

Webinar Will Begin Momentarily

Become an Orgain Ambassador Today!

Request an Orgain Ambassador account to access our on-line sampling portal so you can share Orgain products and discount offers with your patients or clients.



healthcare.orgain.com/ambassador

Orgain®

Professional Education Series

Support. Inform. Educate. Empower.

From Diagnosis to Thriving: The Powerful Role of Nutrition in Breast Cancer Treatment and Survivorship

TODAY'S AGENDA:

- Welcome
- Speaker Introduction
- Presentation
- Q&A
- Closing



WEBINAR HOST:

Lauren Bissonnette, MS, RD, LDN
Ambassador Support & Education Manager
Orgain, LLC



WEBINAR PRESENTER:

Alison Tierney, MS, RD, CD, CSO
Oncology Dietitian

From Diagnosis to Thriving:

The Powerful Role of Nutrition in Breast Cancer Treatment and Survivorship

Alison Tierney, MS, RD, CD, CSO



@wholesome.cancer.nutrition



www.wholesomeLLC.com

Objectives

- (1) To highlight breast cancer statistics and modifiable and non-modifiable risk factors.
- (2) To review common nutrition challenges faced by breast cancer patients, particularly during treatment, and how an oncology dietitian can help.
- (3) To examine evidence-based nutrition recommendations for breast cancer patients and those with a history of breast cancer.
- (4) To provide personal insight in how my experience as a breast cancer survivor informs my approach - and how it may positively inform other healthcare professionals' approach.

















Things to Know: Breast Cancer

- Most commonly diagnosed cancer in the United States (1) & world wide (2)
 - 310,720 estimated 2024 diagnoses
- Approximately 13.1% of women will be diagnosed in their lifetime. (1)
 - [Based on 2019-2021 data, excluding 2020 due to COVID-19]
- 5-year relative survival rate is 95.1%. (1)
- Incidence is highest in Northern America, and lowest in Middle Africa & Eastern Asia (3)
 - Migration from low risk to high risk - assume rate of host country
 - Environmental factors are important in development of disease.





Therapeutic & Prognostic Implications

- Estrogen (ER +/-)
- Progesterone (PR +/-)
- Human Epidermal Growth Factor (HER2 +/-)
- Pre- vs. Post-menopausal

Some Limitations

Although a large body of preclinical, population-based, and interventional studies in breast cancer research exist, so too do inconsistencies.

Most data exists from high-income countries.

Many studies do not stratify for menopausal status.

We won't get through everything in this webinar!

Modifiable vs. Nonmodifiable Risk Factors for Breast Cancer

Modifiable	Nonmodifiable
- Alcohol Consumption - Overweight and obesity - Low levels of physical activity - Use of oral contraceptives for birth control - Use of hormone replacement therapy - Childbearing and breastfeeding	- Inherited genes (including BRCA1 and BRCA2) - Race and ethnicity <i>(especially Ashkenazi Jewish)</i> - Having dense breast tissues - Having onset of menarche before age 12 years - Reaching menopause after the age of 55 years - Receiving radiation to the chest

Chart recreated from Oncology Nutrition for Clinical Practice & American Cancer Society (2,3)



Cancer can happen to anyone.

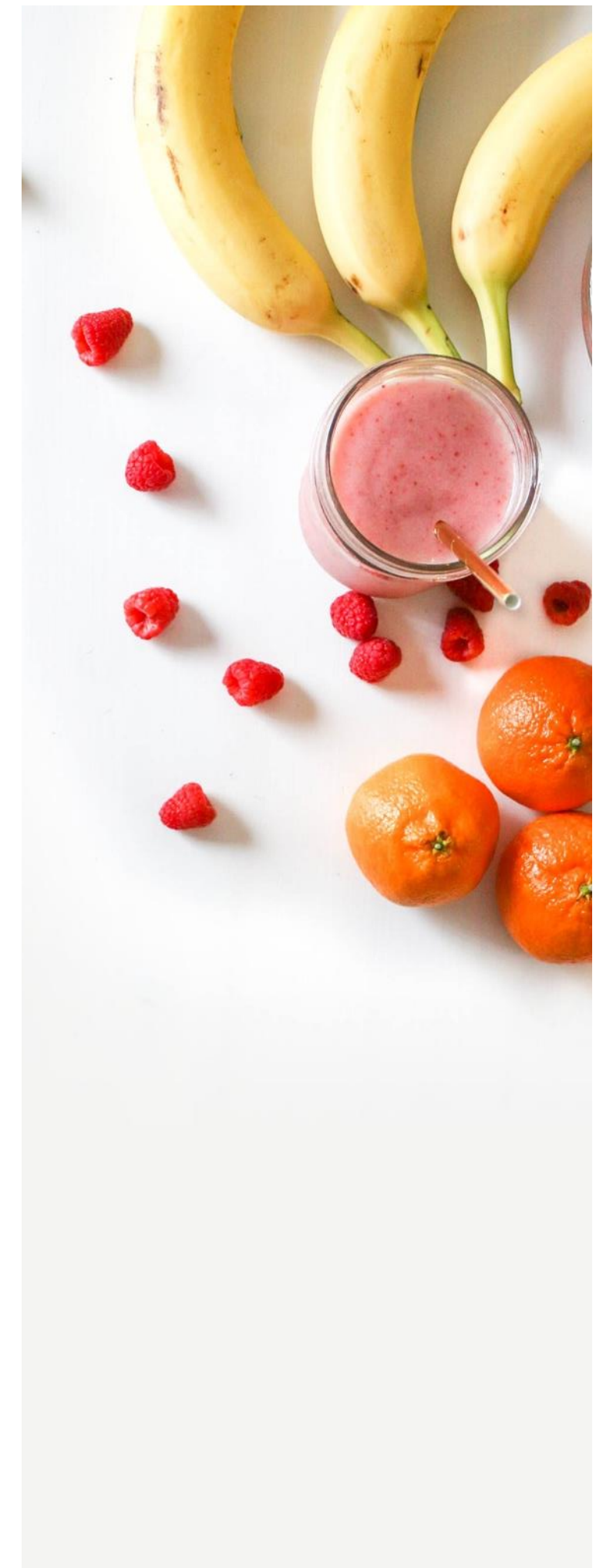
Cancer can happen to anyone.

**Perhaps we should call it “cancer risk reduction”
instead of “cancer prevention”?**

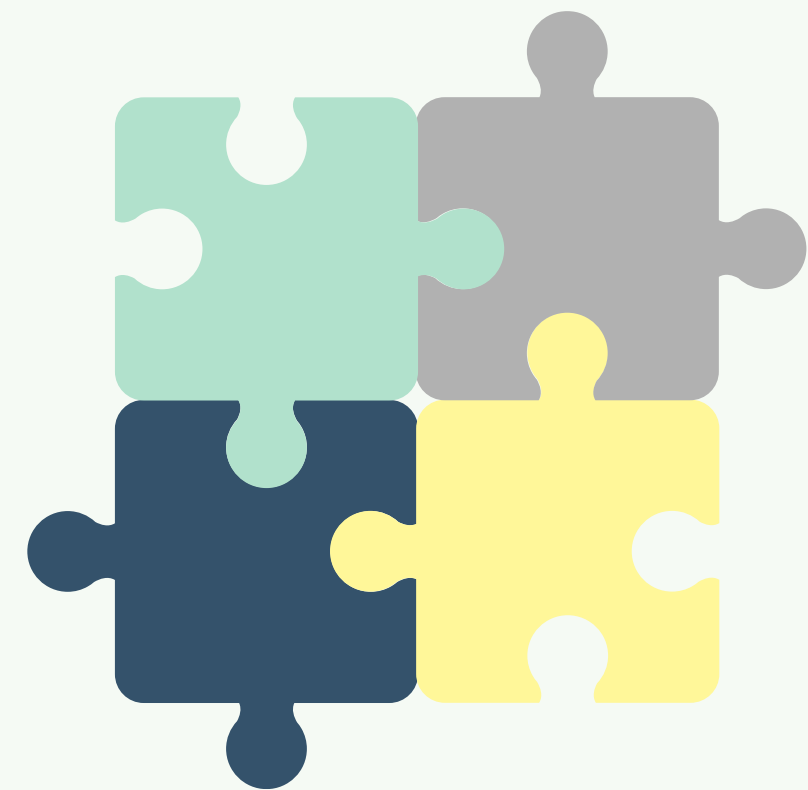
Modifiable vs. Nonmodifiable Risk Factors for Breast Cancer

Modifiable	Nonmodifiable
- Alcohol Consumption - Overweight and obesity - Low levels of physical activity - Use of oral contraceptives for birth control - Use of hormone replacement therapy - Childbearing and breastfeeding	- Inherited genes (including BRCA1 and BRCA2) - Race and ethnicity (especially Ashkenazi Jewish) - Having dense breast tissues - Having onset of menarche before age 12 years - Reaching menopause after the age of 55 years - Receiving radiation to the chest

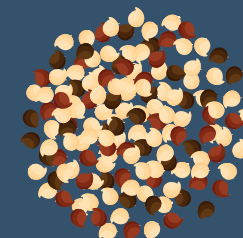
Chart recreated from Oncology Nutrition for Clinical Practice & American Cancer Society (2,3)

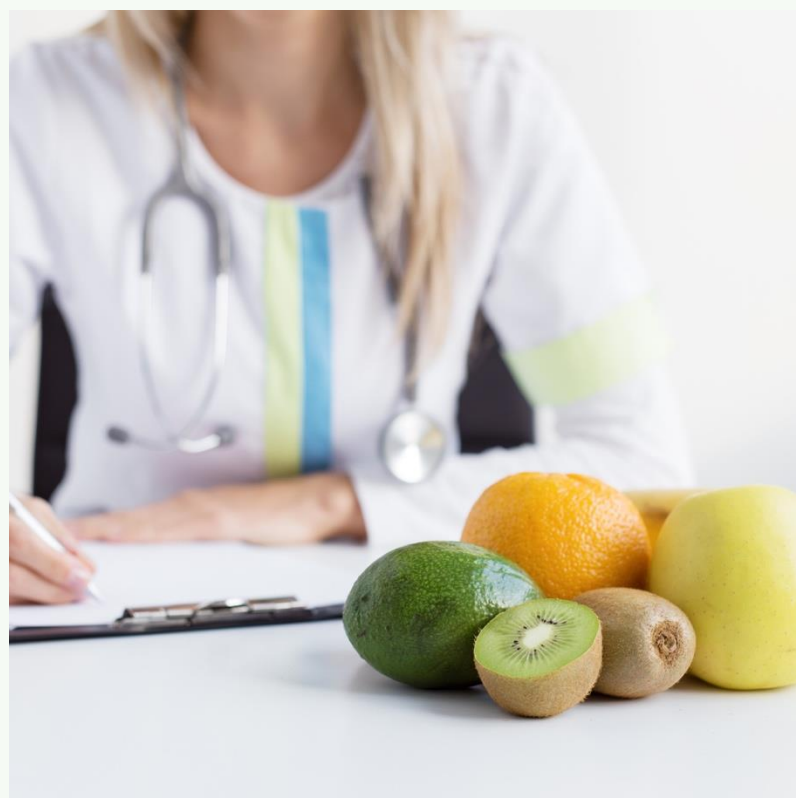


Diet, nutrition, and lifestyle is one piece
of the puzzle, not the only!



Nutrition during Cancer Treatment





Role of Outpatient Oncology Dietitian

Nutrition intervention during cancer treatment is associated with fewer treatment-related side effects (4-7), fewer hospitalizations (6-8), and improved quality of life (4,5,9).



Initial Treatment

Potential Nutrition-Related Concerns

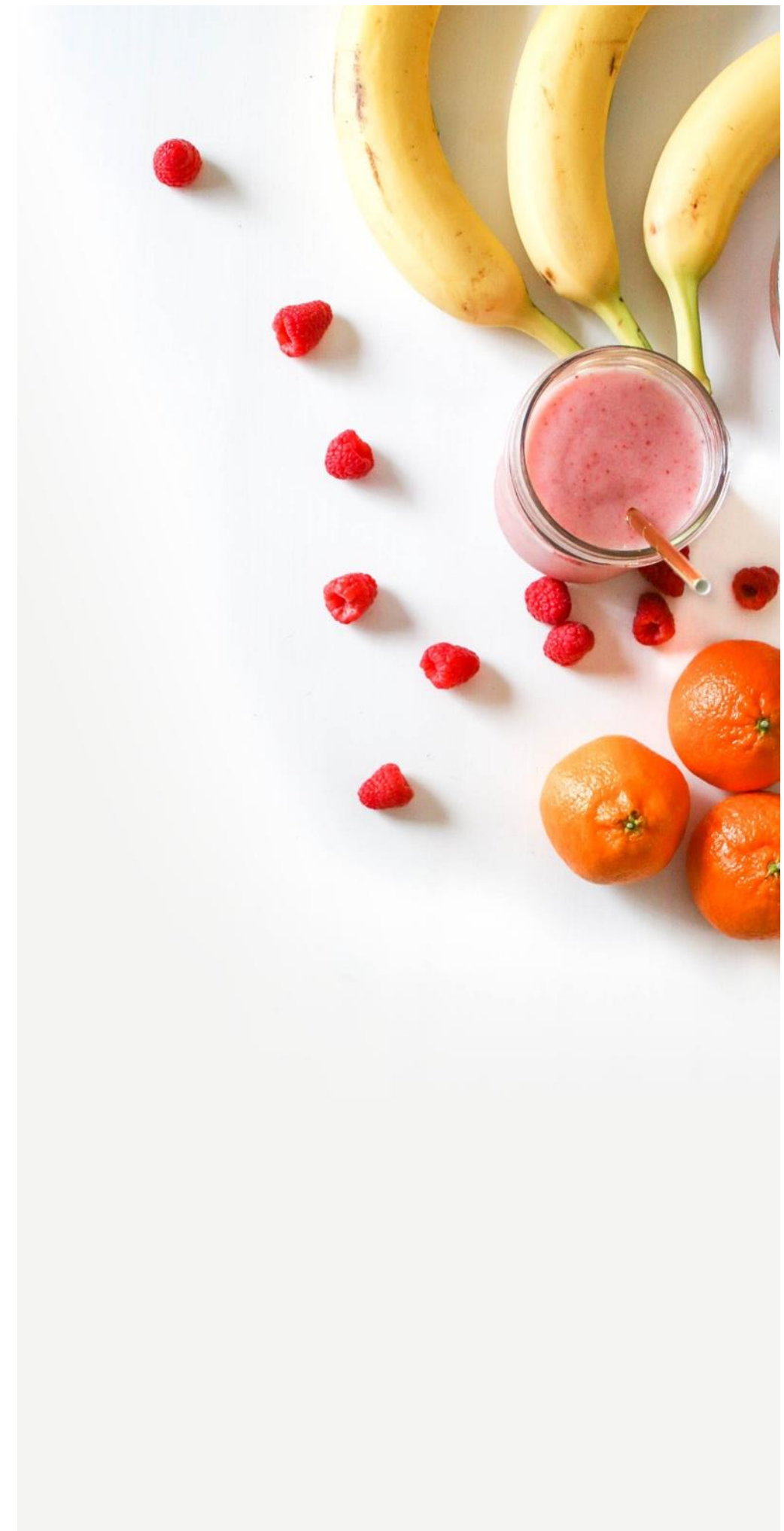
- Treatment side effects
(e.g. nausea, vomiting, diarrhea, mucositis, taste changes, etc.)
- Fatigue
- Pain
- Anorexia (loss of appetite)
- Treatment-related cachexia
- Immunosuppression
- Weight or body-composition changes
- Drug-nutrient interactions

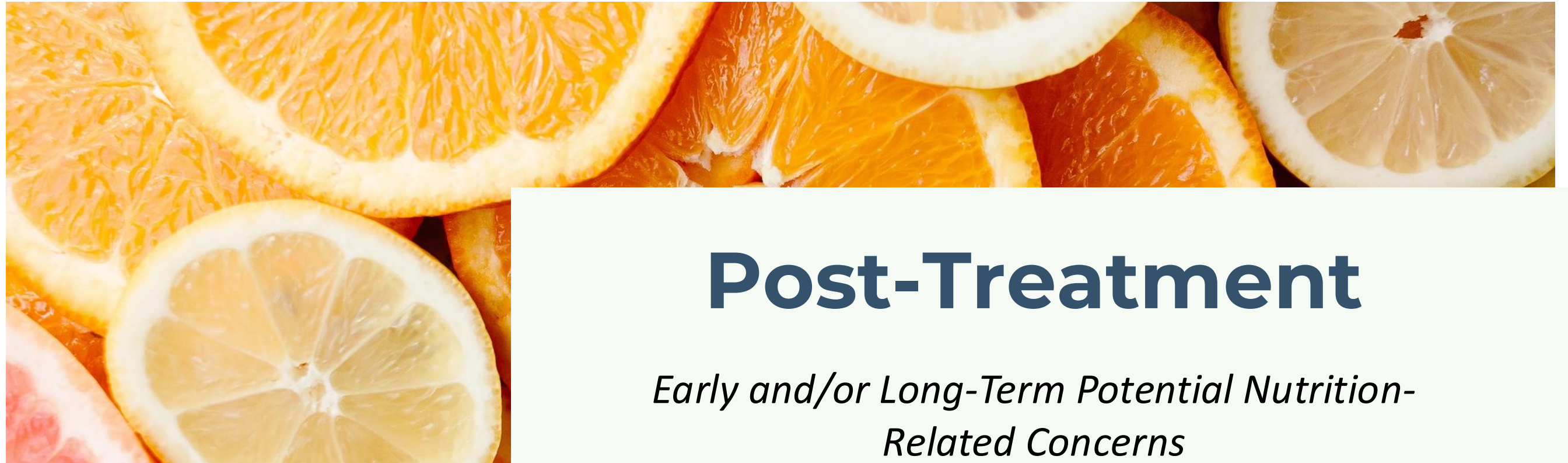
Initial Treatment

Potential Outcomes

- Ability to adhere to scheduled treatment
- Fewer infectious complications
- Improved weight and body composition
- Delay or prevention of disease progression
- Improved chances of survival
- Improved quality of life

(10)





Post-Treatment

Early and/or Long-Term Potential Nutrition-Related Concerns

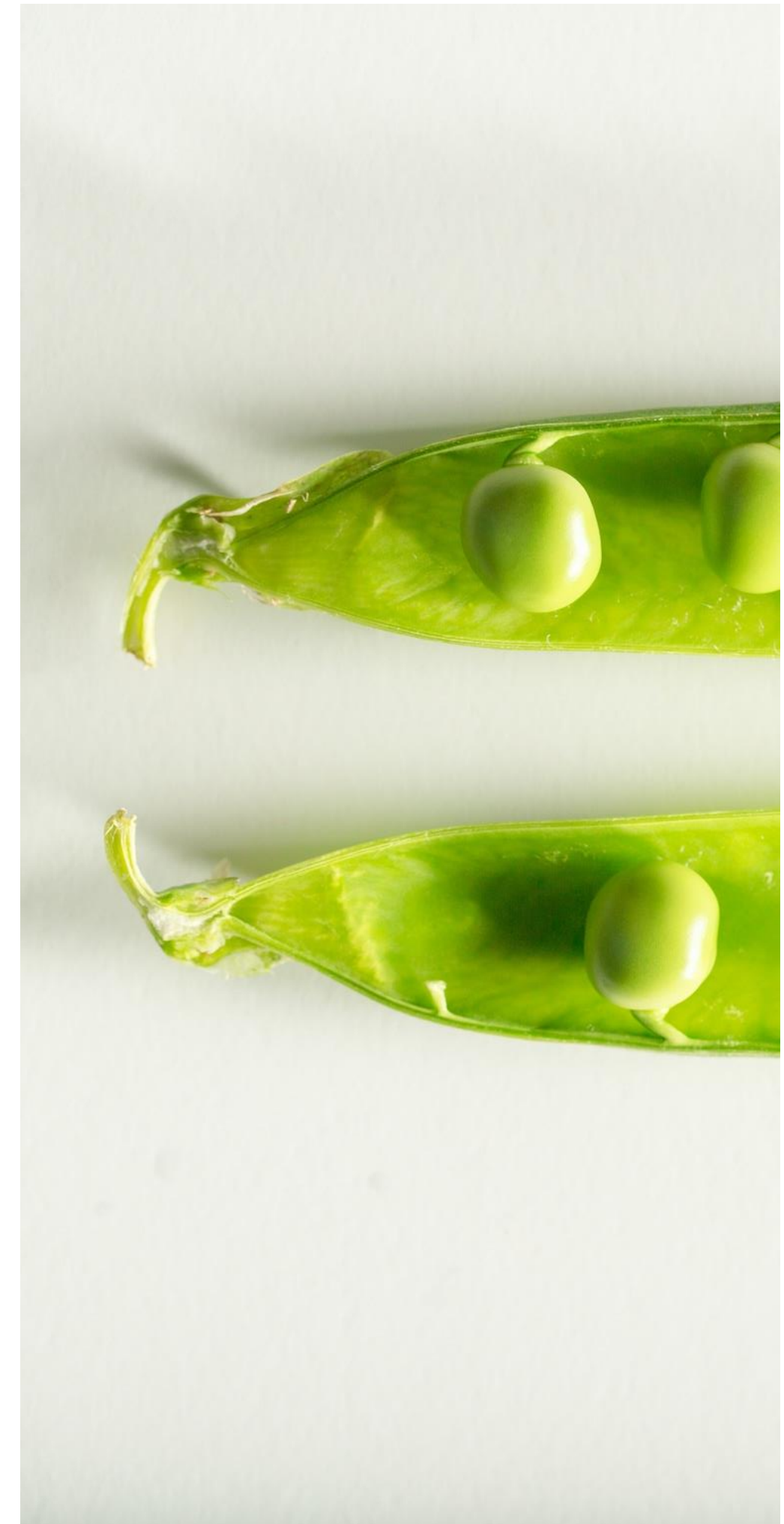
- Fatigue
- Pain
- Endocrine disorders
- Weight or body-composition changes
- Cognitive deficits
- Dental caries or complications
- Cardiovascular complications
- Decreased bone density

Post-Treatment

*Early and/or Long-Term Potential Outcomes of
Nutrition Interventions*

- Decreased fatigue
- Improved functional status
- More rapid recovery from treatment
- Improved weight and body composition
- Decreased risk for cancer recurrence and subsequent primary cancers
- Improved chances of survival
- Improved quality of life
- Decreased health care costs

(10)



Randomized Trial of Exercise and Nutrition on Chemotherapy Completion and Pathologic Complete Response in Women With Breast Cancer: The Lifestyle, Exercise, and Nutrition Early After Diagnosis Study

Tara Sanft, MD^{1,2} ; Maura Harrigan, RD, MS, CSO³; Courtney McGowan, RD, CSO³; Brenda Cartmel, PhD^{2,3} ; Michelle Zupa, BS³ ; Fang-Yong Li, MS³ ; Leah M. Ferrucci, PhD^{2,3} ; Leah Puklin, MPH³ ; Anlan Cao, BS³ ; Thai Hien Nguyen, MPH³; Marian L. Neuhofer, PhD⁴; Dawn L. Hershman, MD⁵ ; Karen Basen-Engquist, PhD⁶ ; Beth A. Jones, PhD^{2,3}; Tish Knobf, PhD^{2,7}; Anees B. Chagpar, MD, MPH^{1,2} ; Andrea Silber, MD^{1,2} ; Anna Tanasijevic, MPH⁸; Jennifer A. Ligibel, MD⁸ ; and Melinda L. Irwin, PhD, MPH^{2,3} 

DOI <https://doi.org/10.1200/JCO.23.00871>

ABSTRACT

PURPOSE Successful completion of chemotherapy is critical to improve breast cancer outcomes. Relative dose intensity (RDI), defined as the ratio of chemotherapy delivered to prescribed, is a measure of chemotherapy completion and is associated with cancer mortality. The effect of exercise and eating a healthy diet on RDI is unknown. We conducted a randomized trial of an exercise and nutrition intervention on RDI and pathologic complete response (pCR) in women diagnosed with breast cancer initiating chemotherapy.

METHODS One hundred seventy-three women with stage I-III breast cancer were randomly assigned to usual care (UC; n = 86) or a home-based exercise and nutrition intervention with counseling sessions delivered by oncology-certified registered dietitians (n = 87). Chemotherapy dose adjustments and delays and pCR were abstracted from electronic medical records. T-tests and chi-square tests were used to examine the effect of the intervention versus UC on RDI and pCR.

RESULTS Participants randomly assigned to intervention had greater improvements in exercise and diet quality compared with UC ($P < .05$). RDI was $92.9\% \pm 12.1\%$ and $93.6\% \pm 11.1\%$ for intervention and UC, respectively ($P = .69$); the proportion of patients in the intervention versus UC who achieved $\geq 85\%$ RDI was 81% and 85%, respectively ($P = .44$). The proportion of patients who had at least one dose reduction and/or delay was 38% intervention and 36% UC ($P = .80$). Among 72 women who received neoadjuvant chemotherapy, women randomly assigned to intervention were more likely to have a pCR than those randomly assigned to UC (53% v 28%; $P = .037$).

CONCLUSION Although a diet and exercise intervention did not affect RDI, the intervention was associated with a higher pCR in patients with hormone receptor–positive/human epidermal growth factor receptor 2–negative and triple–negative breast cancer undergoing neoadjuvant chemotherapy.

ACCOMPANYING CONTENT

 [Protocol](#)

Accepted July 19, 2023
Published September 1, 2023

J Clin Oncol 00:1-11
© 2023 by American Society of Clinical Oncology

 [View Online Article](#)

Creative Commons Attribution
Non-Commercial No Derivatives
4.0 License

INTRODUCTION

Advances in chemotherapy have contributed to decreased mortality in women with early-stage breast cancer.¹ Completion of chemotherapy is critical to improve outcomes. Relative dose intensity (RDI), a measure of chemotherapy completion, is the ratio of the amount of chemotherapy delivered versus the amount initially prescribed, accounting for dose intensity and duration of drugs.² An RDI $< 85\%$ is a common clinical threshold whereby

chemotherapy effectiveness and prognosis significantly worsen.³ Low RDI ($< 85\%$), primarily because of treatment side effects, is observed in 26% and 32% of women with breast cancer who receive conventional and dose-dense chemotherapy regimens, respectively.⁴

Higher levels of physical activity (PA) and better diet quality are associated with lower breast cancer mortality in observation studies.⁵⁻⁷ It is hypothesized that this occurs via improved metabolic and inflammatory biomarkers.^{8,9}

Nutrition & Exercise During Chemotherapy

173 women (*usual care, n=86; intervention, n=87*)

Nutrition intervention with oncology RDs & home-based exercise vs. usual care.

Intervention increased fruit & vegetable serving by 1 vs. diet quality decreasing in usual care.

Intervention group increased exercise by 140 mins/week.

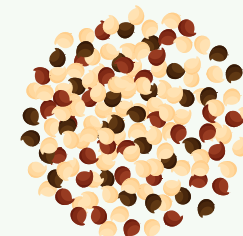
No weight change.

No difference in chemo completion.

53% complete pathological response (intervention) vs. 28% usual care.

This study demonstrates impact in clinical outcomes!

Nutrition & Lifestyle – Breast Cancer Risk Reduction



Nutrition and Physical Activity Cancer Prevention Guidelines, Cancer Risk, and Mortality in the Women's Health Initiative

Cynthia A. Thomson^{1,2}, Marjorie L. McCullough³, Betsy C. Wertheim², Rowan T. Chlebowski⁴, Maria Elena Martinez⁵, Marcia L. Stefanick⁶, Thomas E. Rohan⁷, JoAnn E. Manson¹⁰, Hilary A. Tindle¹², Judith Ockene¹¹, Mara Z. Vitollins¹³, Jean Wactawski-Wende⁸, Gloria E. Sarto¹⁴, Dorothy S. Lane⁹, and Marian L. Neuhouser¹⁵

Abstract

Healthy lifestyle behaviors are recommended to reduce cancer risk and overall mortality. Adherence to cancer-preventive health behaviors and subsequent cancer risk has not been evaluated in a diverse sample of postmenopausal women. We examined the association between the American Cancer Society (ACS) Nutrition and Physical Activity Cancer Prevention Guidelines score and risk of incident cancer, cancer-specific mortality, and all-cause mortality in 65,838 postmenopausal women enrolled in the Women's Health Initiative Observational Study. ACS guidelines scores (0–8 points) were determined from a combined measure of diet, physical activity, body mass index (current and at age 18 years), and alcohol consumption. After a mean follow-up of 12.6 years, 8,632 incident cancers and 2,356 cancer deaths were identified. The highest ACS guidelines scores compared with the lowest were associated with a 17% lower risk of any cancer [HR, 0.83; 95% confidence interval (CI), 0.75–0.92], 22% lower risk of breast cancer (HR, 0.78; 95% CI, 0.67–0.92), 52% lower risk of colorectal cancer (HR, 0.48; 95% CI, 0.32–0.73), 27% lower risk of all-cause mortality, and 20% lower risk of cancer-specific mortality (HR, 0.80; 95% CI, 0.71–0.90). Associations with lower cancer incidence and mortality were generally strongest among Asian, black, and Hispanic women and weakest among non-Hispanic whites. Behaviors concordant with Nutrition and Physical Activity Cancer Prevention Guidelines were associated with lower risk of total, breast, and colorectal cancers and lower cancer-specific mortality in postmenopausal women. *Cancer Prev Res*; 7(1); 42–53. ©2014 AACR.

Authors' Affiliations: ¹Mel and Enid Zuckerman College of Public Health, University of Arizona; ²University of Arizona Cancer Center, Tucson, Arizona; ³American Cancer Society, Atlanta, Georgia; ⁴Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center, Torrance; ⁵Moore's UCSD Cancer Center, University of California, San Diego; ⁶Stanford Prevention Research Center, Department of Medicine, Stanford University, Stanford, California; ⁷Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx; ⁸Department of Social and Preventive Medicine, University at Buffalo, SUNY, Buffalo; ⁹Department of Preventive Medicine, Stony Brook University School of Medicine, Stony Brook, New York; ¹⁰Division of Preventive Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston; ¹¹Department of Medicine, Division of Preventive and Behavioral Medicine, University of Massachusetts, Worcester, Massachusetts; ¹²Division of General Internal Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania; ¹³Wake Forest School of Medicine, Division of Public Health Sciences, Winston-Salem, North Carolina; ¹⁴Department of Gynecology, School of Medicine and Public Health, Madison, Wisconsin; and ¹⁵Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, Seattle, Washington

Corresponding Author: Cynthia A. Thomson, Health Promotion Sciences, Canyon Ranch Center for Prevention & Health Promotion, Mel and Enid Zuckerman College of Public Health, University of Arizona, 1295 N. Martin Street, Tucson, AZ 85721. Phone: 520-626-1565 or 940-1759; Fax: 520-626-2914; E-mail: cthomson@email.arizona.edu

doi: 10.1158/1940-6207.CAPR-13-0258

©2014 American Association for Cancer Research.

Introduction

Nutrition and physical activity cancer prevention recommendations for lifestyle modification have been disseminated by leading cancer organizations and the U.S. Department of Health and Human Services for more than three decades (1–3). While it is well recognized that tobacco cessation is the lead behavioral change to reduce cancer risk, these published recommendations specifically target healthy diet, greater physical activity, moderation of alcohol consumption, and healthy body weight. Of note, Nutrition and Physical Activity Cancer Prevention Guidelines largely overlap with those aimed at overall chronic disease risk reduction (4) and, therefore, may hold potential in also reducing all-cause mortality.

Recent cohort analyses, including the Cancer Prevention Study (CPS) II (5) and the European Prospective Investigation of Cancer (EPIC) study (6), confirmed that behaviors consistent with Nutrition and Physical Activity Cancer Prevention Guidelines were associated with lower cancer incidence and mortality. Similarly, the Iowa Women's Health Study reported that a lack of concordance with earlier cancer prevention guidelines was associated with a

American Cancer Society

"Consume a healthy diet with an emphasis on plant sources."

Highest adherence to the ACS guidelines - 22% decreased risk for breast cancer (12)

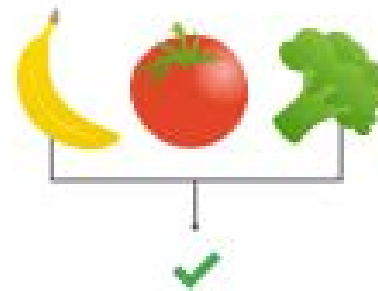
33% decrease for those with a history of diagnosis (12).



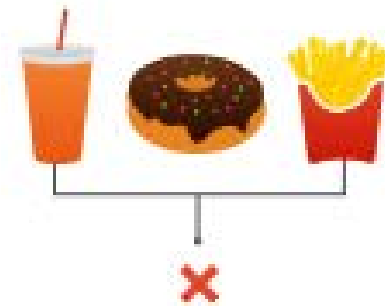
Diet and Activity Guidelines to Reduce Cancer Risk

FOLLOW A HEALTHY EATING PATTERN.

MORE FRUITS AND VEGGIES ... LESS JUNK

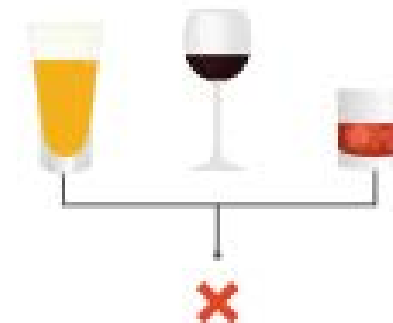


- Foods high in vitamins, minerals, and other nutrients in amounts that help you get to and stay at a healthy body weight
- A colorful variety of vegetables – dark green, red, and orange
- Fiber-rich beans and peas
- A colorful variety of whole fruits
- Whole grains, like whole wheat bread and brown rice



- Red meats such as beef, pork, and lamb and processed meats such as bacon, sausage, deli meats, and hot dogs
- Sugar-sweetened beverages
- Highly processed foods and refined grain products

IT IS BEST NOT TO DRINK ALCOHOL



- If you do choose to drink alcohol, women should have no more than one drink per day and men should have no more than two drinks per day.
- A drink is 12 ounces of regular beer, 5 ounces of wine, or 1.5 ounces of 80-proof distilled spirits.

Nutrition and Physical Activity Cancer Prevention Guidelines, Cancer Risk, and Mortality in the Women's Health Initiative

Cynthia A. Thomson^{1,2}, Marjorie L. McCullough³, Betsy C. Wertheim², Rowan T. Chlebowski⁴, Maria Elena Martinez⁵, Marcia L. Stefanick⁶, Thomas E. Rohan⁷, JoAnn E. Manson¹⁰, Hilary A. Tindle¹², Judith Ockene¹¹, Mara Z. Vitollins¹³, Jean Wactawski-Wende⁸, Gloria E. Sarto¹⁴, Dorothy S. Lane⁹, and Marian L. Neuhouser¹⁵

Abstract

Healthy lifestyle behaviors are recommended to reduce cancer risk and overall mortality. Adherence to cancer-preventive health behaviors and subsequent cancer risk has not been evaluated in a diverse sample of postmenopausal women. We examined the association between the American Cancer Society (ACS) Nutrition and Physical Activity Cancer Prevention Guidelines score and risk of incident cancer, cancer-specific mortality, and all-cause mortality in 65,838 postmenopausal women enrolled in the Women's Health Initiative Observational Study. ACS guidelines scores (0–8 points) were determined from a combined measure of diet, physical activity, body mass index (current and at age 18 years), and alcohol consumption. After a mean follow-up of 12.6 years, 8,632 incident cancers and 2,356 cancer deaths were identified. The highest ACS guidelines scores compared with the lowest were associated with a 17% lower risk of any cancer [HR, 0.83; 95% confidence interval (CI), 0.75–0.92], 22% lower risk of breast cancer (HR, 0.78; 95% CI, 0.67–0.92), 52% lower risk of colorectal cancer (HR, 0.48; 95% CI, 0.32–0.73), 27% lower risk of all-cause mortality, and 20% lower risk of cancer-specific mortality (HR, 0.80; 95% CI, 0.71–0.90). Associations with lower cancer incidence and mortality were generally strongest among Asian, black, and Hispanic women and weakest among non-Hispanic whites. Behaviors concordant with Nutrition and Physical Activity Cancer Prevention Guidelines were associated with lower risk of total, breast, and colorectal cancers and lower cancer-specific mortality in postmenopausal women. *Cancer Prev Res*; 7(1); 42–53. ©2014 AACR.

Authors' Affiliations: ¹Mel and Enid Zuckerman College of Public Health, University of Arizona; ²University of Arizona Cancer Center, Tucson, Arizona; ³American Cancer Society, Atlanta, Georgia; ⁴Los Angeles Biomedical Research Institute at Harbor-UCLA Medical Center, Torrance; ⁵Moore's UCSD Cancer Center, University of California, San Diego; ⁶Stanford Prevention Research Center, Department of Medicine, Stanford University, Stanford, California; ⁷Department of Epidemiology and Population Health, Albert Einstein College of Medicine, Bronx; ⁸Department of Social and Preventive Medicine, University at Buffalo, SUNY, Buffalo; ⁹Department of Preventive Medicine, Stony Brook University School of Medicine, Stony Brook, New York; ¹⁰Division of Preventive Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston; ¹¹Department of Medicine, Division of Preventive and Behavioral Medicine, University of Massachusetts, Worcester, Massachusetts; ¹²Division of General Internal Medicine, University of Pittsburgh, Pittsburgh, Pennsylvania; ¹³Wake Forest School of Medicine, Division of Public Health Sciences, Winston-Salem, North Carolina; ¹⁴Department of Gynecology, School of Medicine and Public Health, Madison, Wisconsin; and ¹⁵Division of Public Health Sciences, Fred Hutchinson Cancer Research Center, Seattle, Washington

Corresponding Author: Cynthia A. Thomson, Health Promotion Sciences, Canyon Ranch Center for Prevention & Health Promotion, Mel and Enid Zuckerman College of Public Health, University of Arizona, 1295 N. Martin Street, Tucson, AZ 85721. Phone: 520-626-1565 or 940-1759; Fax: 520-626-2914; E-mail: cthomson@email.arizona.edu

doi: 10.1158/1940-6207.CAPR-13-0258

©2014 American Association for Cancer Research.

Introduction

Nutrition and physical activity cancer prevention recommendations for lifestyle modification have been disseminated by leading cancer organizations and the U.S. Department of Health and Human Services for more than three decades (1–3). While it is well recognized that tobacco cessation is the lead behavioral change to reduce cancer risk, these published recommendations specifically target healthy diet, greater physical activity, moderation of alcohol consumption, and healthy body weight. Of note, Nutrition and Physical Activity Cancer Prevention Guidelines largely overlap with those aimed at overall chronic disease risk reduction (4) and, therefore, may hold potential in also reducing all-cause mortality.

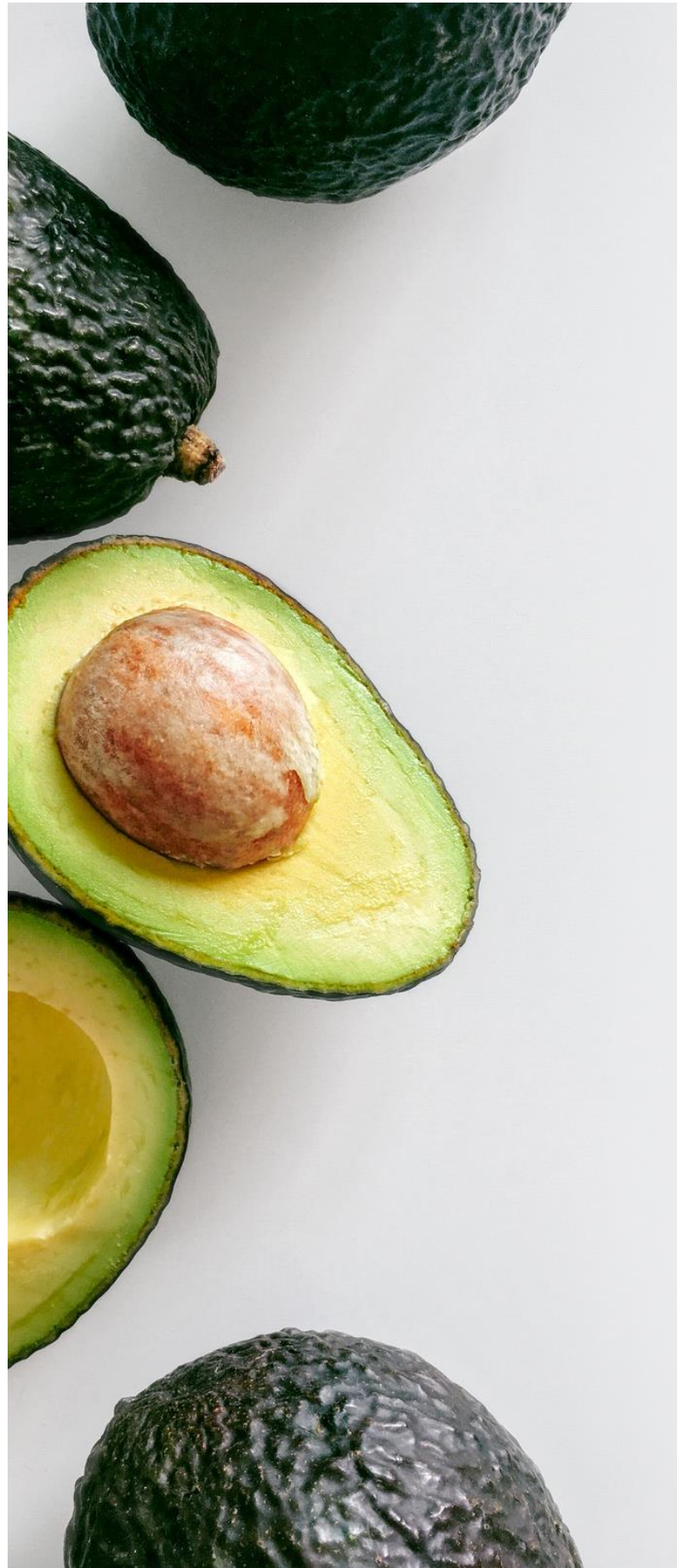
Recent cohort analyses, including the Cancer Prevention Study (CPS) II (5) and the European Prospective Investigation of Cancer (EPIC) study (6), confirmed that behaviors consistent with Nutrition and Physical Activity Cancer Prevention Guidelines were associated with lower cancer incidence and mortality. Similarly, the Iowa Women's Health Study reported that a lack of concordance with earlier cancer prevention guidelines was associated with a

American Cancer Society

"Consume a healthy diet with an emphasis on plant sources."

Highest adherence to the ACS guidelines - 22% decreased risk for breast cancer (12)

33% decrease for those with a history of diagnosis (12).



Dietary Fat

Limit fat intake to 15-20% of total energy intake.

- Some inconsistent data among all subtypes
- Most convincing data for **postmenopausal, ER-/PR-**
- A focus on limiting saturated fat intake
- Limit cholesterol intake to < 370 mg/day

(8, 13,
14)

Fruit

2-3 servings per day

- Much of the research is related to fruit + vegetable intake
- Risk inversely associated with total fruit intake, especially for ER+ breast cancer

(15,16

)



- 2-3 vegetable servings per day (17)
- Focus on **cruciferous** with 4-6 servings/week (17)
- Inverse association between plasma carotenoids and breast cancer risk; may be related to long-term high fruit & vegetable intake (18)
- **Avoid** carotenoid supplementation (19)
- Aiming for 30 grams fiber/day (20)

Vegetables & Carotenoids



Third World Expert Report Findings

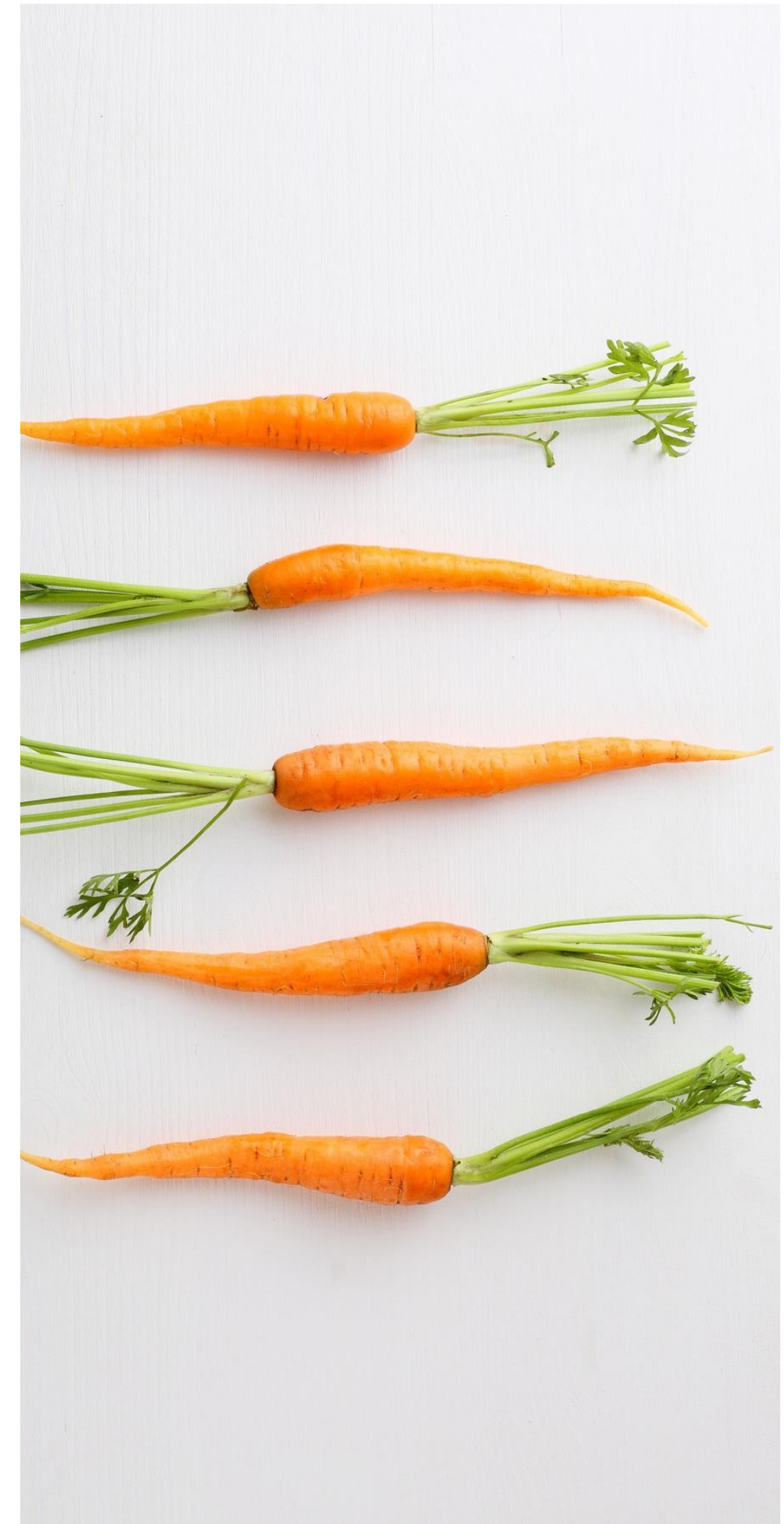
Limited Evidence:

Consuming foods containing carotenoids might decrease the risk of breast cancer.

Limited Evidence:

Consuming non-starchy vegetables might decrease the risk of ER- breast cancer.

(6)





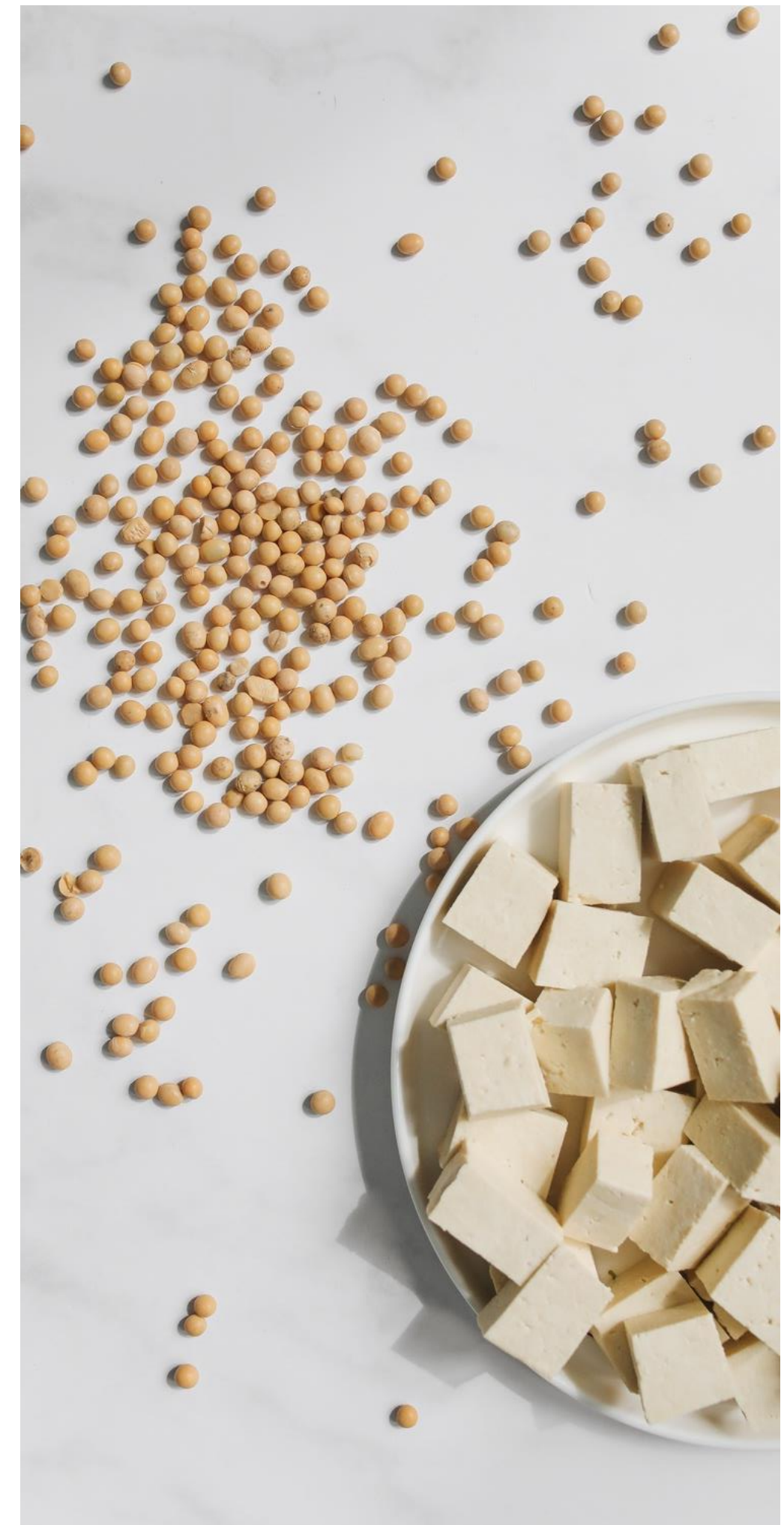
Flaxseed & Lignans

Daily Intake Recommended

- Case-control study: 1/4 cup flaxseed at least monthly or 1 slice of flax bread weekly, 20-30% decreased risk (21)
- Reduced expression of Ki-67 and HER2 proteins and apoptosis increased (22)
- Concerns of interaction with Tamoxifen expressed; preclinical studies show no interaction (22)

Soy & Phytoestrogens

- 1-2 servings per day of whole soy foods (23, 24, 25)
- Breast cancer patients who ate the most soy lived significantly longer and had significantly lower risk of recurrence than those who ate less soy (26)
 - Reducing recurrence risk by 25% (26, 27)
 - Risk reduction in both ER+ and TNBC (28)
- Intake during childhood, adolescence, and adult life each associated with decreased risk (29)



Neither soyfoods nor isoflavones warrant classification as endocrine disruptors: a technical review of the observational and clinical data

Mark Messina^a, Sonia Blanco Mejia^b, Aedin Cassidy^c, Alison Duncan^d, Mindy Kurzer^e, Chisato Nagato^f, Martin Ronis^g, Ian Rowland^h, John Sievenpiperⁱ, and Stephen Barnes^j

^aDepartment of Nutrition, Loma Linda University, Loma Linda, California, USA; ^bDepartment of Nutritional Sciences, University of Toronto, Toronto, Canada; ^cNutrition and Preventive Medicine, Queen's University, Belfast, Northern Ireland, UK; ^dCollege of Biological Sciences, University of Guelph, Guelph, Canada; ^eDepartment of Food Science and Nutrition, University of Minnesota, Minneapolis, Minnesota, USA; ^fGraduate School of Medicine, Gifu University, Gifu, Japan; ^gHealth Sciences Center, Louisiana State University Health Sciences Center, Baton Rouge, New Orleans, USA; ^hHuman Nutrition, University of Reading, Reading, England, UK; ⁱNutritional Sciences, University of Toronto, Toronto, Canada; ^jDepartment of Pharmacology and Toxicology, University of Alabama, Alabama, USA

ABSTRACT

Soybeans are a rich source of isoflavones, which are classified as phytoestrogens. Despite numerous proposed benefits, isoflavones are often classified as endocrine disruptors, based primarily on animal studies. However, there are ample human data regarding the health effects of isoflavones. We conducted a technical review, systematically searching Medline, EMBASE, and the Cochrane Library (from inception through January 2021). We included clinical studies, observational studies, and systematic reviews and meta-analyses (SRMA) that examined the relationship between soy and/or isoflavone intake and endocrine-related endpoints. 417 reports (229 observational studies, 157 clinical studies and 32 SRMAs) met our eligibility criteria. The available evidence indicates that isoflavone intake does not adversely affect thyroid function. Adverse effects are also not seen on breast or endometrial tissue or estrogen levels in women, or testosterone or estrogen levels, or sperm or semen parameters in men. Although menstrual cycle length may be slightly increased, ovulation is not prevented. Limited insight could be gained about possible impacts of in utero isoflavone exposure, but the existing data are reassuring. Adverse effects of isoflavone intake were not identified in children, but limited research has been conducted. After extensive review, the evidence does not support classifying isoflavones as endocrine disruptors.

KEYWORDS

Phytoestrogens; feminization; fertility; cancer; hormones; children; adults; soy; isoflavone; endocrine

Introduction

Over the past 30 years, the health effects of soyfoods and soybean isoflavones have been rigorously investigated. Modern interest in isoflavones began with the US National Cancer Institute funding research aimed at understanding the role of these soybean constituents in cancer prevention and treatment (Messina and Barnes 1991). Within a decade the number of purported health benefits of isoflavones being investigated greatly expanded to include areas such as bone health (Blair et al. 1996; Potter et al. 1998), hot flash alleviation (Murkies et al. 1995) and cognitive function (Pan, Anthony, and Clarkson 1999a, 1999b).

Research interest in soyfoods coincided with the interest in isoflavones because, although they are only one of >100 potentially biologically active components in soybeans and soyfoods (Kang et al. 2010; Fang, Yu, and Badger 2004), among commonly consumed foods the soybean is a uniquely rich source of these diphenolic molecules (Thompson et al. 2006; Franke et al. 1998). To this point, mean isoflavone intake in Japan among older adults ranges from approximately 30 to 50 mg/d (Messina, Nagata, and Wu 2006;

Konishi et al. 2019) whereas per capita intake in the United States (Bai, Wang, and Ren 2014; Sebastian et al. 2015; Chun, Chung, and Song 2007; Chun et al. 2007) and Europe (Zamora-Ros et al. 2013; Ziauddeen et al. 2019) is only a few mg. Thus, soyfoods are often equated with isoflavones.

Genistein (molecular weight, 270 g/mol), daidzein (molecular weight, 254.2 g/mol) and glycitein (molecular weight, 284.3 g/mol), and their respective glycosides (the predominate form in soybeans and unfermented soyfoods) account for approximately 50, 40 and 10%, respectively, of the total isoflavone content of soybeans (Murphy, Barua, and Hauck 2002). In fermented soyfoods, the percentage of isoflavones in aglycone form increases but is quite variable depending upon the food and duration of fermentation (Murphy, Barua, and Hauck 2002; Jang et al. 2008; Chan et al. 2009; Fukutake et al. 1996; Wei, Chen, and Chen 2008). Commonly consumed fermented foods include tempeh, miso and natto whereas unfermented soyfoods include tofu, soymilk and edamame. In this manuscript, isoflavone amounts refer to the aglycone equivalent weight. When converting the glycoside to the aglycone amount, a conversion

CONTACT Mark Messina markjohnmessina@gmail.com Loma Linda University, 26 Spadina Parkway, Pittsfield, MA 01201, USA.

© 2021 The Author(s). Published with license by Taylor & Francis Group, LLC
This is an Open Access article distributed under the terms of the Creative Commons Attribution-NonCommercial-NoDerivatives License (<http://creativecommons.org/licenses/by-nc-nd/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited, and is not altered, transformed, or built upon in any way.

2021 Study - 417 Reports of *Human Data* on Soy Consumption

“The study found isoflavone intake does not adversely affect thyroid function, estrogen levels, ovulation in women, or semen levels in men. These publications also showed no negative effects in children. These results suggest neither isoflavones nor soy foods should be classified as endocrine disruptors associated with disease and adverse health outcomes. Soy products are actually associated with reduced risk of breast and prostate cancer.”

Review

Soy Product Consumption and the Risk of Cancer: A Systematic Review and Meta-Analysis of Observational Studies

Chenting Wang ^{1,†}, Keqing Ding ^{2,†}, Xuanchen Xie ^{1,†}, Jinyue Zhou ¹, Pengju Liu ¹, Shuang Wang ¹, Ting Fang ¹, Guozhang Xu ^{1,*}, Chunlan Tang ^{1,*} and Hang Hong ^{1,*} 

¹ School of Public Health, Health Science Center, Ningbo University, Ningbo 315211, China; wangchenting1@163.com (C.W.); zesyunzan@163.com (X.X.); jinyuez0129@163.com (J.Z.); 13596266939@163.com (P.L.); nianniancat@foxmail.com (S.W.); fangting@nbu.edu.cn (T.F.)

² Ningbo Center for Disease Control and Prevention, Ningbo 315010, China; dingkeqin@163.com

* Correspondence: xuguozhang@nbu.edu.cn (G.X.); chunlant@163.com (C.T.); honghang28@163.com (H.H.); Tel.: +86-574-87609950 (H.H.); Fax: +86-574-87600761 (H.H.)

[†] These authors contributed equally to this work.

Abstract: Background: The association between soy product consumption and cancer risk varies among studies. Therefore, this comprehensive meta-analysis of observational studies examines the association between soy product consumption and total cancer risk. Methods: This study was conducted following the PRISMA guidelines. Up to October 2023, all eligible published studies were searched through PubMed and Web of Science databases. Results: A total of 52 studies on soy product consumption were included in this meta-analysis (17 cohort studies and 35 case-control studies). High consumption of total soy products (RR: 0.69; 95% CI: 0.60, 0.80), tofu (RR: 0.78; 95% CI: 0.70, 0.86), and soymilk (RR: 0.75; 95% CI: 0.60, 0.93) were associated with reduced total cancer risk. No association was found between high consumption of fermented soy products (RR: 1.18; 95% CI: 0.95, 1.47), non-fermented soy products (RR: 0.95; 95% CI: 0.77, 1.18), soy paste (RR: 1.00; 95% CI: 0.88, 1.14), miso soup (RR: 0.99; 95% CI: 0.87, 1.12), or natto (RR: 0.96; 95% CI: 0.82, 1.11) and cancer risk. A 54 g per day increment of total soy products reduced cancer risk by 11%, a 61 g per day increment of tofu reduced cancer risk by 12%, and a 23 g per day increment of soymilk reduced cancer risk by 28%, while none of the other soy products were associated with cancer risk. Conclusion: Our findings suggest that high total soy product consumption, especially soymilk and tofu, is associated with lower cancer risk. More prospective cohort studies are still needed to confirm the causal relationship between soy product consumption and cancer risk.

Keywords: soy product; cancer; meta-analysis; dose-response; observational study

1. Introduction

The incidence of cancer is rising dramatically, and it is the leading cause of death worldwide. There were nearly 19.3 million new cancer cases and 10 million deaths worldwide in 2020, according to the GLOBOCAN database. The cancer with the highest number of new cases is breast cancer, followed by lung cancer, colorectal cancer, prostate cancer, and stomach cancer, and these cancers are also the leading causes of cancer deaths [1]. Breast, prostate, and colorectal cancers are lower in Asia than in the Western regions, while the stomach and esophagus cancers are very common, which may be related to different regional lifestyles and dietary habits [1–5]. Soy products are processed foods made from beans as the primary raw material, and as one of the main food items for Asian populations, soy products are consumed more in Asia than in the West [6,7]. As a valuable source of isoflavones, phytosterols, lecithin, polyunsaturated fatty acid, dietary fiber, and high-quality protein, soy products have attracted considerable attention for their potential to reduce the risk of cancer [8]. Isoflavones can inhibit tumor growth and induce apoptosis in cancer cells through pathways mediated by hormone and non-hormone



Citation: Wang, C.; Ding, K.; Xie, X.; Zhou, J.; Liu, P.; Wang, S.; Fang, T.; Xu, G.; Tang, C.; Hong, H. Soy Product Consumption and the Risk of Cancer: A Systematic Review and Meta-Analysis of Observational Studies. *Nutrients* **2024**, *16*, 986. <https://doi.org/10.3390/nu16070986>

Academic Editors: Antonella Agodi, Martina Barchitta and Andrea Maugeri

Received: 4 March 2024
Revised: 24 March 2024
Accepted: 24 March 2024
Published: 28 March 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).



2024 Meta-Analysis Review on Soy Product Consumption (31)

- **Key Finding:** High consumption of soy products, especially tofu and soymilk, is associated with a significantly reduced total cancer risk.
 - Tofu: 12% risk reduction (61g/day)
 - Soymilk: 28% risk reduction (23g/day)
 - Total Soy Products: 11% reduction per 54g/day.
- **What This Suggests for Breast Cancer Survivors:** Contrary to outdated concerns, moderate soy intake can be protective rather than harmful. It doesn't increase the risk of recurrence and, in fact, may lower the risk of other cancers.
- **Practical Application:** Recommend the inclusion of tofu, edamame, tempeh, or soy milk in meals to improve overall nutritional intake without fear.
 - These foods are also rich in protein, fiber, and phytochemicals, which support both treatment and recovery.



Fasting

- Longer nighttime fasting associated with lower blood glucose levels (but not statistically significant lower A1C) (32)
- Women who fasted for 13 hours or more overnight had a reduced risk of breast cancer recurrence compared to those who ate over a longer window.
 - Fasting for this duration may reduce inflammation and improve sleep, both factors linked to breast cancer outcomes. (33)

Caution in Breast Cancer Patients:

Although fasting and TRE show promise, these approaches may not be suitable for all breast cancer patients, especially those undergoing active treatment or experiencing significant weight loss or malnutrition. *Individualized medical advice is essential.*

Weight

Third World Expert Report Findings

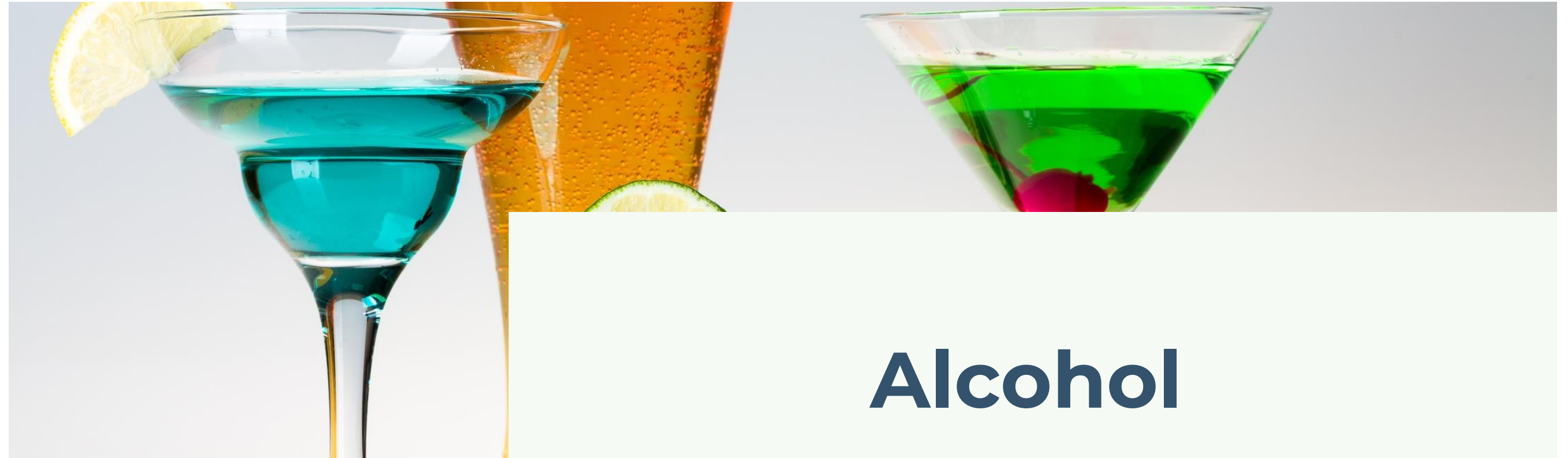
Strong Evidence:

Being overweight or obese throughout adulthood increases the risk of postmenopausal breast cancer.

Greater weight gain in adulthood increases the risk of postmenopausal breast cancer.

(6)





Alcohol

Third World Expert Report

Strong Evidence:

Consuming alcoholic drinks increases the risk for premenopausal breast cancer.



Alcohol

Breast Cancer; Research Overall

Research *consistently* shows that drinking alcoholic beverages — beer, wine, and liquor — increases a woman's risk of ER+ breast cancer.

- Can increase levels of estrogen and other hormones associated with ER+ BC.
- May increase breast cancer risk by damaging DNA in cells.
- Compared to women who don't drink at all, women who have **three alcoholic drinks per week** have a *15%* higher risk of BC.
 - Estimated that the risk of BC goes up another 10% for each additional drink women regularly have each day.



Physical Activity

Third World Expert Report

Strong Evidence:

Undertaking vigorous physical activity decreases the risk of premenopausal breast cancer.

Limited Evidence:

Being physically active might decrease the risk of premenopausal breast cancer.

Evidence Summary for Food & Lifestyle Advice for Patients with Breast Cancer

Component	Guideline
Healthy Lifestyle	Follow American Cancer Society guidelines for a plant-based approach to eating. (4)
Low-Fat Diet	Limit fat to 15%-20% of total energy intake, especially for postmenopausal, ER-, PR-; limit saturated fat; and limit <370 mg/day (13, 36)
Fruit Intake	Aim for 2-3 servings per day. (14)
Vegetable Intake	Aim for 2-3 servings per day; for cruciferous vegetables, aim for 4-6 servings per week (16)
Carotenoid Intake	Eat foods containing carotenoids 3x per week; supplemental carotenoids not recommended (18)
Fiber Intake	Aim for at least 30 g/day. (37,38)
Flaxseed Intake	Aim for 1-3 tablespoons of ground flaxseed per day. (39)

(continued)

Evidence Summary for Food & Lifestyle Advice for Patients with Breast Cancer

Component	Guideline
Soy Intake	Aim for 1-2 servings per day of whole soy foods (10-40 mg of soy isoflavones per day). (23,24,25)
Fasting	Aim for a 13-hour fast, overnight. (33)
Weight	Obtain and maintain a healthy body weight. (35,36)
Alcohol Intake	Limit to no more than 3-4 drinks per week. (40)
Activity	Aim for the equivalent of walking for 30 minutes, 6 days per week. (20)

Chart recreated from Oncology Nutrition for Clinical Practice & American Cancer Society (2,3)

PUTTING IT INTO PRACTICE

- Oncology dietitians can play an incredible role in the success of patient outcomes!
- Nutrition goes beyond just nutrition.
- Patients needs to counseled based on where they are at - and where they are willing to go.
- During treatment vs. survivorship goals may differ.
- *Cancer changes everything.*



Favorite Resources

- [Wholesome LLC](#)
- [American Cancer Society](#)
- American Institute for Cancer Research [\(AICR\)](#)
- Physicians Committee for Responsible Medicine [\(PCRM\)](#)
- [Cook for Your Life](#)
- [World Cancer Fund - The Third Expert Report](#)





Q&A OPPORTUNITY

Thank You



@wholesome.cancer.nutrition



www.wholesomeLLC.com

WHOLESONELLC.COM

Referenc es

1. SEER Cancer Stat Facts: Female Breast Cancer. National Cancer Institute. Accessed September 26th, 2024. <https://seer.cancer.gov/statfacts/html/breast.html>
2. Ferlay J, Soerjomataram I, Ervik M et al. GLOBOCAN 2021 v1.2, Cancer Incidence and Mortality Worldwide: IARC CancerBase No. 11.2015; available from <http://globocan.iarc.fr>
3. McPherson K, Steel CM and Dixon JM. ABC of breast diseases. Breast cancer epidemiology risk factors, and genetics. BMJ 2000;321:624-8. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1118507/>
4. Thomson C, McCullough M, Wertheim B, et al. Nutrition and physical activity cancer prevention guidelines, cancer risk, and the mortality in the Women's Health Initiative. *Cancer Prev Res.* 2014;7(1):42-53. doi:10.1158/1940-6207.CAPR-13-0258. <https://sci-hub.st/10.1158/1940-6207.CAPR-13-0258>
5. Melina V, Craig W, Levin S. Position of the Academy of Nutrition and Dietetics: Vegetarian Diets. J Acad Nutr Diet. 2016. Dec;116(12):1970-1980. Doi:10.1016/j.jand.2016.09.025. PMID: 27886704. <https://sci-hub.st/10.1016/j.jand.2016.09.025>
6. World Cancer Research Fund/American Institute for Cancer Research. Diet, Nutrition, Physical Activity and Cancer: a Global Perspective. Continuous Update Project Expert Report 2018. Available at <https://www.wcrf.org/diet-activity-and-cancer/>.
7. Tantamango-Bartley Y, Jaceldo-Siegl K, Fan J, Fraser G. Vegetarian diets and the incidence of cancer in a low-risk population. *Cancer Epidemiol Biomarkers Prev.* 2013;22(2):286-294. <https://sci-hub.st/10.1158/1055-9965.epi-12-1060>
8. Oncology Nutrition Dietetic Practice Group, Voss, A., & Williams, V. (2021). *Oncology Nutrition for Clinical Practice* (2nd ed.). Academy of Nutrition & Dietetics.
9. American Cancer Society Breast Cancer Early Detection and Diagnosis website. Accessed May 11, 2022. <https://www.cancer.org/cancer/breast-cancer/screening-tests-and-early-detection.html>
10. Thomson C, McCullough M, Wertheim B, et al. Nutrition and physical activity cancer prevention guidelines, cancer risk, and mortality in the Women's Health Initiative. *Cancer Prev Res.* 2014;7(1):42-53. doi:10.1158/1940-607.CAPR-13-0258. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4090781/>

References (continued)

11. Sanft, T., Harrigan, M., McGowan, C., Cartmel, B., Zupa, M., Li, F. Y., Ferrucci, L. M., Puklin, L., Cao, A., Nguyen, T. H., Neuhouser, M. L., Hershman, D. L., Basen-Engquist, K., Jones, B. A., Knopf, T., Chagpar, A. B., Silber, A., Tanasijevic, A., Ligibel, J. A., & Irwin, M. L. (2023). Randomized Trial of Exercise and Nutrition on Chemotherapy Completion and Pathologic Complete Response in Women With Breast Cancer: The Lifestyle, Exercise, and Nutrition Early After Diagnosis Study. *Journal of clinical oncology : official journal of the American Society of Clinical Oncology*, JCO2300871. Advance online publication. <https://doi.org/10.1200/JCO.23.00871>
12. Thomson C, McCullough M, Wertheim B, et al. Nutrition and physical activity cancer prevention guidelines, cancer risk, and mortality in the Women's Health Initiative. *Cancer Prev Res*. 2014;7(1):42-53. doi:10.1158/1940-6073.CAPR-13-0258. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4090781/>
13. Li C, Yang L, Zhang D, Jiang W. Systematic review and meta-analysis suggest that dietary cholesterol intake increases risk of breast cancer. *Nutr Res*. 2016;36(7):627-635. doi:10.1016/j.nutres.2016.04.009. <https://sci-hub.st/https://pubmed.ncbi.nlm.nih.gov/26424778/>
14. Pierce J, Stefanick M, Flatt S, et al. Greater survival after breast cancer in physically active women with high vegetable-fruit intake regardless of obesity. *J Clin Oncol*. 2007;25(17):2345-2351. <https://sci-hub.st/10.1200/jco.2006.08.6819>,
15. Lissowska J, Gaudet M, Brinton L, et al. Intake of fruits, and vegetables in relation to breast cancer risk by hormone receptor status. *Breast Cancer Res Treat*. 2008;107(1):113-117. <https://sci-hub.st/10.1007/s10549-007-9524-9>
16. Emaus M, Peeters P, Bakker M, et al. Vegetable and fruit consumption and the risk of hormone receptor-defined breast cancer in the EPIC cohort. *Am J Clin Nutr*. 2016;103(1):168-177. doi:10.3945/ajcn.114.101436. <https://sci-hub.st/10.3945/ajcn.114.101436>
17. Rock C, Flatt S, Natarajan L, et al. Plasma carotenoids and recurrence-free survival in women with a history of breast cancer. *J Clin Oncol*. 2005;23(27):6631-6638. <https://ascopubs.org/doi/10.1200/JCO.2005.19.505>
18. Greenlee H, Kwan M, Kushi L, et al. Antioxidant supplement use after breast cancer diagnosis and mortality in LACE cohort. *Cancer*. 2012;118(8):2048-2058. doi:10.1002/cncr.26526. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3323673/>
19. McEligot A, Largent J, Ziggas A, Peel D, Anton-Culver H. Dietary fat, fiber, vegetable, and micronutrients are associated with overall survival in postmenopausal women diagnosed with breast cancer. *Nutr Cancer*. 2006;55(2):132-140. https://sci-hub.st/10.1207/s15327914nc5502_3
20. Aune D, Chan D, Greenwood D, et al. Dietary fiber and breast cancer risk: a systematic review and meta-analysis of prospective studies. *Ann Oncol*. 2012;23(6):1394-1402. [https://www.annalsofoncology.org/article/S0923-7534\(19\)38732-0/fulltext](https://www.annalsofoncology.org/article/S0923-7534(19)38732-0/fulltext)

References (continued)

21. Lowcock E, Cotterchio M, Boucher B. Consumption of flaxseed, a rich source of lignans, is associated with reduced breast cancer risk. *Cancer Causes Control*. 2013;24(4):813-816. doi:10.1007/s10552-013-0155-7.
22. Calado A, Neves P, Santos T, Ravasco P. The effect of flaxseed in breast cancer: a literature review. *Front Nutr*. 2018;5(4):4-11. doi:10.3389/fnut.2018.00004. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5808339/pdf/fnut-05-00004.pdf>
23. Guha N, Kwan M, Quesenberry C, Weltzein E, Castillo A, Caan B. Soy isoflavones and risk of cancer recurrence in a cohort of breast cancer survivors: the Life After Cancer Epidemiology study. *Breast Cancer Res Treat*. 2009;118(2):395-405. doi:10.1007/s10549-009-0321-5
24. Nechuta S, Caan B, Chen W, Lu W, Chen Z, Kwan M. Soy food intake after diagnosis of breast cancer and survival: an in-depth analysis of combined evidence from cohort studies of US and Chinese women. *Am J Clin Nutr*. 2012;96(2):1.
25. Shu X, Zheng Y, Cai H, Gu K, Chen Z, Zheng W. Soy food intake and breast cancer survival. *JAMA*. 2009;302(22):2437-2443. doi:10.1001/jama.2009.1783
26. Bhagwat, S., Haytowitz, DB, and Holden, JM. 2008. USDA Database for the Isoflavone Content of Selected Foods, Release 2.0. U.S. Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory Home Page: <http://www.ars.usda.gov/nutrientdata/isoflav>
27. Bhagwat, S., Haytowitz, DB, and Holden, JM. 2008. USDA Database for the Isoflavone Content of Selected Foods, Release 2.0. U.S. Department of Agriculture, Agricultural Research Service, Nutrient Data Laboratory Home Page: <http://www.ars.usda.gov/nutrientdata/isoflav>
28. Chi F, Wu R, Zeng YC, Xing R, Liu Y, Xu ZG. Post-diagnosis soy food intake and breast cancer survival: a meta-analysis of cohort studies. *Asian Pac J Cancer Prev*.
29. [Korde LA, Wu AH, Fears T, Nomura AM, West DW, Kolonel LN, Pike MC, Hoover RN, Ziegler RG. Childhood soy intake and breast cancer risk in Asian American women. *Cancer Epidemiol Biomarkers Prev*. 2009 Apr;18\(4\):1050-9.](#)
30. Mark Messina, Sonia Blanco Mejia, Aedin Cassidy, Alison Duncan, Mindy Kurzer, Chisato Nagato, Martin Ronis, Ian Rowland, John Sievenpiper & Stephen Barnes (2022) Neither soyfoods nor isoflavones warrant classification as endocrine disruptors: a technical review of the observational and clinical data, *Critical Reviews in Food Science and Nutrition*, 62:21, 5824-5885, DOI: [10.1080/10408398.2021.1895054](https://doi.org/10.1080/10408398.2021.1895054)

References (continued)

31. Wang, C.; Ding, K.; Xie, X.; Zhou, J.; Liu, P.; Wang, S.; Fang, T.; Xu, G.; Tang, C.; Hong, H. Soy Product Consumption and the Risk of Cancer: A Systematic Review and Meta-Analysis of Observational Studies. *Nutrients* **2024**, *16*, 986. <https://doi.org/10.3390/nu16070986>
32. Marinac C, Natarajan L, Sears D, et al. Prolonged nightly fasting and breast cancer risk: findings from NHANES (2009 -2010). *Cancer Epidemiol Biomark Prev.* 2015;24(5):783-789. doi:10.1158/1055-9965.
33. Marinac C, Nelson S, Breen C, et al. Prolonged nightly fasting and breast cancer prognosis. *JAMA Oncol.* 2016;2(8):1049 -1055. doi:10.1001/jamaoncol.2016.0164.
34. “New American Plate: Setting Your Table to Prevent Cancer.” American Institute for Cancer Research, <https://www.aicr.org/cancer-prevention/healthy-eating/new-american-plate/>
35. Caan B, Kwan M, Shu X, et al. Weight change and survival after breast cancer in the after breast cancer pooling project. *Cancer Epidemiol Biomark Prev.* 2012;21(8):1260-1271.doi:10.1158/1055-9965.
36. Playdon M, Bracken M, Sanft T, Ligibel J, Harrigan M, Irwin M. Weight gain after breast cancer diagnosis and all-cause mortality: systemic review and meta-analysis. *J Natl Cancer Inst.* 2015;107(2):1-15.doi:10.1093/jnci/djv275.
37. Chlebowski R, Aragaki A, Anderson G, et al. Low-fat dietary pattern and breast cancer mortality in the Women’s Health Initiative Randomized Controlled Trial. *J Clin Oncol.* 2017;35(25):2919-2926. doi:10.1200/JCO.2016.72.0326.
38. Rock C, Flatt S, Thomason C, et al. Effects of a high-fiber, low-fat diet intervention on serum concentrations of reproductive steroid hormones in women with a history of breast cancer. *J Clin Oncol.* 2004;22(12):2379-2387.
39. Mason J, Thompson L. Flaxseed and its lignan and oil components: can they play a role in reducing the risk of and improving the treatment of breast cancer? *Appl Physiol Nutr Metab.* 2014;39(6):663-678. doi:10.1139/apnm-2013-0420.
40. Kwan M, Kushi L, Weltzien E, et al. Alcohol consumption and breast cancer recurrence and survival among women with early -stage breast cancer: the life after cancer epidemiology study. *J Clin Oncol.* 2010;28(29):4410-4416. doi:10.1200/JCO.2010.29.2730.

Thank you for joining us today.

Become an Orgain Ambassador Today!

Request an Orgain Ambassador account to access our on-line sampling portal so you can share Orgain products and discount offers with your patients or clients.



healthcare.orgain.com/ambassador

Orgain®

Professional Education Series

Support. Inform. Educate. Empower.



WEBINAR HOST:

Lauren Bissonnette, MS, RD, LDN
Ambassador Support & Education Manager
Orgain, LLC

Lauren.bissonnette@drinkorgain.com



WEBINAR PRESENTER:

Alison Tierney, MS, RD, CD, CSO
Oncology Dietitian

alison@wholesomellc.com



GENERAL INQUIRIES:

medinfo@orgain.com

Sponsor Disclosure: Financial support for this presentation was provided by Orgain. The views expressed herein are those of the presenter and do not necessarily represent Orgain's views. The material herein is accurate as of the date it was presented and is for educational purposes only and is not intended as a substitute for medical advice. Reproduction or distribution of these materials is prohibited. ©2024 Orgain, LLC. All rights reserved.