Objectives

- -Review the epidemiology of Western diet and cancer risk
- -Review the effect of obesity on cancer risk and cancer survival
- -Identify strategies to help individuals use a plant-based whole food diet to prevent cancer and improve cancer survival

Epidemiology Describes Four Levels For Cancer Prevention

- **Primordial or Societal Prevention**
  - Avoids the emergence and establishment of social, economic, and cultural patterns of living that are known to contribute to elevated risk of disease
- **Primary Prevention**
  - Controlling causes and risk factors
    - Condoms, needle exchange or vaccine to prevent spread of HIV, HBV or HPV
- **Secondary Prevention** (from onset of disease to normal diagnosis)
  - Develop safe accurate methods of detection (at early curable stage) and development of preventive drugs, vaccines
- **Tertiary Prevention**
  - Reducing ongoing morbidity or mortality once cancer is diagnosed
  - Monitoring for early detection of second primary cancers
  - Modified from Basic Epidemiology, R. Beaglehole, et al, 1993

Western Dietary Pattern

- Sugar (Added sugar, refined grains)
- Unhealthy Fats (sources:meat, processed meat, dairy)
- Absence of Plants
- Associated with physical inactivity

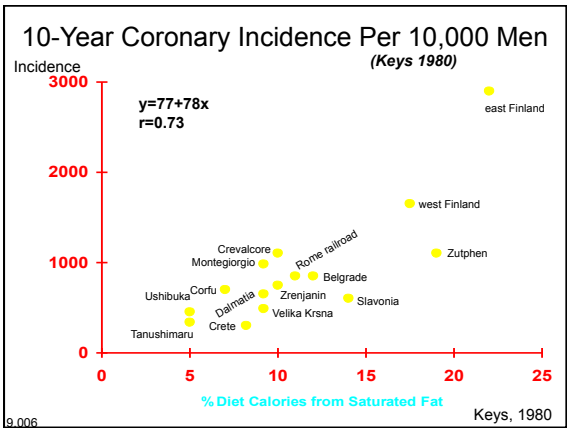
Typical American Plate

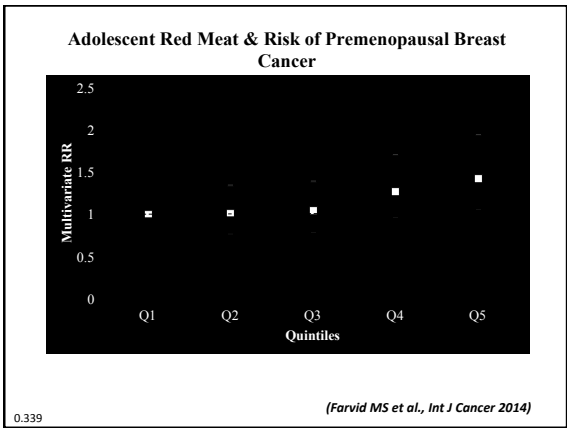
Dietary Patterns

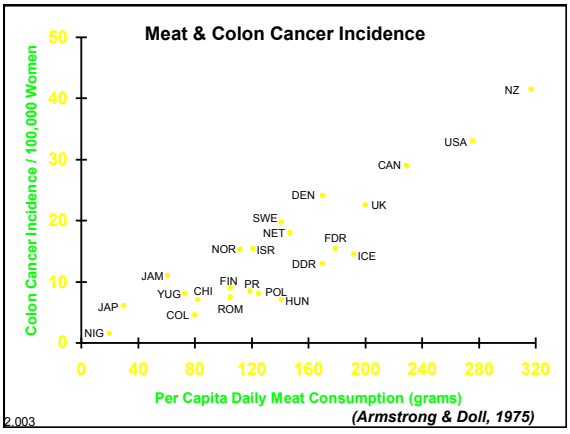
Table D1.32. Composition of three USDA Food Patterns (Healthy U.S.-Style, Healthy Vegetarian, and Healthy Mediterranean-style) at the 2000 calorie level. Daily or weekly amounts from selected food groups, subgroups, and components.

Food group	Healthy US-style Pattern	Healthy Vegetarian Pattern	Healthy Med-style Pattern
Fruit	2 c per day	2 c per day	2 ½ c per day
Vegetables	2 ½ c per day	2 ½ c per day	2 ½ c per day
-Legumes	1 ½ c per wk	3 c per wk	1 ½ c per wk
Whole Grains	3 oz eq per day	3 oz eq per day	3 oz eq per day
Dairy	3 c per day	3 c per day	2 c per day
Protein Foods	5 ½ oz eq per day	3 ½ oz eq per day	6 ½ oz eq per day
--Meat	12 ½ oz eq/wk	--	12 ½ oz eq/wk
--Poultry	10 ½ oz eq/wk	--	10 ½ oz eq/wk
--Seafood	8 oz eq/wk	--	15 oz eq/wk
--Eggs	3 oz eq/wk	3 oz eq/wk	3 oz eq/wk
--Nuts/seeds	4 oz eq/wk	7 oz eq/wk	4 oz eq/wk
--Processed soy	½ oz eq/wk	8 oz eq/wk	½ oz eq/wk
Oils	27 g per day	27 g per day	27 g per day

Source: Food Pattern Modeling report: ***Appendix E-3.7 Developing Vegetarian and Mediterranean-style Food Patterns***







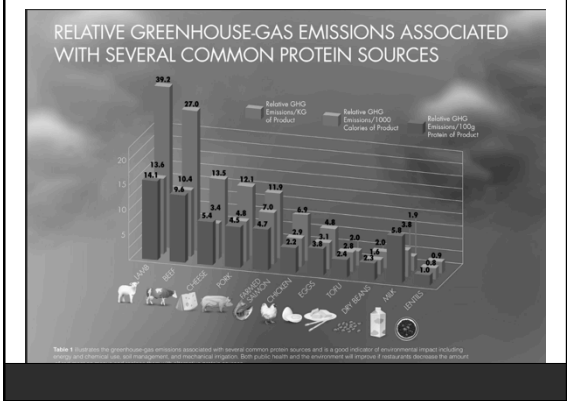
Meat carcinogens

- Heterocyclic amines polycyclic aromatic hydrocarbons formed when cooking meat at high temperatures
- Similar to compounds produced fromlighting a tobacco leaf on fire

TMAO

- choline in eggs, poultry, dairy and fish produces the same toxic TMAO as carnitine in red meat, which may help explain plant-based protection from heart disease and prostate cancer.

Department of Surgery
Division of Public Health Sciences

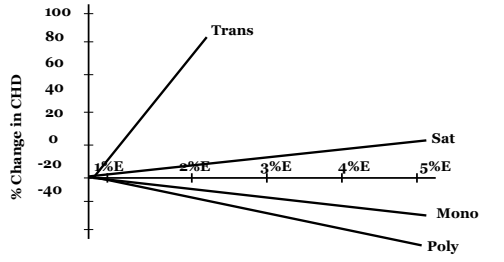


Red Meat

- Greater impact on the environment than any other food in our diet:
- 20 percent of all greenhouse gases are attributable to raising animals for food.
- Most of the meat we consume comes from factory farms,
- where animals are fattened with hormones and antibiotics and routinely subjected to inhumane conditions that breed disease.

AICR: Limit Red Meat Intake

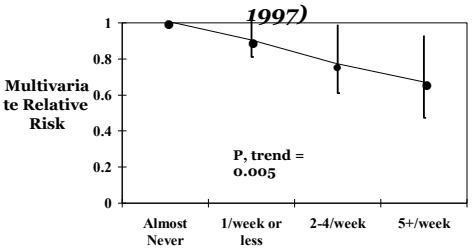
- Limit red meat to 18 ounces per week (includes beef pork and lamb), with a long-term goal of no more than 11 oz/week.
- Avoid processed meats
- "Processed meat" refers to meats preserved by smoking, curing or salting, or by the addition of preservatives (ham, bacon, pastrami, salami, hot dogs and sausages.
- When meat is preserved by smoking, curing or salting, or by the addition of preservatives, cancer-causing substances (carcinogens) can be formed. These substances can damage cells in the body, leading to the development of cancer.



(Hu et al. 1997)

9.131

Nut Consumption and Risk of Coronary Heart Disease (NHS, 1980-1994) *(Hu et al. 1997)*



Frequency of Nut Consumption

9.127

Diet and Fatal Prostate Cancer in SDA Men, 1960-1980 (n = 99 cases)

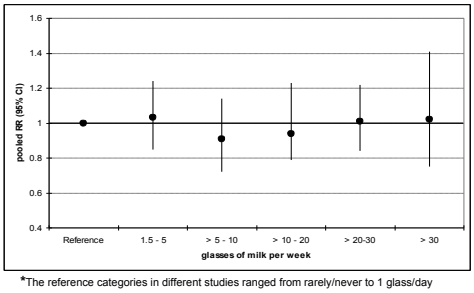
(Snowdon et al, 1984)

Milk		
<1 glass/day	**1.0**	
1-2 glasses/day	**1.8**	**(1.0-3.0)**
3+ glasses/day	**2.4**	**(1.3-4.3)**

p trend = 0.005

3.020

Pooled Analysis of Categories of Milk Intake* & Hip Fractures in Women (All Studies)

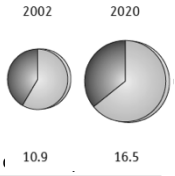


*The reference categories in different studies ranged from rarely/never to 1 glass/day

(Bischoff-Ferrari et al.)

24.056

Overview



2012 – 14 M cases

1.7 M breast

I. Burden – growing

II. Barriers to breast

III. Drivers of breast

IV. Focusing breast cancer prevention

V. Steps we can take *now*

II. Barriers to breast cancer prevention

1. *Skepticism* that cancer can be prevented
2. *Short-term* focus of research
3. *Timing*: Interventions too late in life
4. Research focused on treatment not prevention
5. Debates among scientists
6. Societal factors ignored
7. Lack of transdisciplinary training
8. Complexity of implementation

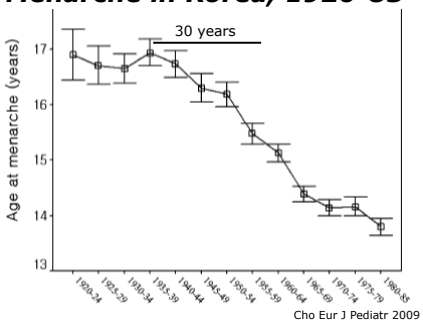
Colditz et al. Sci Transl Med 2012: March 28

Generally accepted breast ca. prevention strategies

Strategy	Risk group	% US pop	Risk reduction
Bilateral oophorectomy	BRCA1/2	<1%	50% ↓
Tamoxifen / Raloxifene	>1.67% 5-yr risk	10-40%	50% ↓
Weight loss (22lb)	Overweight + obese	60%	50%* ↓
Stopping estrogen & progestin Rx	Past vs. current	1-5%	10% ↓

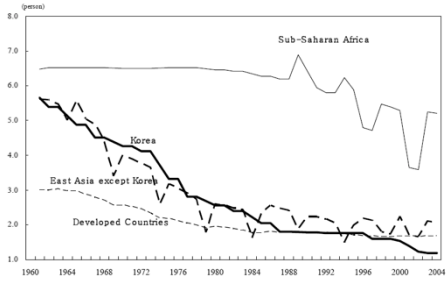
* Loss after menopause based on Eliassen et al. JAMA, 2006; Colditz & Bohlke 2014

Within-country change: Menarche in Korea, 1920-85



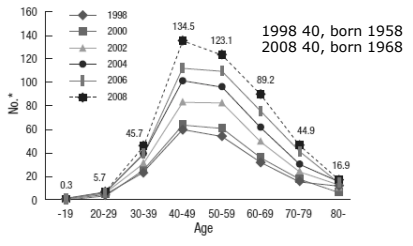
Cho Eur J Pediatr 2009

Within-country change: Fertility, 1960-2004



Ito et al. NEBR, 2008

Within-country change: Breast cancer incidence, Korea



Jung et al. J Breast Ca, 2011

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden

Barriers
1. Skepticism
2. Short-term
3. Timing

Drivers

Focusing prevention

Steps we can take *now*

Barrier 3: ***Timing*** – focusing

research and current prevention on the period around diagnosis when breast cancer develops over decades

Majority of etiologic studies focus on lifestyle and drugs months before diagnosis

- Epidemiology of breast cancer focuses predominantly on postmenopausal women
- Prevention trials in women at high risk of developing breast cancer within 5 years

This focus distracts us from understanding when risk accumulates and what drives risk

See Colditz, Bohlke, Berkey Br Ca Res Tr 2014

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden

Barriers
1. Skepticism
2. Short-term
3. Timing

Drivers

Focusing prevention

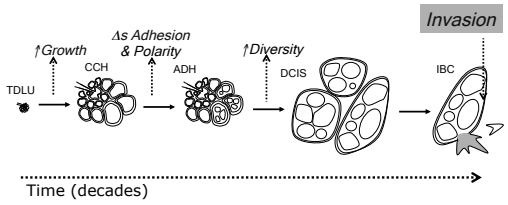
Steps we can take *now*

Life-course development of risk accumulation

- Long-term effects of early radiation
- Menopause – cessation of menstrual cycles leads to slower risk accumulation
- Menopause tells us hormones or accumulation through premenopausal years must be important
- Menarche and height point to early life as important

Model of breast cancer development

Wellings-Jensen Model (JNCI 55:231, 1975)
Adapted from Allred



Challenges and Opportunities in Breast Cancer Prevention

Cancer burden

Barriers
1. Skepticism
2. Short-term
3. Timing

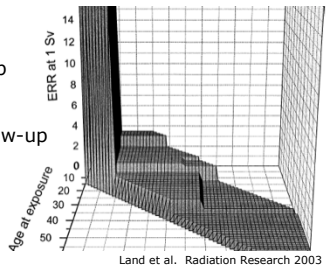
Drivers

Focusing prevention

Steps we can take *now*

Long-term effects of radiation in early life

Atomic bomb survivors,
70,165
40 year follow-up
1059 cases



Land et al. Radiation Research 2003

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden

Barriers

Drivers

Focusing prevention

Steps we can take *now*

III. Drivers of breast cancer

- Progression through premalignant lesions as risk accumulates
- Faster rise in risk before menopause than after
- Hormonal cycling during premenopausal years
- Peak height growth velocity
- Diet and physical activity

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden

Barriers

Drivers

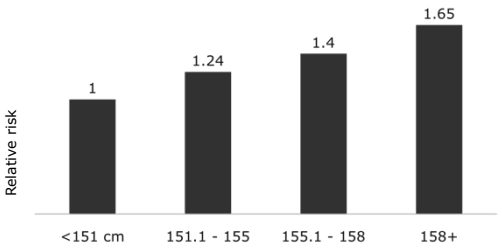
Focusing prevention

Steps we can take *now*

Within-country change: Height in Korea, 1920-90

Hwang Ann Hum Biol 2003

Height and relative risk of breast cancer incidence in Korea – 339,000 women, 1994-2004



Sung J, et al. AJE 2009

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Understanding growth velocity (Stuart study)

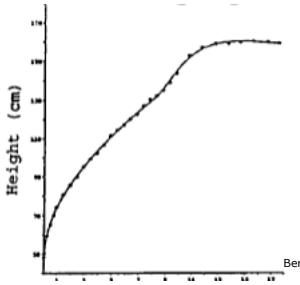
Harvard Growth Study (HGS)
Females born in 1930s and 1940s, followed to age 18

- Age at menarche recorded to month
- Annual height measurements (identify year in which girl experienced most rapid adolescent height growth)
- Mother interviewed annually on dietary intake over past 6 months while child being examined/ measured, etc.

Challenges and Opportunities Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Growth curve of one girl, HGS Peak height velocity = amount of greatest height gain in a single year



Berkey et al. Cancer 1999

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Predictors measured from birth through age 5, HGS

Age at menarche =
12.8 (0.12) – 0.38 (0.12)height at age 3 to 5yr
+ 2.19 (0.91) vegetable protein ages 3 to 5 yr.

Peak height growth velocity =
14.2 + 4.25 (1.07) calories – 0.39 BMI ages 3 to 5yr + 2.08 (0.95) animal protein ages 3 to 5yr

Results consistent when repeated for exposures at age 10

Berkey, …, Colditz AJE 2000; 152:446-52

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Milk and growth velocity

Previously published from GUTS

- Higher growth velocity increased risk of BBD (Berkey)
- Also, increased risk of pre and postmenopausal breast cancer
- Milk intake positively related to increase in peak height growth velocity (Berkey CEBP 2009)

Now, meta-analysis of 12 controlled trials

- 0.4cm per year additional height growth for each 8oz (cup) of milk consumed

De Beer. Dairy products and physical stature. Economics and human biology 2012;10:299-309

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Applying peak height growth velocity: Nurses' Health Study and adolescent cohort (GUTS)

Higher peak height growth velocity (PHGV) associated with increased risk of pre and post menopausal breast cancer

- Highest vs. lowest quintile of PHGV; 8.9cm/yr vs. ≤7.6 cm/yr;
  - RR=1.31 premenopausal breast cancer
  - RR=1.40 postmenopausal breast cancer

For Benign Breast Disease same range in PHGV gave RR = 2.10

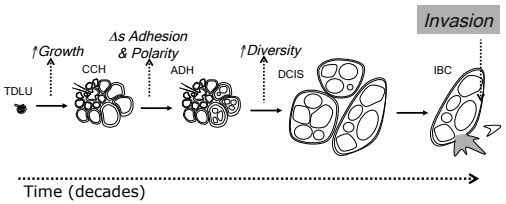
Berkey et al. Cancer 1999 & 2011

Milk Type Drives Establishment of Infant Gut Microbiota

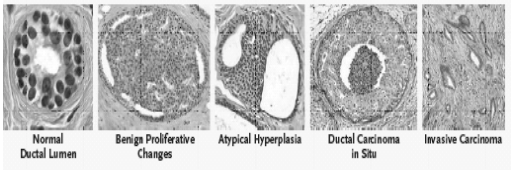
- In the absence of maternal breast milk (MBM), pasteurized donor human milk (PDHM), or infant formula (IF) is fed to preterm infants
- Microbome of preterm infants fed MBM, PDHM, and IF characterized by distinct patterns of bacterial species
- The bacterial communities are dynamic

Model of breast cancer development

Wellings-Jensen Model (JNCI 55:231, 1975)
Adapted from Allred



Intermediate markers: benign breast disease (BBD)



RR = 1.8 = 3 to 5

London et al. JAMA et al 1989

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

IV. Focusing breast cancer prevention

Understanding what predicts incidence of benign breast disease

NHSII – incident BBD (RO1-CA50385)

- Central pathology review
- Components of adolescent lifestyle:
  - Diet including alcohol
  - Physical activity

GUTS, Growing Up Today Study

- Prospective data collected
- Self-report benign breast disease confirmed by breast biopsy

Alcohol

A known breast carcinogen

IARC 2007

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Alcohol intake, ages 18-22, incident proliferative BBD, NHSII

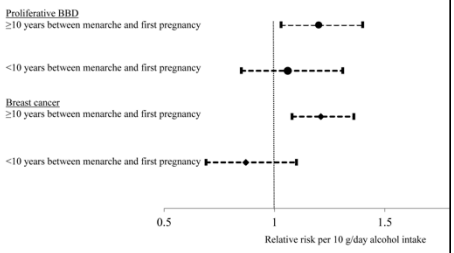
Alcohol intake (grams/ day)	Cases (678)	Person-year	RR (95% CI)
None	155	64,827	1.0 reference
0.1-4.9	193	78,365	1.11 (0.89, 1.38)
5.0-14.9	236	88,310	1.36 (1.09, 1.69)
≥15	30	9519	1.35 (1.01, 1.81)
			p_{trend} <0.01

Liu et al. – Pediatrics, 2012

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Alcohol before first pregnancy, NHSII



Liu, Colditz, Tamimi JNCI 2013

Vegetable protein intake

Surrogates – soy, fiber, fruit and vegetables

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Soy Asia vs. USA

Daily Isoflavone Intake United States vs. Asia

0mg — 30mg

"High" US intake

"Low" Asia intake

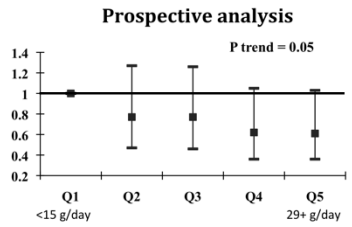
The highest soy intake in the United States (measured by isoflavone intake) is well below the lowest intake in Asia

Wu et al. 2008

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Adolescent fiber & proliferative BBD: NHSII



Su et al. Cancer Causes Control 2010

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

BBD, GUTS cohort

112 women confirmed biopsy for benign breast lesion

6950 free from biopsy

FFQ at entry 1996, then 1997, and 1998

- Peanut consumption (peanut butter and bags of peanuts) significantly inverse
- Total servings of vegetable per day inversely related to risk of BBD

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Cumulative dietary intake 1996 to 1998 and risk of BBD

Dietary intake	Mean intake	OR	95% Confidence Interval
Vegetable protein (10gm/d)	24 g	0.86	0.55-1.34
Vegetable fat (10gm/d)	33 g	0.72	0.52-0.98
Peanut butter and bags of peanuts (servings/3d)	0.52	0.56	0.35-0.87
Beans, lentils, soybeans (servings/3d)	0.24	0.95	0.55-1.62
Corn (servings/3d)	0.40	0.73	0.37-1.43
Total servings per day of peanut butter, bags of nuts, beans, lentils, soybeans, and corn	0.38	0.33	0.13-0.82

Multivariable adjusted models include childhood adiposity, age at menarche, adolescent alcohol intake, and pregnancy (ever). Berkey et al. Breast Ca Res Treat, 2013

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Ontario, Canada: Population-based case-control study

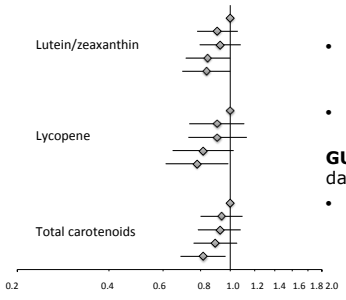
Recall of adolescent diet
- (55 food items)

High participation
- (2865 cases, 3299 controls)

Top vs. bottom quintile of intake
- Fiber mvOR = 0.66 (0.55 - 0.78)
- Vegetable protein mvOR = 0.80 (0.68 – 0.95)
- Nuts mvOR = 0.76 (0.61 - 0.95)

Liu, Y., Colditz, et al. Breast Cancer Res Treat 2014.

Carotenoids Breast Ca. & BBD

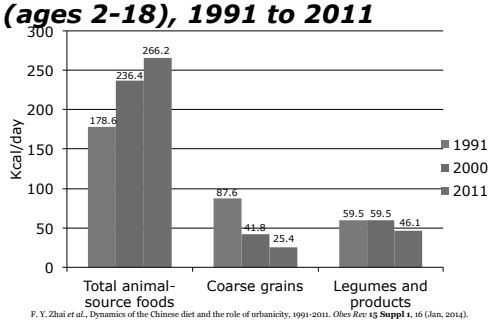


- 3055 prospective cases breast and controls with bloods stored
- Total carotenoids: 19% lower risk

GUTS Prospective diet data (Boeke Peds 2014)
- Beta-carotene, Alpha-carotene, Lutein all inversely related to risk of incident BBD

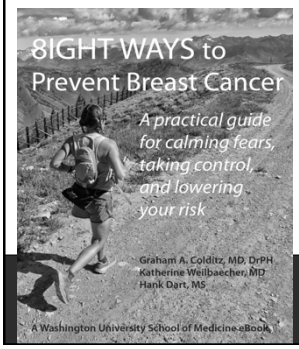
Eliassen, et al. *J Natl Cancer Inst* 2012

Food consumption trends in China (ages 2-18), 1991 to 2011



F. Y. Zhai *et al.*, Dynamics of the Chinese diet and the role of urbanicity, 1991-2011. *Obes Rev* **15 Suppl 1**, 16 (Jan, 2014).

Physical activity



Challenges and Opportunities in Breast Cancer Prevention

Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

Summary of evidence: Adolescent exposures -- BBD

Lifestyle	Relative Risk BBD
Alcohol	
Peak Growth Velocity	
height	
Nuts	
Fiber	
Carotenoids	
Vegetable protein	
Family history	
Physical activity	

Challenges and Opportunities in Breast Cancer Prevention

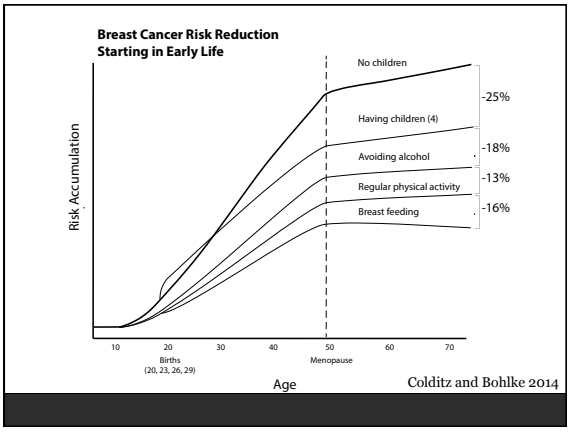
Cancer burden
Barriers
Drivers
Focusing prevention
Steps we can take *now*

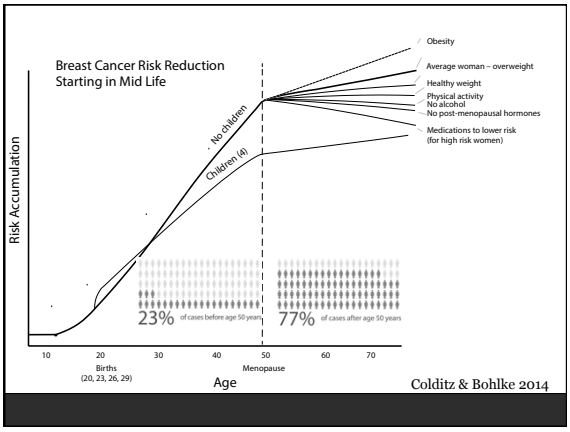
V. <u>Steps</u> we can take *now* to prevent breast cancer

Target prevention early in life
- Eat mostly a plant-based diet
- Limit alcohol before first pregnancy
- Increase and maintain physical activity

Work globally and locally

Refine messaging and social strategy





Challenges and Opportunities in Breast Cancer Prevention

- Cancer burden
- Barriers
- What drives breast cancer?
- Focusing prevention
- Step to take *now*

A global prevention imperative

Timing matters

- To maximize benefits we must focus on biologically relevant periods
- Identify lifestyle factors that limit the impact of drivers
- Tap potential benefit from childhood and adolescent plant diet and physical activity
  - What intermediate marker can we measure?

Must identify strategies to counter adverse effect of alcohol

Challenges and Opportunities in Breast Cancer Prevention

- Cancer burden
- Barriers
- Drivers
- Focusing prevention
- Steps we can take *now*

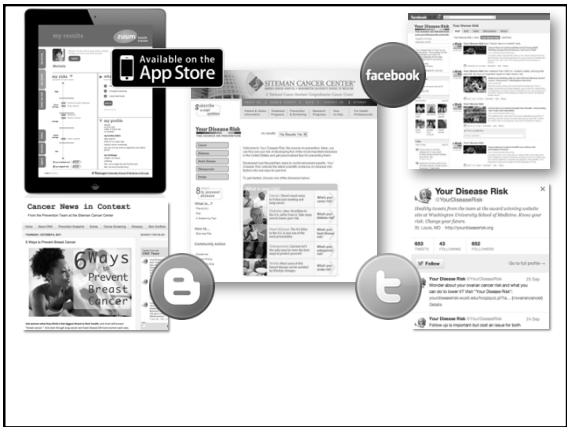
Messages for 16 to 30 year old women and their families and communities

Go big with plant based foods – fruits, beans, vegetables, nuts, and whole grains

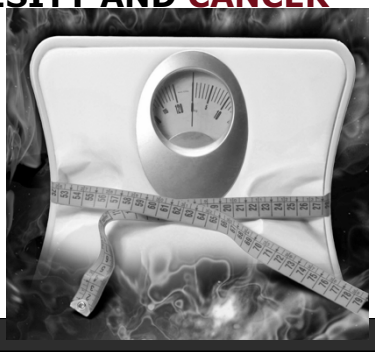
Think before you drink

Put on those Dancing – and Walking and Running and Cycling shoes

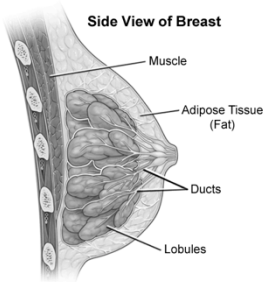
Don't obsess – but watch your weight



OBESITY AND CANCER



Female Breast Anatomy

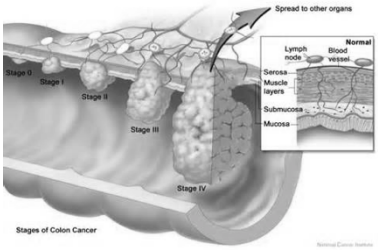


The bulk of the breast tissue is adipose tissue interspersed with connective tissue

Breast ducts comprise only about 10% of the breast mass

- lobes
- ducts
- lymph nodes

STAGES OF COLON CANCER

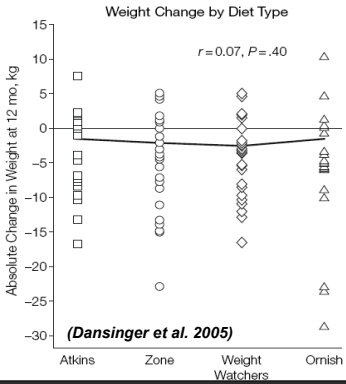


Watch Your Weight!

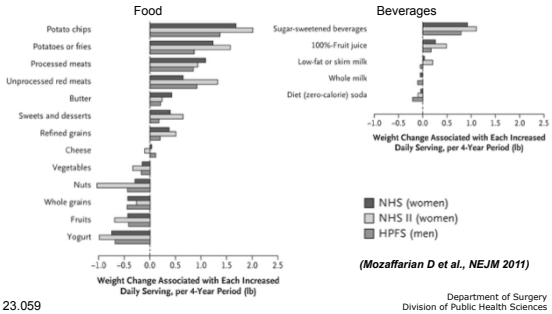
- **65% of Americans are overweight or obese.**
- **Only 6% of Americans identify being overweight or obese as a risk factor for cancer despite a clearly established scientific link.**
- **Research shows that fat cells can act as "hormone pumps," secreting hormones and other growth factors into the bloodstream.**
- **If the body's cells are exposed to very high levels of these substances over an extended period, they tend to reproduce more quickly → ? Increase cancer cell growth.**
- **Researchers stress that this potentially dangerous condition is reversible!**

How Does This Impact Weight Control?

- It **is** about calories, not a magic protein vs. carbohydrate formula
- Obesity became an epidemic in the U.S. at the same time portion sizes grew
- Now "value meals" and "super sizes" are commonplace
- Average calorie intake per day of Americans has risen from 1,854 to 2,002 over the last 20 years – 148 calories/day, which is estimated to add an extra 15 pounds per year (2)



Changes in Food and Beverage Consumption and Weight Changes Every 4 Years According to Study Cohort



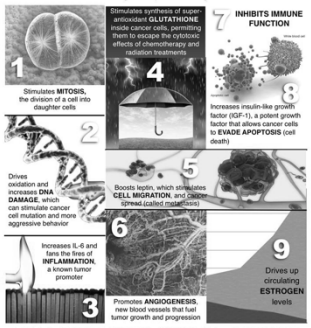
(Mozaffarian D et al., NEJM 2011)

Department of Surgery
Division of Public Health Sciences

9 Ways Sugar Impacts Cancer

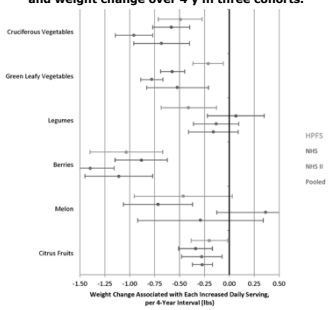
Are you eating too many carbs? Sweets and starches—even "healthy" whole-grains—can lead to insulin resistance, which impacts cancer several ways. Let us show you how to find the right amount of carbs for your body's metabolism.

Evidence-based nutrition consulting for cancer patients and oncologists worldwide since 1997.



Exp Diabetes Res, 2012:789174. • *Am J Pathol*, 2006 Nov;169(5):1505-22. • *Clin Cancer Res* 2012;18(20):5585-94.

Fig 2. Relationships between changes in intake of classes of vegetables and fruits and weight change over 4 y in three cohorts.



Bertoia ML, Mukamal KJ, Cahill LE, Hou T, Ludwig DS, et al. (2015) Changes in Intake of Fruits and Vegetables and Weight Change in United States Men and Women Followed for Up to 24 Years: Analysis from Three Prospective Cohort Studies. PLoS Med 12(9): e1001878. doi:10.1371/journal.pmed.1001878
http://127.0.0.1:8081/plosmedicine/article?id=info:doi/10.1371/journal.pmed.1001878

Physical activity and Cancer: Critical for weight control, growth hormone regulation, stress management, counteract fatigue, support immune system , etc:

- New Guidelines from the Dept of Health & Human Services

  Minimum 150 min moderate, or 75 min vigorous to reduce risk of chronic disease
  - Ideally aim for more – and necessary if weight loss and maintenance of loss is the goal – 300 min of moderate or 150 minutes of vigorous.

- Physical activity linked to lower risk of breast, prostate and colorectal cancer

GOD'S ORIGINAL DIET

And God said, Behold, I have given you every herb bearing seed, which is upon the face of all the earth, and every tree, in the which is the fruit of a tree yielding seed; to you it shall be for meat.
Genesis 1:29

Donut vs.Orange

- 200 calories
- 10 grams sugar
- 0 grams fiber
- 0 phytonutrients

- 62 calories
- 12 grams sugar
- 3 grams fiber
- 170 phytonutrients

Food First

- 75% of Americans don't eat "5 a day"
- Americans eat 1.5 servings of vegetables & less than 1 serving of fruit daily, despite consistent evidence that these foods decrease the risk of many chronic diseases.
- We throw away more than 11 billion pounds of fruits and vegetables every year in the US!!
- Americans spent $26.7 billion per year on dietary supplements in 2009 despite limited and inconclusive scientific evidence of effectiveness in disease prevention and

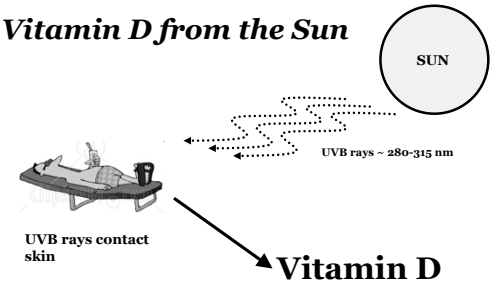
- U.S. Department of Agriculture, finds that potatoes now make up 30 percent of the vegetables grown and processed for Americans each year, while tomatoes make up 22 percent.
- Toss in lettuce (7 percent), and these three vegetables comprise 59 percent of the vegetables grown for and distributed to Americans, according to 2013 USDA data.
- Too little variety means too few nutrients
- may not be getting the full range of nutrients offered by a wide variety of vegetables.

FRENCH FRIES OR CANCER FRIES?

French fries are made with hydrogenated oils and then fried at high temperatures (80X more fat). They also contain cancer-causing acryl amides which occur during the frying process.

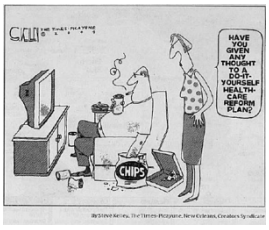
Prudent Diet

Vitamin D from the Sun

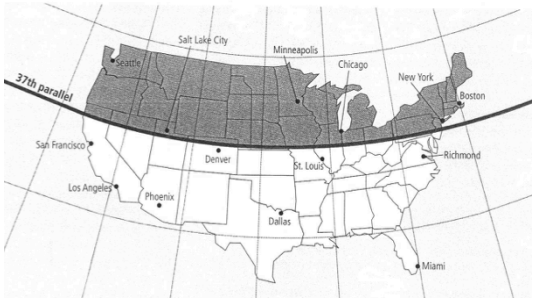


Humans are designed to make vitamin D when skin is exposed to sunlight.

Holick, Ann NY Acad Sci, 435:1-13, 1985

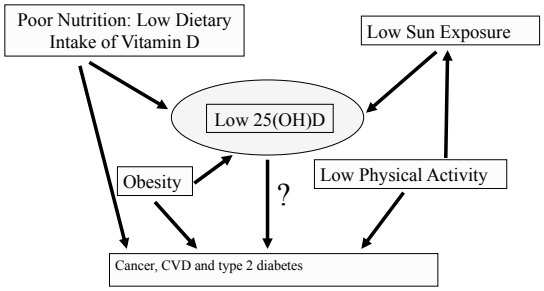


Wintertime Vitamin D Production in the Northern U.S.

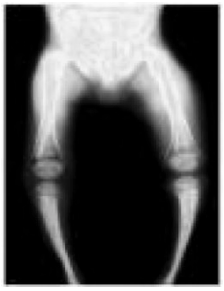


Except during the summer, people who live at latitudes above ~37 degrees north in the U.S (shaded region) or below about 37 degrees south of the equator don't get enough UVB exposure to make all the vitamin D they need.

Potential Sources of Confounding in the Relationship between Serum 25(OH) Vitamin D and Health Outcomes

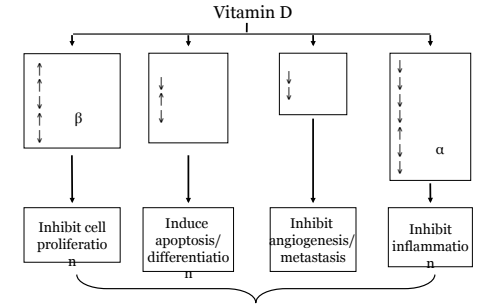


Classic Skeletal Effect of Vitamin D Deficiency: Rickets



Courtesy: Institute of Medicine, National Academies

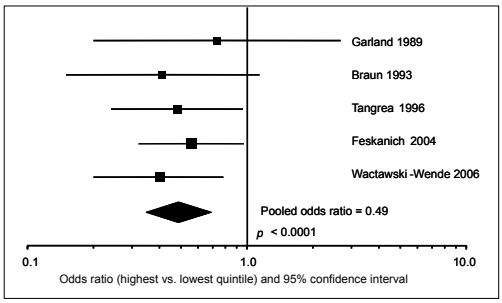
Mechanisms by which Vitamin D May Lower Cancer Risk



(↑ = increase, ↓ = decrease expression or level)

Source: Adapted from Manson JE, et al. *Cont Clinical Trials*, 2011.

Serum 25(OH)D and Risk of Colorectal Cancer



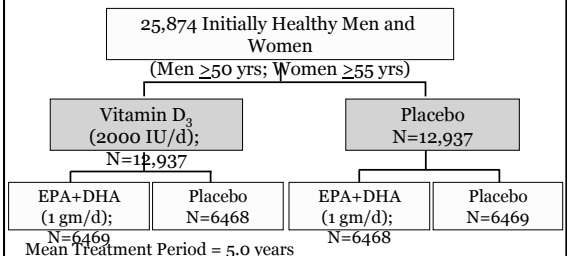
Source: Gorham, et al. *Am J Prev Med* 2007; 32:210-216.

Vitamin D and Cancer: Summary of Findings from Observational Studies

	Colorectal Cancer	Prostate Cancer	Breast Cancer	Total Cancer
Ecologic (UV-B)	↓↓	↓	↓	↓
Vitamin D intake	↓↓	0	↓	↓
Circulating 25 (OH)D	↓↓	↓	↓	↓

↓↓=strong protection; ↓=suggestive protection; 0=sparse or inconclusive data

The *VIT*amin D and Omeg*A*-3 Tria*L* (*VITAL*): Design

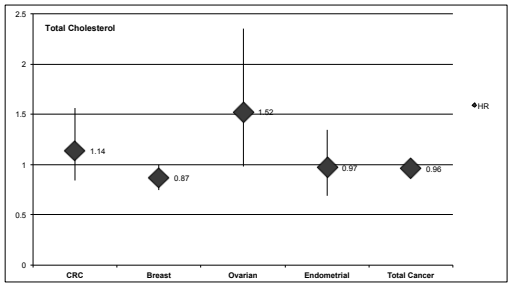


Mean Treatment Period = 5.0 years
5107 African Americans
Blood collection in ~16,954, follow-up bloods in ~6000
Primary Outcomes: Cancer (total) and CVD (MI, stroke, CVD death)

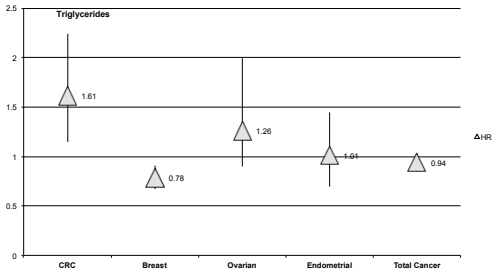
Women's Health Study

- The **Women's Health Study (WHS)** was a randomized clinical trial of vitamin E and low-dose aspirin among 39,876 US women (1993-2004), that continues today as an observational cohort.

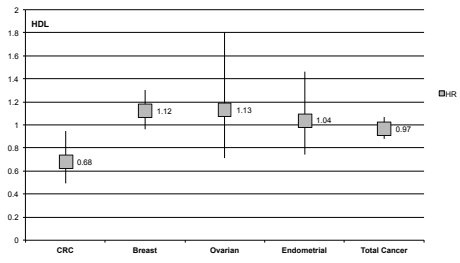
Total Cholesterol and Incident Cancer



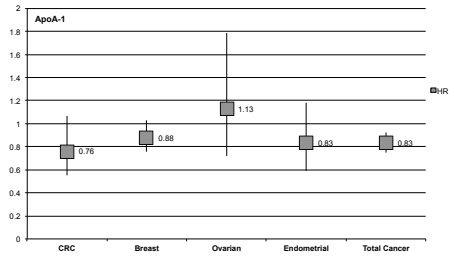
Triglycerides and Cancer Incidence



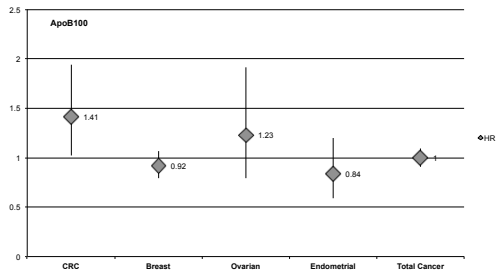
HDL and Incident Cancer



Apo A1 and Incident Cancer



ApoB100 and Incident Cancer



How to Upregulate Metabolism

- the enzyme that uses carnitine to help us burn fat, carnitine palmitoyl transferase, is actually upregulated by about 60% in those eating meat-free diets, which may help explain why those eating plant-based diets tend to be slimmer

Western Diet versus Prudent Diet

- WD (high in lean meat, poultry, fish, solid fat, oils, cheese, processed meats, refined grains, white potatoes, and added sugars) and Prudent dietary pattern (PD) (high in fruits and vegetables)

Insulin and Cancer

- Excess insulin can promote tumor cell growth
- Behaviors that increase insulin levels
  - Consumption of refined sugar and flour
  - Overeating
  - Weight gain
  - Sedentary lifestyle
- Behavior that reduces insulin levels
  - Physical activity, weight loss, unrefined carbs

Lower fasting insulin level at time of breast cancer diagnosis is associated with improved survival.
Mulligan et al. Breast Ca Res Treat. 2007 Jan 13

What About Soy?

- Whole soy foods may help prevent:
  - Breast cancer
  - Colon cancer
  - Prostate cancer
  - Bladder caner
  - Heart disease
  - Osteoporosis
- Issue is phytoestrogens→ up to 1000 x weaker than estradiol
- Soy sauce, soy lecithin and soy oil contain no phytoestrogens
- **Caution** for people with ER+ breast cancer → **avoid soy isosflavones**

Whole soy foods are fine *in moderation*

What about women who have had breast cancer?

- Two recent studies of Asian women showed reduced risk of recurrence with higher dietary intake of soy foods/isoflavones:

Effect of soy isoflavones on breast cancer recurrence and death for patients receiving adjuvant endocrine therapy, Kang X et al, CMAJ. 2010 Oct 18

= 534 women with medium follow up of 5.1 years

Soy food intake and breast cancer survival, Shu XO et al, JAMA. 2009 Dec 9: 302(22):2483-4

Aim to get some protein from plants as well - legumes, nuts, seeds, quinoa

FRENCH FRIES OR CANCER FRIES?

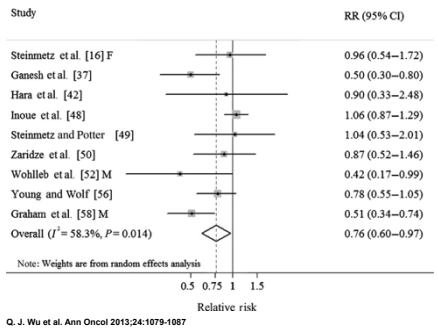
French fries are made with hydrogenated oils and then fried at high temperatures (80X more fat). They also contain cancer-causing acryl amides which occur during the frying process.

Change Your Oil

1. Broccoli

- Most attention as a breast cancer prevention food
- Research has shown it blocks tumor growth, preventing the further spread of cancer if it does occur
- anti-cancer benefit from other cruciferous veggies, including cauliflower, cabbage, Brussels sprouts, and kale - eat one or more of these vegetables every day

Forest plot (random-effect model) of cabbage consumption and colorectal cancer risk.



Q. J. Wu et al. Ann Oncol 2013;24:1079-1087

2. Garlic

•Garlic seems to have an impact on cell cycling (process by which a normal, healthy cell might become cancerous)

•Credit for regulating this goes to the component of garlic called **allyl sulfide** Allyl sulfides are found throughout the onion family

•Prevents breast cancer

3. Apples

An apple a day may keep cancer away — but there's a catch.

•Peeling apple-tossing away a rich source of fiber, antioxidants, and other compounds needed for anti-cancer nutrition.

•Lab studies show that apple peel can actually fight the spread of cancer cells.

4. Pomegranates

•Early stages research

•Cell culture study suggests that the fruit contains a compound that might help fight cancer's growth — especially estrogen-dependent cancers (breast, endometrium).

•Also help fight heart disease and prostate cancer.

5. Walnuts

•Walnuts contain many helpful nutrients and healthy ω-3 fatty acids, which help your body fight inflammation

•Research also suggests that walnuts may actually slow the growth of breast cancer tumors, so this tasty nut could play a role in breast cancer management even after diagnosis

6. Flaxseed

•Flaxseed oil, or the seed itself, ground into a flour-like dust
•Milled flaxseed has a component called **lignans**
•Lignans may decrease cancer growth; perfect for a breast cancer management diet
•Buy ground flaxseed or grind the seeds using a coffee grinder, then sprinkle the flaxseed on salads or in muffins

8. Soybeans

•Mixed reviews regarding adult breast cancer prevention, but preteen girls could eat two servings of soybean products a day, and get anti-cancer nutrition benefits later in life

•On the other hand, against adult women taking soy or isoflavone supplements these products contain estrogen-like compounds

9.Orange Fruits and Vegetables

•Carrots, cantaloupe, and sweet potatoes — foods rich in the form of vitamin A – carotenoids (and 600 different carotenoids)

•Higher levels of carotenoids in a bloodstream- lower risk for breast cancer

•Increase intake of orange, red, yellow, and even dark green foods

10. Berries

•Blueberries, blackberries, raspberries, and strawberries add color, variety, and flavor

•Also power-packed with vitamins, minerals, and antioxidants

•Recent research suggests that blueberries enhance the effect of the often-prescribed drug tamoxifen in fighting breast cancer cells.

12. Turmeric

•The spice that gives curry its beautiful yellow color contains a chemical called curcumin

•Lab studies using curcumin supplements have shown that it could play a role in helping fight tumors when combined with certain drug-based therapy

•Also anti-inflammatory effect that could protect overall health

AICR Global Report Recommendations:

1. Be as lean as possible without becoming underweight.

2. Be physically active for at least 30 minutes every day.

3. Avoid sugary drinks. Limit consumption of energy-dense foods. → due to correlation with obesity

4. Eat more of a variety of vegetables, fruits, whole grains and legumes such as beans.

5. Limit consumption of red meats (such as beef, pork and lamb) and avoid processed meats. → 11 – 18 oz per week max

AICR Global Report Recommendations (continued):

6. If consumed at all, limit alcoholic drinks to 2 for men and 1 for women a day. → 12 oz beer, 5 oz wine, 1.5 oz spirits

7. Limit consumption of salty foods and foods processed with salt (sodium).→ stomach cancer (also moldy foods due to liver cancer in developing countries)

8. Don't use supplements to protect against cancer.

9. * It is best for mothers to breastfeed exclusively for up to 6 months and then add other liquids and foods. → reduce breast cancer in mom and obesity in child

10. * After treatment, cancer survivors should follow the recommendations for cancer prevention.
*Special Population Recommendations

Challenges and Opportunities in Breast Cancer Prevention

Cancer burden

Barriers

Drivers

Focusing prevention

Steps we can take *now*

Thank you

- Graham Colditz,Bernie Rosner & Cathy Berkey (statisticians)
- Stu Schnitt, Laura Collins, Jim Connolly, Craig Allred (pathologists)
- NHS/WUSTL/Cancer Care Ontario investigators and trainees and participants
- American Cancer Society Clinical Research Professorship
- NCI & Breast Cancer Research Foundation for funding