
FAD or FACT: current controversies in nutrition

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THE UNIVERSITY
OF BRITISH COLUMBIA



University
of Victoria

Let's Talk Science

What is it?

Non-profit, national organization

UBC and UVic affiliated

Focused on providing education to
communities in sciences,
technology, engineering and
mathematics

Disclaimer

- We are students
- We are not physicians, dietitians, or scientific experts in this field

Outline

1. Introduction
2. Facts on fats
3. Moo or Boo - the verdict on red meat

~Break~

4. Gluten free diets
5. Nutritional Supplements



Introduction to Current Guidelines



Canadian Guide to Nutrition

Recommended Number of Food Guide Servings per Day

Age In Years Sex	Children		Teens		Adults				
	2-3	4-8	9-13	14-18	19-50	51+			
	Girls and Boys		Females	Males	Females	Males	Females	Males	
Vegetables and Fruit	4	5	6	7	8	7-8	8-10	7	7
Grain Products	3	4	6	6	7	6-7	8	6	7
Milk and Alternatives	2	2	3-4	3-4	3-4	2	2	3	3
Meat and Alternatives	1	1	1-2	2	3	2	3	2	3

The chart above shows how many Food Guide Servings you need from each of the four food groups every day.

Having the amount and type of food recommended and following the tips in *Canada's Food Guide* will help:

- Meet your needs for vitamins, minerals and other nutrients.
- Reduce your risk of obesity, type 2 diabetes, heart disease, certain types of cancer and osteoporosis.
- Contribute to your overall health and vitality.

What is One Food Guide Serving? Look at the examples below.

Vegetables and Fruit

- Fresh, frozen or canned vegetables: 125 mL (½ cup)
- Leafy vegetables: Cooked: 125 mL (½ cup); Raw: 250 mL (1 cup)
- Fresh, frozen or canned fruits: 1 fruit or 125 mL (½ cup)
- 100% Juice: 125 mL (½ cup)

Grain Products

- Bread: 1 slice (35g)
- Bagel: ½ bagel (45 g)
- Flat breads: ½ pita or ½ tortilla (35 g)
- Cooked rice, bulgur or quinoa: 125 mL (½ cup)
- Cereal: Cold: 30 g; Hot: 175 mL (¾ cup)
- Cooked pasta or couscous: 125 mL (½ cup)

Milk and Alternatives

- Milk or powdered milk (reconstituted): 250 mL (1 cup)
- Canned milk (evaporated): 125 mL (½ cup)
- Fortified soy beverage: 250 mL (1 cup)
- Yogurt: 175 g (¾ cup)
- Kefir: 175 g (¾ cup)
- Cheese: 50 g (1 ½ oz.)

Meat and Alternatives

- Cooked fish, shellfish, poultry, lean meat: 75 g (2 ½ oz.)/125 mL (½ cup)
- Cooked legumes: 175 mL (¾ cup)
- Tofu: 150 g or 175 mL (¾ cup)
- Eggs: 2 eggs
- Peanut or nut butters: 30 mL (2 Tbsp)
- Shelled nuts and seeds: 60 mL (¼ cup)

Make each Food Guide Serving count... wherever you are – at home, at school, at work or when eating out!

- ▶ **Eat at least one dark green and one orange vegetable each day.**
 - Go for dark green vegetables such as broccoli, romaine lettuce and spinach.
 - Go for orange vegetables such as carrots, sweet potatoes and winter squash.
- ▶ **Choose vegetables and fruit prepared with little or no added fat, sugar or salt.**
 - Enjoy vegetables steamed, baked or stir-fried.
- ▶ **Have vegetables and fruit more often than juice.**
- ▶ **Make at least half of your grain products whole grain each day.**
 - Eat a variety of whole grains such as barley, brown rice, oats, quinoa and wild rice.
 - Enjoy whole grain breads, oatmeal or whole wheat pasta.
- ▶ **Choose grain products that are lower in fat, sugar or salt.**
 - Compare the Nutrition Facts table on labels to make wise choices.
 - Enjoy the true taste of grain products. When adding sauces or spreads, use small amounts.
- ▶ **Drink skim, 1%, or 2% milk each day.**
 - Have 500 mL (2 cups) of milk every day for adequate vitamin D.
 - Drink fortified soy beverages if you do not drink milk.
- ▶ **Select lower fat milk alternatives.**
 - Compare the Nutrition Facts table on yogurts or cheeses to make wise choices.
- ▶ **Have meat alternatives such as beans, lentils and tofu often.**
- ▶ **Eat at least two Food Guide Servings of fish each week.***
 - Choose fish such as charr, herring, mackerel, salmon, sardines and trout.
- ▶ **Select lean meat and alternatives prepared with little or no added fat or salt.**
 - Trim the visible fat from meats. Remove the skin on poultry.
 - Use cooking methods such as broiling, baking or poaching that require little or no added fat.
 - If you eat lunchmeats, sausages or prepackaged meats, choose those lower in salt (sodium) and fat.

Oils and Fats

- Include a small amount – 30 to 45 mL (2 to 3 Tbsp) – of unsaturated fat each day. This includes oil used for cooking, salad dressings, margarine and mayonnaise.
- Use vegetable oils such as canola, olive and soybean.
- Choose soft margarines that are low in saturated and trans fats.
- Limit butter, hard margarine, lard and shortening.



* Health Canada provides advice for limiting exposure to mercury from certain types of fish. Refer to www.healthcanada.gc.ca for the latest information.

Lobby groups for the meat and dairy sectors are up in arms over indications that Canada's next food guide could discourage the consumption of beef, butter and cheese.

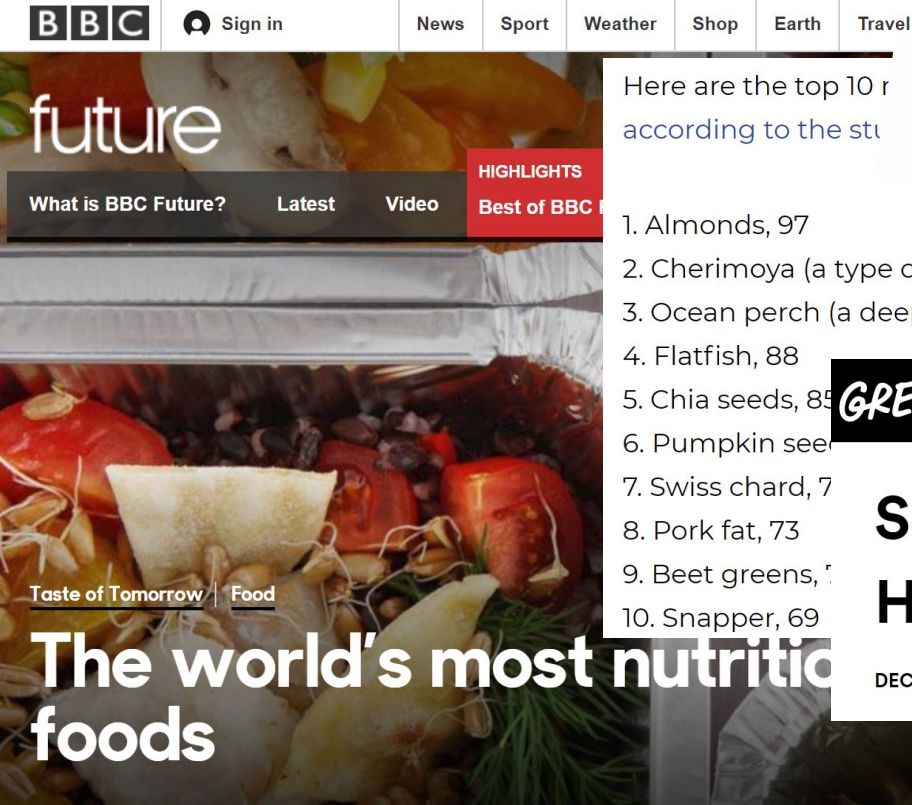
The guide, expected to be released early next year after its first overhaul in a decade, has been instrumental in teaching generations the importance of nutrition and a balanced diet. And while it may not be Health Canada's intention, it can also serve as a key marketing tool for certain food industries.

Earlier this year, Health Canada published guiding principles and recommendations, one of which promotes eating more protein-rich foods derived from plants.

future

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Taste of Tomorrow | Food

The world's most nutritious foods

After analysing more than 1,000 raw foods, researchers ranked the ingredients that provide the best balance of your daily nutritional requirements - and they found a few surprises.

Here are the top 10 ranked ingredients and their nutritional scores, according to the study.

1. Almonds, 97
2. Cherimoya (a type of fruit), 96
3. Ocean perch (a deep-water fish), 89
4. Flatfish, 88
5. Chia seeds, 85
6. Pumpkin seeds, 84
7. Swiss chard, 79
8. Pork fat, 73
9. Beet greens, 71
10. Snapper, 69

Pork fat ranked among top 10 most nutritious foods: Report

GREATIST

Seriously, Though, Is Coconut Oil Healthy or Not?

DECEMBER 5, 2017 | BY JULISSA TREVIÑO

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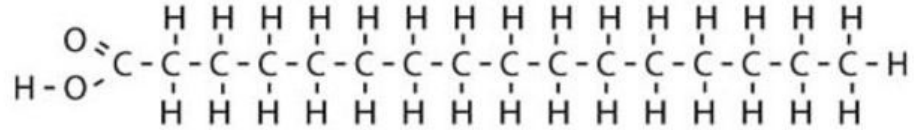
Fat - What is it?

Fat = type of lipid with a chain of carbon atoms bonded to hydrogen atoms

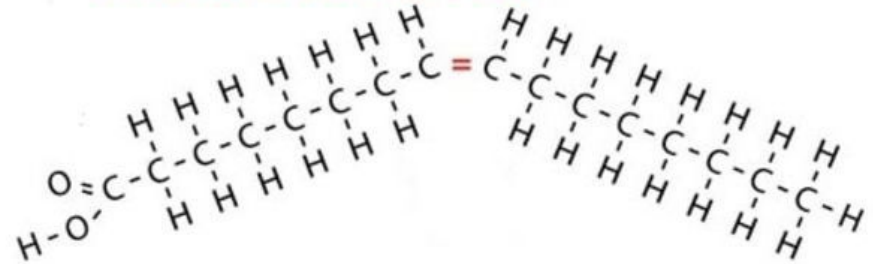
3 different types:

1. Saturated 
2. Unsaturated 
3. Trans 

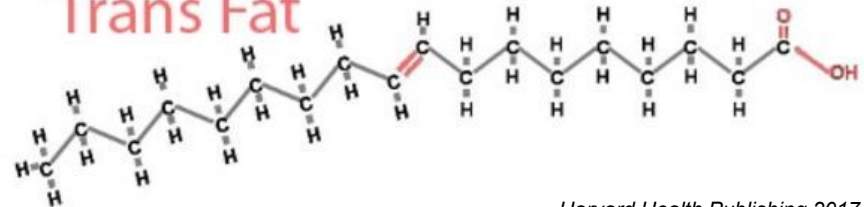
Saturated Fat



Unsaturated Fat

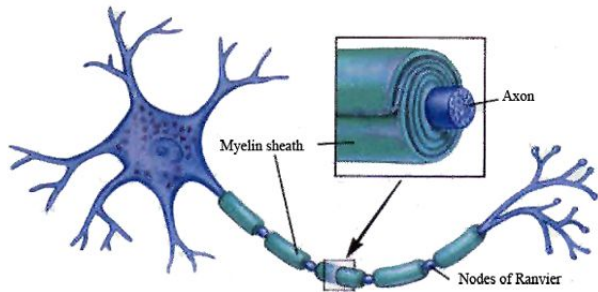


Trans Fat



Fat - Why do we need it?

- Major source of energy
- Growth & development
- Fat-soluble vitamins: A, D, E, K
- Building block of cell membranes, sheaths surrounding nerves
- Blood clotting



Saturated Fat

- Dairy products, incl. butter, cheese and whole milk
- Animal-based foods, incl. beef, lamb, pork and veal, lard & shortening
- Palm oil
- Coconut oil

High intake linked with raised levels of harmful (LDL) cholesterol



Note on Cholesterol



What is it?

- Fat-like substance that is found in ALL cells in our bodies
- Our bodies need some cholesterol to make hormones, vitamin D, etc.
- Our bodies make all the cholesterol that we need
- Levels of cholesterol largely determined by GENETICS

Endogenous and Exogenous Sources of Cholesterol

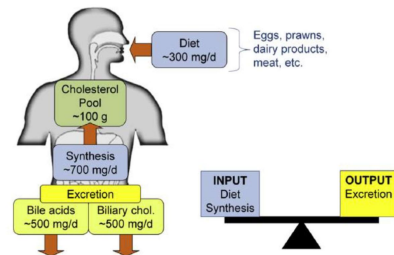


FIGURE 3 Whole body cholesterol homeostasis. Cholesterol homeostasis is achieved when input from diet and synthesis is matched by output through excretion in the bile (both as bile acids and biliary cholesterol).

LDL vs HDL



LDL: “bad” cholesterol - high levels can lead to a buildup of cholesterol in arteries



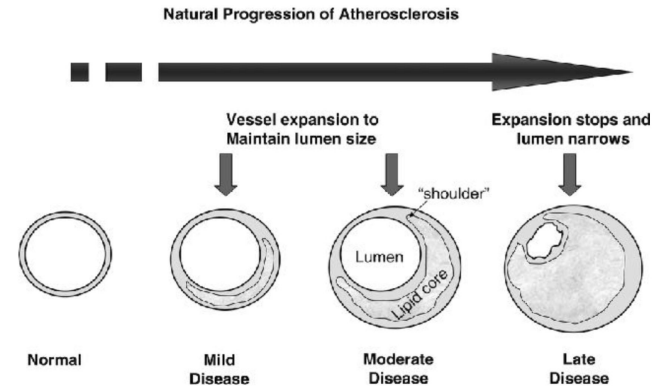
HDL: “good” cholesterol - carries cholesterol from other parts of body back to liver, which is then removed from body

Saturated Fat

Saturated fats can increase your risk of heart disease (one of the leading causes of death in Canada)

How?

- High intake raises your level of LDL (bad) cholesterol
- Plaque build-up
- Reduced O₂ and blood flow



Intake of saturated and trans unsaturated fatty acids and risk of all cause mortality, cardiovascular disease, and type 2 diabetes: systematic review and meta-analysis of observational studies

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Abstract

Go to:

Objective To systematically review associations between intake of saturated fat and trans unsaturated fat and all cause mortality, cardiovascular disease (CVD) and associated mortality, coronary heart disease (CHD) and associated mortality, ischemic stroke, and type 2 diabetes.

Conclusions Saturated fats are not associated with all cause mortality, CVD, CHD, ischemic stroke, or type 2 diabetes, but the evidence is heterogeneous with methodological limitations. Trans fats are associated with all cause mortality, total CHD, and CHD mortality, probably because of higher levels of intake of industrial trans fats than ruminant trans fats. Dietary guidelines must carefully consider the health effects of recommendations for alternative macronutrients to replace trans fats and saturated fats.

Saturated Fat Consumption and Risk of Coronary Heart Disease and Ischemic Stroke: A Science Update

[Joyce A. Nettleton](#),^{a,*} [Ingeborg A. Brouwer](#),^b [Johanna M. Geleijnse](#),^c and [Gerard Hornstra](#)^d

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Abstract

Go to:

At a workshop to update the science linking saturated fatty acid (SAFA) consumption with the risk of coronary heart disease (CHD) and ischemic stroke, invited participants presented data on the consumption and bioavailability of SAFA and their functions in the body and food technology. Epidemiological methods and outcomes were related to the association between SAFA consumption and disease events and mortality. Participants reviewed the effects of SAFA on CHD, causal risk factors, and surrogate risk markers. Higher intakes of SAFA were not associated with higher risks of CHD or stroke apparently, but studies did not take macronutrient replacement into account. Replacing SAFA by *cis*-polyunsaturated fatty acids was associated with significant CHD risk reduction, which was confirmed by randomized controlled trials. SAFA reduction had little direct effect on stroke risk. Cohort studies suggest that the food matrix and source of SAFA have important health effects.

Keywords: Saturated fat, Coronary heart disease, Stroke, Risk factors, Dietary recommendations

Disclosure Statement

Go to:

Financial assistance for this publication, travel funds to attend the SAFA meeting and honoraria were provided to the authors or their institutions from the International Expert Movement to Improve Dietary Fat Quality (IEM; www.theiem.org), the Netherlands Oils and Fats Industry and the Palm Oil Alliance. J.A.N. reports honoraria from Unilever Research and Development. J.M.G. reports grants from Unilever for epidemiological research on dietary and circulating fatty acids in cardiac patients. G.H. reports consultancy fees from the Netherlands Fats and Oils Industry and the European Palm Oil Alliance.

Footnotes

Go to:

¹While this paper was in revision, re-analyses of these cohorts were unable to verify this finding. In contrast, a positive association between SAFA intake and CHD risk was observed [98].

Intake of individual saturated fatty acids and risk of coronary heart disease in US men and women: two prospective longitudinal cohort studies

[Geng Zong](#), postdoctoral fellow,¹ [Yanping Li](#), research scientist,¹ [Anne J Wanders](#), research scientist,² [Marjan Alsema](#), lead scientist,² [Peter L Zock](#), science leader,² [Walter C Willett](#), professor,³ [Frank B Hu](#), professor,³ and [Qi Sun](#), assistant professor⁴

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Abstract

Go to:

Objectives To investigate the association between long term intake of individual saturated fatty acids (SFAs) and the risk of coronary heart disease, in two large cohort studies.

Conclusions Higher dietary intakes of major SFAs are associated with an increased risk of coronary heart disease. Owing to similar associations and high correlations among individual SFAs, dietary recommendations for the prevention of coronary heart disease should continue to focus on replacing total saturated fat with more healthy sources of energy.

Saturated Fat: Current Recommendations

Reducing amount of **total fat intake to <30%** of total energy intake:
→ helps prevent unhealthy weight gain in the adult population

Reducing **saturated fat to <10%** of total energy intake:
→ decreases risk of developing non-communicable disease (incl. DM, heart disease, stroke, cancer)

Saturated **Fat intake can be reduced by:**

- Changing how you cook - remove fatty part of meat; use vegetable oil
- Limit consumption of foods containing high amounts of saturated fat (e.g. cheese, ice cream, fatty meat)

Unsaturated Fat



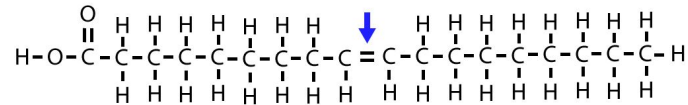
Monounsaturated fats (MUFA)

- Nuts & Seeds
- Avocados
- Vegetable oil, incl:
 - Olive
 - Canola
 - Peanut
 - Sesame
 - Safflower
 - Sunflower

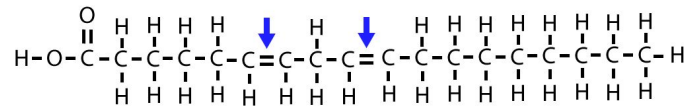
Polyunsaturated fats (PUFA)

- Nuts & seeds
- Fatty fish
- Vegetable oils, incl:
 - Corn
 - Canola
 - Soybean
 - Flaxseed
 - Safflower
 - Sunflower

Oleic acid - Monounsaturated fatty acid



Linoleic acid - Polyunsaturated fatty acid



Monounsaturated Fat - The Seven Countries Study (1960s)



MUFA decreases total and LDL cholesterol levels, and therefore lowers risks of heart disease

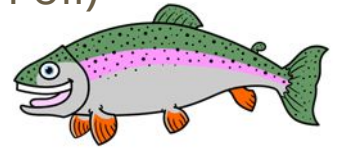
Polyunsaturated Fat

= Essential fats

2 main types:

1. Omega 3 (fatty fish, flaxseeds, walnuts, canola oil, soybean oil)

- Reduces total and LDL cholesterol
- Raises HDL
- Lowers risk of heart disease and stroke



2. Omega 6 (brazil nut, safflower, soybean, sunflower, walnut, and corn oils)

- Reduces total and LDL cholesterol
- Lowers risk of heart disease and stroke



Trans fat

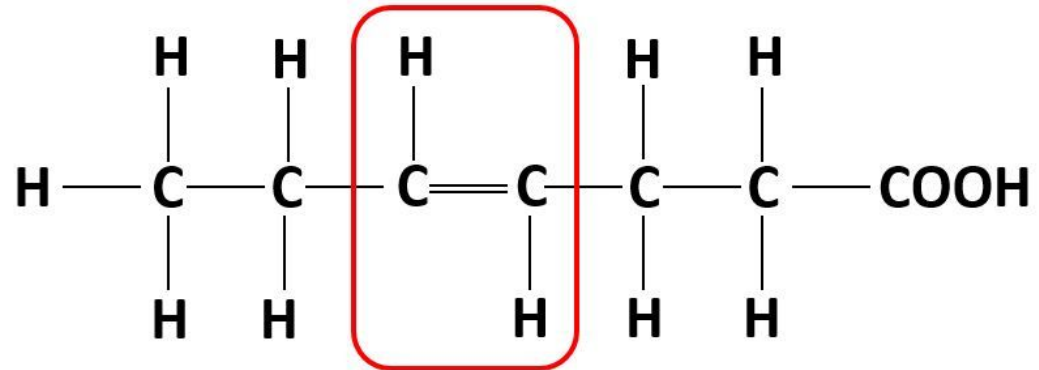
Naturally in:

- Beef
- Lamb
- Dairy products



Industrially-produced trans fat

- Hard margarines
- Vegetable shortenings



Trans Fat and Health

- Double trouble!!
 - Raises LDL
 - Lowers HDL
- Strongly associated with an increased risk of cardiovascular diseases
 - Heart attack
 - Stroke
 - T2DM
- Linked to several types of cancer

“Removing trans fats from the food supply is one of the most straightforward public health interventions for reducing the risk of cardiovascular diseases and some cancers, and improving diet”

- WHO Regional Director for Europe



“why does mcdonalds still use trans fat in their food when it is illegal in many European countrys”



Hi Marcel. We follow Health Canada's Trans Fat Task Force guidelines for trans fats for all of our products. For example, less than 2% of total fat in our oils comes from trans fat. For more information on trans fats in Canada click [here](#). And to learn more about our ingredients' nutrition profiles, please visit our [Nutrition Calculator](#).

October 12, 2012

Trans Fat Timeline

- 1903 - Hydrogenation patented
- 1960 - Trans fats gain popularity
- 1990 - Science finds serious harms
- 1993 - WHO warning
- 1995 - Canada has one of the highest intake of trans fat in the world
- 2002 - Trans fat on labels
- 2004 - Rare political consensus to ban
- 2007 - Government warns industry
- 2009 - Plans for ban scrapped
- 2010 - Government backs away
- 2011 - NDP tries again
- 2013 - US FDA determines trans fats are no longer “generally recognized as safe”
- 2015 - USA FDA announces a ban on artificial trans fats that will come into effect in 2018
- 2017 - Canadian federal health minister, Ginette Petitpas Taylor announces trans fats will be added to 'List of Contaminants and Other Adulterating Substances' effective.....

Health Canada trans fat ban takes effect next year

Artificial trans fat will be off Canadians' dining plates as of 1 year from today

CBC News | Posted: Sep 15, 2017 3:27 PM ET | Last Updated: Sep 15, 2017 3:27 PM ET



Fats - Summary

Sources of fats			
Saturated fats	Polyunsaturated fats	Monounsaturated fats	Trans fats
Butter, ghee, lard, suet, dripping, cheese, cream, full-fat milk and fat on meat and poultry. Processed foods such as burgers, sausages, pastry, pies, cakes, biscuits and rich puddings.	Sunflower, corn, soya and rapeseed oils. Spreads made from these oils. Nuts and seeds.	Olive and rapeseed (canola) oils. Avocados. Some nuts including walnuts, almonds and pecans.	Processed foods (see <i>saturated fats</i>). Fast foods. Takeaway foods.

Poly & mono-unsaturated fats: Good → Incorporate into diet

Saturated fats: OK in moderation → Limit, replace with MUFA & PUFA

Trans fats: Bad → Avoid.

Don't trust everything you read in media. Do your own research with reliable sources!

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Red Meat Consumption



My aim

Focus on the effects that red meat has on health

Review the evidence & help you draw your own conclusions

Provide recommendations for reducing risk of cancer



Outline:

1. Types of meat
2. Nutritional benefits of meat
3. Processed meats & carcinogens
4. Link between red meat & cancer
5. Limitations in research
6. Recommendations: reducing the risk

Types of meat

Red Meat

- beef, veal, pork, lamb, mutton, horse, and goat
- red when raw, dark red when cooked



BEEF



PORK



GOAT (Mutton)



LAMB (A Grade)

White Meat

- meat of poultry (breast)
- chicken, duck, quail, and turkey
- pale in color before and after cooking



CHICKEN



DUCK



QUAIL



TURKEY

Dark Meat

- Meat of poultry (legs)

What are the differences?



Conventional

- Factory farmed
- Grain-fed
- Antibiotics & hormones



Processed

- Processing methods
- Chemicals/preservatives added
- Extend shelf life
- Improve taste



Organic

- Naturally fed (grass-fed)
- No antibiotics or hormones given

Nutritional Benefits of Red Meat

B Vitamins

Thiamin (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), B6, B12

- Build & repair nerve and muscle tissue
- Maintains healthy digestive tract
- Protects the nervous system
- Maintain healthy skin & red blood cells
- Support cell function & metabolism
- Transport of amino acids



Nutritional Benefits of Red Meat

Minerals

- Iron
 - Builds hemoglobin in red blood cells
 - Prevents nutritional anemia
 - Helps with energy production
- Zinc
 - Protects bones
 - Resistance to infection
 - Develops & maintains immune system
- Magnesium
 - Improves bone strength
 - Helps keep blood pressure normal
 - Helps maintain healthy heart muscle

- Phosphorous
- Selenium



Nutritional Benefits of Red Meat

Protein

- Builds & repairs body tissues
- Regulates body processes
- Help fight infection

Fat

- Supplies energy
- Protects & insulates body parts
- Transports vitamins A, D, E, K
- Supplies essential fatty acids



Nutritional Benefits of Red Meat

Creatine

- Stores energy in muscles & increases muscle strength
- Boosts athletic performance
- Speeds muscle growth
- Improves brain function

Carnosine

- Antioxidant
- Protects cells against oxidative stress
- Anti-aging properties



Nutritional Anemia

Iron deficiency

- With a low iron supply, your body's ability to produce healthy red blood cells diminishes

Symptoms

- Weakness, fatigue, pale complexion, increased susceptibility to infection, difficulty concentrating, cold hands & feet.

Common in:

- Adolescence, females, vegetarians, pregnant women

Why does meat have such a bad rap?

What is a carcinogen?

Substances and exposures that can lead to cancer

Ability to damage genome and disrupt cellular pathways

- Lifestyle factors (nutrition, tobacco use, etc.)
- Naturally occurring exposures (ultraviolet light, infectious agents, etc.)
- Medical treatments (radiation and medicines including chemotherapy, hormone drugs, etc.)
- Workplace exposures
- Household exposures
- Pollution

https://www.cancer.org/cancer/cancer-causes/general-info/known-and-probable-human-carcinogens.html#additional_resources

Processed Meats

Meat that has gone through various processing methods such as:

- Curing
 - nitrite and/or nitrate for preservation, flavour and colour
- Smoking
 - exposing meat to smoke for flavouring, browning, cooking, or preserving food
- Fermenting
 - Preserves meat & adds flavour
- Adding preservatives
 - Reduces microbial growth & increases shelf life
- Salting

Ham, bacon, salami, sausages, burgers, etc.

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4698595/>



Meat Consumption & Carcinogens

N-nitroso compounds (NOC)

- Mutagenic and potent carcinogenic agents in animals
- Found in processed meats
- Nitrates, nitrites

Heterocyclic amines (HCAs) and polycyclic aromatic hydrocarbons (PAHs)

- Potent carcinogens
- Produced during high-temperature or open flame cooking (grilling, pan-frying, barbecuing)

Oxidation of Iron

- Iron is easily oxidized in the intestinal tract cells
- Cause cell damage
- Iron can act as a catalyst for NOC formation

Colorectal Cancer

Cancer most associated with red meat consumption

Cancer of the colon and rectum

3rd most commonly diagnosed cancer in men and the second in women - according to the World Health Organization (WHO)

- 3rd leading cause of cancer-related deaths

Lifetime risk:

- Men: 1 in 22 (4.49%)
- Women: 1 in 24 (4.15%)

<https://www.cancer.org/cancer/colon-rectal-cancer/about/key-statistics.html>

International Agency for Research on Cancer

Part of the World Health Organization (WHO)

One of its major goals is to identify causes of cancer

Evaluate possible cancer-causing candidates, and place them into one of the following groups:

- Group 1: Carcinogenic to humans
- Group 2A: Probably carcinogenic to humans
- Group 2B: Possibly carcinogenic to humans
- Group 3: Unclassifiable as to carcinogenicity in humans
- Group 4: Probably not carcinogenic to humans

Link between meat & cancer?

In 2015, 22 scientists from 10 countries met at the International Agency for Research on Cancer (IARC) to evaluate the relationship between the consumption of red meat and cancer.

- Reviewed more than **800 observational studies** to reach conclusions
- Examined red meat eaters over time to see if they developed cancer
- Examined various cancers in populations with different diets
- Hundreds and thousands of subjects

Key Terms

Correlation:

- Association/relationship between two variables
- Correlation is positive when two variables increase together

Causation:

- Cause and effect relationship
- When a variable **causes** the outcome of another variable

IARC Monographs evaluate consumption of red meat and processed meat

Lyon, France, 26 October 2015 – The International Agency for Research on Cancer (IARC), the cancer agency of the World Health Organization, has evaluated the carcinogenicity of the consumption of red meat and processed meat.

Red meat

After thoroughly reviewing the accumulated scientific literature, a Working Group of 22 experts from 10 countries convened by the IARC Monographs Programme classified the consumption of red meat as probably carcinogenic to humans (Group 2A), based on limited evidence that the consumption of red meat causes cancer in humans and *strong* mechanistic evidence supporting a carcinogenic effect.

This association was observed mainly for colorectal cancer, but associations were also seen for pancreatic cancer and prostate cancer.

Processed meat

Processed meat was classified as *carcinogenic to humans (Group 1)*, based on sufficient evidence in humans that the consumption of processed meat causes colorectal cancer.

Meat consumption and its effects

The consumption of meat varies greatly between countries, with from a few percent up to 100% of people eating red meat, depending on the country, and somewhat lower proportions eating processed meat.

The experts concluded that each 50 gram portion of processed meat eaten daily increases the risk of colorectal cancer by 18%.

IARC findings

Classified red meat as “**probably carcinogenic to humans**” and processed meats as “**carcinogenic to humans**”

Eating 50g of **processed meat** everyday increased the risk of colorectal cancer by 18%

- Equivalent of about 4 strips of bacon or 1 hot dog

WHO classification of red and processed meats

IARC* Carcinogenic Classification Groups

Likelihood
causes cancer
High to Low



Causes cancer: Processed meats including

Sausages
and hotdogs



Bacon



Salami



Probably causes cancer: Red meats including

Pork



Beef



Lamb



Source: Cancer Research UK, WHO

*International Agency for Research on Cancer



<https://www.cancer.org/cancer/colon-rectal-cancer/about/key-statistics.html>

Limitations in the WHO Research

Observational in nature

- No manipulation from researchers, they simply just sit and watch

Confounders

- Failed to take into account cooking methods, other lifestyle factors

Research is not strong enough (limited evidence)

- Cannot establish clear causal relationship

Limited evidence means that a positive association has been observed between exposure to the agent and cancer but that other explanations for the observations (technically termed chance, bias, or confounding) could not be ruled out.

<https://www.cancer.org/cancer/colon-rectal-cancer/about/key-statistics.html>

Group 1 Carcinogens

WHO classified processed meat as a Group 1 carcinogen (smoking and alcohol found in this group)

- Level of risk differs

Processed meat being “carcinogenic” still contributes very minimally to the risk of developing cancer

[Oncol Rev.](#) 2015 Feb 10; 9(1): 288.

Published online 2015 Dec 28. doi: [10.4081/oncol.2015.288](https://doi.org/10.4081/oncol.2015.288)

Red Meat and Colorectal Cancer

[Nuri Faruk Aykan](#)

[Author information](#) ► [Article notes](#) ► [Copyright and License information](#)

Processed meats are carcinogenic
new review of evidence

BMJ 2015 ; 351 doi: <https://doi.org/10.1136/bmj.h5729>

(Published 26 October 2015)

Cite this as: *BMJ* 2015;351:h5729

Carcinogenicity of consumption of red and processed meat

Véronique Bouvard, Dana Loomis, Kathryn Z Guyton, Yann Grosse, Fatiha El Ghissassi, Lamia Benbrahim-Tallaa, Neela Guha, Heidi Mattock, Kurt Straif on behalf of the International Agency for Research on Cancer Monograph Working Group

Published: 26 October 2015

[PLoS One.](#) 2011; 6(6): e20456.

Published online 2011 Jun 6.

doi: [10.1371/journal.pone.0020456](https://doi.org/10.1371/journal.pone.0020456)

PMCID: PMC3108955

Red and Processed Meat and Colorectal Cancer Incidence: Meta-Analysis of Prospective Studies

[Doris S. M. Chan](#),¹ [Rosa Lau](#),¹ [Dagfinn Aune](#),¹ [Rui Vieira](#),¹ [Darren C. Greenwood](#),² [Ellen Kampman](#),³ and [Teresa Norat](#)^{1,*}

Things to consider..

Correlation does not mean causation

Based on food questionnaires - people asked to remember what they ate in the past

Confounding factors that increase risk of colorectal cancer:

- Poor dietary and lifestyle choices
- Alcohol and tobacco use
- Lack of exercise, obesity
- Exposure to other carcinogens

Cancer Research (2010)

Participants: 300, 948 men and women

Study focuses on mechanisms for the link between high meat consumption and risk

- Detailed questionnaire on meat type
- Cooking methods

Seven years follow up

- Found 2, 719 colorectal cancer cases

Confirmed positive association

<https://www.ncbi.nlm.nih.gov/pubmed/20215514>

Prevention and Epidemiology

A Large Prospective Study of Meat Consumption and Colorectal Cancer Risk: An Investigation of Potential Mechanisms Underlying this Association

Amanda J. Cross, Leah M. Ferrucci, Adam Risch, Barry I. Graubard, Mary H. Ward, Yikyung Park, Albert R. Hollenbeck, Arthur Schatzkin, and Rashmi Sinha

DOI: 10.1158/0008-5472.CAN-09-3929 Published March 2010

EPIC Trial

Participants: 478, 040 men and women (35-69 yrs)

Collected information about diet and lifestyle

Follow up (4.8 years)

- 1,329 colorectal cancers

[J Natl Cancer Inst.](#) 2005 Jun 15;97(12):906-16.

Meat, fish, and colorectal cancer risk: the European Prospective Investigation into cancer and nutrition.

[Norat T¹](#), [Bingham S](#), [Ferrari P](#), [Slimani N](#), [Jenab M](#), [Mazuir M](#), [Overvad K](#), [Olsen A](#), [Tjønneland A](#), [Clavel F](#), [Boutron-Ruault MC](#), [Kesse E](#), [Boeing H](#), [Bergmann MM](#), [Nieters A](#), [Linseisen J](#), [Trichopoulou A](#), [Trichopoulos D](#), [Tountas Y](#), [Berrino E](#), [Palli D](#), [Panico S](#), [Tumino R](#), [Vineis P](#), [Bueno-de-Mesquita HB](#), [Peeters PH](#), [Engeset D](#), [Lund E](#), [Skeie G](#), [Ardanaz E](#), [González C](#), [Navarro C](#), [Quirós JR](#), [Sanchez MJ](#), [Berglund G](#), [Mattisson I](#), [Hallmans G](#), [Palmqvist R](#), [Day NE](#), [Khaw KT](#), [Key TJ](#), [San Joaquin M](#), [Hémon B](#), [Saracci R](#), [Kaaks R](#), [Riboli E](#).

The higher the consumption of red meat and processed meat, the higher the risk of CRCA.

- Inverse for fish
- No impact for poultry intake

High Temperature Cooking

Creates chemical reactions among amino acids, creatines, and sugars — reactions that may produce dangerous carcinogens and mutagens

Produces heterocyclic amines (HCAs) & polycyclic aromatic hydrocarbons (PAHs)

<https://www.myoleanfitness.com/red-meat-and-cancer-risk/>



Concerned about Red Meat?

Limit consumption of red meat & processed meat

- No more than 70g/day

Poultry

- Less saturated fats than red meat
- Lower cholesterol content than red meat

Lean, organic meat

- Extra lean ground beef, turkey, etc.

Fish

- Omega-3-fatty acids (help reduce the risk of cardiovascular disease)
- 2 portions/week



Each of these is about 70g



Concerned about Red Meat?

Meat alternatives

- Legumes (beans, lentils, chickpeas)

Increase fibre intake

- Vegetables, fruits, and whole grains
- Help protect against CRCA
- Protects lining of the colon
- Makes you feel fuller
- Promotes regular bowel movement

Obtain Iron elsewhere

- Spinach, nuts and seeds, iron-fortified cereals or bread



HOW MUCH MEAT DO YOU EAT A DAY?

HOW YOUR PROCESSED AND RED MEAT CONSUMPTION CAN ADD UP OVER A DAY...

ENGLISH BREAKFAST



Two sausages... 60g
Three rashers
of bacon..... 75g

CUT IT DOWN

One sausage..... 30g
One rasher
of bacon..... 25g

HAM SANDWICH



Two slices
of ham..... 50g

SWAP IT

Substitute ham
for chicken
or tuna..... 0g

SPAGHETTI BOLOGNESE



Minced beef
in a regular
portion..... 100g

BULK IT OUT

Use less meat
and add beans
or extra veggies... 15g

285g

TOTAL
EATEN

70g

RECOMMENDED
DAILY LIMIT OF
CONSUMPTION

Reducing the risk of CRCA & other cancers

Avoid cooking with high temperatures

Avoid blackened/charred meat

Avoid tobacco

Eat healthy

Regular physical activity

Limit alcohol consumption

Reduce Your Risk of Colon Cancer



Get or stay active!



Reduce or eliminate red & processed meat



Maintain a healthy weight



Stop smoking

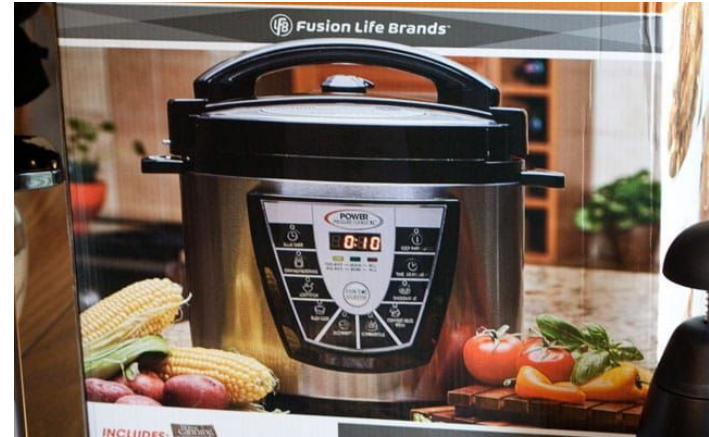
Cooking Red Meat

Avoid/limit

- Grilling/ barbecuing
- Pan frying
- Broiling?

Choose

- Roasting & baking
- Pressure cooking
- Using a crock pot (slow cooking)
- Sous-Vide



Conclusions

Accumulated evidence indicating an association between consuming red meat and colorectal cancer

- **Causation cannot be established**

Processed red meat & cancer are more strongly correlated

Recommend a diet that limits processed meat and red meat, and that is high in vegetables, fruits, and whole grains.

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9. World Health Organization Says Processed Meat Causes Cancer (n.d.). Retrieved March 16, 2018, from <https://www.cancer.org/latest-news/world-health-organization-says-processed-meat-causes-cancer.html>

Hold the Gluten?



Gluten: fact or fiction?

The same wheat has been cultivated for thousands of years therefore gluten sensitivity can not possibly exist

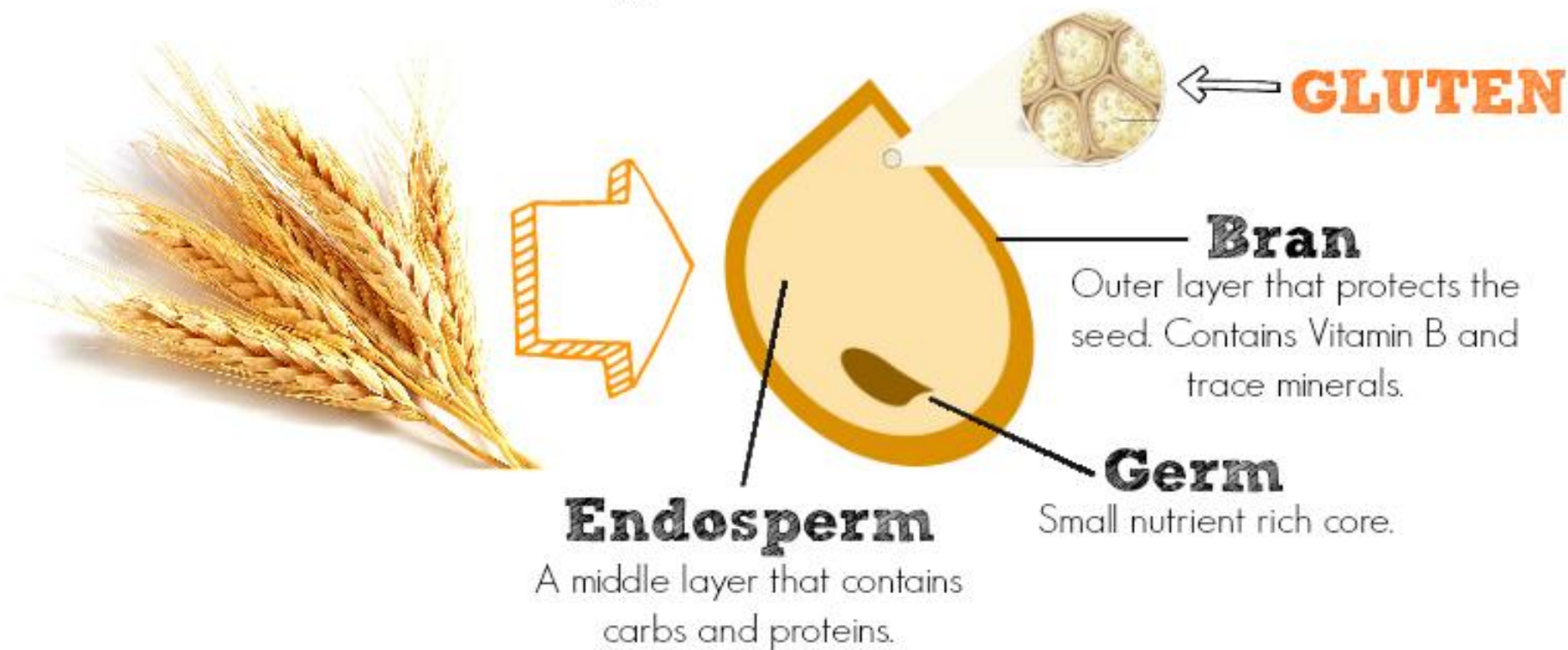
Non-celiac gluten sensitivity is supported by considerable scientific evidence

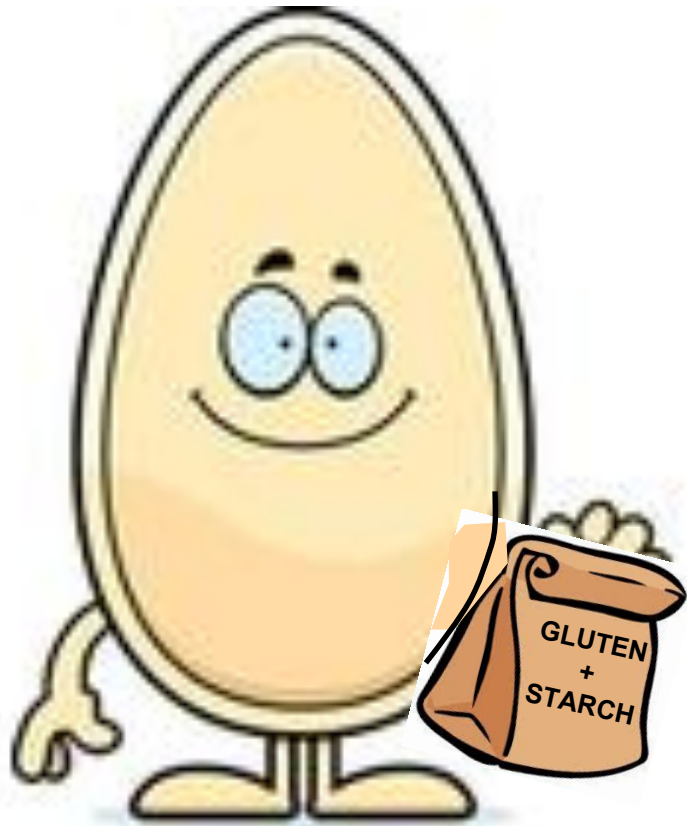
Eating gluten free is inherently healthier than diets containing gluten

What is gluten?

- Gluten is a high molecular weight storage protein in plants such as wheat, barley, oats, and rye
- Gluten and starch are found in the endosperm of plant seeds, which nourishes seeds during development and germination
- Not all grains contain gluten – *e.g. rice, corn, soy, quinoa, flax, and chia*
- The term “gluten” comes from the Latin word for glue, “glutinium” due to its elastic properties

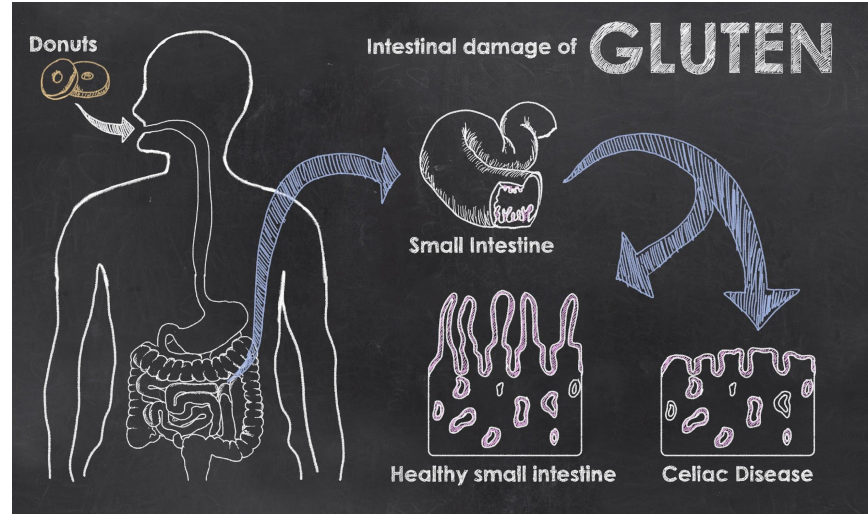
Anatomy of a Grain





Introduction to gluten sensitivity: celiac disease

- Gluten is digested by genetically susceptible individuals and a breakdown product of gluten (**gliadin**) is recognized by the immune system, resulting in an inflammatory response, mucosa changes, and antibody production against the gluten metabolic pathway



Robbins basic pathology 10th edition

Gujral, Naiyana, Hugh J Freeman, and Alan B R Thomson. 2012. "Celiac Disease: Prevalence, Diagnosis, Pathogenesis and Treatment." *World journal of gastroenterology* 18(42): 6036–59. <http://www.ncbi.nlm.nih.gov/pubmed/23155333> (March 11, 2018).



Normal Intestinal Villi

(Source: library.med.utah.edu)



Damaged Villi (Celiac Disease)

(Source: <https://commons.wikimedia.org/wiki/User:Nephron>)

Introduction to celiac disease

- Estimated to affect 0.5 – 1% of people worldwide
- Diagnosis is made based on clinical history, serology (anti-tTG), and duodenal biopsy
- Treatment is to remove gluten from diet

SYMPTOMS OF CELIAC DISEASE

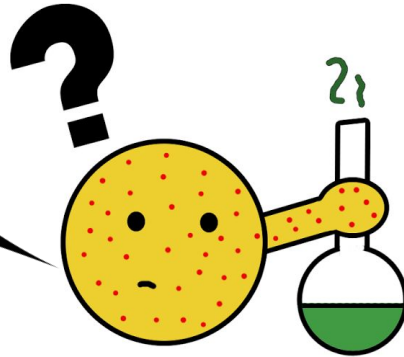


Robbins basic pathology 10th edition

Gujral, Naiyana, Hugh J Freeman, and Alan B R Thomson. 2012. "Celiac Disease: Prevalence, Diagnosis, Pathogenesis and Treatment." *World journal of gastroenterology* 18(42): 6036–59. <http://www.ncbi.nlm.nih.gov/pubmed/23155333> (March 11, 2018).

Celiac disease and hypersensitivity reactions

But wait, if the immune system is sensitive to gluten can it cause **anaphylaxis** in celiac disease?



Anaphylaxis

Cytotoxic

immune complex

Delayed type 

Wheat Allergy

- Rare (<0.5%) type I (immediate) hypersensitivity to wheat
- Symptoms can range from vomiting, diarrhea, rash, and eczema to asthma and anaphylaxis depending on degree of sensitivity
- May be caused by ingestion, inhalation, or skin contact

People with wheat allergy must watch what they eat.



History of wheat cultivation

- Artificial breeding of wheat to select for the most fit variant that can better adapt to extreme climates, be more resistant to disease, and produce better quality bread has altered the molecular makeup of gluten
- The molecular makeup of gluten, as it exists today, is more likely to be recognized by the immune system of an individual with celiac disease than historical variants

The same wheat has been cultivated for thousands of years therefore gluten sensitivity can not possibly exist

Non-celiac gluten sensitivity (NCGS)

- Individuals **without celiac disease** or wheat allergy that report **symptoms associated with gluten ingestion** that disappear with avoidance of gluten-containing foods
- Symptoms include abdominal pain (68%), diarrhea (33%), headaches (35%), chronic fatigue (33%), disturbances in attention (22%), and anemia (20%)
- NCGS is often diagnosed as irritable bowel syndrome (IBS)
- The prevalence is estimated to be 0.6 – 6% in the US

Elli, Luca, Leda Roncoroni, and Maria Teresa Bardella. 2015. "Non-Celiac Gluten Sensitivity: Time for Sifting the Grain." *World Journal of Gastroenterology* 21(27): 8221. <http://www.ncbi.nlm.nih.gov/pubmed/26217073> (March 11, 2018).

Czaja-Bulsa, Grażyna. 2015. "Non Coeliac Gluten Sensitivity – A New Disease with Gluten Intolerance." *Clinical Nutrition* 34(2): 189–94.

NCGS: The hard evidence

- There is evidence that the immune system of individuals with NCGS is similar to individuals with celiac disease (50% have HLA-DQ2 or DQ8 molecules)
- 25 – 57% of non-celiac individual who identify as having a gluten sensitivity have anti-gliadin (gluten breakdown product) antibodies
- Therefore, some evidence exists to indicate that non-celiac individuals who identify as being gluten sensitive have immune systems that are capable of responding to gluten

NCGS: The controversy

- No diagnostic markers or specific clinical diagnostic criteria exists for identifying non-celiac gluten sensitivity
- It is unclear whether individuals with gluten sensitivities are truly responding to gluten or something else
- There continues to be widespread and unfounded speculation of the health benefits of gluten avoidance resulting in a massive industrial expansion, with an estimated 15 billion dollar market worldwide



NCGS: The controversy

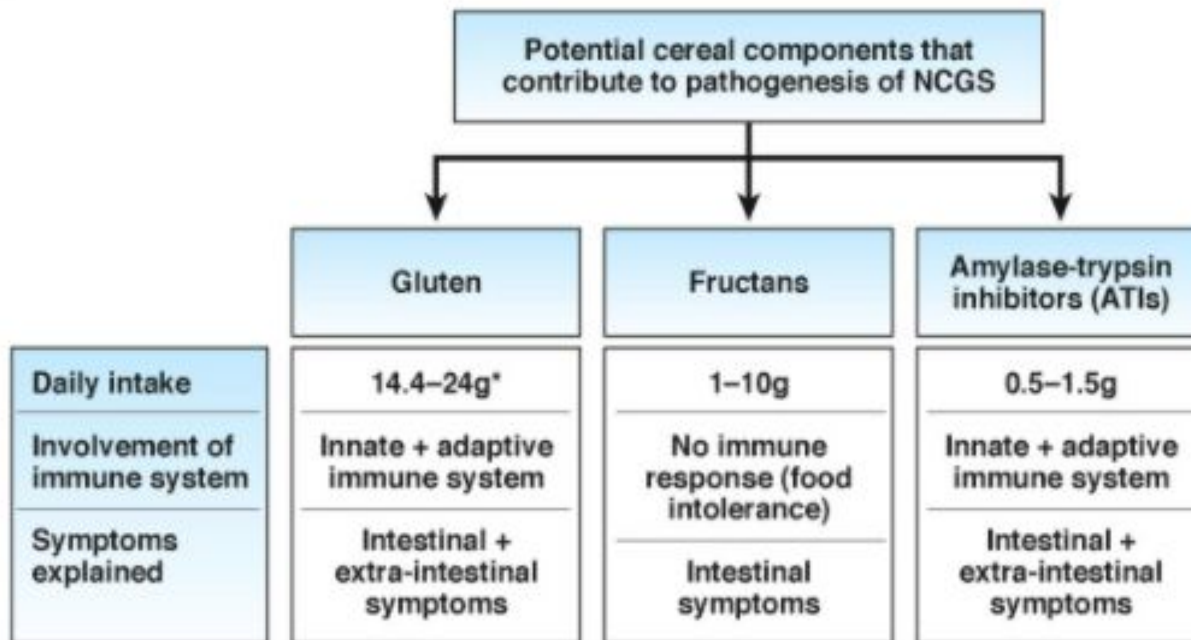


Figure adapted from Verbeke, Kristin. 2018. "Nonceliac Gluten Sensitivity: What Is the Culprit?" *Gastroenterology* 154(3): 471–73. <https://www-sciencedirect-com.ezproxy.library.ubc.ca/science/article/pii/S0016508518300258?via%3Dihub> (March 9, 2018).

NCGS: The controversy

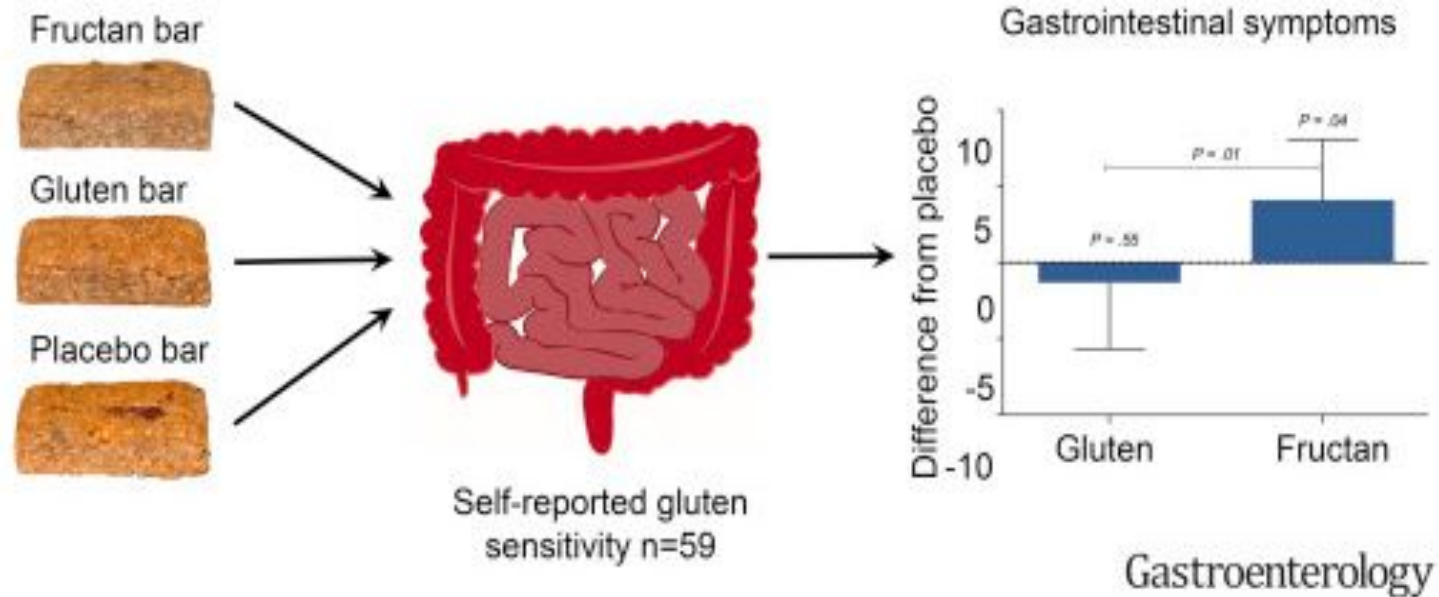


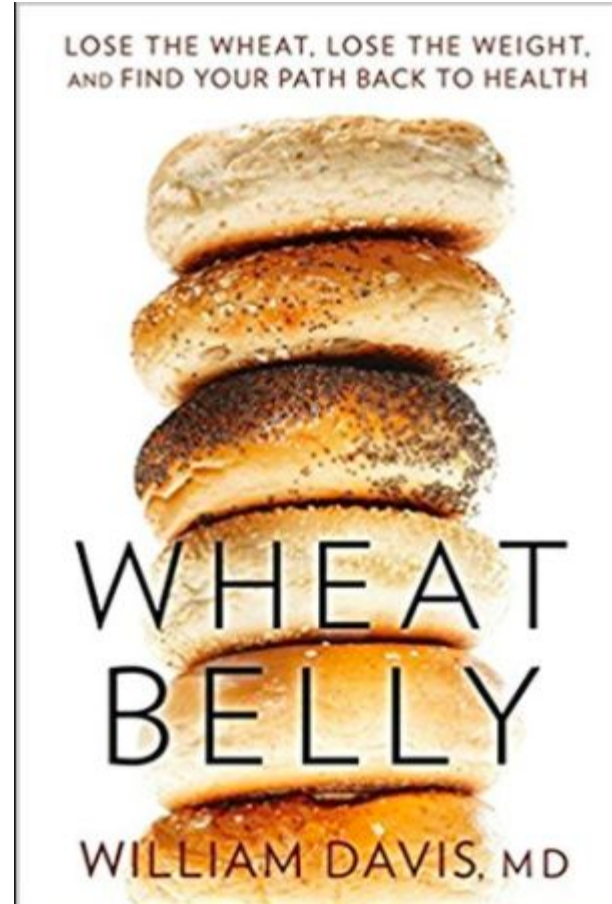
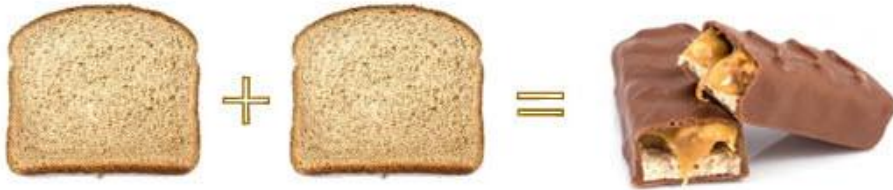
Figure adapted from Skodje, Gry I. et al. 2018. "Fructan, Rather Than Gluten, Induces Symptoms in Patients With Self-Reported Non-Celiac Gluten Sensitivity." *Gastroenterology* 154(3): 529–539.e2. <http://www.ncbi.nlm.nih.gov/pubmed/29102613> (March 9, 2018).

Gluten and social media



Gluten and social media

“Lose the wheat, lose the weight and find your path back to health”



Gluten and social media



Gluten and social media

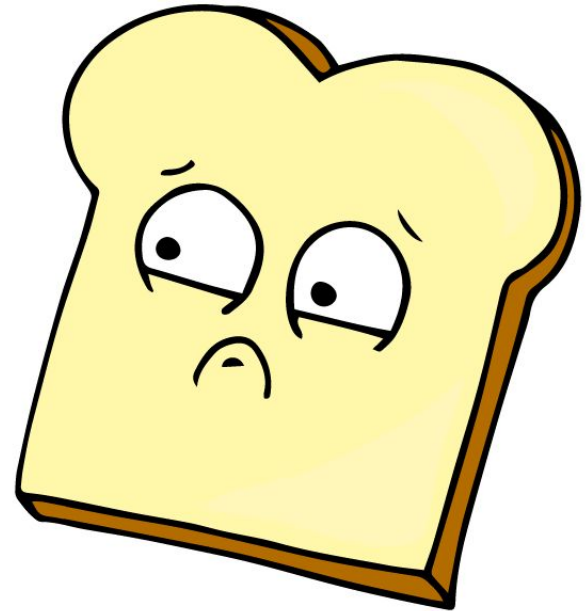


Gluten and social media



Gluten and social media

- Many people eat gluten free because they feel it is healthier
- Up to 30% of people in the US may minimize or avoid gluten due to concerns regarding inflammation, obesity, neuropsychiatric problems, and cardiovascular disease
- Only ~ 1 in 4 people who self-report as NCGS fulfill criteria for diagnosis and are often not adequately investigated for celiac disease



Pros and cons of a gluten free diet

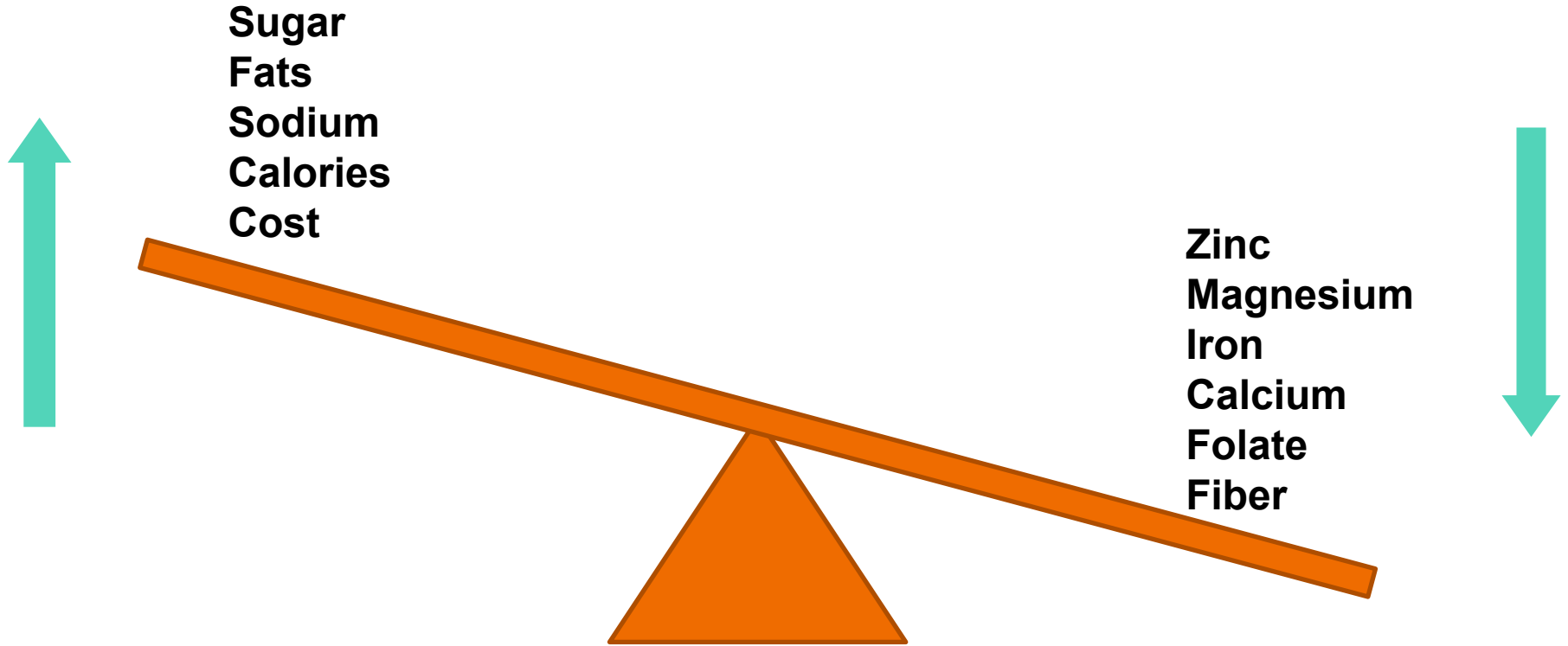
Pros:

- In celiac disease – a gluten-free diet is associated with decreased cardiovascular disease, cancer risk, as well as increased iron and micronutrient stores

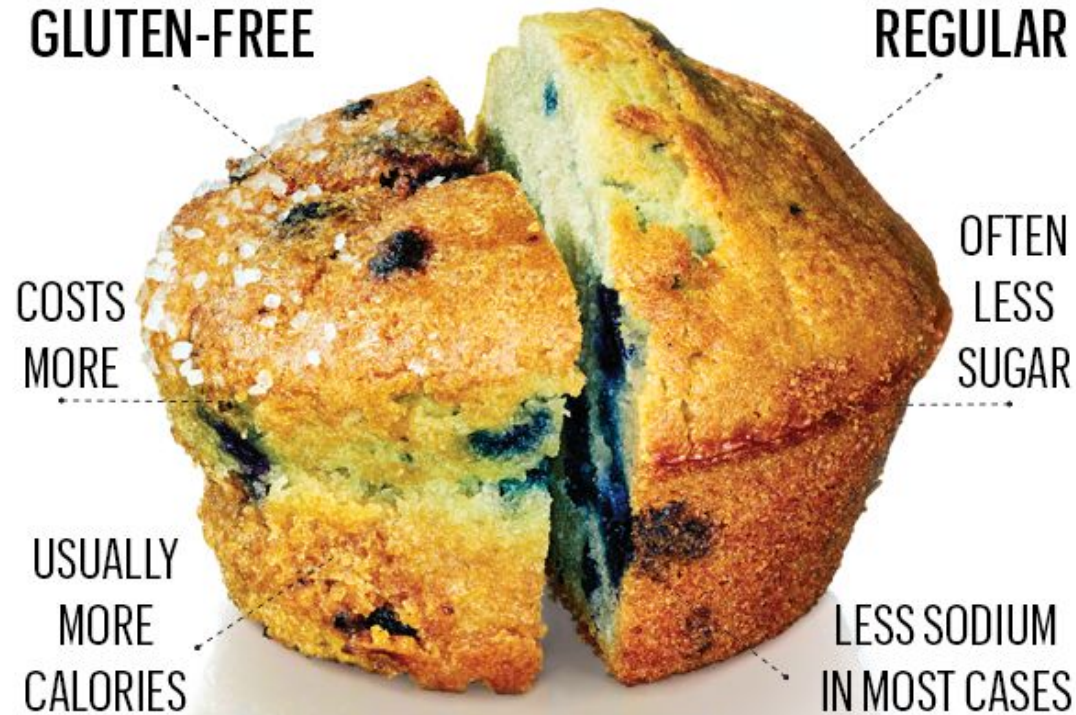
Cons:

- Gluten-free food is generally **more expensive**
- Gluten-free diets tend to contain **more sugar and fat but low in fiber**
- Gluten-free diets tend to be associated with **micronutrient deficiencies**

Pros and cons of a gluten free diet



Pros and cons of a gluten free diet



Gluten: fact or fiction?

The same wheat has been cultivated for thousands of years therefore gluten sensitivity can not possibly exist

Non-celiac gluten sensitivity is supported by considerable scientific evidence

Eating gluten free is inherently healthier than diets containing gluten

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Nutritional supplements



Who needs a stimulant??



Background

Who am I?

- Third year medical student, worked in a variety of medical specialties
- Studied nutrition during my undergraduate degree

Why do I care?

- General interest in the subject with an aptitude to change my diet based on research I found reliable
- Patients ask all the time

Outline

1. The real world of supplements: an introduction
2. The great unknown
3. Multivitamins
4. Glucosamine chondroitin
5. Vitamin D / Calcium
6. Omega - 3
7. Probiotics
8. Others
9. Take home points



Nutritional supplements



“ Well my brother told me about taking some _____. What do you think about that? ”

“ Hey doc, should I be taking this ”

“ I’ve just felt so much better since I’ve started taking ____.” “ Ok then, that’s fine if it’s working I suppose...”

Nutritional supplements: the stats



Published in major medical journal (JAMA) March 6, 2018

- 52% of US adults use at least 1 supplement product; 10% use 4.
- 90,000 products on the market
- \$30 billion industry

- “Most studies have not demonstrated clear benefit for prevention of disease”
- “May have harmful effects, including increased mortality from high doses of beta carotene, folic acid, vitamin E, selenium”

The great unknown



Good data:

1. Multivitamins
2. Vitamin D and Calcium
3. Glucosamine chondroitin
4. Fish oil / omega 3
5. A few others

Little to no data:

1. CoQ10
2. Herbal extracts
3. Saint Johns Wort
4. Gingko biloba
5. Hydrangea
6. Cramp bark
7. Peppermint oil
8. Catnip
9. Elderberry
10. Hibiscus
11. Ginseng
12. Hops
13. Rosemary oil
14. Literally anything else

The great unknown



What a doctor needs to know:

1. Does it work
2. Is it safe

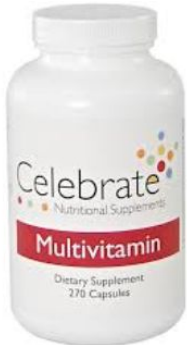
What's the best way to answer these?

- Randomized controlled trial
- Meta-analysis
- Grain of salt

Multivitamins



- Most popular supplement
- Taken for “general health” or “possibly lacking things in my diet”
- Act in a variety of ways given the mixed composition
- Vary in price



Multivitamins



- Cancer or cardiovascular disease
 - Physicians health study: 14 641 male doctors over the age of 50 followed for 11 years. **Hazards ratio 0.92** (0.86-0.998; P=0.04) for **total cancer** but no significant reduction in any site specific cancer. No effect seen for women (1)
 - Annals of internal medicine: Limited evidence supports **any benefit** from supplementation for prevention of cancer or CVD (2)
- Safety
 - Recent summary article in JAMA: Well proven to be **safe** for long term use (3)
- Poor diet
 - **No change** in stroke risk for women (n=86142), even for those with low quality diet (4)

Multivitamins



SAFE

NOT EFFECTIVE

NO dosing concerns



Glucosamine Chondroitin



- Victoria special
- Commonly used for preventing arthritis or helping reduce pain in people with arthritis
- Some people also give it to their aging pets



Glucosamine Chondroitin

- **No impact** on **perceived joint pain** (hip and knee) when compared to placebo, either alone or in combination. No impact on **joint space narrowing** (n=3803) (1)
- **No good evidence** to support use for hip or knee OA for patient factors based on pain severity, BMI, sex, structural injuries. (2)
- High quality, double blinded (n=164) study actually showed **placebo to be more effective** over 6 months. (3)
- “Uncertainty around the clinical benefit of using these agents” in canines. (4)

1. Effects of glucosamine, chondroitin, or placebo in patients with osteoarthritis of hip or knee: network meta-analysis. *BMJ* 2010; 341 doi: <https://doi.org/10.1136/bmj.c4675> (Published 16 September 2010)
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4. *Open Veterinary Journal*, (2017), Vol. 7(1): 36-49



Glucosamine Chondroitin



SAFE

NOT
EFFECTIVE

NO dosing
concerns

Vitamin D + Calcium



- Impact calcium homeostasis
- The 49th parallel
- Bye bye winter blues



Vitamin D + Calcium

- Hip fractures
 - Study of post-menopausal women taking 1g Ca, 400 IU Vit D vs. placebo (n=36282) 1% increase in bone density but no change in risk of hip fracture, and 17% increased risk of kidney stones. (1)
 - Study of 30970 patients showed 15% risk reduction of fracture for non/institutionalized individuals. With 30% reduction in hip fracture. (2) By the national osteoporosis foundation...
- Cardiovascular disease
 - No effect at combined dose <2.5g per day (6)
- Overall mortality
 - Vitamin D3 (not other subtypes) **reduced mortality** for institutionalized patients by 6% (n=73927) (3)
- Depression
 - No effect with Vitamin D supplementation (n=3191, 4923). (4,5)

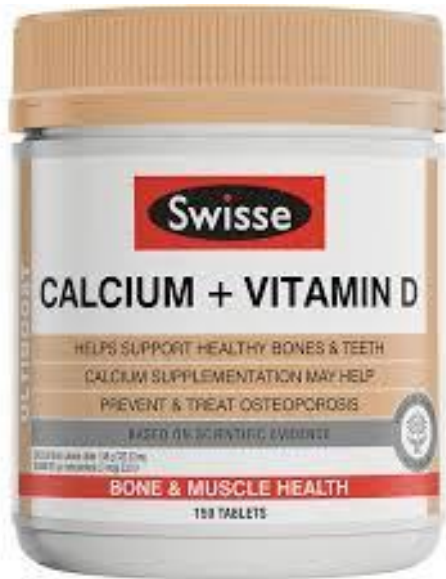
Vitamin D + Calcium



- Rickets
 - Children require Vitamin D to aid with normal growth and prevention of rickets (with soft bones). (health link BC)
- Verdict for Canadians
 - Adults over 50 should have 400IU per day as a supplement (Health Canada)

1. Calcium plus Vitamin D Supplementation and the Risk of Fractures February 16, 2006. N Engl J Med 2006; 354:669-683
2. Calcium plus vitamin D supplementation and risk of fractures: an updated meta-analysis from the National Osteoporosis Foundation. Osteoporosis International. January 2016, Volume 27, Issue 1, pp 367–376.
3. <https://link.springer.com/article/10.1007/s00198-015-3386-5>
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5. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4008710/>
6. [http://www.nutritionjrnal.com/article/S0899-9007\(14\)00485-7/abstract](http://www.nutritionjrnal.com/article/S0899-9007(14)00485-7/abstract)
7. <https://annals.org/aim/fullarticle/2571714/lack-evidence-linking-calcium-without-vitamin-d-supplementation-cardiovascular-disease>
8. <https://jamanetwork.com/journals/jama/fullarticle/204651>

Vitamin D + Calcium



SAFE
(usually)

EFFECTIVE
- Fractures
- Rickets

NO dosing
concerns

Omega 3 / Fish oils



- Taken for a variety of reasons but often related to preventing dementia, cancer, cardiovascular diseases, or depression
- Mechanism: signal transduction changes at cell membrane and gene expression

Omega 3 / Fish oils

- Depression
 - **Adjuvant** therapy for those with a diagnosis of MDD (19 combined trials) (1)
- Cancer
 - **No impact** on prostate cancer (36 trials) (2,3)
 - Breast (1/3/7); colorectal (0/1/17); lung (1/1/4); skin (1/0/0); no risk for bladder, lymphoma, ovarian, pancreatic, stomach (5)
- Cardiovascular disease
 - Reduce mortality by 9% in those with **pre-existing** heart disease, but indeterminate for primary prevention. (4)
- Dementia
 - **No change** in the risk of dementia, however fish intake over 500g/wk associated with 16% lower risk. (6)

1. Role of Omega-3 Fatty Acids in the Treatment of Depressive Disorders: A Comprehensive Meta-Analysis of Randomized Clinical Trials. Plos One. May 2014.
2. Michael T. Dinwiddie, Paul D. Terry, Jay Whelan & Rachel E. Patzer (2015) Omega-3 Fatty Acid Consumption and Prostate Cancer: A Review of Exposure Measures and Results of Epidemiological Studies, Journal of the American College of Nutrition, 35:5, 452-468, DOI: 10.1080/07315724.2015.1032444
3. <http://journals.sagepub.com/doi/abs/10.1177/1534735416656052>
4. <http://circ.ahajournals.org/content/early/2017/03/13/CIR.0000000000000482.short>
5. <https://jamanetwork.com/journals/jama/fullarticle/202260>
6. Omega-3 fatty acids intake and risks of dementia and Alzheimer's disease: A meta-analysis. Neuroscience & Biobehavioral Reviews. 2015.

Omega 3 / Fish oils



SAFE

EFFECTIVE

- Depression
- Cardiovascular dis.

NO dosing concerns

Probiotics



- Usually taken to “restore normality/achieve balance in gut bacteria”



Probiotics

- Pregnancy
 - Meta-analysis of 27 studies “no increase or decrease preterm birth or secondary outcomes.” (1)
 - **Reduced neonatal mortality** in babies (n=1224) small for gestational age (lowest 5%) by 1.6%. (4)
- Weight loss / diabetes
 - Meta-analysis of 15 studies (n=957) showed significant increased weight reduction over 3-12 week period, by 0.9 lb (2)
 - Borderline efficacy in aiding management of diabetes, only with multiple species. (6)
- Depression
 - Meta-analysis of 5 studies (n=365) showed significant reduction in depression rating scale, no comment on efficacy, “more rigorous RCTs are necessary.” (3)
- Significantly improved symptoms of IBS (n=1351). (5)

1. Pregnancy outcomes in women taking probiotics or prebiotics: a systematic review and meta-analysis. BMC. 2017.
2. Effects of probiotics on body weight, body mass index, fat mass and fat percentage in subjects with overweight or obesity: a systematic review and meta-analysis of randomized controlled trials. Obesity reviews. 2018.
3. <http://onlinelibrary.wiley.com/doi/10.1111/obr.12626/full>
4. <http://www.mdpi.com/2072-6643/8/8/483/htm>
5. <http://onlinelibrary.wiley.com/doi/10.1111/apa.13280/full>
6. Effect of probiotics and synbiotics on blood glucose: a systematic review and meta-analysis of controlled trials. European Journal of Nutrition. February 2018, Volume 57, Issue 1, pp 95–106.

Probiotics



Variable safety

EFFECTIVE

- IBS
- Very low birth weight
- lose 0.9lbs!

Doses not reliable

Summary of some more...

1. St. John's Wort: indicated for mild depression, risk of fatal drug interactions
2. Turmeric: for arthritis, more studies that are rigorous required
3. Protein: no evidence to support its use without exercise interventions
4. CoQ10: Little supporting evidence for myopathy
5. Caffeine: increased BP, lipids, esophageal cancer, lower colon, endometrial, prostate cancer, and Parkinsons disease
6. Apple cider vinegar: reduces blood lipids, no correlation to success. Study demonstrated that pills did not contain apple cider vinegar (speaks to many supplements)
7. Beta-carotene: increases risk for lung cancer in smokers

Known dangers



- This is why doctors get scared / quiet / oppositional
- Case 1: St. John's Wort: Metabolic enzyme (CYP450) inhibition interfering with Warfarin causing delayed clot formation leading to fatal gastrointestinal bleed or hemorrhagic strokes
- Case 2: Vitamin D toxicity causes nephrocalcinosis, bone demineralization, constipation and bone pain
- Case 3: Gingko biloba has anti-platelet functions and therefore can interact with warfarin, advil, aspirin leading to increased bleeding risk
- Case 4: Licorice derived from fennel seeds can cause severe high blood pressure through action on the kidney, possibly leading to stroke
- Case 5: What's next?? We don't want it to be you!

Summary

Choose wisely

Natural does not equal safe

Most supplements have not been proven to work as advertising may suggest

Forget about supplements! A healthy balanced diet + enjoyable exercise will always have you living longer, happier, and stronger!



How to find food & nutrition info you can trust

Not all advice we see online or in media is evidence-based

5 tips to help spot misinformation:

1. Promising a **quick fix**, like fast weight-loss or a miracle cure
2. **Trying to sell you products** like special foods or supplements instead of teaching you how to make better food choices at home
3. Providing **information based on personal stories**
4. Claim based on a **single study**
5. What are the person's **qualifications?** Look for initials "RD" or "Pdt" to identify a registered dietitian

Cr-edible Resources

- Practice-based Evidence in Nutrition (PEN)
- EatRight Ontario
- Dietitians of Canada: Your Health
- Blogs by members of Dietitians of Canada
- eaTipster
- Healthy Canadians - Health Canada
- Health Link BC
- National Library of Medicine
- Medline Plus: Healthy Web Surfing

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13. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4008710/>
14. [http://www.nutritionjrn.com/article/S0899-9007\(14\)00485-7/abstract](http://www.nutritionjrn.com/article/S0899-9007(14)00485-7/abstract)
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26. <http://www.mdpi.com/2072-6643/8/8/483/html>
27. <http://onlinelibrary.wiley.com/doi/10.1111/apa.13280/full>
28. Effect of probiotics and synbiotics on blood glucose: a systematic review and meta-analysis of controlled trials. *European Journal of Nutrition*. February 2018, Volume 57, Issue 1, pp 95–106.

A top-down view of a white wooden surface surrounded by a variety of fresh produce and kitchen items. The items include tomatoes, almonds, cashews, a banana, an avocado, a carrot, a green bell pepper, a red bell pepper, a yellow bell pepper, a head of cabbage, kiwi slices, a red apple, a measuring tape, three spoons, a glass of milk, an orange, a lemon, a pumpkin, and crackers. The text 'Thank you' is centered in a large, teal, sans-serif font.

Thank you