

Cancer and a Plant Based Diet

Sarah Taylor

Certificate in Plant Based Nutrition

Author, *Vegan in 30 Days*

Vegetarian to Vegan



The 3 Steps of Cancer

1. Initiation

The DNA damage that starts the cancer process

2. Promotion

Tumor formation

3. Progression

Tumor growth and metastasis



Cancer and Epigenetics

- Epigenetics is the study of gene expression
 - What makes genes turn “on” and “off”?
- 50% of women with the “deadly” BRCA gene for breast cancer never get it. Why? Because the BRCA gene is never turned on. Why? Epigenetics.

Cancer & Diet Statistics

ESTIMATED PERCENTAGES OF CANCER DUE TO SELECTED FACTORS¹

Diet	30-60%
Tobacco	30%
Air and Water Pollution	5%
Alcohol	3%
Radiation	3%
Medications	2%



¹ National Cancer Institute. *Cancer Rates and Risks*. Washington, DC: 1985

² Doll R, Peto R. The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today. *J Natl Cancer Inst.* 1981;66:1191-1308

Cancer & Diet Statistics

- In 1892, *Scientific American* noted that “cancer is most frequent among those branches of the human race where carnivorous habits prevail¹.”



Breast Cancer and Animal Products

- NYU Cancer Institute compared the diets of 250 breast cancer patients to 499 women without breast cancer¹.
 - The cancer patients ate more meat, cheese, butter and milk than the women without cancer.
 - The women who consumed more animal products had as much as three times the cancer risk of the other women.

Avoid the “bad” foods, Eat the “good” foods

- Certain foods can create an environment where cancerous cells can proliferate more easily.
- White blood cells roam our bloodstreams looking for cancerous cells and (hopefully) abolish them before they grow out of control.
- Increasing your intake of fruits and vegetables strengthens your immune system and helps knock out cancer cells.



Meat, Poultry, Fish, Dairy & Eggs

THE RESEARCH AGAINST ANIMAL-BASED PRODUCTS

Animal Protein and Cancer

- Rats were given a cancer-causing substance, then subjected to a “high protein diet” (20% of calories from casein) or a “low protein diet” (5% of calories) from casein.”
- Then checked to see if they developed cancer or pre-cancerous lesions.

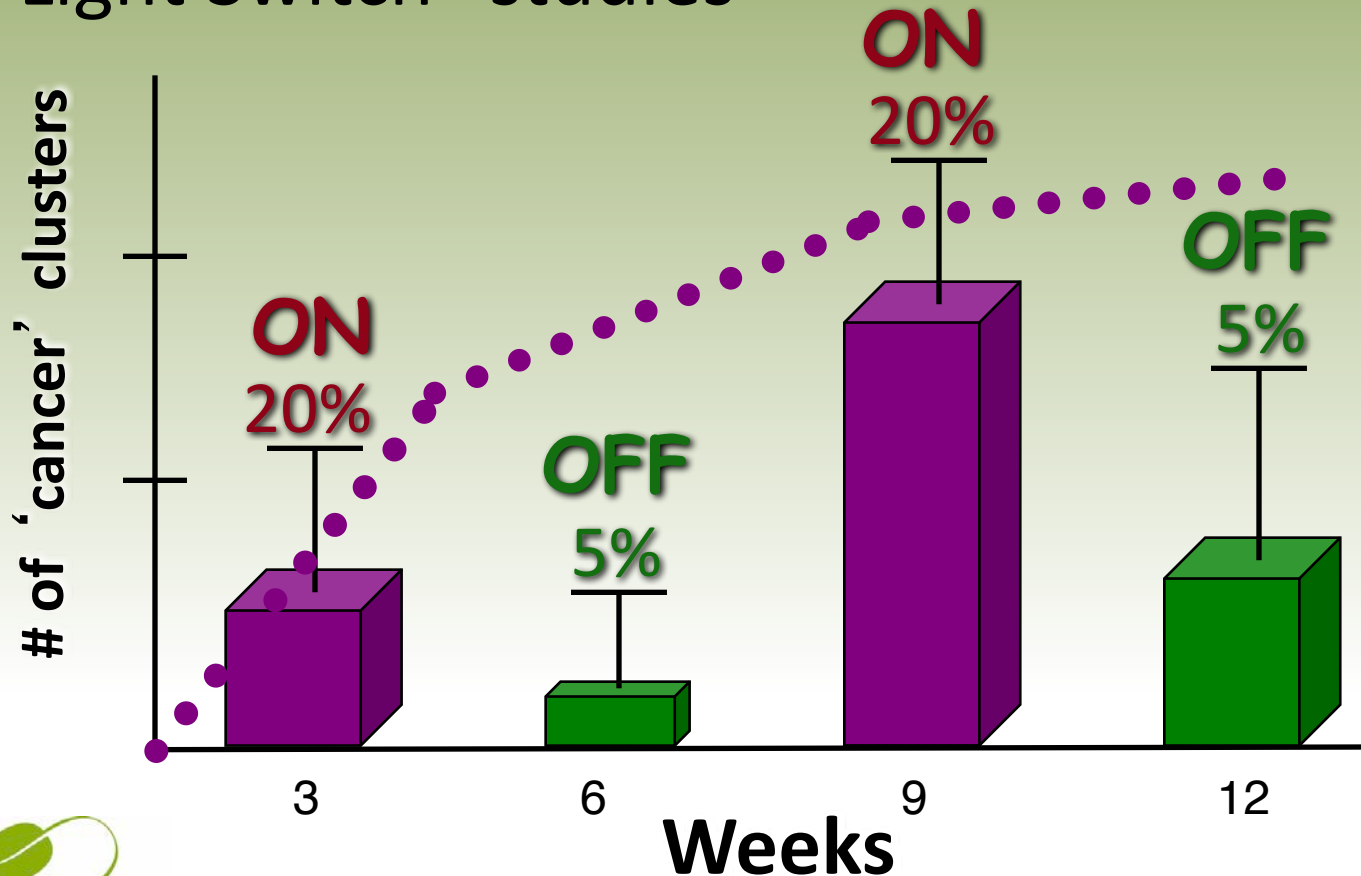
Animal Protein and Cancer

Dietary Protein %	Animals with Tumors or Hyperplastic Nodules
20%	30/30 (100%)
5%	0/30 (0%)

Dietary Protein %	Animals Alive at 100 Weeks
20%	0/60 (0%)
5%	60/60 (100%)

Animal Protein and Cancer

- “Light Switch” studies



Animal Protein and Cancer

- Soy and wheat proteins did not cause any cancer or pre-cancerous lesions at a low or high protein diet
- “Casein is the most relevant chemical carcinogen ever identified.” - Colin Campbell
- But is there proof of this in humans?...

Cooking Meat and Breast Cancer

- Long Island Breast Cancer Study: Women who eat more grilled, barbecued or smoked meats have 47% higher odds of breast cancer¹.
- Iowa Women's Health Study: Women who ate their meat "very well done" had nearly five times the odds of getting breast cancer².

¹ Steck SE, Gaudet MM, Eng SM, et al. Cooked meat and risk of breast cancer – lifetime versus recent dietary intake. *Epidemiology*. 2007;18(3):373-382.

² Zheng W, Gustafson DR, Sinha R, et al. Well-done meat intake and the risk of breast cancer. *J Natl Cancer Inst*. 1998;90(22):1724-1729.

Cooking Meat and Breast Cancer

- Heterocyclic Amines (HCAs) are produced through the process of cooking meat, and have been linked to cancer.
 - Grilling, frying and oven-broiling produce large amounts of HCAs.
 - Grilled chicken has been shown to form higher concentrations of HCAs than other types of meat¹.
 - Eating well-done meats has been associated with both breast and colon cancers^{2,3}.

¹ Sinha R, Rothman N, Brown ED, et al. High concentrations of the carcinogen 2-amino-1-methyl-6-phenylimidazo-[4,5-b]pyridine [PhIP] occur in chicken but are dependent on the cooking method. *Cancer Res.* 1995;55:4516-4519.

² Sinha R, Gustafson DR, Kulldorff M, Wen WQ, Cerhan JR, Zheng W. 2-amino-1-methyl-6-phenylimidazo-[4,5-b]pyridine, a carcinogen in high-temperature-cooked meat, and breast cancer risk. *J Natl Cancer Inst.* 2000;92:1352-1354

³ Butler LM, Sinha R, Millikan RC, et al. Heterocyclic amines, meat intake, and and association with colon cancer in a population-based study. *Am J Epidemiol.* 2003;157:434-445.

Meat and Colon Cancer

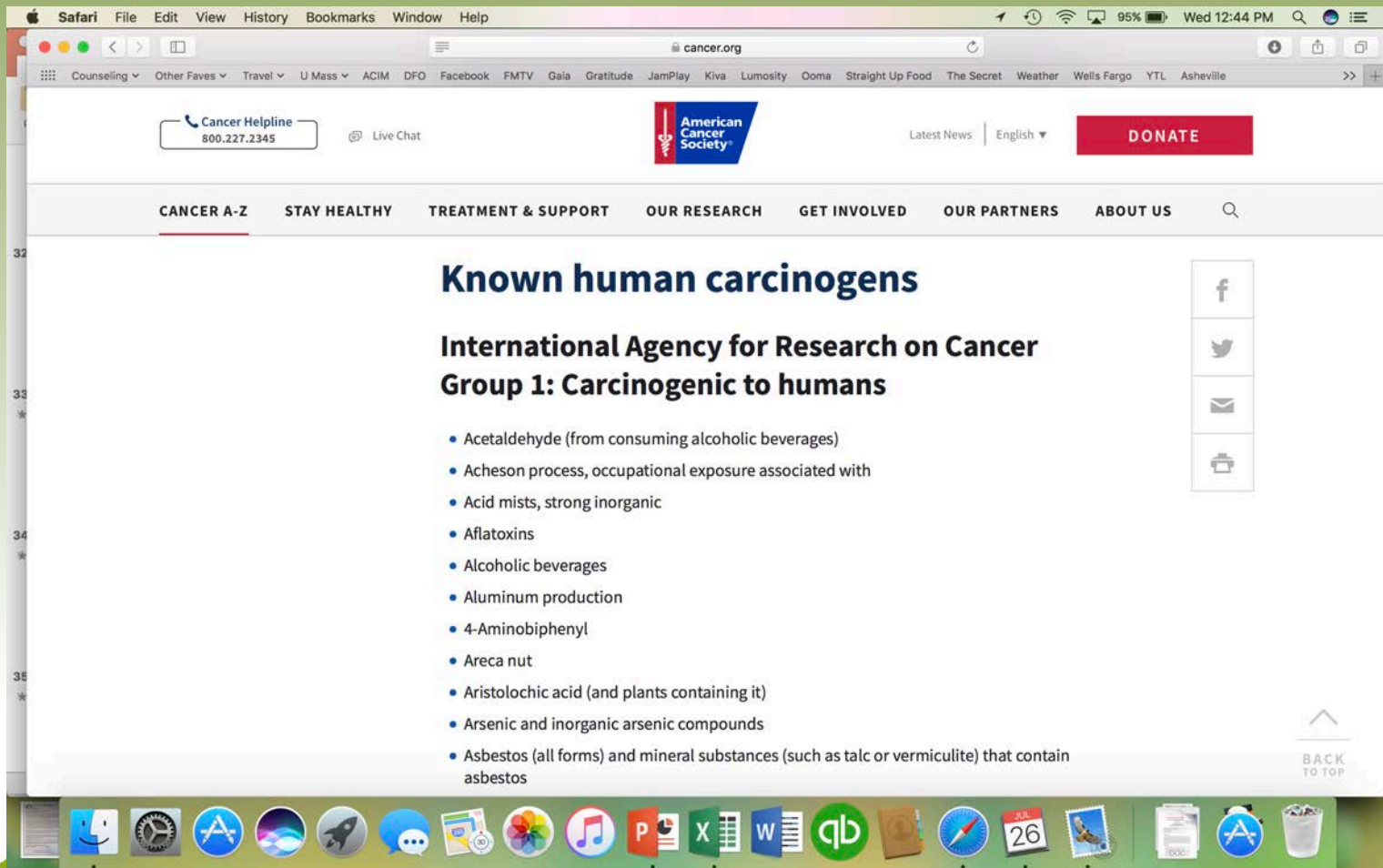
- Strong links have been found between colon cancer and the consumption of alcohol, meat and other fatty foods¹.
 - Red and processed meats (bacon, ham, hot dogs, sausage) are the biggest offenders.
- Just one 50g serving (~1 hot dog) of processed meat per day increases the risk of colorectal cancer by 21%¹.

Meat and Esophageal Cancer

- Over the past 20 years, about 45 studies have examined the link between diet, Barrett's esophagus and esophageal cancer.
 - The most consistent association with cancer was the consumption of meat and high-fat diets¹.



What the ACS Has to Say About...



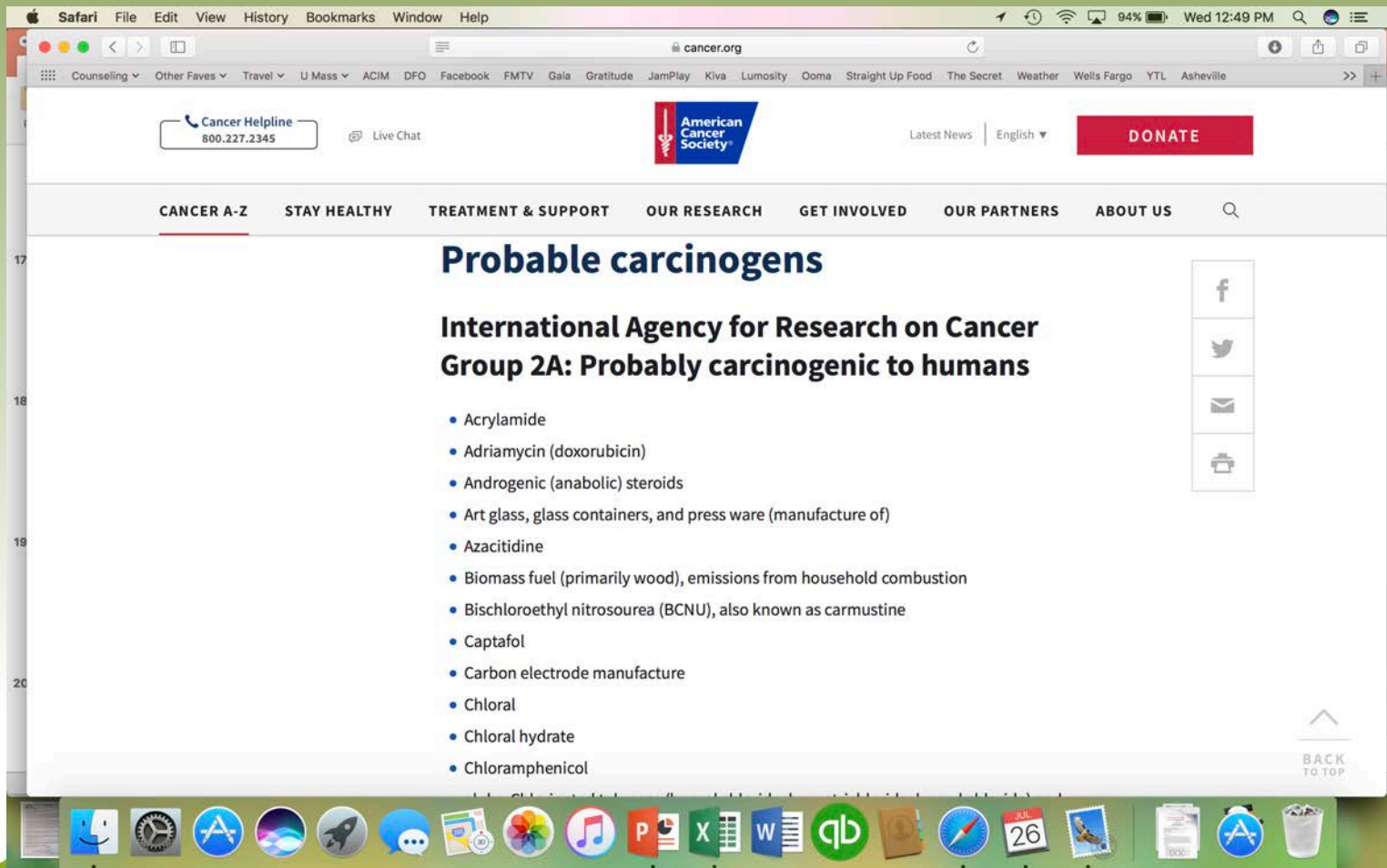
Processed Meats

The screenshot shows the American Cancer Society website in a Safari browser window. The page is titled 'CANCER A-Z' and lists various carcinogenic agents. The agent 'Processed meat (consumption of)' is highlighted in blue. The list includes:

- *Opisthorchis viverrini* (infection with), also known as the Southeast Asian liver fluke
- Outdoor air pollution (and the particulate matter in it)
- Painter (workplace exposure as a)
- 3,4,5,3',4'-Pentachlorobiphenyl (PCB-126)
- 2,3,4,7,8-Pentachlorodibenzofuran
- Phenacetin (and mixtures containing it)
- Phosphorus-32, as phosphate
- Plutonium
- Polychlorinated biphenyls (PCBs), dioxin-like, with a Toxicity Equivalency Factor according to WHO (PCBs 77, 81, 105, 114, 118, 123, 126, 156, 157, 167, 169, 189)
- **Processed meat (consumption of)**
- Radioiodines, including iodine-131
- Radionuclides, alpha-particle-emitting, internally deposited (Note: Specific radionuclides for which there is sufficient evidence for carcinogenicity to humans are also listed individually as Group 1 agents)
- Radionuclides, beta-particle-emitting, internally deposited (Note: Specific radionuclides for which there is sufficient evidence for carcinogenicity to humans are also listed individually as Group 1 agents)
- Radium-224 and its decay products

The browser window shows the URL 'cancer.org' and the page title 'Cancer Helpline 800.227.2345'. The American Cancer Society logo is visible in the top right corner. The page is viewed on a Mac OS desktop with various application icons in the dock at the bottom.

What the ACS Has to Say About...



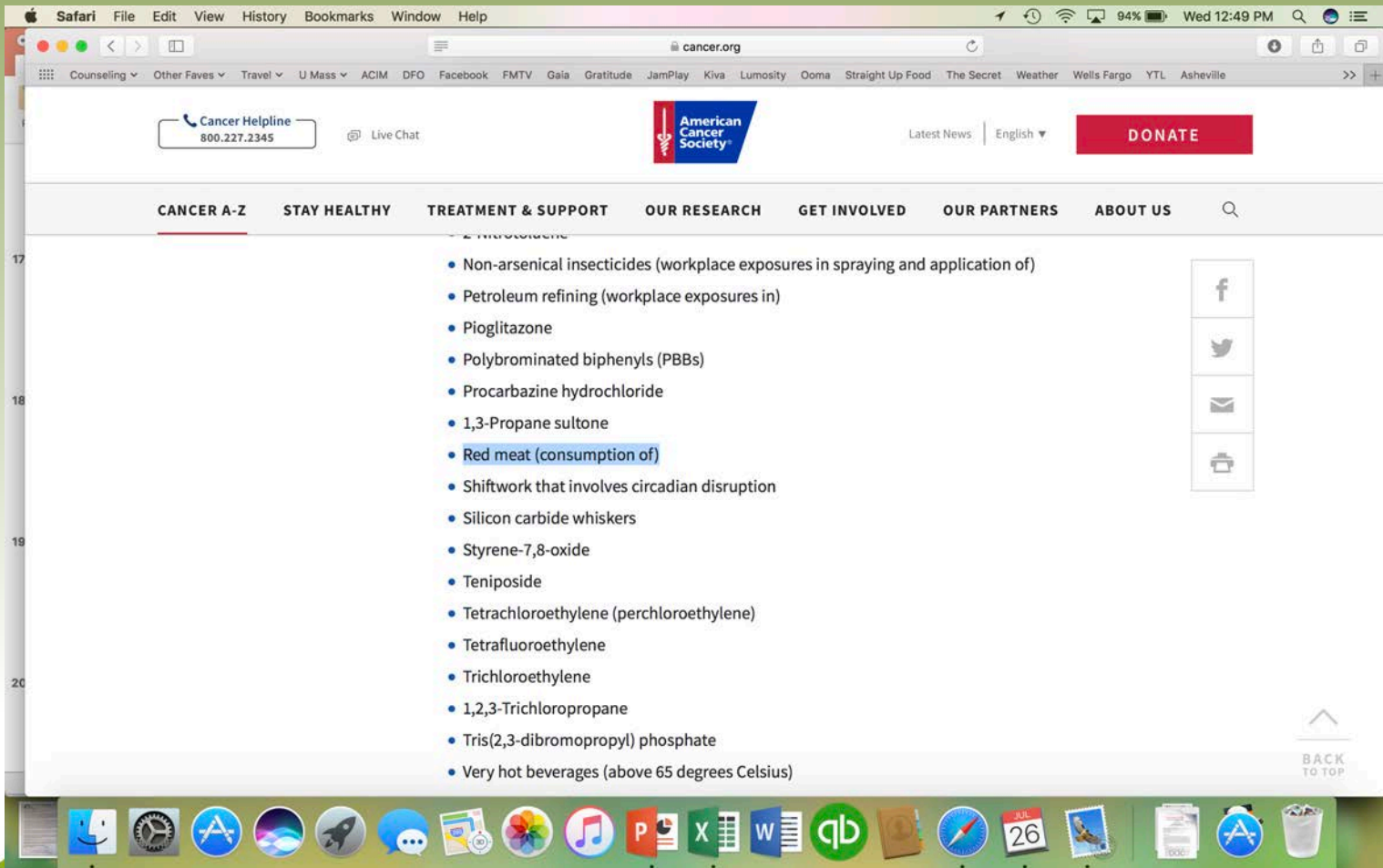
The screenshot shows the American Cancer Society website in a Safari browser window. The page title is "Probable carcinogens" and the subtitle is "International Agency for Research on Cancer Group 2A: Probably carcinogenic to humans". A list of 14 items is provided, each preceded by a blue dot. The items are: Acrylamide, Adriamycin (doxorubicin), Androgenic (anabolic) steroids, Art glass, glass containers, and press ware (manufacture of), Azacitidine, Biomass fuel (primarily wood), emissions from household combustion, Bischloroethyl nitrosourea (BCNU), also known as carmustine, Captafol, Carbon electrode manufacture, Chloral, Chloral hydrate, and Chloramphenicol. The website header includes the ACS logo, a "DONATE" button, and navigation links like "CANCER A-Z", "STAY HEALTHY", "TREATMENT & SUPPORT", "OUR RESEARCH", "GET INVOLVED", "OUR PARTNERS", and "ABOUT US".

Probable carcinogens

International Agency for Research on Cancer Group 2A: Probably carcinogenic to humans

- Acrylamide
- Adriamycin (doxorubicin)
- Androgenic (anabolic) steroids
- Art glass, glass containers, and press ware (manufacture of)
- Azacitidine
- Biomass fuel (primarily wood), emissions from household combustion
- Bischloroethyl nitrosourea (BCNU), also known as carmustine
- Captafol
- Carbon electrode manufacture
- Chloral
- Chloral hydrate
- Chloramphenicol

Red Meat

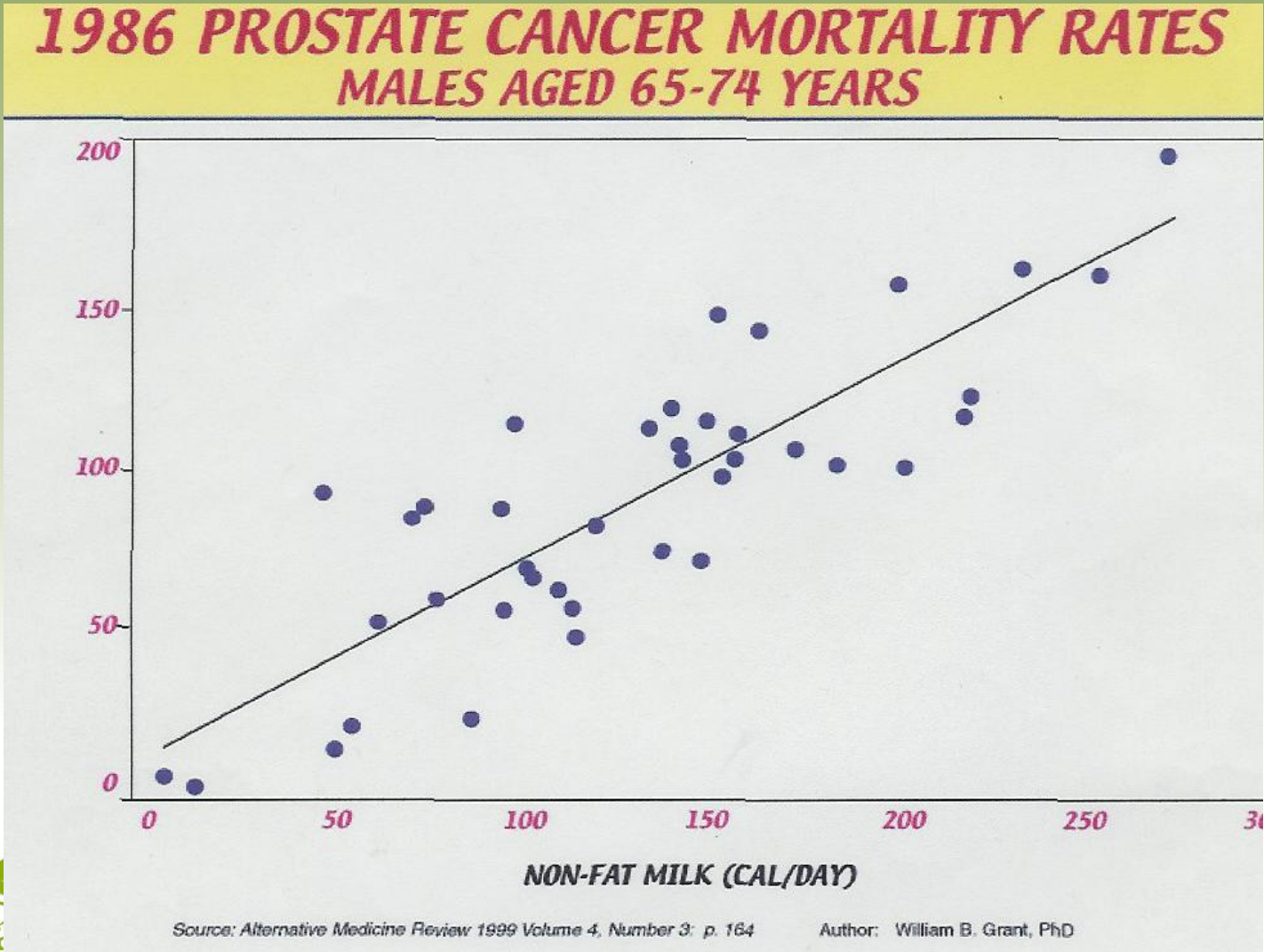


Ovarian Cancer and Milk

- The Iowa Women's Health Study found that women who consumed more than one glass of milk per day had a 73 percent greater chance of ovarian cancer than women who drank less than one glass per day¹.

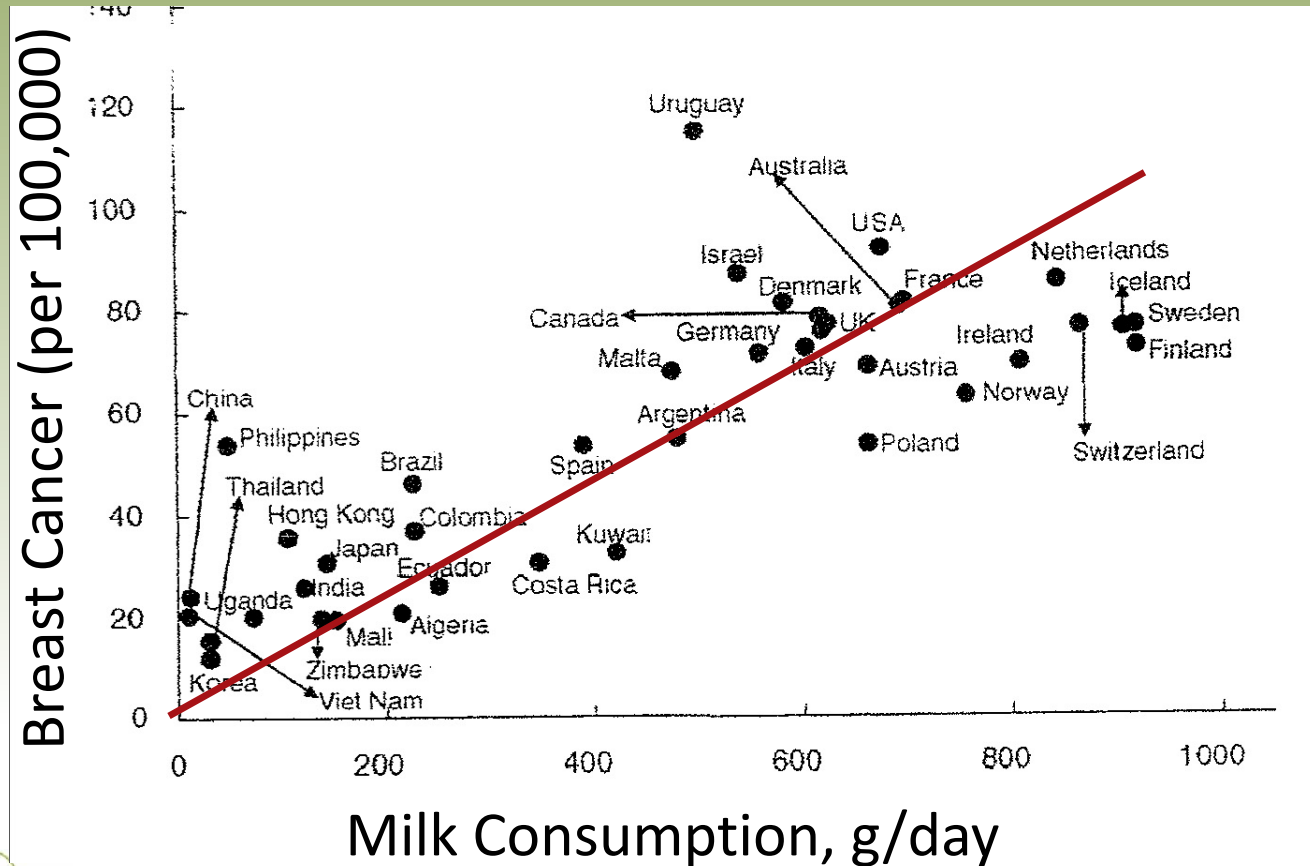


Prostate Cancer and Skim Milk

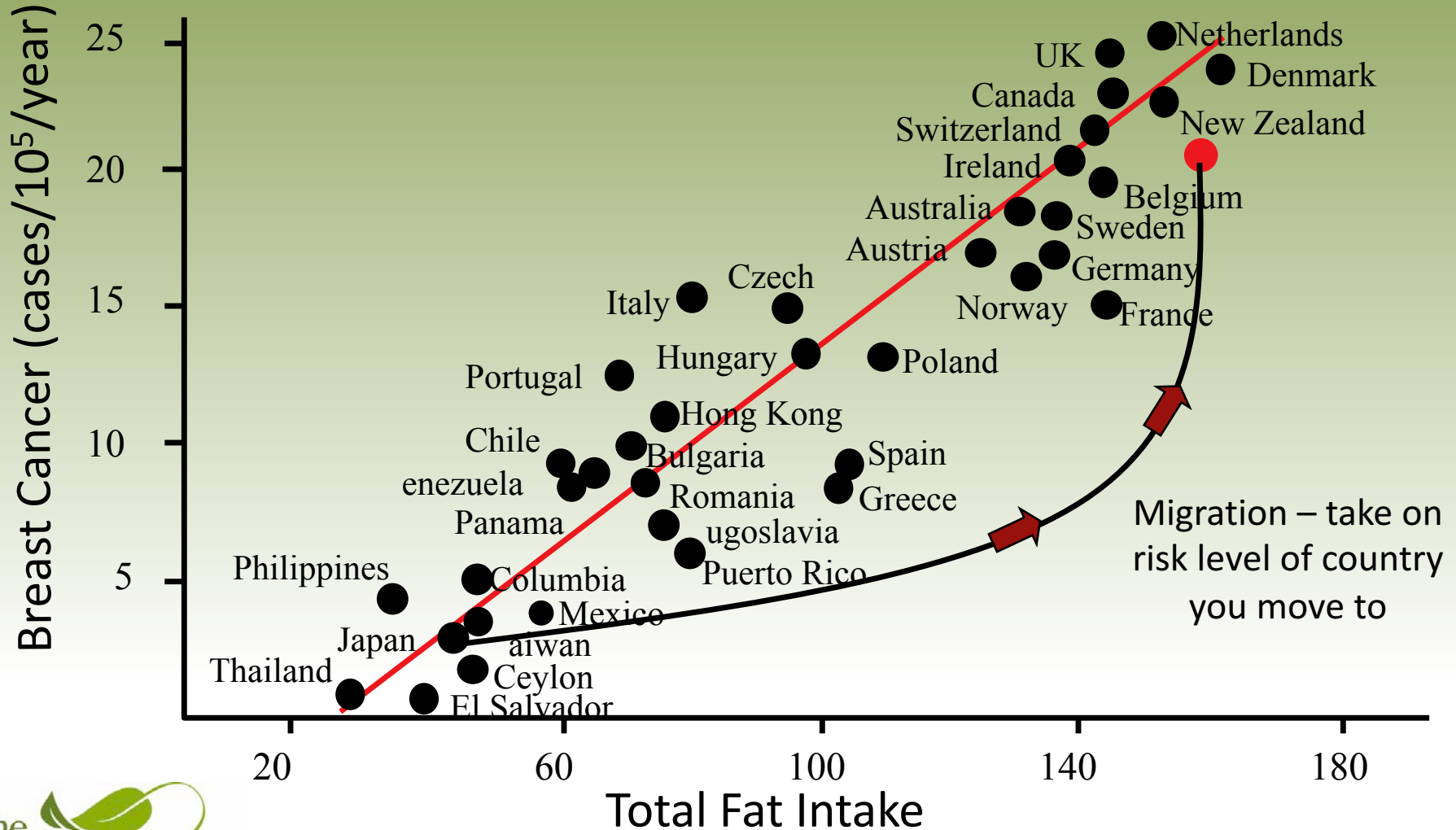


Breast Cancer and Milk

Same with Uterine Cancer



Fat and Breast Cancer



Fat and Breast Cancer

- For a woman with metastatic breast cancer, the risk of dying from the disease at any point increases 40% for every 1,000g of fat consumed monthly¹.
 - A typical American diet ~60% greater risk than a low-fat vegetarian diet.

Fat and Pancreatic Cancer

- The NIH-AARP study with over 545,000 people found that the consumption of fats from all sources was significantly associated with pancreatic cancer risk...
...But no correlation was found with the consumption of plant fats¹.

Chicken & Pancreatic Cancer

- The EPIC study of over 477,000 patients found a 72% increased risk of pancreatic cancer for every 50g (~1/4 breast) of chicken consumed daily¹.



1. Rohrmann S, Linseisen J, Nothlings U, et al. Meat and fish consumption and risk of pancreatic cancer: results from the European Prospective Investigation into Cancer and Nutrition. *Int J Cancer*. 2013;132(3):617-624.

Eggs & Colon Cancer

- People who consume just 1.5 eggs per week have nearly five times the risk for colon cancer, compared with those who consume less than 11 eggs per year¹.



Eggs & Bladder Cancer

- Research published in *International Urology and Nephrology* suggests that even moderate egg consumption can triple the risk of developing bladder cancer¹.
 - The intake of kale, cereals, cabbage, tangerines and carrots were protective against bladder cancer.



Eggs & Prostate Cancer

- A 2011 Harvard study in 27,607 men without prostate cancer found that those who consumed 2.5 eggs per week increased their risk for metastatic (deadly) prostate cancer by 81%, compared with men who consumed less than half an egg per week¹.



1. Richman EL, Kenfield SA, Stampfer MJ, et al. Egg, red meat, and poultry intake and risk of lethal prostate cancer in the prostate specific antigen-era: incidence and survival. *Cancer Prev Res.* 2011;4:2110-2121.

Baby Cows vs Baby Humans¹

- Cow's milk is 15% protein to help a baby calf double it's birth weight in ~ 45 days.
- Human's milk is 5% protein to help a baby human double it's birth weight in ~ 180 days.
- Cow's milk has 20 times more casein than human milk.



¹ <http://josquin.tripod.com/milk.htm>. Retrieved 2012-01-13.

Insulin-Like Growth Factor-1

- IGF-1 is a hormone that is produced throughout life, but is at its highest levels during puberty and in younger years.
 - Infants and children need higher levels of IGF-1 because they are growing quickly.
 - Therefore, it is found in high amounts in human milk
 - Adults do not need high levels of IGF-1, and high levels of IGF-1 are associated with many cancers
 - IGF-1 helps cancer cells to grow

Insulin-Like Growth Factor-1

- Increased levels of IGF-1 in adults lead to increased growth in cancer cells¹
- The amount of IGF-1 in the liver is positively associated with a diet high in casein, while low IGF-1 levels are associated with a casein-free diet².
- Animal protein intake increases IGF-1 levels in humans

¹ Arnaldez FI, et al. *Targeting the insulin growth factor receptor 1*. Hematol Oncol Clin North Am. 2012 Jun 26;(3)527-42, vii-viii. Epub 2012 Feb 28.

² Miura, Y.; Kato, H.; Noguchi, T. (2007). *Effect of dietary proteins on insulin-like growth factor-1 (IGF-1) messenger ribonucleic acid content in rat liver*. British Journal of Nutrition 67 (2): 257.

Insulin-Like Growth Factor-1

- Human Studies show...
 - Pre-menopausal women with the highest circulating levels of IGF-1 have a 7-fold greater risk of breast cancer when compared with women who have the lowest rates of IGF-1.
 - Men under 60 with the highest circulating levels of IGF-1 have a 4-fold greater risk of prostate cancer when compared with men who have the lowest rates of IGF-1.
 - Women with high IGF-1 levels had a higher rate of getting colorectal cancer.

Hankinson SE, Willett WC, et al. *Circulating concentrations of insulin-like growth factor I and risk of breast cancer.* Lancet, [Volume 351, Issue 9113](#), Pages 1393 - 1396, 9 May 1998.

Chan JM, Stampfer MJ, et al. *Plasma insulin-like growth factor-I and prostate cancer risk: a prospective study.* Science. 1998 Jan 23;279(5350):563-6.

Kaaks, R. Toniolo P, et al. *Serum C-peptide, insulin-like growth factor (IGF)-I, IGF-binding proteins, and colorectal cancer risk in women.* J Natl Cancer Inst. 2000 Oct 4;92(19):1592-600.

Insulin-Like Growth Factor-1

- After just 11 days of reducing animal protein in your diet, your IGF-1 levels can drop by 20%¹.
- BUT! IGF-1 levels increase with consumption of dairy and eggs as well as meat.
 - Vegetarians don't achieve a significant reduction in IGF-1 levels with diet – only vegans do².

¹ Ngo TH, Barnard RJ, Tymchuk CN, Cohen P, Aronson WJ. Effect of diet and exercise on serum insulin, IGF-1, and IGFBP-1 levels and growth of LNCaP cells in vitro (United States). *Cancer Causes Control*. 2002;13(10):929-935.

² Allen NE, Appleby PN, Davey GK, Kaaks R, Rinaldi S, Key TJ. The associations of diet with serum insulin-like growth factor 1 and its main binding proteins in 292 women meat-eaters, vegetarians and vegans. *Cancer Epidemiol Biomarkers Prev*. 2002;11(11):1441-1448.

Insulin-Like Growth Factor-1

- Laron Syndrome is a rare form of dwarfism caused by the body's inability to produce IGF-1.
 - People with Laron Syndrome only grow to be a few feet tall, but almost never get cancer¹.

¹ Guevara-Aguirre J, Balasubramanian P, Guevara-Aguirre M, et al. Growth hormone receptor deficiency is associated with a major reduction in pro-aging signaling, cancer and diabetes in humans. *Sci Transl Med.* 2011;3(70):70ra13.

EPIGENETICS?



Vegetables, Fruits, Beans, Grains, Nuts & Seeds

THE RESEARCH FOR PLANT -BASED FOODS

Nutrition

	Fat	Animal Protein	Cholesterol	Calories	Fiber	Micro-nutrients	Water
Meat	✓	✓	✓	✓			
Dairy	✓	✓	✓	✓			
Non-Fat Dairy		✓	✓				
Eggs	✓	✓	✓	✓			
Beans					✓		✓
Grains					✓		✓
Vegetables					✓	✓	✓
Fruits					✓	✓	✓

The Benefits of Fiber

- Fiber actually changes the type of bacteria present in the intestine, which reduces production of carcinogenic secondary bile acids.



The Benefits of Fiber

- Yale researchers found that premenopausal women who ate more than 6g of soluble fiber a day (~1 c black beans)* had 62% lower odds of breast cancer compared with those who only ate 4g¹.
 - For estrogen receptor negative tumors (harder to treat), they had 85% lower odds.

*Fiber from food, not supplements



¹ Li Q, Holford TR, Zhang Y, et al. Dietary fiber intake and risk of breast cancer by menopausal and estrogen receptor status. *Eur J Nutr.* 2013;52(1)217-223.

The Benefits of Fiber

- A combination of 22 studies found that there is a 14-15% lower risk of breast cancer for every 20g of fiber intake each day^{1,2}.



¹ Howe GR, Hirohata T, Hislop TG, et al. Dietary factors and risk of breast cancer: combined analysis of 12 case-control studies. *J Nat Cancer Inst.* 1990;82(7):561-569.

² Dong J-Y, He K, Wang P, Qin LQ. Dietary fiber intake and risk of breast cancer: a meta-analysis of prospective cohort studies. *Am J Clin Nutr.* 2011;94(3):900-905.

The Benefits of Fiber

- High fiber intake may reduce the incidence of esophageal cancer by as much as one-third¹.



Daily Fiber

- Daily fiber amounts:
 - The average American women¹: less than 15g/day
 - Only about half the *minimum* daily recommendation.
 - Vegetarians²: 20g/day
 - Vegans²: 46 g/day
 - Whole Food, Plant Based Vegans³: 60g/day

¹ Clemens R, Kranz S, Mobley AR, et al. Filling America's fiber intake gap: summary of a roundtable to probe realistic solutions with a focus on grain-based foods., *J Nutr.* 2012;142(7):1390S-1401S.

² Farmer B, Larson BT, Fulgoni VL, Rainville AJ, Liepa GU. A vegetarian dietary pattern as a nutrient-dense approach to weight management: an analysis of the National Health and Nutrition Examination Survey 1999-2004. *J Am Diet Assoc.* 2011;111(6):819-827.

³ Rizzo NS, Jaceldo-Siegl K, Sabagte J, Fraser GE. Nutrient profiles of vegetarian and nonvegetarian dietary patterns. *J Acad Nutr Diet.* 2013;113(12):1610-1619.

⁴ Dewell A, Weidner G, Sumner MD, Chi CS, Ornish D. A very-low-fat vegan diet increases intake of protective dietary factors and decreases intake of pathogenic dietary factors. *J Am Diet Assoc.* 2008;108(2):347-356.

The Benefits of Phytates

- Phytates are found in the seeds of plants – whole grains, beans, nut and seeds.
- Phytates can help the body eliminate excess iron, which can generate harmful free radicals.
- In vitro studies show phytates inhibit the growth of virtually all human cancer cells tested so far
 - Colon, breast, cervix, prostate, liver, pancreas and

The Benefits of Soy

- In women with breast cancer, those who ate the most soy lived significantly longer and had a significantly lower risk of recurrence than those who ate less¹.
- Another study found 90% who ate the most soy after a breast cancer diagnosis were still alive after 5 years, compared with 50% who ate little or no soy².

¹ Chi F, Wu R, Zeng YC, Xing R, Liu Y, Xu ZG. Post-diagnosis soy food intake and breast cancer survival: a meta-analysis of cohort studies. *Asian Pac J Cancer Prev.* 2013;14(4):2407-2412.

² Kang HB, Zhang YF, Yang JD, Lu KL. Study on soy isoflavone consumption and risk of breast cancer and survival. *Asian Pac J Cancer Prev.* 2012;13(3):995-998.

The Benefits of Plants

- In a study of 50,000 African American women¹...
 - Collard green consumption was associated with less breast cancer risk at all ages.
 - Broccoli was especially protective among pre-menopausal women
 - Those who ate two or more servings of vegetables a day had a significantly decreased risk of estrogen- and progesterone-receptor negative cancer (hard to treat).

¹ Boggs DA, Palmer JR, Wise LA, et al. Fruit and vegetable intake in relation to risk of breast cancer in the Black Women's Health Study. *Am J Epidemiol.* 2010;172(11):1268-1279.

The Benefits of Plants

- University of Oxford found the incidence of blood cancers (leukemia, lymphoma and myeloma) among vegetarians is nearly half that of those eating meat¹.
 - Believed sulforphane is responsible, an active component in cruciferous vegetables.
 - Cruciferous vegetables = broccoli, cauliflower, kale, collard greens, watercress, bok choy, kohlrabi, rutabaga, turnips, arugula, radishes, cabbage.

The Benefits of Plants

- Yale researchers found that women with non-Hodgkins lymphoma, who ate 3 or more servings a day of veggies had a 42% improved survival rate over those who ate less.
- Iowa Women's Health study found higher cruciferous veggie intake was associated with lower risk of developing NHL.



¹ Han X, Zhang T, Foss F, et al. Vegetable and fruit intake and Non-Hodgkin lymphoma survival in Connecticut women. *Leuk Lymphoma*. 2010;51(6):1047-1054.

² Tompson CA, Habermann TM, Wang AH, et al. Antioxidant intake from fruits, vegetables and other sources and risk of non-Hodgkin's lymphoma: the Iowa Women's Health Study. *Int J Cancer*. 2010;126(4):992-1003.

It's the Plants, NOT the Supplements!

- Higher *dietary* intake of antioxidants is associated with significantly lower lymphoma risk.
 - *Supplements* didn't work!



It's the Plants, NOT the Supplements!

- Combinations of antioxidants like Vitamin A, vitamin E and beta-carotene in pill form were associated with *increased risk* of death¹.
 - “Supplements contain only a select few antioxidants, whereas your body relies on hundreds of them, all working synergistically.”
 - High doses of a single antioxidant may upset this delicate balance and may actually diminish your body's ability to fight cancer².

¹ Bjelakovic G, Nikolova D, Simonetti RG, Gluud C. Antioxidant supplements for prevention of gastrointestinal cancers: a systematic review and meta-analysis. *Lancet*. 2004;364(9441):1219-1228.

² Jacobs DR, Tapsell LC. Food synergy: the key to a healthy diet. *Proc Nutr Soc*. 2013;72(2):200-206.

... and it's not just getting rid of the meat!

- There may be as much as an 8-fold difference between a high-vegetable, low-meat diet, and a high-meat, low-vegetable diet.
 - So, it's not just the meat!



Eating Healthy Works Fast!

- Researchers had women eat a healthy diet and exercise for two weeks.
- After two weeks, they put some blood of the pre-diet change and post-diet change onto breast cancer cells in petri dishes.
 - The blood from the post-diet change suppressed cancer growth significantly better and killed 20-30% more cancer cells than the blood taken from the same women 2 weeks before¹.

Getting Started

But Where Will I Get My Protein?

- Kwashiorkor?
- The USDA suggests we eat about 50g protein a day.
- On an average day, I will eat a large banana, a large vegan burrito and two veggie sandwiches, which equals about 70g of protein.
 - Just 1 cup of black beans = 39g protein

Scott Jurek

World Record Ultra Marathon Runner



Martina Navratilova

Most Grand Slam titles in the world



Kendrick Farris

2016 Olympics Body Building Competitor



How to Get Started

- Take it in steps
 - Meatless Mondays
 - Go vegetarian/vegan on weekdays, not weekends
 - Eliminate red meat for a week or a month, then poultry, then fish, etc.
 - Simply cut back without eliminating.
 - Ask with every food you choose, “Is there a healthier choice that I would be agreeable to right now?”
- Go 100%
 - Eliminate all meats, dairy and eggs
 - To feel best, eat whole, unprocessed beans, grains, fruits, vegetables, nuts and seeds
 - Whole Foods “Health Starts Here” deli line

Most Importantly – GET MOTIVATED!

- Books:
 - The Food Revolution by John Robbins
 - The China Study by T. Colin Campbell
 - How Not to Die by Michael Greger
 - Eat to Live by Joel Fuhrman
 - Diet for a New America by John Robbins
- Videos
 - Forks Over Knives
 - What the Health
 - FMTV.com
- Website:
 - NutritionFacts.org















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"People eat meat and think they will become strong as an ox, forgetting that the ox eats grass."

~ Pino Caruso, Italian Actor

“If diet is wrong, medicine is of no use. If diet is correct, medicine is of no need.”

~ Ayurvedic Proverb