

Diet

How do we help patients understand what we mean by a wholefood diets and why diet changes are important?

Your diet in a nutshell: eat recognisable, unprocessed foods like vegetables, fruits, whole grains and fresh meat.

“a diet of minimally processed foods close to nature, predominantly plants, is decisively associated with health promotion and disease prevention”. Can We Say What Diet Is Best for Health? D.L. Katz and S. Meller Annual Review of Public Health 2014 35:1, 83-103

What is a whole food?

Produce of any kind:

- Fresh vegetables such as leafy greens, carrots, avocados, radishes, cucumbers, squash, and sweet potatoes
- Fresh or dried fruit such as apples, pears, oranges, watermelon, tomatoes, grapes, and bananas
- Dairy products without added sugar or chemical flavourings (eg plain Greek yogurt)
- Meat, poultry, and fish that is baked, roasted, grilled, or boiled
- Legumes, nuts, and products made from them such as hummus and nut butter as long as it's made without added sugar, trans fats, or chemicals.

The benefits of a whole food or a minimally processed diet include lower rates of heart disease, cancer and type 2 diabetes. Another advantage of eating mostly whole foods comes from the vast array of nutrients acting together.

Whole foods such as fruits and vegetables contain phytochemicals and these natural compounds can help reduce the risk of cardiovascular and other diseases. Fruits and vegetables also contain nutrients and fibre, and the best way to make sure you are accessing these beneficial elements is to eat them in their natural form.

What do we know about carbonated drinks, is it the carbonation, sugar content or other additives that act as disrupters? How does this apply to carbonated water or fermented drinks such as Kombucha?

Carbonation is the saturation of a liquid with CO₂ gas. In other words, it is a term used to describe the dissolution of CO₂ gas in water utilising pressure and temperature.

The maximum amount of CO₂ that can be dissolved in water is 8 g/L. The excess of CO₂ will normally only remain in water when the drink is under pressure. Or in other words, the carbonated drinks are prepared by mixing chilled flavoured syrups with carbonated water in which carbonation levels range up to 3.5-5 g CO₂ per liquid volume in colas and related drinks, while fruity ones, are less carbonated.

The ingredients of a typical carbonated soft drink include purified water that has been impregnated with CO₂ gas, sweetening agents (dry or liquid sugars, or/and non-nutritive sweeteners), acids (citric, gluconic, tartaric, and/or phosphoric), flavours (derived from fruit, vegetables, or artificial flavours), colour (natural or artificial), preservatives, and other optional ingredients (e.g., vitamin C).

In a comprehensive study published in Nature, researchers found that consumption of commonly consumed non-caloric artificial sweeteners may result in glucose intolerance and metabolic issues by altering intestinal microbiota. The study also suggests that

artificial sweeteners can interfere with regular gut bacteria function. Carbonation does not in itself produce a problem for bacterial composition in the gut, rather the other ingredients as described can do so.

“Kombucha is a fermented drink and may, as can others, modify microbiota composition in the human gut.” Leah T Stiemsma, Reine E Nakamura, Jennifer G Nguyen, Karin B Michels, Does Consumption of Fermented Foods Modify the Human Gut Microbiota?, The Journal of Nutrition, Volume 150, Issue 7, July 2020, Pages 1680-1692, <https://doi.org/10.1093/jn/nxaa077>

Certain vegetables are often contributors to IBS like symptoms (pain/bloating). Is this true? Are there any ways of minimising the ‘unwanted’ effects of these clearly beneficial groups of vegetables?

Based on a programme devised by Monash University a scoring system for high or low FODMAP (Fermentable Oligo- Di- Monosaccharides And Polyols) foods was proposed to provide a short-term strategy to relieve the symptoms of IBS and SIBO.

This can include avoiding ‘cruciferous’ vegetables (e.g. broccoli and cauliflower), albeit that this study suggests that the previously observed health benefits of cruciferous vegetable consumption may be partly associated with the anti-inflammatory effects of these vegetables, which as discussed is a key part of prescribing lifestyle food recommendations.

Many people with IBS find their symptoms are worse if they eat high FODMAPs like cruciferous vegetables or a lot of inappropriate fibre (soluble better for IBS-D and insoluble for IBS-C). This may also be because they lack the healthy colonic bacteria necessary to digest these foods. But bacteria in the gut can be modified by changing the diet.

A gradual re-introduction of cruciferous and other high FODMAPs is possibly the best way to improve IBS symptoms. The low FODMAP, low residue diet is only meant as a short-term measure to reduce immediate symptoms of gas, and gas always increases colonic distress whatever your IBS type.

The best way is to gradually introduce the least harmful high FODMAPs and this is more trial and error but generally I have found that initially at least, the oligosaccharides (legumes) create a lot more gas than certain fructans like wheat and certain cooking techniques like steaming, mashing, toasting etc can reduce the indigestible gases even further.

It is often advocated that frozen veg is just as good as fresh. Is this the case for soluble fibre and nutrients and ability to positively impact the gut microbiome?

The carbohydrate, protein, fibre, and mineral content do not differ much between fresh or frozen fruits and vegetables. But vitamins and beneficial plant-derived chemicals (phytonutrients) may be lost when produce sits on the supermarket shelf or in your refrigerator before being eaten. That means unless you buy fruits and vegetables harvested locally—and recently—the ones you eat may contain fewer vitamins and phytonutrients than you think.

Fresh or frozen: What’s the difference?

How do fresh and frozen produce stack up in terms of nutritional content? Here is what researchers at the University of California-Davis found:

- The carbohydrate, protein, fibre, and mineral content are similar between fresh and frozen.
- Fresh produce can lose half of its vitamins and phytonutrients during storage or cooking.
- Fewer of the fat-soluble vitamins A and E are lost in the frozen packaging process compared with water-soluble vitamins like C.
- Frozen produce may contain more vitamins and phytonutrients than days-old fresh items, though additional cooking and storage after defrosting may close that gap.

In terms of their impact on the microbial diversity - fibre remains a cornerstone of their proliferation and the fibre content does not appear to be affected by freezing (within reasonable time parameters) rather adequate intake of fibre is more important. Apart from processing steps that require physical removal of tissue such as peeling, few processing and storage conditions are severe enough to alter the highly stable compounds that comprise dietary fibre.

I'm still confused about fats. Please shed light on saturated/poly/mono/unsaturated - plant vs. animal fats - and the pros/cons if possible.

Dietary fats and related benefits or risks have occupied nutrition studies and commentaries for decades. Inevitably there are proponents of various combinations and explain this to a patient in a few minutes remains a challenge - let alone adapting to evolving position papers!

A paper: Ludwig DS, Willett WC, Volek JS, Neuhouser ML. Dietary fat: From foe to friend? *Science*. 2018 Nov 16;362(6416):764-770. doi: 10.1126/science.aau2096.

Establishes some consensus points:

1. With a focus on nutrient quality, good health and low chronic disease risk can be achieved for many people on diets with a broad range of carbohydrate-to-fat ratios.
2. Replacement of saturated fat with naturally occurring unsaturated fats provides health benefits for the general population. Industrially produced trans fats are harmful and should be eliminated. The metabolism of saturated fat may differ on carbohydrate- restricted diets, an issue that requires study.
3. Replacement of highly processed carbohydrates (including refined grains, potato products, and free sugars) with unprocessed carbohydrates (non-starchy vegetables, whole fruits, legumes, and whole or minimally processed grains) provides health benefits.
4. Biological factors appear to influence responses to diets of differing macronutrient composition. People with relatively normal insulin sensitivity and b cell function may do well on diets with a wide range of carbohydrate-to-fat ratios; those with insulin resistance, hypersecretion of insulin, or glucose intolerance may benefit from a lower- carbohydrate, higher-fat diet.
5. A ketogenic diet may confer particular metabolic benefits for some people with abnormal carbohydrate metabolism, a possibility that requires long-term study.
6. Well-formulated low-carbohydrate, high-fat diets do not require high intakes of protein or animal products. Reduced carbohydrate consumption can be achieved by substituting grains, starchy vegetables, and sugars with nonhydrogenated plant oils, nuts, seeds, avocado, and other high-fat plant foods.
7. There is broad agreement regarding the fundamental components of a healthful diet that can serve to inform policy, clinical management, and individual dietary choice. Nonetheless, important questions relevant to the epidemics of diet-related chronic disease remain.

Another paper to cover points of consensus: Forouhi, N. G., Krauss, R. M., Taubes, G., & Willett, W. (2018). Dietary fat and cardiometabolic health: evidence, controversies, and consensus for guidance. *BMJ (Clinical research ed.)*, 361, k2139. <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6053258>

Is there any health benefit in following the 'seasonal availability' approach? Does that fit into the food as information / nutritional immunology approach?

There are seasonal variations in immune function. This study, published in the journal Nature Communications, shows that the activity of almost a quarter of our genes (5,136 out of 22,822 genes tested) differs according to the time of year, with some more active in winter and others more active in summer. This seasonality also affects our immune cells and the composition of our blood and adipose tissue (fat).

It's not only those seasonal runny noses that we all seem to suffer more in winter, a host of health conditions including heart attacks and strokes and even depression - are more common in winter, while people are healthier in the summer. The majority of our immune system cells contain genes controlled by the circadian rhythm. Some genes become more active in the summer months, while others became more active in the winter. For example, one gene involved in the body's anti-inflammation response was increased during the summer, while some involved in inflammation were increased in the winter.

Eating seasonally (and adapting food choices according to availability) also means you are more likely to eat the freshest produce and consume it at the time it was ripened - this is now known to preserve their phytonutrient properties.

Is there any evidence to suggest that pairing certain foods with are pro- and anti- inflammatory (e.g. deep fried sausage + cruciferous veg) somehow balance each other out - causing a net neutral inflammatory effect on Tregs/effector cells?

It is becoming clear that nutrition, metabolic state, microbiota, and autoimmunity are deeply interconnected. The role of macro and micronutrients on the creation and sustainability of Tregs is an area of increasing interest, as it confers a protective mechanism for inappropriate inflammation generation. Increasing evidence suggests lack of Treg stability as a culprit of autoimmunity.

Dietary factors, via direct effects on immune cells or by acting indirectly through modulation of the gut microbiota, may regulate Treg plasticity and function and, therefore, may have the potential to control disease outcome.

This is an area of expanding research so to answer the question, there is as far as I know no direct research on the 'balancing' benefits, but there exists compelling (safe) evidence that a diet that favours an anti-inflammatory food source, in season promotes the generation of Tregs and reduces adverse effector T cell activity.