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The Prevention and Treatment of Disease with a Plant-Based Diet

What it means for your patients and practice

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Vegetarians of Washington

- An 501c3 nonprofit, founded in 2001.
- Largest regional membership-based vegetarian society in the US.
- Produce Seattle's annual Vegfest.
- Run numerous programs for the public and work with a wide variety of businesses and professionals.

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Our Prescribe Vegetarian Campaign

- Teach Doctors to Use this Powerful Medicine

Goal 1 – To change the State's Medical School curricula to require the inclusion of Vegetarian Nutritional Medicine.

Goal 2 – To raise awareness, among doctors and the general public, of the potential for vegetarian nutritional medicine to drastically cut healthcare costs and save lives.

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The Current Situation

*Diet is the **number #1 leading risk factor** for the disease and disability burden in the United States yet doesn't have a large presence in the medical curriculum.*

Christopher J. L. Murray and the US Burden of Disease Collaborators. "The State of US Health, 1990-2010 Burden of Diseases, Injuries, and Risk Factors." *JAMA.* 2013;310(6):591-606

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The Challenges We Face

- Ever-increasing rates of common chronic diseases
- Ever-increasing cost of healthcare

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The Human Cost – Increased Suffering

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The Infrastructure Cost

- Insufficient providers
- Stressed doctors
- Overburdened resources

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Traditional Solutions are expensive

- New drugs
- New surgical techniques and equipment

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What America really needs is a healthier population!

Isn't it better to prevent people getting sick in the first place?

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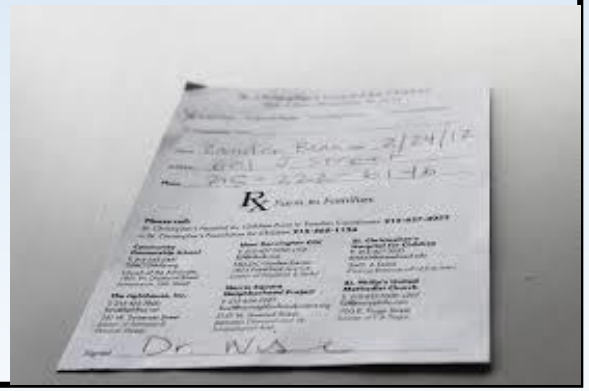
The Solution to the Healthcare Crisis:

Teach Doctors to Prescribe a Vegetarian Diet for their patients



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"It will be in the field of nutrition that some of our greatest strides in the prevention of disease will yet come. Here preventative medicine reaches its zenith, since food has to do with the very essence of life itself. It is the fuel that maintains, repairs, and runs the human machine. It is the source of the material needed to keep the body tissue healthy, vigorous, and free of sickness."

J. Wayne McFarland MD, Fellow of the Mayo Clinic

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"There is not a single medical specialty or subspecialty that would not benefit from increased emphasis on nutrition education. Eight out of ten of the leading causes of morbidity and mortality in the United States are nutritionally related."

-Gerald Friedman MD

Dimaria-Ghalili RA, et al. Capacity building in nutrition science: revisiting the curricula for medical professionals. *Annals of the New York Academy of Sciences* Volume 1306, Annals Reports pages 21–40, December 2013

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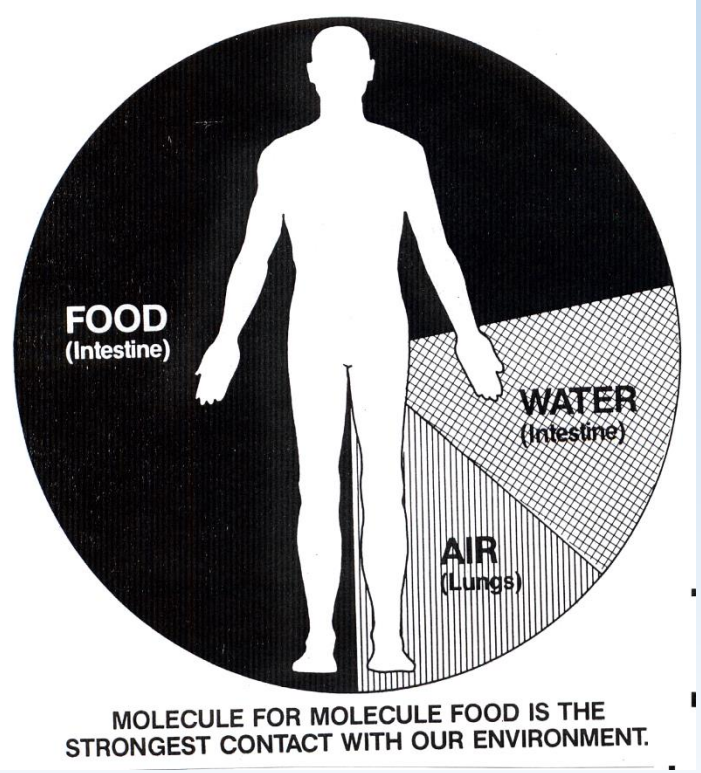
Plant-Based Diets



Important for Doctors to understand

Important for Patients to hear

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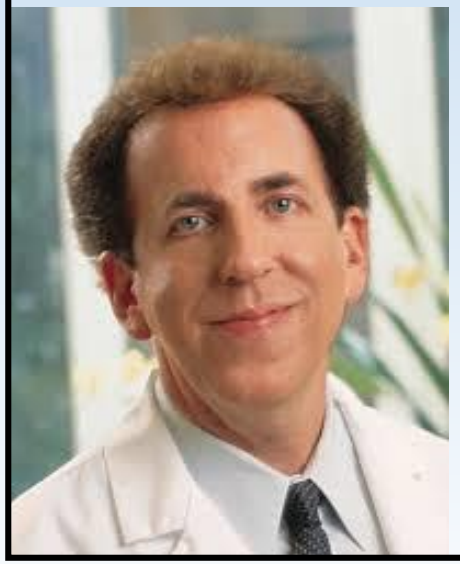
"More than **75% of the $2.8 trillion** in annual U.S. healthcare costs (mostly sick-care costs) are **from chronic diseases**, which can often be prevented and even **reversed by eating a plant-based diet**, at a fraction of the costs - and the only side-effects are good ones."



– Dean Ornish MD
Cardiologist

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The missing ingredient in Medical School

- 94% agreed that it was their obligation to discuss nutrition with patients
- 14% felt physicians were adequately trained to provide nutrition counseling
- 2% of residents availed themselves of courses in nutrition when offered in medical school

Vetter ML, Herring SJ, Sood M, Shah NR, Kalet AL. What do resident physicians know about nutrition? An evaluation of attitudes, self-perceived proficiency and knowledge. J Am Coll Nutr. 2008 Apr;27(2):287-98

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Fruits, vegetables, legumes, whole grains and nuts:

the miracle drugs of the 21st century!

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What we'll cover today

Cardiology
Endocrinology
Neurology
Nephrology
Gastroenterology
Oncology
Urology
Rheumatology
Ophthalmology
Emergency Medicine
OB/GYN
Infectious Disease
Nutritional Key points
Myth debunking
Clinical Practice

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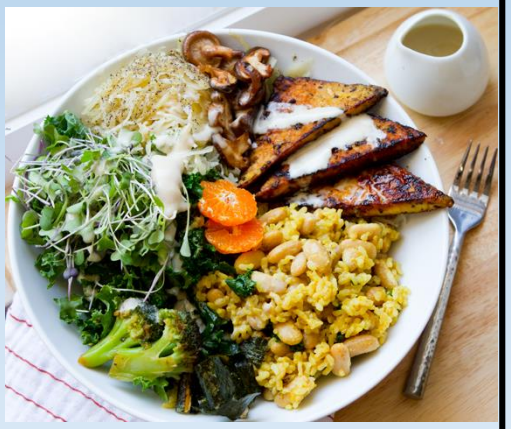
What is a Vegetarian Diet?

- A Total Vegetarian, Vegan or Plant-Based Diet is based on fruits, vegetables, whole grains, legumes and nuts.
- Some vegetarians also include dairy products and eggs.
- Vegetarians do not eat meat, poultry or fish.



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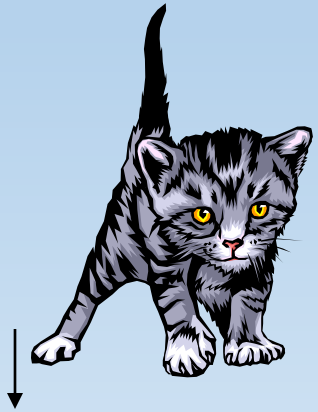
We are Herbivores



Carnivores

- have claws
- no skin pores
- extremely concentrated urine
- no molar teeth
- short intestinal tract (3 times body length)
- strong stomach acid

Omnivores

- have claws
- no skin pores
- extremely concentrated urine
- no molar teeth
- short intestinal tract (4-6 times body length)
- strong stomach acid

Herbivores

- no claws
- perspires through skin pores
- moderately concentrated urine
- flat molars for grinding
- long intestinal tract (10-12 times body length)
- stomach acid 20 times weaker than meat eaters.

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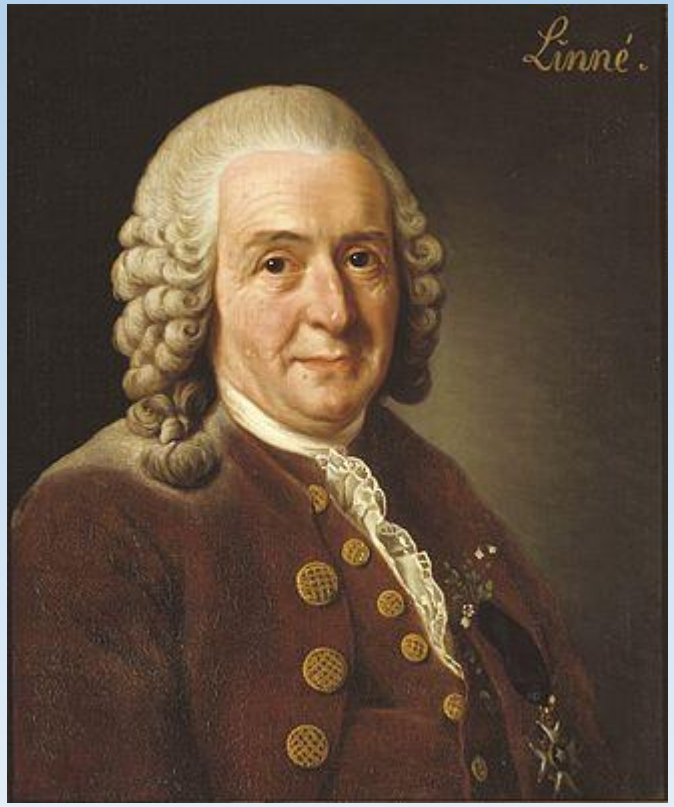

- Carl Linnaeus
Father of Taxonomy i.e.
Kingdom, genus and species

"Man's structure, external and internal, compared with that of other animals, shows that fruit and succulent vegetables constitute his natural food."

-Carl Linnaeus

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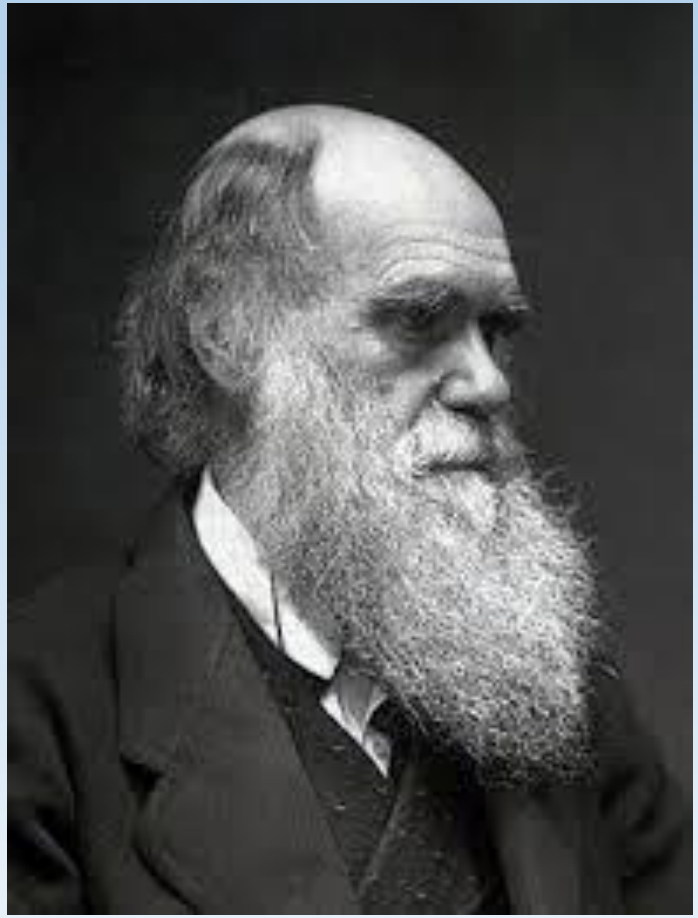

Charles Darwin

"The grading of forms, organic functions…and diets showed in an evident way that the normal food of man is vegetable…and that we are not destined to compete with wild beasts or carnivorous animals."

-Origin of Species
by Charles Darwin

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"It is the position of the American Dietetic Association that appropriately planned vegetarian diets, including total vegetarian or vegan diets, are healthful, nutritionally adequate, and may provide health benefits in the prevention and treatment of certain diseases.

Well planned vegetarian diets are appropriate for individuals during all stages of the life cycle, including pregnancy, lactation, infancy, childhood, and adolescence, and for athletes."

Academy of Nutrition and Dietetics

Volume 109, Issue 7, Pages 1266-1282 (July 2009)

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"Vegetarians living in affluent countries enjoy remarkably good health, exemplified by low rates of obesity, coronary diseases, diabetes, and many cancers, and increased longevity."

Dr. Joan Sabate MD, chair of the Department of Nutrition at Loma Linda University School of Public Health

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Cardiovascular Disease

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Myocardial Infarction is the
Number 1 cause of death in the US.

Cerebrovascular Disease is the
Number 4 cause of death in the US.

National Vital Statistics Reports, Volume 61, Number 6, October 10, 2012

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Hypertension & Hypercholesterolemia

	Prevalence of Hypertension	Hypercholesterolemia (At least 5.18 mmo/L)[3]
US Adults	29.1%[1]	50%[2]

[1] CDC National Center for Health Statistics NCHS Data Brief, Number 133, October 2013
Note: The prevalence of hypertension is 65.0% among those 60 and over.

[2] Ford ES, Mokdad AH, Giles WH, Mensah GA. Serum total cholesterol concentrations and awareness, treatment, and control of hypercholesterolemia among US adults: findings from the National Health and Nutrition Examination Survey, 1999 to 2000. Circulation. 2003; 107: 2185–2189.

[3] 5.18 mmol/L (200 mg/dL [1 mmol/L=38.598 mg/dL]) is level that the National Cholesterol Education Program (NCEP) expert panel considers “borderline-high risk.”

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"A vegetarian diet can prevent 90 percent of our thromboembolic disease and 97 percent of our coronary occlusions." JAMA 1961

Diet and Stress in Cardiovascular disease JAMA; vol.176 No. 9 June 3, 1961 p.806

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Serum Cholesterol Matters

Serum cholesterol is the most well established risk factor, and has a strong linear relationship with CAD

High levels of total cholesterol and low-density lipoprotein (LDL) result in coronary artery epithelial dysfunction.

Hadi AR Hadi. Endothelial Dysfunction: Cardiovascular Risk Factors, Therapy, and Outcome. *Vasc Health Risk Manag*. 2005 Sep; 1(3): 183–198.

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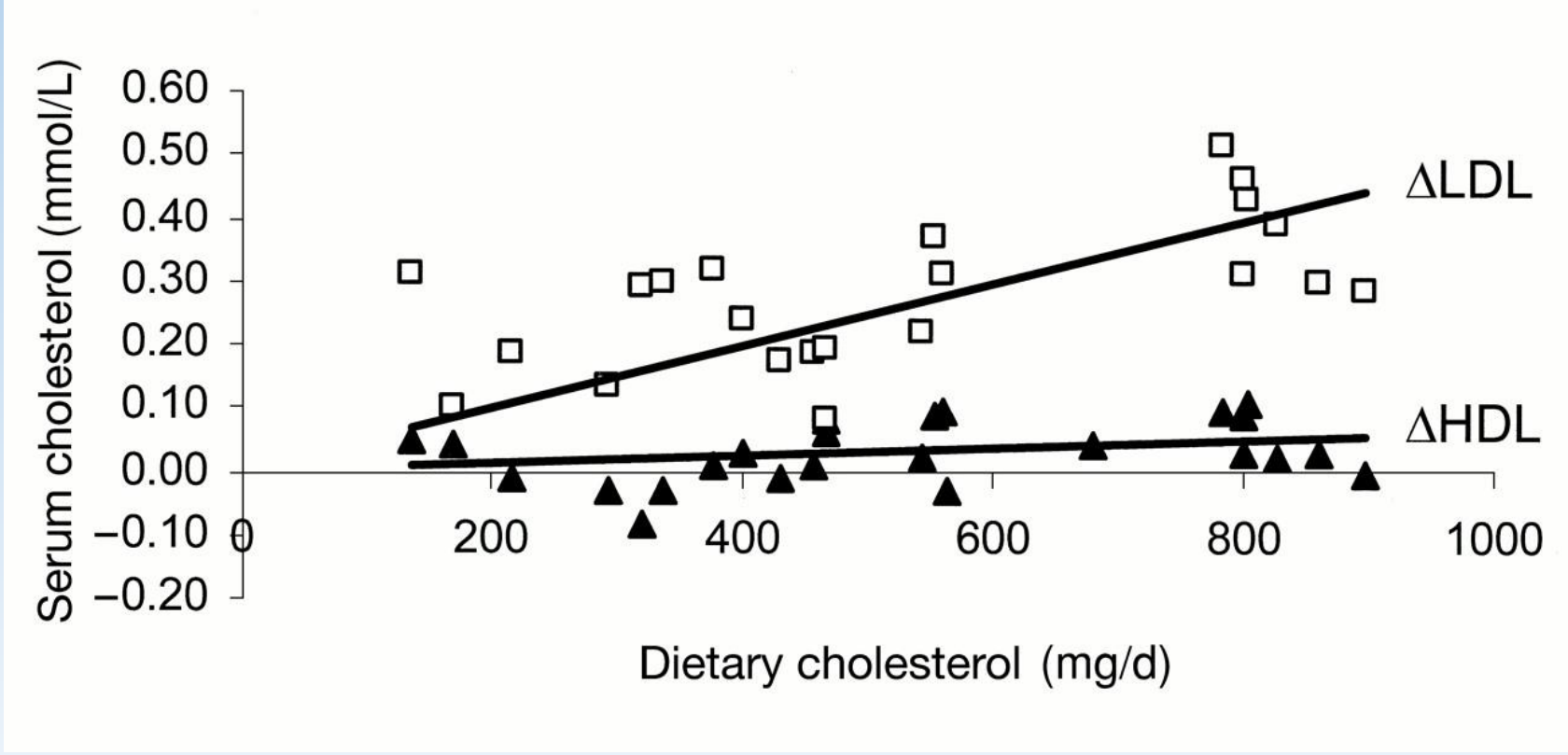
Changes in serum LDL-cholesterol (□) and HDL-cholesterol (▲) concentrations with cholesterol intake.



Weggemans, R. et. al. Dietary cholesterol from eggs increases the ratio of total cholesterol to high-density lipoprotein cholesterol in humans: a meta-analysis *Am J Clin Nutr* May 2001 vol. 73 no. 5 885-891

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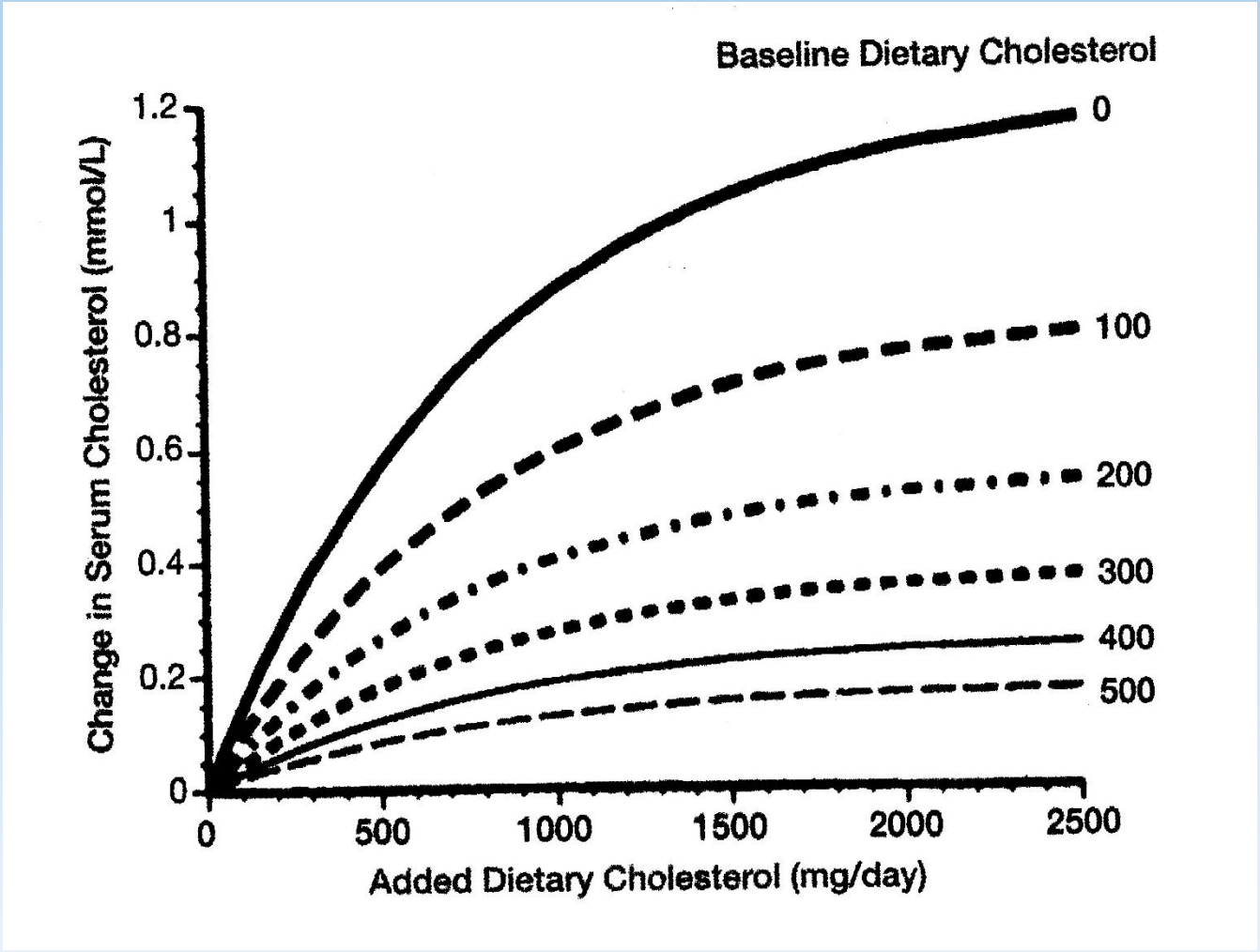
Relationship between Added Dietary Cholesterol and Change in Serum Cholesterol



Hopkins PN Effects of dietary cholesterol on serum cholesterol: a meta-analysis and review. Am J Clin Nutr. 1992 Jun;55(6):1060-70.

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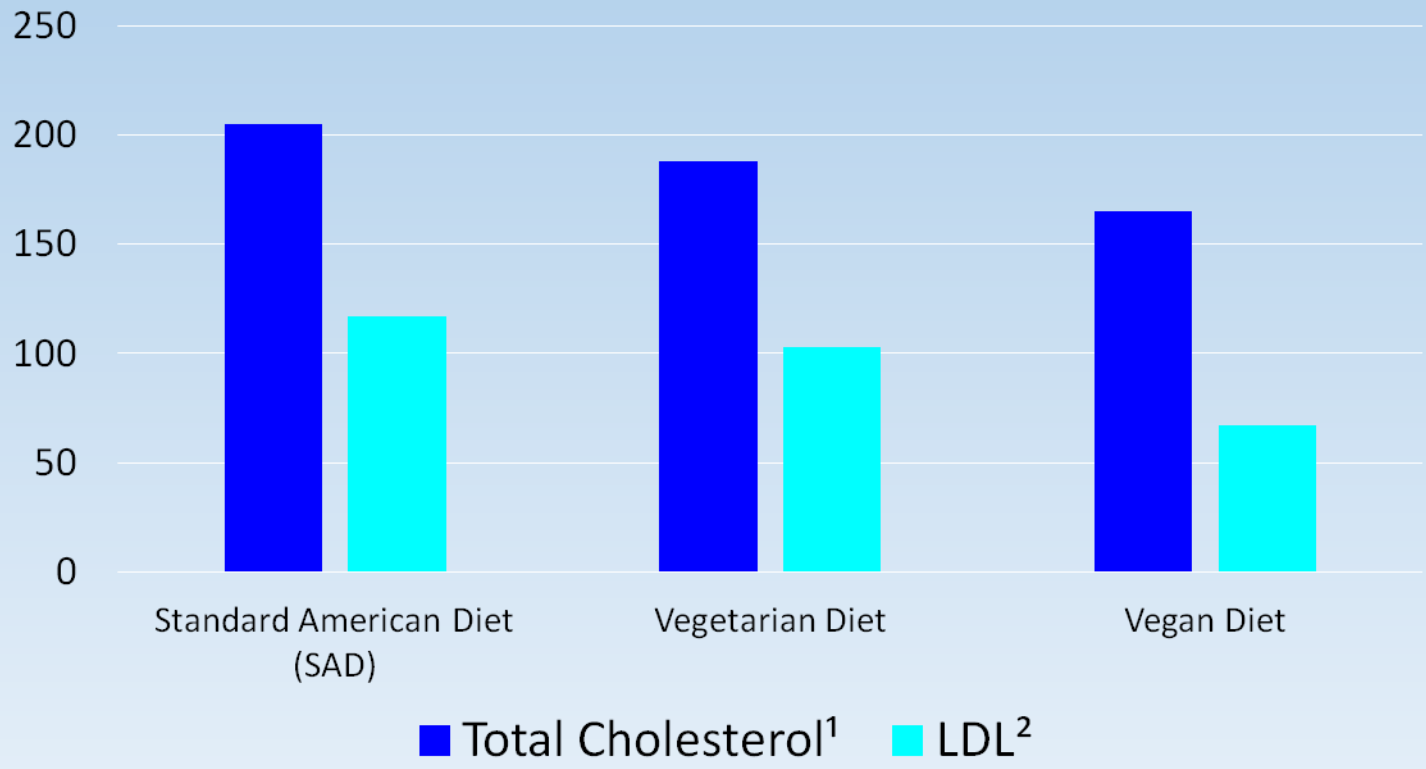
Cholesterol Levels as affected by Diet



[1] Thorogood M, Carter R, Benfield L, McPherson K & Mann JI. Plasma and lipoprotein cholesterol concentrations in people with different diets in Britain. *BrMedJ* 1987;295 351-353

[2] Haddad EH, et al. Dietary intake and biochemical, hematologic, and immune status of vegans compared with nonvegetarians. *Am J Clin Nutr*. 1999;70(suppl):586S-93S.

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Cholesterol Content of Various Foods

Animal Foods	*Cholesterol content (mg)*	*Plant Foods*	*Cholesterol content*
Egg (1 egg)	274	All Grains	0
Shrimp (3oz)	166	All Vegetables	0
Pork tenderloin, lean (4oz)	106	All Nuts	0
Beef, top round, lean (4oz)	103	All Seeds	0
Chicken breast, skinless (4oz)	97	All Fruits	0
Salmon, Chinook (4oz)	96	All Legumes	0
Swiss cheese (3oz)	70	All Vegetable Oils	0

Source: Pennington JAT, Bowes and Church's Food Values of Portions Commonly Used 16th edition J.B Lippincott 1994, USDA National nutrient database

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Saturated Fat in Various Foods

Animal Fats	*Saturated Fat as % of Total Fat*	*Plant Oils*	*Saturated Fat as % of Total Fat*
Butter	68%	Olive oil	13%
Beef fat (tallow)	50%	Corn oil	13%
Pork fat (lard)	33%	Sunflower oil	10%
Chicken fat	30%	Safflower oil	9%
		Canola oil	7%

Source: Pennington JAT, Bowes and Church's Food Values of Portions Commonly Used 16th edition J.B Lippincott 1994, USDA National nutrient database

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Vegetarians have the best cholesterol ratios

	TC:HDL-C Ratio	LDL-C:HDL-C Ratio
Vegetarians	2.9	1.7
Boston Marathon Runners	3.5	2.0
Average female w/o CHD	4.4	2.9
Average male w/o CHD	5.1	3.3
Average female with CHD	5.3	3.5
Average male with CHD	5.8	3.8

Castelli et al. Summary Estimates of Cholesterol. *Circulation* Vol 67, No 4, p.734 April 1983

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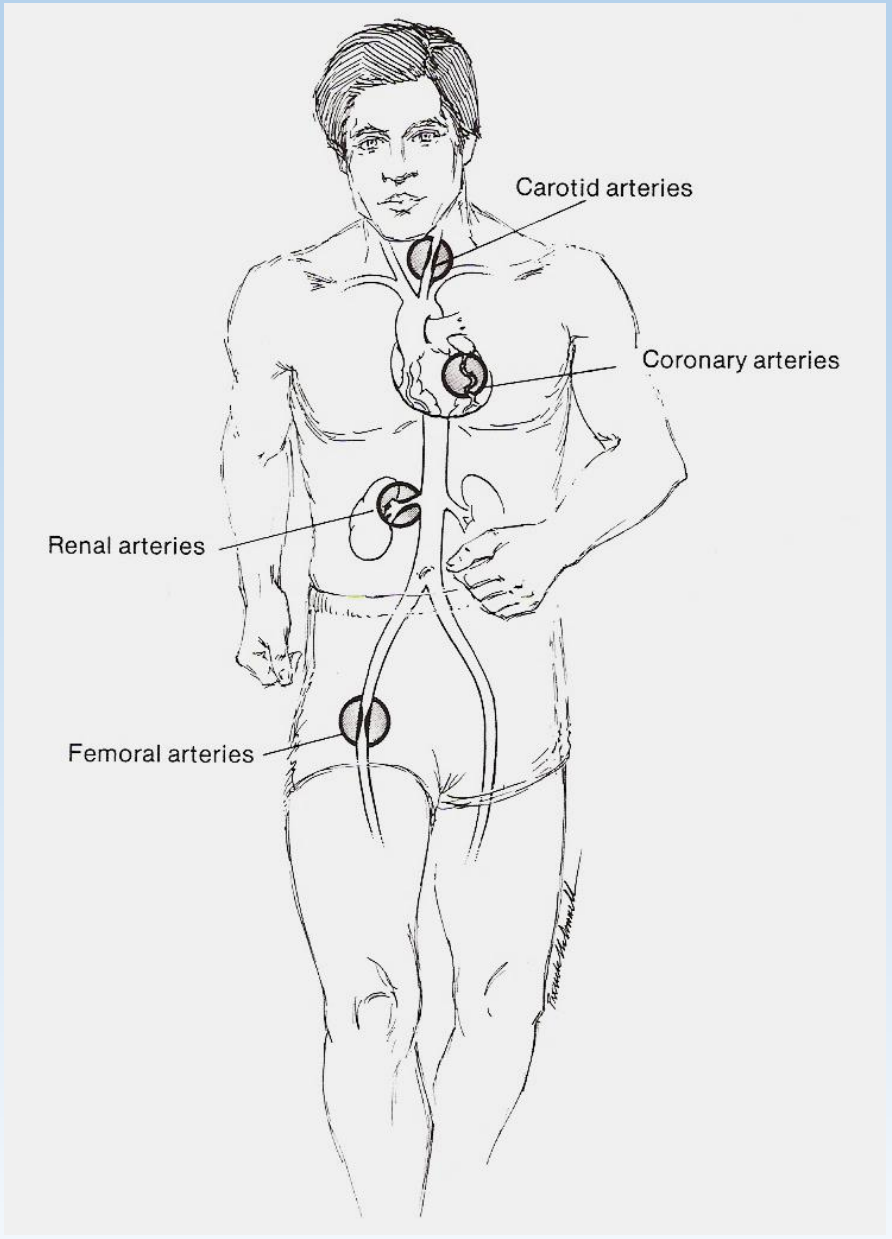
Where our Arteries Clog



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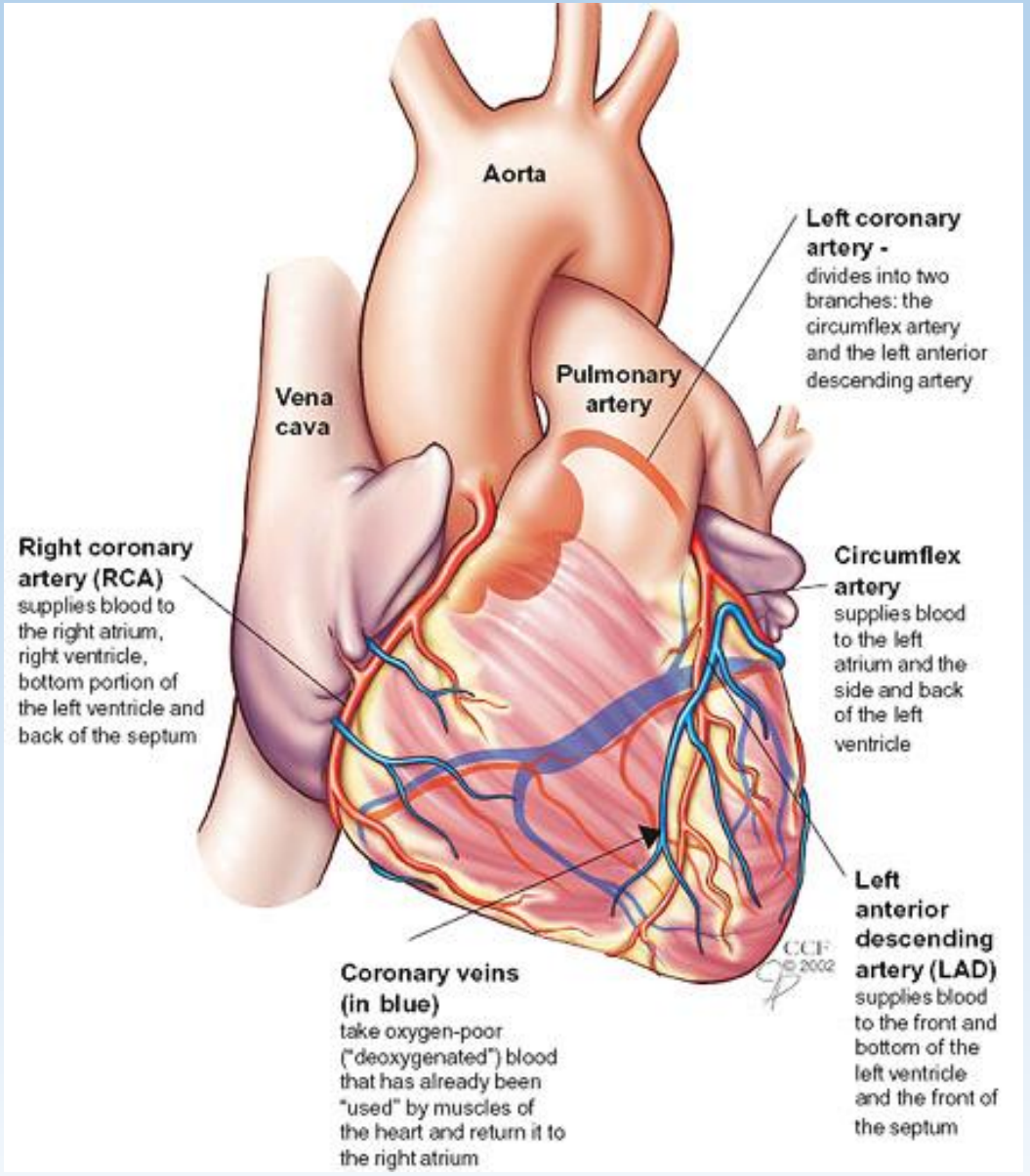
The Coronary Arteries



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Atherosclerotic Plaque in the Carotid Artery

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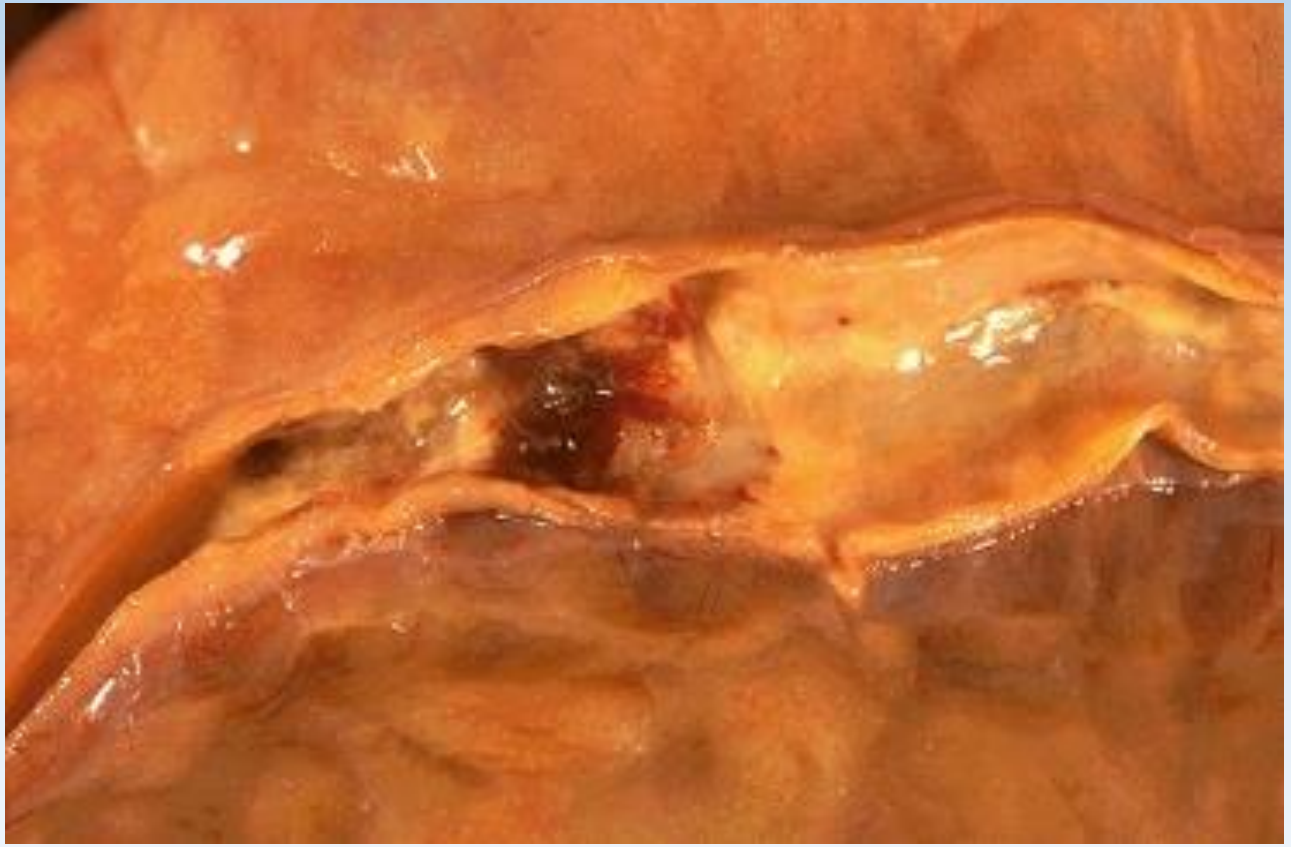
Coronary Atheroma

Coronary atherosclerosis complicated by hemorrhage into the atheromatous plaque



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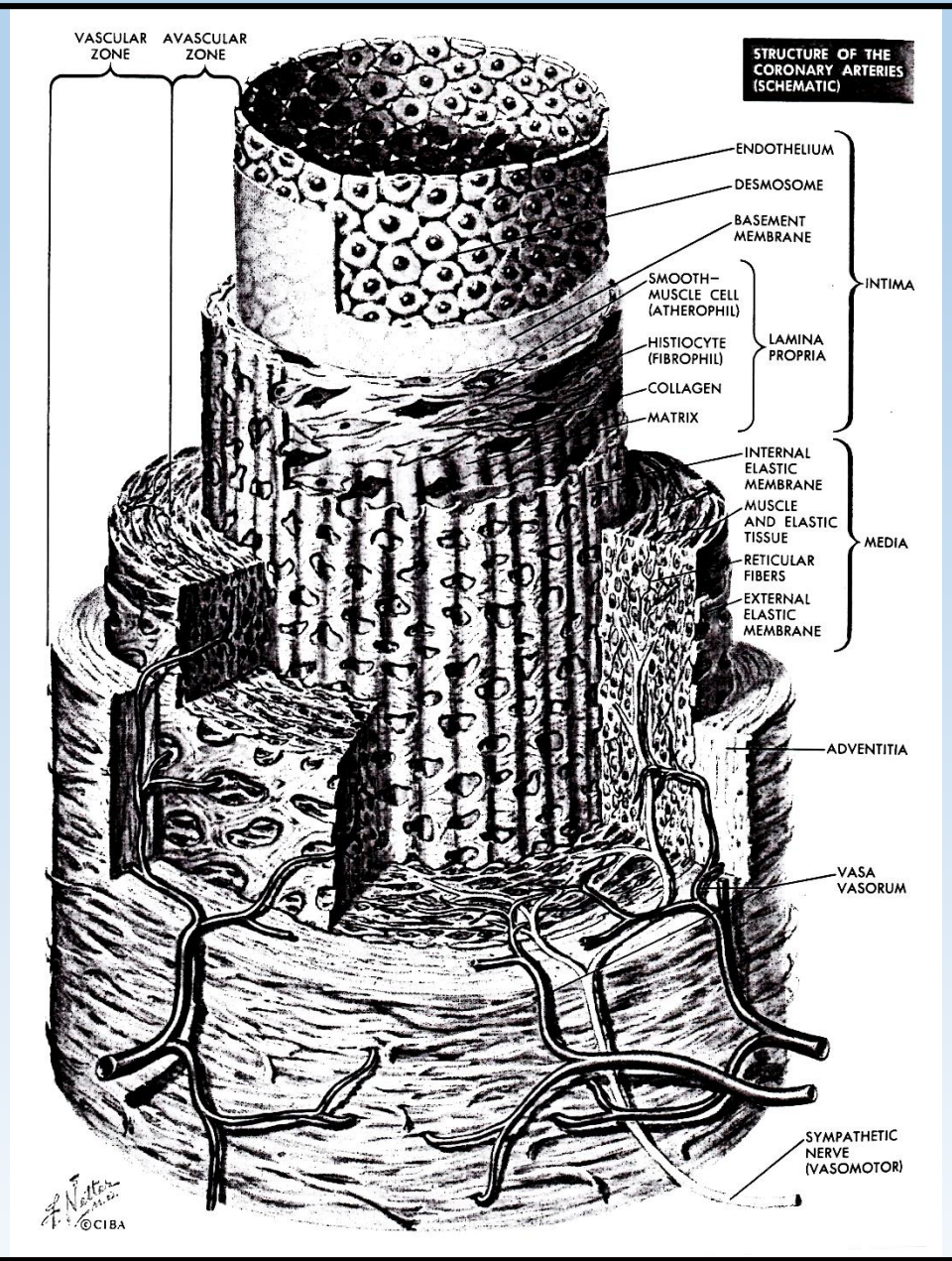
Coronary Artery Anatomy



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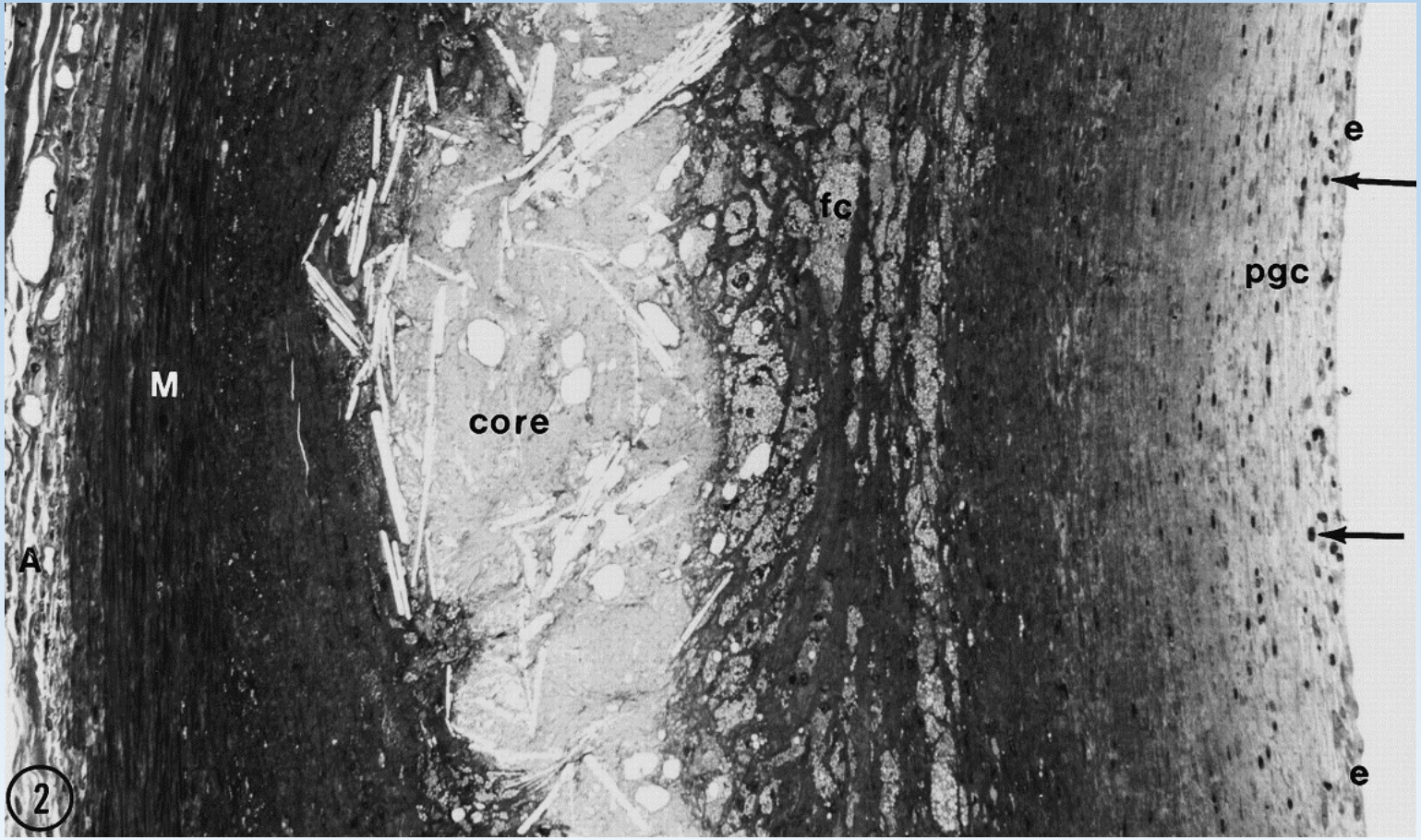
Atheroma Histopathology



Herbert C. Stary, MD et al. A Definition of Advanced Types of Atherosclerotic Lesions and a Histological Classification of Atherosclerosis. *Circulation*. 1995; 92: 1355-1374

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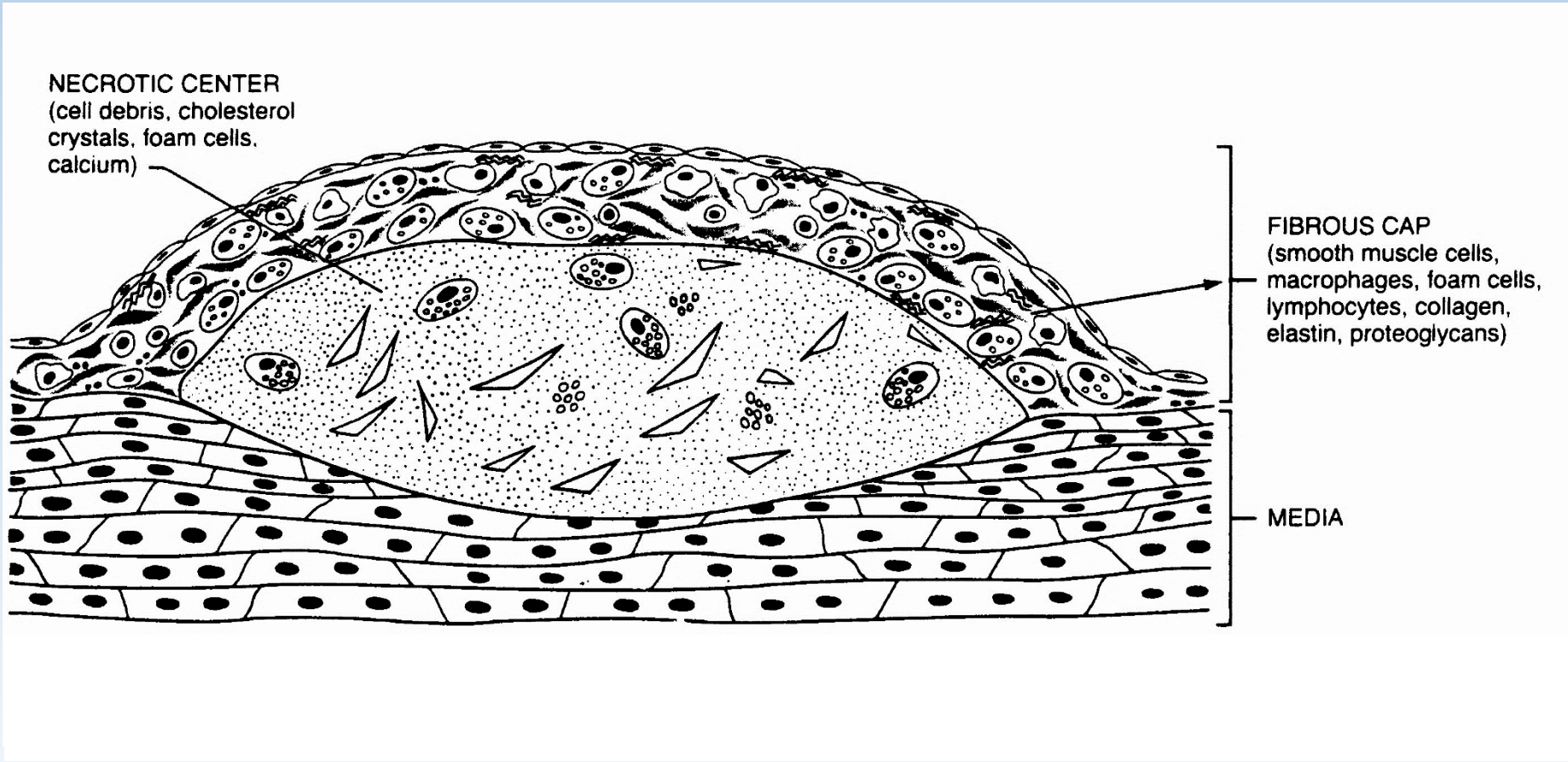
Atheroma Histopathology



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Advanced Glycation End Products

AGEs have a range of pathological effects esp. diabetes, atherosclerosis

Blocks nitric oxide activity in the endothelium

Cause the production of reactive oxygen species

Increased vascular permeability

Increased arterial stiffness

AGEs have higher concentration in meat and dairy than in most plant foods

- Butter 26,480 (units/100gram)
- Chicken broiled 8,299
- McDonald's Hamburger 5,418
- Boca Burger (veggie) 67

1.Joshua A. Beckman, MD; Advanced Glycation End Products. Circulation. 2006; 114: 597-605

2. Caifeng Fu et al. Advanced Glycation End Products Activate Endothelium Through Signal-Transduction. *Circulation*. 2002;105:816-822;

3. Jaime Uribarri, MD et al. J *Am Diet Assoc*. Jun 2010; 110(6): 911–16.e12.

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Relevant aspects of Endothelial Dysfunction

Hyperglycemia, Hypertension,
Hypercholesterolemia, Oxidative Stress → Endothelial Dysfunction

Some Aspects	Resulting in
Decreased Nitric Oxide (NO)	Decreased vascular dilation Increased thrombosis Increased leukocyte adhesion Increased platelet aggregation Increased s. muscle proliferation
Increased Inter Leukin 6 (IL-6) Increased C-Reactive Protein (C-RP)	Increased oxidative stress Increased inflammation Increased thrombosis Increased adhesion

Dod HS, Ornish D et al. Effect of intensive lifestyle changes on endothelial function and on inflammatory markers of atherosclerosis. *American Journal of Cardiology* 105:3 2010 Feb 1 pg 362-7

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Vegetarians and Endothelial Dysfunction

- Vegetarians have better flow mediated vasodilation[1]
- Vegetarians have better nitroglycerin induced vasodilation[2]

1. Volker Schachinger et. al. Prognostic Impact of Coronary Vasodilator Dysfunction on Adverse Long-Term Outcome of Coronary Heart Disease Circulation. 2000; 101: 1899-1906
2. Lin CL et. al. Vascular dilatory functions of ovo-lactovegetarians compared with omnivores. Atherosclerosis. 2001 Sep;158(1):247-51.

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The more Fruits and Vegetables the better!

- Increasing fruit and vegetable intake increases endothelial Nitric Oxide in a dose dependent manner
- Fruits and vegetables mitigate increases in vascular stiffness in a dose dependent manner





Anna L Macready et al. Flavonoid-rich fruit and vegetables improve microvascular reactivity and inflammatory status in men at risk of cardiovascular disease—FLAVURS: a randomized controlled trial. *Am J Clin Nutr* March 2014 vol. 99 no. 3 479-489

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Low fat vegetarian diet

=

Standard Heart Association diet

+ Lovostatin

Source: David Jenkins et al, “Direct comparison of a dietary portfolio of cholesterol-lowering foods with a statin in hypercholesterolemic participants”, *Am J Clin Nutr*, Vol 81 (2), 380-387

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By switching to a low fat vegetarian diet:

- The heart's ability to pump blood improved in only 24 days
- Half of patients showed improvement in their coronary arteries in only 3 months
- Chest pain was reduced by 91%

Source: Dean Ornish M.D. et al, "Intensive Lifestyle Changes for Reversal of Coronary Heart Disease", JAMA 1998;280:2001-2007

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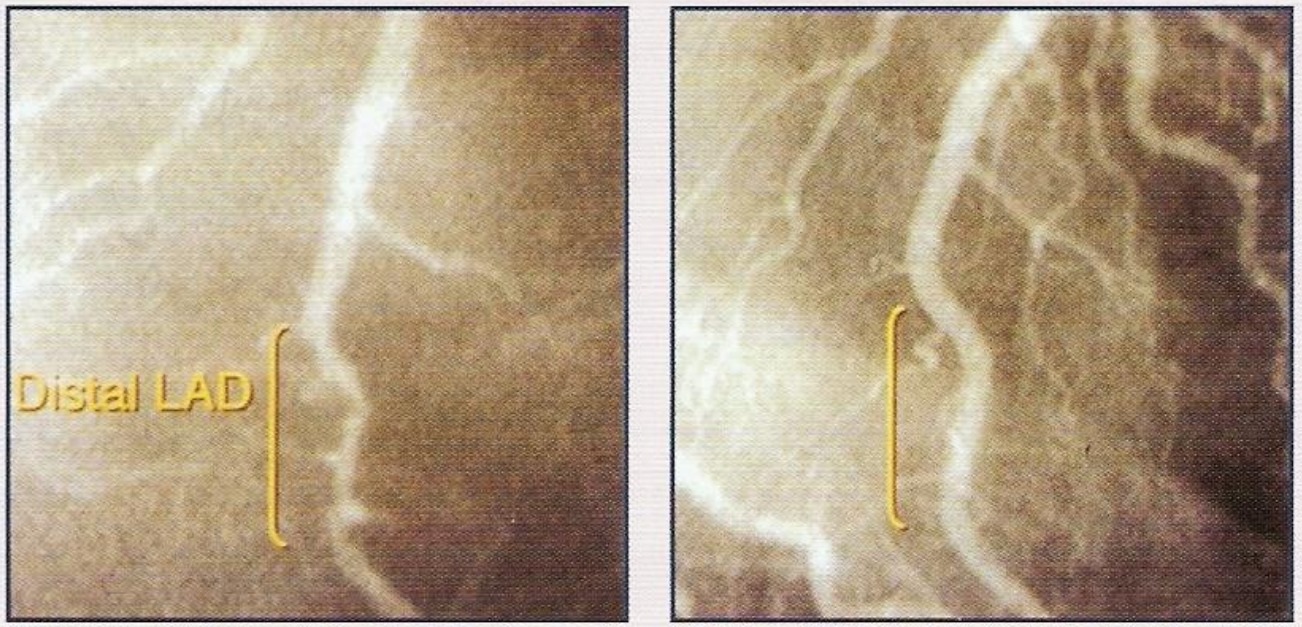
Reversal of Coronary Disease Achieved with Plant-Based Diet



Coronary angiograms of the distal left anterior descending artery before (left bracket) and after (right bracket) 32 months of a plant-based diet without cholesterol-lowering medication, showing profound improvement. Used with permission from Dr. Caldwell B. Esselstyn, Jr. (*Source: Prevent and Reverse Heart Disease by Dr. Esselstyn.*)

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Treatment Comparisons

Restenosis rates	
Balloon angioplasty	30-60% [1]
Bare metal stents	16-44% [1]
Drug eluting stents	16% [1]
Low fat vegan diet	0% [2]

Plus: Vegan diet has no surgical risk of mortality, no post op complications, very low cost, and also treats common comorbidities: hypertension, diabetes

1. Vasim F. Delineating the Numerous Causes of Drug-Eluting Stent Restenosis Circulation: *Cardiovascular Interventions*. 2011; 4: 195-205

2. Ornish D. Avoiding revascularization with lifestyle changes: The Multicenter Lifestyle Demonstration Project. *Am J Cardiol*. 1998 Nov 26;82(10B):72T-76T.

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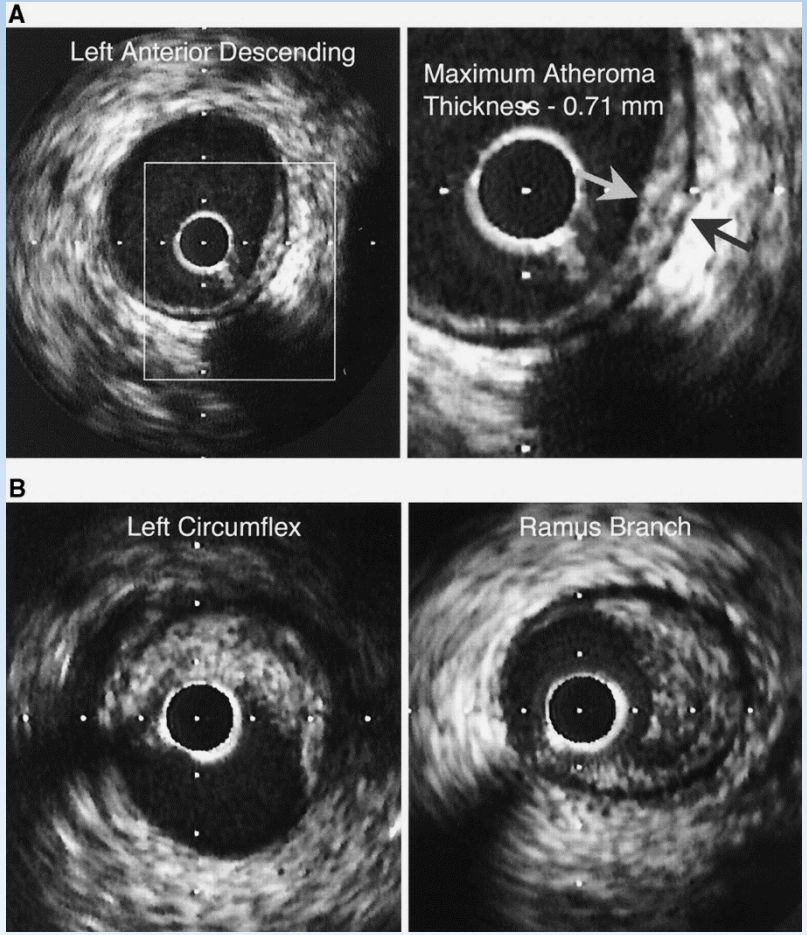
Example of atherosclerosis in LAD of 17-year-old man.



Tuzcu E M et al. *Circulation*. 2001;103:2705-2710

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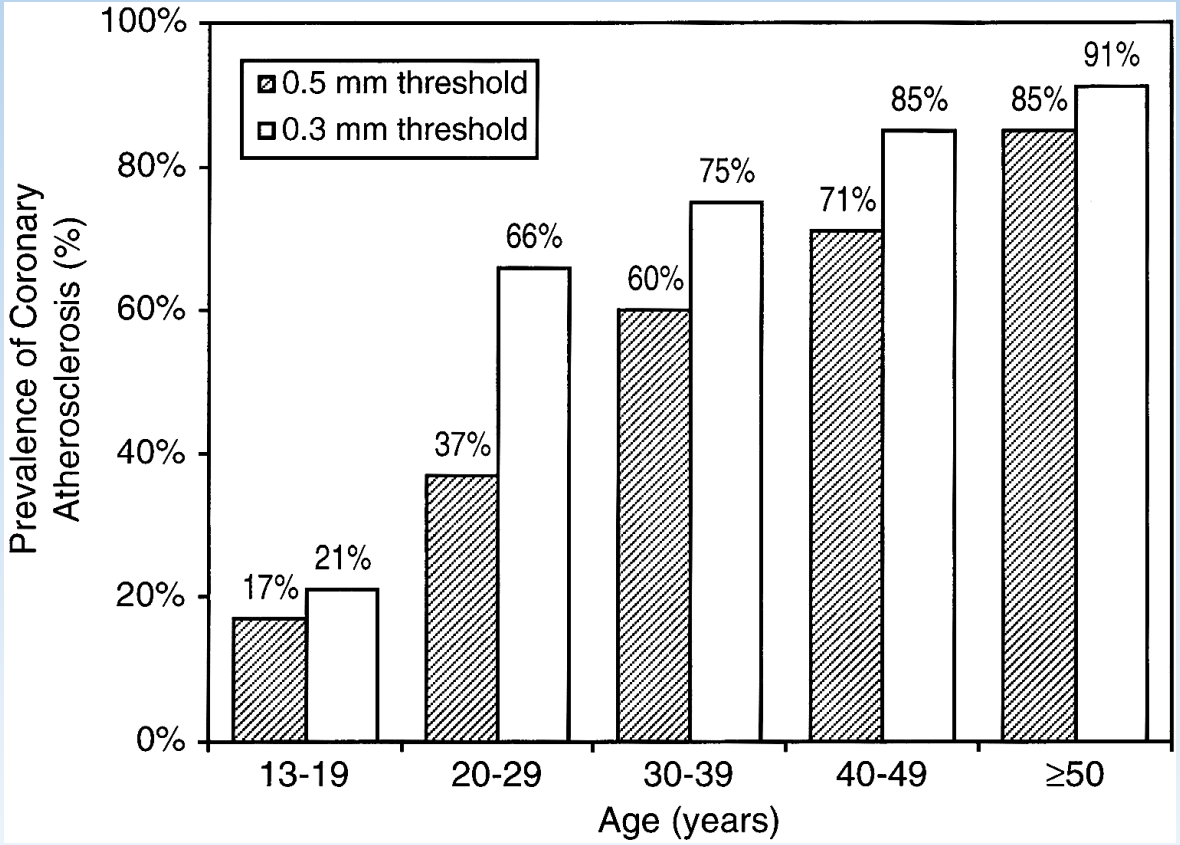
Prevalence of Coronary Atherosclerosis by age with 0.5- and 0.3-mm thresholds for defining atherosclerotic lesions.



Tuzcu E M et al. *Circulation*. 2001;103:2705-2710

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"Coronary artery disease does not occur magically at ages 40, 50, 60, or later, with the first appearance (and often the last) of chest pain.

It's really a childhood disease, which takes several decades to reach its endpoint. Ideally, its prevention should start during the pre-kindergarten years, by changing children's eating habits."

- Pediatrician Charles R. Attwood MD FAAP

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Hemorheology in Vegetarians

Vegetarians have lower blood viscosities.
The more plant foods the lower the viscosity.

"Stricter avoidance of animal products was associated with even lower values [of viscosity]"

Ernst E. et al. Blood rheology in vegetarians. *Br J Nutr*. 1986 Nov;56(3):555-60.

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Poiseuille's law and its Consequences for Blood Flow

Q = volume of blood per unit time
r = radius of lumen
ΔP = change in pressure between proximal to lesion and distal to lesion
L = length of coronary artery
η = viscosity of blood

$$Q = \frac{\pi r^4 \Delta P}{8 L \eta}$$

Vegetarian diet results in:

↑ r from an increase in lumen radius, esp important because r is raised to the 4th power

↓ η vegetarians have low blood viscosities under both low and high sheer stress (η is not a constant)

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Vegetarians have lower levels of cE-Selectin

E-selectin (cE-Selectin) is a cell adhesion molecule expressed only on endothelial cells activated by cytokines. Like other selectins, it plays an important role in inflammation.

Purschwitz K, Rassoul F, Reuter W, et.al. [Soluble leukocyte adhesion molecules in vegetarians of various ages]. Zeitschrift fur Gerontologie und Geriatrie. Dec 2001;34(6):476-9

Leeuwenberg J, Smeets E, Neefjes J, et.al. E-selectin and intercellular adhesion molecule-1 are released by activated human endothelial cells in vitro. Immunology. Dec 1992;77(4):543-9

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Vegetarian diet reduces myeloperoxidase (MPO) levels.

MPO and its oxidant products play a role in in plaque formation, rupture and impair nitric oxide.

Upadhyay R. Emerging Risk Biomarkers in Cardiovascular Diseases and Disorders. *Journal of Lipids*. 2015;2015:Article ID 971453, 50 pages

Navarro J, de Gouveia L, Rocha-Penha L, et.al. Reduced levels of potential circulating biomarkers of cardiovascular diseases in apparently healthy vegetarian men. *Clinica Chimica Acta*. Aug 2016;461:110-113.

Vegetarians have lower levels of Matrix Mettalo Proteinase (MMP2) and (MMP9) and higher levels of Tissue Inhibitors of MMP (TIMP-1) and lower ratio of MMP9/TIMP-1.

MMP has a role in atherogenesis by increasing smooth muscle proliferation, inflammation and decreasing plaque stability. TIMP-1 checks this action.

Navarro J, de Gouveia L, Rocha-Penha L, et.al. Reduced levels of potential circulating biomarkers of cardiovascular diseases in apparently healthy vegetarian men. *Clinica Chimica Acta*. Aug 2016;461:110-113.

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There is overlap between the serum concentrations of salicylic acid in vegetarians and patients taking aspirin, 75 mg daily.

Blacklock CJ Salicylic acid in the serum of subjects not taking aspirin. Comparison of salicylic acid concentrations in the serum of vegetarians, non-vegetarians, and patients taking low dose aspirin. *J Clin Pathol*. 2001 Jul;54(7):553-5.

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Low Inflammation, High Anti-oxidation, Thinner IMT

- "Vegetarians demonstrated a lower blood concentration of CRP compared to non-vegetarians"
- "Long-term vegetarians have a better antioxidant status than ...omnivores."
- "Vascular effects of a vegetarian diet include a thinner carotid IMT"

1. Effects of long-term vegetarian diet on biomarkers of antioxidant status and cardiovascular disease risk. *Nutrition.* 2004;20(10):863–6.
2. Determinants of inflammatory markers in a bi-ethnic population. *Ethn Dis*. 2011 Spring;21(2):142-9.
3. Vegetarian diets in cardiovascular prevention. *Curr Treat Options Cardiovasc Med*. 2013 Dec;15(6):735-45. .
4. Chinese lacto-vegetarian diet exerts favorable effects on metabolic parameters, intima-media thickness, and cardiovascular risks in healthy men. *Nutr Clin Pract*. 2012 Jun;27(3):392-8.

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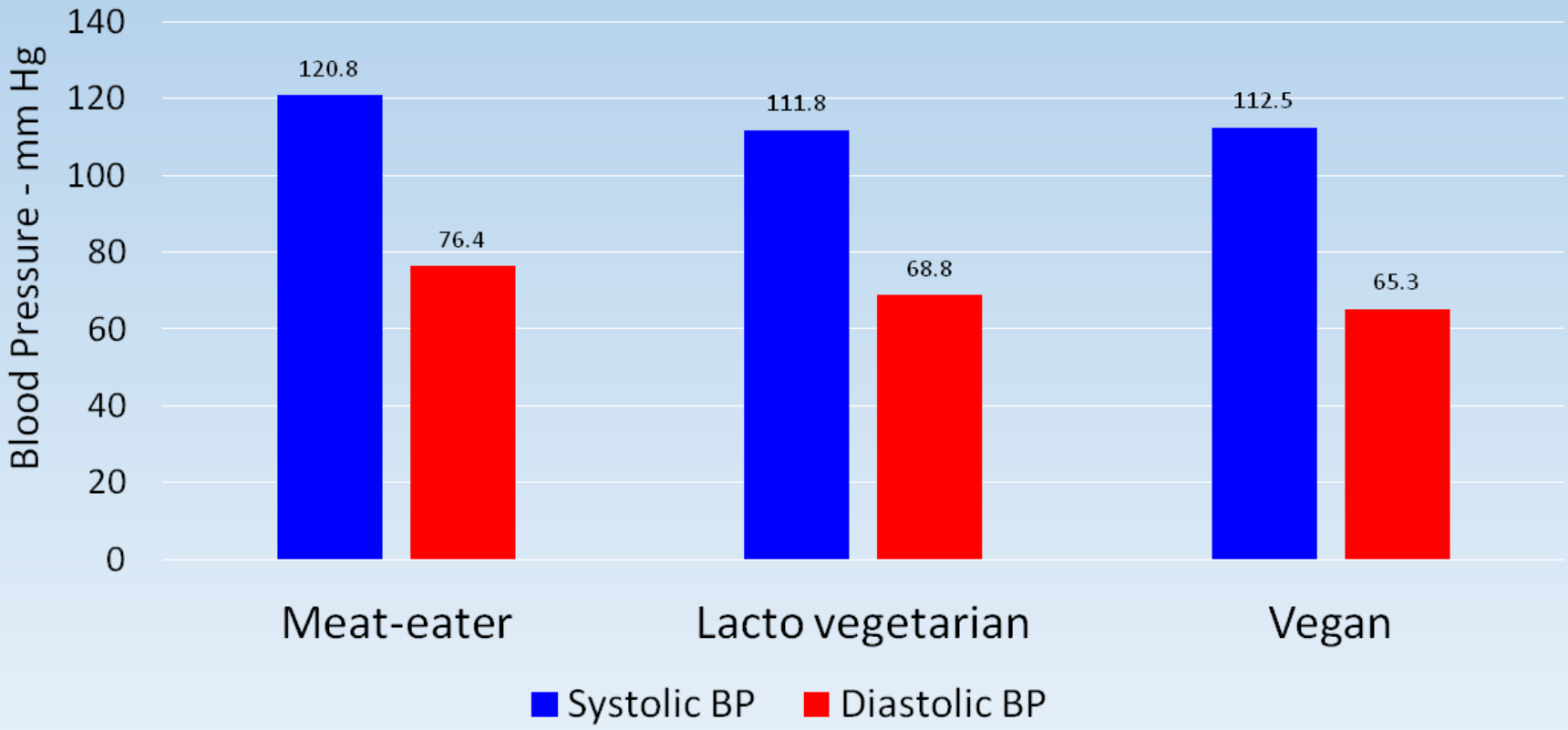
Vegetarians have Lower Blood Pressure



Sacks FM, Kass EH. Low blood pressure in vegetarians: Effects of specific foods and nutrients. *Am J Clin Nutr*. 1988 Sep;48(3 Suppl):795-800.

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Veg Diet is safe and efficacious for treating Hypertension

In a 6 week controlled study, omnivores were fed a vegetarian diet. Blood pressure was reduced by an average of 6mm Hg/3mm Hg.

Beilin LJ et al. Vegetarian diet and blood pressure levels: incidental or causal association? Am J Clin Nutr. 1988 Sep;48(3 Suppl):806-10.

Hypertensive patients were placed on a vegan diet for 1 year. Their blood pressure was reduced by 9 mm Hg/5 mm Hg.

Lindahl O, et al. A vegan regimen with reduced medication in the treatment of hypertension. Br J Nutr. 1984 Jul;52(1):11-20.

Vegetarians OF WASHINGTON

"Vegetarian diet lowers risk of essential hypertension independent of and in addition to their lower BMI, insulin resistance and C-reactive protein."

Chuang SY. Vegetarian diet reduces the risk of hypertension independent of abdominal obesity and inflammation: a prospective study. *J Hypertens*. 2016 Aug 10.

Vegetarians OF WASHINGTON

"Our analysis found that vegetarian diets lower blood pressure very effectively, and the evidence for this is now quite conclusive. I would encourage physicians to prescribe plant-based diets as a matter of routine, and to rely on medications only when diet changes do not do the job"

"Consumption of vegetarian diets is associated with lower BP. Such diets could be a useful non-pharmacologic means for reducing BP."

Yokoyama Y, Nishimura K, Barnard ND, et al. Vegetarian diets and blood pressure: a meta-analysis. *JAMA Internal Medicine 2014, Feb 24*

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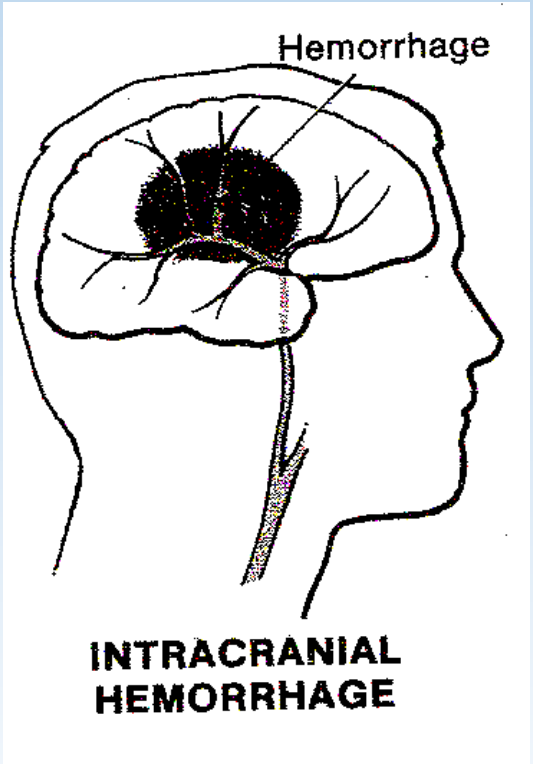
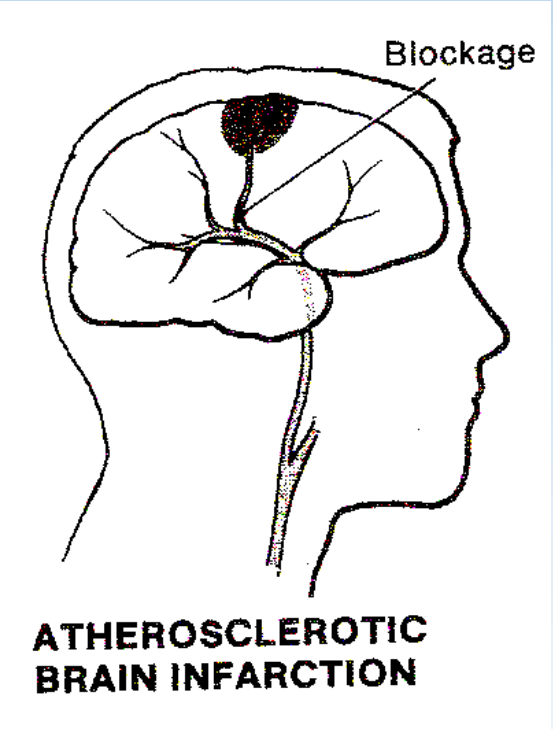
The Two Types of Stroke





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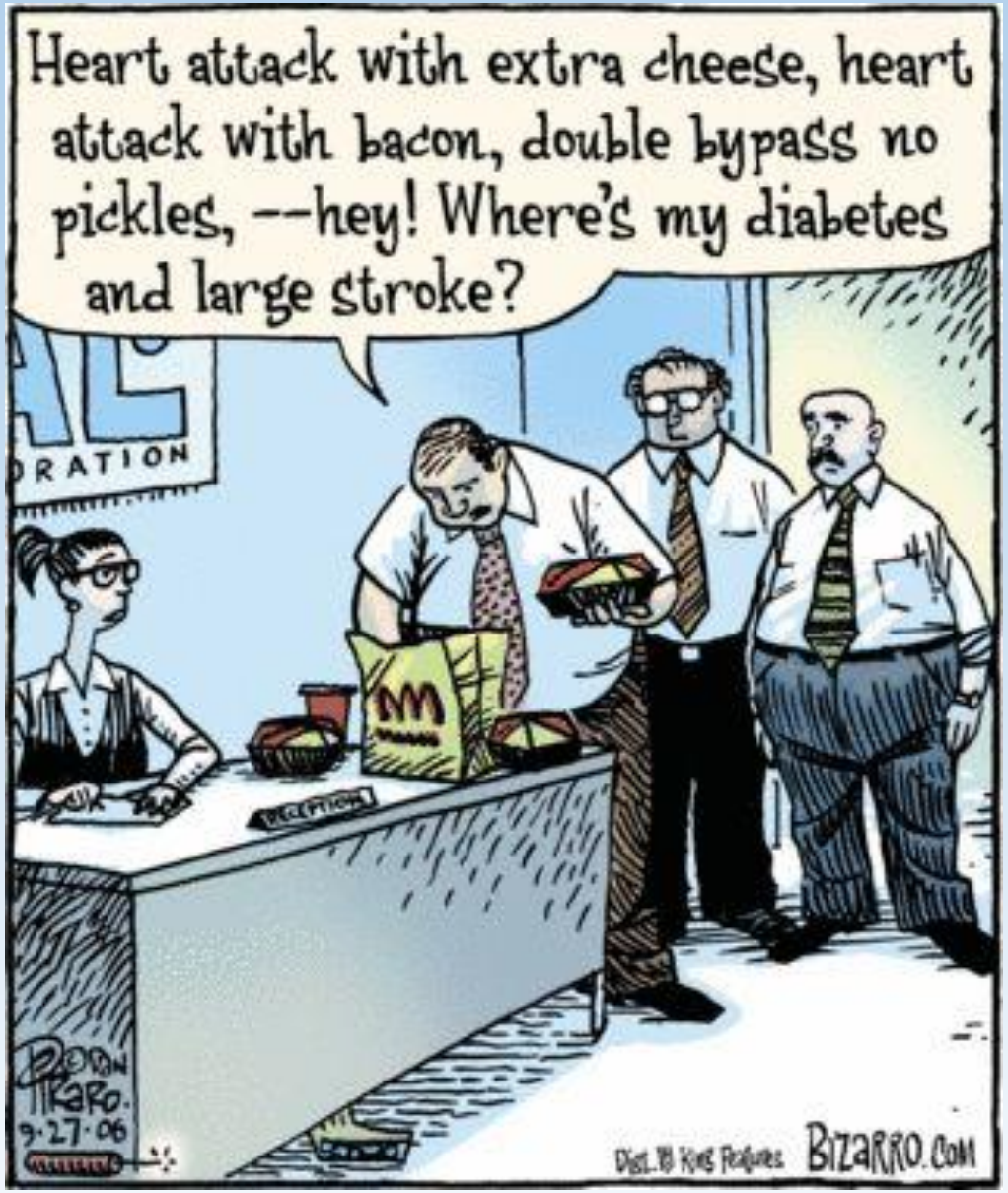

Vegetarians OF WASHINGTON

Vegetarians have only 1/3 risk of dementia as meat eaters.

Giem P The incidence of dementia and intake of animal products: preliminary findings from the Adventist Health Study. Neuroepidemiology. 1993;12(1):28-36.

Vegetarians OF WASHINGTON

Vegetarians have a Better Cardiovascular Profile

- Lower TC
- Better Ratio TC/HDL-C, LD-C/HDL-C
- Lower 27HC
- Lower Triglycerides
- Thinner Intima Media Thickness
- Better Anti-oxidant status
- Lower BP
- Lower stroke risk
- Better Insulin Sensitivity
- Lower Type II Diabetes
- Lower BMI

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5 Minute Break

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Obesity

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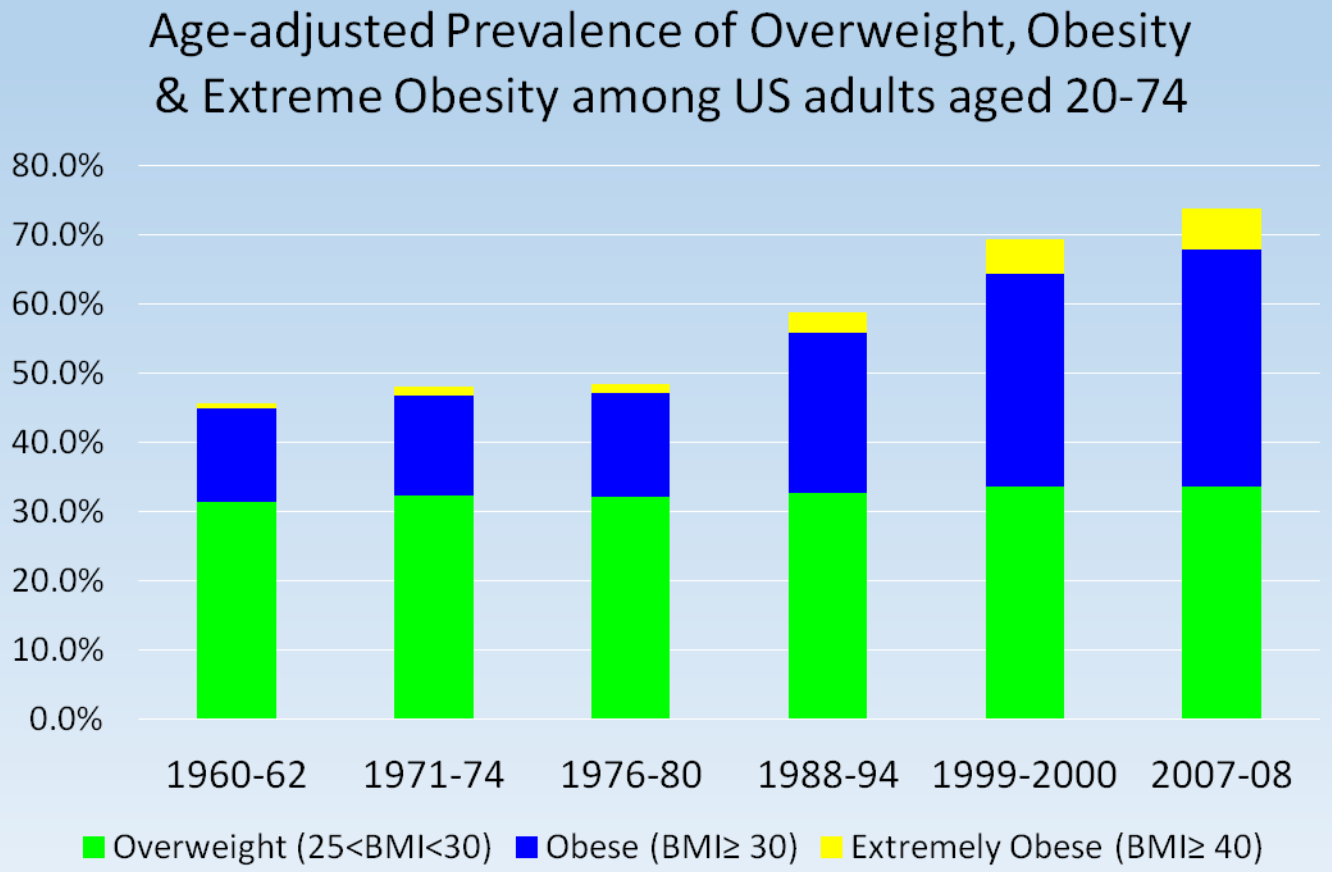

Prevalence of Overweight, Obesity, and Extreme Obesity Among Adults: United States, Trends 1960–1962 Through 2007–2008. by Cynthia L. Ogden, Ph.D., and Margaret D. Carroll, M.S.P.H., Division of Health and Nutrition Examination Surveys, June 2010

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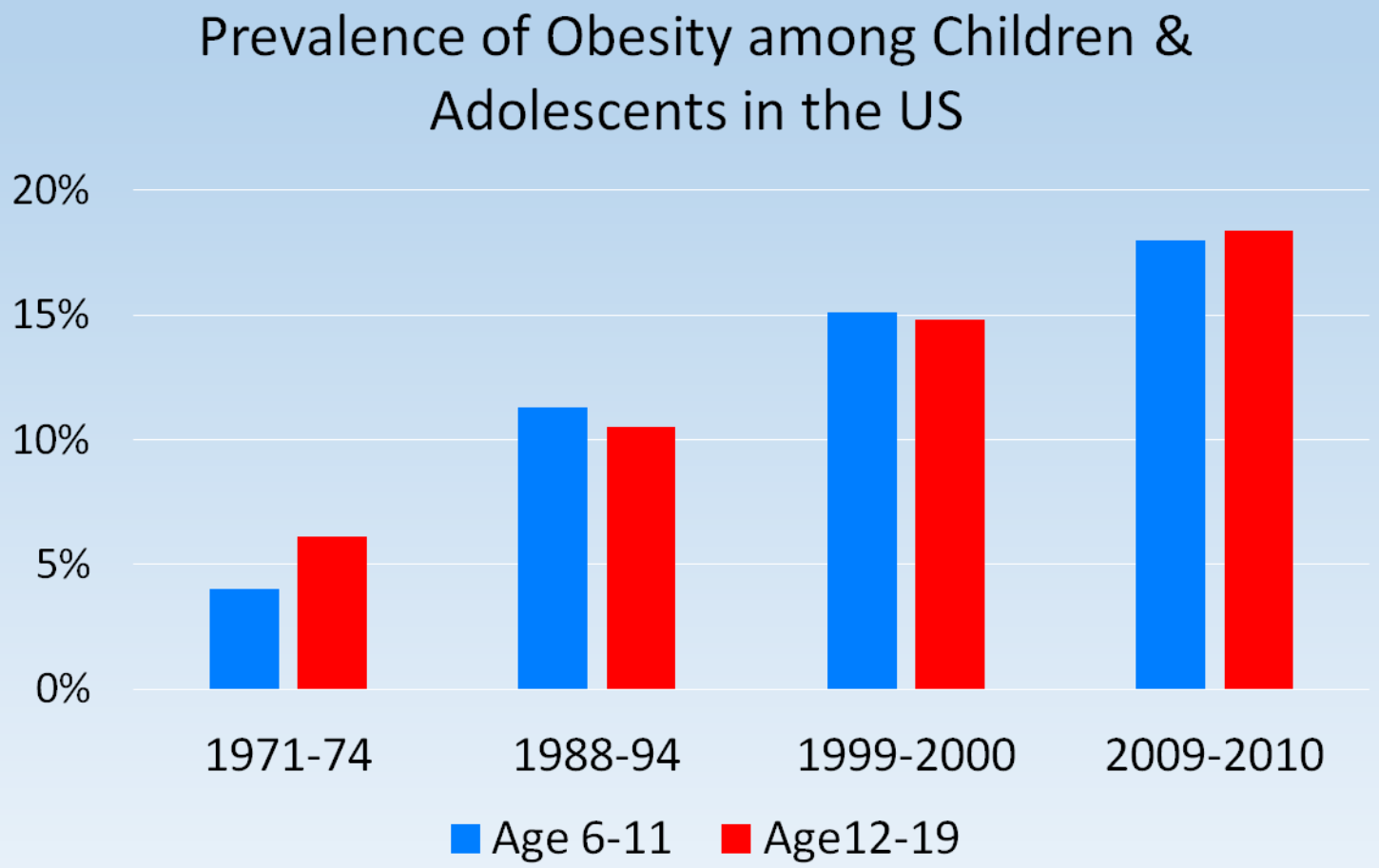

Obesity is body mass index greater than or equal to the 95th percentile from the sex- and age-specific 2000 CDC growth charts. Sources: CDC/NCHS, NHES and NHANES

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- *Vegetarians have a 45% decreased risk of being overweight or obese*
- *Vegans have a 65% decreased risk of being overweight or obese*
- *Vegans are on average 30 pounds thinner*

American Journal of Clinical Nutrition 2005;81:1267–74

- *Healthy BMI range 18-25 kg/m²*
- *Average BMI on typical American Diet – 28.8 kg/m²*
- *Average BMI on vegan diet – 23.6 kg/m²*

Diabetes Care May 2009 vol. 32 no. 5 791-796

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Vegetarian Children have Lower BMI

Age	Average BMI of Non-Vegetarian Child	Average BMI of Vegetarian Child
6-11 yrs	18.5 ± 0.1	17.3 ± 1.5
12-18 yrs	22.3 ± 0.1	20.0 ± 1.0

Am J Clin Nutr September 1, 2003 vol. 78 no. 3 626S-632S

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Whole Plant Foods – Advantage for weight control

- Low glycemic load.
- High fiber food results in slow and steady absorption, and an even blood glucose without peaks and valleys.
- Low saturated fat foods result in better insulin sensitivity.
- Lower caloric density results in “greater volume” satiety with less calories.
- Greater nutrient density results in “greater nutrient” satiety.

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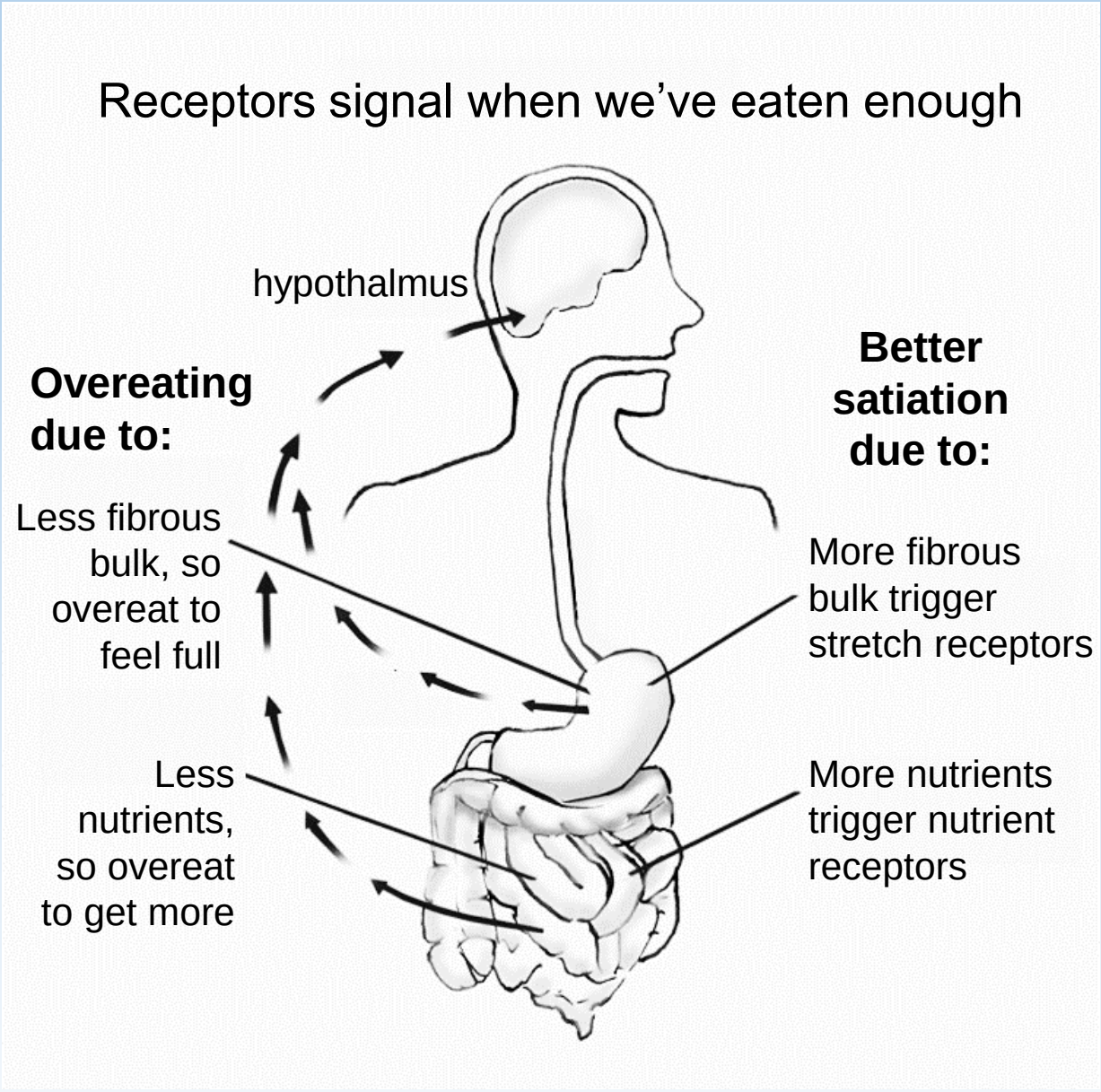
How the body tells us when we're full



Eat to Live rev ed 2011 Joel Furhman MD p.29

Vegetarians OF WASHINGTON

Metabolic Syndrome

23% of US adults were estimated to have Metabolic Syndrome in 2010.

Hiram Beltrán-Sánchez, et al. Prevalence and Trends of Metabolic Syndrome in the Adult U.S. Population, 1999–2010. *J Am Coll Cardiol*. 2013;62(8):697-703.

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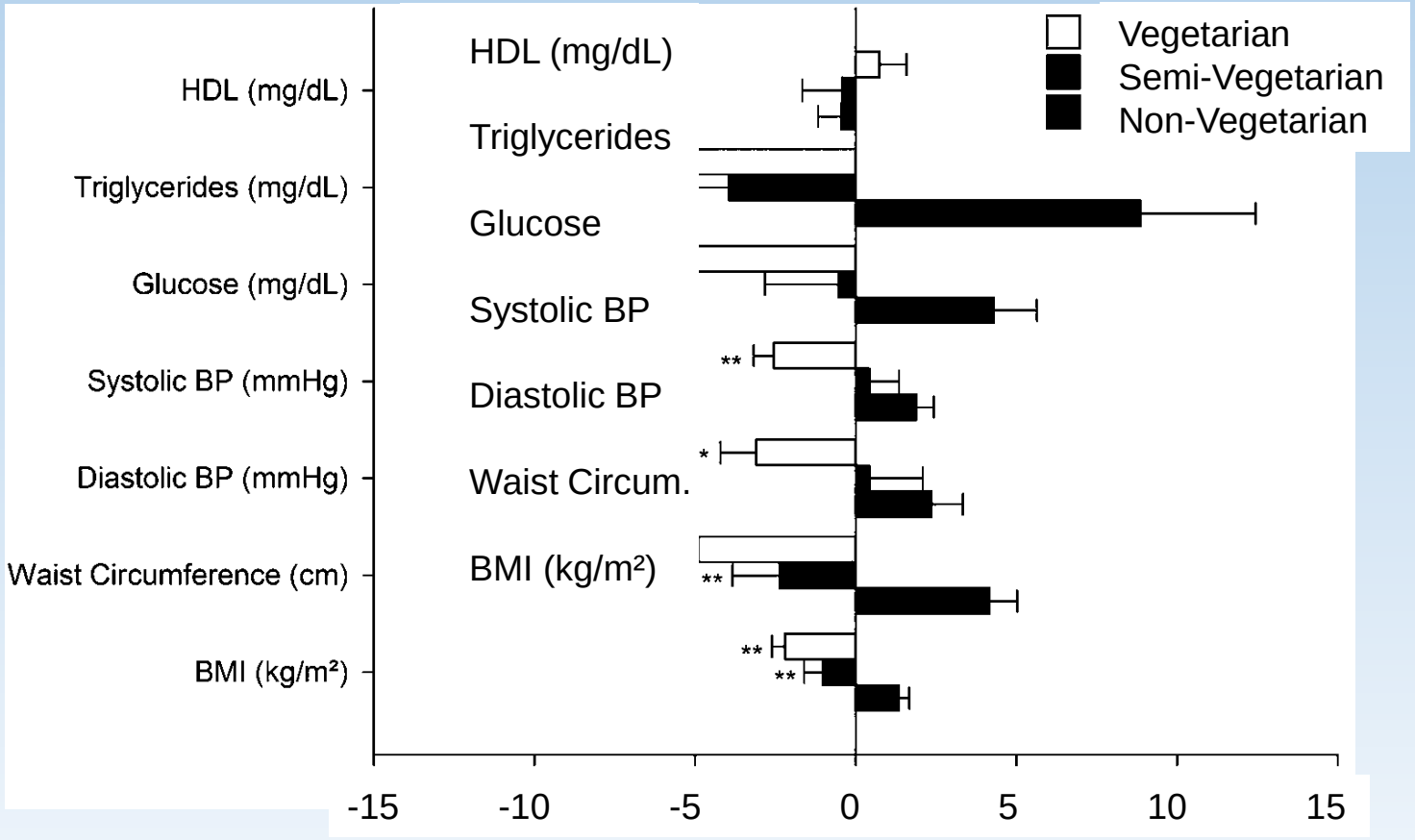
Metabolic Syndrome



"A vegetarian dietary pattern is associated with a more favorable profile of MRFs and a lower risk of MetS. The relationship persists after adjusting for lifestyle and demographic factors."

Diabetes Care. May 2011; 34(5): 1225–1227. "Vegetarian Dietary Patterns Are Associated With a Lower Risk of Metabolic Syndrome" Nico S. Rizzo, Joan Sabaté, MD, DRPH, Karen Jaceldo-Siegl, and Gary E. Fraser, MD

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Type 2 Diabetes

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Type 2 Diabetes Prevalence

	Number in US Population	% in US Population
Age 20 yrs or older	25.6 million	11.3%
Age 65 yrs or older	10.9 million	26.9%

Diabetes Fast Facts March 2013 - American Diabetes Association

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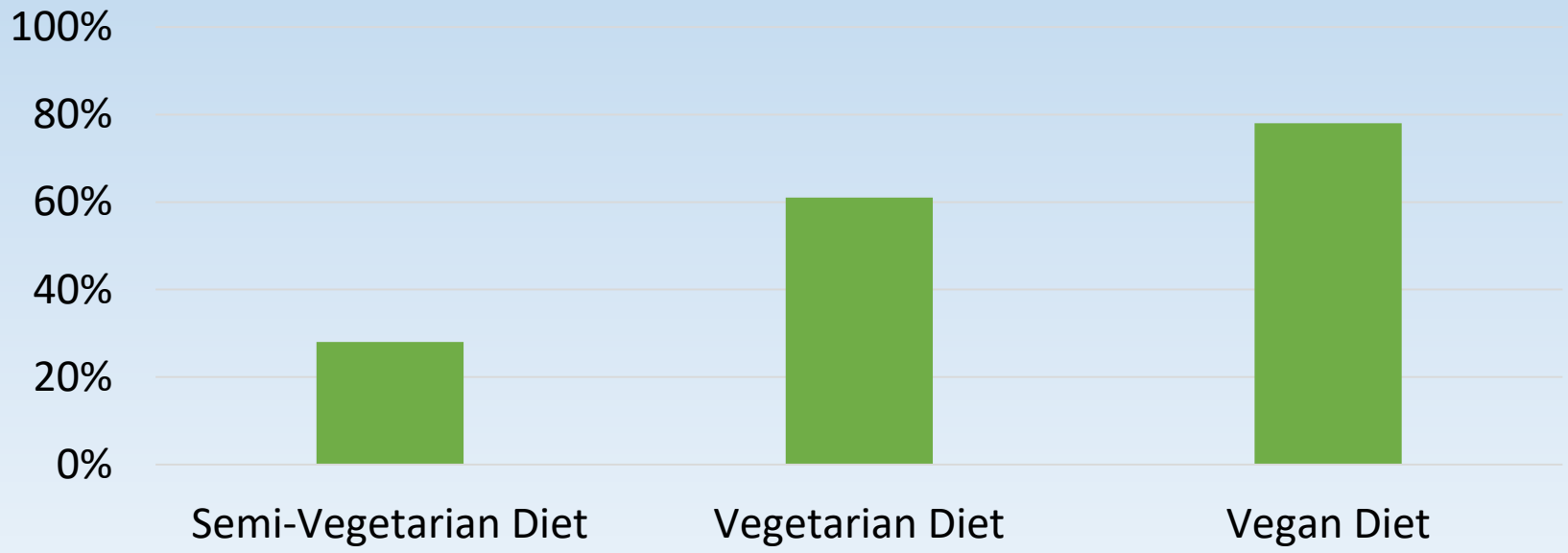
Reduction in Prevalence for Type II Diabetes by diet



Gary E Fraser. "Mean BMI and prevalence of Diabetes and Hypertension in different types of vegetarians compared with non-vegetarians in California Seventh-day Adventists." Am J Clin Nutr. May 2009; 89(5): 1607S–1612S.

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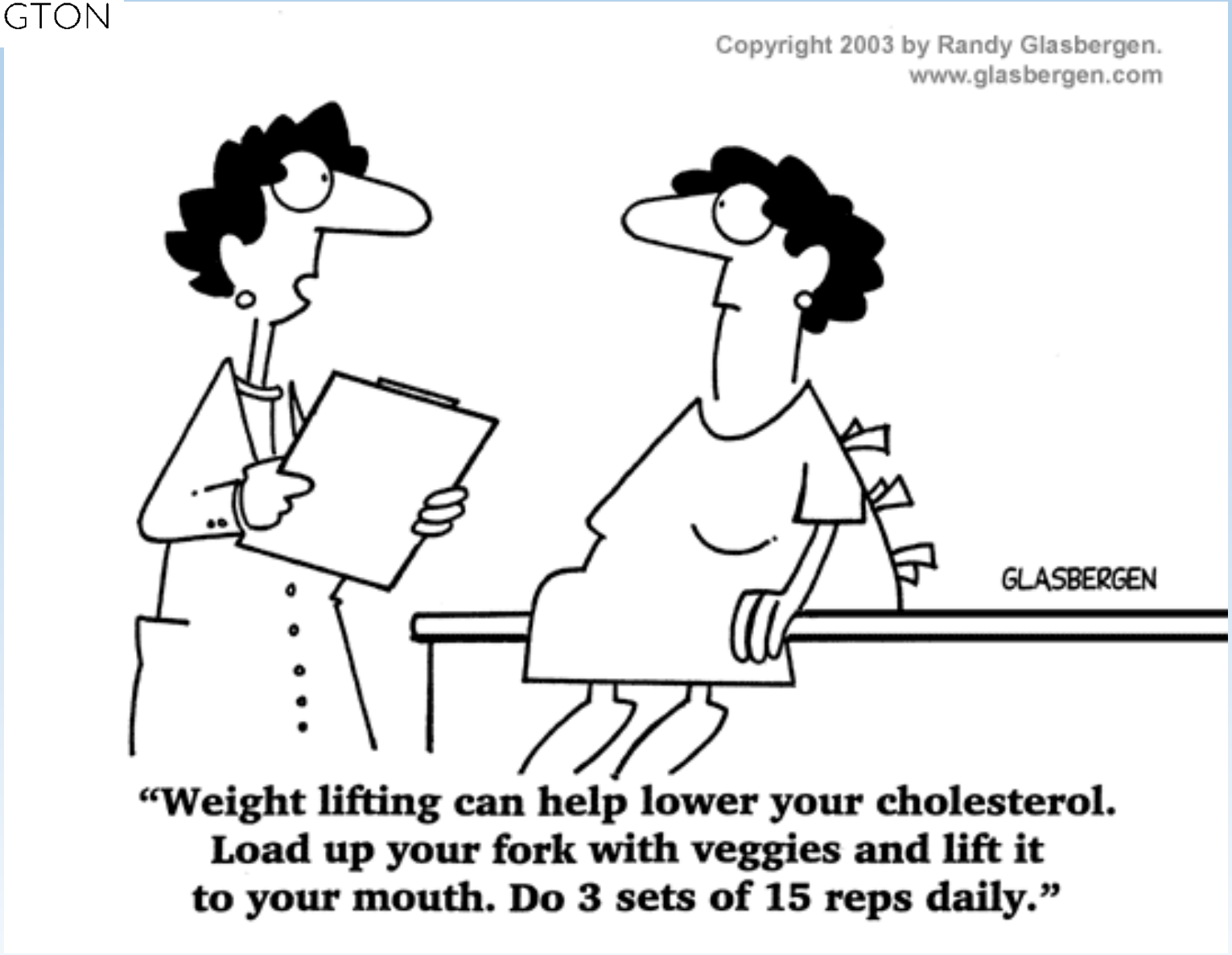
Type 2 Diabetes: Diet Matters More than Exercise

When patients were told **not to exercise**:

The mean fasting serum glucose of the experimental group, decreased from 10.7 to 7.75 mmol/L (195 to 141 mg/dl) and the mean weight loss was 7.2 Kg (15.8 lbs)

Nicholson A, Sklar M, Barnard N, et.al. Toward improved management of NIDDM: A randomized, controlled, pilot intervention using a lowfat, vegetarian diet. Preventive Medicine. Aug 1999;29(2):87-91.

Vegetarians OF WASHINGTON



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The Effectiveness of Treatments Compared

Diet	Reduction in HbA1C Levels	Weight Loss	Reduction in LDL Cholesterol	Reduction in Urinary Albumin	Reduction in Medications
American Diabetes Assoc. Diet	0.38 pts	3.1kg	10.7%	10.9mg/24h	26%
Low-fat Vegan Diet	1.23 pts	6.5 kg	21.2%	15.9mg/24h	43%
(Metformin	0.60 pts)				

Barnard ND, et al. “A low-fat vegan diet improves glycemic control and cardiovascular risk factors in a randomized clinical trial in individuals with type 2 diabetes.” *Diabetes Care*. 2006 Aug;29(8):1777-83.
Effect of intensive blood-glucose control with metformin…, *Lancet*. 1998 Sep 12;352(9131):854-65.

Vegetarians OF WASHINGTON

BMI and prevalence of Diabetes and Hypertension in California Seventh-Day Adventists

Diet group	BMI (in kg/m^2)	Diabetes	Hypertension
Non-vegetarian	28.26	1.00	1.00
Semi-vegetarian	27.00	0.72	0.77
Pesco-vegetarian	25.73	0.49	0.62
Lacto ovo-vegetarian	25.48	0.39	0.45
Vegan	23.13	0.22	0.25
	Values are means	Values are relative risks	Values are relative risks

Mean BMI and prevalence of Diabetes and Hypertension in different types of vegetarians compared with non-vegetarians in California Seventh-day Adventists. *Am J Clin Nutr*. May 2009; 89(5): 1607S–1612S.

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Blood Glucose and Insulin Resistance

Diet	Glucose	Insulin	Insulin Resistance
Standard Meat-Centered Diet	105 mg/dl	7.32 mU/l	1.50 (HOMA)
Vegetarian Diet	80 mg/dl	4.96 mU/l	0.99 (HOMA)

Valachovicova M et. al. No evidence of insulin resistance in normal weight vegetarians: A case control study. *Eur J Nutr*. 2006 Feb;45(1):52-4.
Kuo CS. Insulin sensitivity in Chinese ovo-lactovegetarians compared with omnivores. *Eur J Clin Nutr*. 2004 Feb;58(2):312-6

Vegetarians OF WASHINGTON

Even low dose exposure to POPs conferred a very significant rise in the risk of Type 2 Diabetes by 14-38 times

Lee D, Lee I, Jin S, et.al. Association between serum concentrations of persistent organic pollutants and insulin resistance among nondiabetic adults: results from the National Health and Nutrition Examination Survey 1999-2002. *Diabetes Care*. Mar 2007;30(3):622-8.

Lee D, Steffes M, Sjödin A, et.al. Low dose of some persistent organic pollutants predicts type 2 diabetes: a nested case-control study. *Environmental Health Perspectives*. Sep 2010;118(9):1235-42

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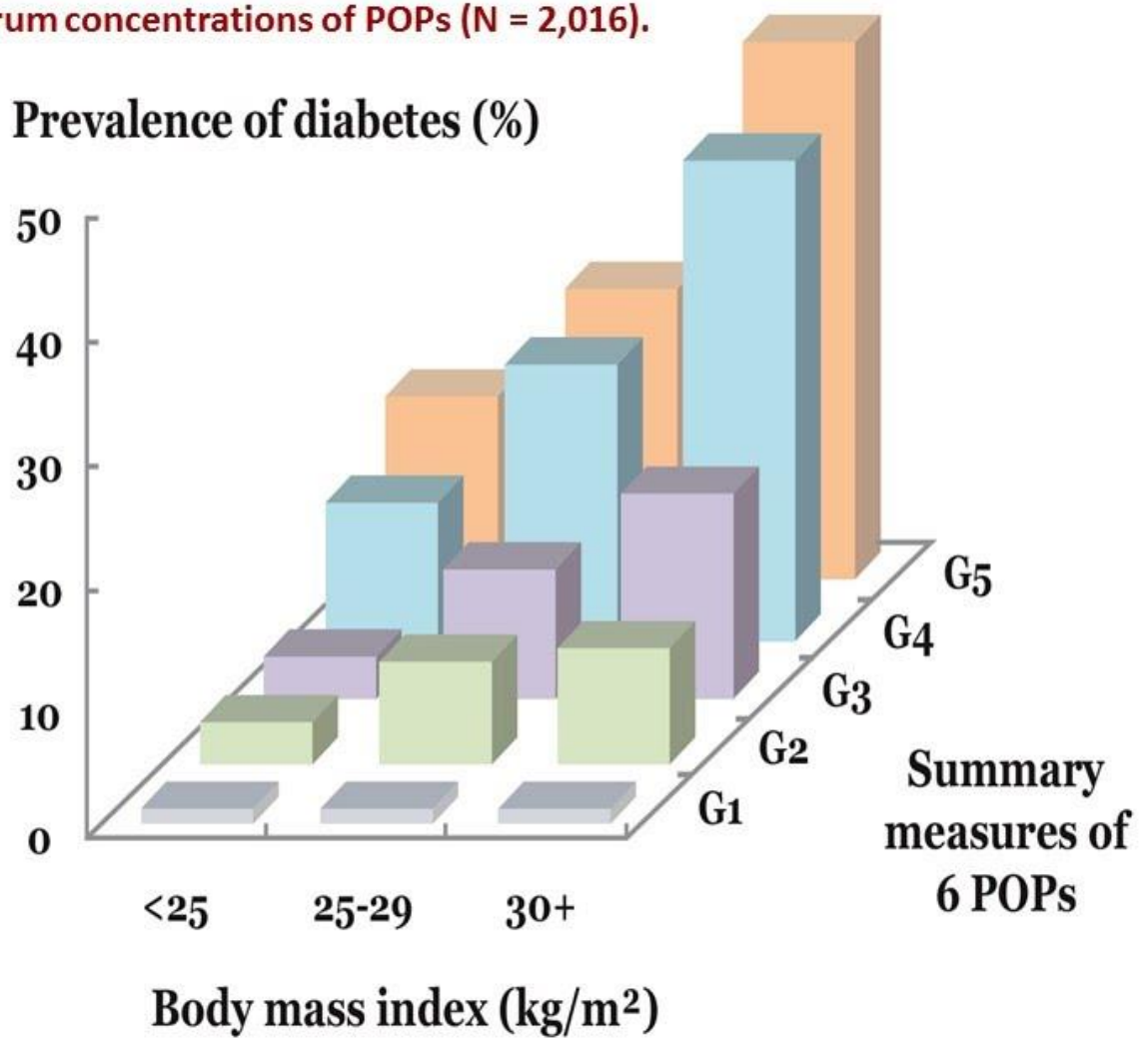
USA 1999-2002. The prevalence of diabetes increases with BMI (only if contaminated by POPs?) and with serum concentrations of POPs (N = 2,016).

Among people with lower concentrations of the summary POPs (G1 row), the frequency of diabetes did not increase with increasing BMI, and diabetes was very rare (even among people with BMI ≥30kg/m²). Furthermore, the frequency of diabetes increased with rising concentrations of POPs, even among people with low BMI (<25).



Lee DH et al. *Diabetes Care* 2006

Vegetarians OF WASHINGTON

Research shows an association between POPs and mitochondrial dysfunction in the Beta cells.

De Tata V. Association of dioxin and other persistent organic pollutants (POPs) with diabetes: epidemiological evidence and new mechanisms of beta cell dysfunction. International Journal of Molecular Sciences. May 2014;15(5):7787-811.

Kim J, Lee H. Metabolic syndrome and the environmental pollutants from mitochondrial perspectives. Reviews in Endocrine and Metabolic Disorders. Dec 2014;15(4):253-62.

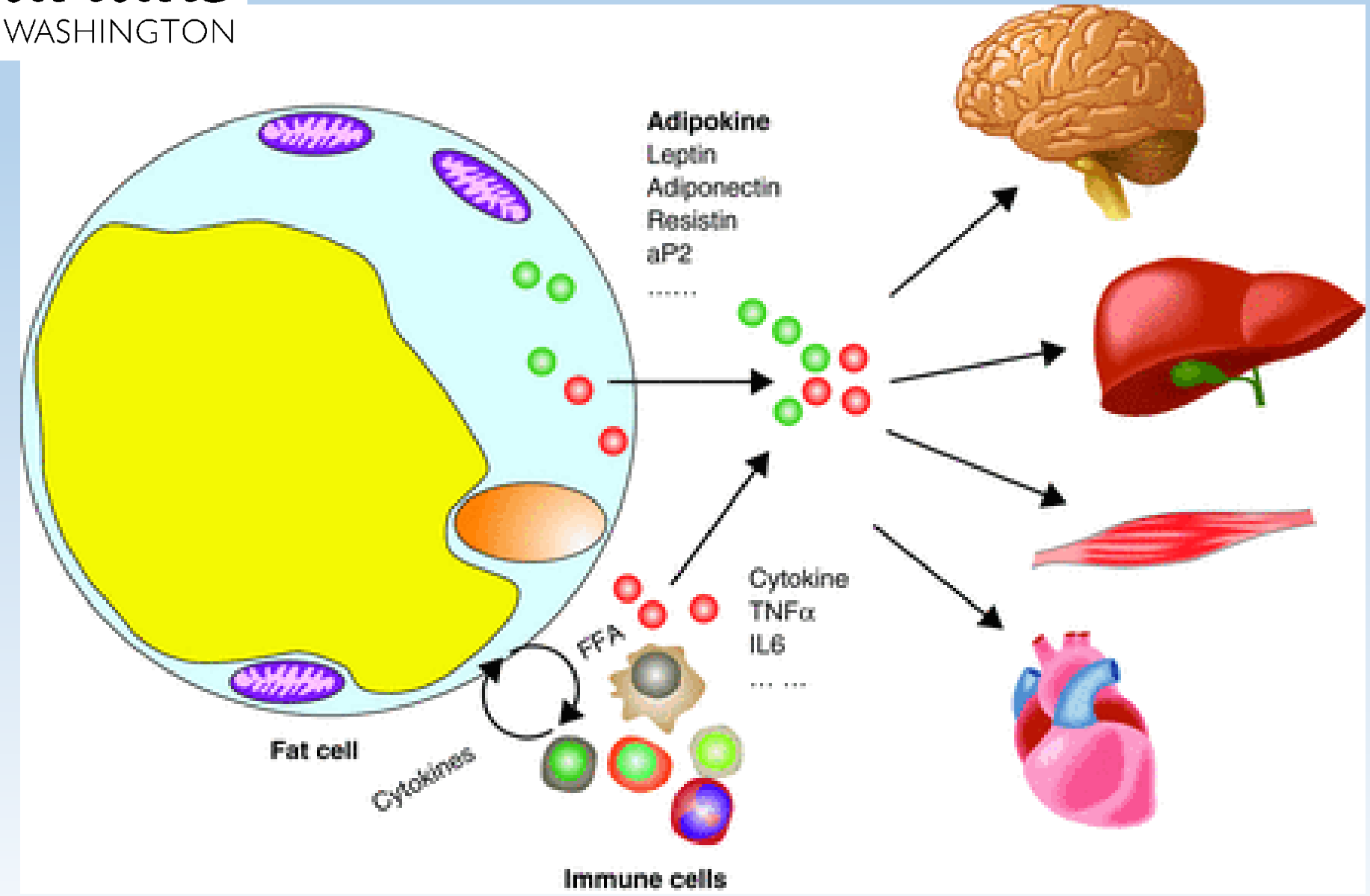
Vegetarians OF WASHINGTON

Adipose tissue has both endocrine and paracrine function

The adipocyte has been shown to secrete a variety of bioactive proteins into the circulation. These secretory proteins have been collectively named adipocytokines.

Chandran M, Phillips S, Ciaraldi T. Adiponectin: More Than Just Another Fat Cell Hormone? Diabetes Care. Aug 2003;26(8):2442-2450.

Vegetarians OF WASHINGTON



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Vegetarians and vegans have an anti-diabetic adipocytokine profile

- Lower IL-6, leptin,
- Lower C-reactive Protein
- Higher levels of adiponectin

Source: Type II Diabetes posting, refs 49,50, 56-61, VegetarianPrescription.org

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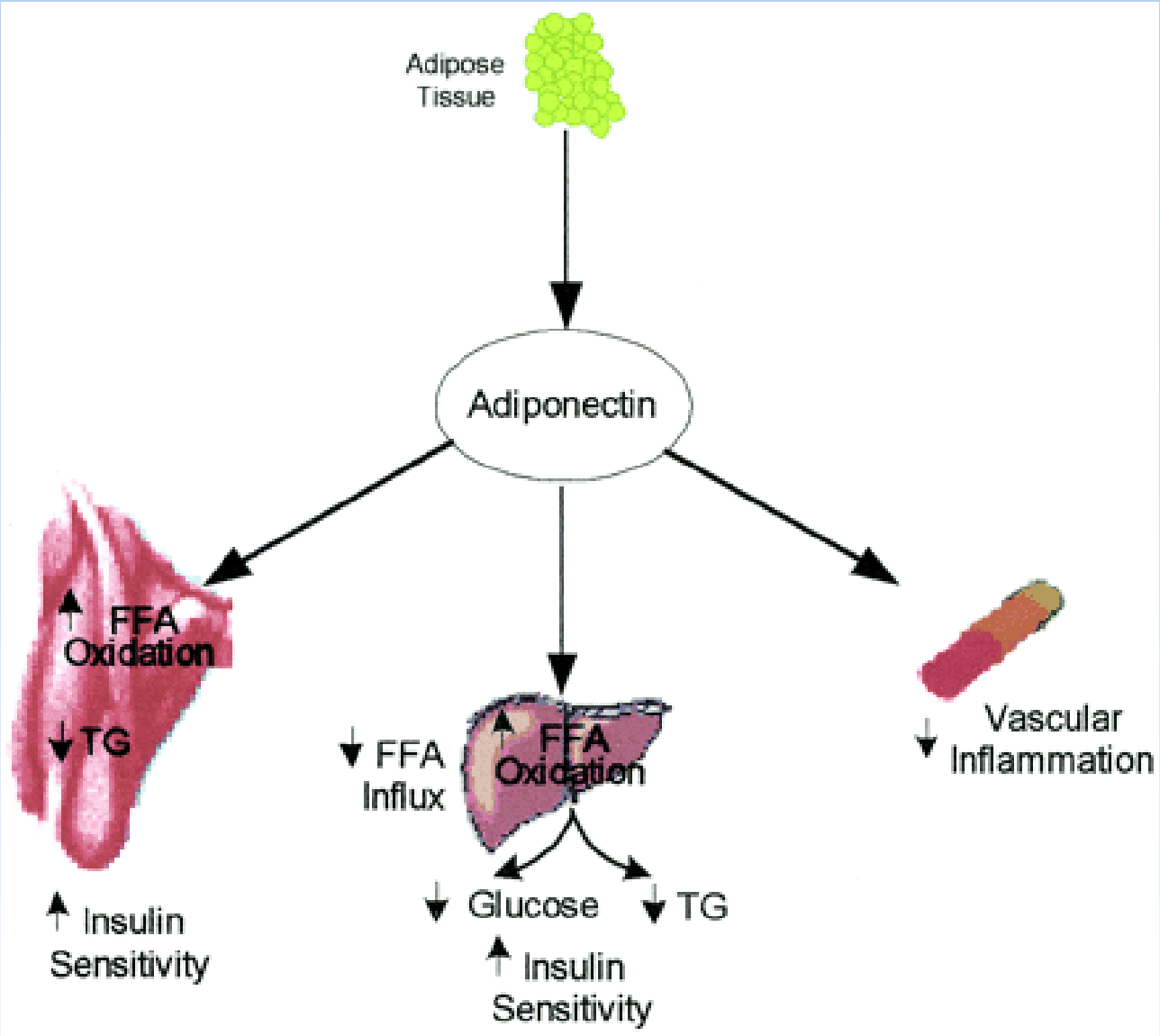
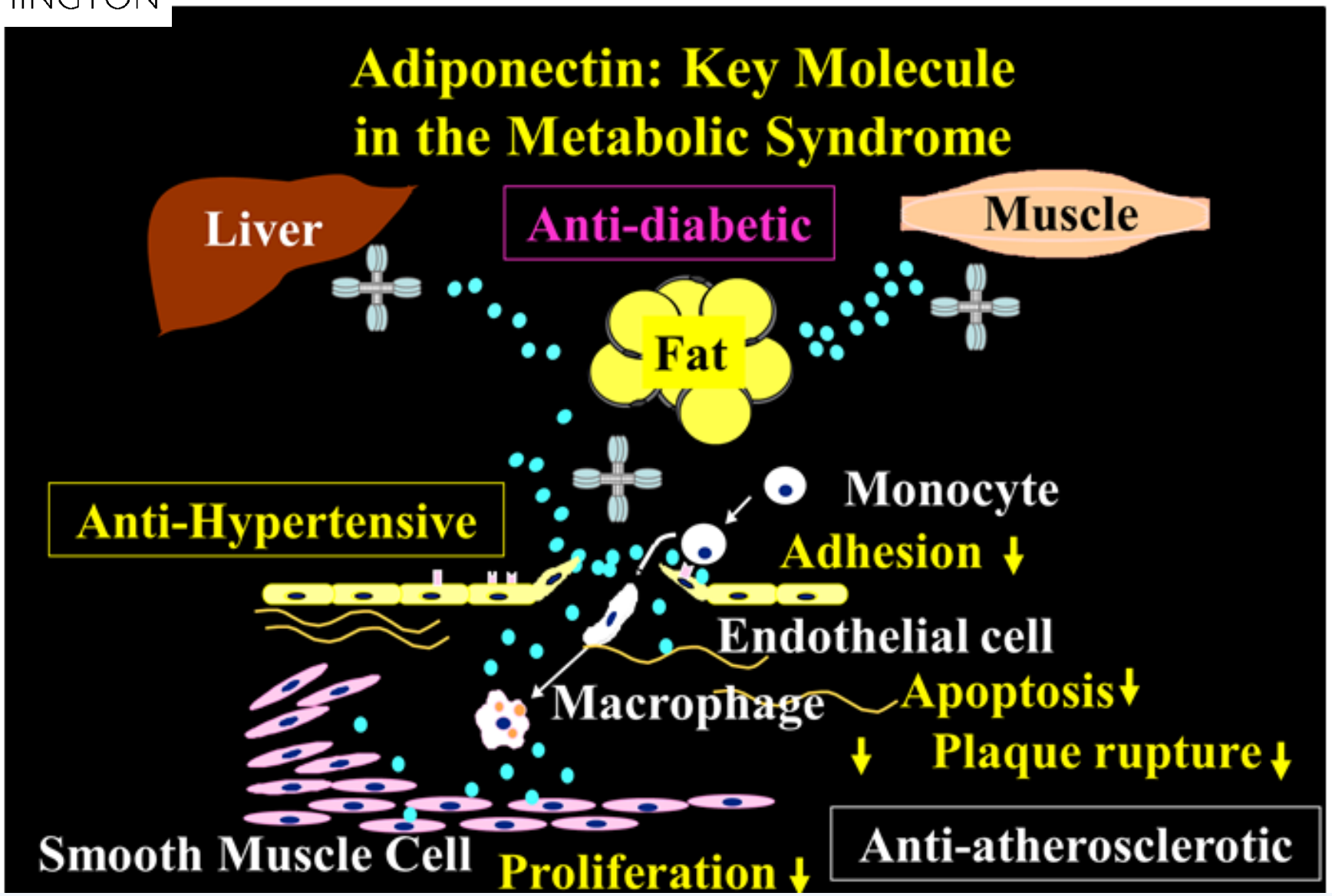


Vegetarians OF WASHINGTON



Vegetarians OF WASHINGTON

Microbiome

Diabetics ↓ butyrate producing bacteria

Plant-Based Diet ↑ butyrate producing bacteria

Larsen N, Vogensen F, van den Berg F, et.al. Gut microbiota in human adults with type 2 diabetes differs from non-diabetic adults. PLoS One. Feb 2010;5(2):e9085.
Karlsson F, Tremaroli V, Nookaew I, et.al. Gut metagenome in European women with normal, impaired and diabetic glucose control. Nature. Jun 2013;498(7452):99-103.
Wong J. Gut microbiota and cardiometabolic outcomes: influence of dietary patterns and their associated components. American Journal of Clinical Nutrition. Jul 2014;100(Suppl 1):369S-77S.

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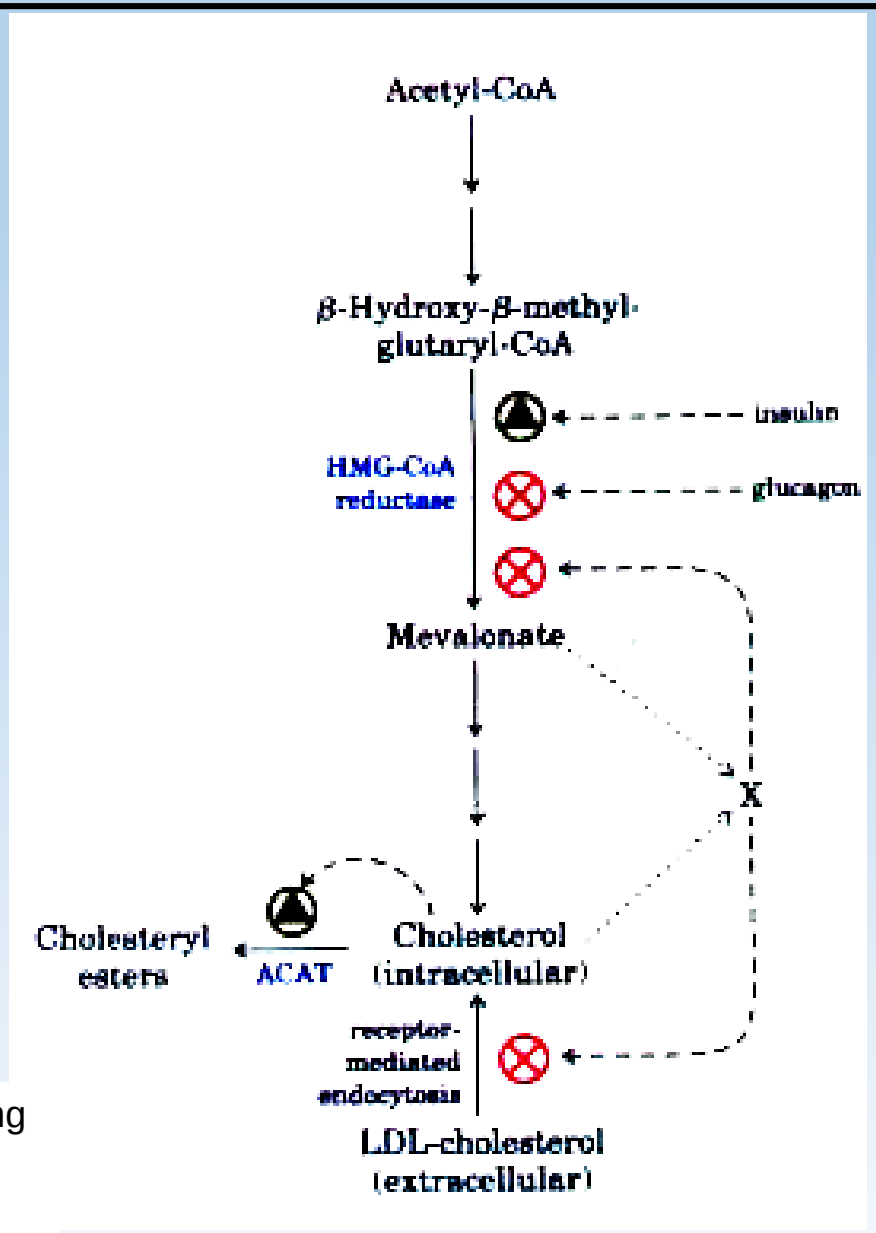
Insulin Stimulates Cholesterol Synthesis



Kari Anne Risan Tobin, et al. Liver X Receptors as Insulin-mediating Factors in Fatty Acid and Cholesterol Biosynthesis. *Journal of Biological Chemistry*, 2002, 277, 10691-10697.

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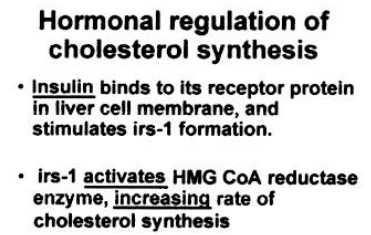
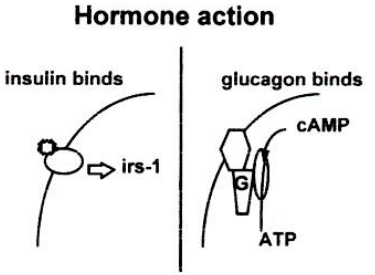
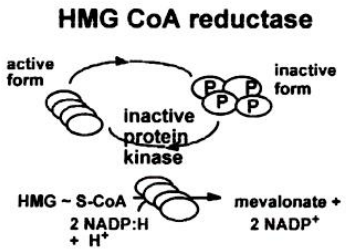
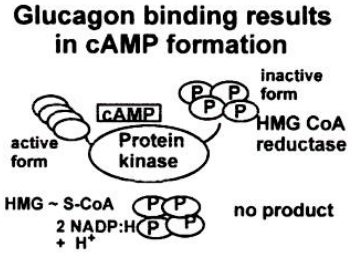
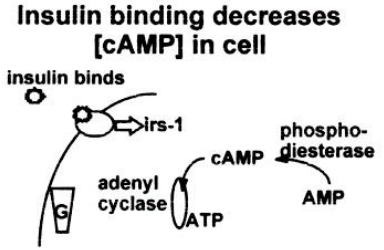
Insulin Stimulates Cholesterol Synthesis

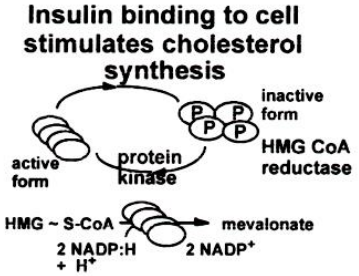












http://www.tamu.edu/faculty/magill/NUTR685/470pdfss/cholsyn.pdf

Vegetarians OF WASHINGTON

Vegans experience:

- ⬆ Skeletal muscle insulin sensitivity
- ⬆ Glucose Disposal
- ⬆ Mitochondria
- ⬇ Intramyocellular lipid

Goff L, et al. Veganism and its relationship with insulin resistance and intramyocellular lipid. *European Journal of Clinical Nutrition*. Feb 2005;59(2):291-8.
Gojda J, et.al. Higher insulin sensitivity in vegans is not associated with higher mitochondrial density. *European Journal of Clinical Nutrition*. Dec 2013;67(12):1310-5.

Vegetarians OF WASHINGTON

Research shows that high consumption of Omega-3 fatty acids may impair insulin action in subjects with type 2 diabetes.

See Type II Diabetes posting references 11-18.
VegetarianPrescription.org

Vegetarians OF WASHINGTON

Omega 6 fats increase insulin sensitivity in a dose dependent manner

Summers L, Fielding B, Bradshaw H. Substituting dietary saturated fat with polyunsaturated fat changes abdominal fat distribution and improves insulin sensitivity. Diabetologia. Mar 2002;45(3):369-77.
Kahleova H, Matoulek M, Bratova M, et.al. Vegetarian diet-induced increase in linoleic acid in serum phospholipids is associated with improved insulin sensitivity in subjects with type 2 diabetes. Nutrition and Diabetes. Jun 2013;3:e75

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Omega 6 fatty acids increase insulin sensitivity.

Long-chain Omega 3 fatty acids do not appear to improve insulin sensitivity or glucose metabolism.

Risérus U, Willett W, Hu F. Dietary fats and the prevention of type 2 diabetes. Prog Lipid Res.. Jan 2009;48(1):44-51

Vegetarians OF WASHINGTON

For Dyslipidemia, BMI, and Hba1c

High Protein Vegan Diet with Meat and Dairy Analogues

= Whole Food Vegan Diet

Jenkins D, Wong J, CWC K, et.al. Effect of a 6-month vegan low-carbohydrate ('Eco-Atkins') diet on cardiovascular risk factors and body weight in hyperlipidaemic adults: a randomised controlled trial. *British Medical Journal* Open. Feb 2014;4:e003505.

Vegetarians OF WASHINGTON

Diabetic Complications

Diabetic Peripheral Neuropathy
Diabetic retinopathy
Diabetic nephropathy

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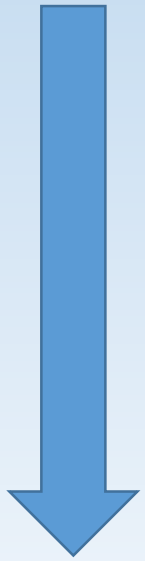
Diabetic Peripheral Neuropathy

47% of diabetes patients have some peripheral neuropathy.

The Vegetarian Advantage: Reduced Risk Factors



- Hypertension
- Hyperglycemia
- Inflammation (C-Reactive Protein)
- Hypercholesterolemia
- AGE (Advanced Glycation End Products)
- Oxidative Stress

.

Dyck PJ, et al. The prevalence by staged severity of various types of diabetic neuropathy, retinopathy, and nephropathy in a population-based cohort: the Rochester Diabetic Neuropathy Study. *Neurology*. 1993 Apr. 43(4):817-24

Vegetarians OF WASHINGTON

Drug Treatments for Diabetic Peripheral Neuropathy, with side effects

Drug Class	Drug	Daily Dose (mg)	Side Effects
Tricyclics	Amitriptyline	25–150	++++
	Imipramine	25–150	++++
SSRIs	Paroxitene	40	+++
	Citalopram	40	+++
Anticonvulsants	Gabapentin	900–1,800	++
	Pregabalin	160–600	++
	Lamotrigine	200–400	++
	Carbamazepine	up to 800	+++
Antiarrhythmics*	Mexilitene	up to 450	+++
Opioids	Tramadol	50–400	+++
	Oxycodone CR†	10–60	++++

All medications in this table have demonstrated efficacy in randomized, controlled studies. *Mexilitene should be used with caution and with regular electrocardiogram monitoring; †Oxycodone controlled release (CR) may be useful as an add-on therapy in severe symptomatic neuropathy.

Andrew J.M. Boulton. Management of Diabetic Peripheral Neuropathy. *Clinical Diabetes* January 2005 vol. 23 no. 1 9-15

Vegetarians OF WASHINGTON

Effective Treatment for Diabetic Peripheral Neuropathy

Patients on a vegan diet experienced:

- 80% complete abatement of pain in 1 month.
- 65% decrease in medications for diabetes
- 71% continue to be pain free after 4 years.

Crane MG, Sample C. Regression of diabetic neuropathy with total vegetarian (vegan) diet. *J Nutr Med* 1994;4:431–9.

Vegetarians OF WASHINGTON

Plant-based diet treatment of diabetic retinopathy

30% regression in both eyes
16% regression in one eye
20% showed no progression of retinopathy.

Kempner, W et al. Effect of rice diet on diabetes mellitus associated with vascular disease. Postgrad Med. 1958 Oct;24(4):359-71.
W. REX HAWKINS, MD Retinal Physician, Issue: April 2008

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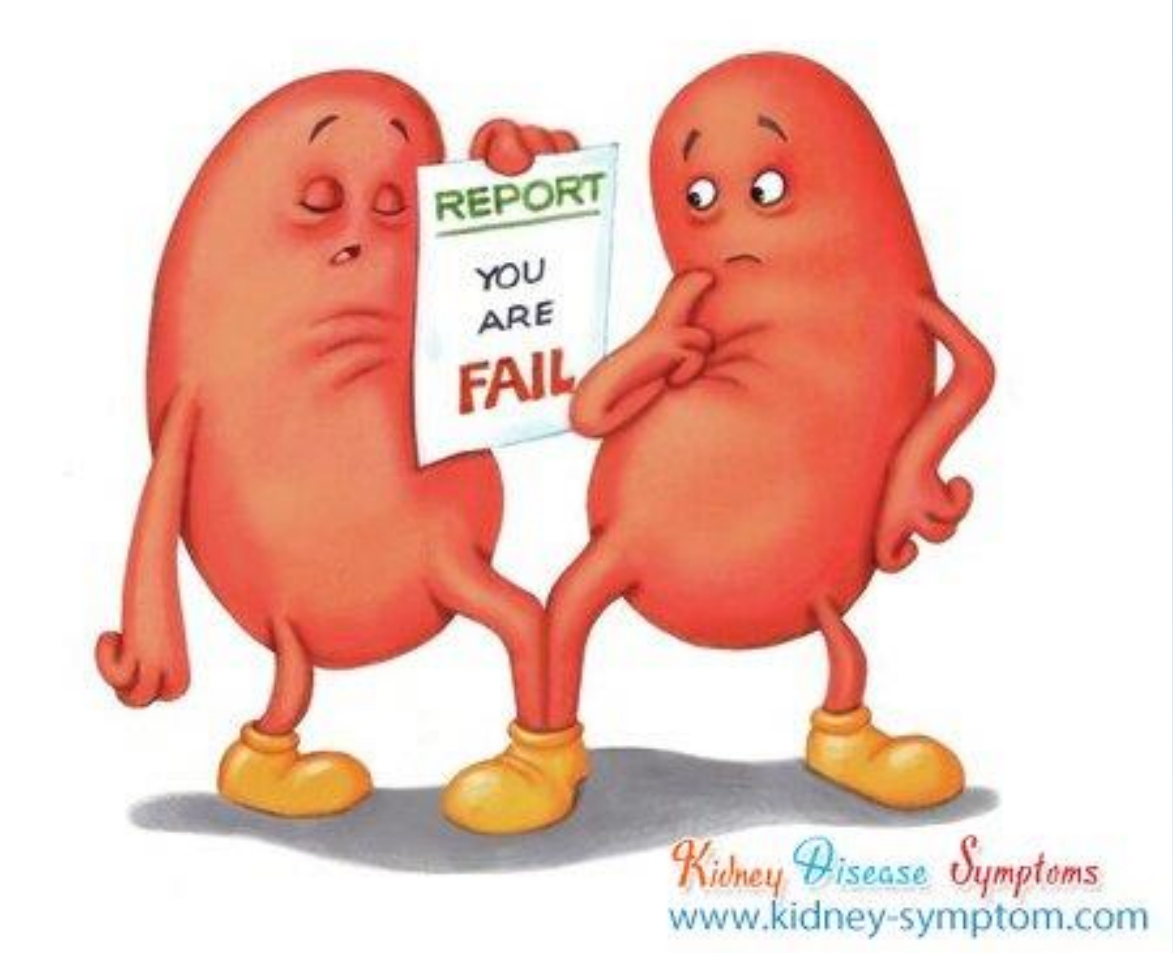
Chronic Kidney Disease



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Causes of Chronic Kidney Disease

- Diabetic Nephropathy
- Hypertension
- Chronic glomerulonephritis
- Lupus nephritis
- Polycystic kidney disease
- Reflux nephropathy
- Multiple myeloma
- B/L renal artery stenosis
- Obstructive uropathy

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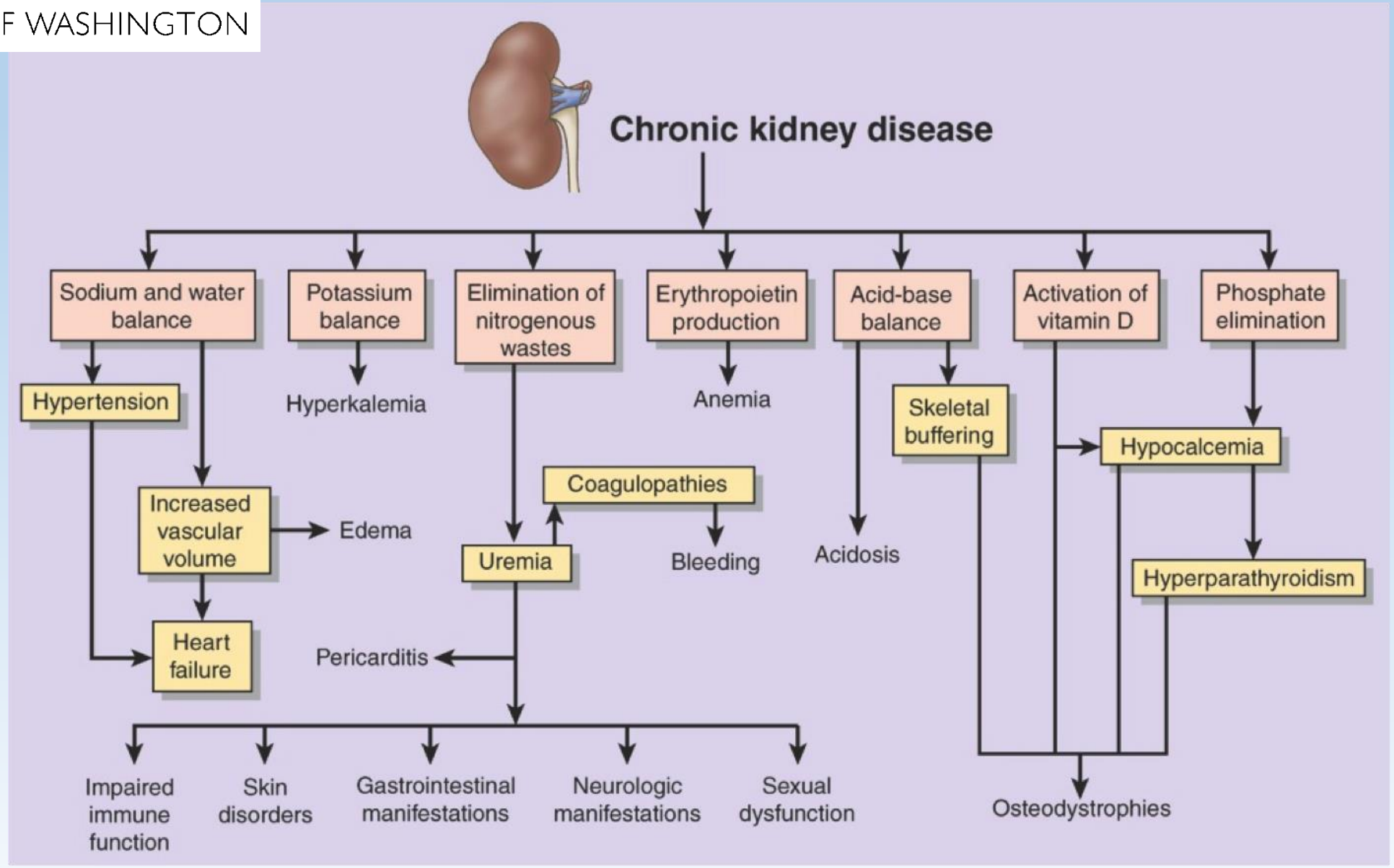
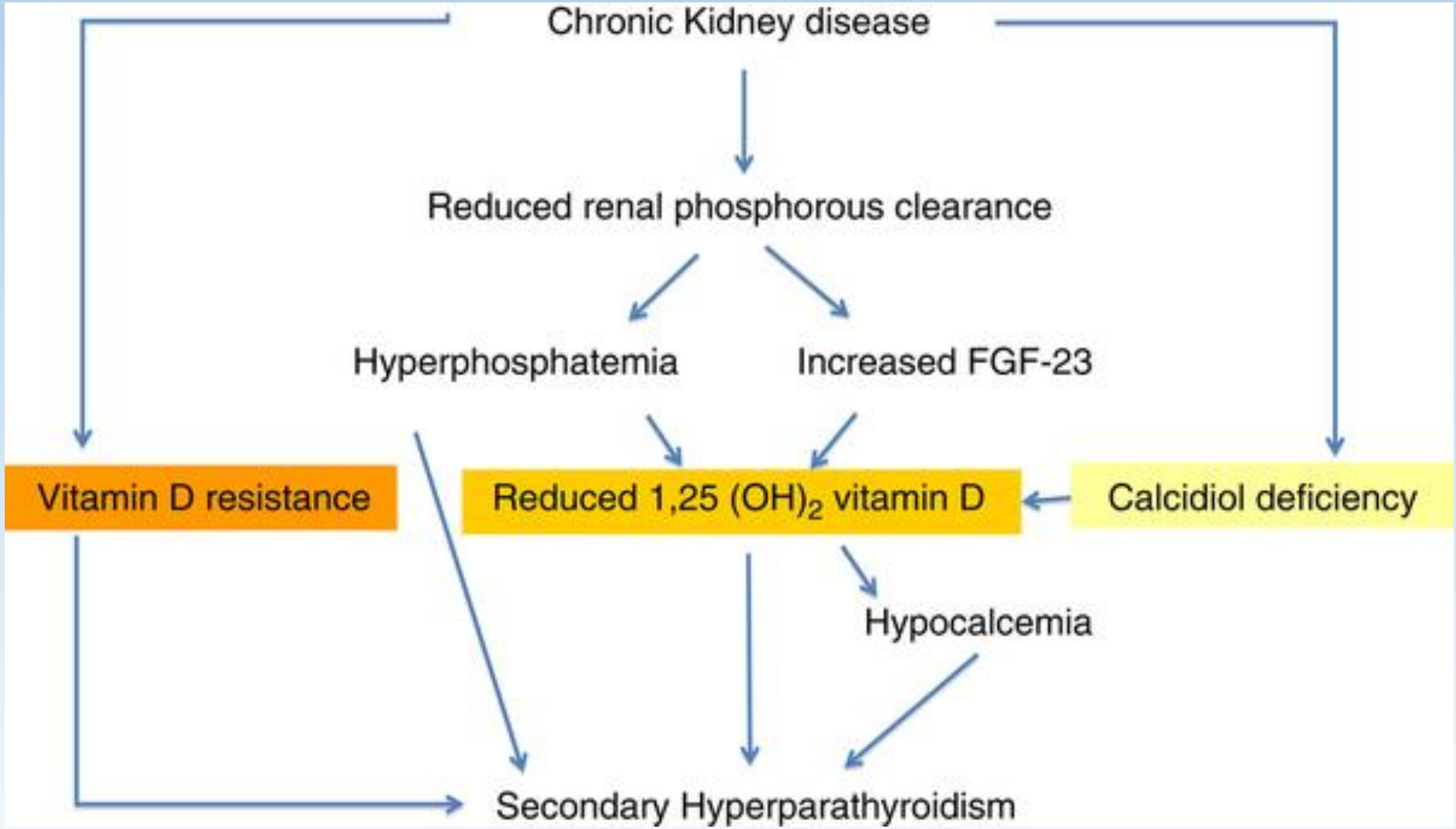


Vegetarians OF WASHINGTON



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Chronic Kidney Disease

Vegans have a less pathogenic level of GFR and lower albuminuria than meat eaters.

Wiseman ME et.al. Dietary Composition and Renal Function in healthy subjects. Nephron 1987;46(1)37-42
Bosch et.al. Renal function reserve in humans. Effect of protein intake on glomerular filtration Am J Med 1983;75(6) 943-950
Kontessis P et.al. Renal, metabolic and hormonal responses to ingestion of animal and vegetable protein. Kidney Intl 1990;38(1) 136-144

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Chronic Kidney Disease Treatment

Vegetarian diet: “first choice” in the treatment of diabetic nephropathy and chronic renal failure.

Vegan diet :

- ↓ Phosphatemia
- ↓ FGF23 (Fibroblast growth factor 23)

Barsotti G Dietary treatment of diabetic nephropathy with chronic renal failure Nephrol Dial Transplant (1998)13 [suppl 8]:49-52nomencla
Barsotti G A low-nitrogen low-phosphorus Vegan diet for patients with chronic renal failure. Nephron. 1996;74(2):390-4.

Vegetarians OF WASHINGTON

Chronic Kidney Disease and Pregnancy

Vegan diet: confirmed as a safe option in the management of pregnant CKD patients and requires less protein restriction.

Safe and efficacious. Attini R, et.al. Vegan-vegetarian low-protein supplemented diets in pregnant CKD patients: fifteen years of experience. BMC Nephrol. 2016 Sep 20;17(1):132.

Vegetarians OF WASHINGTON

Chronic Kidney Disease and Soy

Soybean protein - most extensively studied plant-based protein

- has demonstrated renal protective properties in a number of clinical studies.
- Soy protein improves the GFR.
- Plant proteins result in better phosphate levels and decreased albuminuria.

Sharon M. Moe et. al. Vegetarian Compared with Meat Dietary Protein Source and Phosphorus Homeostasis in Chronic Kidney Disease *Clin J Am Soc Nephrol*. 2011 Feb;6(2):257-64

Kontessis b et. al. Renal, metabolic Ha TK et. al. recommendations for the nutritional management of patients with diabetes mellitus *Eur J Vlin Nutr* 1998;52(7):467-71

Da'Amico et.al. Effect of vegetarian soy on hyperlipidemia in nephrotic syndrome Lancet 1992;339(8802)1131-34

McGraw NJ Soy-based renoprotection. *World J Nephrol*. 2016 May 6;5(3):233-57

Vegetarians OF WASHINGTON

CKD and Fruits & Vegetables

Fruits and vegetables in the diet help reduce albuminuria in hypertensive nephropathy.

Goraya N, Simoni J, Jo C, Wesson DE. Dietary acid reduction with fruits and vegetables or bicarbonate attenuates kidney injury in patients with a moderately reduced glomerular filtration rate due to hypertensive nephropathy. Kidney Int. 2012 Jan. 81(1):86-93.

Vegetarians OF WASHINGTON

Chronic Kidney Failure

Vegetarian diet can slow the progression of chronic renal failure.

Gretz N Influence of diet and underlying renal disease on the rate of progression of chronic renal failure. *Infusionsther Klin Ernahr*. 1987 Oct;14 Suppl 5:21-5.

Jibani MM. Predominantly vegetarian diet in patients with incipient and early clinical diabetic nephropathy: effects on albumin excretion rate and nutritional status. *Diabet Med*. 1991 Dec;8(10):949-53.

Vegetarians OF WASHINGTON

Chronic Kidney Disease and AGEs

Vegetarian diet reduces exposure to preformed dietary Advanced Glycation End Products in hemodialysis patients, reducing their risk of heart disease.

Nongnuch A The effect of vegetarian diet on skin autofluorescence measurements in haemodialysis patients. Br J Nutr. 2015 Apr 14;113(7):1040-3.

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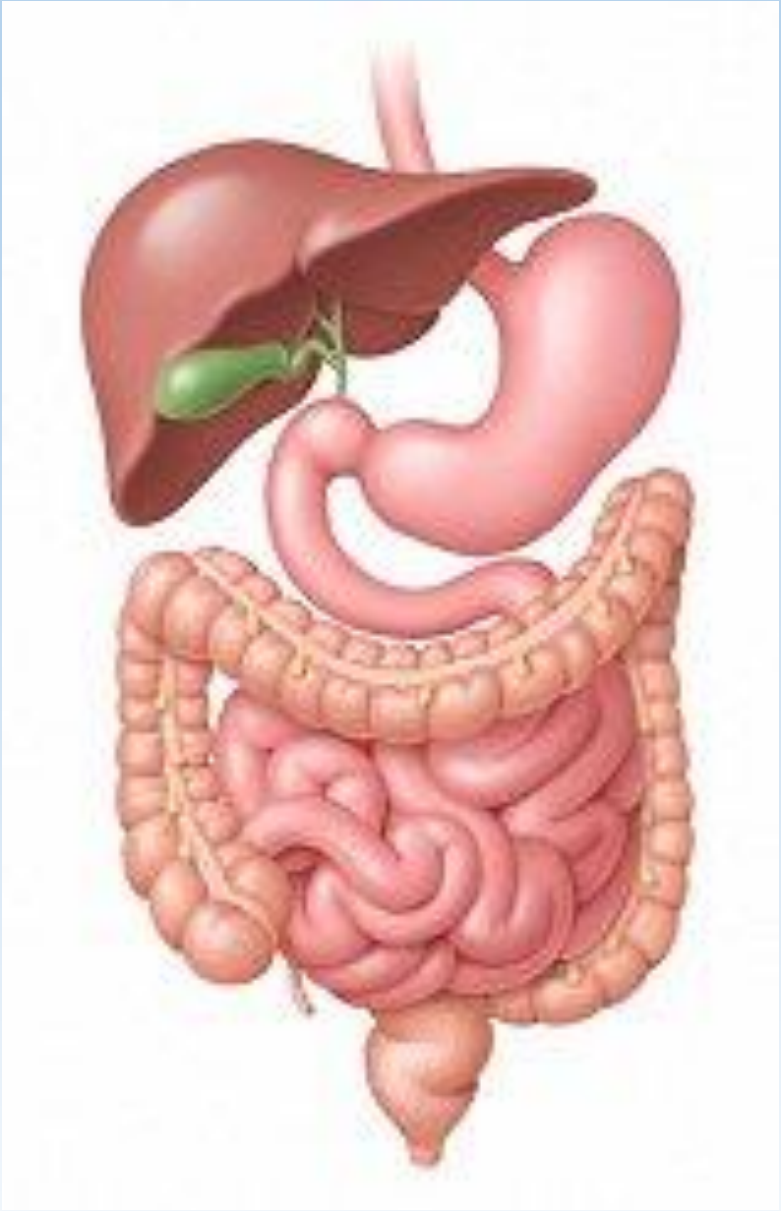
Gastroenterology



Vegetarians OF WASHINGTON

Cholelithiasis (Gall Stones)

Vegetarians have half the risk of cholelithiasis as meat eaters.

Pixley F, Wilson D, McPherson K, Mann J. Effect of vegetarianism on development of gall stones in women. Br Med J (Clin Res Ed). 1985 Jul 6;291(6487):11-2.

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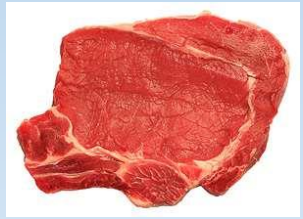
Cholelithiasis risk in men



↑ Long Chain Saturated Fatty Acids (SFAs)

↓ Polyunsaturated Fatty Acids (PUSFAs)

Tsai CJ,et al. Long-chain saturated fatty acids consumption and risk of gallstone disease among men. *Ann Surg* 2008;247:95-1

Tsai CJ, et al.The effect of long-term intake of cis unsaturated fats on the risk for gallstone disease in men: a prospective cohort study. *Ann Intern Med* 2004;141:514-522

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Constipation is an all too common problem.

In 2013 Americans spent over $1 billion on laxatives!

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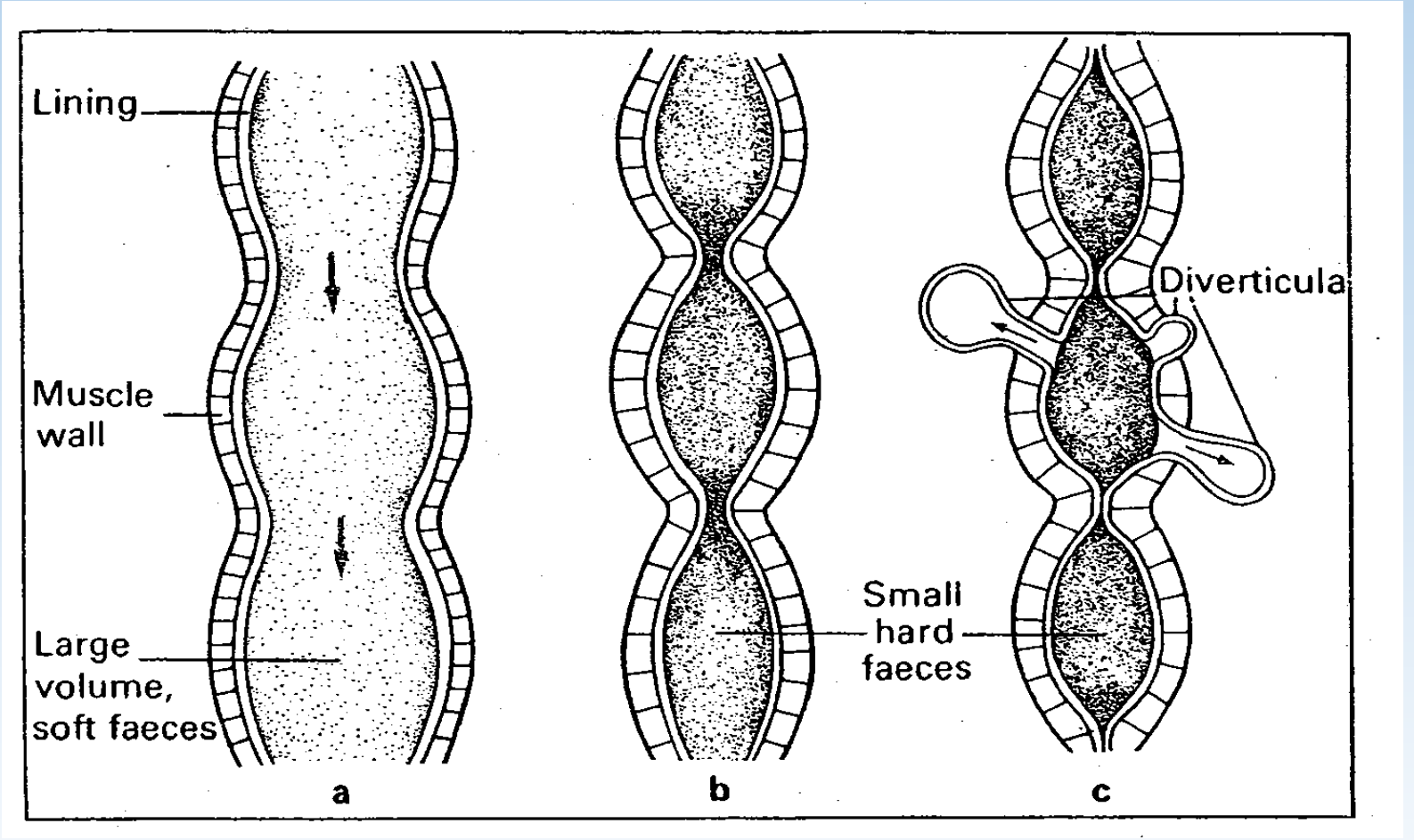
How Diverticulosis Develops in the Colon



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By age 60, two-thirds of all Americans will have developed diverticulosis

The prevalence of diverticular disease in meat eaters is 3 times higher than in vegetarians.

M.H. Floch and I Bina. 2004. The natural history of diverticulitis: fact and theory. *Journal of Clinical Gastroenterology* 38(5 Suppl):S2-7

Gear JS, Ware A, Fursdon P, et al. Symptomless diverticular disease and intake of dietary fibre. *Lancet.* 1979;1:511–514

Vegetarians OF WASHINGTON

Diverticular Disease

Vegetarians: decrease risk of 27%
Vegans: decrease risk 72%

Dietary fiber: those consuming the most reduced risk by 41%

Crowe FL, et al. Diet and risk of diverticular disease in Oxford cohort of European Prospective Investigation into Cancer and Nutrition (EPIC): prospective study of British vegetarians and non-vegetarians. *BMJ*. 2011 Jul 19;343:d4131.

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Fiber Content of Various Foods

Plant Food	*Fiber*	*Animal Food*	*Fiber (grams)*
Whole wheat bread (2 slices)	3.8g	Beef	0.0
Spaghetti, whole wheat (4oz cooked)	5.1g	Pork	0.0
Corn (1 cup cooked)	4.6g	Chicken	0.0
Broccoli (4oz)	3.0g	Fish	0.0
Peas (3oz cooked)	4.7g	Eggs	0.0
Sweet Potato (1 medium cooked, baked in skin)	3.3g	Milk	0.0
Lentils (1/2 cup cooked)	7.8g	Cheese	0.0
Black beans (3oz cooked)	7.5g		
Banana (1 large)	3.5g		
Orange, fresh (2 7/8” diam)	3.1g		
Pear (1 large)	7.1g		

Source: USDA National Nutrient Database

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LUNCH BREAK

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Cancer

"Cancer is most frequent among those branches of the human race where carnivorous habits prevail."

Scientific American **January 1892**

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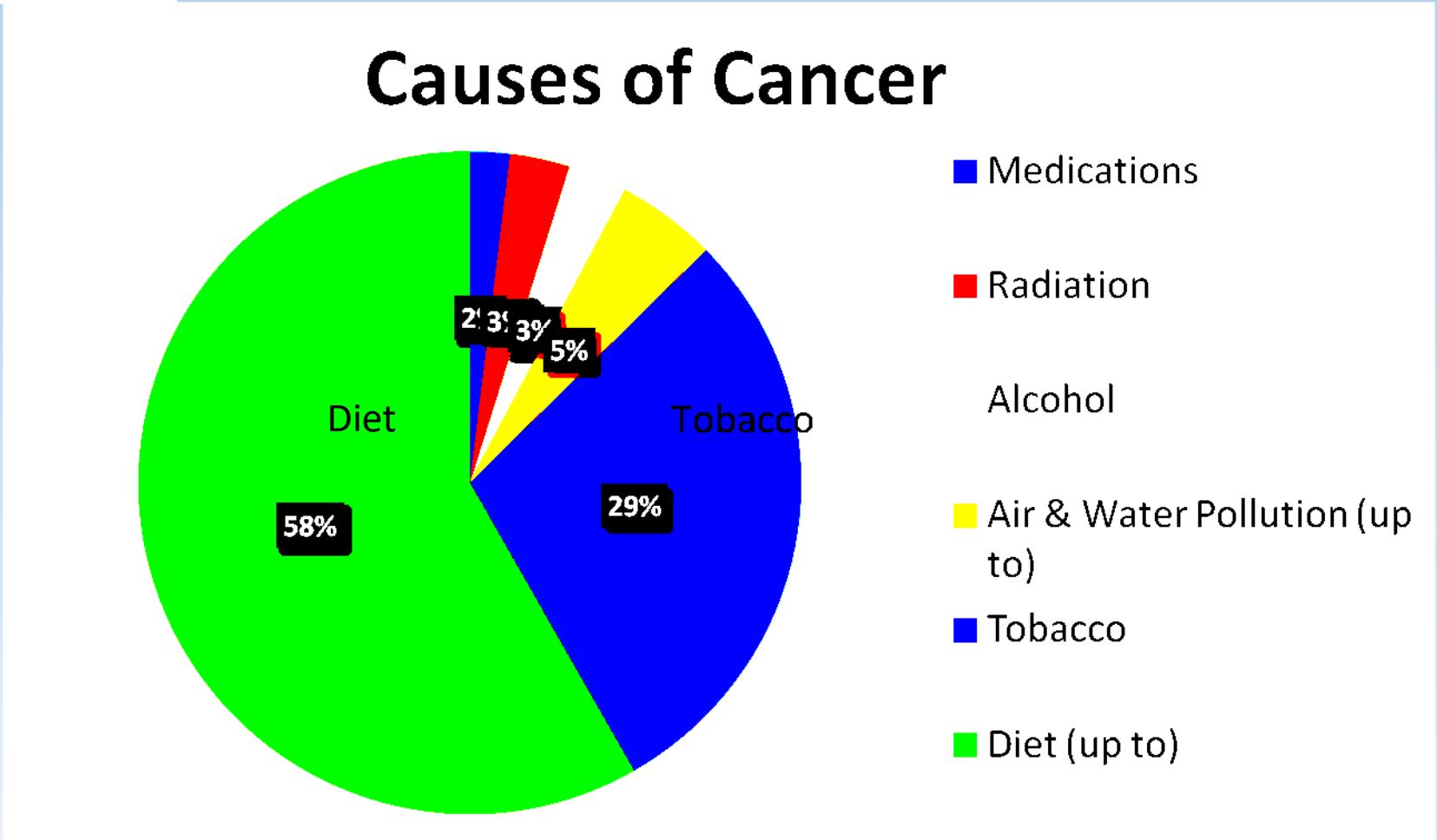

National Cancer Institute: Cancer Rates and Risks. Washington DC 1985.
Doll R, Peto R. The causes of cancer: quantitative estimates of avoidable risks of cancer in the United States today. *J. Natl Canc Inst* 1981;66:1191-308

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"Strong evidence *does* show that a diet filled with a variety of plant foods such as vegetables, fruits, whole grains and beans helps lower risk for many cancers."

American Institute for Cancer Research

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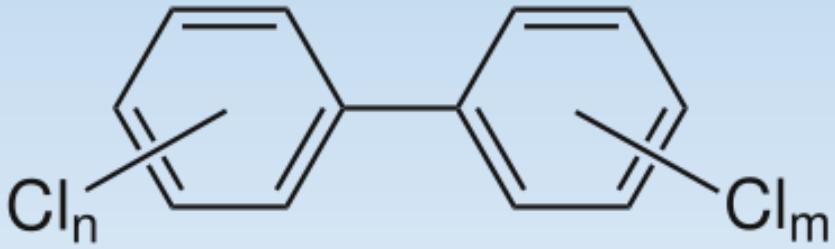
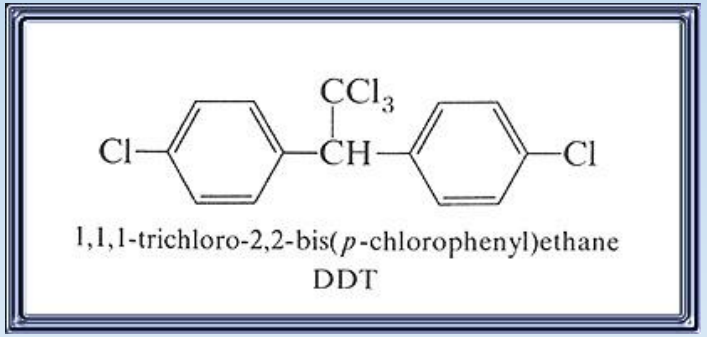
Persistent Organic Pollutants (POPs)



PCB Structural Formula

Dioxin Structural Formula



DDT Structural Formula

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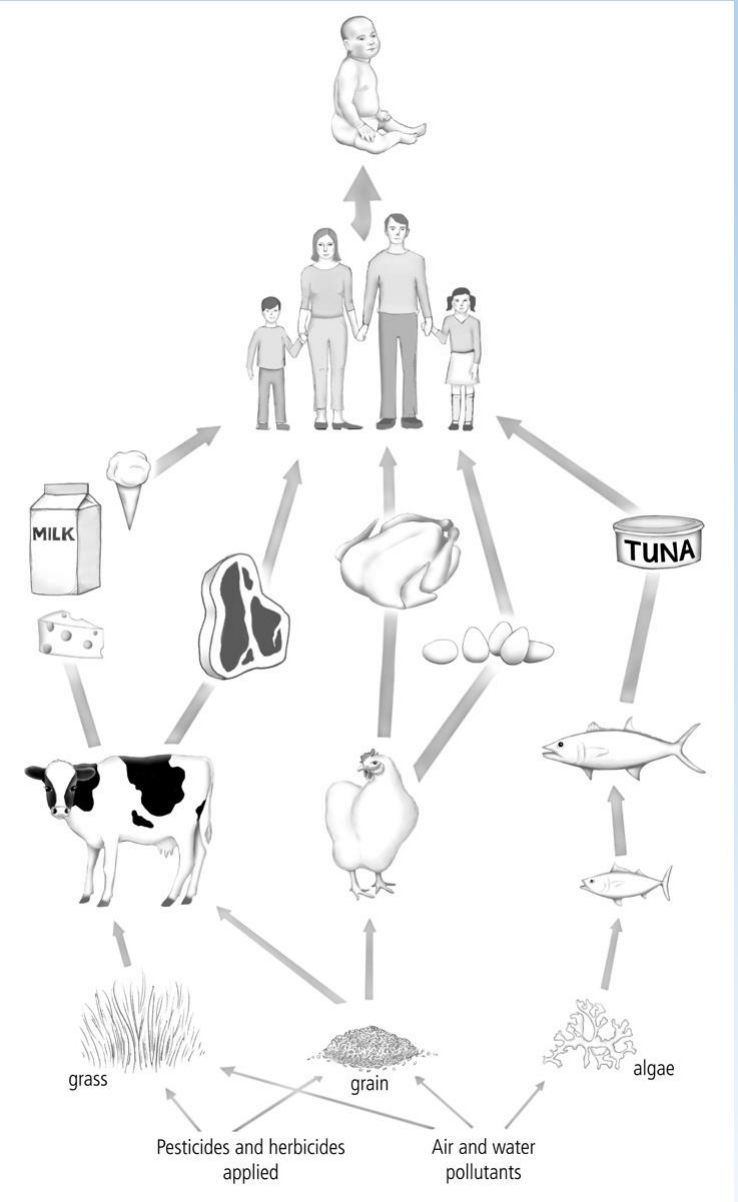
The Food Chain

At each link in the chain, the toxic chemicals become more concentrated.



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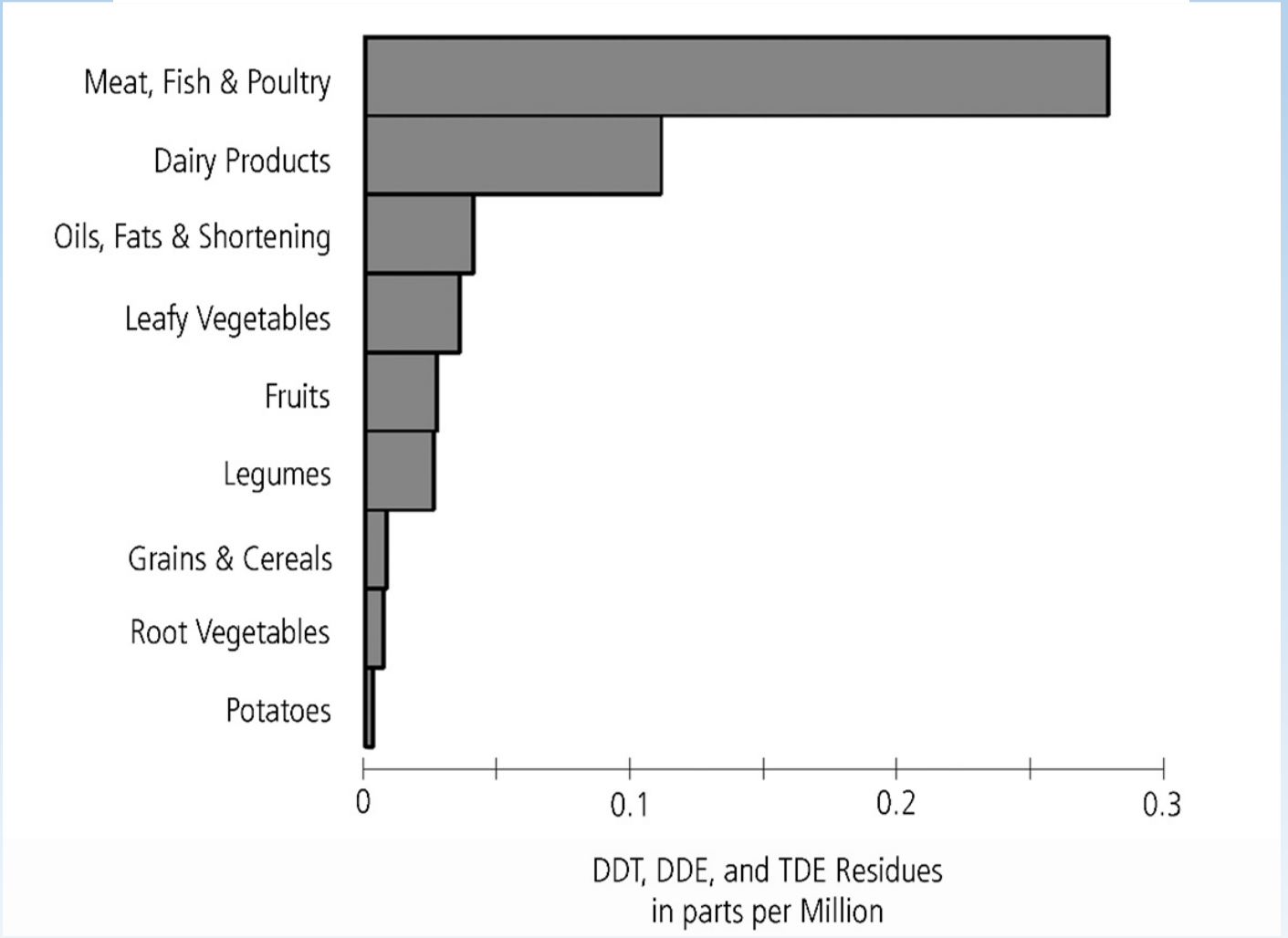
Pesticide Residues in the US Diet



Corneliussen, PE. “Pesticide Residues in Total Diet” Pesticide Monitoring Journal 1969 2:140-152

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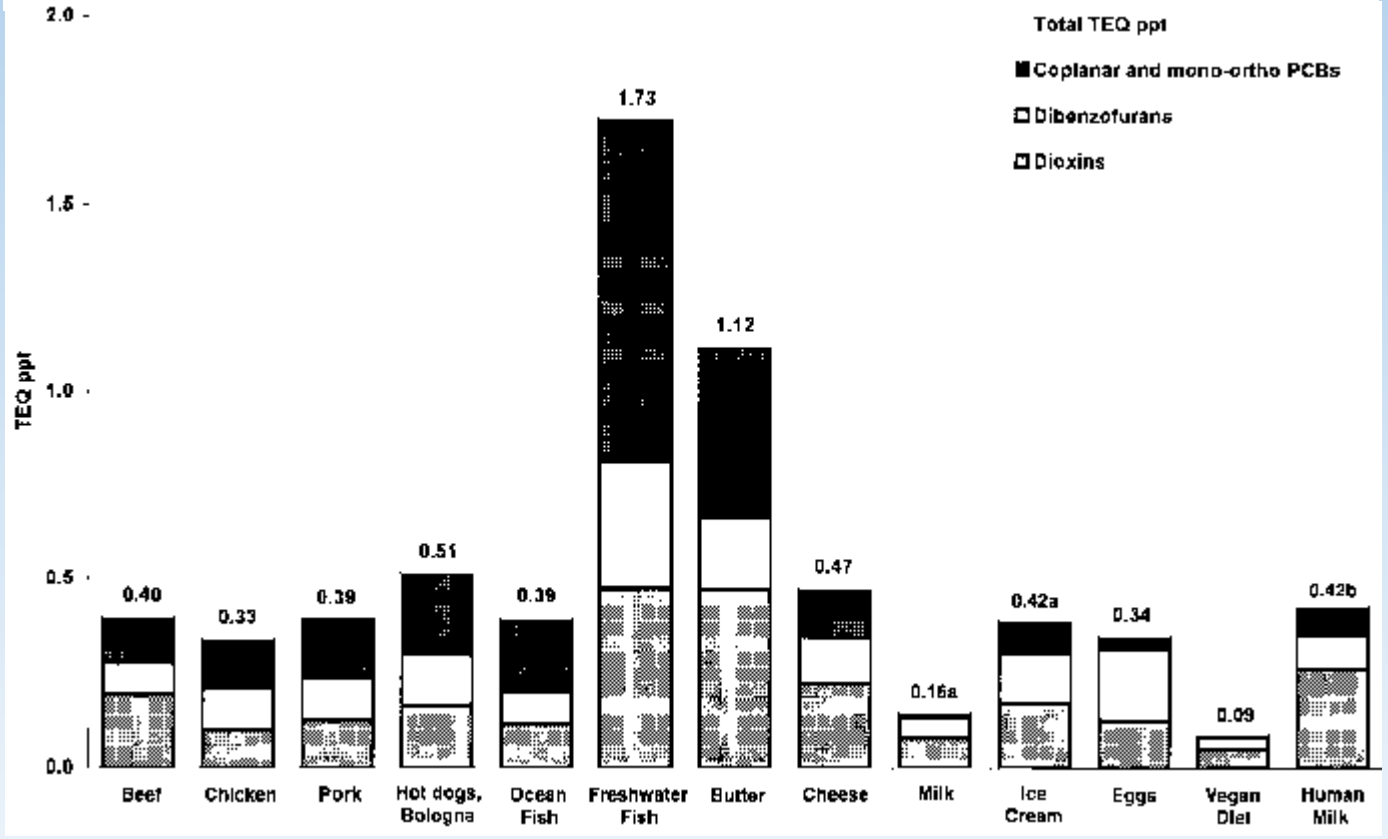
Industrial Toxic Chemicals in our Food



Arnold Schecter et. al., Journal of Toxicology and Environmental Health, Part A, 63:1–18,2001

Foods included in the vegan diet: Fruit: Apples, bananas, oranges, nectarines, canned fruit. Vegetables: Green beans, salad, frozen mixed vegetables, Legumes: Kidney beans, lentils, tofu, peanut butter, Cereals: Graham crackers, bread, cereal, macaroni, rice

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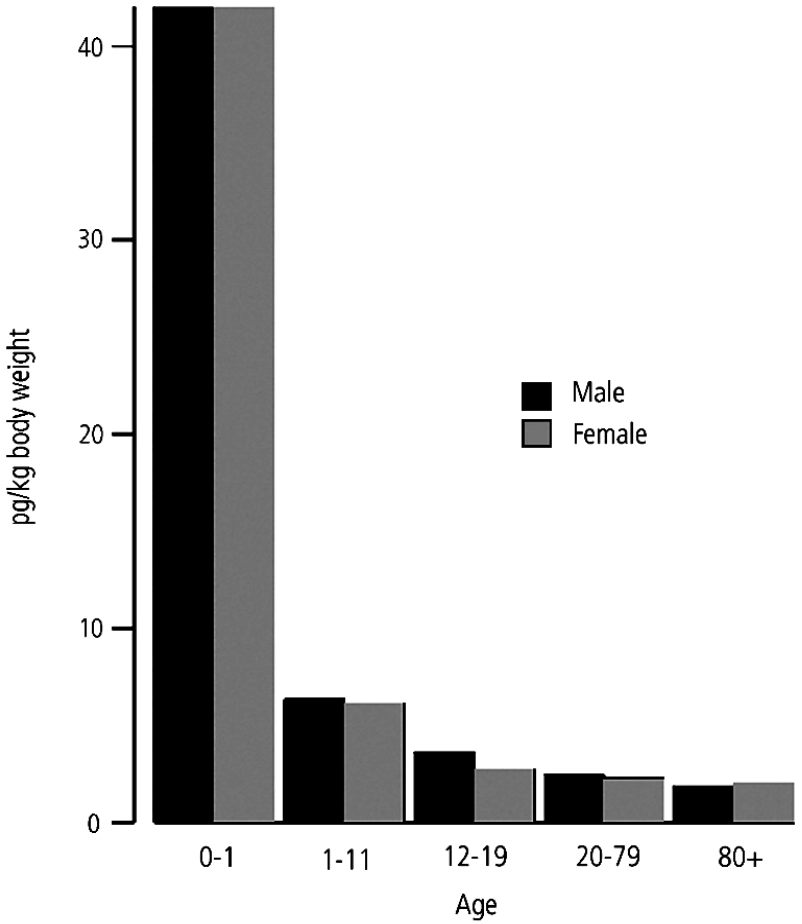
Average Daily Intake of Dioxin by Age and Sex



Source: Schecter, Arnold, Intake of Dioxins and related compounds from Food in US Population. Journal of Toxicology and Environmental Health, Part A, 63:1-18, 2001

"Breast milk, if regulated like infant formula, would commonly violate Food and Drug Administration action levels for poisonous or deleterious substances in food and could not be sold."

Walter J. Rogan M.D. Archives of Pediatric and Adolescent Medicine vol.150, September 1996, page 981

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HCAs are carcinogens formed by heating meat.

At least 24 studies have now implicated HCAs in breast cancer, colon cancer, lung cancer, and cancer of the larynx, stomach, and prostate.

Source: Mark G Knize & James Felton, “Formation and human risk of carcinogenic Heterocyclic Amines formed from natural precursors in meat”, Nutrition Reviews Vol 63(5) 158-165

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The Five Worst Foods to Grill

Food Item	HCAs: nanograms per 100 grams
Chicken breast, skinless, boneless, grilled, well done	14,000 nanograms/100 grams
Steak, grilled, well done	810 nanograms/100 grams
Pork, barbecued	470 nanograms/100 grams
Salmon, grilled with skin	166 nanograms/100 grams
Hamburger, grilled, well done	130 nanograms/100 grams
Veggieburger, grilled, well done	None
Corn, grilled, well done	None

Source: The Cancer Project, Physicians Committee for Responsible Medicine

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World Health Organization Position on Cancer

Processed meat was classified as carcinogenic to humans (Group 1). Tobacco smoking and asbestos are also both classified as carcinogenic to humans (Group 1).

Red meat was classified as Group 2A, probably carcinogenic to humans.

The groupings are based on strength of evidence

http://www.who.int/features/qa/cancer-red-meat/en/

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"We are one of the most polluted species on the planet. Indeed, we are all so contaminated that if we were cannibals our meat would be banned from human consumption."

Paula Baillie Hamilton, Physician Oxford University

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Phytochemical Classification

- Phytochemicals
  - Phenolic Acids
  - Flavonoids
    - Anthocyanins, Flavones, Flavanones, Isoflavones
    - Flavonols
    - Flavanols
      - Catechins and Epicatechins
      - Proanthocyanidins
        - Procyanidins
        - Prodelphinidins
  - Stilbenes/ Lignans

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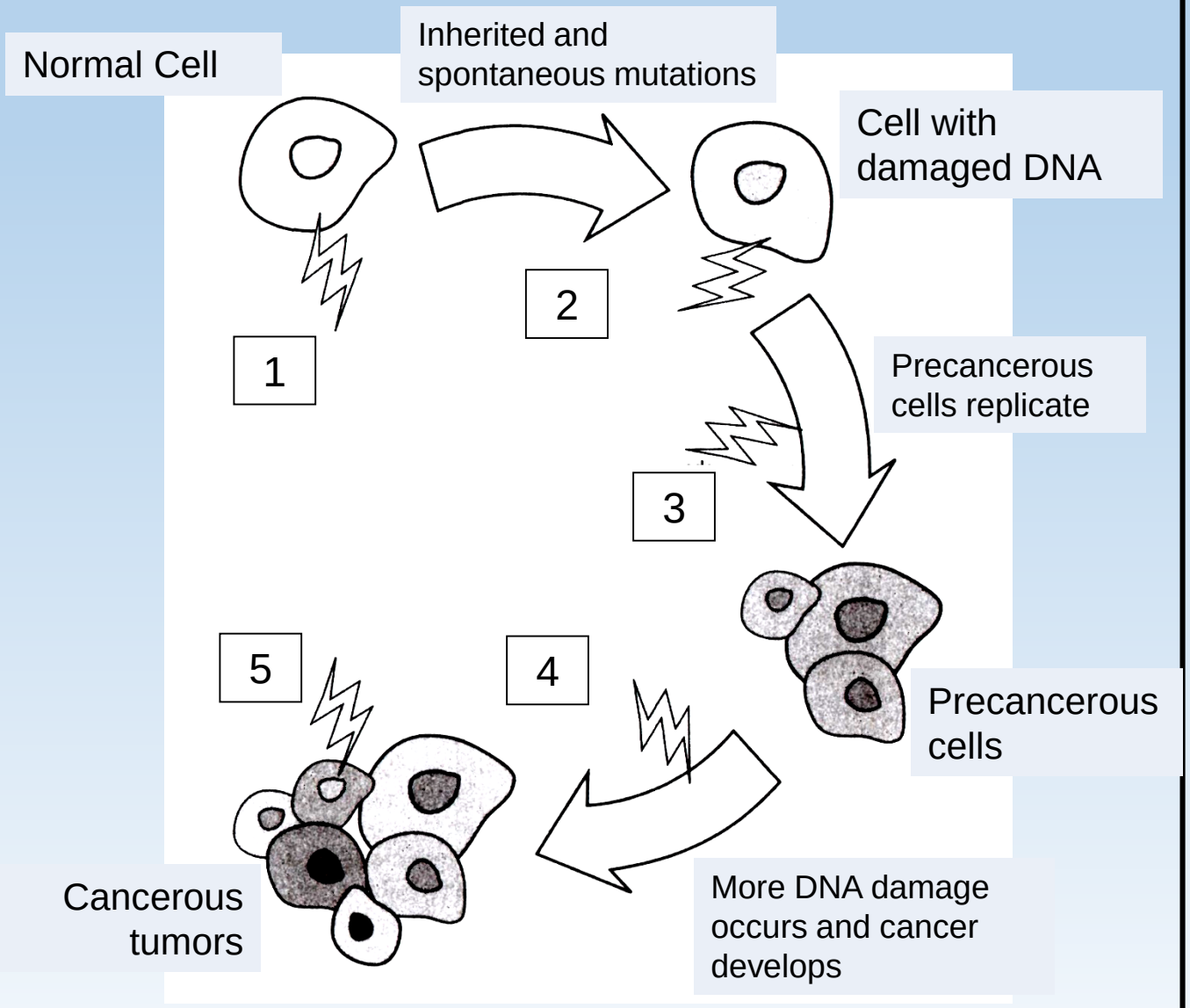
Five Ways Phytochemicals Prevent Cancer

1. Detoxify and deactivate carcinogens
2. Fuel cellular mechanisms to repair damaged DNA sequences
3. Impede proliferation of cells with DNA damage
4. Protect DNA against further damage
5. Inhibit the spread of cancerous cells



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Food	*Phytochemical*	*Possible Benefit*
Soy Beans, Soy Milk, and Tofu	Isoflavones (Genistein and Daidzein)	A reduction in blood pressure and increased vessel dilation [8]
Strawberries, Red Wine, Blueberries	Anthocyanins	Improvement of vision, inhibition of nitric oxide production, induction of apoptosis, decreased platelet aggregation, and neuroprotective effects [8]
Red Wine, Grape Juice, Grape Extracts, Cocoa	Proanthocyanidins and flavan-3-ols	Inhibition of LDL oxidation, inhibition of cellular oxygenases, and inhibition of proinflammatory responses in the arterial wall [8]
Garlic, onions, leeks, olives, scallions	Sulfides, thiols	Decrease in LDL cholesterol [9]
Carrots, tomatoes, and tomato products, and various types of fruits and vegetables	Carotenoids such as lycopene, beta-carotenes	Neutralization of free radicals that cause cell damage [9]
Broccoli and other cruciferous vegetables such as kale, horseradish	Isothiocyanates (sulforaphane)	Neutralization of free radicals that cause cell damage [9] and protection against some cancers [10]

Source: http://nutrition.ucdavis.edu/content/infosheets/fact-pro-phytochemical.pdf

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Chemoprotective foods

- Isothiocyanate sulforaphane, found in cruciferous vegetables, reduced PhIP adduction to DNA. [1]
- Salicylate containing plant foods reduce inflammation. [2]
- Lycopene, in tomato products, reduced aggressive prostate cancer risk by 60% [3]
- Allium, found in onions, garlic etc, reduced risk of prostate cancer by 49% [4]
- Soy reduced risk of prostate cancer 51% [5]

1. Walters DG, Young PJ, Agus C, et al. Cruciferous vegetable consumption alters the metabolism of the dietary carcinogen 2-amino-1-methyl-6-phenylimidazo[4,5-b]pyridine (PhIP) in humans. *Carcinogenesis*. 2004;25:1659–1669.
2. Blacklock CJ et al. Salicylic acid in the serum of subjects not taking aspirin. Comparison of salicylic acid concentrations in the serum of vegetarians, non-vegetarians, and patients taking low dose aspirin. *J Clin Pathol*. 2001 Jul;54(7):553-5.
3. Gann PH et al. Lower prostate cancer risk in men with elevated plasma lycopene levels: results of a prospective analysis. *Cancer Res* 1999 Mar 15;59(6):1225-30
4. Hsing AW et.al. Allium vegetables and risk of prostate cancer: a population-based study.*J Natl Cancer Inst*. 2002 Nov 6;94(21):1648-51.
5. Van Die MD, et al. Soy and soy isoflavones in prostate cancer: a systematic review and meta-analysis of randomized controlled trials. *BJU Int*. 2014 May;113(5b):E119-30

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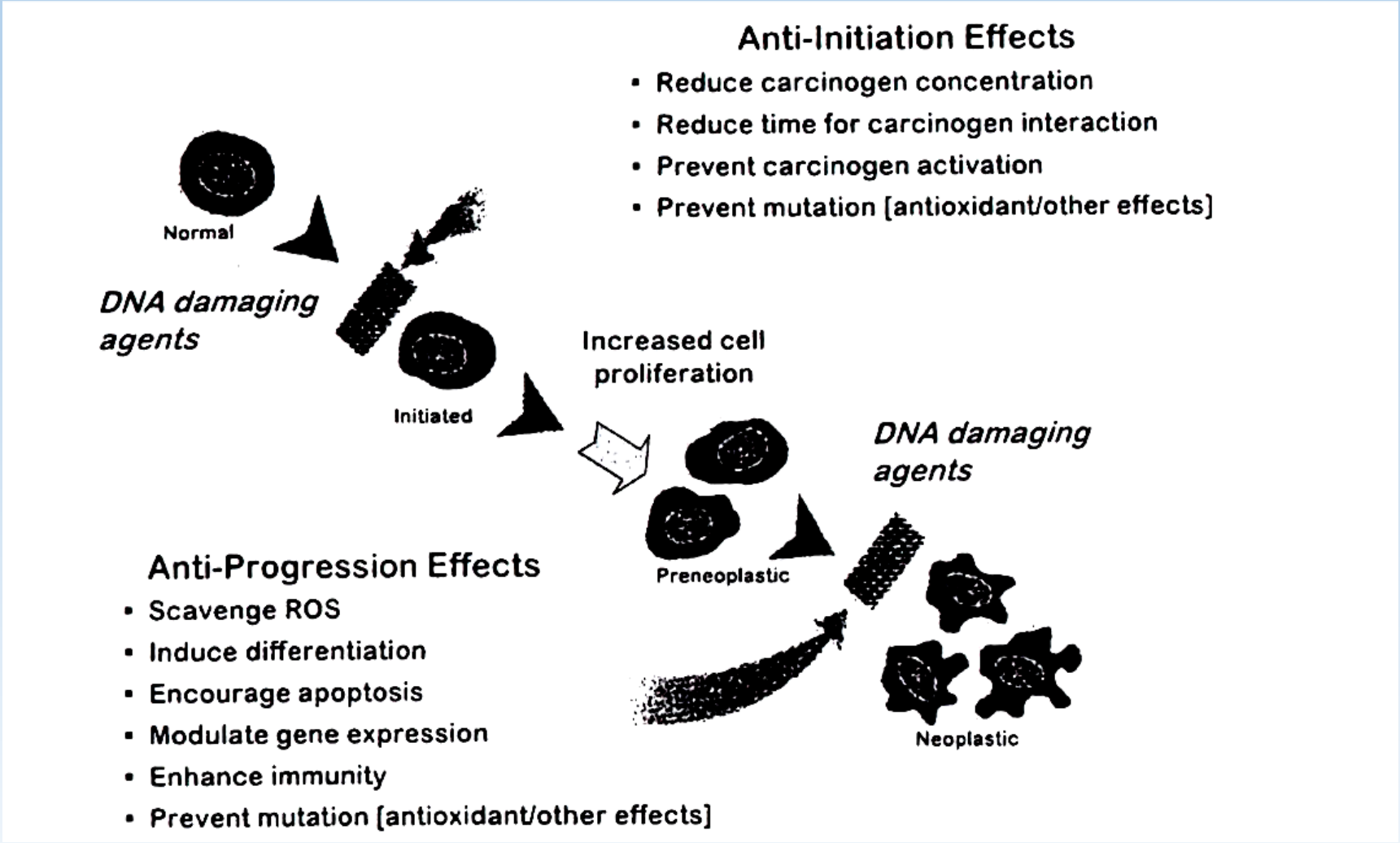
Mechanisms by which Fiber may protect against Cancer



Ferguson, LR et al. Changing concepts of dietary fiber. Implications for carcinogenesis. Nutr Cancer 2001:39(2): 155-169

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Diet Induced Changes in Gene Expression

Changes in gene expression at 3 months intervention indicated significant modulation of biological processes that have critical roles in tumorigenesis. ($p<0.05$)

Ornish D, et al. Changes in prostate gene expression in men undergoing an intensive nutrition and lifestyle intervention. *Proc Natl Acad Sci USA*. 2008 Jun 17;105(24):8369-74.

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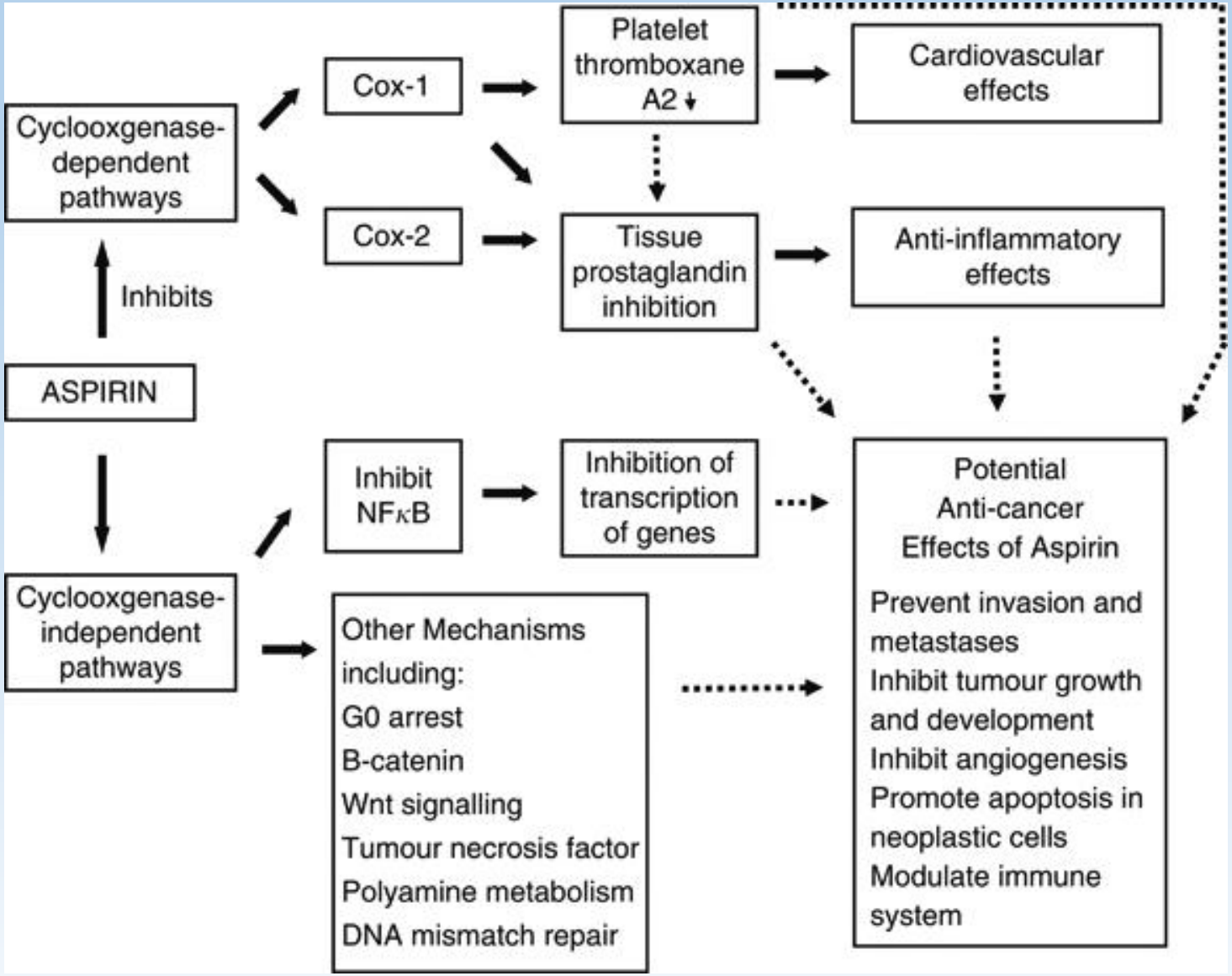
Mechanisms by which Salicylates may protect against Cancer



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Salicylate – a chemotherapeutic

"Based on the rapid metabolism of aspirin to salicylate in humans and the high salicylate/aspirin ratios in serum, it is likely that the anticancer activity of aspirin is also due to the salicylate metabolite."

Langley RE Aspirin and cancer: has aspirin been overlooked as an adjuvant therapy? Br J Cancer. 2011 Oct 11;105(8):1107-13.

Pathi S et.al. Aspirin inhibits colon cancer cell and tumor growth and downregulates specificity protein (Sp) transcription factors. PLoS One. 2012;7(10):e48208.

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"A healthy diet not only can inhibit tumorigenesis but also can have a major impact on cancer progression and survival. Many chemicals found in edible plants are known to inhibit metastatic progression of cancer."

Gary G. Meadows. Diet, nutrients, phytochemicals, and cancer metastasis suppressor genes
Cancer and Metastasis Reviews December 2012, Volume 31, Issue 3-4, pp 441-454

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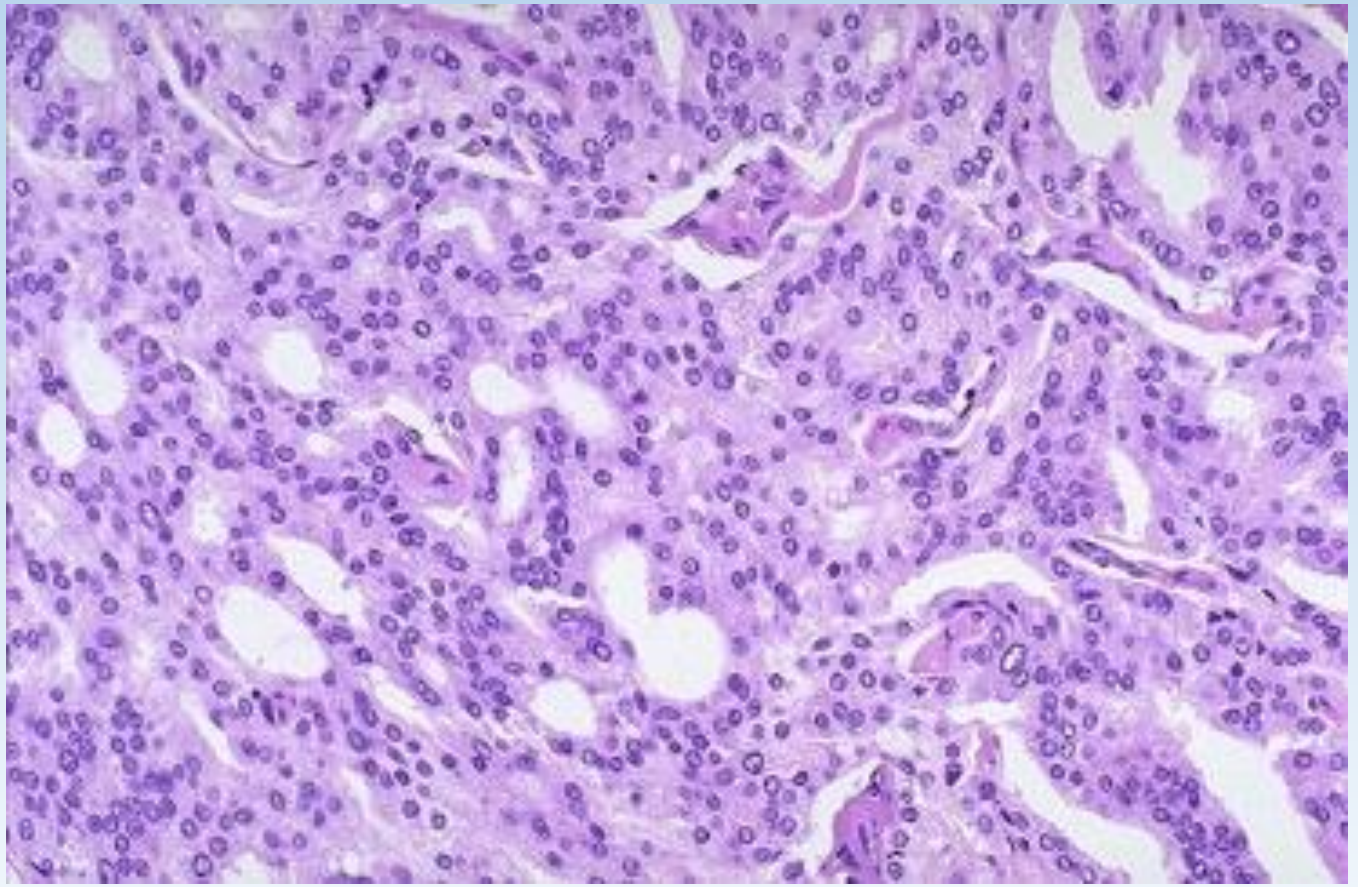
Prostate Cancer Pathology

95% of prostate cancers are adenocarcinomas. Here's an example of a low grade prostate adenocarcinoma.



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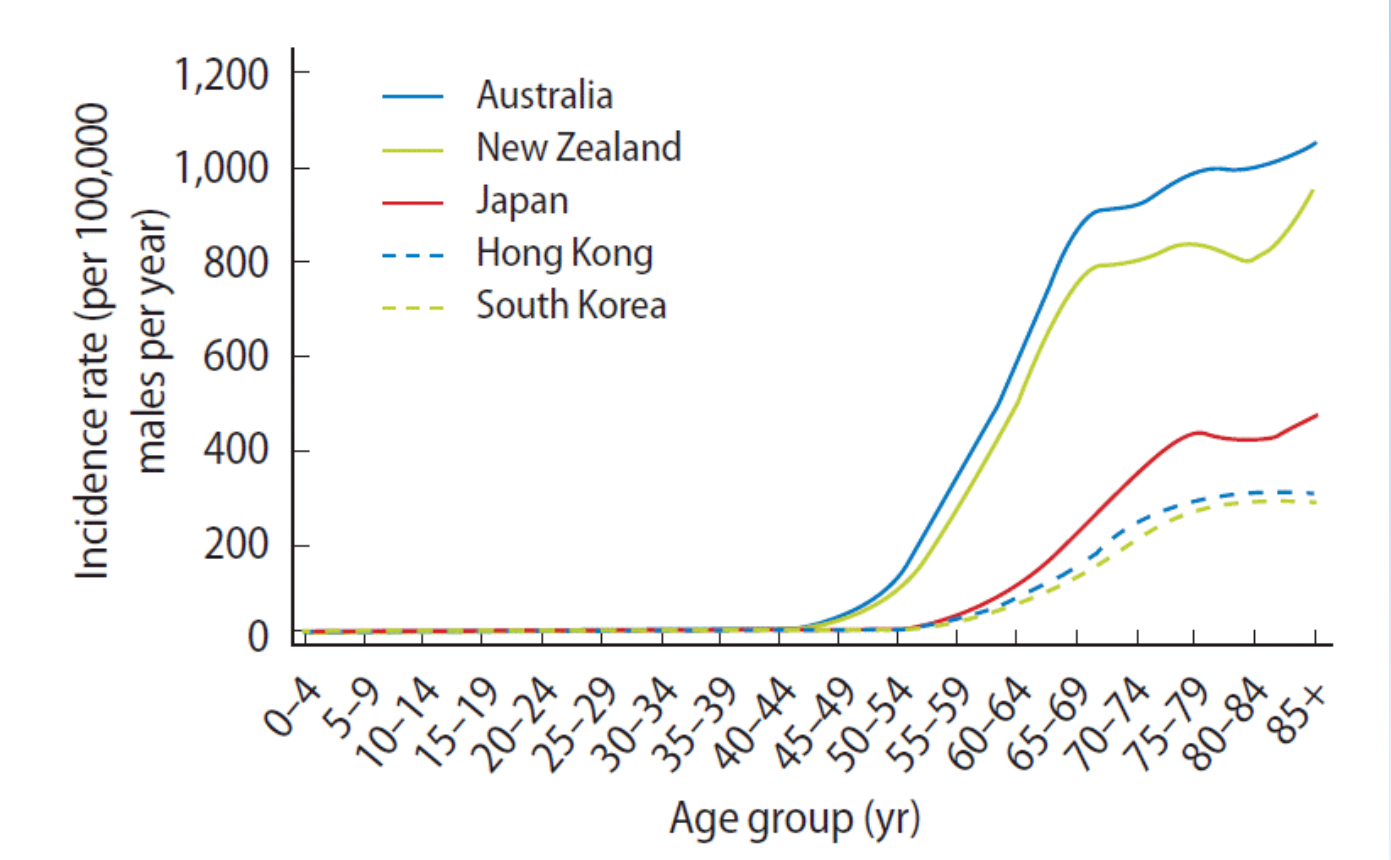
Prostate Cancer Rates – Asia Pacific Country Comparison



Peter D. Baade et.al. Epidemiology of prostate cancer in the Asia-Pacific region. *Prostate International* Volume 1(2); 2013

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Prostate Cancer is the most common cancer in men (after skin cancer). [CDC]

As an overall dietary pattern, the risk of prostate cancer was **54% greater** in the nonvegetarians (P=0.03) than vegetarians

Fraser GE Associations between diet and cancer, ischemic heart disease, and all-cause mortality in non-Hispanic white California Seventh-day Adventists. *Am J Clin Nutr*. 1999 Sep;70(3 Suppl):532S-538S

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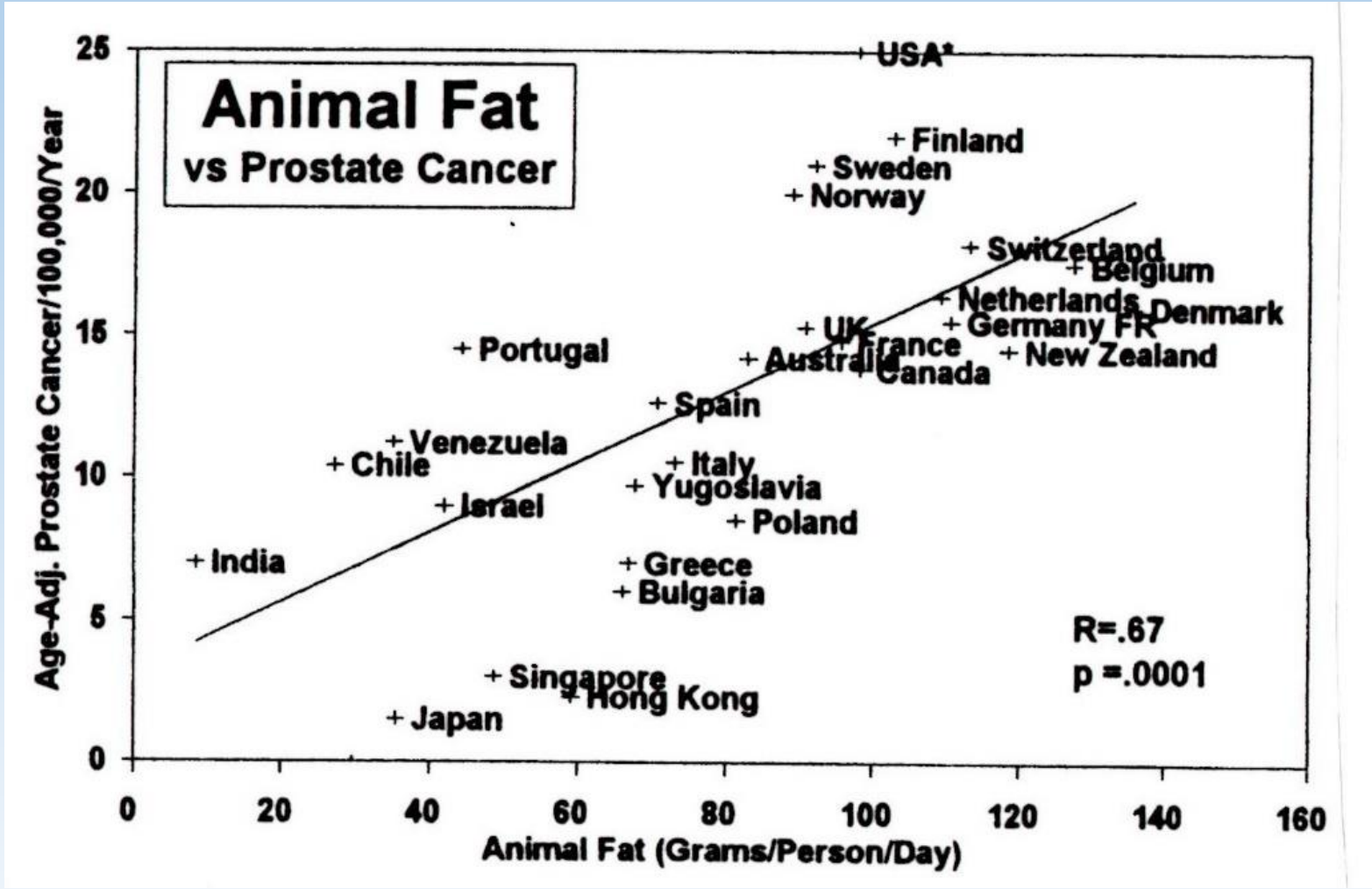
The Relationship between Animal Fat Consumption and Prostate Cancer Cases



Rose D.P. The Biochemical Epidemiology of Prostatic Carcinoma
Dietary Fat and Cancer
Alan R. Liss Inc. New York 1986

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Compared to men in the lower tercile of saturated fat intake, those in the upper tercile had three times the risk of dying from prostate cancer.

Fradet Y, Meyer F, Bairati I, Shadmani R, Moore L. Dietary Fat and Prostate Cancer Progression and Survival *Eur Urol* 1999;35:388–391

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POPs Increase Risk of Prostate Cancer

Greater than median concentration of:	Increased risk of Prostate Cancer by:
PCB congener	3.15 times
Trans-chlordane	3.49 times

Hardell L, et al. Adipose tissue concentrations of persistent organic pollutants and the risk of prostate cancer. *Occup Environ Med*. 2006 Jul;48(7):700-7.

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Prostate Cancer

Tumor Suppression after one year on a Vegan Diet

	Vegetarian diet	Non-Veg diet
Patients with disease progression	0	6
PSA	-4%	+6%
Inhibition of LNCaP	70%	9%

Source: Dean Ornish et al. 2005. Intensive lifestyle changes may affect the progression of prostate cancer. *Journal of Urology* 174(3):1065-9

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Prostate Cancer Patients choosing Watchful Waiting

	Dietary Intervention	Control Group
Year 1	0%	12%
Year 3	5%	37%

Percentage of patients requiring standard treatment

Ornish D, et al. Intensive lifestyle changes may affect the progression of prostate cancer. *J Urol*. 2005 Sep;174(3):1065-9

Frattaroli J, Ornish D et al. Clinical events in prostate cancer lifestyle trial: results from two years of follow-up. *Urology*. 2008 Dec;72(6):1319-23.

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Serum cholesterol has also been identified as an independent risk factor for prostate cancer.

Morote J, Celma A, Planas J, Placer J, de Torres I, Olivan M, Carles J, Reventós J, Doll A. Role of serum cholesterol and statin use in the risk of prostate cancer detection and tumor aggressiveness. *Int J Mol Sci*. 2014;15:13615–13623.

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Inflammation

Prostate Carcinoma pathogenic factor: recurrent epithelial cell injury, resulting in inflammation. [1]

Inflammagens: dietary carcinogens and inflammatory oxidants. [1]

Vegetarian diet results in lower levels of C-reactive protein. [2,3]

1. De Marzo AM, Platz EA, Sutcliffe S, et al. Inflammation in prostate carcinogenesis. *Nat Rev Cancer*. 2007;7:256–269.
2. Krajcovicova-Kudlackova M, Blazicek P. C-reactive protein and nutrition. *Bratisl Lek Listy* 2005;106(11):345-7.
3. Chen CW, Lin YL, Lin TK, Lin CT, Chen BC, Lin CL. Total cardiovascular risk profile of Taiwanese vegetarians. *Eur J Clin Nutr*. 2008 Jan;62(1):138-44.

Vegetarians OF WASHINGTON

A statin cholesterol-lowering drug significantly reduced risk of recurrence in 1,146 radical prostatectomy patients

Allott EH, Howard LE, Cooperberg MR, Kane CJ, Aronson WJ, Terris MK, Amling CL, Freedland SJ. Postoperative statin use and risk of biochemical recurrence following radical prostatectomy: results from the Shared Equal Access Regional Cancer Hospital (SEARCH) database. *BJU Int*. 2014;114:661–666.

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Medical researchers at Roswell Park Cancer Institute in Buffalo, New York,..

…found that people who consume plenty of fruits and vegetables reduce their risk of prostate cancer by about 50%.

Source: S.E. McCann. 2005 Intakes of selected nutrients, foods, and phytochemicals and prostate cancer risk in western New York. *Nutrition and Cancer* 53(1):33-41

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Instead of Watchful Waiting – Prescribe Vegetarian

- Safe and effective
- No side effects
- No contraindications
- Good patient compliance
- Reduction of comorbidity risk
- Cost effective
- Epitome of Naturopathic Medicine

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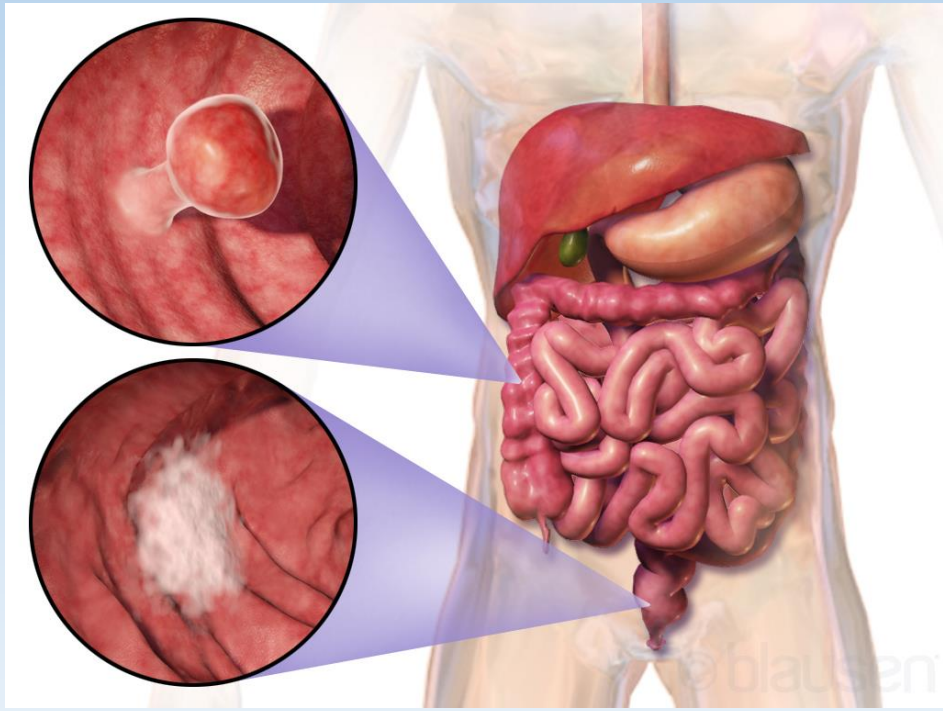
Colon Cancer

Red and processed meat
increases
colon cancer risk



Red meat: 27% per 100gm
Processed meat:58% per 100gm

Aune D et. al. Red and processed meat intake and risk of colorectal adenomas: a systematic review and meta-analysis of epidemiological studies. Cancer Causes Control. 2013 Apr;24(4):611-27

Vegetarians OF WASHINGTON

Colon Cancer

Endogenous Nitroso compounds, formed in the gut from eating red meat, damage DNA thus increasing cancer risk

Lewin MH Red meat enhances the colonic formation of the DNA adduct O6-carboxymethyl guanine: implications for colorectal cancer risk. Cancer Res. 2006 Feb 1;66(3):1859-65.

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Heme Iron and Colon Cancer

Heme iron in red meat stimulates the endogenous production of carcinogenic N Nitroso compounds. Processed (nitrite-preserved red) meat additionally contains high concentrations of preformed N Nitroso

Heme iron:
Catalyzes formation of N Nitroso compounds
Forms genotoxic aldehydes by lipoperoxidation

Bastide N et. al. Heme iron from meat and risk of colorectal cancer: a meta-analysis and a review of the mechanisms involved. Cancer Prev Res (Phila). 2011 Feb;4(2):177-84.

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HCAs and Colon Cancer

Heterocyclic Amines from red meat:

Those with the highest intake increased their colon cancer risk by 87%

Helmus DS Red meat-derived heterocyclic amines increase risk of colon cancer: a population-based case-control study. Nutr Cancer. 2013;65(8):1141-50..

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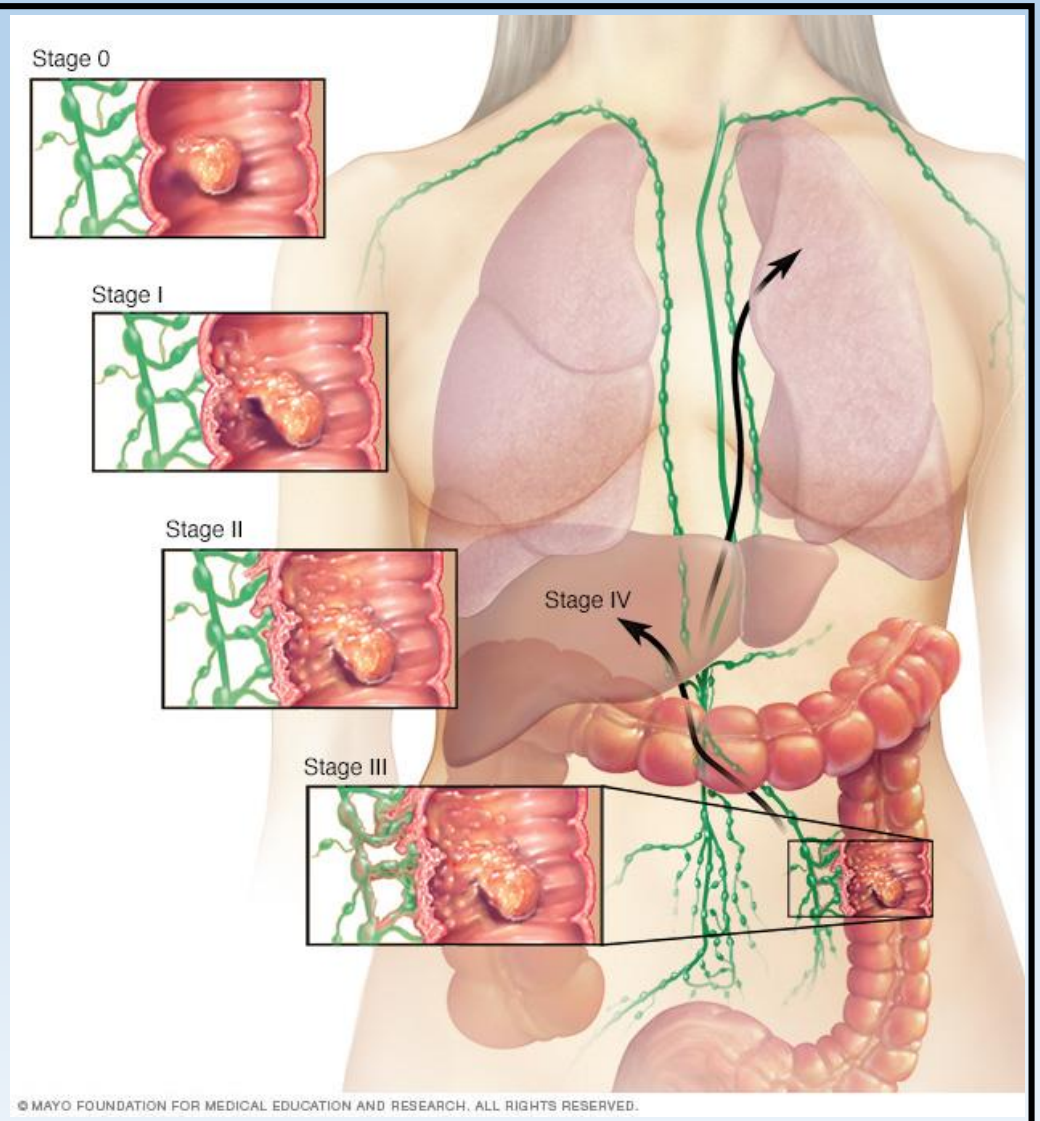
CRP and Colon Cancer

Increased risk of death for high C-Reactive Protein levels:

7.37 for stage I and II
3.29 for stage III
2.24 for stage IV.



Kersten C Increased C-reactive protein implies a poorer stage-specific prognosis in colon cancer. Acta Oncol. 2013 Nov;52(8):1691-8

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Colon Cancer and Plant-Based Diets

Plant-based diet - 46% decreased risk of colon cancer

Plant-based diet - 73% decreased risk of rectal cancer

Chen Z. Dietary patterns and colorectal cancer: results from a Canadian population-based study. *Nutr J*. 2015 Jan 15;14:8.

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Colon Cancer

Vegetarian diet results in much less mutagenic potential in feces

Bandaru S. Reddy, Metabolic epidemiology of large bowel cancer Fecal mutagens in high- and low-risk population for colon cancer A preliminary report Mutation Research/Fundamental and Molecular Mechanisms of Mutagenesis Volume 72, Issue 3, August 1980, Pages 511–522

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Plant foods and Colon Cancer

Plant bioactive compounds such as grape seed extract, curcumin, lycopene, and resveratrol have chemopreventive effects against colon cancer driven by cancer stem cells.

Kasdagly M. Colon carcinogenesis: influence of Western diet-induced obesity and targeting stem cells using dietary bioactive compounds. Nutrition. 2014 Nov-Dec;30(11-12):1242-56

Vegetarians OF WASHINGTON

Salicylates and Colon Cancer

Aspirin decreased colon cancer recurrence by 35%

Even low dose decreased colon cancer recurrence by 22%

Sandler et. al. A randomized trial of aspirin to prevent colorectal adenomas in patients with previous colorectal cancer. *N Engl J Med*. 2003 Mar 6;348(10):883-90.
Din FV. Effect of aspirin and NSAIDs on risk and survival from colorectal cancer. *Gut*. 2010 Dec;59(12):1670-9.

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Colon Cancer

Vegetarians have less MMP-2 and MMP-9

Considerable evidence has implicated the over expression of matrix metalloproteinases(MMPs) MMP-1, -2, -3. -7, -9, -13 in human colorectal cancers. The degree of over expression of some MMPs has been noted to correlate with stage of disease and prognosis.

Navarro J, de Gouveia L, Rocha-Penha L, et.al. Reduced levels of potential circulating biomarkers of cardiovascular diseases in apparently healthy vegetarian men. Clinica Chimica Acta. Aug 2016;461:110-113.
Zucker S Role of matrix metalloproteinases (MMPs) in colorectal cancer. Cancer Metastasis Rev. 2004 Jan-Jun;23(1-2):101-17.

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Fiber and Colon Cancer

"The evidence on the role of dietary fiber in colorectal cancer etiology has been recently upgraded by the CUP expert panel from probable to convincing."

-The World Cancer Research Fund/American Institute for Cancer Research (WCRF/AICR)

Norat T, Aune D, Chan D, Romaguera D. Fruits and vegetables: updating the epidemiologic evidence for the WCRF/AICR lifestyle recommendations for cancer prevention.
Cancer Treat Res. 2014;159:35-50.

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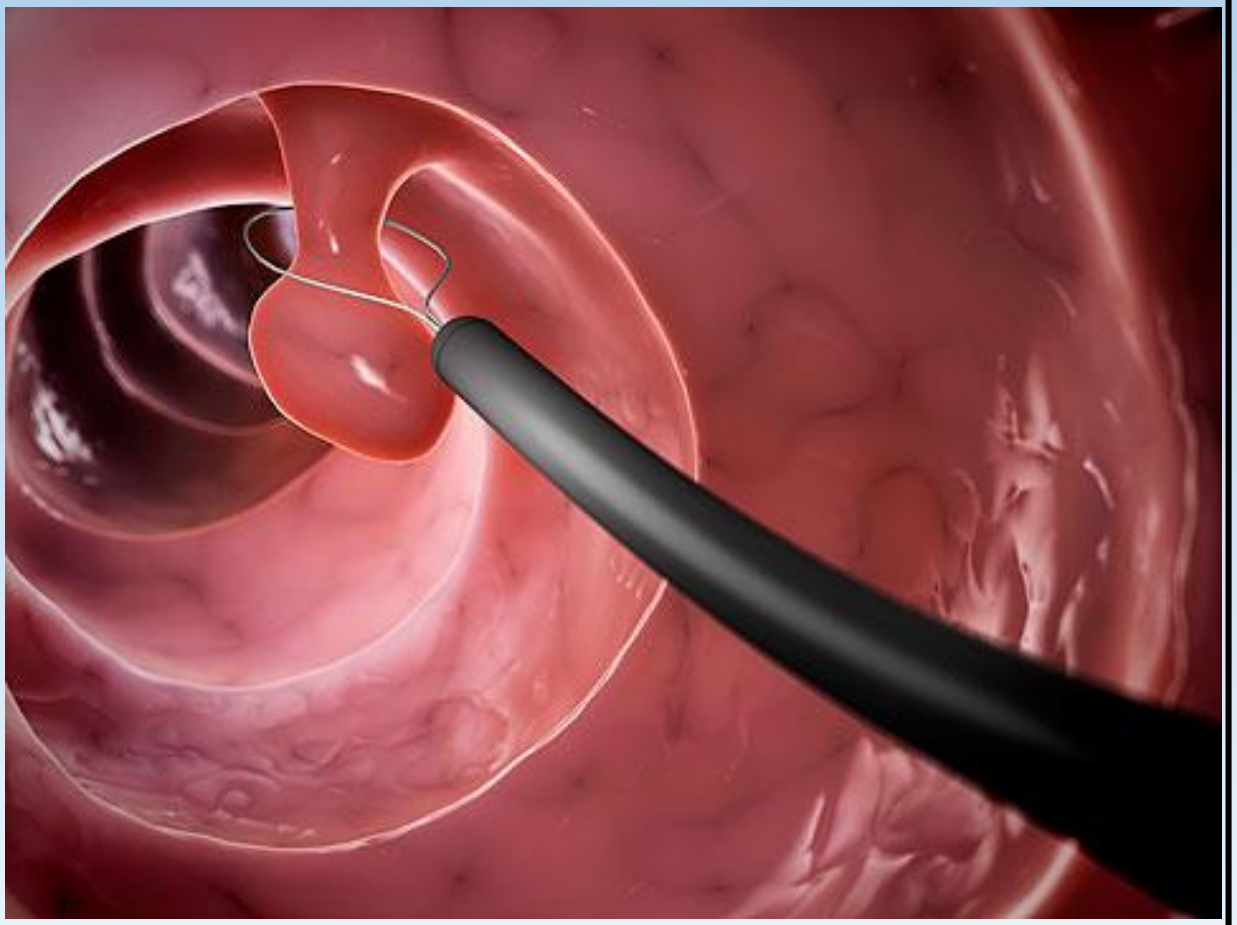
Polypectomy is Treatment not Prevention



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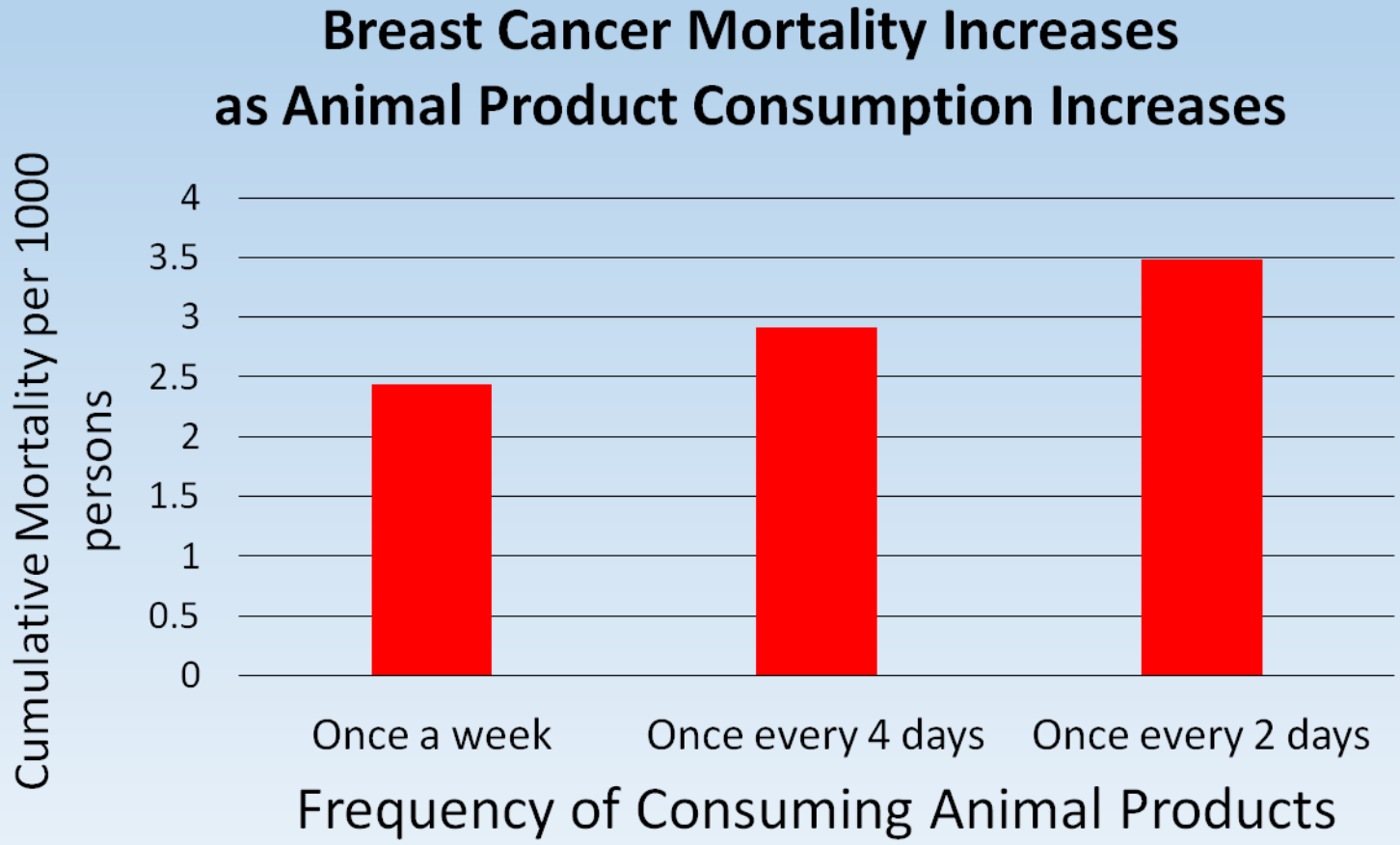

Diet, Serum Markers and Breast Cancer Mortality in China
Jpn Journal of Cancer Research 1994;85 572-577 Guo, WD et al.

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"What we have now found is a molecule - not cholesterol itself, but an abundant *metabolite* of cholesterol - called 27HC that mimics the hormone estrogen and can independently drive the growth of breast cancer."

Donald McDonnell
- chair of the Department of Pharmacology
and Cancer Biology at Duke University

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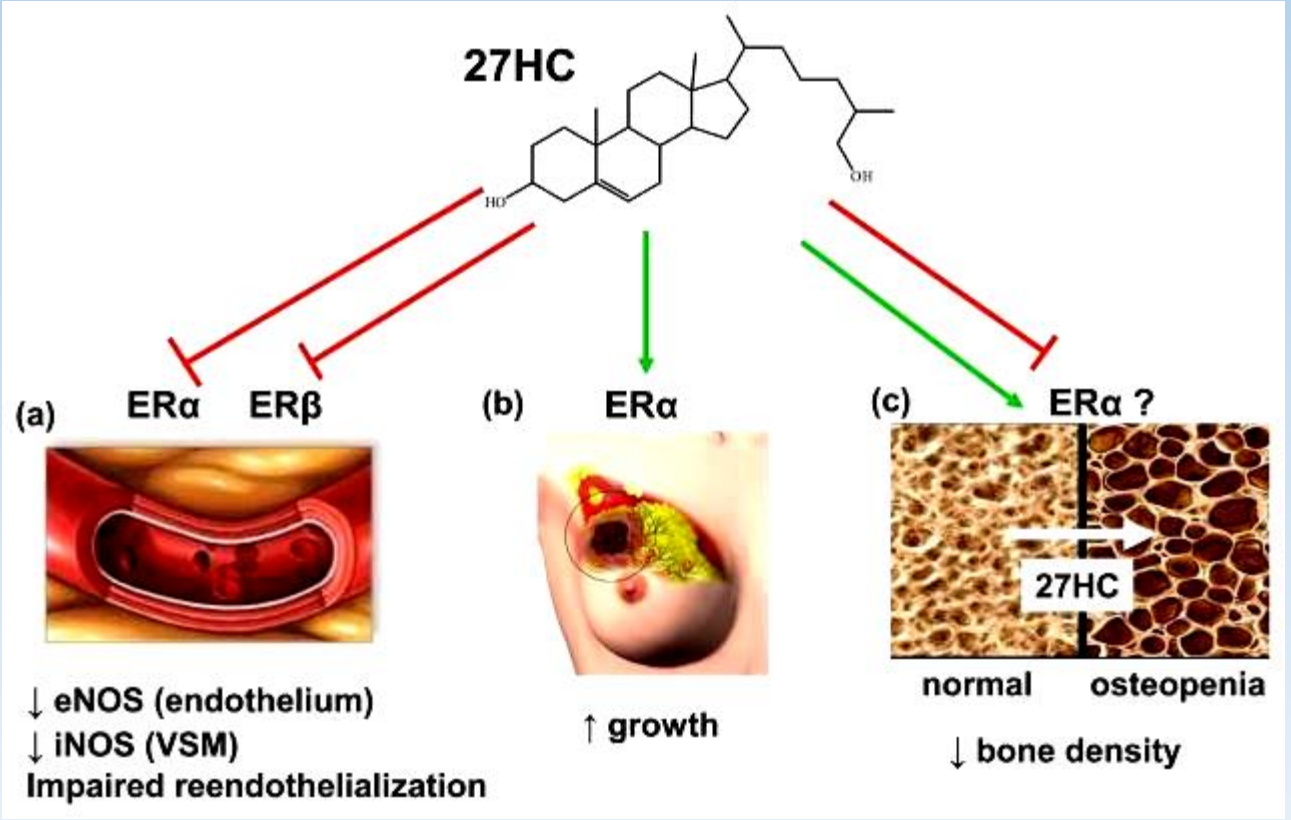
27HC damages arteries, breast tissue and even bone density



27HC has multiple actions in ER target tissues. Activation is shown as a green arrow, and antagonism is shown as a red block. *Trends Endocrinol Metab.* Apr 2011; 22(4): 130–135.

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Salicylates protect against Breast Cancer

Regular aspirin use decreases breast cancer recurrence by 70%

Holmes MD et. al. Aspirin intake and survival after breast cancer. J Clin Oncol. 2010 Mar 20;28(9):1467-72

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"High soy intake is associated with an approximate one third reduction in the risk of both premenopausal and postmenopausal breast cancer."

American Journal of Clinical Nutrition 2009 May;89(6)1920-1926

"Patients with breast cancer can be assured that enjoying a soy latte or indulging in Pad Thai with tofu causes no harm and, when consumed in plentiful amounts, may reduce risk of disease recurrence"

Journal of the American Medical Association 2009; 302: 2437-43

"Breast cancer patients who ate the most soy had a 54% reduction in risk of dying from breast cancer."

Cancer Epidemiol Biomarkers Prev. 2011 May;20(5):854-8

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International Journal of Cancer :

"The risk [of lung cancer] for those who seldom consumed vegetables was about twice of that among those who consumed vegetables frequently."

Source: A. Rylander and G. Axelsson. 2006. Lung cancer risks in relation to vegetable and fruit consumption and smoking. *International Journal of Cancer* 118(3):739-43

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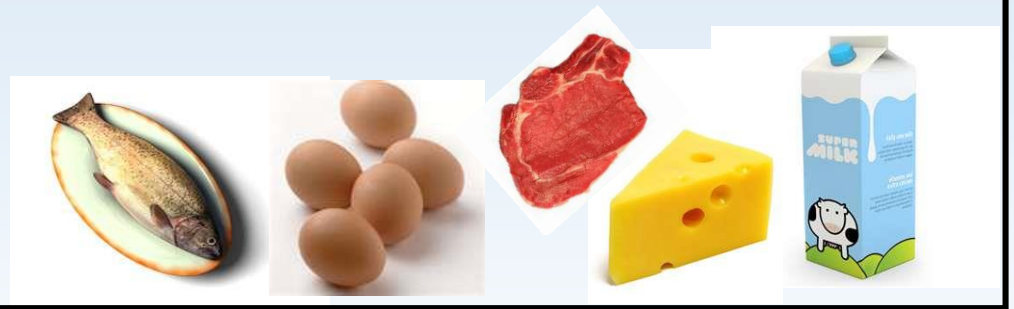
Plant-Based Diets Reduce Cancer Risk by:

Fiber
Phytonutrients
Plant oils

Carcinogens
Cholesterol
Inflammagens
Saturated fats



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5 Minute Break

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Auto-Immune Diseases

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Risk of Rheumatoid Arthritis

Compared with vegetarians, the increased risk for:

Women non-vegetarians	57%
Semi vegetarians	14%
Men non-vegetarians	50%
Semi vegetarians	14%.

Gary E Fraser. Associations between diet and cancer, ischemic heart disease, and all-cause mortality in non-Hispanic white California Seventh-day Adventists. Am J Clin Nutr September 1999 vol. 70 no. 3 532s-538s

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The prevalence of rheumatoid arthritis and rheumatism was ≈50% greater [in non-vegetarians].

Gary E Fraser. Associations between diet and cancer, ischemic heart disease, and all-cause mortality in non-Hispanic white California Seventh-day Adventists. Am J Clin Nutr September 1999 vol. 70 no. 3 532s-538s

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Treatment of RA with a vegetarian diet

Symptomatic Improvement:

- Joint swelling,
- Pain score,
- Grip strength
- Severity of morning stiffness
- Duration of morning stiffness
- Severity of limitation in function,
- Number of swollen joints,
- Number of tender joints,
- Ritchie's articular index

Sources: See Rheumatoid Arthritis posting refs 6-9, in VegetarianPrescription.org

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Treatment of RA with a vegetarian diet

Improvements in Clinical Lab results:

- Leukocyte count,
- IgM,
- RF (Rheumatic Factor),
- Complement components C3 and C4
- Erythrocyte sedimentation rate (ESR),
- C reactive protein,
- Proteus mirabilis

Sources: See Rheumatoid Arthritis posting refs 6 & 8, in VegetarianPrescription.org

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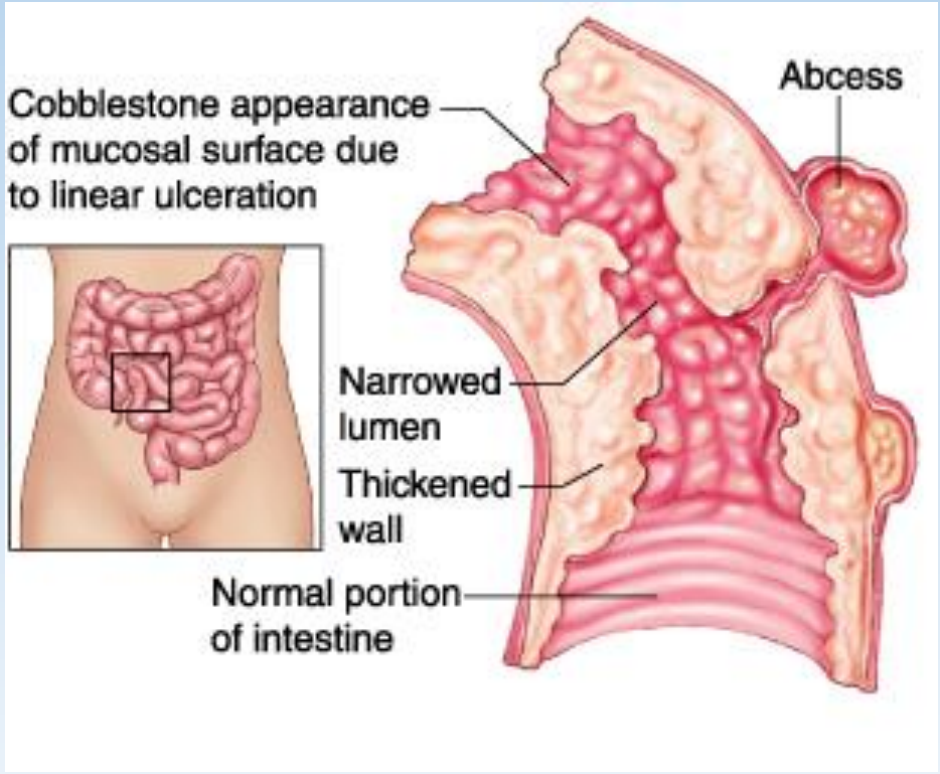
Crohn's Disease



Vegetarian diet reduces risk by:

70% in girls

80% in boys

D'Souza S et.al. Dietary patterns and risk for Crohn's disease in children. *Inflamm Bowel Dis.* 2008 Mar;14(3):367-73.

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Crohn's Disease – Two year interventional study

Vegetarian diet remission:

100% at end of one year
92% at two years

Control group 33% remission at 2 years.

Chiba M Lifestyle-related disease in Crohn's disease: relapse prevention by a semi-vegetarian diet. *World J Gastroenterol*. 2010 May 28;16(20):2484-95

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Obstetrics & Gynecology

Vegetarians OF WASHINGTON

Risk of Pre-Eclampsia

General population:	3%
Vegans:	0.01%

Carter JP, Furman T, Hutcheson HR. “Preeclampsia and reproductive performance in a community of vegans.” South Med J. 1987 Jun;80(6):692-7.

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Excessive Weight Gain in Pregnancy

Vegetarians have a 54% reduced risk

Alison M. Stuebe et. al. “Associations of diet and physical activity during pregnancy with risk for excessive gestational weight gain” Am J Obstet Gynecol. 2009 Jul; 201(1)

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Low fat vegetarian diet reduces dysmenorrhea from an average of 3.9 days to 2.7 days

- ↓ PMS symptoms
- ↑ SHBG (sex-hormone-binding globulin) from 39 nm/L to 46 nm/L

Barnard ND Diet and sex-hormone binding globulin, dysmenorrhea, and premenstrual symptoms. Obstet Gynecol. 2000 Feb;95(2):245-50.
Dalton ME Sex hormone-binding globulin concentrations in women with severe premenstrual syndrome. Postgrad Med J. 1981 Sep;57(671):560-1.

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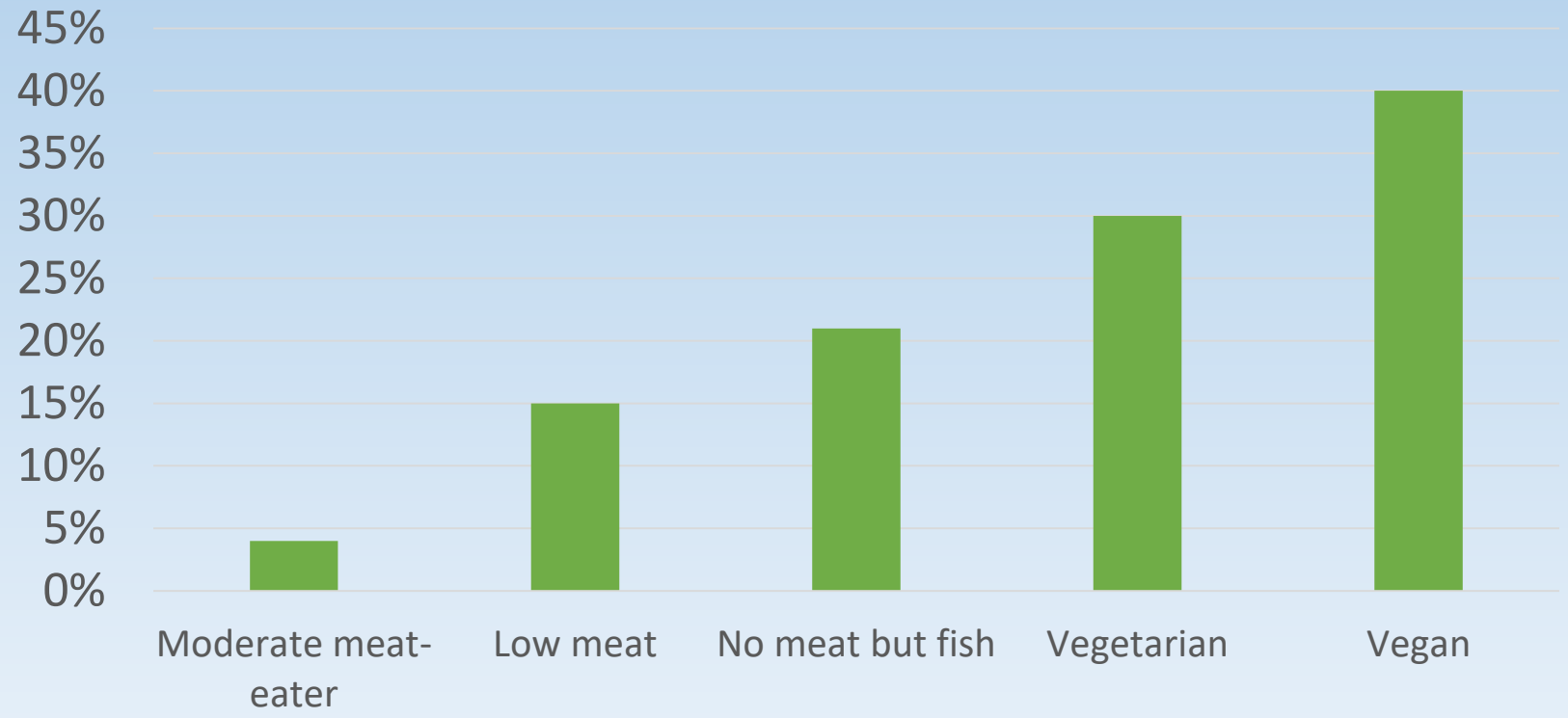
Reduction of Cataract Risk from the Standard British Diet



Paul N Appleby, Naomi E Allen, Timothy J Key. “Diet, vegetarianism, and cataract risk” Am J Clin Nutr May 2011 vol. 93 no. 5 1128-1135

Vegetarians OF WASHINGTON

Burn Patients - the most nutritional demanding

- Adults with burns covering 25% surface area experience increases in metabolic rates between 118% and 210%,
- Caloric needs can exceed 5,000 KCal/Day.
- Protein needs increase dramatically as well, often increasing to 2gm/Kg

Herndon RN, Tompkins RG. Support of the metabolic response to burn injury. The Lancet, Volume 363, Issue 9424, 1895 – 1902

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Patients suffering from 10% to 50% surface area of 2nd and 3rd degree thermal burns

Vegetarian = Meat Eating with respect to:

- Biochemical parameters,
- Status of wound healing,
- Microbiological investigations,
- Length of hospital stay.
- weight management,
- graft take,

Sharma S, Sharma RK, Parashar A. Comparison of the nutritional status and outcome in thermal burn patients receiving vegetarian and non-vegetarian diets. Indian J Plast Surg. 2014 May;47(2):236-41

Vegetarians OF WASHINGTON

"Healthful dietary models indicated consistently the vegan diet as the most healthy one."

Peter Clarys et. al. "Comparison of Nutritional Quality of the Vegan, Vegetarian, Semi-Vegetarian, Pesco-Vegetarian and Omnivorous Diet." Nutrients 2014;6(3):1318–1332.

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"…when we look at the subset who had followed a vegetarian diet for at least half their life, it appears they lived about 13 years longer."

Joel Fuhrman M.D.
analyzing a study of Californian vegetarians

Rucker C Hoffman. *The Seventh Day Diet* Random House 1991

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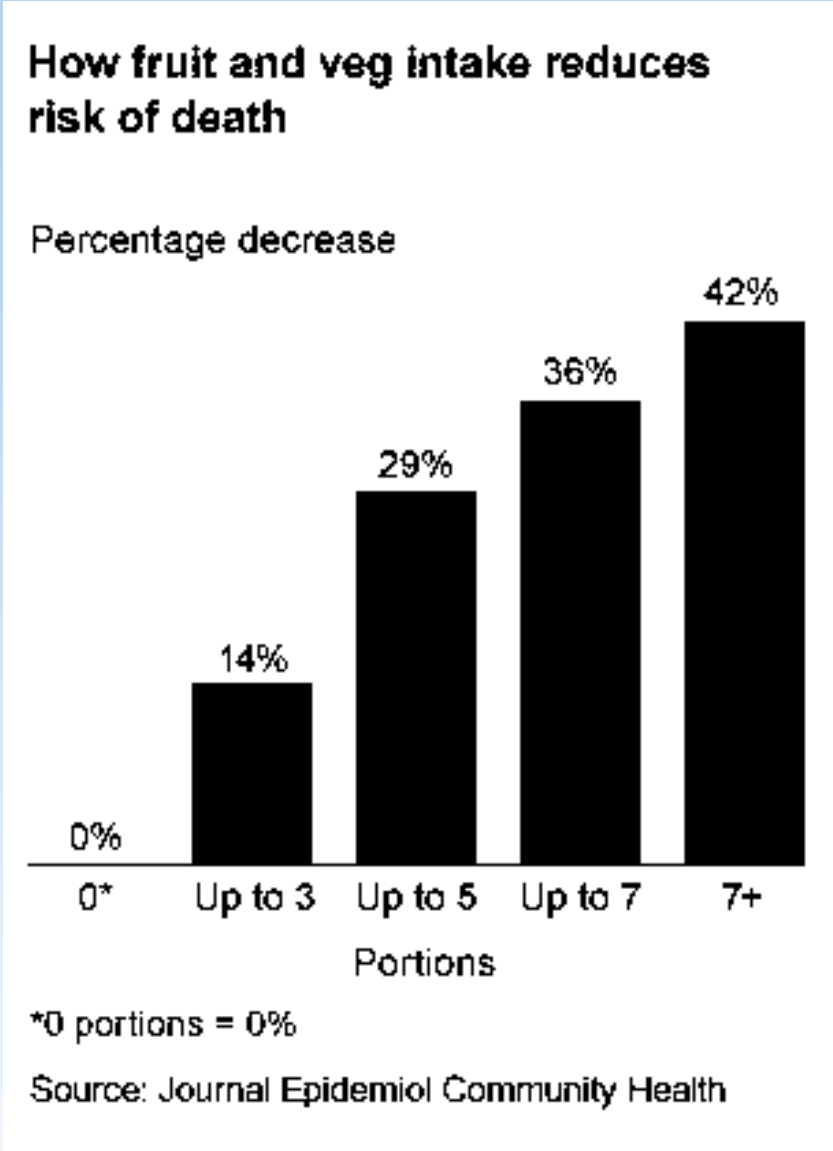
"The clear message here is that the more fruit and vegetables you eat, the less likely you are to die at any age. My advice would be, however much you are eating now, eat more."

- Dr Oyinlola Oyebode

Oyinlola Oyebode et al. Fruit and vegetable consumption and all-cause, cancer and CVD mortality: analysis of Health Survey for England data. *J Epidemiol Community Health 31.3.2014*



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Infectious Disease

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Industrial Food Animal Production (IFAP):

- Almost all meat and dairy in the US comes from IFAP operations
- Thousands of cattle, tens of thousands of pigs, hundreds of thousands of chickens are confined at a single facility producing enormous amounts of animal waste.
- IFAP raises serious public health concerns for industry workers, rural communities, consumers of animal products, and the general public.

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Shift from Extensive to Intensive Farming

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Public Health Concerns

- Animal welfare: Overcrowding induces stress and susceptibility to infections.
- Worker health: Transmission of diseases from animals to workers, who might then spread infections to their communities.
- Infections from consuming raw/undercooked meat
- Feed additives/antibiotics may contaminate food supply
- Antibiotic resistance: erodes effectiveness of life-saving drugs
- Emergence of novel viruses including new influenza strains

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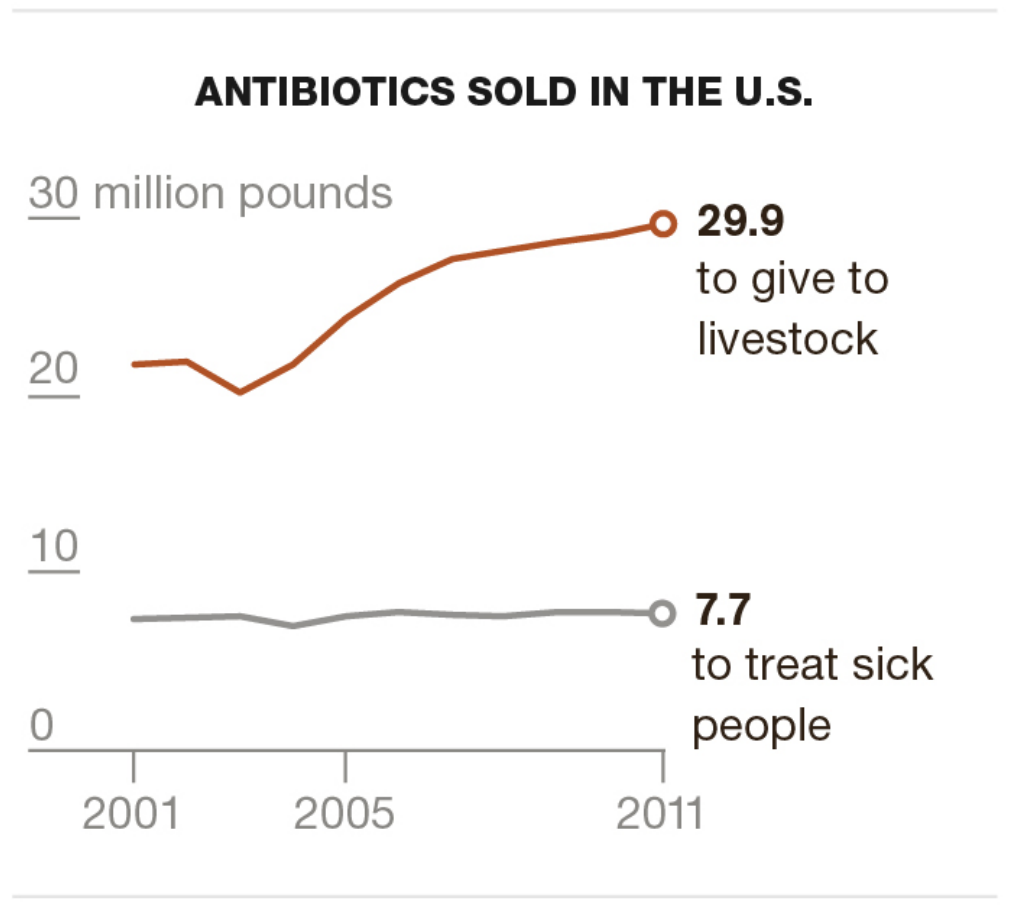
Increase of Antimicrobial Use in Livestock



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Antibiotic Use in Livestock

- Treatment or prevention of infection
- Sub-therapeutic doses in animal feed to promote growth in intensive animal farming.
- Improved feed conversion efficiency (more output, such as muscle or milk, for a given amount of feed) most likely by affecting gut flora.

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80% of antibiotics are used in farm animals

“Rather than healing sick animals, these drugs are often fed to animals at low levels to make them grow faster and to suppress diseases that arise because they live in dangerously close quarters on top of one another’s waste.”

- David Kessler FDA commissioner,

"There's unequivocal evidence relationship between use of antibiotics in animals and transmission of antibiotic-resistant bacteria causing adverse effects in humans"

- Ali Khan, deputy director CDC

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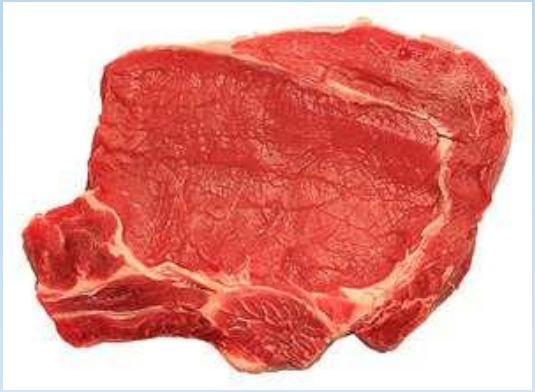
Resistant Bacteria are spread by:

Fomites:



Vectors:

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How Resistance Develops and Spreads

1 Antibiotics can be given to livestock in their feed or sprayed on them, to be ingested when the animals groom themselves.

2 The bacteria causing an infection are usually not resistant to drugs.

But some of them can be naturally drug resistant.

When antibiotics kill the nonresistant bacteria…

…the resistant ones—the superbugs—can flourish.

53%

of grocery store chicken sampled in a 2013 study had resistant *E. coli.*

3 Superbugs can be passed to humans in many ways.

Farmworkers often have direct contact with animals.

Drug-resistant bacteria can linger on improperly cooked meat.

Fertilizer or water containing animal feces can spread superbugs to food crops.

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In supermarkets, Salmonella was present in

35% of chicken,

25% of turkey,

and 16% of pork

All had bacteria resistant to at least one antibiotic and half had bacteria resistant to three or more antibiotics.

Source: Chen Sheng et al. 2004. Characterization of Multiple-Antimicrobial-Resistant Salmonella Serovars Isolated from Retail Meats. *Applied and Environmental Microbiology* 70(1):1-7

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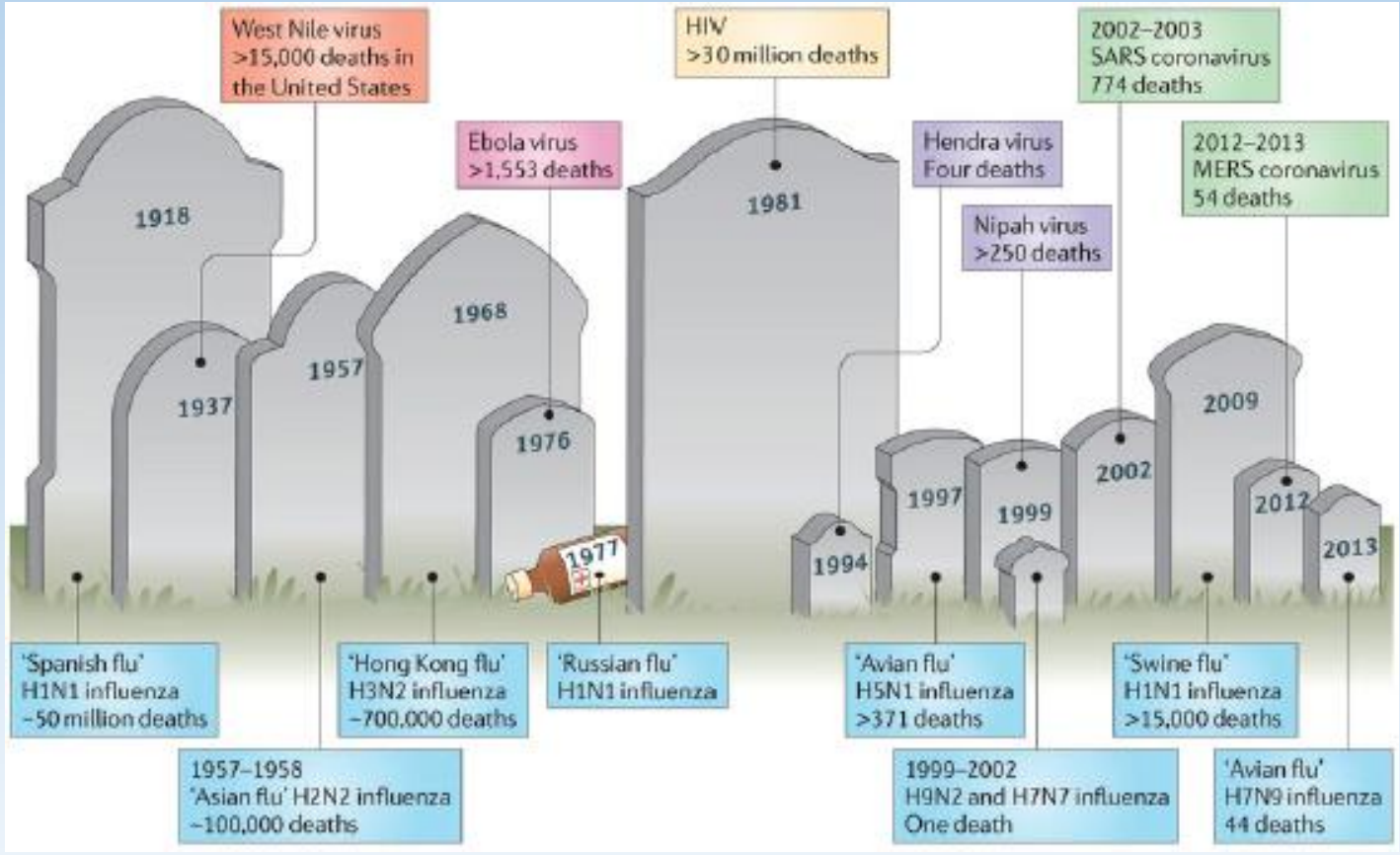
Emergence of Novel Viruses: Predominance of Zoonoses



Workshop Overview." Institute of Medicine. *Emerging Viral Diseases: The One Health Connection: Workshop Summary*. Washington, DC: The National Academies Press, 2015.

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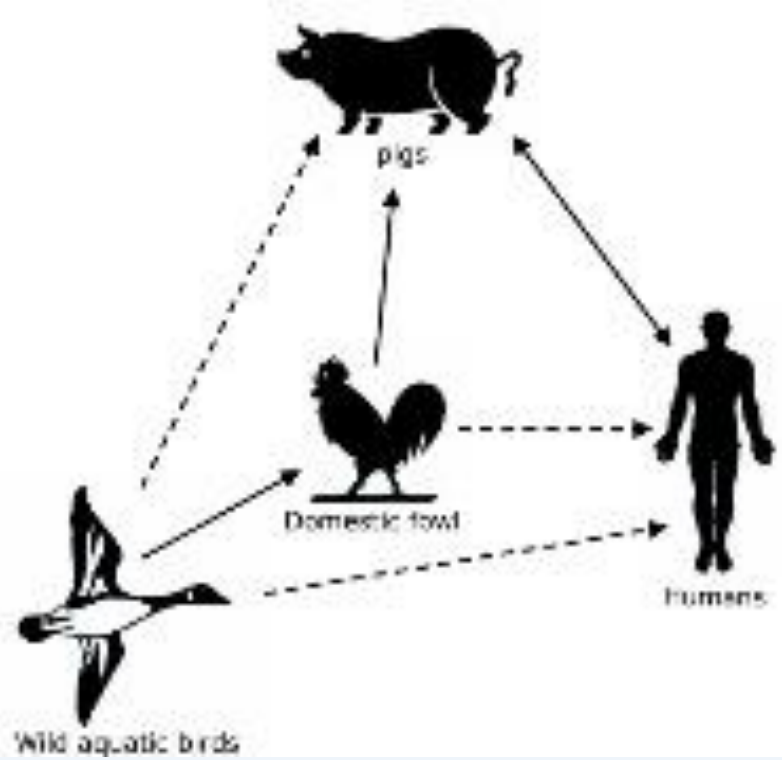
A New Flu Virus is Manufactured on Factory Farms Every Year



The pig as a “mixing vessel” for influenza

Wenjun Ma, Robert E Kahn, and Juergen A Richt. The pig as a mixing vessel for influenza viruses: Human and veterinary implications. *J Mol Genet Med*. Jan 2009; 3(1): 158–166.

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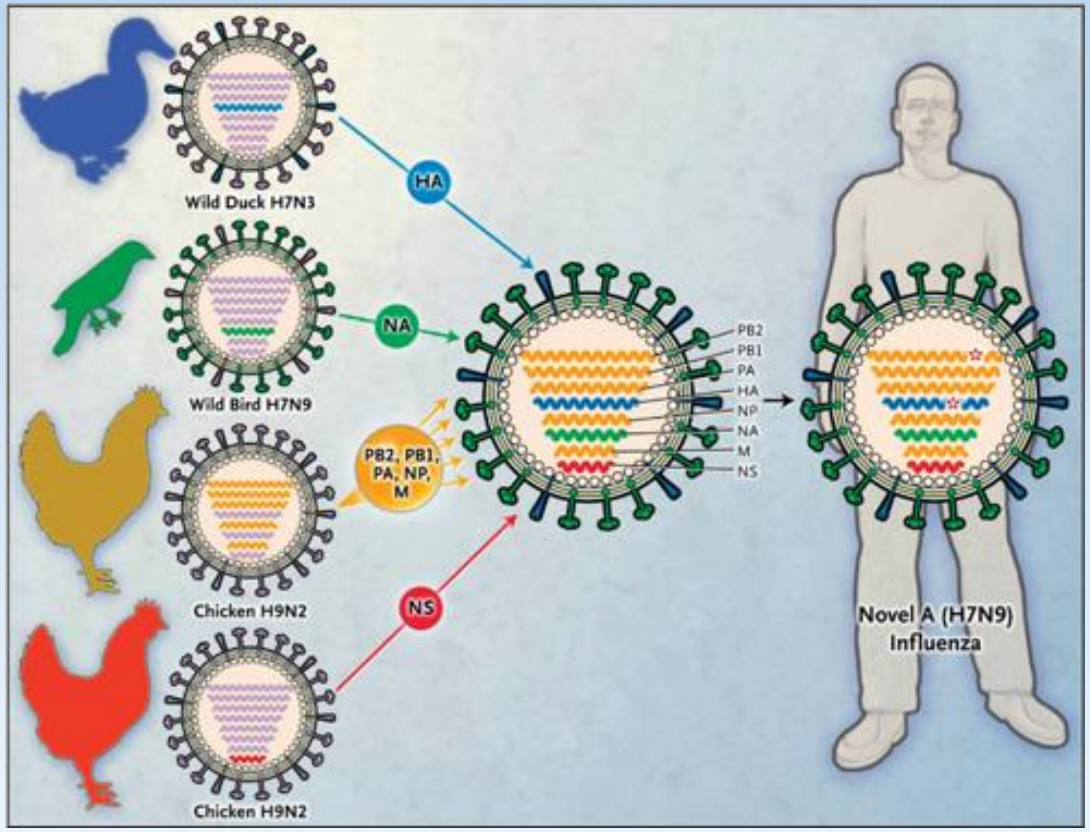
Novel Influenza Viruses: Industrial and Live Markets



- Frequent contact among large populations of hogs, birds, and humans — such as where industrial hog and poultry operations are sited in close proximity — offer ideal conditions for the generation of new influenza viruses.
- Live animal markets, another big contributor
- Novel avian H7N9 influenza virus is a reassortant virus containing gene segments derived from four separate avian influenza viruses, including 2 wild birds and 2 domestic poultry.

SOURCE: Morens et al., 2013. ©2013 Massachusetts Medical Society.

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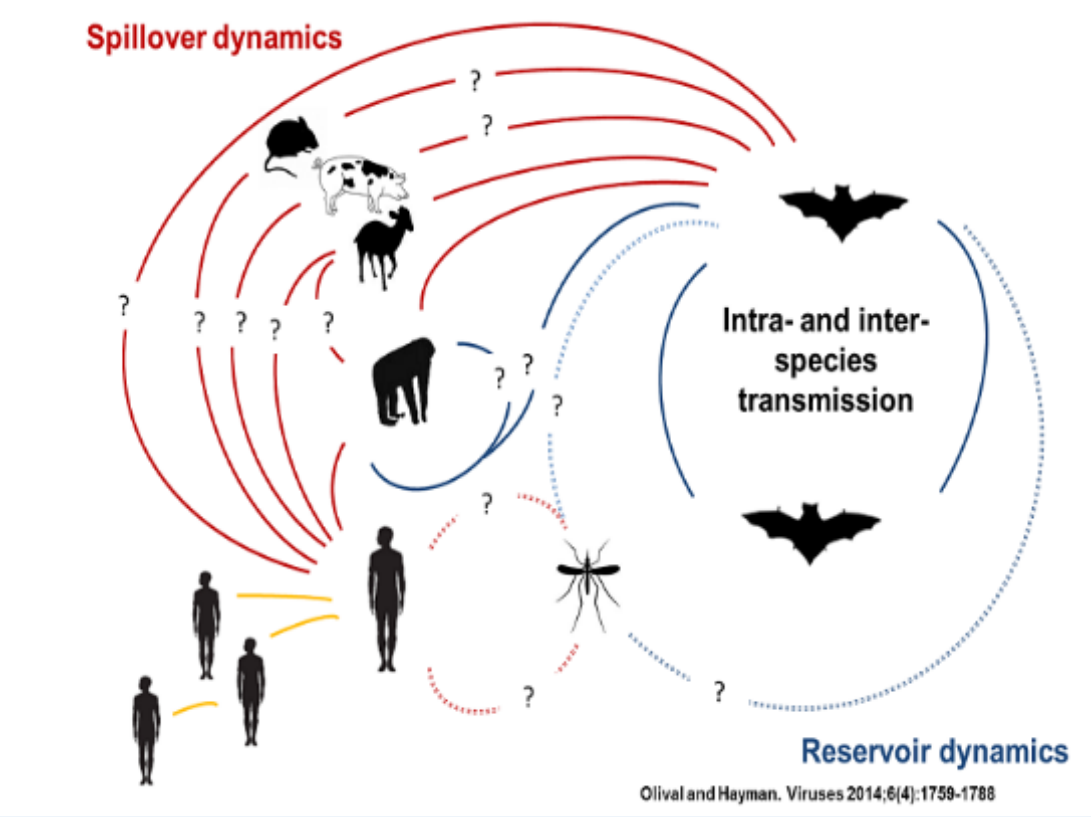
Bats, the Most Populous Mammal and Emerging Viruses: SARS, Ebola, Others



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Viruses are easily spread

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Nutritional Issues

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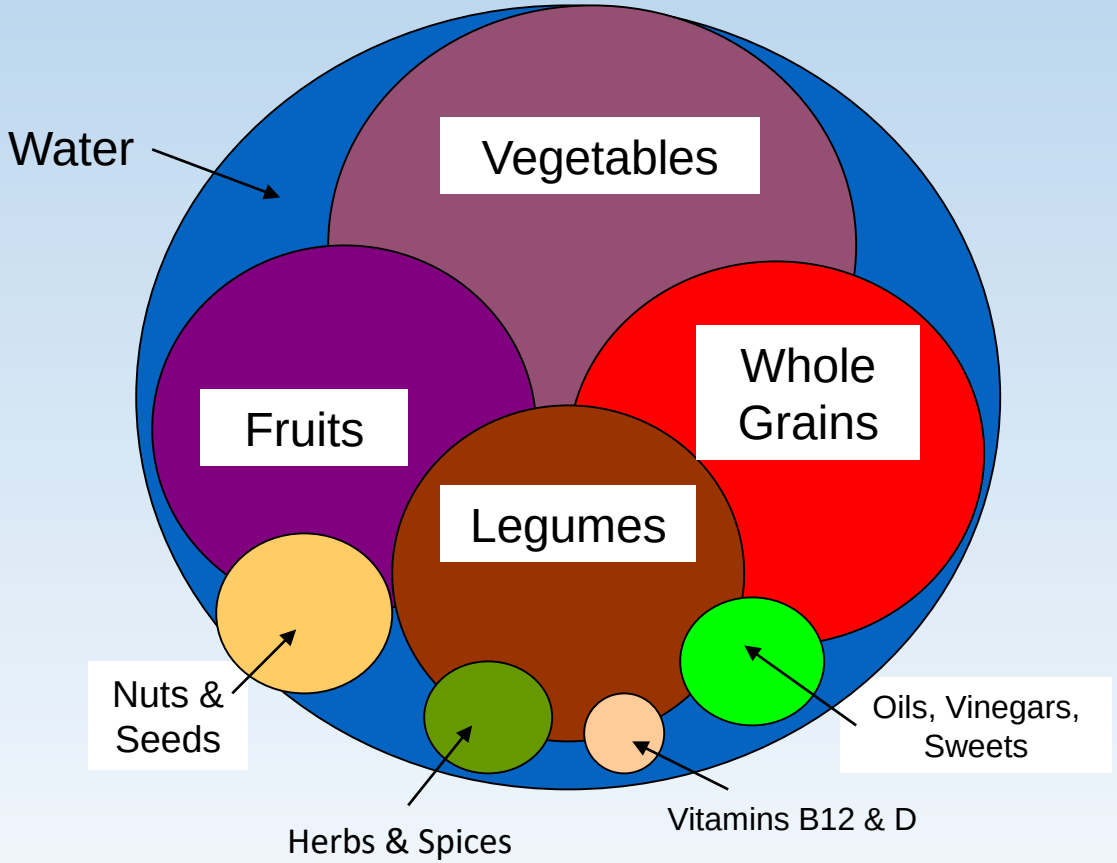
The New Healthy Food Groups



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It's Easy to get the Protein you need from Plant Foods

(Protein is shown as a percentage of calories)

Vegetables	*Protein*	*Legumes & Grains*	*Protein*
Spinach	49%	Lentils	29%
Broccoli	45%	Pinto beans	26%
Kale	45%	Chickpeas	23%
Mushrooms	39%	Peanut	18%
Okra	27%	Sunflower seed	17%
Tomato	20%	Wheat	17%
Pumpkin	15%	Oatmeal-cooked	15%
Corn	15%	Cashew	12%
Potato	11%	Rice-brown	8%

Source: Keith Akers, A Vegetarian Sourcebook

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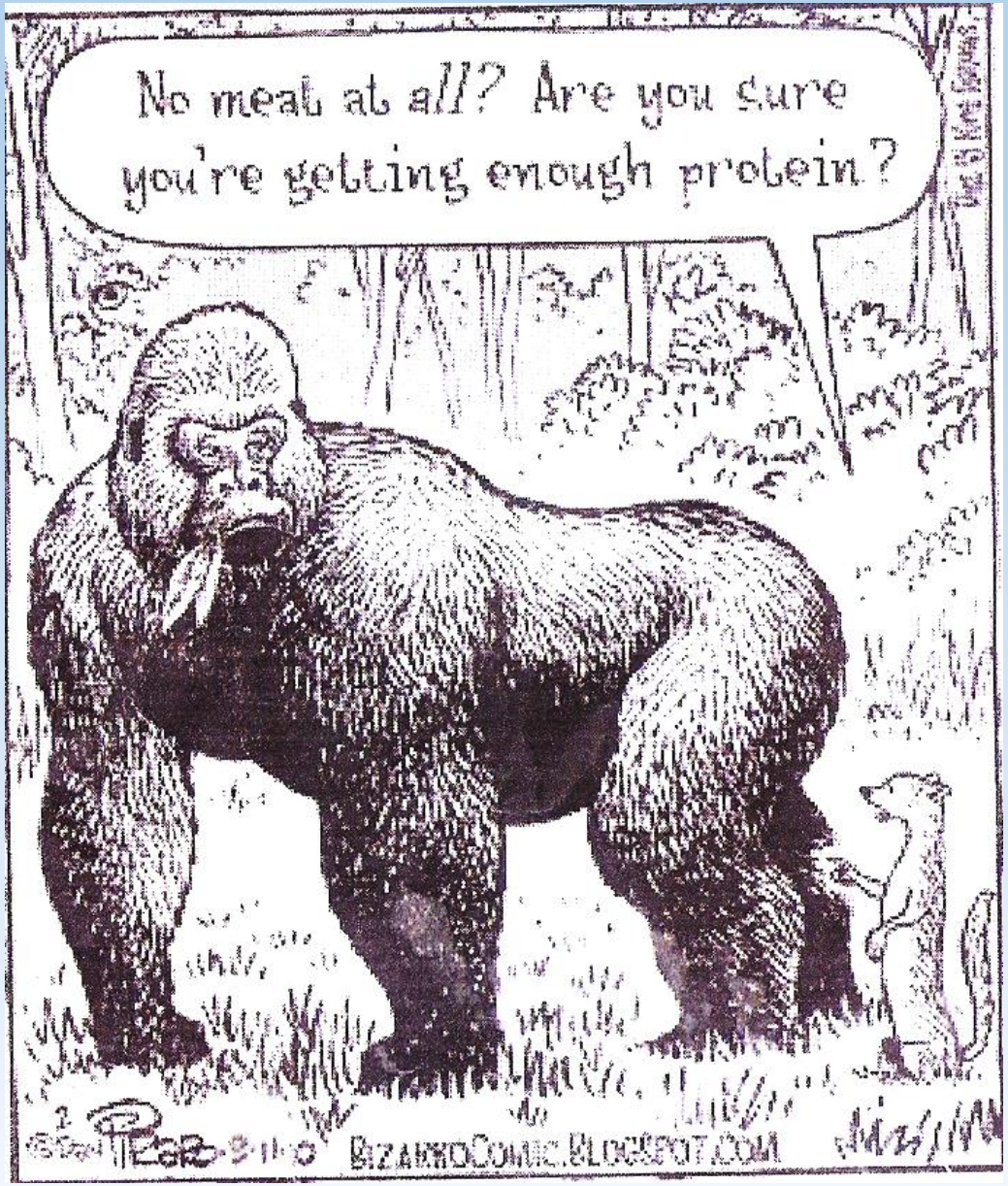

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"An assortment of plant foods eaten over the course of a day can provide all essential amino acids and ensure adequate nitrogen retention and use in healthy adults, thus, complementary proteins do not need to be consumed at the same meal."

American Dietetic Association, Position on Vegetarian and Vegan Diets, 2009

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The pool of amino acids come from four sources:

- Enzymes secreted into the intestine to digest proteins.
- Intestinal cells sloughed off in the intestine.
- Intracellular spaces of the skeletal musculature
- Synthesis of amino acids by intestinal microflora

Fuller MF, Reeds PJ. Nitrogen cycling in the gut. *Ann Rev Nutr* 1998; 18:385-411
Badloo et al. Dietary protein, growth and urea kinetics. *J Nutr* 1999;129:969-979
Millward et al The nutritional value of plant based diets in relation to amino acid and protein requirement. *Proc Nutr Soc* 1999;58:249—260

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Calcium Content of Various Foods.

Food	*Calcium mg per 100 cal serving*	*Absorption rate*
Bok Choy	870mg	53%
Collard Greens	609mg	52%
Orange Juice (calcium fortified)	320mg	52%
Tofu, set with calcium	287mg	31%
Kale	270mg	49%
Broccoli	215mg	61%
Cow's milk (for comparison)	**188mg**	**32%**
Sesame seeds	170mg	21%
Cabbage	160mg	65%
White beans	72mg	22%
Tempeh	55mg	37%

Source: USDA National Nutrient Database

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You don’t need to worry about Iron levels

	Male on SAD	Male on Vegan Diet	Female on SAD	Female on Vegan Diet
Hemoglobin (g/L)	156	154	133	132
Hematocrit	0.45	0.45	0.40	0.39

Haddad EH, et al. Dietary intake and biochemical, hematologic, and immune status of vegans compared with nonvegetarians. *Am J Clin Nutr*. 1999;70(suppl):586S-93S.

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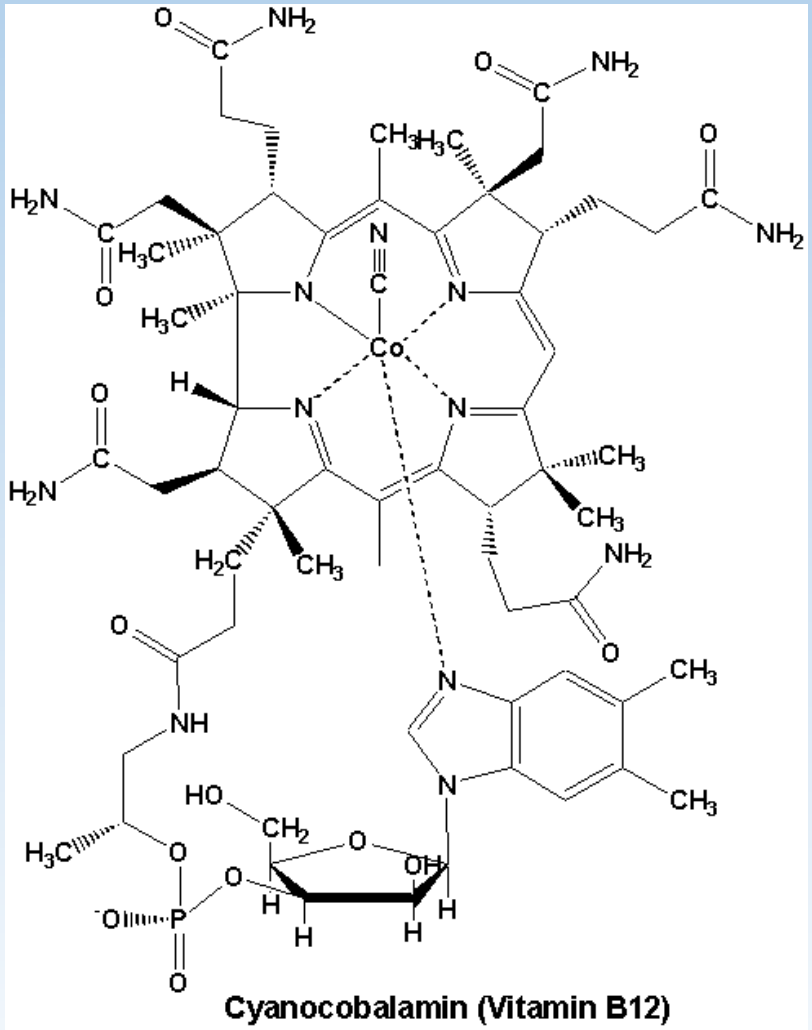
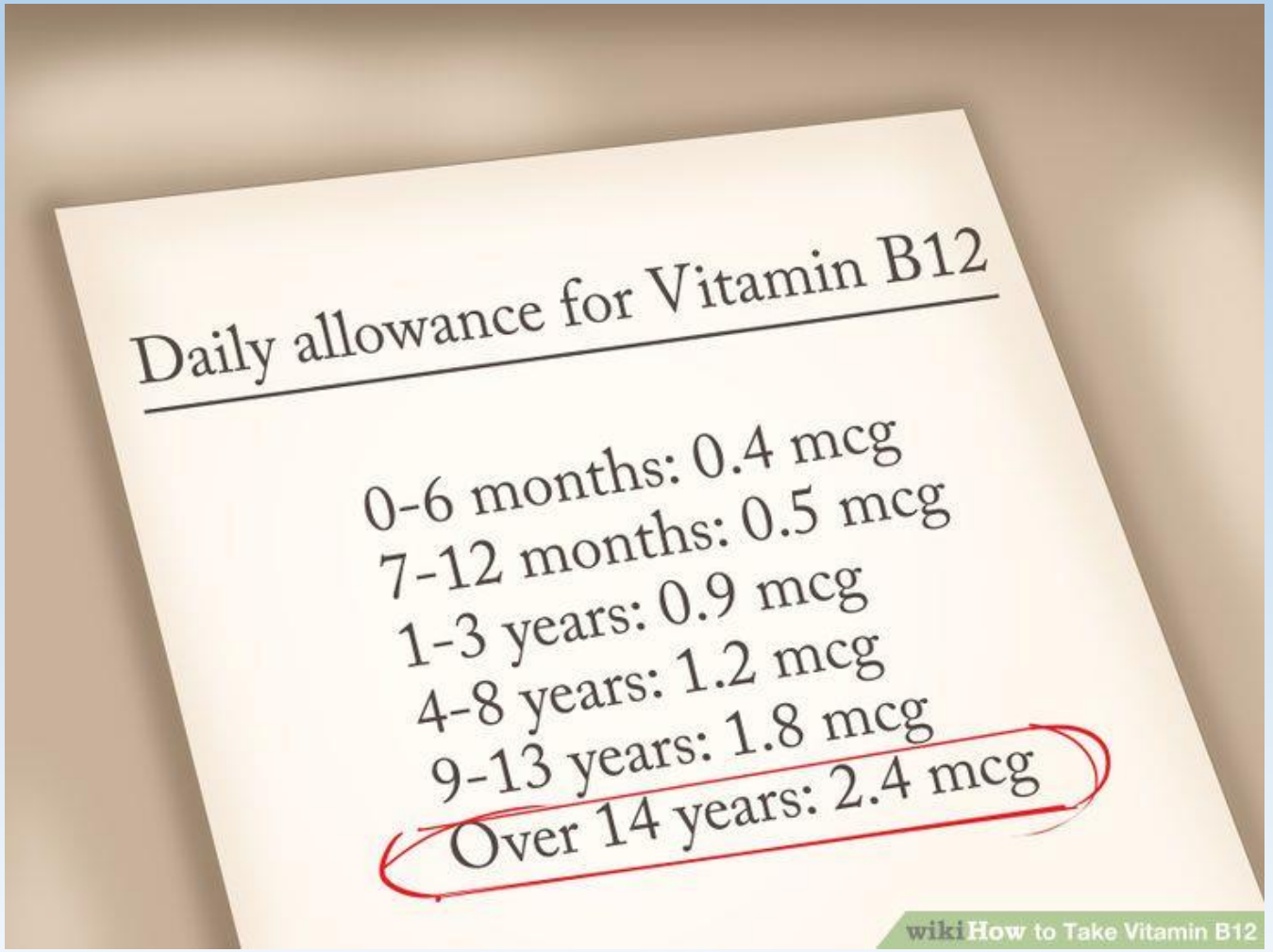
Vitamin B12 is needed





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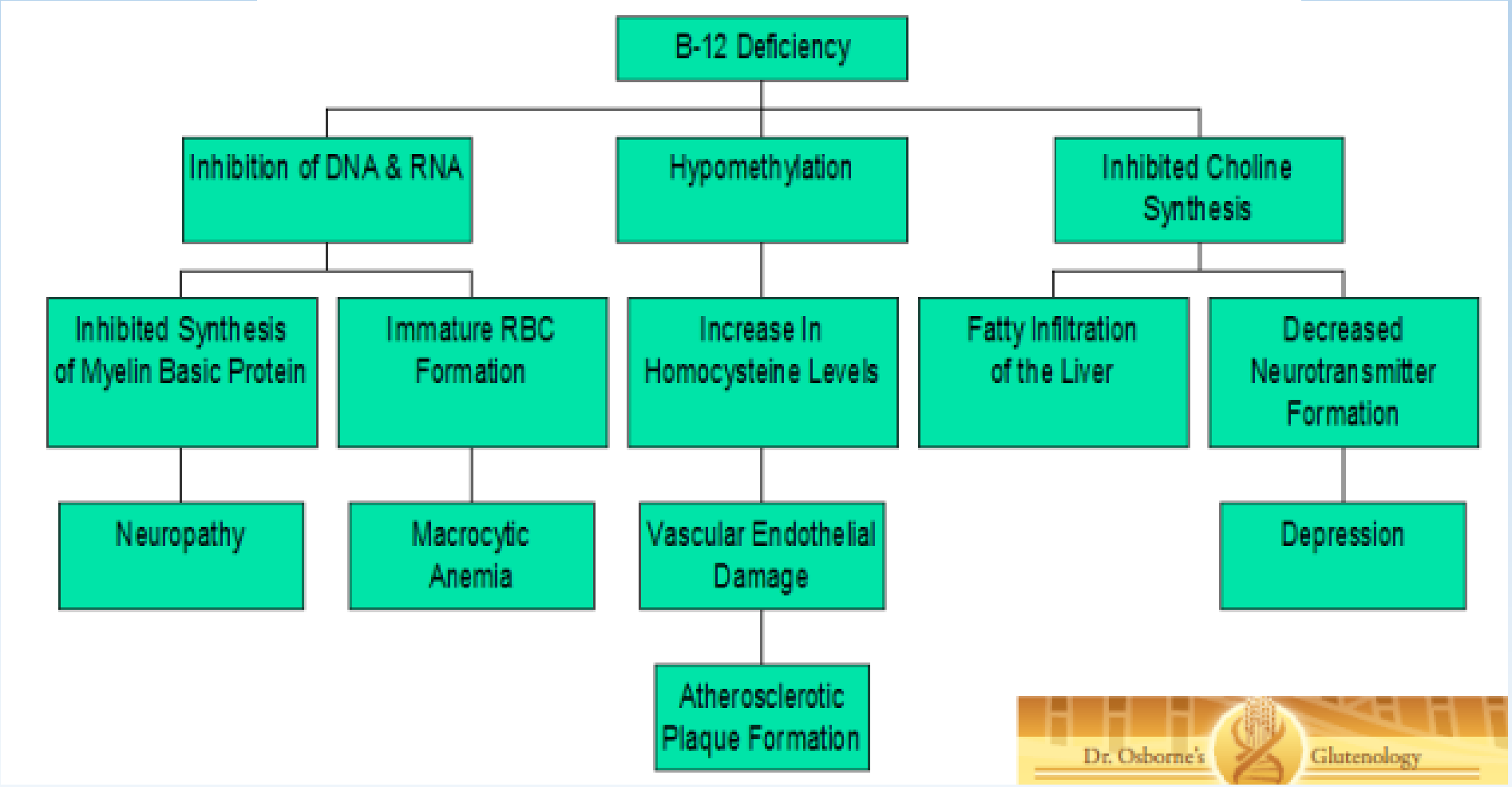
Vitamin B12 deficiency leads to:



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Treatment of vitamin B12 deficiency

- Patients with pernicious anemia have historically been treated with parenteral therapy.
- Intramuscular injections of 100 mcg of vitamin B12 are adequate for each dose.
- Replacement is usually given daily for the first week, weekly for the first month, and then monthly for life.
- It is a lifelong disorder, and if patients discontinue their monthly therapy the vitamin deficiency will recur.
- Oral cobalamin may be used instead of parenteral therapy and can provide equivalent results. The dose is 1000 mcg/day and must be continued indefinitely.

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Essential fatty acids – Omega 3 & Omega 6

The science, not the hype

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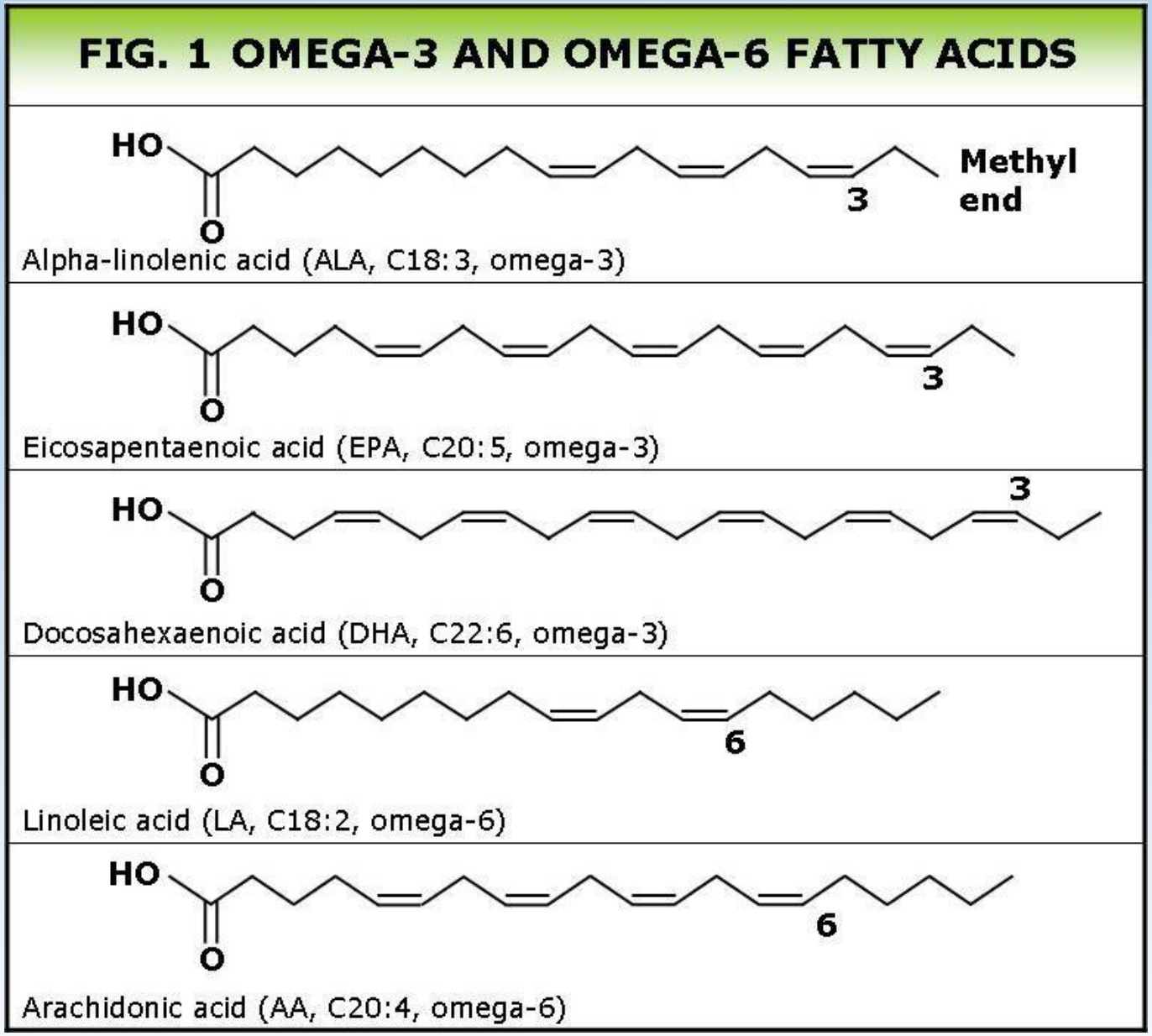
Essential Fatty Acids

The Science



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"Greenland Eskimos and the Canadian and Alaskan Inuit have CAD as often as the non-Eskimo populations."[1]

"Eskimos have CHD despite high consumption of omega-3 fatty acids." [2]

1. Fodor JG. "Fishing" for the origins of the "Eskimos and heart disease" story: facts or wishful thinking? *Can J Cardiol*. 2014 Aug;30(8):864-8

2. Ebbesson SO. "Eskimos have CHD despite high consumption of omega-3 fatty acids: the Alaska Siberia project." *Int J Circumpolar Health*. 2005 Sep;64(4):387-95.

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Review of Fish Oil and Cardiovascular Disease

"All of the studies included were the gold-standard kind of clinical trial -- with people assigned at random to either take fish oil or a placebo. The studies ranged in length from one to nearly five years.

The authors detected **no reduction in any cardiovascular events**, such as heart attacks, sudden death, angina, heart failures, strokes or death, no matter what dose of fish oil used."

Source: Sang Mi Kwak, MD et al, "Efficacy of Omega-3 Fatty Acid Supplements in the Secondary Prevention of Cardiovascular Disease" *Arch Intern Med.* Published online April 9, 2012.

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"There is no evidence of adverse effects on health or cognitive function with lower DHA intake."

Sanders TA. DHA status of vegetarians. *Prostaglandins Leukot Essent Fatty Acids*. 2009 Aug-Sep;81(2-3):137-41.

Vegetarians OF WASHINGTON

Removing fish improves mood

Vegetarians have better mood

Beezhold BL et. al. Vegetarian diets are associated with healthy mood states: a cross-sectional study in seventh day adventist adults. Nutr J. 2010 Jun 1;9:26. .

Beezhold BL, et.al. Restriction of meat, fish, and poultry in omnivores improves mood: A pilot randomized controlled trial *Nutr J*. 2012; 11: 9.

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Omega 3's are readily available in plants

	Amount	Omega-3 (ALA)
Walnuts	1 ounce	2.6g
Flax Seed	1 Tablespoon	1.6g
Chia Seed	1 ounce	5.1g

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Walnuts and Heart Health

- Lower total cholesterol and LDL
- Increase cholesterol efflux
- Lower diastolic blood pressure
- Improve endothelial function
- Decrease oxidative stress
- Decrease inflammation

Chiang YL[1], et al. The effect of dietary walnuts compared to fatty fish on eicosanoids, cytokines, soluble endothelial adhesion molecules and lymphocyte subsets: a randomized, controlled crossover trial. *Prostaglandins Leukot Essent Fatty Acids*. 2012 Oct-Nov;87(4-5):111-7.

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"The theory that omega-3 fatty acids are better for our health than omega-6 fatty acids, this is not supported by the latest evidence. Thus the omega-3 to omega-6 ratio is basically the "good divided by the good," so it is of no value in evaluating diet quality or predicting disease."

–Frank Sacks MD Harvard University

Mozaffarian D. Interplay between different polyunsaturated fatty acids and risk of coronary heart disease in men. *Circulation*. 2005 Jan 18;111(2):157-64

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“The ratio of n-6/n-3 polyunsaturated fatty acids is of no value in modifying cardiovascular disease risk”

Griffin BA (2008). "How relevant is the ratio of dietary omega-6 to omega-3 polyunsaturated fatty acids to cardiovascular disease risk? Evidence from the OPTILIP study". *Current Opinion in Lipidology* 19 (1): 57–62.

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n-6 fatty acids do not inhibit the anti-inflammatory effects of n-3 fatty acids

Pischon T, Hankinson SE, Hotamisligil GS, Rifai N, Willett WC, Rimm EB. Habitual dietary intake of n-3 and n-6 fatty acids in relation to inflammatory markers among US men and women. Circulation. 2003; 108: 155–160

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"Omega-6 fats are not only safe but they are also beneficial for the heart and circulation"

The body converts very little linolenic acid into arachidonic acid, even when linolenic acid is abundant in the diet.

Harris WS et. al. Omega-6 fatty acids and risk for cardiovascular disease: a science advisory from the American Heart Association Nutrition Subcommittee of the Council on Nutrition, Physical Activity, and Metabolism; Council on Cardiovascular Nursing; and Council on Epidemiology and Prevention. Circulation. 2009 Feb 17;119(6):902-7.

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Anti-inflammatory/anti-aggregatory prostacyclin, lipoxin A (sub)4 and epoxyeicosatrienoic acids are promoted by omega-6 fatty acids

Serhan CN. Lipoxins and aspirin-triggered 15-epi-lipoxins are the first lipid mediators of endogenous anti-inflammation and resolution. Prostaglandins Leukot Essent Fatty Acids. 2005; 73: 141–162.

Node K, Huo Y, Ruan X, Yang B, Spiecker M, Ley K, Zeldin DC, Liao JK. Anti-inflammatory properties of cytochrome P450 epoxygenase-derived eicosanoids. Science. 1999; 285: 1276–1279.

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Veg Mother and Baby are Doing Fine.

- Ratio in mother's diet does not affect amount and increase of adipose tissue in babies
- Estrogen boosts omega-3 conversion to DHA in child bearing years

Hauner H Effect of reducing the n-6:n-3 long-chain PUFA ratio during pregnancy and lactation on infant adipose tissue growth within the first year of life: an open-label randomized controlled trial. Am J Clin Nutr. 2012 Feb;95(2):383-94.

Burdge GC et. al. Conversion of alpha linolenic acid to longer chain polyunsaturated fats in human adults Reprod Nutr Dev 2005;45:581-97

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Clinical Strategy

Employ curcuminoids where indicated. Curcumin elevates levels of enzymes involved in the synthesis of DHA such as FADS2 and elongase 2 in both liver and brain tissues.

Wu A, Noble EE et. al Curcumin boosts DHA in the brain: Implications for the prevention of anxiety disorders. *Biochim Biophys Acta*. 2015 May;1852(5):951-61.

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Vegetarians' flora degrade phytates

"The vegetarians' microbiota degraded up to 100% phytate to myo-inositol phosphate products lower than $InsP_3$."

Markiewicz LH, et al. Diet shapes the ability of human intestinal microbiota to degrade phytate - in vitro studies. *J Appl Microbiol*. 2013 Mar 30.

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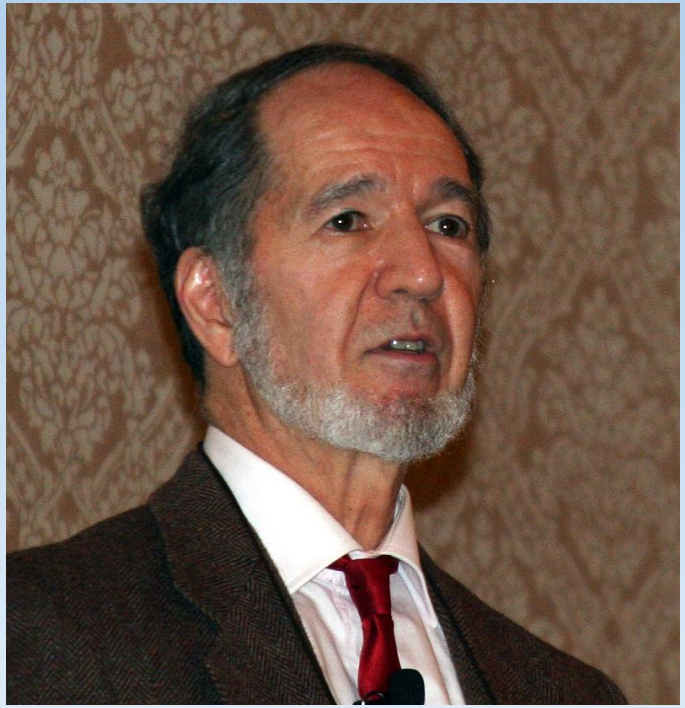
Paleo Fantasy



Jared Diamond

Graduate of Harvard and Cambridge
Royal Society Prize for Science
National Medal of Science
Pulitzer Prize Winner

By the time man had advanced enough to hunt for any quantity of meat, approx. 100,000 years ago, his brain was already formed, and the rest of anatomy was also fully modern.

Any idea that hunting and meat account for human brain and intelligence is “pure fantasy”

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Paleo Fantasy

Jane Goodall
Anthropologist

"The human species does not have the physical attributes of a carnivore. If everyone knew and faced up to all the facts, most would either opt for drastically cutting their meat consumption or giving up meat altogether."

- Jane Goodall
Author of Harvest for Hope

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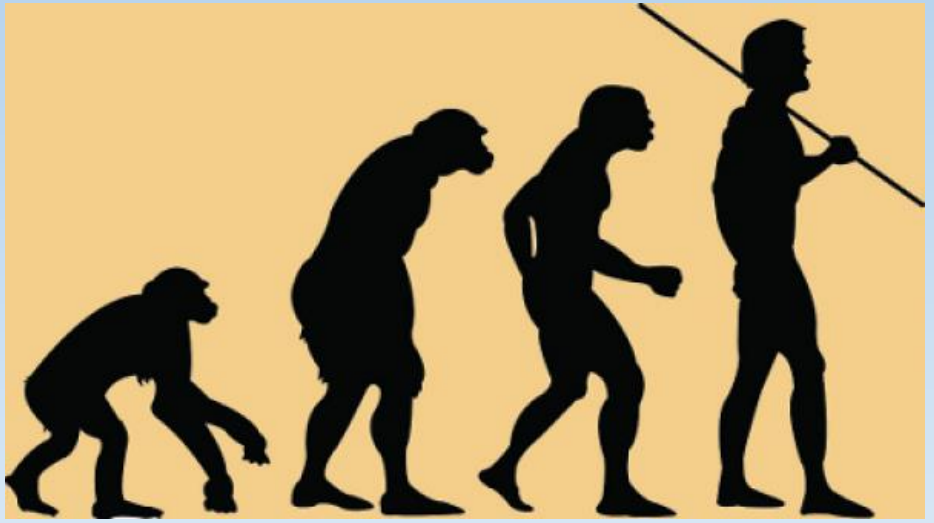
Paleo Fantasy

"What we are able to eat and thrive on depends on our more than 30 million years of history as primates, not a single more recent moment in time." The Paleo diet reflects a "misunderstanding of evolution"

- Marlene Zuk
Anthropologist
Author of Paleofantasy



- 2 million years ago Australopithecus ate grains and a wide variety of plants.
- Neanderthals cooked grains and a wide variety of plants.
- 30,000 years ago humans baked pita bread.

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"Although we think we are one and we act as if we are one, human beings are not natural meat eaters…flesh was never intended for human beings who are natural herbivores"

Dr. William Roberts, Editor in Chief of the American Journal of Cardiology, Vol 66, p896

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Clinical Practice

Vegetarians OF WASHINGTON

Clinical Practice

Patients turn to the internet when their doctor doesn't know about the prevention and treatment of disease, and attempt to self treat.

Kendra L. Schwartz, MD, MSPH et. al. "Family Medicine Patients' Use of the Internet for Health Information: A MetroNet Study." J Am Board Fam Med January-February 2006 vol. 19 no. 1 39-45

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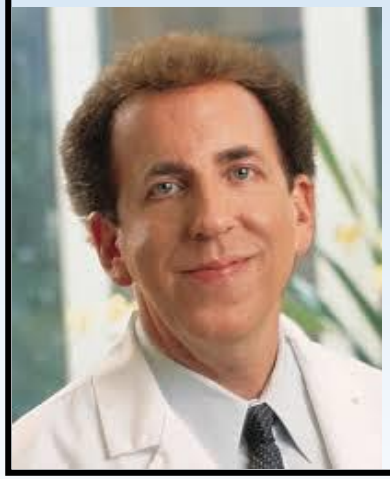
"I don't understand why asking people to eat a well-balanced vegetarian diet is considered drastic, while it is medically conservative to cut people open and put them on cholesterol-lowering drugs for the rest of their lives."



— Dean Ornish, MD
Cardiologist

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"Most patients are willing to give a vegetarian diet a try once they receive information on its health benefits. The acceptability of a low-fat vegan diet is high."

Public views of the benefits and barriers to the consumption of a plant-based diet. *Eur J Clin Nutr* 2006 Jul;60(7):828-37.

A low-fat vegan diet elicits greater macronutrient changes, but is comparable in adherence and acceptability, compared with a more conventional diabetes diet among individuals with type 2 diabetes.

Barnard ND et al. *J Am Diet Assoc*. 2009 Feb;109(2):263-72.

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Patient Compliance

Your patients will go for it even though it may be very new to them.[1]

Heart patients had 89% compliance with a plant-based diet over 4 years.[2]

1. David Drozek et al. “Short-term effectiveness of a lifestyle intervention program for reducing selected chronic disease risk factors in individuals living in rural Appalachia: a pilot cohort study.” *Adv Prev Med*. E Pub Jan 16 2014; 2014:798184

2. Esselstyn et. al. A way to reverse CAD. *J Fam Pract*. 2014 July;63(7):356-364,364a,364b.

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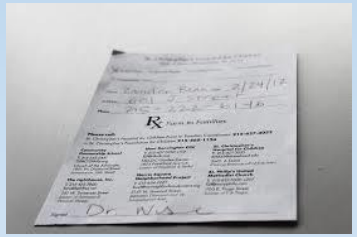
How to Enhance Patient Compliance



- Explain the efficacy of dietary intervention
- Emphasize the safety[1]
- Prescribe a specific plant-based diet in writing on stationery
- Elicit support from patient's partner[2]

1. Cullum-Dugan D, Pawlak R. "Position of the academy of nutrition and dietetics: vegetarian diets." *J Acad Nutr Diet*. 2015 May;115(5):801-10

2. Kerry NL Avery The importance of dietary change for men diagnosed with and at risk of prostate cancer: a multi-centre interview study with men, their partners and health professionals. *BMC Family Practice* 2014, 15:8

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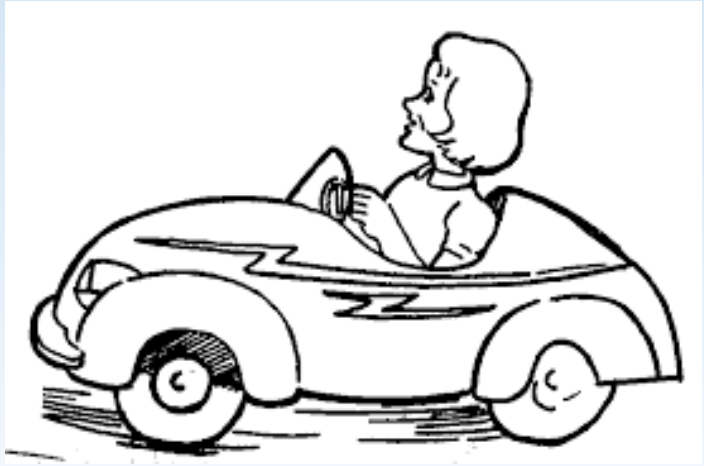
Locus of Control

Put your patients in the driver seat. Explain the road ahead if they follow a plant based diet and the road ahead if they don't. **Then let them choose.**



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Traditions are not always the healthiest

Respect ethnicity and tradition, but compassionately counsel as to the healthiest diet

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A Better Burger

Instead of:

- Beef/Chicken
- Iceberg lettuce
- Ketchup
- Mayonnaise
- White bread bun
- French Fries

Encourage:

- Veggie Patty
- Romaine lettuce
- Tomato slices
- Veganaise
- Whole grain bun
- Baked Sweet Potato Wedges, Salad or Fruit

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Patient Compliance

Kim Williams MD

President – American College of Cardiology

Dr Kim Williams suggests:

Teach your patients how to shop. Emphasize meat and dairy substitutes.

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Integration with Standard Treatment

Doctors should titrate current medications and dosages as patients show improvement on plant-based nutritional medicine.

Reassess symptoms and lab values frequently after beginning treatment until patient stabilizes.

Phillip J Tuso. Nutritional Update for Physicians: Plant-Based Diets. *Perm J* 2013 Spring; 17(2):61-66

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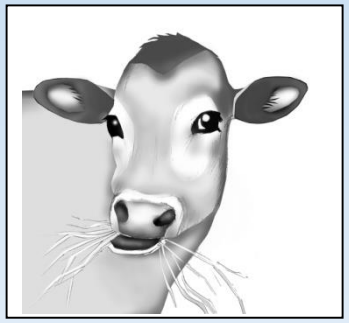
The Compassionate Physician

Vegetarians OF WASHINGTON

How We Waste Protein & Calories

100g of protein

100 calories



23g protein

15 calories

MILK

10g protein

4 calories

BEEF

Problems With Meat by John A. Scharffenberg MD MPH p.66-68

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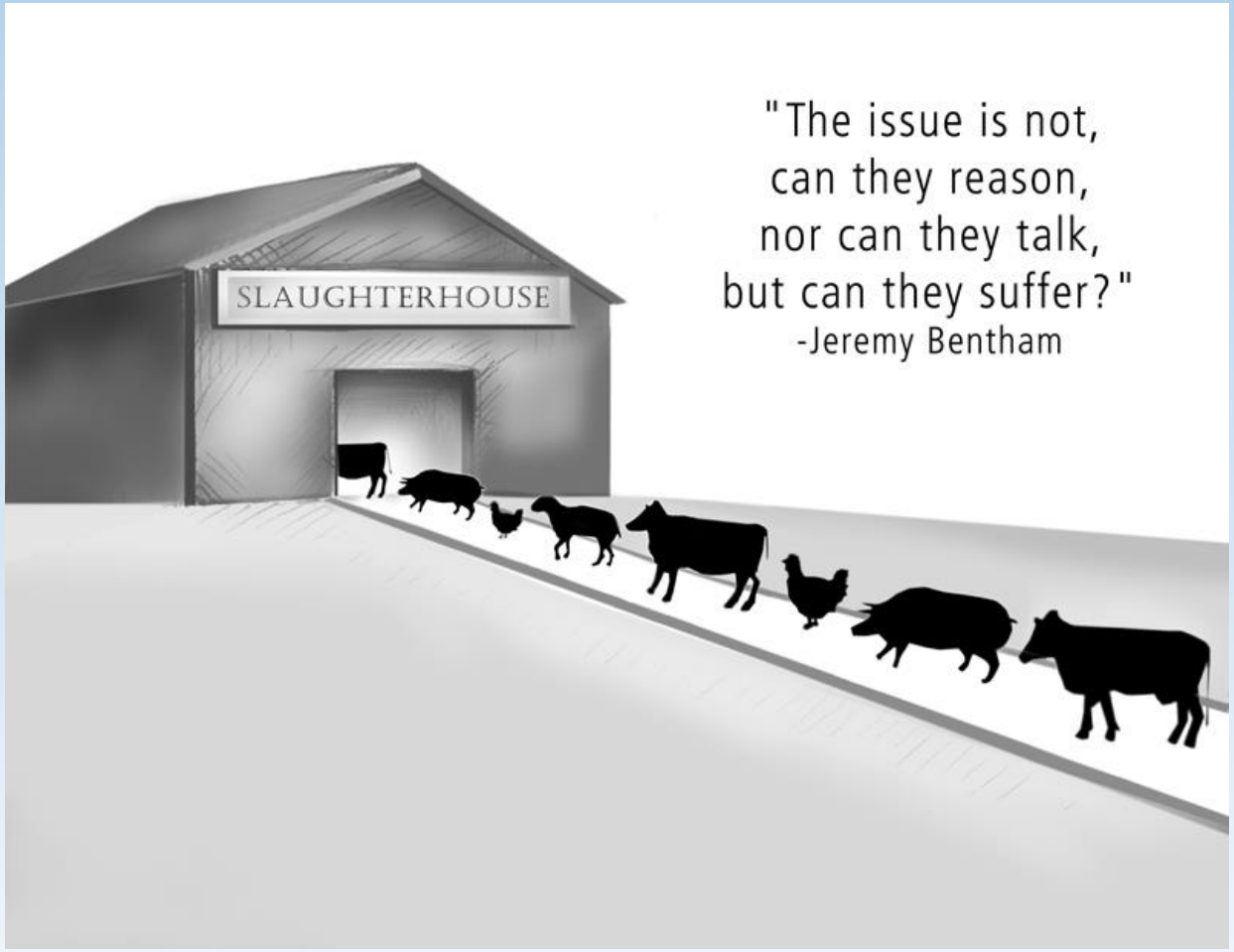

"Based on what is known to date, all vertebrates, and some invertebrates, experience pain in response to actual or potential tissue damage."

- Merck Veterinary Manual

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Raising Livestock is very damaging

"Livestock and their byproducts actually account for 51 percent of annual worldwide GHG [green house gas] emissions."

-2009 World Watch Institute Report

- Air & Water Pollution
- Soil Erosion
- Rainforest Destruction

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Vegetarians in the US

In a Harris Interactive poll of US adults in March 2012:

1% (2 million people) were vegan
3% (7 million people) were vegetarian (excluding vegans)

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Some doctors are already practicing Vegetarian Nutritional Medicine!

Dr Esther Park-Hwang
Obstetrician
Tacoma, WA

Dr Kim Williams – President of American College of Cardiology

Dr Arun Kalyanasundaram
Cardiologist,
Seattle, WA

Dr Ron Swensen
Oncologist
Renton, WA

Dr Chris Kozura – Naturopathic Doctor, Seattle, WA

Dr Keith Hanson
Family Medicine
Brewster, WA

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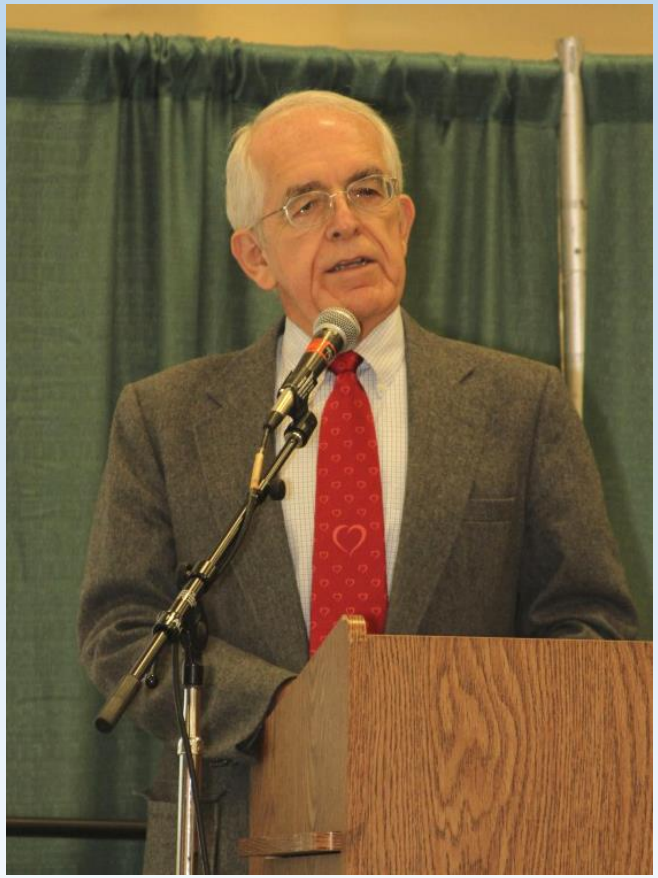
Veg Doctors are popular at Vegfest



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"Let food be thy medicine and medicine be thy food"

- Hippocrates, 400 BC

"The future of health care will involve an evolution toward a paradigm where the prevention and treatment of disease is centered, not on a pill or surgical procedure, but on another serving of fruits and vegetables."

- Philip J Tuso, MD; Mohamed H Ismail, MD; Benjamin P Ha, MD; Carole Bartolotto, MA, RD, Nutritional Update for Physicians: Plant-Based Diets. *Perm J* 2013 Spring;17(2):61-66