



Nutrition and Cancer: Do's and Don't's

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Donald I. Abrams, MD Disclosures

- ▶ Scientific Advisor to:
 - ▶ Cannformatics
 - ▶ Clever Leaves
 - ▶ Lumen
 - ▶ Maui Wellness Group
 - ▶ Wellkasa

- ▶ Received Honoraria from:
 - ▶ GW Pharmaceuticals for lecture
 - ▶ L-Nutra for expert consultation
 - ▶ Metagenics Australia for lectures

The Weed and the Garden



Cancer is like a weed. Someone else is taking care of your weed. It's my job to make your soil as inhospitable as possible to growth and spread of the weed.

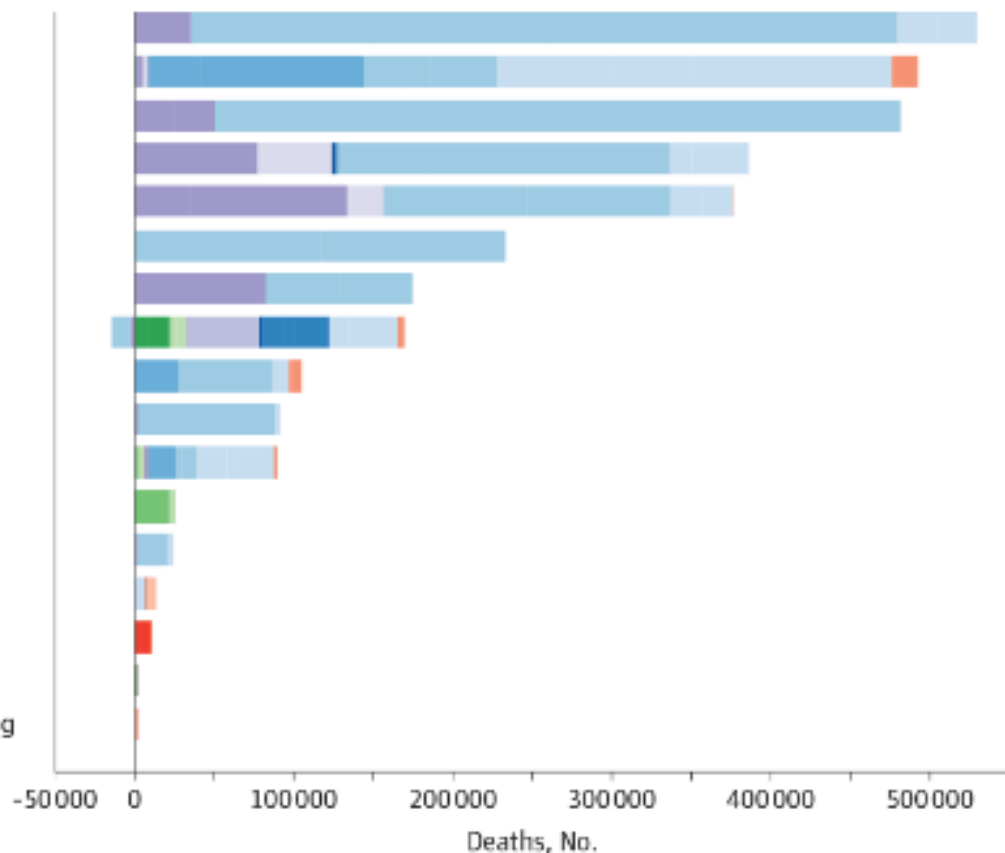
From: **The State of US Health, 1990-2016 Burden of Diseases, Injuries, and Risk Factors Among US States**

JAMA. 2018;319(14):1444-1472. doi:10.1001/jama.2018.0158

A Risk factors and related deaths

Risk factors

- Dietary risks
- Tobacco use
- High systolic blood pressure
- High body mass index
- High fasting plasma glucose
- High total cholesterol
- Impaired kidney function
- Alcohol and drug use
- Air pollution
- Low physical activity
- Occupational risks
- Low bone mineral density
- Residential radon and lead exposure
- Unsafe sex
- Child and maternal malnutrition
- Sexual abuse and violence
- Unsafe water, sanitation, and handwashing



Communicable, maternal, neonatal, and nutritional diseases

- HIV/AIDS and tuberculosis
- Diarrhea, lower respiratory tract, and other common infectious diseases
- Maternal disorders
- Neonatal disorders
- Nutritional deficiencies
- Other communicable maternal, neonatal, and nutritional diseases

Noncommunicable diseases

- Neoplasms
- Cardiovascular diseases
- Chronic respiratory diseases
- Cirrhosis and other chronic liver diseases
- Digestive diseases
- Neurological disorders
- Mental and substance use disorders
- Diabetes, urogenital, blood, and endocrine diseases
- Musculoskeletal disorders
- Other noncommunicable diseases

B Risk factors as a percentage of disability-adjusted life-years

Risk factors

14 Components of Dietary Risk

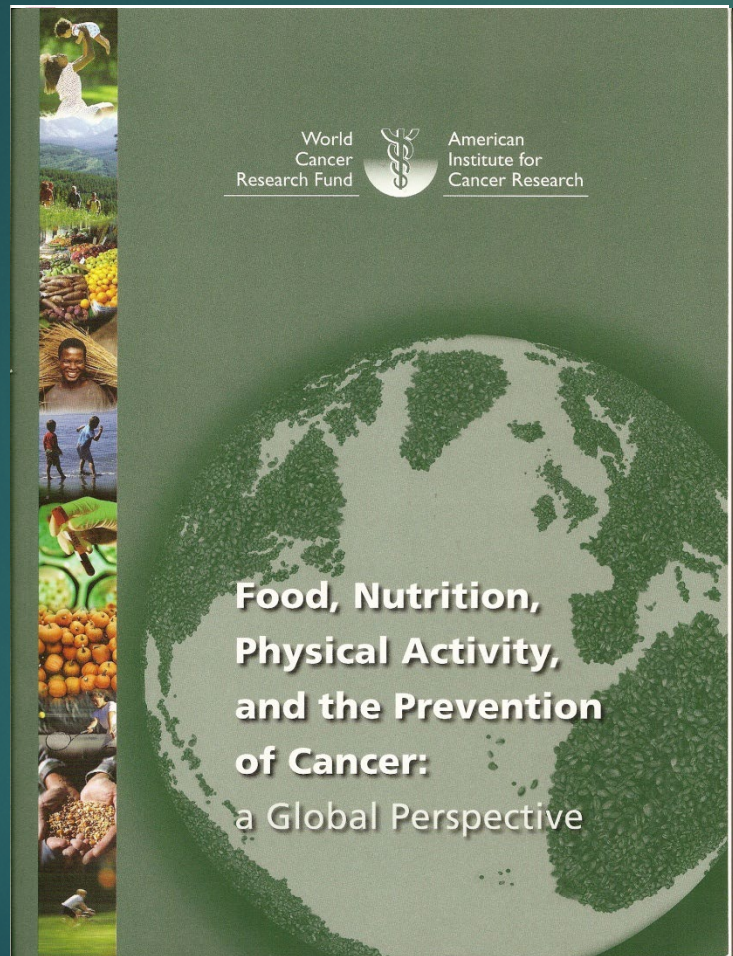
▶ Diets low in:

- ▶ Fruits
- ▶ Vegetables
- ▶ Whole grains
- ▶ Nuts and seeds
- ▶ Milk
- ▶ Fiber
- ▶ Calcium
- ▶ Seafood omega 3s
- ▶ PUFA's

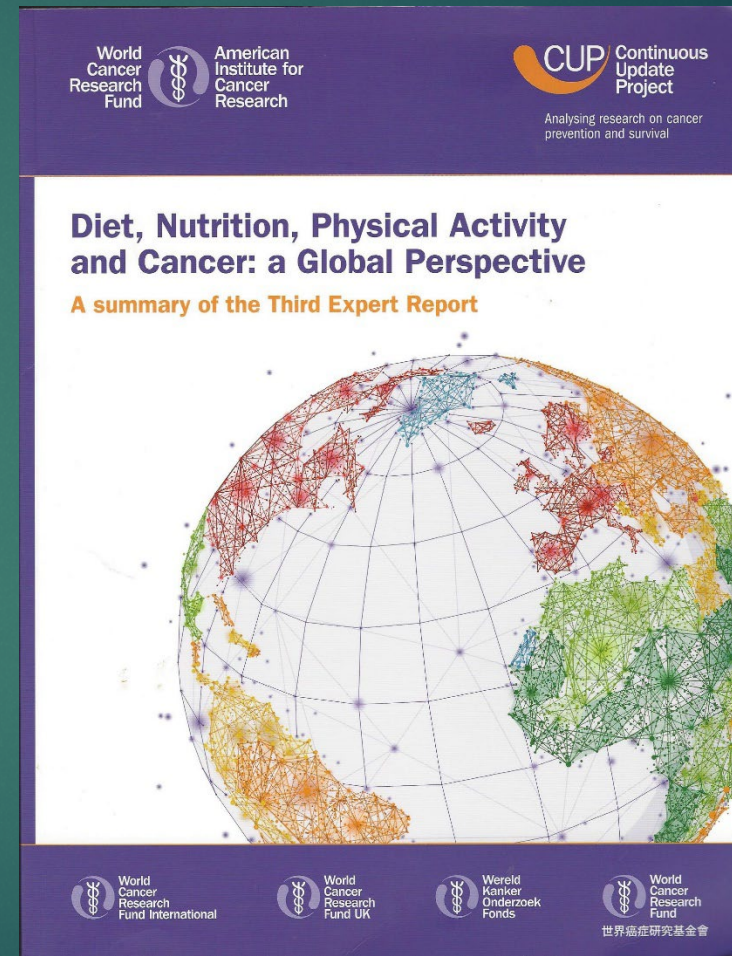
▶ Diets high in:

- ▶ Red meat
- ▶ Processed meat
- ▶ Sugar-sweetened beverages
- ▶ Trans fatty acids
- ▶ Sodium

WCRF/AICR Guidelines



2007



2018

AICR RECOMMENDATIONS FOR CANCER PREVENTION

A Blueprint to Beat Cancer

To prevent cancer, people should aim to follow as many of the 10 Cancer Prevention Recommendations as possible. However, any change you make that works toward meeting the goals set out in the Recommendations will go some way to reducing your cancer risk.

BE A HEALTHY WEIGHT

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



BE PHYSICALLY ACTIVE

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



EAT A DIET RICH IN WHOLE GRAINS, VEGETABLES, FRUITS AND BEANS

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



LIMIT CONSUMPTION OF RED AND PROCESSED MEAT

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



LIMIT CONSUMPTION OF SUGAR-SWEETENED DRINKS

Drink mostly water and unsweetened drinks

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



LIMIT ALCOHOL CONSUMPTION

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



DO NOT USE SUPPLEMENTS FOR CANCER PREVENTION

Aim to meet nutritional needs through diet alone



FOR MOTHERS: BREASTFEED YOUR BABY, IF YOU CAN

Breastfeeding is good for both mother and baby



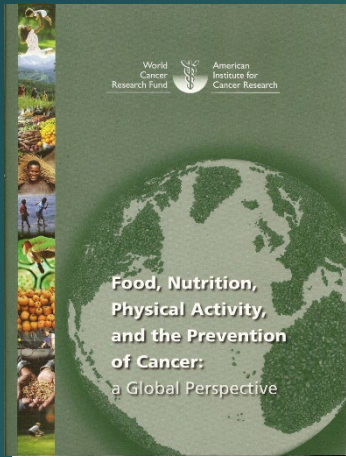
AFTER A CANCER DIAGNOSIS: FOLLOW OUR RECOMMENDATIONS, IF YOU CAN

Check with your health professional about what is right for you

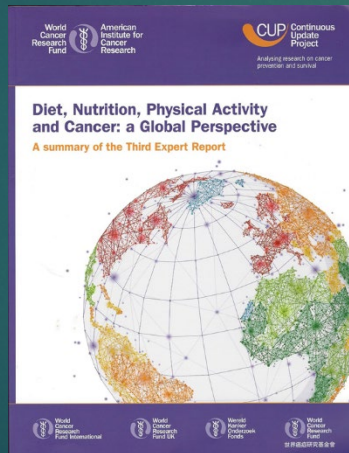


DO'S

GUIDELINE #1- WEIGHT



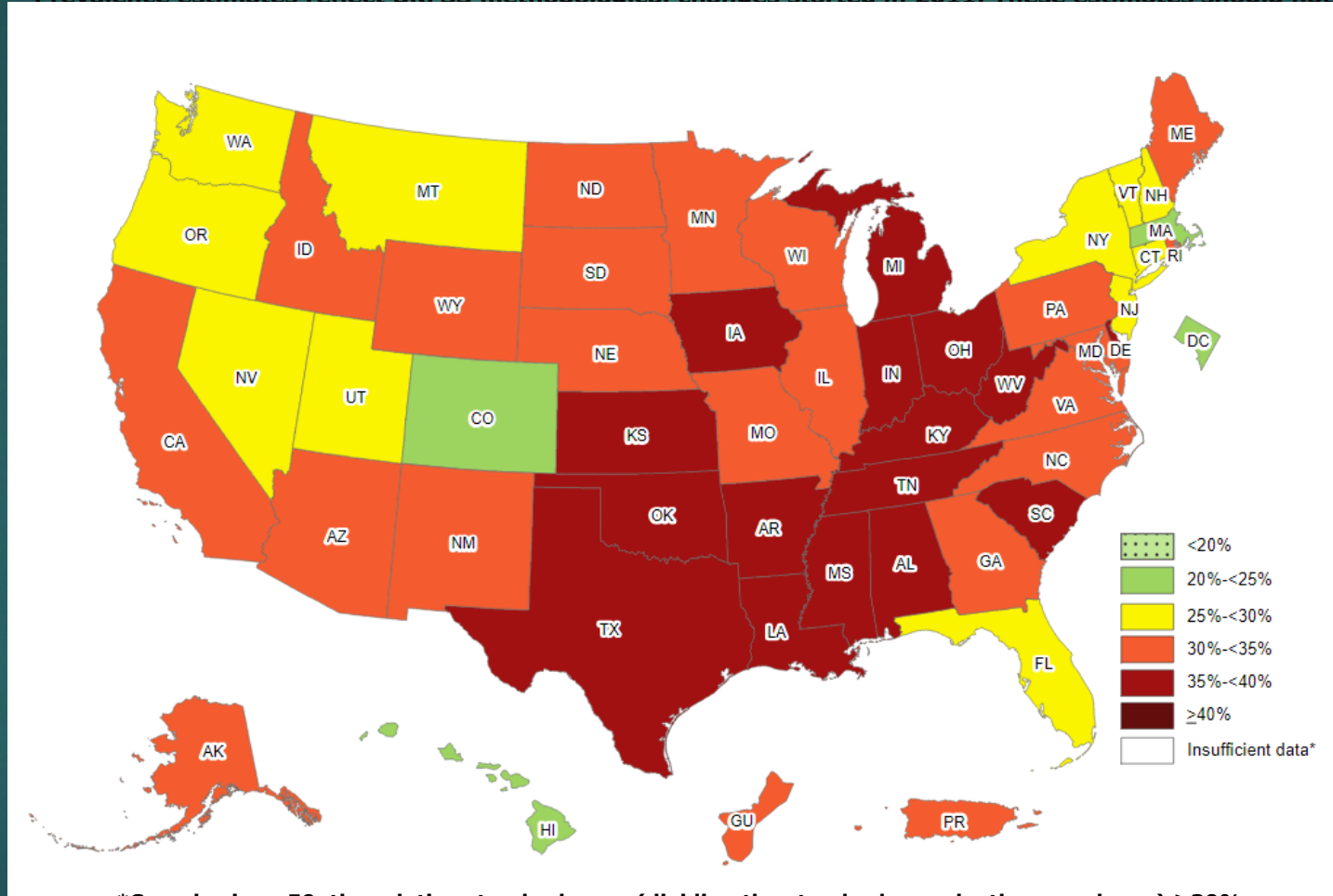
**Be as lean as possible
without becoming underweight**



**Be a healthy weight.
Keep your weight within the
healthy range and avoid weight
gain in adult life**

Prevalence¹ of Self-Reported Obesity Among U.S. Adults by State and Territory, BRFSS, 2020

¹ Prevalence estimates reflect BRFSS methodological changes started in 2011. These estimates should not be



Obesity-Associated Malignancies

- ▶ CDC estimates that overweight/obesity now associated with 40% of all cancer in US
 - ▶ Accounts for 55% all cancer in women
 - ▶ Accounts for 24% all cancer in men
 - ▶ Accounts for 2/3 of all cancer in adults 50 to 74 years old
- ▶ More than 630,000 Americans diagnosed with an overweight/obesity associated CA

▶ CDC.gov 2018

Obesity-Associated Malignancies

Estimated Percentages of Annual US Cancers Caused by Excess Body Fat

Breast: 17% , 33,000 cases
Esophagus: 35%, 5,800 cases
Pancreas: 28%, 11,900 cases
Gallbladder: 21%, 2,000 cases
Colorectal: 9%, 13,200 cases
Endometrial: 49%, 20,700 cases
Kidney: 24%, 13,900 cases

Source: AICR/WCRF "Policy and Action for Cancer Prevention" report, 2009

AICR report estimates that obesity-related excesses of these 7 cancers account for ~ 115,000 preventable deaths a year in the US

AICR Body Weight and Cancer

▶ Probable increases risk

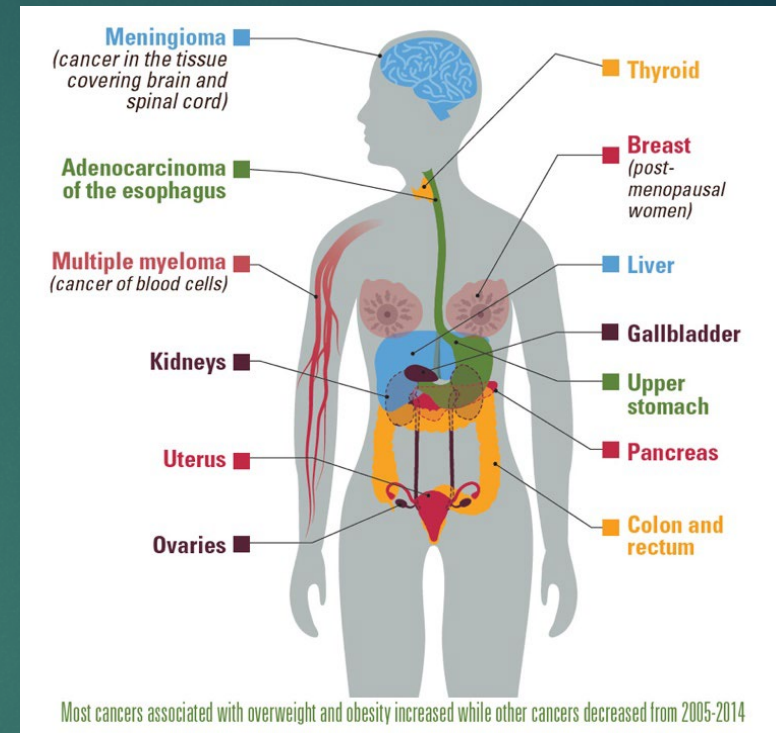
- ▶ Mouth, pharynx, larynx
- ▶ Stomach
- ▶ Gallbladder
- ▶ Ovary
- ▶ Prostate

▶ Suggestive increases risk

- ▶ Cervix

▶ Probable decreases risk

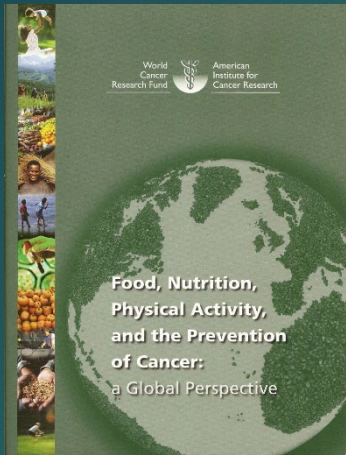
- ▶ Breast premenopause



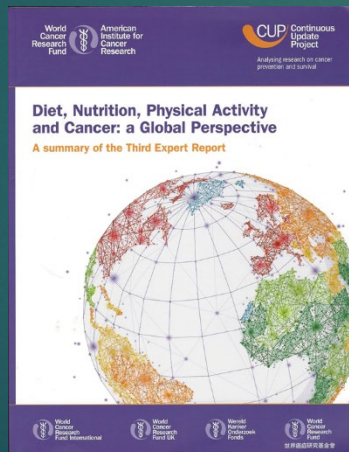
Body Fat Increases CA Risk

- ▶ Fat increases estrogen production
- ▶ Body fat secretes cytokines that promote inflammation
- ▶ Increase in body fat may impair immunity
- ▶ Too much body fat triggers insulin resistance, raising levels of insulin and growth factors that promote cancer

GUIDELINE #2-PHYSICAL ACTIVITY



Be physically active for at least 30 minutes every day



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

Exercise in Cancer Survivors

- ▶ Meta-analysis of 16 breast and 7 CRC studies with ~50,000 survivors
 - ▶ The most active breast CA survivors had lower rates of death from breast CA (RR, 0.72; (0.60-0.85) and other causes (RR, 0.52; 0.42-0.64)
 - ▶ The most active CRC survivors had lower rates of death from CRC (RR, 0.61; (0.40-0.92) and other causes (RR, 0.58; 0.48-0.70)
 - ▶ Survivors reporting an increase in activity **after diagnosis** had lower risk of death (RR, 0.61; 0.46-0.80) than those who did not

The Role of The Oncologist

- ▶ Majority of non-small cell lung cancer survivors desired advice re: PA with 80% preferring face-to-face rec from an MD; 92% preferring under CA Center auspices

- ▶ Philip et al, Support Care Cancer, 2014

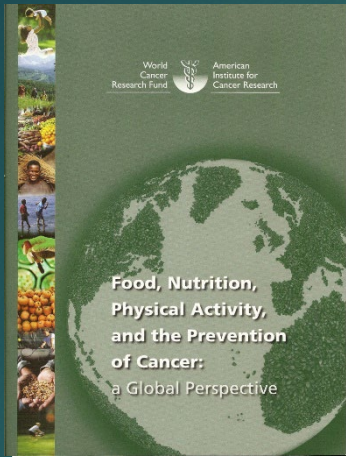
- ▶ Survey of Canadian oncologists showed 62% agreed that PA was safe and beneficial, but only 42% ever recommended it and only 26% within past month

- ▶ Jones et al, Support Care Cancer, 2005

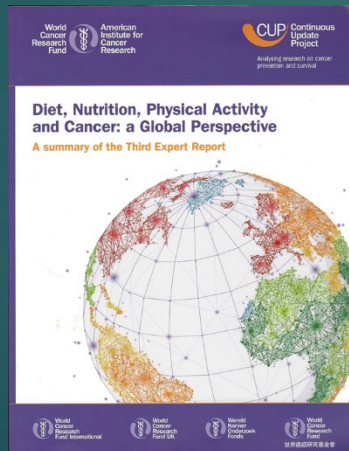
- ▶ Oncologist recommending PA resulted in increase of 60 min vigorous walking/week

- ▶ Jones et al, Ann Behav Med 2004

PLANT-BASED GUIDELINES



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



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

Moved from #4 to #3

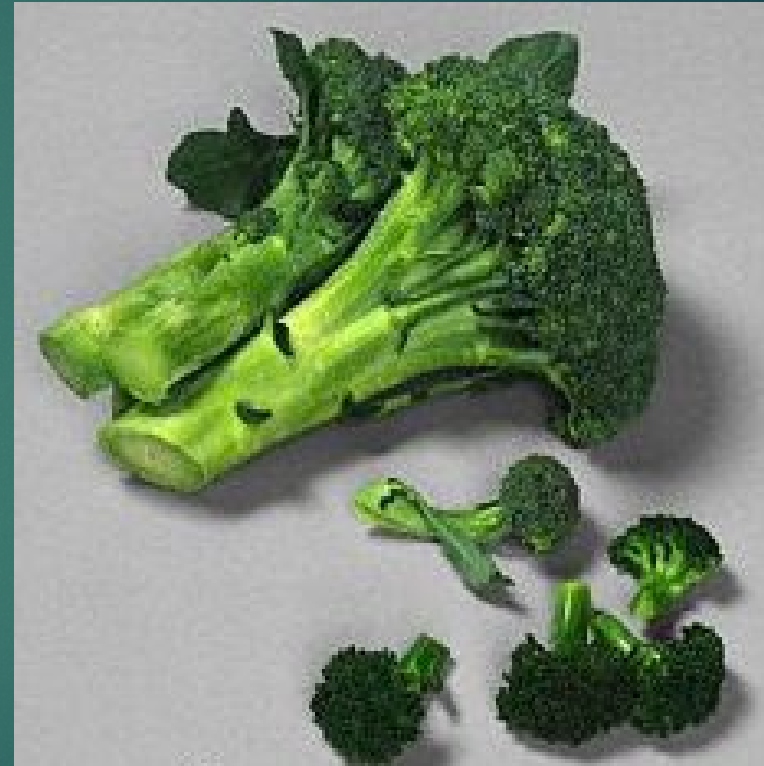
U.S. Diets Fall Short on F&Vs

- ▶ CDC reports few adults eat recommended number of servings/day
 - ▶ 12% eat 1.5-2 cup equivalents of fruit a day
 - ▶ Highest among women (15.1%), 31-50 yo (13.8%), and non-Hispanics (15.7%)
 - ▶ Median intake is one fruit a day
 - ▶ 9% eat 2-3 cup equivalents of vegetables
 - ▶ Highest among women (10.9%), >51 yo (10.9%) and highest income group (11.4%)
 - ▶ Median intake is 1.7 times a day for vegetables
 - ▶ 18-30 year olds: 9.2% fruit, 6.7% vegetables

Nutritional Prevention Strategies

Eat More:

- ▶ Phytoestrogens
 - ▶ Soy foods
 - ▶ Flaxseed (Omega 3's)
- ▶ Cruciferous vegetables
- ▶ Garlic and onions
- ▶ Turmeric and ginger
- ▶ Green tea
- ▶ Nuts



Soy in Breast CA: Yes or No?

- ▶ Life After Cancer Epidemiology Study followed 1954 breast CA survivors dx 97-00 for 6.3 yrs
 - ▶ 282 breast CA recurrences ascertained
 - ▶ Isoflavone intake assessed
- ▶ Soy intake at levels comparable to those consumed in Asian population
 - ▶ May reduce the risk of recurrence in women who have been treated with tamoxifen
 - ▶ In postmenopausal women (HR 0.48, 0.21-0.79, p=0.008)
 - ▶ Does not appear to negate the effects of tamoxifen
- ▶ Shanghai Breast Cancer Survival Study confirmed 30% ↓ in recurrence and mortality; WHEL analysis also confirmed benefit of soy

Mushrooms and Green Tea

- ▶ Case control study in SE China 2004-2005
- ▶ 1009 women with confirmed breast CA and 1009 age-matched controls
 - ▶ Compared with non-consumers
 - ▶ OR- 0.36 (95% CI 0.25, 0.51) for daily intake >10g fresh mushrooms
 - ▶ OR- 0.53 (95% CI 0.38, 0.73) for daily intake > 4 g dried mushrooms
 - ▶ ORs 0.11 and 0.18 for fresh and dried in combo with >1.05 g dried green tea leaf beverages/day
 - ▶ Effects seen in pre and post-menopausal women

Mediterranean Diet and Breast CA

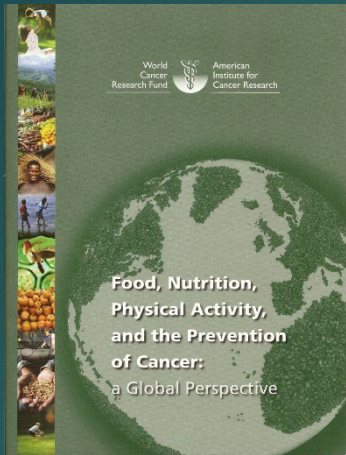
- ▶ PREDIMED study 1:1:1 randomized, single-blind trial in Spain from 2003-2009
 - ▶ 4282 women 60-80 yo at risk for CVD
 - ▶ Allocated to MD supplemented with extra- virgin olive oil, MD supplemented with mixed nuts or control diet and advice to ↓ dietary fat
 - ▶ 35 cases breast CA after median 4.8 yrs
 - ▶ Adjusted HR for MD with EVOO 0.32 (0.13,0.79)
 - ▶ Adjust HR for MD with nuts 0.59 (0.26-1.35)

More on Nuts and Breast CA

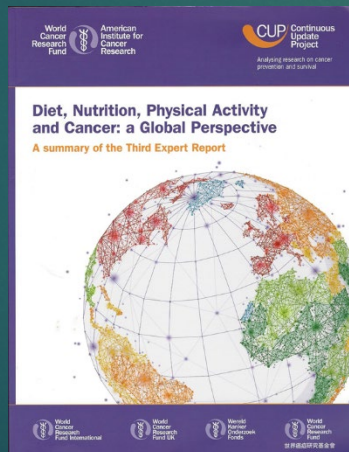
- ▶ 3449 long-term breast cancer survivors in Shanghai study followed median 8.27 years
 - ▶ 209 developed recurrence or metastases
 - ▶ 374 died with 252 breast cancer related deaths
 - ▶ 10 years post-diagnosis, nut consumers had higher OS (93.7% vs 89.0%; Ptrend=.022) and DFS (94.1% vs 86.2%; Ptrend=.003)
 - ▶ Association was dose-related
 - ▶ Associations did not vary by nut type; hormone status
- ▶ Wang et al, Int J CA 2022

DON'T'S

GUIDELINE #3-ENERGY DENSE

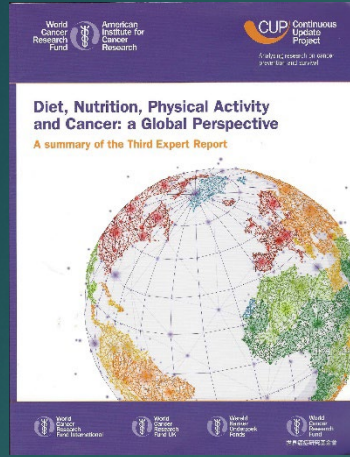


Avoid sugary drinks
Limit consumption of energy dense foods
(particularly processed foods high in
added sugar, or low in fiber, or high in fat)



Guideline split into two separate
components in 2018 edition

ENERGY DENSE FOOD GUIDELINE #4



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

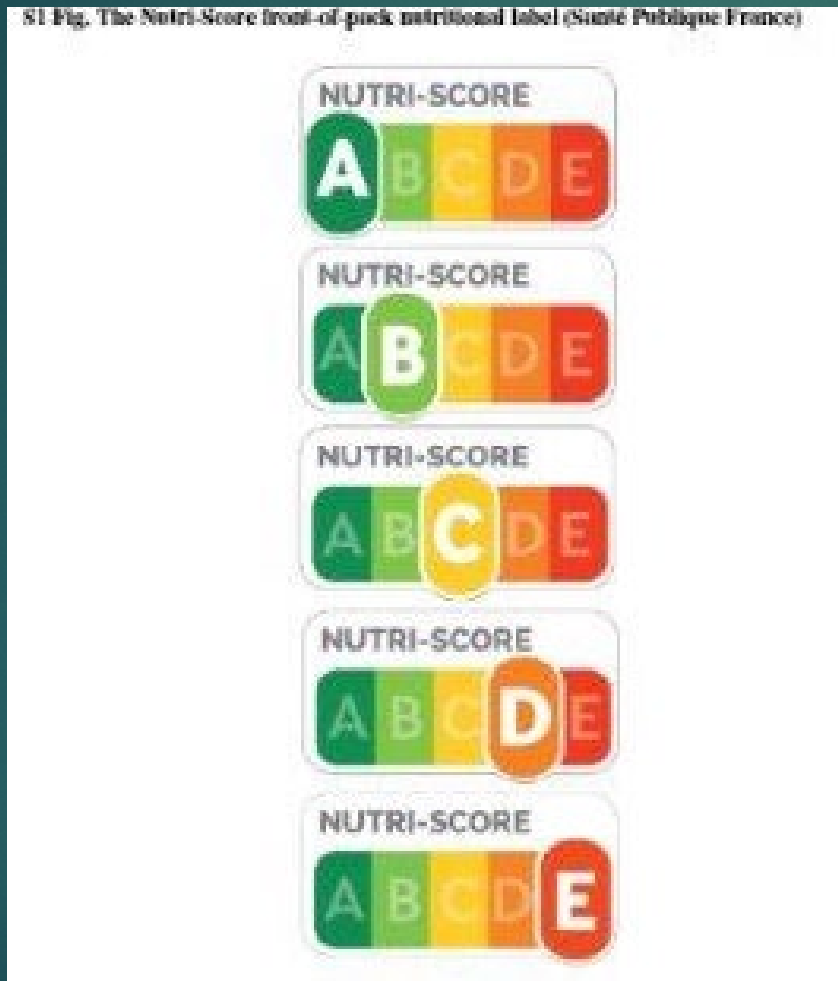


AICR Fast Foods Guideline



“Processed foods high in fat, starches or sugars embody a cluster of characteristics that encourage excess energy consumption, for example, by being highly palatable, high in energy, affordable, easy to access and convenient to store”

Nutritional Quality and Cancer



▶ Nutri-Score derived from Nutrient Profiling System of the British Food Standards Agency (modified version)

▶ Score for each food calculated using its 100-g content in energy, sugar, saturated fat, Na⁺, fiber, protein, and fruits/vegetables /legumes/nuts

▶ Higher score = lower quality

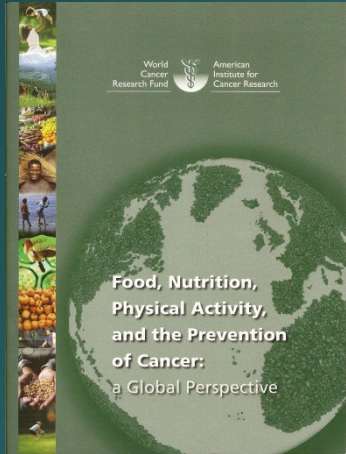
Nutritional Quality and Cancer

- ▶ 471,495 adults in European Prospective Investigation into Cancer and Nutrition
- ▶ 10 European countries enrolled '92-00
- ▶ Median f/u 15.3 years
- ▶ 49,794 incident invasive cancer cases
 - ▶ Breast 12,063, prostate 6,745, colon 5,806, lung 3,654
- ▶ High scores: France, Germany, UK, Sweden
- ▶ Low scores: Greece, Italy, Spain, Norway

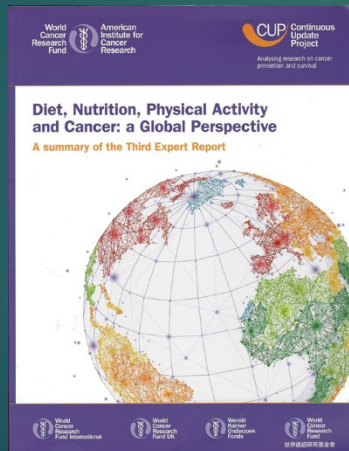
Nutritional Quality and Cancer

- ▶ Higher score associated with higher risk for all cancer (HR 1.07; 1.03-1.10, P-tr<.001)
 - ▶ Rates for high scores were 81.4/10,000 pers-yrs
 - ▶ Men 115.9, Women 66.6
 - ▶ Rates for low scores were 69.5/10,000 pers-yrs
 - ▶ Men 89.6, Women 61.1
 - ▶ Higher scores associated with higher risk of CRC, HCC and post-menopausal breast CA in women and lung and (borderline) prostate CA in men
 - ▶ Higher risk of stomach and upper aerodigestive tract CA also observed

SUGARY DRINK GUIDELINES



2007- #3
Avoid *sugary* drinks



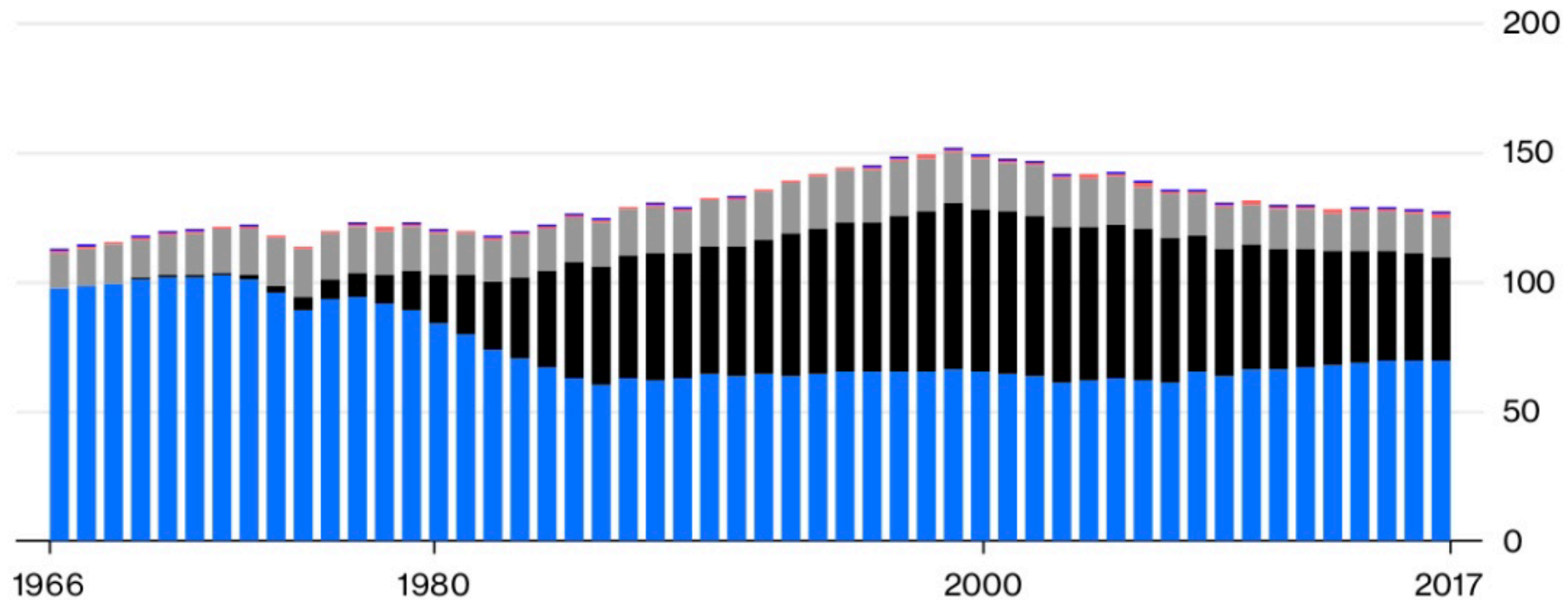
2018- #6
Limit consumption of *sugar-sweetened* drinks
Drink mostly water and unsweetened drinks



Less of the Sweet Stuff

Per-capita annual consumption of caloric sweeteners, in pounds

■ Refined sugar ■ High-fructose corn syrup ■ Other corn sweeteners ■ Honey
■ Maple and other syrups



Source: U.S. Department of Agriculture

BloombergOpinion

Sugary Drinks and Cancer Risk

- ▶ 101,257 participants in French NutriNet-Sante prospective cohort median f/u 5.1 yrs
- ▶ Evaluated consumption of sugary drinks (97 items including 100% fruit juice) and artificially sweetened beverages (12 items)
 - ▶ 100% fruit juices (45%), other sugary drinks (36%), artificially sweetened beverages (19%)
- ▶ Mean age 42.2 yrs; 78% ♀; 2193 CA cases
 - ▶ 693 breast CA (283 pre, 410 postmenopausal)
 - ▶ 291 prostate CA
 - ▶ 166 colorectal CA

Sugary Drinks and Cancer Risk

- ▶ Positive association between **sugary** drink consumption and:
 - ▶ Overall cancer; HR for a 100 mL/d increase 1.18 (1.10-1.27), $P < 0.001$
 - ▶ Breast cancer; HR 1.22 (1.07-1.39), $P = 0.004$ (premenopausal $P = 0.02$, postmenopausal $P = 0.07$)
 - ▶ No association detected for prostate or CRC CA
- ▶ Positive association between **100% fruit juice**:
 - ▶ Overall cancer; HR for a 100 mL/d increase 1.12 (1.03-1.23), $P = 0.007$
- ▶ Artificially sweetened beverages*: no \uparrow risk
 - ▶ * Small sample size

NONI



Out of Stock at the Company



\$19.18 Now Acai Concentrate 16oz
 \$34.39 Nature's Way Organic Acai Berry Juice
 \$19.18 Now Acai Juice Superfruit Antioxidant Juice
 \$26.39 Nature's Way Alive! Whole Fruit Antioxidant Goji Berry
 \$16.96 Pure Fruit Goji-Zen 1 Liter (33.8oz)
 \$24.39 Pure Planet Tart Cherry Conc



Out of Stock at the Company

Out of Stock at the Company

\$16.96 Pure Fruit Mangosteen
 \$28.76 New Mangosteen Superfruit
 \$10.99 Pure Fruit Mangosteen

New health star rating system ranks fruit juice below diet cola in shift to sugar-based grading

Vic Country Hour / By Jane McNaughton

Posted 1d ago, updated Yesterday at 5:51am



The citrus industry says the decision could cost rural communities millions of dollars. (Flickr: Rob Bertholf)

Switching to Diet Soft Drinks?

- ▶ 451,743 European Prospective Investigation into Cancer (EPIC) participants
- ▶ Mean 50.8 yrs, 71.1% ♀, mean f/u 16 yrs
- ▶ Higher all-cause mortality among participants who consumed ≥ 2 glasses/d vs consumers of ≤ 1 glass/month for:
 - ▶ Total soft drinks: HR 1.17 (1.11-1.22); $P < .001$
 - ▶ Sugar sweetened: HR 1.08 (1.01-1.16); $P = .004$
 - ▶ Deaths from digestive diseases
 - ▶ Artificially sweetened: HR 1.26 (1.16-1.35); $P < .001$
 - ▶ Deaths from circulatory disease

Artificial Sweeteners and Cancer Risk

- ▶ 102,865 adults from French NutriNet-Sante included (median f/u 7.8 yrs)
- ▶ Repeated 24-hur dietary records provided data on sweetener intake
- ▶ After adjusting for multiple confounding factors, compared to non-consumers, higher consumers of total artificial sweeteners (> median) had higher risk of overall cancer (n=3358 cases) HR=1.13 [1.03-1.25]
 - ▶ Aspartame HR=1.15 (1.03-1.28) and acesulfame-K HR=1.13 [1.01-1.26] were associated with increased cancer risk
 - ▶ Higher risks observed for breast cancer (n=979 cases) HR=1.22 [1.01-1.48] and obesity-related cancers (n=2023 cases) HR=1.13 [1.00-1.28] (? reverse causality)
 - ▶ No associations with sucralose noted (all others consumed by <3.5% participants)
- ▶ Findings suggest “that artificial sweeteners and excessive sugar intake may be equally associated with cancer risk”

Amount/Serving	% DV*	Amount/Serving	% DV*	Amount/Serving	% DV*
Total Fat 5g	8%	Sodium 250mg	10%	Insoluble Fiber 5g	
Sat. Fat 2g	10%	Total Carb. 30g	10%	Sugars 13g	
Trans Fat 0g		Fiber 6g	24%	Protein 9g	13%
Cholesterol 0mg	0%	Soluble Fiber 1g			

Vitamin A 0% • Vitamin C 15% • Calcium 20% • Iron 10% • Vitamin E 35% • Vitamin B6 25%
 Folic Acid 25% • Vitamin B12 25% • Magnesium 10% • Zinc 15%

INGREDIENTS: BROWN RICE SYRUP, SOY PROTEIN ISOLATE, EVAPORATED CANE JUICE CRYSTALS, CRYSTALLINE FRUCTOSE, OAT FIBER, KASHI
 GRAINS & SESAME® BLEND (STONE GROUND WHOLE: HARD RED WINTER WHEAT, OATS, RYE, BARLEY, TRITICALE, LONG GRAIN BROWN RICE, CORN (W/OUT
 WHEAT, SESAME SEEDS), PEANUTS, RICE FLOUR, NATURAL PEANUT BUTTER, MECHANICALLY FRACTIONATED PALM KERNEL OIL, COCOA, NONFAT MILK, CORN BRAN, SALT, COCOE
 TANNIN, BROWN RICE FLOUR, WHEAT BRAN, CHICORY ROOT FIBER, VEGETABLE GLYCERIN, COCOA, NONFAT MILK, CORN BRAN, SALT, COCOE TANNIN, POTASSIUM
 CITRATE, CALCIUM CARBONATE, NATURAL FLAVORS, MAGNESIUM OXIDE, SOY LECITHIN, ASCORBIC ACID (VITAMIN C), ALPHA TOCOPHEROL (VITAMIN E), ZINC OXIDE, FERROUS FUMARATE (IRON), ANNATTO (COLOR), PYRIDOXINE HYDROCHLORIDE (VITAMIN B6), FOLIC ACID, VITAMIN B12.
 MAY CONTAIN TRACES OF TREE NUTS.

LARA BAR™ is a main ingredient

EXP. DATE: 2015-01-15 01153 5



Nutrition Facts Serving size: **1 bar (48g)**, Amount per serving: **Calories 220**, **Total Fat 12g**
 (Saturated Fat 2.5g (12% DV), Trans Fat 0g, Polyunsaturated Fat 2g, Monounsaturated Fat 7g, **Cholesterol 0mg**
 (0% DV), **Sodium 5mg (0% DV)**, **Total Carb. 25g (9% DV)**, Dietary Fiber 2g (9% DV), Total Sugars 15g (Incl. 0g Added
 Sugar), **Protein 5g**, Vitamin D (0% DV), Calcium (0% DV), Iron (8% DV), Potassium (6% DV). % DV = % Daily Value

INGREDIENTS: CASHEWS, DATES.



Oncologists Often Ask

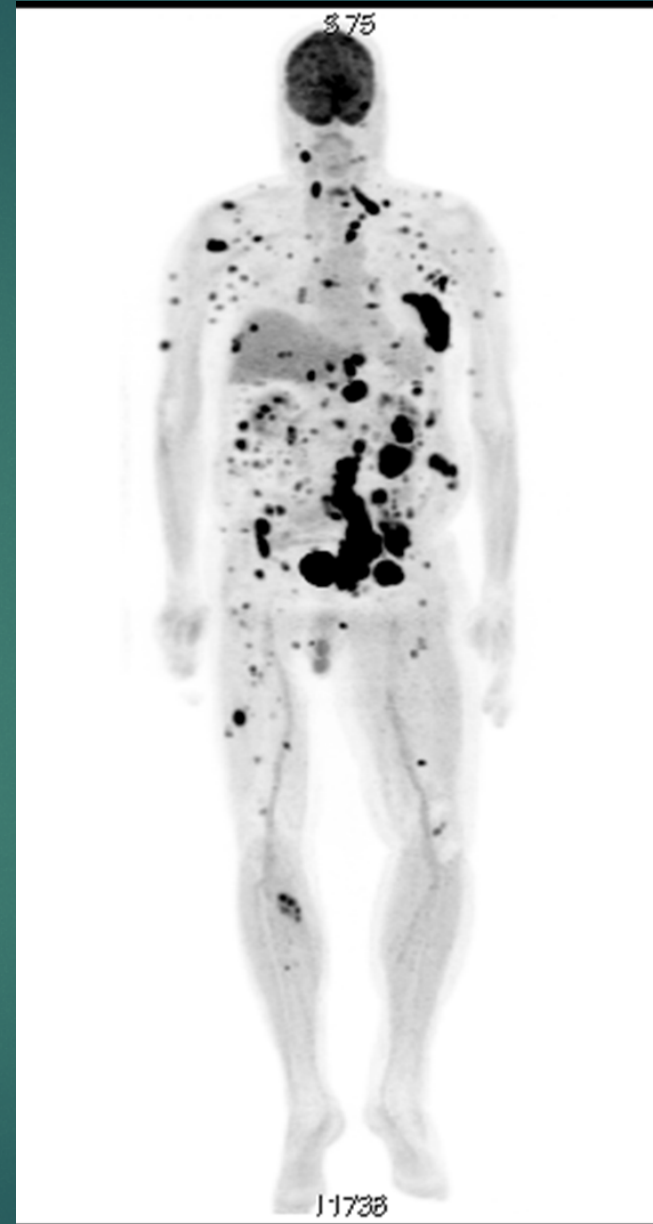
Why do you tell all
of our patients
that cancer loves
sugar?

Oncologists Often Ask

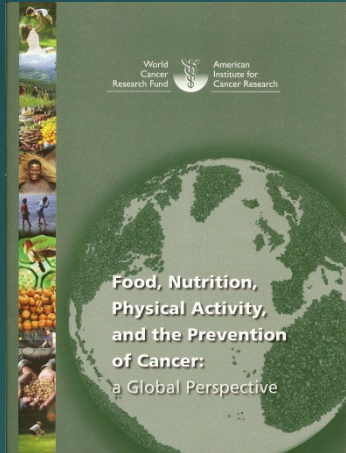
Why do you tell all of our patients that cancer loves sugar?

Answer:

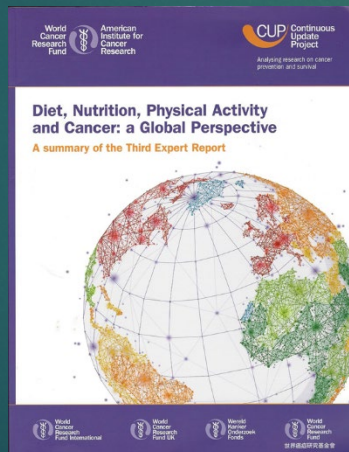
What's a PET scan



RED MEAT GUIDELINE #5

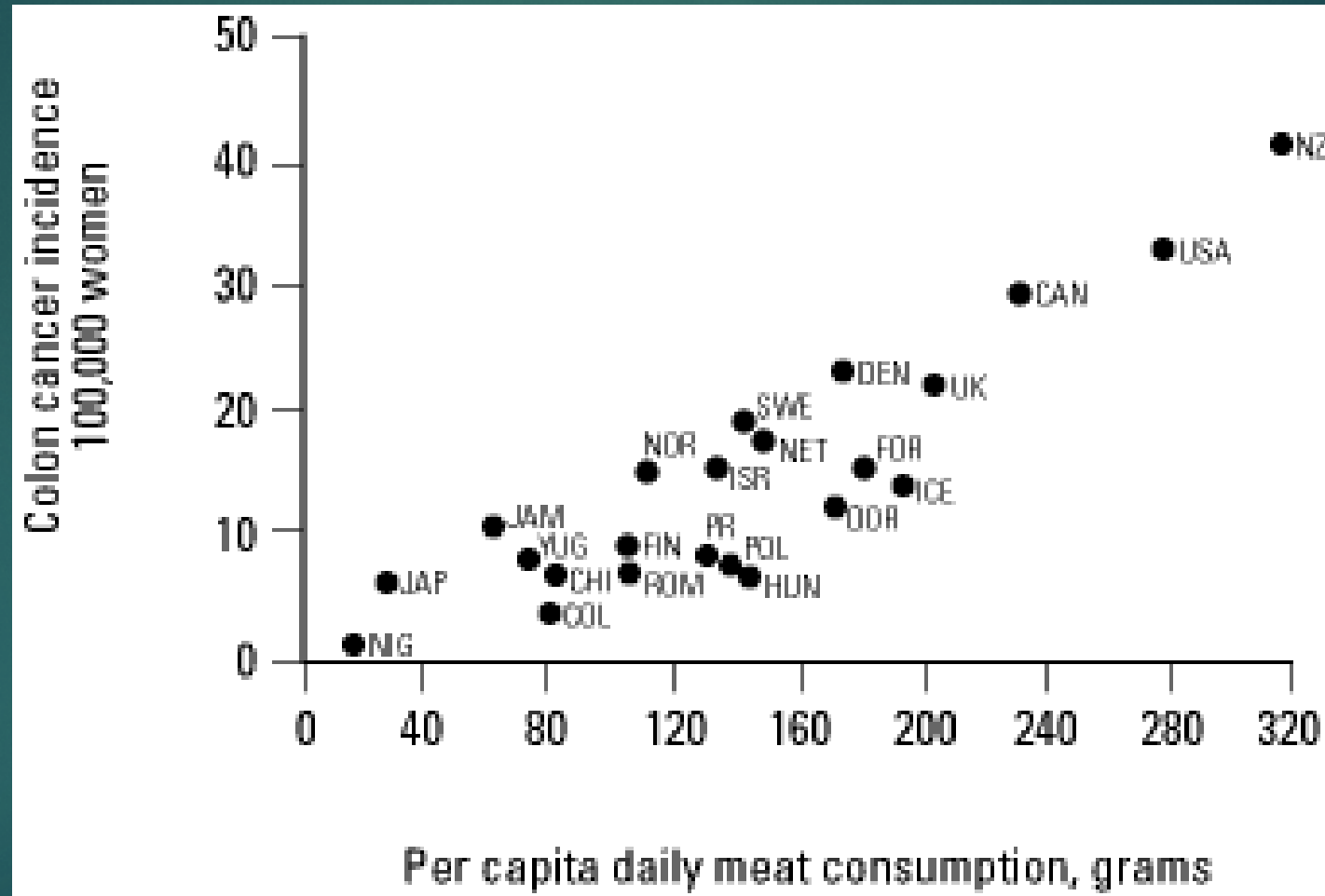


2007
Limit consumption of red meats (beef, pork and lamb) and *avoid* processed meats



2018
Limit consumption of red and processed meats. Eat no more than moderate amounts of red meat, such as beef, pork and lamb. Eat little, if any, processed meat

Meat Intake and Colon Cancer



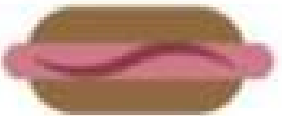


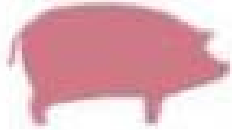
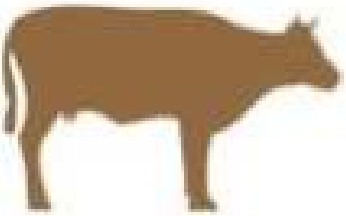

Armstrong and Doll, 1975 in Willett, 1995

WHO classification of red and processed meats

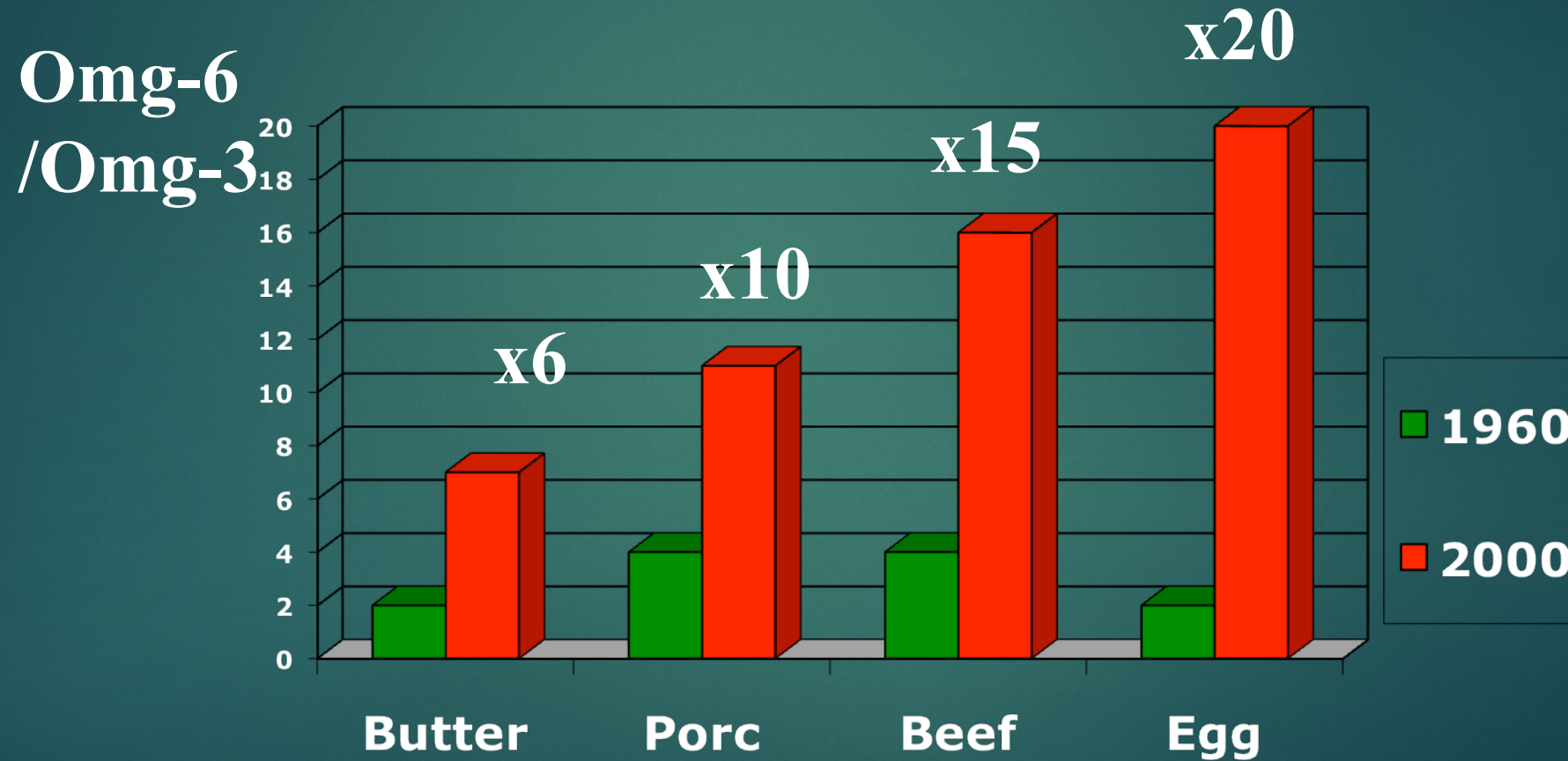
IARC* Carcinogenic Classification Groups

Likelihood
causes cancer
High to Low

- 1
- 2a
- 2b
- 3
- 4

Causes cancer: Processed meats including		
Sausages and hotdogs 	Bacon 	Salami 
Probably causes cancer: Red meats including		
Pork 	Beef 	Lamb 

Transformation of food chain



Ailhaud et al., *Prog. Lip. Res.*, 2006 – Simopoulos & Salem. *NEJM*, 1989

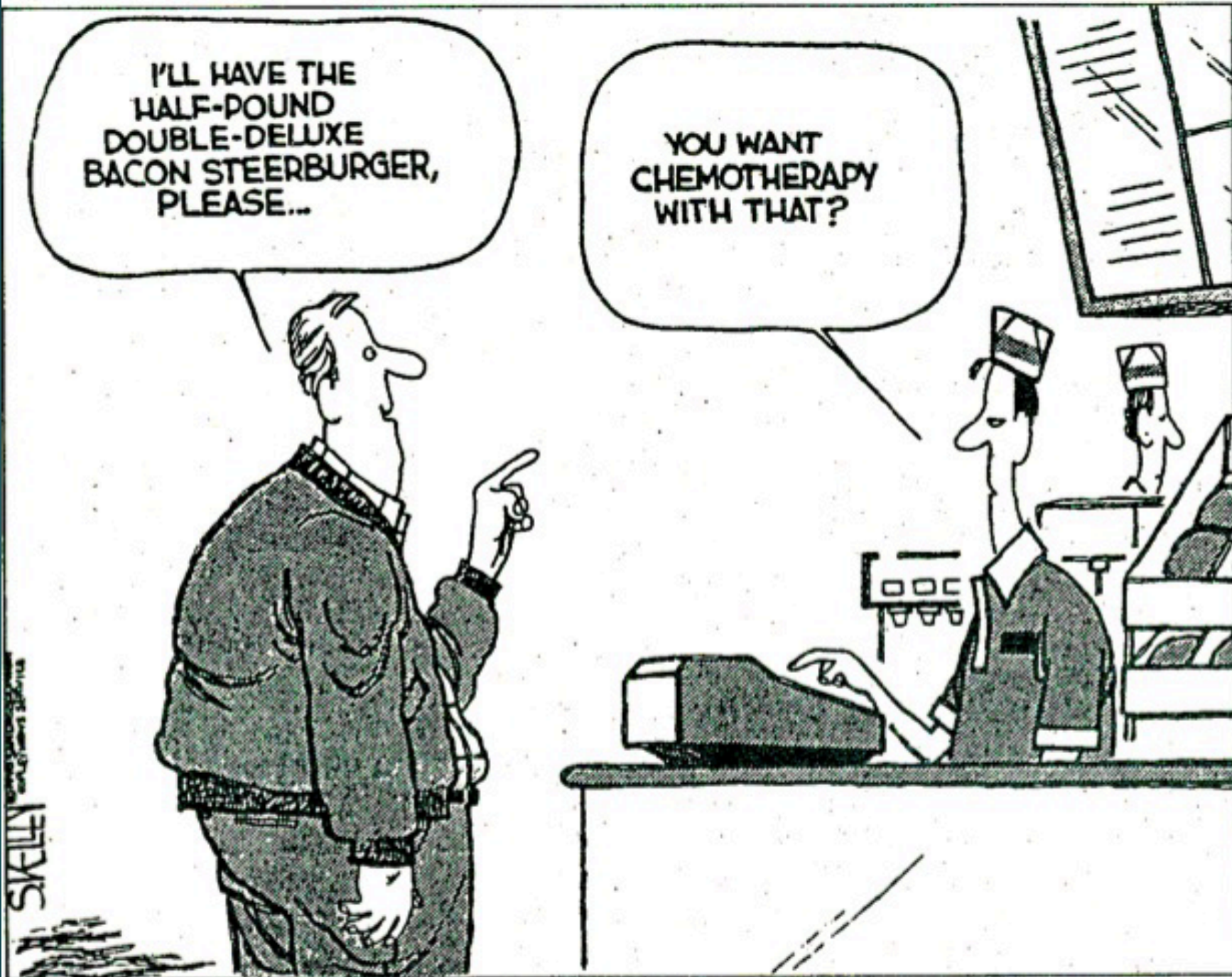
Meat and Colorectal Cancer

- ▶ Total iron intake and dietary iron both inversely associated, although the more bioavailable **heme iron** was positively associated
- ▶ **Nitrate** intake from processed meat positively associated; **nitrite** not ($p=0.055$)
- ▶ **Heterocyclic amine** intake (MeIQx and DiMeIQx) positively associated but only associated with colon, not rectal CA

I'LL HAVE THE
HALF-POUND
DOUBLE-DELUXE
BACON STEERBURGER,
PLEASE...

YOU WANT
CHEMOTHERAPY
WITH THAT?

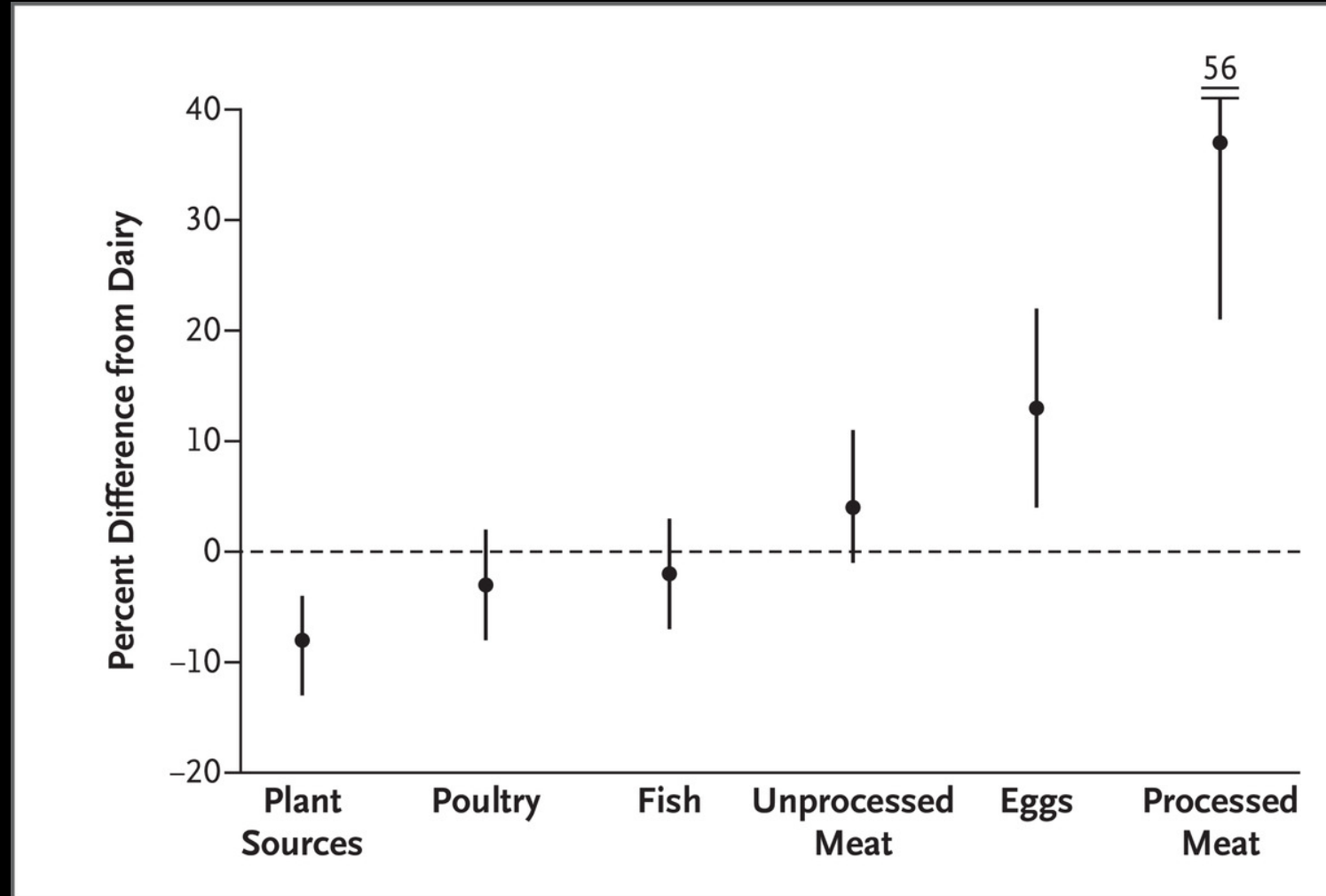
STICKLE



Meat Trends in US 1999-2016

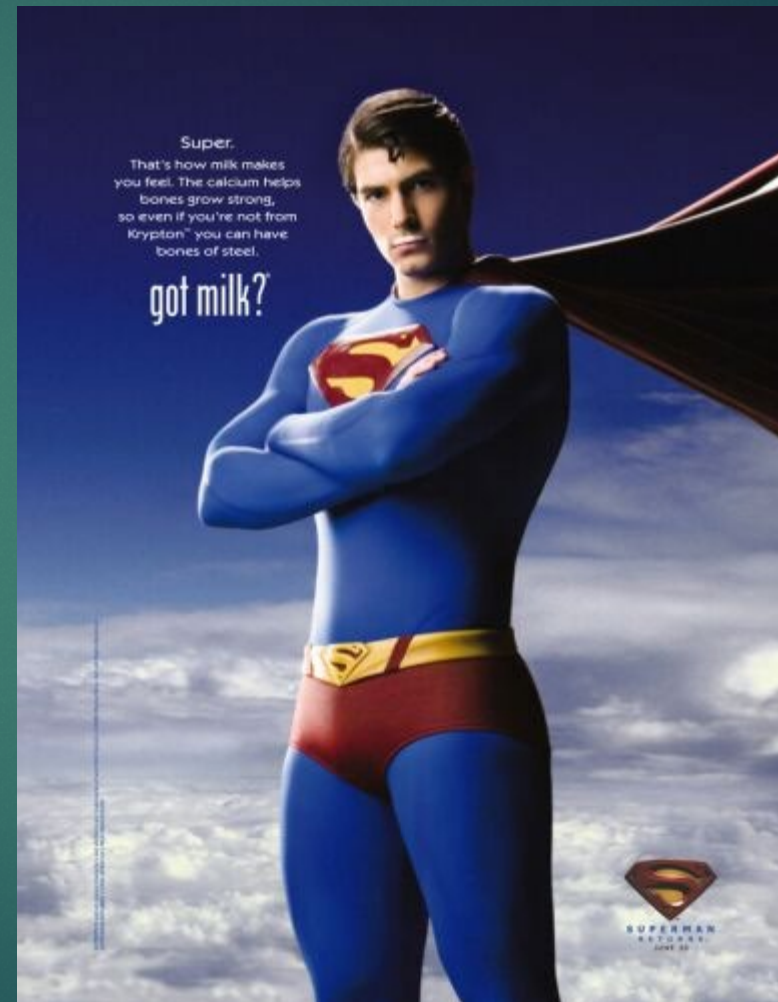
- ▶ 43,995 National Health and Nutrition Examination Survey (NHANES) adults
- ▶ Mean consumption of processed meat remained unchanged in past 18 years
 - ▶ Luncheon meat (73.3 g/wk), sausage (45.5), hot dog (17.5), ham (17.5), bacon (8.6)
- ▶ Mean consumption declined for unprocessed meat (-56.7 g/wk; $P < 0.001$)
- ▶ Mean consumption increased for poultry (47.0 g/wk; $P < 0.001$); no Δ fish or shellfish

All-Cause Mortality Associated with Protein Sources.



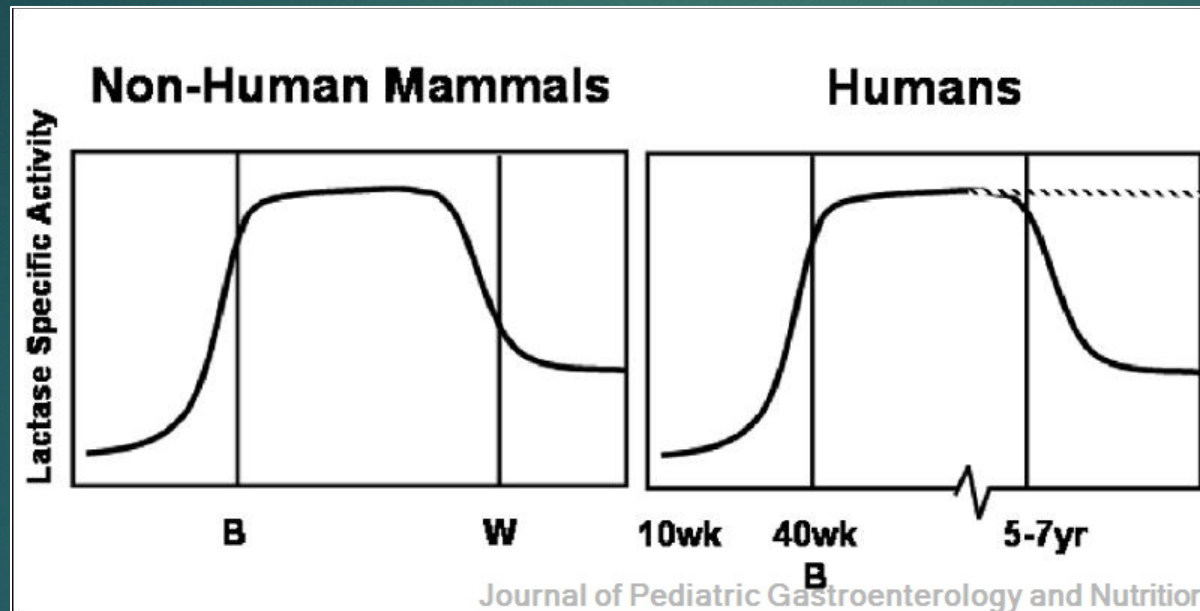
Chemopreventive Components of Dairy

- ▶ Dairy products contain
 - ▶ Calcium
 - ▶ Vitamin D
 - ▶ Butyric acid
 - ▶ Conjugated linoleic acid
 - ▶ Sphingolipids
 - ▶ Probiotic bacteria in fermented products



The Problem With Dairy

Most animals lose milk-digesting enzymes after weaning, so lactose intolerance becomes the norm



Lactose and Lactase-Who Is Lactose Intolerant and Why?

Montgomery, Robert K; Krasinski, Stephen D; Hirschhorn, Joel N; Grand, Richard J

Journal of Pediatric Gastroenterology and Nutrition. 45():S131-S137, December 2007.

doi: 10.1097/MPG.0b013e31812e68f6

FIG. 3. Developmental patterns (transcriptionally regulated) of lactase-phlorizin hydrolase expression in humans and other mammals. Schematic diagram of developmental changes in lactase-specific activity changes from fetal life through birth and weaning.

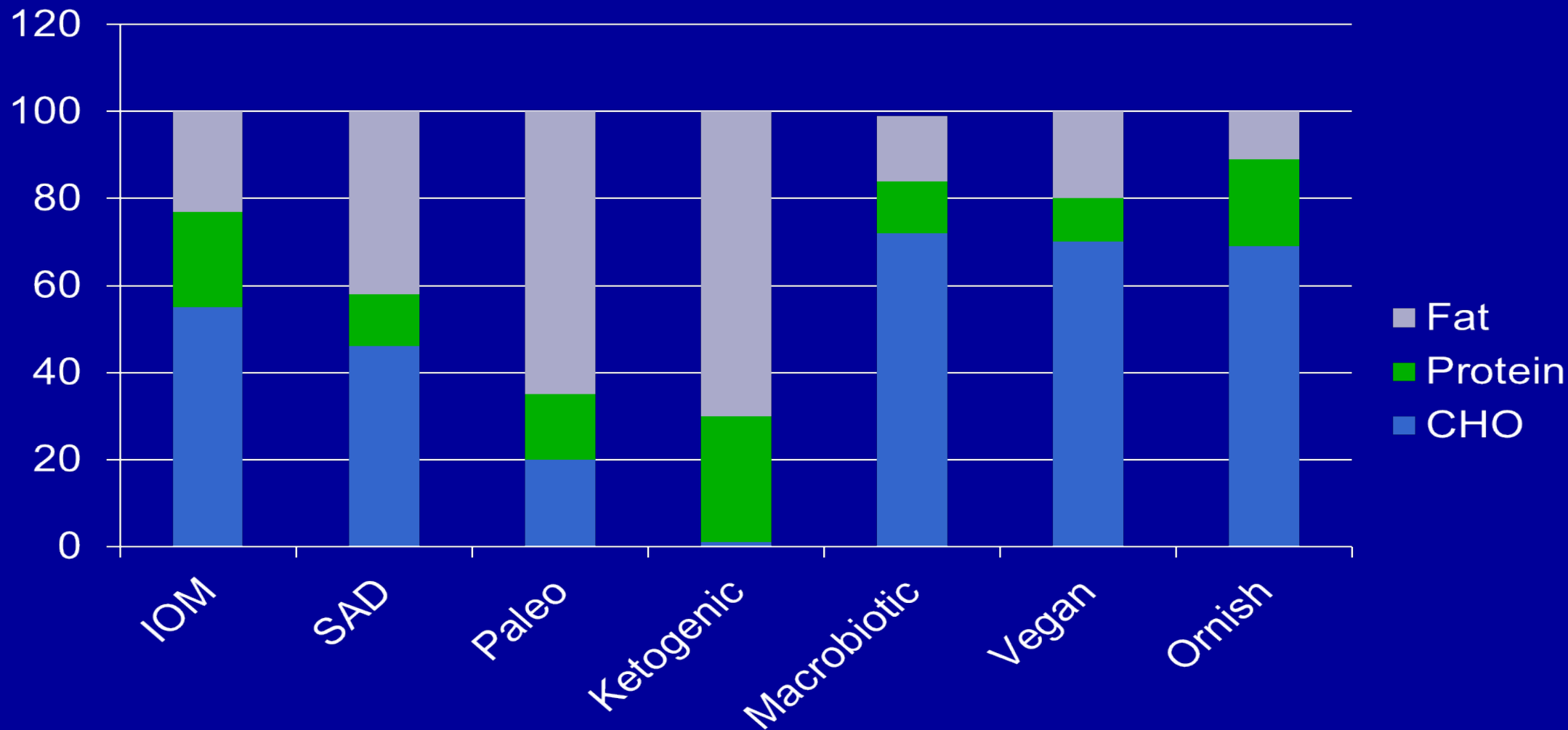
Dairy and Cancer in China

- ▶ China Kadoorie Biobank study recruited 510,146 adults from 5 urban and 5 rural regions 2004-2008; food frequency questionnaire completed
- ▶ During a mean follow-up of 10.8 years, 29,277 cancer cases recorded
- ▶ Dairy consumption has increased in China, but still <10% US daily amount
- ▶ Cohort is 59% women, 44% urban, baseline age 52
- ▶ 20.4% reported dairy (milk) at least once a week defined as regular consumers c/w never or rare consumers (non-consumers)
- ▶ Regular consumers more likely women, higher education and income and had higher consumption of all major foods (except preserved vegetables)
 - ▶ Dairy consumption positively associated with risk of total cancer HR 1.09 (1.06-1.12); liver cancer HR 1.12 (1.02-1.22); female breast cancer HR 1.22 (1.12-1.32); lymphoma HR 1.23 (1.04-1.46)
 - ▶ Associations were independent of other lifestyle factors including adiposity and consistent across subgroups

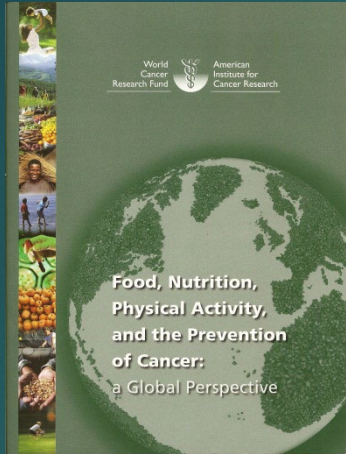
Vegetarian Diet Patterns & CRC

- ▶ Adventist Health Study 2 of 77,659 people
- ▶ 380 colon and 110 rectal CA dx at 7.3 yrs
 - ▶ Adjusted HR in vegetarians vs non
 - ▶ All CRC 0.78 [0.64-0.95]
 - ▶ Vegans 0.84 [0.59-1.19]
 - ▶ Lacto-Ovo 0.82 [0.65-1.02]
 - ▶ Pescoveg 0.57 [0.40-0.82]
 - ▶ Semiveg 0.92 [0.62-1.37]
 - ▶ Colon CA 0.81 [0.65-1.00]
 - ▶ Rectal CA 0.71 [0.46-1.06]

Comparative Macronutrients of Popular Cancer Diets

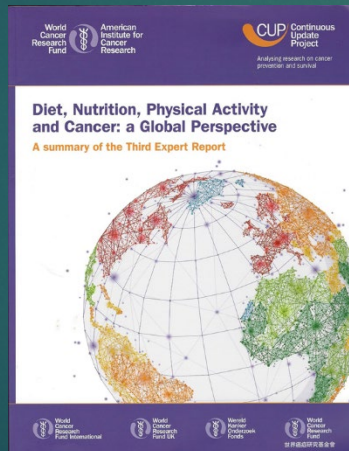


ALCOHOL GUIDELINES



2007

If consumed at all, limit alcohol to 2 a day for men and 1 a day for women.



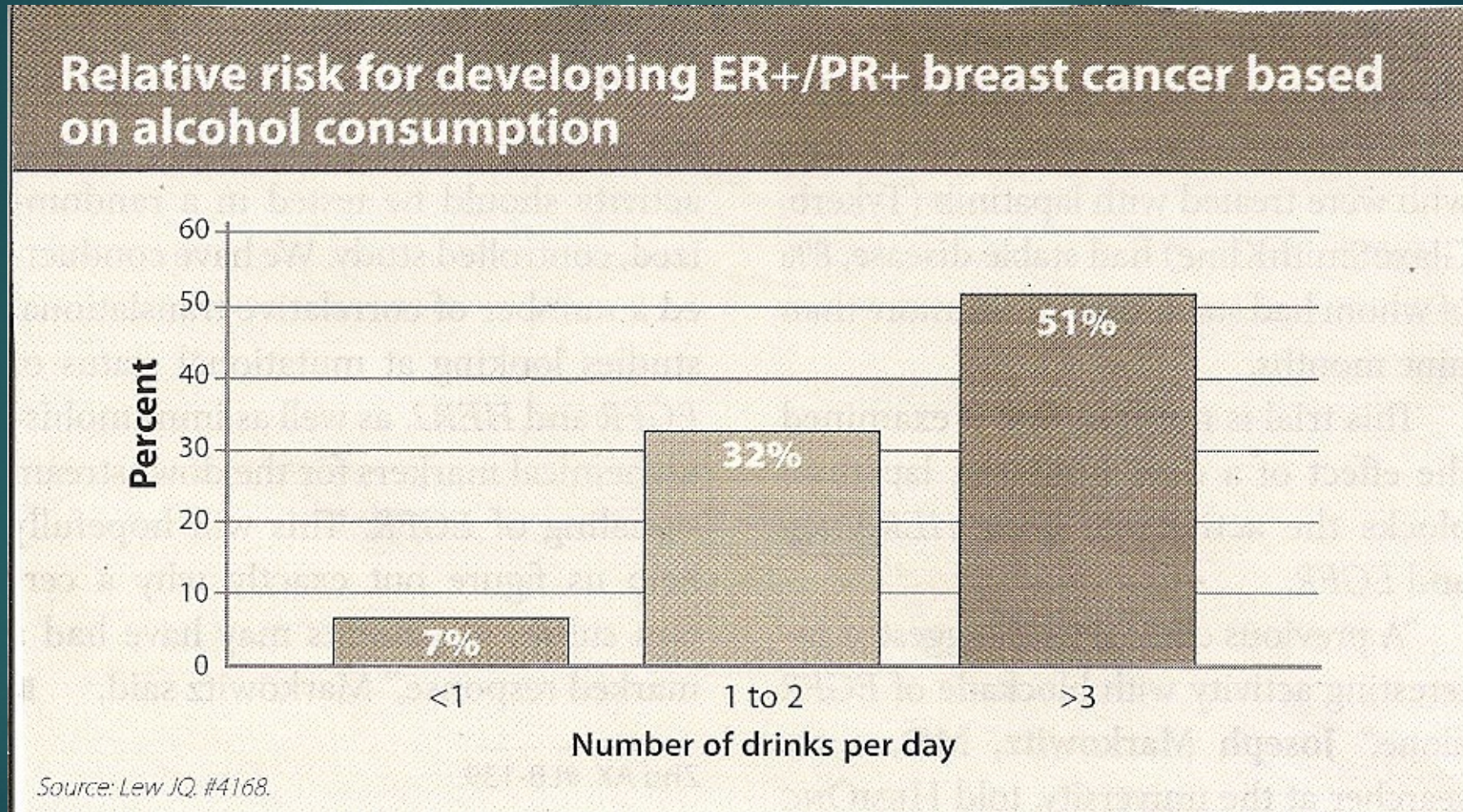
2018

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

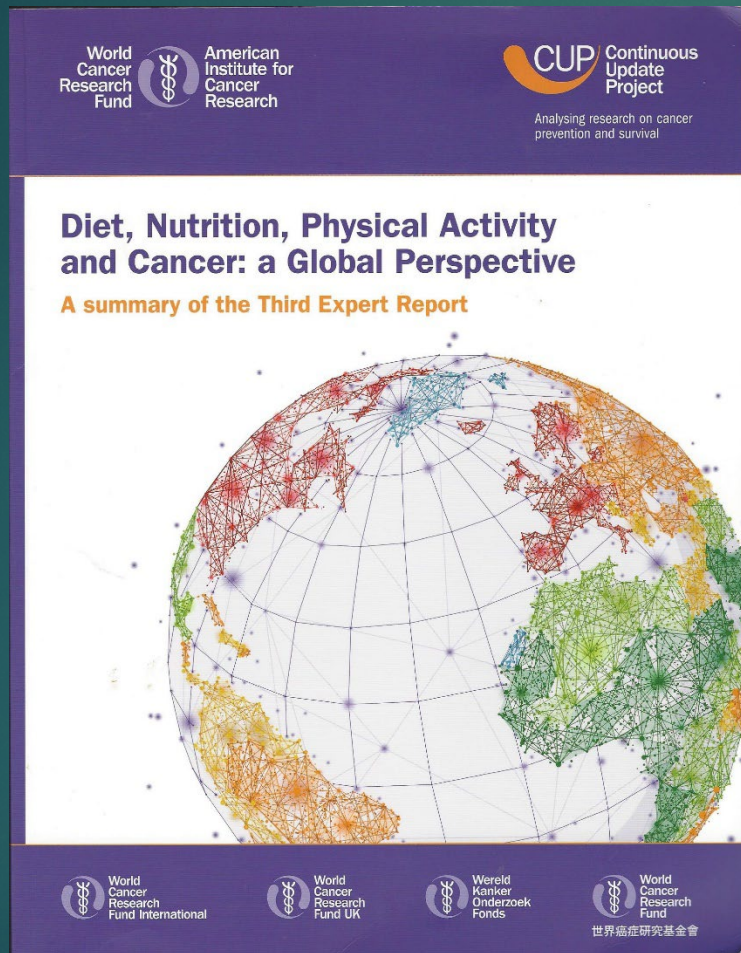
AICR Alcohol and Cancer

- ▶ Convincing increases risk
 - ▶ Mouth, pharynx, larynx
 - ▶ Esophagus
 - ▶ Liver
 - ▶ Colorectum
 - ▶ Post menopausal breast
- ▶ Probable increases risk
 - ▶ Stomach
 - ▶ Premenopausal breast
- ▶ Suggestive increases risk
 - ▶ Lung
 - ▶ Pancreas
- ▶ Probable decreases risk of kidney cancer

Alcohol and Breast Cancer



ADDITIONAL AICR GUIDELINES



- ▶ **Don't use supplements to protect against cancer**
- ▶ It is best for mothers to breastfeed exclusively for up to 6 months
- ▶ After Rx, cancer survivors should follow the recommendations for cancer prevention

Doc, Can I Take This?

Real Questions is:

Will this interfere with my cancer treatment via

- 1) CYP 450 or
- 2) Oxidant/Antioxidant effect



Photo by Lawenda

My Antioxidant Approach

- ▶ Individual advice depends on goal of Rx
 - ▶ If cure, err on side of caution
 - ▶ Delay antioxidants until end of Rx
 - ▶ Discontinue day before, of, after chemo cycle
 - ▶ Antioxidant rich **foods** likely ok
 - ▶ If palliation, encourage use for protection of normal tissue, optimization of QOL
- ▶ Antioxidant radio- and chemoprotectants (mesna, amifostine) do not interfere with anti-tumor effects of Rx

My Recommended Supplements

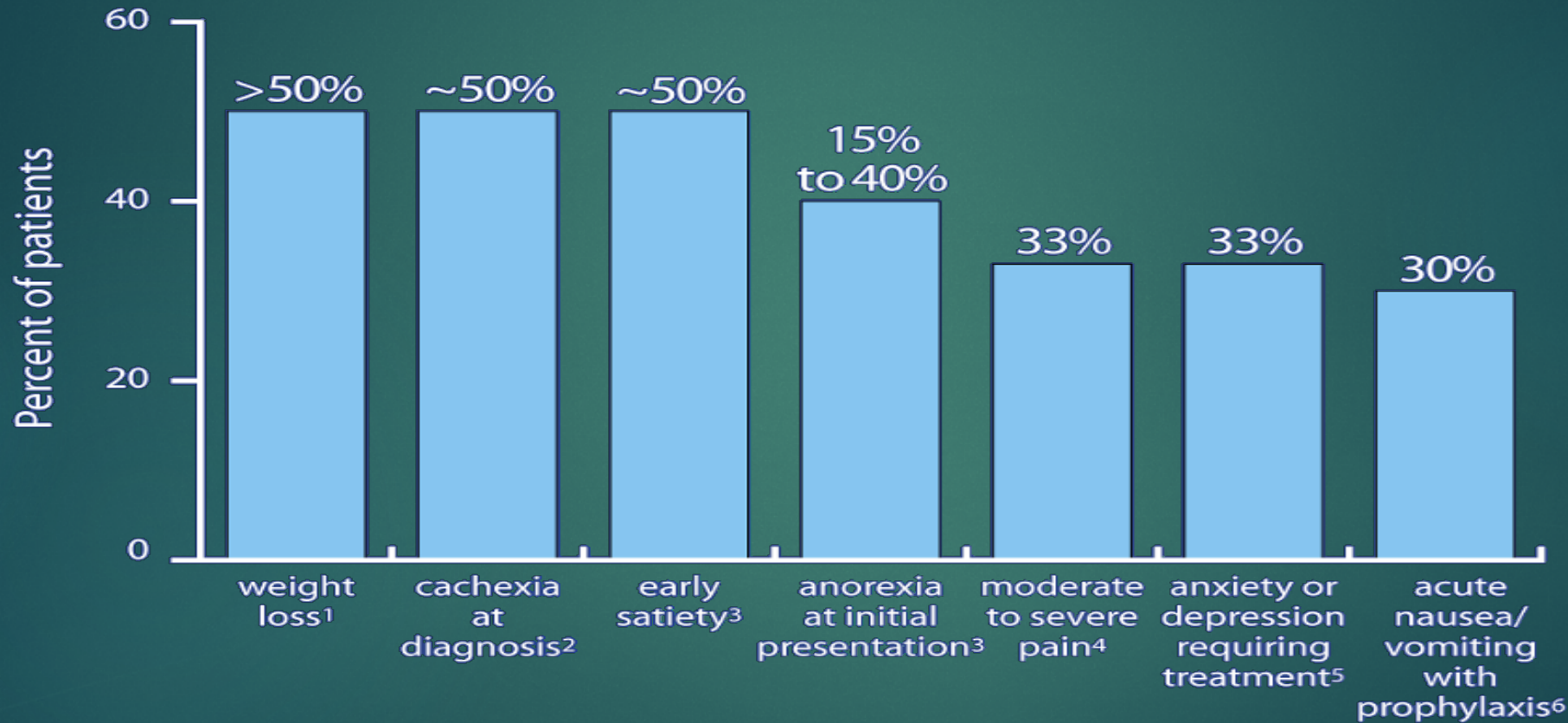
- ▶ Vitamin D3 (depending on 25OHD level)
- ▶ Calcium/Magnesium
- ▶ Omega 3's
- ▶ Medicinal Mushrooms
- ▶ Turmeric
- ▶ Probiotic

My Recommended Supplements

- ▶ Vitamin D3 (depending on 25OHD level)
- ▶ Calcium/Magnesium
- ▶ Omega 3's
- ▶ Medicinal Mushrooms
- ▶ Turmeric
- ▶ Probiotic
- ▶ Cannabis



Symptom Management Challenges Associated with Cancer and Its Treatments



1. Arnold SM, et al. In: DeVita VT, et al, eds. *Cancer: Principles & Practice of Oncology*. 2001.

2. Damsky D. *Clin J Onc Nursing*. 2002;6(4):235-238.

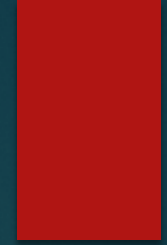
3. Body JJ. *Curr Opin Oncol*. 1999;11:255-260.

4. Foley KM. In: DeVita VT, et al, eds. *Cancer: Principles & Practice of Oncology*. 2001.

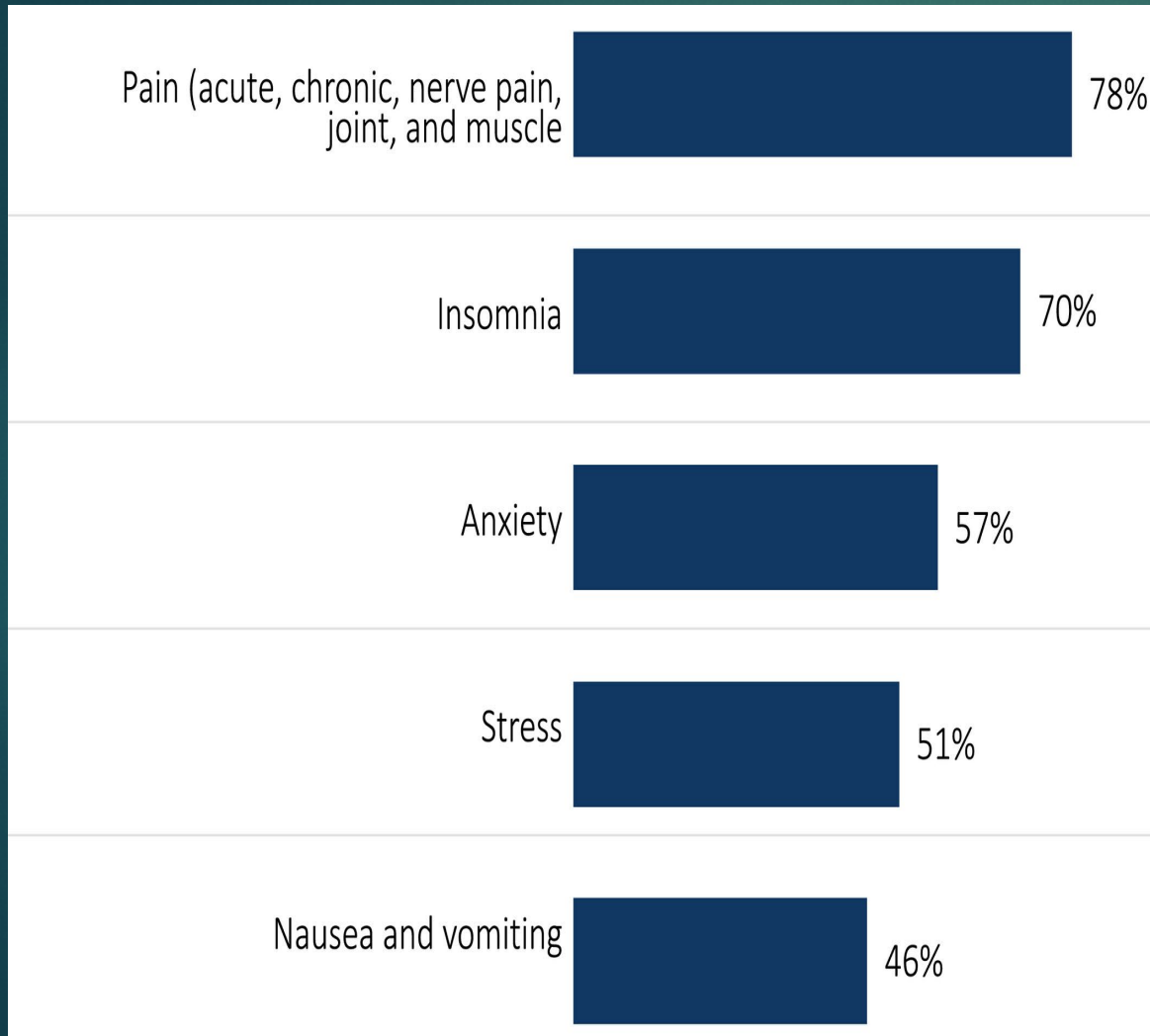
5. Massie MJ, et al. In: DeVita VT, et al, eds. *Cancer: Principles & Practice of Oncology*. 2001.

6. Carlson RH. *Oncology Times*. 2001;23(3):19-23.

Cannabis Use in Breast Cancer



A Coala-T-Cannabis Survey Study of breast cancer patients' use of cannabis before, during, and after treatment

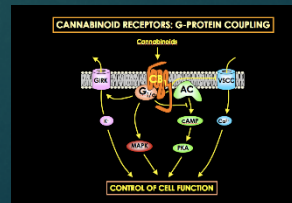
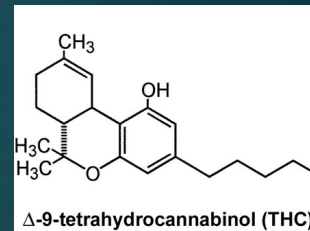


- ▶ 612 patients responded to survey; mean age 57
- ▶ 42% used cannabis for medical purposes; only 23% strictly medical
 - ▶ 75% reported extremely or very helpful at relieving sx
 - ▶ 79% used during Rx; 54% after completion of treatment
 - ▶ 49% said cannabis also being used to treat the cancer itself






Weiss et al, Cancer 2021

Cannabis 101

- ▶ Versatile botanical used for millennia removed from US Pharmacopeia in 1942; placed in Schedule I in 1970
- ▶ Contains over 400 chemicals including ~120 cannabinoids as well as terpenoids and flavonoids
 - ▶ Delta-9-tetrahydrocannabinol (THC) most psychoactive; cannabidiol (CBD) modulates activity of THC; cannabinol (CBN), cannabigerol (CBG), tetrahydrocannabivarin (THCV) and delta-8-THC are other cannabinoids of note
- ▶ Cannabinoid receptors 1 and 2 (CB1 and CB2) present in brain and throughout body to complex with endocannabinoids as well as phytocannabinoids (THC, but *NOT* CBD)



Cannabis Delivery Systems

	Initial Effects	Maximum Effects	Duration of Effects
 Inhalation (ex. smoking, vaping)	Fast onset Less than 10 minutes	15-20 minutes	Short duration 3-4 hours
 Ingestion (ex. capsules, edibles, etc.)	Delayed onset 30-90 minutes	1-6 hours	Long duration 4-8 hours
 Sublingual (ex. Tinctures, oils, chewing gum)	Mid-range onset 5-20 minutes	1.5 hours	Mid-range duration 1.5-3 hours
 Dermatological (ex. Topical)	??	??	2 days *time released nature
 Suppositories (ex. Rectally or vaginally)	15-30 minutes	30 minutes- 1 hour	2-4 hours

Cannabis as an Anti-Cancer Agent

- ▶ In 1975 VCU investigators reported that delta-9-THC, delta-8-THC and CBN inhibited Lewis lung adenocarcinoma cell growth in vitro and in mice; CBD did NOT!
- ▶ Increasing body of preclinical evidence suggests cannabinoids may have anti-cancer activity
- ▶ Anti-oxidant and anti-inflammatory effects may contribute as well
- ▶ Possibility of anti-tumor activity via cannabinoid receptors inducing apoptosis and impairing tumor vascularization
- ▶ Multiple tumor cell lines inhibited *in vitro*
- ▶ Cannabinoid administration to nude mice curbs growth of various tumor xenografts
 - ▶ Lung, breast, colorectal and pancreas carcinoma -Lymphoma
 - ▶ Skin carcinoma -Thyroid epithelioma
 - ▶ Melanoma -Glioma

Nabiximols in Glioblastoma Trial

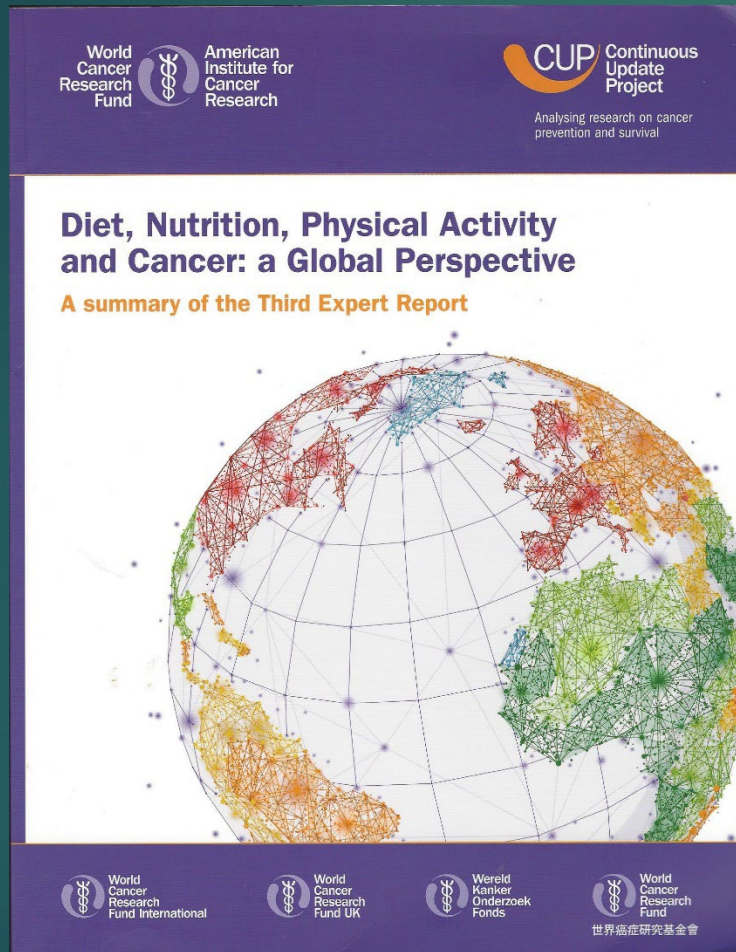
- ▶ A phase 1b randomized trial of nabiximols (12) compared with placebo (9), with dose dense temozolomide in patients with recurrent glioblastoma multiforme
- ▶ Only 33% of both groups were progression-free at 6 months
- ▶ 83% one year survival in nabiximols c/w 44% in placebo group ($p=0.042$) [not powered for survival endpoint]; OS at 2 yrs 50% vs 22% ($p=0.134$)

▶ Twelves et al, Br J of Cancer, 2021

Adherence to AICR Guidelines

- ▶ 41,543 NutriNet-Sante Cohort participants developed 1489 cancers over 6.5 years
- ▶ Study investigated 3 validated and 1 new score (only WCRF/AICR cancer-specific)
 - ▶ WCRF/AICR, Alternate Healthy Eating Index, French Nutrition and Health Program-Guidelines Score and MEDI-LITE score
 - ▶ A 1-point increment in WCRF/AICR score
 - ▶ 12% decrease in overall CA risk (8-16%, $P < 0.0001$)
 - ▶ 14% decrease in breast CA risk (6-21%, $P = 0.001$)
 - ▶ 12% decrease in prostate CA risk (0-22%, $P = 0.05$)
 - ▶ For colorectal CA, $HR = 0.86$ [0.72-1.03; $P = 0.09$]

ADDITIONAL AICR GUIDELINES



- ▶ Don't use supplements to protect against cancer
- ▶ It is best for mothers to breastfeed exclusively for up to 6 months
- ▶ **After Rx, cancer survivors should follow the recommendations for cancer prevention**



Does It Really Matter
After A Cancer
Diagnosis?

Nutrition

6. Please describe your typical diet:

Breakfast Buttered, toasted bagel; orange juice; coffee

Lunch Rarely

Dinner Restaurants / burgers + fries / frozen dinners

Snacks Occasional ice cream

7. Do you change your eating habits when you are upset, worried, or sad? Yes No

8. Do you eat when you are rushed? Yes No

9. Do you skip meals? Yes No

Breakfast

Lunch

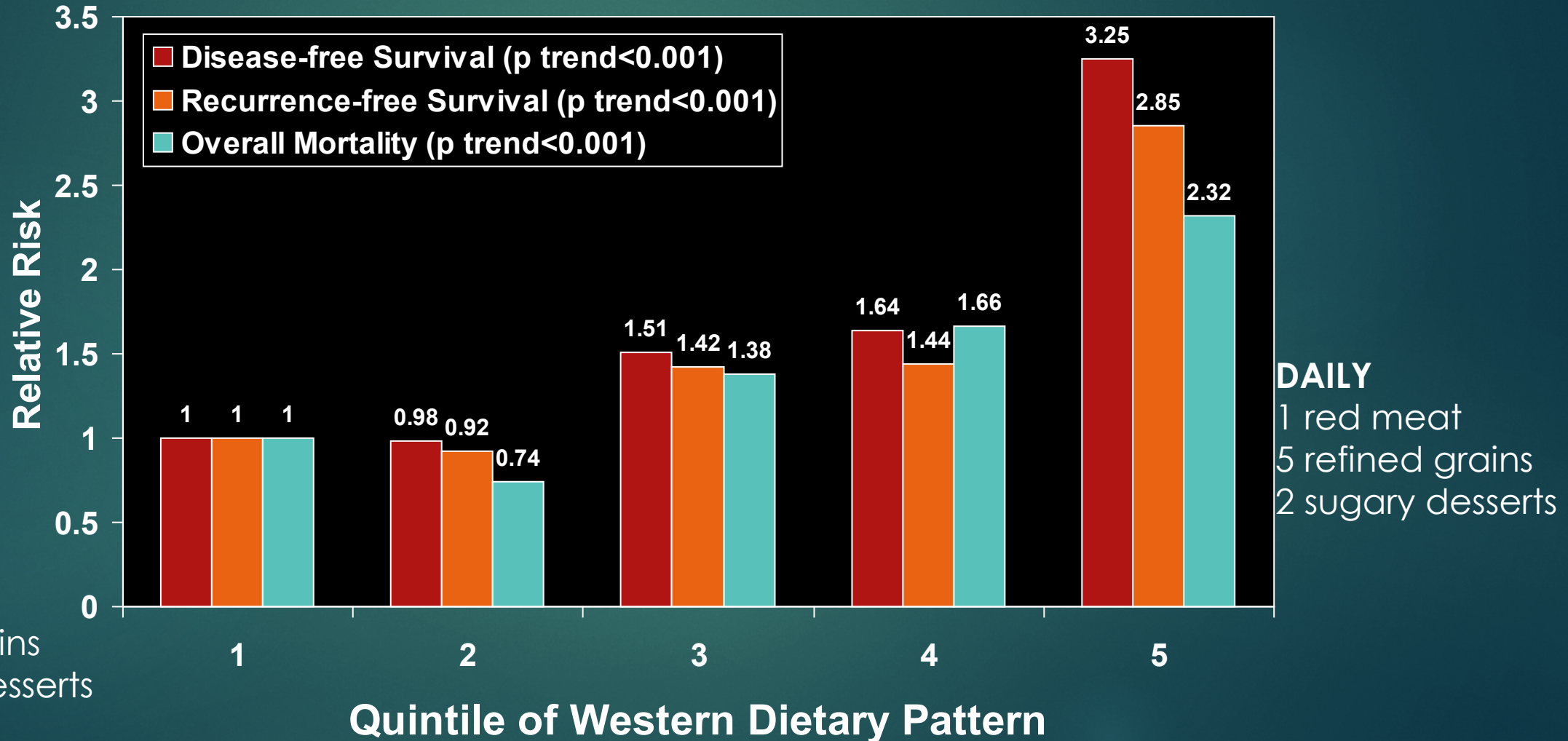
Dinner

10. How many glasses of fluids (water, juice) do you drink a day? five to eight

11. How many cups/cans of caffeinated drinks (coffee, tea, soda) do you drink/day? six to eight

CALGB Prospective Observational Study: Western Dietary Pattern and Cancer Outcomes

•F/U 5.3 years, 324 patients recurred, 223 died with recurrence and 28 died without CA



Dietary Patterns in Colon CA

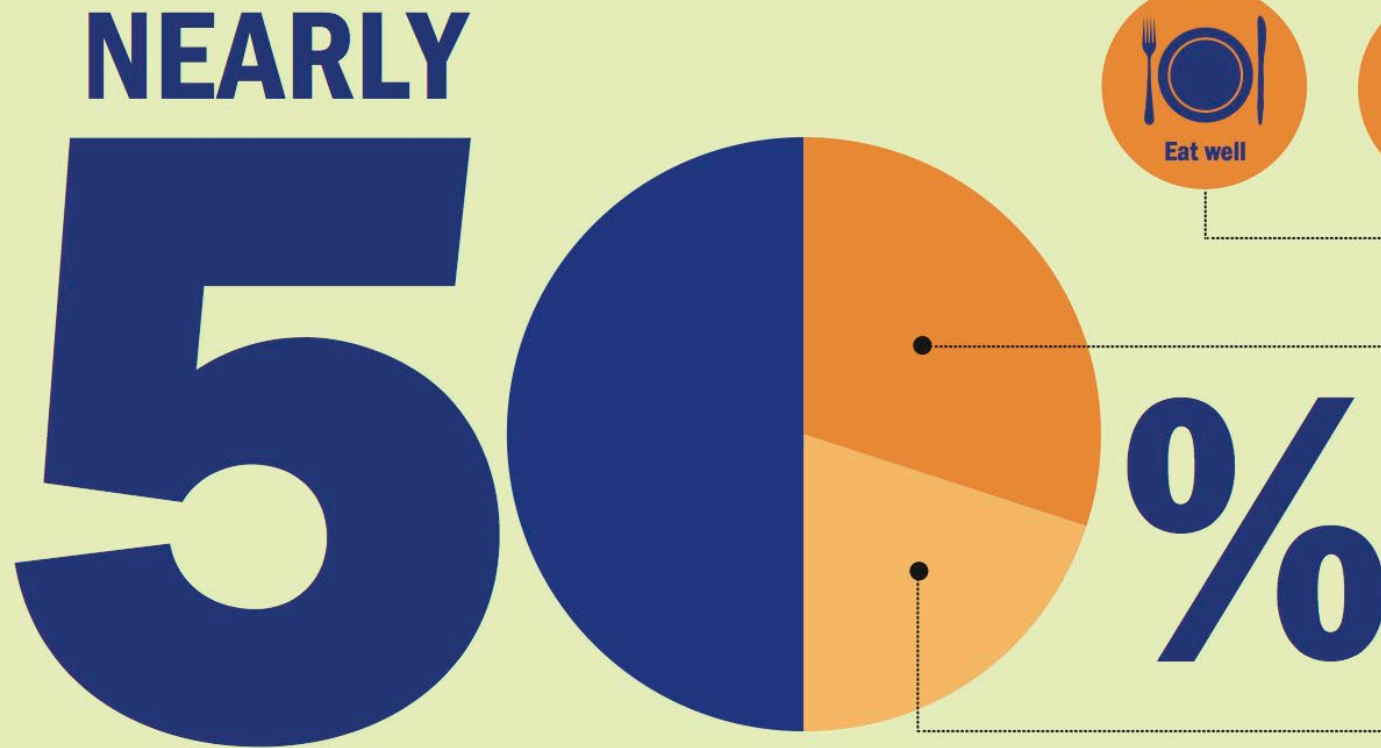
- ▶ Recent analysis of same cohort evaluated dietary insulin load
 - ▶ Foods with high food insulin index (FII) evoke a stronger plasma insulin response
 - ▶ Calculated dietary insulin load from FFQ and FII
- ▶ Higher dietary insulin load associated with worse DFS (HR 2.77), RFS and OS
 - ▶ Higher levels in women, less physically active, higher glycemic load, cereal fiber and total CHO, less EtOH
 - ▶ Association with outcome independent of Western vs prudent dietary pattern
 - ▶ Magnitude of association highest in obese patients

The Ideal Diet

ORGANIC +
PLANT-BASED +
ANTIOXIDANT RICH +
WHOLE FOODS
ANTI-INFLAMMATORY

My Standard Recommendations


- ▶ Increase plant based foods
 - ▶ Fruits (deep pigment) and vegetables (cruciferous)
 - ▶ Whole grains and nuts
- ▶ Decrease animal fats
 - ▶ Eliminate dairy, red and processed meats
 - ▶ Poultry preferably organic
 - ▶ Increase marine omega-3's
- ▶ Decrease refined carbohydrates
 - ▶ Sugar, white flour, white rice
- ▶ Season with garlic, ginger, onions, turmeric
- ▶ Drink green tea and red wine (if alcohol consumed)



of the most
common cancers

CAN BE PREVENTED

SOURCES: Colditz GA et al. Sci Transl Med. Applying what we know to accelerate cancer prevention. Sci Transl Med. 2012 Mar 28;4(127); AICR/WRCF's, *Food, Nutrition, Physical Activity and the Prevention of Cancer: a Global Perspective* (2007), *Policy and Action for Cancer Prevention* (2009), Continuous Update Project reports (ongoing).



The doctor of the future will give no medicine, but will interest his patients in the care of the human body, in diet, and in the cause and prevention of disease.

Thomas Edison 1847-1931

Let your food be your medicine
And your medicine be your food
Hippocrates

