Alkaline, Paleo, Ketogenic, Macrobiotic, or Vegan: Are Any Really Anti-Cancer?

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ACS and WCRF/AICR Guidelines

Food, Nutrition, Physical Activity, and the Prevention of Cancer: a Global Perspective
Choose foods and beverages in amounts that help achieve & maintain a healthy weight

- Avoid sugary drinks
- Limit consumption of energy dense foods
- Particularly processed foods high in added sugar, low in fiber or high in fat
PLANT-BASED GUIDELINES

• Consume a healthy diet, with an emphasis on plant sources
• Eat 5 or more servings of a variety of fruits and vegetables each day; every meal and snacks
• Choose whole grains in preference to refined

Eat more of a variety of vegetables, fruits, whole grains and legumes
Limit consumption of processed and red meats

Limit consumption of red meats (beef, pork and lamb) and avoid processed meats
USDA Agrees!

Fruits:
Focus on fruits.
- Eat a variety of fruit.
- Choose fresh, frozen, canned or dried fruit.
- Go easy on fruit juices.

Vegetables:
Vary your veggies.
- Eat more green dark veggies.
- Eat more orange veggies.
- Eat more dry beans and peas.

Physical Activity
Find your balance between food & physical activity.
- Be physically active for 30 minutes most days of the week.
- Children and teenagers should be physically active for 60 minutes everyday or most days of the week.

Milk:
Get your calcium-rich foods.
- Go low-fat or fat-free
- If you don’t or can’t consume milk, choose lactose-free products or other calcium sources.

Grains:
Make at least half your grains whole.
- Eat at least 3 ounces of whole grain bread, cereal, rice, or pasta everyday.
- Look for the word “whole” before the grain name on the list of ingredients.

Oils:
Know your fats.
- Make most of your fat sources from fish, nuts and vegetable oils.
- Limit solid fats like butter, stick margarine, shortening, and lard.

Meats & Beans
Go lean on protein.
- Choose low-fat or lean meats and poultry.
- Bake it, broil it or grill it.
- Vary your choices with more fish, beans, peas, nuts, and seeds.

Source: ChooseMyPlate.gov
But Do The Guidelines Work?

- Meta-analysis based of published studies on dietary guidelines and RR of cancer
- 17 epidemiological studies looked at potential association between good and bad adherence to guidelines and risk
- Mostly USDA food pyramid or Dietary Guidelines for Americans (only 1 AICR)
- No protective effect for overall CA but a 21% ↓ risk colon CA and 22% ↓ cancer-specific mortality

Balter et al Curr Opin Oncol 2012
Do The CA Guidelines Work?

- Examined association between ACS guidelines and CA in 65,838 postmenopausal woman in Women’s Health Initiative Observational Study
- After a mean 12.6 years of follow-up, 8632 CA and 2356 CA deaths were identified
- Highest ACS guidelines scores compared with the lowest
  - 17% lower risk of any CA [0.75-0.92]
  - 22% lower risk of breast CA [0.67-0.92]
  - 52% lower risk of colorectal [0.32-0.73]
  - 20% lower risk CA mortality [0.71-0.90]

Navigating the Diet Craze Maze

• Three Questions to Ask
  – What is it?
  – Is the rationale behind it logical?
  – Does it promote health?

Alkaline Diet

- SAD is highly acid-forming, overwhelming body’s mechanism for removing excess acid
- Based on the theory that an acid environment causes and promotes cancer
- Alkaline diet reduces acid load, helping to reduce strain on acid-detoxification systems
- Patients assess diet’s effects by monitoring urine pH

http://www.acidalkalinediet.net/
Alkaline Diet

• 80% alkaline foods (vegetables, low sugar fruits, some legumes)
  – Alkalinizing vegetables: beets, broccoli, cauliflower, celery, cucumber, kale, lettuce, onions, peas, pepper, spinach
  – Alkalinizing fruits: apples, bananas, berries, grapes, lemons, oranges, melons, peach, pear

• <20% acid-forming foods (meat, dairy, eggs, corn, wheat, coffee, sugar, alcohol)

• Fermented soy acceptable
Alkaline Diet

• Lemons and Oranges?
  – **Note:** a food's acid or alkaline forming tendency in the body has nothing to do with the actual pH of the food itself. Although it might seem that citrus fruits would have an acidifying effect on the body, the citric acid they contain actually has an alkalinizing effect in the system.
  • The Acid-Alkaline-Association Diet® web site

http://www.acidalkalinediet.net/
Alkaline Diet

• If kidney function is normal, body maintains optimal blood pH regardless of diet
• Urine pH does not reflect change in body pH
• Diet is high in fiber and plant nutrients
• Diet may be low in protein, calories, vitamin D and calcium
• No clinical data on benefit in cancer
• May be good diet but for wrong reason

Schwalfenberg, J Environ and Public Health 1012
Paleolithic Diet aka Paleo

- Founded on the premise that we should only eat foods that our ancestors ate during the Paleolithic period
- Features foods that were gathered or hunted by our ancestors before agriculture
- Contrasts with high carb diet in that it reduces inflammation, reverse diabetes, lower blood pressure and ↓ cancer risk

Lindeberg, Am J Human Biol 2012
Paleolithic Diet Assumptions

- Human genes have not changed much since the Paleolithic era
  - Irish genes changed with the introduction of potato as a staple
  - Gene to digest lactose induced by dairy

- We have understanding of prehistoric diets

- Foods available then are available now
  - Nuts and seeds of today felt to be different
Paleolithic Diet

- **Includes**
  - Fruits and shoots
  - Flowers and buds
  - Young leaves
  - Roots and bulbs
  - Nuts & non-grass seeds
  - Animal meat & organs
  - Bone marrow
  - Fish and shellfish
  - Insects, larvae
  - Eggs

- **Excludes**
  - Grains
  - Beans
  - Dairy products
  - Refined fat
  - Sugar
  - Hence provides more fat, saturated fat and cholesterol and less CHO than Guidelines
Greater Whole-Grain Intake Is Associated with Lower Risk of Type 2 Diabetes, Cardiovascular Disease, and Weight Gain$^{1-3}$

We also observed an inverse association between whole-grain intake and weight gain, with consistently less weight gain observed in those consuming 48–80 g/d of whole grain (3–5 servings/d) compared with never/rare consumers (1.27 vs. 1.64 kg) during 8–13 y of follow-up.

Whole-grain and high fiber intakes are routinely recommended for prevention of vascular diseases; however, there are no comprehensive and quantitative assessments of available data in humans. The aim of this study was to systematically examine longitudinal studies investigating whole-grain and fiber intake in relation to risk of type 2 diabetes (T2D), cardiovascular disease (CVD), weight gain, and metabolic risk factors. We identified 45 prospective cohort studies and 21 randomized-controlled trials (RCT) between 1966 and February 2012 by searching the Cumulative Index to Nursing and Allied Health Literature, Cochrane, Elsevier Medical Database, and PubMed. Study characteristics, whole-grain and dietary

Can Oatmeal Help Fatty Liver Disease?
Was that a Paleo chardonnay or Sauvignon blanc?
Ketogenic Diet

- A diet that can induce ketosis, the state of having elevated ketone bodies in blood
- Ketone bodies are a form of energy produced by breakdown of fat
- During periods of prolonged fasting or CHO restriction, blood glucose levels do not meet energy demands
- Fat is broken down leading to ketosis
Ketogenic Diet

• Introduced in 1920’s for children with uncontrolled epilepsy; now being explored in autism, Alzheimer’s, ALS, Parkinson’s and cancer (especially brain tumors)

• Premsie: Cancer cells can only use glucose for energy (Warburg effect), but not ketone bodies

• Hypothesis is that glucose restriction may “starve” cancer cells and ketones are toxic to cancer cells
Ketogenic Diet

• Restricted calorie ketogenic diets in mice
  – Decreased glioma size
  – Reduced ROS produced in tumor cells
  – Enhanced anti-tumor effects of radiation
  – Prolonged survival

• Ketogenic diet in human gliomas
  – Positive case reports of transient effects
  – 5 ongoing clinical trials in brain tumor patients
  – (ClinicalTrials.gov)

Mukherjee et al, Br J Cancer, 2002; Schwartz et al, Cancer and metabolism 2015
Ketogenic Diet

• Ketogenic diet characterized by a ratio of fat:protein+CHO of 3:1 or 4:1
• Diet usually initiated in a clinical setting
• Sample Ketogenic Diet Meal
  – Breakfast: Eggs Benedict
    • 55 gm cream, 36% fat
    • 48 gms butter
    • 14 gms Canadian bacon
    • 60 gms eggs, raw
    • 5 gm cheese
    • 15 gm strawberries

» Ketogenic Diet for Brain Tumor Patients” Renda
Ketogenic Diet

• Side effects
  – Vitamin and mineral deficiencies
  – Hyperlipidemia
  – Constipation/diarrhea
  – Weight loss
  – Kidney stones
  – Nausea and vomiting
  – Acute pancreatitis
  – Fatigue
  – Headaches

» http://www.ketogenic-diet-resource.com
Ketogenic Diet in Recurrent GBM

- 20 pts with recurrent GBM put on low CHO diet to assess feasibility
- 3 discontinued because of tolerability
- Urine ketosis in 12/13 evaluable patients
- 1 minor response, 2 stable disease @ 6wks; 6/7 on bevacizumab + diet had objective response
- Median PFS 5 wks; overall survival 32 wks
- No adverse effects of diet

Rieger et al; Int J Oncol 2014
Not All Fats Are the Same

- Foods high in omega-3 fats
  - Cold water fish
  - Ground flax seeds or flax oil
  - Leafy green vegetables
  - Walnuts

- Foods high in trans- and omega-6 fats
  - Red meats
  - Dairy products
  - Partially hydrogenated oils
  - Corn, cottonseed, grapeseed, peanut, safflower, soy, and sunflower oils
  - Foods with long shelf life
Vegan Diet

• Based on risks associated with animal products; often overlay of ethics or other beliefs; 6% of US population is vegan

• Diet avoids all animal products

• Many health benefits appreciated
  – Protection against CV disease, obesity, type-2 diabetes, HTN, some cancers, total mortality

• Potential deficiencies
  – Protein - Vitamin B12 -Iron - Omega 3’s
  – Calcium -Zinc -Iodine

Le and Sabate, Nutrients, 2014
Ornish Regimen

• Vegan diet with only 10% calories from fat
  – Diet supplemented with soy, fish oil, vit C, E and selenium
  – 30 min aerobic exercise and 60 min stress reduction daily
  – Participants adhered to regimen for 3-months

• Randomized trial in 93 prostate CA patients
  – Experimental group had ↓ PSA while controls ↑
  – Experiment group had ↑ telomerase activity
  – At 2 yrs, conventional Rx to 5% vs 27% controls

Vegetarian Diet Lowers Risk for Some Cancers, Study Finds

Vegetarians who also eat fish have even greater protection against colorectal cancers

A vegetarian and pescevegetarian diet reduced risk for colorectal cancers, according to a new study by Dr. Michael Sera, the study’s lead researcher, and his colleagues.
Vegetarian Diet Patterns & CRC

- Adventist Health Study 2 of 77,659
- 380 colon and 110 rectal CA 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]

Orlich et al; JAMA Intern Med 2015
Macrobiotics

- Based on teachings of Japanese physician, Sagen Ishizuka (1850-1910)
- Saw food as basis of health and illness
- Saw changing food habits as the cause of physical and moral decline of Japan
- Modern era ushered in meat, dairy, potatoes, eggs, white bread, refined sugar
  - Perhaps appropriate for cold, dry climates
  - For warm, moist island climate, proper diet is rice, vegetables and sea products
Macrobiotics

- Macro=great  bios=life
- Diet emphasizes whole grains and fresh vegetables
- Avoids meat, dairy foods and processed foods
- Goal is to provide the body with essential nutrients to function efficiently without taxing it with toxins or excesses that must be eliminated or stored
- A body not burdened by excesses or toxins can heal better

Macrobiotic Diet and Cancer

• Remarkable case reports of people attributing recovery from cancer to macrobiotics
• Many dietary factor recommended are associated with ↓’ed cancer risk
• Women consuming macrobiotics have lower estrogen levels
• Few studies have compared macrobiotic patients to historical controls

Kushi et al, J Nutr 2001
Macrobiotic Diet

• Potential Risks
  – Weight loss
  – Anemia
  – Low protein
  – Low B12, vitamin D, calcium, zinc and iron

O’Brien et al, Oncology Nutrition for Clinical Practice, 2013
Other Popular Anti-Cancer Diets

• Budwig Diet
  – Natural unrefined foods emphasized
  – Flaxseed oil, cottage cheese and honey bid
  – Avoids complete protein

• Gerson Therapy
  – Vegetarian diet and coffee enemas
  – Intake of 15-20# organic F&V daily, juiced
  – Avoids fat and protein

• Raw Food Plan
  – Raw or heated to 105° to preserve enzymes
  – 75% fruits and vegetables plus seaweed, sprouts, nuts, beans and whole grains
  – Avoids meat, dairy and eggs

» O’Brien et al, Oncology Nutrition for Clinical Practice 2013
Figure 3. Number of Deaths and Percentage of Disability-Adjusted Life-Years Related to the 17 Leading Risk Factors in the United States in 2010 for Both Sexes Combined
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

Lim et al, Lancet 2012
Comparative Macronutrients

- IOM
- SAD
- Paleo
- Ketogenic
- Macrobiotic
- Vegan
- Ornish

Categories:
- Fat
- Protein
- CHO
Cancer Diets Sytematic Review

- Diets evaluated: alkaline, raw, macrobiotic, Budwig, Gerson and ketogenic
- “We did not find clinical evidence supporting any of the diets.”
- Case reports and preclinical data point to potential harm of some of the diets
- Conclude oncologists should engage more in counseling patients on such diets

Huebner et al, Anticancer Research 2014
My Ideal Anticancer Diet

- ORGANIC
- PLANT-BASED
- ANTIOXIDANT RICH
- ANTI-INFLAMMATORY
- WHOLE FOODS
My Ideal Anticancer Diet

ORGANIC +
PLANT-BASED +
ANTIOXIDANT RICH +
WHOLE FOODS
ANTI-INFLAMMATORY
Dietary Patterns in Colon CA

- Prospective observational study of 1009 pts with Stage III colon cancer enrolled in CALGB 89803 between 4/99-5/01
  - Pts reported on dietary intake using a ffq during and 6 months after the trial
  - Two major dietary patterns recognized

- Two major dietary patterns identified
  - **Western pattern** characterized by high intakes of meat, fat, refined grains, and dessert
  - **Prudent pattern** characterized by high intakes of fruits and vegetables, poultry and fish
  - Every patient scored along the spectrum of both

- Patients were followed up for cancer recurrence or death

Meyerhardt et al JAMA 2007
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

• Highest quintile in Western diet had daily median
  – 1 serving of red meat
  – 5 servings of refined grains
  – 2 sugar desserts

• Lowest quintile in Western diet had daily median
  – 0.3 serving red meat (2 per week)
  – 2 servings refined grain
  – 0.5 sugar desserts (3 per week)

• “So the recommendation is more of an avoidance than an increase in diet components”

Meyerhardt Personal Communication
Dietary Fat and Breast Cancer

• Women’s Intervention Nutrition Study in 1994 randomized 975 breast cancer pts to reduced fat intake for 5 yrs vs 1462 controls

• At 5 yrs, intervention group reduced fat calories by 9.2% and lost 6# more

• Now with max 19.4 yrs f/u, relapse rate 24% lower and death rate lower (13.6% vs 17%; HR; 0.76-1.2)

• ER negative pts had significant benefit

Chlebowski, San Antonio Abstract 2014
Understanding the WHEL Results

• Women’s Healthy Eating and Living (WHEL) enrolled 3088 women from 7 centers 1995-2000
• Stage I-IIla invasive breast CA treated with lumpectomy and XRT or mastectomy
• Intervention group: 5 vegetables plus 16 oz vegetable juice, 3 fruits, 30 gm fiber and <15-20% calories from fat
• Control group: “5-A-Day” print guidelines

Pierce et al JAMA 2007
Understanding the WHELM Results

• Intervention group had 65% ↑ in vegetables, 25% fruit, 30% fiber and 13% ↓ fat
• Patterns differed significantly during the 7.3 years of the study
• At 1 yr, intervention group consumed 12 F&V servings/day vs 7.3 in control group
• No difference in disease-free or overall survival between the groups
• More “good” does not change rates

Pierce et al JAMA 2007
My Standard Recommendations

• Increase plant based foods
  – Whole grains
  – Fruits (deep pigment) and vegetables (cruciferous)

• 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
Let your food be your medicine
And your medicine be your food

Hippocrates