


Role of Nutrition in Cancer Prevention and Survivorship: Research to Practice

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Disclosures

- No Conflicts of Interest
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Objectives

1. The participant will be able to identify the relationship between cancer, obesity, and nutrition.
2. The participant will be able to discuss how chronic inflammation relates to obesity, cancer, and nutrition.
3. The participant will be able to state the American Institute for Cancer Research (AICR) Cancer Prevention Recommendations, focusing on the impact of dietary patterns and healthy weight.



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>18 million current
cancer survivors

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Cancer survivors

- Decrease of 3.8 million deaths 1991-2020
- Most growth in the aging population
 - 67% survivors 65+ years old



Sources: 7,8

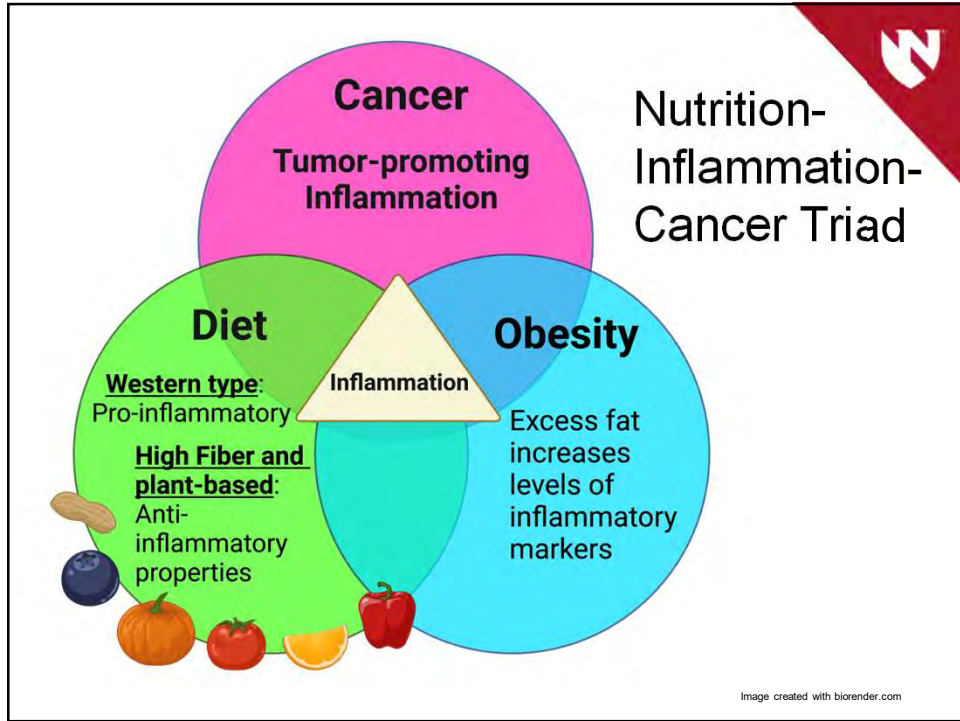
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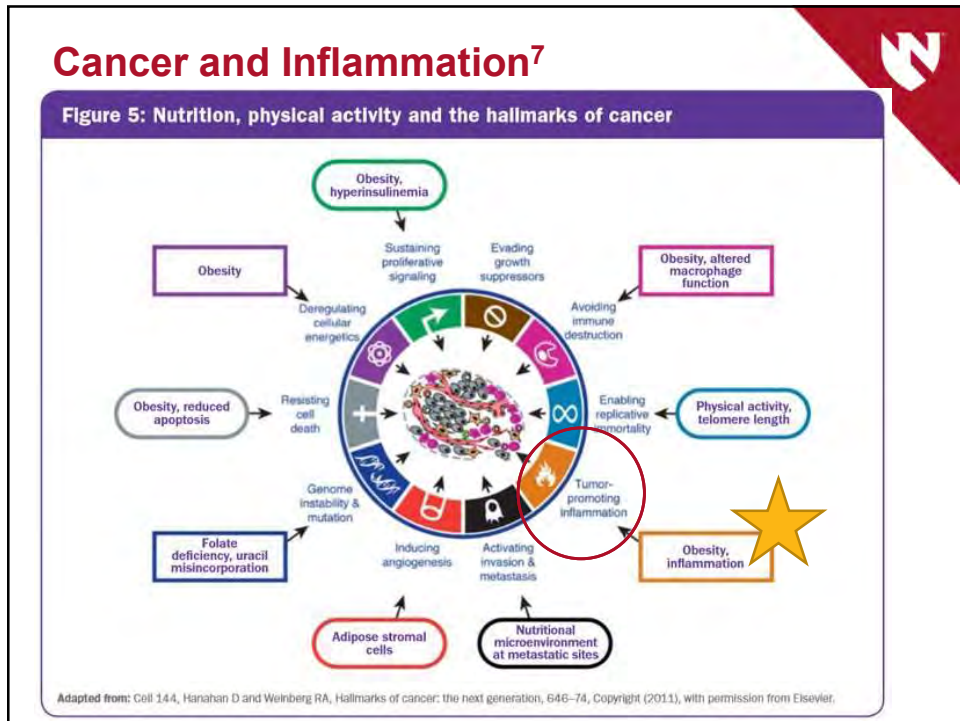
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90% of cancer survivors face long-term effects from treatment

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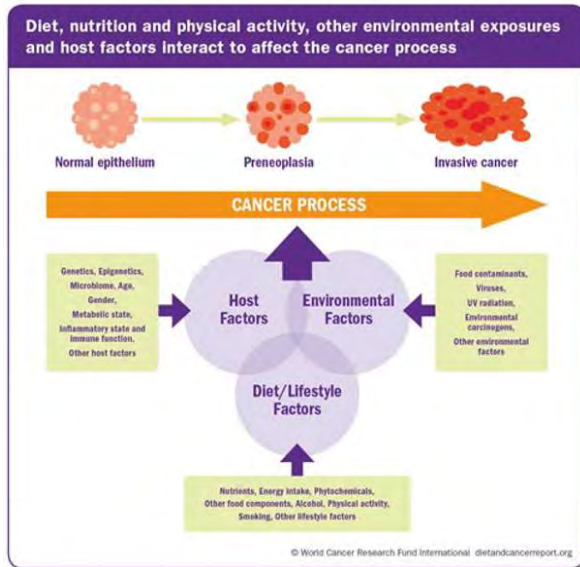
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Cancer Risk Factors

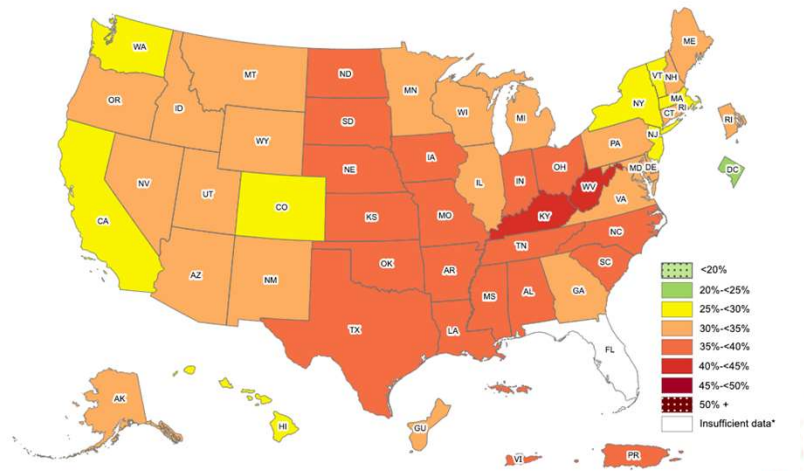
- Heredity
- Occupational exposures
- Sun exposure
- Smoking/exposure to secondhand smoke
- Alcohol consumption
- Diet
- Physical activity
- Overweight/obesity



Source: CDC (10); WCRF (4)

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Obesity in US: 2021



Source: CDC (2)

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Cancer and Obesity

- 12/17 cancers reviewed linked to “greater body fatness”⁴
- Worldwide effects of overweight/obesity on cancer
 - esophagus (adenocarcinoma)
 - stomach
 - pharynx & larynx
 - colon & rectum
 - liver
 - gallbladder
 - pancreas
 - kidney
 - advanced prostate
 - post-menopausal female breast
 - endometrium
 - ovary



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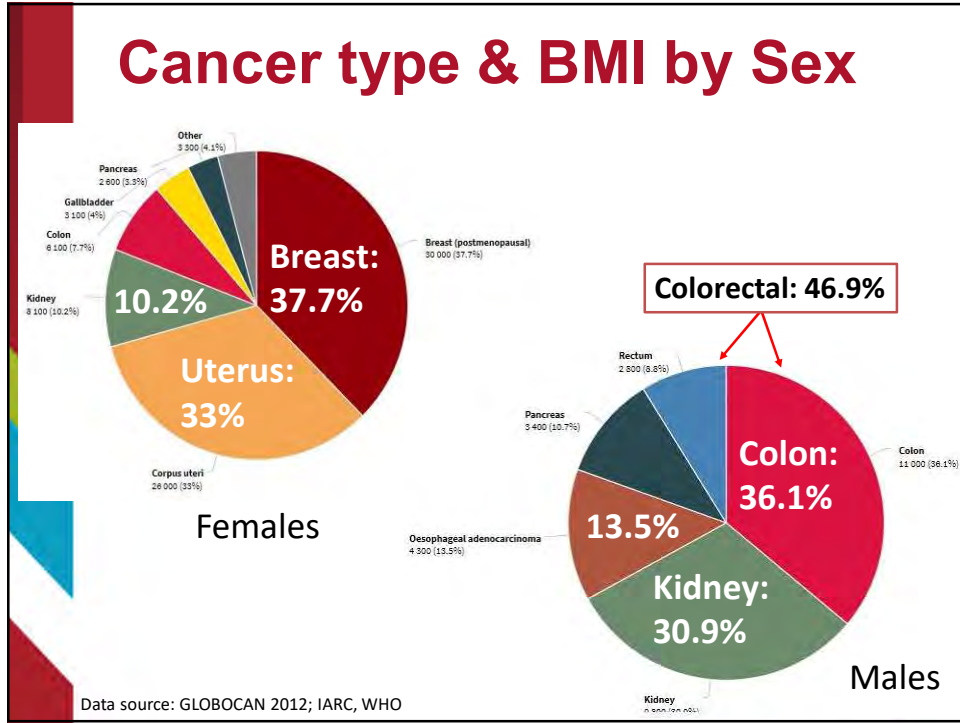
Cancer and Body Fatness

BODY FATNESS AND WEIGHT GAIN AND THE RISK OF CANCER					
WCRF/AICR GRADING		DECREASES RISK		INCREASES RISK	
		Exposure	Cancer site	Exposure	Cancer site
STRONG EVIDENCE	Convincing			Adult body fatness	Esophagus (adenocarcinoma) 2016 ² Pancreas 2012 ¹ Liver 2015 ² Colorectum 2017 ¹ Breast (postmenopause) 2017 ^{1,3} Endometrium 2013 ^{4,5} Kidney 2015 ¹
	Probable	Adult body fatness Body fatness in young adulthood	Breast (premenopause) 2017 ^{1,3} Breast (premenopause) 2017 ^{1,4} Breast (postmenopause) 2017 ^{1,4}	Adult body fatness	Breast (postmenopause) 2017 ² Mouth, pharynx and larynx 2018 ¹ Stomach (cardia) 2016 ² Gallbladder 2015 ^{2,7} Ovary 2014 ^{2,5,8} Prostate (advanced) 2014 ^{1,9}
LIMITED EVIDENCE	Limited – suggestive			Adult body fatness	Cervix (BMI > 29 kg/m ²) 2017 ^{2,5}
STRONG EVIDENCE	Substantial effect on risk unlikely	None Identified			

Table source: WCRF (4)



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Cancer and Body Fatness Mechanisms

Greater body fatness	Hyperinsulinemia	mTOR/PI3K/AKT, MAPK	Reduced apoptosis; increased proliferation, genome instability
	Increased oestradial	MAPK/ERK/PI3K	Increased proliferation in ER+ tissues; genome instability
	Inflammation	STAT3/NF- κ B	Reduced apoptosis, increased cell division, altered macrophage function, etc.; genome instability
		E.g. WNT, P53	E.g. cellular energetics, etc.

Table source: WCRF (4)

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Body Fatness & Breast Cancer Risk: Postmenopausal status

- **Convincing Strong Evidence: Increased Risk**
- Postmenopausal Breast Cancer¹¹
 - 12% increased risk of post-menopausal breast cancer per 5 kg/m² BMI
 - RR 1.12 [1.09-1.15]
 - >80,000 cases examined in 56 studies



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Body fatness & Breast Cancer Risk: Postmenopausal status

Excess BMI & Breast cancer subtype¹¹

Subtype	RR	95% CI
ER+	1.17	1.09-1.25
PR+	1.47	1.36-1.60
ER+PR+	1.29	1.19-1.40

- Other subtypes not significant



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Body fatness & Breast Cancer Risk: Premenopausal status

- Pre-menopausal Breast Cancer¹¹
 - 7% decreased risk per 5kg/m²
 - RR 0.93 [0.90-0.97]
 - 16,371 cases in 37 studies



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Body fatness & Breast Cancer Risk: Panel Consensus

- Panel Consensus¹¹:
 - Post-menopausal breast cancer much more common
 - **Decreased risk of pre-menopausal breast cancer with high body fatness is outweighed by post-menopausal risk**



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Body Fatness and Breast Cancer: Proposed Mechanisms¹¹

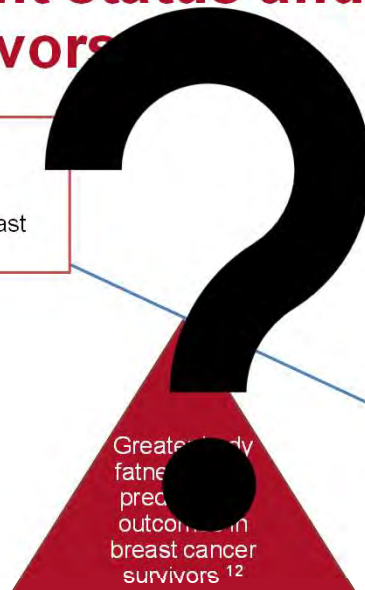
- Body fatness impacts:
 - Hormones
 - Higher body fat have higher circulating estrogen and insulin
 - Associated with low-grade inflammation
 - Environment promotes carcinogenesis/ suppress apoptosis
- **Premenopausal women with excess body fat**
 - May cause anovulation and hormonal imbalance
- **Postmenopausal women with excess body fat**
 - Lower ovarian estrogen production
 - Body uses adipose tissue to create estrogen



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Weight status and cancer survivors

Post-diagnostic **weight gain** associated with **mortality** in breast cancer¹⁶



Overweight and obese breast cancer survivors: **weight loss** associated with **higher mortality** vs with weight stability¹⁵

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Limitations of Weight Studies

- Limited research on the impact of obesity on cancer survivorship
 - Studies short, observational, small sample size or highly specific populations¹²
- **Intentional vs unintentional disease-related weight loss**
 - Sarcopenia and cachexia
- General population studies¹⁶
 - Unintentional weight loss – increased mortality
 - Intentional weight loss – no effect on survival
- Breast Cancer *intervention* studies
 - **Intentional weight loss may improve symptoms and side effects**



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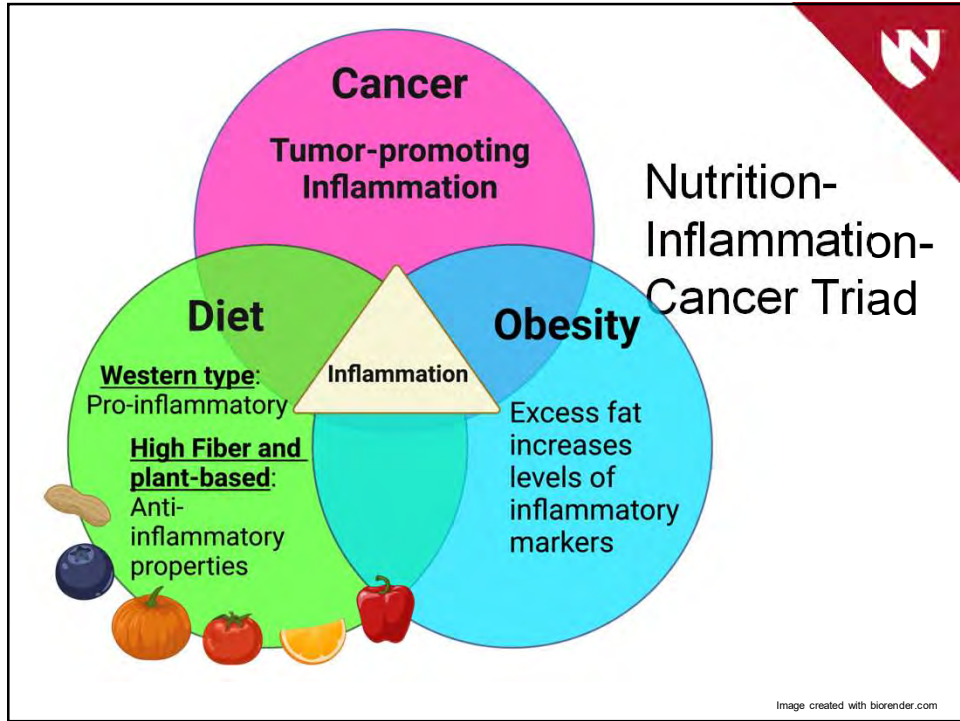
Metabolic Health and Cancer

- Framingham Study analysis¹⁸

	Overweight HR (95% CI)	Obese HR (95% CI)
BMI	1.5 (1.2-1.9)	1.7 (1.3-2.3)
	Blood Glucose <125	Blood Glucose >125
BMI >25 kg/m ²	1.5 (1.2-1.8)	2.1 (1.4-3.0)
High waist-height ratio	1.5 (1.1-2.0)	2.0 (1.3-3.2)



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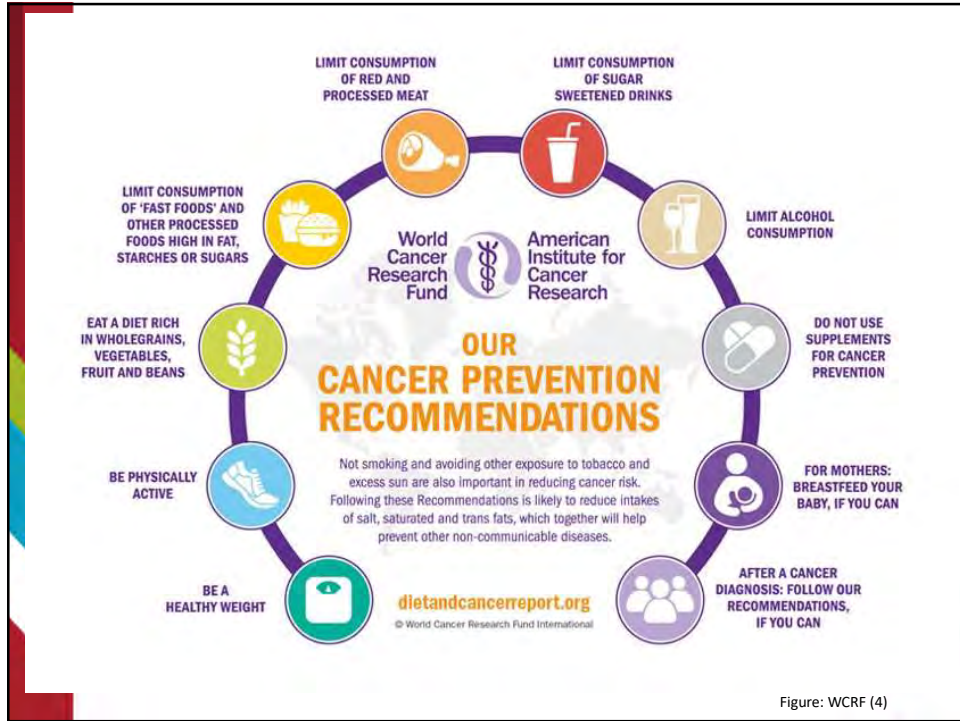


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WCRF/AICR Cancer Prevention Recommendations

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Cancer and Healthy Weight

RECOMMENDATION

Be a healthy weight

Keep your weight within the healthy range¹ and avoid weight gain in adult life

- **GOAL** Ensure that body weight during childhood and adolescence projects towards the lower end of the healthy adult BMI range
- **GOAL** Keep your weight as low as you can within the healthy range throughout life
- **GOAL** Avoid weight gain (measured as body weight or waist circumference)² throughout adulthood

- Healthy Weight:
 - BMI 18.5-24.9 kg/m²
- Waist Circumference
 - Men: 37"
 - Women: 31.5"

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Cancer and Physical Activity



RECOMMENDATION

Be physically active

Be physically active as part of everyday life – walk more and sit less

GOAL Be at least moderately physically active¹, and follow or exceed national guidelines

GOAL Limit sedentary habits

¹ Moderate physical activity increases heart rate to about 60 to 75 per cent of its maximum.

- **Moderate:** walking, household chores, recreational cycling, swimming or dancing
- **Vigorous:** running, competitive sports, swimming, aerobics



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Bringing the Recommendation to Life

- Think of it as "activity, not exercise."
- Move more, sit less
- Something is better than nothing.
- Small goals really do add up, try 10 minutes to start
- More than the scale
- 30 minutes, most days
- Make it fun, something you enjoy, don't judge your activity
- Partner up
- Plan- how does this adjust seasonally?
- Track- wearable device, track time, etc.
- Try something new
- Standing desk
- Find an app that works for you



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Joyful Movement



Stock photo

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Diet Recommendations



Stock photo

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Whole Grains and Fiber



RECOMMENDATION

Eat a diet rich in wholegrains, vegetables, fruit and beans

Make wholegrains, vegetables, fruit, and pulses (legumes) such as beans and lentils a major part of your usual daily diet

- WMA** Consume a diet that provides at least 30 grams per day of fibre¹ from food sources
- WMA** Include in most meals foods containing wholegrains, non-starchy vegetables, fruit and pulses (legumes) such as beans and lentils
- WMA** Eat a diet high in all types of plant foods including at least five portions or servings (at least 400 grams or 15 ounces in total) of a variety of non-starchy vegetables and fruit every day
- WMA** If you eat starchy roots and tubers as staple foods, eat non-starchy vegetables, fruit and pulses (legumes) regularly too if possible

¹ Measured by the AOAC method.



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Where is fiber?

Fruits and Vegetables

- Raspberries, pears, apples
- Broccoli, peas, carrots, brussels sprouts

Whole grains

- Oatmeal, whole-grain pasta and breads, popcorn, quinoa

Nuts, beans, seeds

High Fiber Plant proteins

- Chickpeas
- Quinoa
- Edamame
- Hemp hearts
- Beans
- Lentils
- Nuts



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6g Fiber
Calories: 369
Fat: 21g
Carbs: 27g
Protein: 18g

Simple Egg Sandwich



HIGH FIBER FOODS

14g Fiber
Calories: 359
Fat: 16g
Carbs: 61g
Protein: 11g

Mediterranean Barley with Chickpeas



Pear
5,5 g. /1 medium



Apple
4,4 g. /1 medium



Broccoli
5,1 g. /1 cup



6g Fiber
Calories: 285
Fat: 16g
Carbs: 31g
Protein: 9g

Apple & Peanut Butter




Split peas
5,5 g. /1 medium



Barley
6,0 g. /1 cup



Banana
3,1 g. /1 medium



7g Fiber
Calories: 309
Fat: 7g
Carbs: 34g
Protein: 27g

Chicken & Black Bean Enchiladas



Bran flakes
5,5 g. /1 cup



Artichoke
10,3 g. /1 medium



Black beans
15 g. /1 cup





Images: MyFitnessPal.com; vectorstock.com

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Fighting Inflammation with Fiber

The American Institute for Cancer Research recommends 30g of fiber daily

Recipes from <https://www.aicr.org/cancer-prevention/recipes>

Breakfast	Lunch	Snack	Dinner
<p><i>Pumpkin Spice Overnight Oats</i> + 1/2 cup Pears</p>	<p><i>Citrus Quinoa Avocado Salad</i></p>	<p><i>Apple Nachos</i></p>	<p><i>Almond-Crusted, Baked Chicken Tenders</i> + Balsamic-Glazed Carrots</p>
10g	13g	4g	5g

Check out our recorded Cooking Classes:
<https://www.nebraskamed.com/cancer/cancer-survivorship-program/nutrition>



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What does "Plant-Based" Mean?

- "Plant forward:" focus on foods that come from plants- fruit, veggies, whole grains, beans, etc.
- Does not necessarily mean vegan or vegetarian.
- Plant foods are high in fiber, nutrients, phytochemicals that may help prevent cancer.



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The "Standard American Plate"



Photo: AICR

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The "Transitional Plate"



Photo: AICR

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The "New American Plate"



Photo: AICR

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Fast food



RECOMMENDATION

Limit consumption of 'fast foods' and other processed foods high in fat, starches or sugars

Limiting these foods helps control calorie intake and maintain a healthy weight

GOAL Limit consumption of processed foods high in fat, starches or sugars – including 'fast foods'¹; many pre-prepared dishes, snacks, bakery foods and desserts; and confectionery (candy)

¹ 'Fast foods' are readily available convenience foods that tend to be energy dense and are often consumed frequently and in large portions.



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Red/Processed Meat

Strong Evidence

- Red meat and processed meat are causes of colorectal cancer
- ≤ 18 oz chosen to balance benefits of nutrients and risks
- Processed meats-high salt and cooking methods that generate carcinogens



RECOMMENDATION

Limit consumption of red and processed meat

Eat no more than moderate amounts of red meat¹, such as beef, pork and lamb. Eat little, if any, processed meat²

GOAL If you eat red meat, limit consumption to no more than about three portions per week. Three portions is equivalent to about 350 to 500 grams (about 12 to 18 ounces) cooked weight of red meat.³ Consume very little, if any, processed meat

¹ The term 'red meat' refers to all types of mammalian muscle meat, such as beef, veal, pork, lamb, mutton, bison and goat.
² The term 'processed meat' refers to meat that has been transformed through salting, curing, fermentation, smoking or other processes to enhance flavour or improve preservation.
³ 500 grams of cooked red meat is roughly equivalent to 700-750 grams of raw meat, but the exact conversion depends on the cut of meat, the proportions of lean meat and fat, and the method and degree of cooking.



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Cancer and Sugar Sweetened Beverages



RECOMMENDATION

Limit consumption of sugar sweetened drinks

Drink mostly water and unsweetened drinks

GOAL Do not consume sugar sweetened drinks¹

- Liquids with added sugars
 - Sucrose, corn syrup, honey, fruit juices/concentrate
 - Soda, sports drinks, energy drinks, sweetened coffee/tea drinks
- Does not include artificial sweeteners



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Cancer and Alcohol



RECOMMENDATION

Limit alcohol consumption

For cancer prevention, it's best not to drink alcohol

GOAL For cancer prevention, it's best not to drink alcohol

- **Strong evidence:** Drinking alcohol is the cause of many cancers
- **"Drinking alcohol is not recommended for health benefit"**
 - If you choose to drink, do not exceed national guidelines
 - 2/day- men; 1/day - women

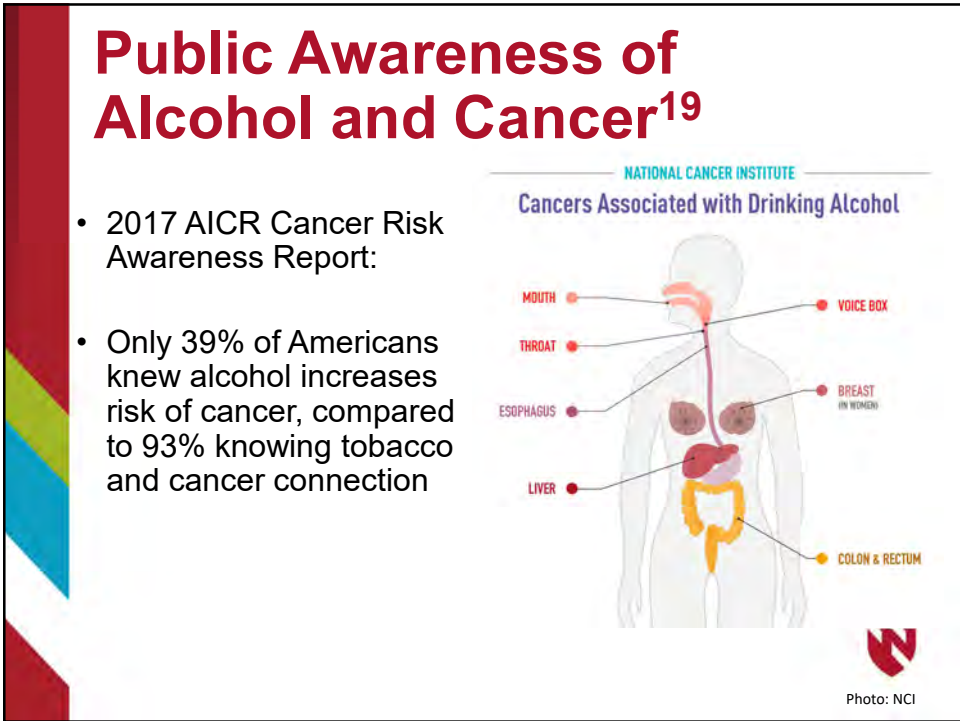


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Cancer and Supplements

- Try to meet nutritional needs through diet alone
- Not an insurance policy—they can't provide the variety and synergy of nutrients and phytochemicals in food
- “Too much of a good thing isn't good”
 - ATBC and CARET trials
- Not enough long-term data



WCRF/AICR (4)

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Supplements- Smart shopping

- Unlike drugs that must be proven safe and effective for their intended use before marketing, there are **no provisions in the law for FDA to approve dietary supplements for safety** before they reach the consumer²¹
- Companies do not have to provide evidence on safety or claims before on market
- **Look for third party verification like USP or NSF**
- Supplements are a ~\$40 billion industry
 - Marketed toward vulnerable populations as a “magic bullet”



Photo: Google images
<https://examine.com/>

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Breastfeeding and Cancer



RECOMMENDATION

For mothers: breastfeed your baby, if you can

Breastfeeding is good for both mother and baby

GOAL This recommendation aligns with the advice of the World Health Organization, which recommends infants are exclusively breastfed¹ for 6 months, and then up to 2 years of age or beyond alongside appropriate complementary foods

- **Strong evidence:** Breast feeding helps protect against breast cancer for mother and excess weight gain for baby
- Breastfeeding has many other health benefits



WCRF/AICR (4)

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Cancer survivor diet recommendations



RECOMMENDATION

After a cancer diagnosis: follow our Recommendations, if you can

Check with your health professional what is right for you

GOAL All cancer survivors¹ should receive nutritional care and guidance on physical activity from trained professionals

GOAL Unless otherwise advised, and if you can, all cancer survivors are advised to follow the Cancer Prevention Recommendations as far as possible after the acute stage of treatment



WCRF/AICR (4)

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What do I share with patients?

- Excess body weight is a cause of several cancers
- Nutrition and healthy lifestyle patterns can decrease risk of cancer and help prevent other NCDs
- Create life-long healthy living patterns and positive relationships with food!



Images: pinterest.com

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Intuitive eating principles

- Reject diet mentality
- Honor your hunger
- Make peace with Food
- Challenge the food police
- Discover the Satisfaction Factor
- Feel your fullness
- Respect your body
- Movement- feel the difference
- Cope with your emotions with kindness
- Honor your health- Gentle Nutrition



Adobe stock photo

Evelyn Tribole, MS, RDN, CEDRD-S
 Elyse Resch, MS, RDN, CEDS-S, Fiaedp, FADA, FAND
<https://www.intuitiveeating.org/>



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- **Help patients make small, achievable goals and work toward bigger ones**
- Every little step helps!
 - Try making half your plate vegetables and fruit every meal twice a week
 - Choose a whole fruit over fruit juice-increase fiber!
 - 3 cans soda to 2 cans soda



Images: smartcaresoftware.com; ilshealth.com

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Questions?



ask the
dietitian



Image: foodallergynorthtexas.org

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