRC or confirmed advanced adenoma

Colonoscopy OR stool based testing OR flexible sigmoidoscopy OR CT colonography (every 1-10 years)

Increased Risk
- Personal history of adenoma or sessile serrated polyp or CRC
- Inflammatory bowel disease or positive family history

Colonoscopy every 3-10 years, depending on risk factor

High-risk Syndromes
- Lynch syndrome
- Polyposis syndromes
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Wolf AM et al. Colorectal cancer screening for average-risk adults: 2018 guideline update from the American Cancer Society. *CA Cancer J Clin* 2018; 68: 250-281.
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Colon Cancer Preventative Pharmacologic Therapies*

- Aspirin
- Vitamin D (?)

*Aspirin and vitamin D are not labeled for colon cancer risk-reduction and are not suggested for all patients for risk reduction in colon cancer

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Colon Cancer Preventative Pharmacologic Therapies

Aspirin

- CAPP2 Trial: HD ASA use in patients with Lynch syndrome decreased relative risk of developing CRC compared to placebo
- Cao et al (2016): Regular ASA use was associated with lower risk of overall cancer
- Rothwell et al (2010): ASA reduced the 20-year risk of colon cancer (benefit increased with duration of treatment; no increased benefit seen in doses >75 mg/day)

*Aspirin is not labeled for colon cancer risk-reduction and is not suggested for all patients for risk reduction in colon cancer

Lancet 2011; 378: 2081-87. *JAMA Oncol* 2016; 2(6):762-769. *Lancet* 2010; 376:1741-50.

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Colon Cancer Preventative Pharmacologic Therapies

Vitamin D

- Autier et al, 2014
- Chung et al, 2011
- Gorham et al, 2007
- Lappe et al, 2007
- Ma et al, 2011
- Others

Ou et al, 2015: Vitamin D supplementation had no effect on recurrence of CRC (within 3-5 years of primary CRC)

*Vitamin D is not labeled for colon cancer risk-reduction and is not suggested for all patients for risk reduction in colon cancer

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Colon Cancer Preventative Pharmacologic Therapies

~~Vitamin D~~*

Vitamin D is NOT recommended by NCCN guidelines, US Preventive Services Task Force, or the American Cancer Society at this time

*Vitamin D is not labeled for colon cancer risk-reduction and is not suggested for all patients for risk reduction in colon cancer

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Circulating Vitamin D and Colorectal Cancer Risk: An International Pooling Project of 17 Cohorts

Hot off the press

McCullough et al	
Design	Analysis of colorectal cancer cases and controls from prospective studies participating in the international Circulating Biomarkers and Breast and Colorectal Cancer Consortium
Outcomes	First primary colorectal cancers
Results	Deficient vitamin D levels (<30 nmol/L) associated with a 31% higher colorectal cancer risk (RR+1.31, 95% CI= 1.05-1.62)

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J Natl Cancer Inst. 2019. Vol 111(2): djy087.

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Circulating Vitamin D and Colorectal Cancer Risk: An International Pooling Project of 17 Cohorts

Hot off the press

McCullough et al	
Conclusions	Higher circulating vitamin D related to statistically significant, substantially lower colorectal cancer risk in women and non-statistically significant lower risk in men

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J Natl Cancer Inst. 2019. Vol 111(2): djy087.

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Colon Cancer Risk-Reducing Summary*

Secondary prevention of colorectal cancer

- Consider low dose aspirin (OTC, balance risk vs benefits)

*Aspirin is used off-label for colon cancer reduction in the specific population listed

National Comprehensive Cancer Network, Colon Cancer Guidelines Version 3.2018, available from www.nccn.org. 49

Prostate Cancer

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Risk Factors

- Family History
- History of prostate disease
- Inherited mutations
- Race (AA men more at risk)
- Family or personal history of high-risk germline mutations

Keep in mind…

Medications may affect PSA levels (finasteride, dutasteride, ketoconazole, saw palmetto)

National Comprehensive Cancer Network, Prostate Cancer Early Detection Guidelines Version 2.2018, available from www.nccn.org. 51

Prostate Cancer Screening

Age 45-75 years
- Prostate-specific antigen (PSA) and consider digital rectal examination (DRE)

Age >75 years in select patients
- PSA and consider DRE, for select patients

National Comprehensive Cancer Network, Prostate Cancer Early Detection Guidelines Version 2.2018, available from www.nccn.org. 52

Prostate Cancer Screening

Age 45-75 years
- Prostate-specific antigen (PSA) and consider digital rectal examination (DRE)

PSA < 1ng/ml: every 2-4 years
PSA 1-3 ng/ml: every 1-2 years
PSA > 3 ng/ml: biopsy

Age >75 years in select patients
- PSA and consider DRE, for select patients

National Comprehensive Cancer Network, Prostate Cancer Early Detection Guidelines Version 2.2018, available from www.nccn.org. 53

Prostate Cancer Screening

Age 45-75 years
- Prostate-specific antigen (PSA) and consider digital rectal examination (DRE)

PSA < 1ng/ml: every 2-4 years
PSA 1-3 ng/ml: every 1-2 years
PSA > 3 ng/ml: biopsy

Age >75 years in select patients
- PSA and consider DRE, for select patients

Testing after 75 years old should only be done in healthy men to detect aggressive cancers; over screening this population can lead to over diagnosis and is not recommended

National Comprehensive Cancer Network, Prostate Cancer Early Detection Guidelines Version 2.2018, available from www.nccn.org. 54

Prostate Cancer Screening

US Preventive Services Task Force

- Men age 55-69 discuss benefits and risks with their doctor before deciding on screening
- Men 70 years and older should not receive PSA screening

American Cancer Society

- Age 50 with average risk
- Age 45 with high risk
  - AA men, men with 1st degree relative diagnosed with prostate cancer <65 years old
- Age 40 with even higher risk
  - >1 first degree relative with prostate cancer at an early age

US Preventive Services Task Force. Screening for Prostate Cancer. *Jama* 2018; 319(18):1901-1913.
American Cancer Society. American Cancer Society Recommendations for Prostate Cancer Early Detection. Revised April 14, 2016. Available at: https://www.cancer.org/cancer/prostate-cancer/early-detection/acs-recommendations.html

Prostate Cancer Chemopreventive Studies

- 5- Alpha Reductase Inhibitors
- Vitamins/Supplements

*These medications are not labeled for prostate cancer risk-reduction and are not suggested for patients for risk reduction in prostate cancer

Long-Term Survival of Participants in the Prostate Cancer Prevention Trial

Thompson et al	
Design	Follow-up on Prostate Cancer Prevention Trial participants (18880 men)
Outcomes	Incidence of prostate cancer for an additional year after study published Assess survival status through October 21, 2011
Results	The finasteride group has prostate cancer diagnosed in 989 of 9423 men versus 1412 of 9457 in the placebo group (RR0.70; 95% CI, 0.65 to 0.76; P<0.001)

N Engl J Med 2013; 369(7): 603-10.

Long-Term Survival of Participants in the Prostate Cancer Prevention Trial

Thompson et al	
Conclusions	• Finasteride reduced risk of prostate cancer by ~one third but high-grade prostate cancer more common in finasteride group than in placebo group • After 18 years of follow up, no significant between-group differences in overall survival or survival found between groups

N Engl J Med 2013; 369(7): 603-10.

Vitamins E and C in the Prevention of Prostate and Total Cancer In Men

Gaziano et al	
Design	Randomized, double-blind, placebo controlled factorial trial with 14641 male physicians aged 50 and older were assigned vitamin E or placebo, vitamin C or placebo, and a multivitamin or placebo over 8 years
Outcomes	Occurrence of prostate and total cancer
Results	1008 incident cases of prostate cancer and 1943 total cancers Vitamin E had no significant effect versus placebo (HR 0.97, 95% CI, 0.85-1.09; P=0.58) or total cancer (HR 1.04; 95% CI, 0.95-1.13, P= .41) Vitamin C had no significant effect versus placebo

JAMA 2009. 301(1): 52-62.

Vitamins E and C in the Prevention of Prostate and Total Cancer In Men

Gaziano et al	
Conclusions	This study did not support the use of Vitamin E nor C supplementation in the reducing the risk of prostate or total cancer in men over 50 years old

JAMA 2009. 301(1): 52-62.

Prostate Cancer CPPA Recommendation Summary

No current recommendations from NCCN, USPSTF, or ACS

More studies are needed to determine if 5-alpha reductase inhibitors are effective and safe for chemoprevention in prostate cancer

National Comprehensive Cancer Network, Prostate Cancer Guidelines Version 4.2018, available from www.nccn.org.

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Let's review which CPPAs have evidence and are recommended for each disease state…

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Lung Cancer
- Smoking cessation aids

Breast Cancer
- Tamoxifen, raloxifene, aromatase inhibitors (patient specific)

Colon Cancer
- Aspirin for secondary prevention

Prostate Cancer
- No current recommendations

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Question 1

Mr. Hacker is a 60 yo male who is a frequent patient to your pharmacy. He tells you that he stopped smoking last week because he figured it was time since he has a 32 pack-year history. He is ready to take control of his health and is wondering if maybe he should go see his doctor for a check up. What should you suggest to him based on his smoking history?

A. A visit to the doctor is a good idea for general health but not for lung cancer screening. Mr. Hacker is in the moderate risk category for lung cancer.

B. A visit to the doctor is a good idea for lung cancer screening. Mr. Hacker is in the high risk category.

C. A visit to the doctor is not necessary right now. Mr. Hacker is in the high risk category for lung cancer but it is probably really hard for him to drive to the doctor's office so he should stay home.

D. A visit to the doctor is a waste of time. Mr. Hacker is probably fine.

E. None of the above

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Question 1

Mr. Hacker is a 60 yo male who is a frequent patient to your pharmacy. He tells you that he stopped smoking last week because he figured it was time since he has a 32 pack-year history. He is ready to take control of his health and is wondering if maybe he should go see his doctor for a check up. What should you suggest to him based on his smoking history?

A. A visit to the doctor is a good idea for general health but not for lung cancer screening. Mr. Hacker is in the moderate risk category for lung cancer.

B. A visit to the doctor is a good idea for lung cancer screening. Mr. Hacker is in the high risk category. (It is recommended he gets a CT scan)

C. A visit to the doctor is not necessary right now. Mr. Hacker is in the high risk category for lung cancer but it is probably really hard for him to drive to the doctor's office so he should stay home.

D. A visit to the doctor is a waste of time. Mr. Hacker is probably fine.

E. None of the above

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Question 2

Mrs. Chatte is a 43 yo F patient at your pharmacy that likes to stay up to date on the current "trends" in cancer-preventing vitamins and supplements she hears about on TV. She comes into the pharmacy and tells you about how *everyone* is taking vitamin D to prevent colon cancer after a recent ground breaking study and support from Dr. PrimeTime, Mrs. Chatte's favorite physician/talk-show host. She wants to know what you think. You tell her:

A. Vitamin D is recommended by some, but not all organizations, but as long as you're healthy it won't hurt you.

B. Our pharmacy has the best priced vitamin D, you should buy it here.

C. The suggestions may or may not change in the future due to this new study, but vitamin D is not currently recommended for colon cancer prevention.

D. You will need a prescription since the recommended dose is not available over the counter,

E. None of the above

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E. None of the above

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Question 3

Which resources can you use for trustworthy cancer chemoprevention information?

A. National Comprehensive Cancer Network (NCCN)

B. American Chemopreventive Society (ACS)

C. U.S. Preventative Services Task Force (USPSTF)

D. American Cancer Society (ACS)

E. National Cancer Institute (NCI)

F. All of the above except B

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Question 3

Which resources can you use for trustworthy cancer chemoprevention information?

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C. U.S. Preventative Services Task Force (USPSTF)

D. American Cancer Society (ACS)

E. National Cancer Institute (NCI)

F. All of the above except B

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Question 4

Which medications have evidence and a recommendation to be utilized as CPPAs?

A. Vitamin D

B. Vitamin E

C. Beta carotene

D. Vitamin C

E. None of the above

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Question 4

Which medications have evidence and a recommendation to be utilized as CPPAs?

A. Vitamin D

B. Vitamin E

C. Beta carotene

D. Vitamin C

E. None of the above

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Question 5

B.C. is a 22 yo F regular patient to your pharmacy. She asks whether there is anything that may prevent breast cancer. Her mother was diagnosed when she was 35 years old and B.C. wants to do anything she can to prevent it. Does B.C. have any options?

A. Yes, her mother's diagnosis counts as a qualifying risk factor. Tamoxifen has an indication for this patient.

B. Yes, her mother's age at diagnosis counts as a qualifying risk factor. Tamoxifen has a potential indication for this patient.

C. No, regardless of her mother's diagnosis, B.C. is too young.

D. Yes, B.C. can make non-pharmacologic lifestyle changes to help prevent future cancer.

E. None of the above

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Question 5

B.C. is a 22 yo F regular patient to your pharmacy. She asks whether there is anything that may prevent breast cancer. Her mother was diagnosed when she was 35 years old and B.C. wants to do anything she can to prevent it. Does B.C. have any options?

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C. No, regardless of her mother's diagnosis, B.C. is too young.

D. Yes, B.C. can make non-pharmacologic lifestyle changes to help prevent future cancer.

E. None of the above

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Question 6

Can B.C. get tamoxifen over the counter?

A. Yes

B. No

USHP

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Question 6

Can B.C. get tamoxifen over the counter?

A. Yes

B. No

USHP

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Question 7

You are a pharmacy technician working at the register when multiple patients come in and ask for advice on specific items they found in the OTC area. Which patient is a candidate for pharmacist counseling due to incorrect use of CPPAs?

A. A 56 yo M buying aspirin for primary prevention of colon cancer

B. A 23 yo F buying aspirin for secondary prevention of colon cancer

C. A 92 yo F buying nicotine gum to help prevent lung cancer

D. A 30 yo F buying nicotine patches for herself to quit smoking

USHP

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Question 7

You are a pharmacy technician working at the register when multiple patients come in and ask for advice on specific items they found in the OTC area. Which patient is a candidate for pharmacist counseling due to incorrect use of CPPAs?

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"Everybody's Free (To Wear Sunscreen)"

-Baz Luhrmann

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Prevention Intervention Comprehension:
Understanding cancer preventative pharmacologic agents

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