6-19-2018

Guide To Popular Diets, Food Choices, And Their Health Outcome

Ronald D. Hills Jr.
University of New England, rhills@une.edu

Emily Erpenbeck
University of New England, eerpenbeck@une.edu

Health Care: Current Reviews
ISSN: 2375-4273

Hills Jr and Erpenbeck, Health Care Current Reviews 2018, 6:2
DOI: 10.4172/2375-4273.1000223

Review Article Open Access

Guide to Popular Diets, Food Choices, and Their Health Outcome

Ronald D. Hills Jr* and Emily Erpenbeck

Department of Pharmaceutical Sciences, College of Pharmacy, University of New England, USA

Abstract

Integrative medicine is becoming increasingly important for a patient population afflicted with preventable illnesses such as cardiometabolic disease. Diet and nutrition are an under-tapped opportunity in health care for improving wellness and patient-centered health outcomes. Key nutritional principles are reviewed for alternate dietary strategies patients choose from in pursuit of healthy living or to alleviate chronic illness. Whole food eating plans are discussed including plant-based, Mediterranean, Paleo, and ketogenic diets as well as the specific carbohydrate and low FODMAP diets for colitis and irritable bowel syndrome. Opposed to the traditional categorization of diets by macronutrient composition, it is more useful to discuss the nutritional quality of specific foods and available micronutrients. Cardiovascular and other risk factors are reviewed for foods and food combinations, supporting a diet rich in vegetables, fruit, nuts/seeds, and seafood omega-3 fats.Nutrition and lifestyle education is needed to counsel patients on the best dietary strategy that ensures their adherence and improves long-term health outcomes.

Keywords: Integrative medicine; Nutrition; Diet and lifestyle; Micronutrients; Prevention of non-communicable disease; Cardio-metabolic risk factors

Introduction

Over 70% of colon cancer and stroke, 80% of coronary heart disease, and 90% of type 2 diabetes is potentially preventable through patient lifestyle modification [1]. In 2015, 71% of deaths were attributed to dietary and lifestyle choices, up from 58% in 1990 [2]. For a population afflicted with preventable illness, integrative medicine is the solution to the healthcare crisis facing many Western nations [3]. Integrative medicine is a patient-centered, healing oriented method of care that emphasizes patient empowerment and lifestyle change to alleviate chronic disease and reduce the total costs of care. Half of all adults in the U.S. have a chronic health condition, resulting in a burden of care that accounts for 86% of all medical expenses [4]. As we discuss below, nutrition and diet are lifestyle choices that play a fundamental role in determining health outcomes for the significant chronic conditions heart disease, stroke, type 2 diabetes, and cancer [5].The study of nutrition often emphasizes single food components, but it is more useful to discuss foods themselves and the role of food and nutrient combinations in the maintenance of health and disease [6]. Traditional dietary advice has focused on energy balance and the ratio of macronutrients: how many calories are consumed in the form of carbohydrates, protein and fat [7]. It is now known that certain foods such as sugar-sweetened beverages (SSBs), trans fats, and some non-nutritive sweeteners contribute to cardiometabolic diseases (heart disease, stroke and type 2 diabetes) by mechanisms that are in addition to their caloric contribution to positive energy balance [8]. Added sugar was shown in one study to have more ill health effects when consumed in liquid form rather than solid food [9]. High calorie SSBs contribute to cardiometabolic disease, but consumption of whole fruits, which contain some glucose and fructose, actually lowers one's risk [10]. Each of the three macronutrients (protein, carbs, fat) has been vilified at some point in history, leading to much confusion in the general public [11,12]. In terms of nutrition, it is more helpful to speak of the health benefits of specific foods and their nutrient density. Comparative risk assessment was recently used to associate suboptimal intake of 10 distinct dietary factors with cardiometabolic mortality in U.S. adults [10]. The largest numbers of estimated deaths (7.4% – 9.5% of all cardiometabolic deaths) were due to either high intake of sodium, processed meats, and SSBs or low intake of nuts/seeds, seafood omega-3 fats, vegetables including legumes, and fruits excluding juices. Low estimated mortality burdens were associated with low intake of whole grains (5.9%) and high intake of unprocessed red meats (0.4%).

Insufficient evidence was found for a causal relationship to consumption of dairy products. The idea that chronic Western illnesses can be attributed to diet and lifestyle is not new. An earlier comparison of dietary patterns throughout 65 rural counties in China resulted in the conclusion that consuming a predominantly whole food, plant-based diet helps alleviate chronic disease [5]. A healthy diet is rooted in plant-based foods such as fresh vegetables, fruit, legumes, nuts and seeds. Plants are a synergistic combination of food components, fueling the body with micronutrients in the form of minerals, antioxidants, and fat- or water-soluble vitamins. Conversely, the Western diet is high in processed foods found in the center of the grocery store and emphasizes macronutrients: starch, refined grain, added sugar, and animal protein. The role of consumption of animal products in overall health has been the subject of debate. Consumption of red meat and processed meat in particular (cured meat, sausage, etc.), are significantly associated with colorectal cancer and some evidence links them to pancreatic and prostate cancer [13,14]. Potential causes include carcinogenic compounds created during high temperature cooking and environmental contaminants that concentrate up the food chain in meat and meat products such as dairy [15,16]. There is also some evidence that red meat increases the risk of stroke and type 2 diabetes [17]. No one diet is optimal for all patients. The best diet plan is the one that promotes a patient's long-term adherence and is consistent with his or her particular health needs. In light of this, we compare and contrast the nutritional principles and/or tenets underlying different eating plans popular in the vernacular of the general public.

***Corresponding author:** Ronald D. Hills Jr, Department of Pharmaceutical Sciences, College of Pharmacy, University of New England, 716 Stevens Avenue, Portland, Maine USA, Tel: 1-207-221-4049; E-mail: rhills@une.edu

Received April 05, 2018; **Accepted** June 12, 2018; **Published** June 19, 2018

Citation: Hills Jr RD, Erpenbeck E (2018) Guide to Popular Diets, Food Choices, and Their Health Outcome. Health Care Current Reviews 6: 223. doi: 10.4172/2375-4273.1000223

Vegan diet

Veganism abstains from all animal products (meat, fish, dairy, eggs, and butter). According to epidemiological studies, this diet lowers the risk of chronic Western illnesses: heart disease, diabetes, and cancer [18]. While the Western diet overemphasizes protein consumption, vegans only require about 10% of their calories to derive from protein. Reduced protein intake means that high-carbohydrate foods such as whole grains and legumes are consumed with meals to attain fullness, in addition to high-fat nuts, seeds, and oils. It is advertised that general health benefits can be attained if only 80% of one's calories derive from plant sources, leading some to be "Vegan before 6 pm" or Weekday Vegans. Athletes such as Tom Brady promote this plan for speeding the body's recovery time after workouts. Recent films describing veganism in detail include Plant Pure Nation and What the Health. The latter documentary provides an extensive list of reference sources [19].

Vegetarian and pescetarian diets

Vegetarianism-abstaining from meat-is strongly linked to ancient Eastern religions and the Ahimsa principle of nonviolence. One subclass includes ovo-vegetarians, who eat eggs but not dairy products. Lacto-vegetarians eat dairy (milk, butter, cheese and yogurt) but exclude eggs. The third class, lacto-ovo-vegetarians, eat dairy and eggs. Dairy and eggs provide some B vitamins, but all vegetarians and vegans should take a B12 dietary supplement to avoid a potentially serious vitamin deficiency. Pescetarianism, on the other hand, is a plant-based diet that includes fish and seafood, helping prevent such nutrient and/or protein/amino acid deficiencies. Many coastal communities will also incorporate eggs and dairy products into their plant-seafood diet. The vegan diet is advertised to lower your omega-6:omega-3 ratio. Omega-6 fatty acids are metabolized into pro-inflammatory mediators, while the long chain omega-3s EPA and DHA, found only in seafood, are anti-inflammatory antioxidants and have a counterbalancing effect.

Humans are thought to have evolved on a 1:1 dietary omega ratio, but the Western diet is over 10:1 due to its emphasis on animal products and vegetable oils. A ratio below 4:1 improves cardiovascular outcomes and may inhibit cancer [20]. The relationship between dietary intake and circulating plasma levels is less obvious, because conversion of short chain omega-3 ALA (consumed in plants) into long chain EPA and DHA occurs in tight competition with the conversion of omega-6 fats into inflammatory hormones (Figure 1) [21]. In a comparison of fish-eaters, meat-eaters, vegetarians, and vegans, meat-eaters had the lowest blood EPA level and vegans had the lowest DHA level, while fish-eaters had the highest DHA and second-highest EPA (behind vegans) [22].

Paleo diet (grain-free)

The Paleolithic diet derives from the superior cardiometabolic health and physical fitness of indigenous hunter-gatherer populations such as the Hadza [23,24]. The paleo diet abstains from starch (potato, corn, refined cereal), all grains (pasta, rice, bread, flour, barley), processed foods, added sugar, and dairy products. A fist-sized portion of animal protein is recommended with breakfast, lunch, and dinner to attain fullness. Pasture-raised eggs and grass-fed meat are encouraged for their higher omega-3 content compared to conventional grain-fed animals. Grass-fed butter (not margarine) and ghee are usually allowed. Cold-pressed avocado oil, coconut oil, and olive oil are allowed rather than processed vegetable oils. Strict paleo dieters limit pseudograins (quinoa, buckwheat and chia) and legumes (beans, peas, lentils, chickpea, peanut) since they contain what they call "antinutrients" such as phytic acid. Tree nuts are allowed but only in moderation, as they are much higher in omega-6 fats than omega-3s. Milk chocolate is not paleo, but raw cacao is consumed for its polyphenol antioxidants. Clinical trials have shown that a paleo diet improves cardiometabolic markers far more effectively than the low-fat, high-carb diet recommended by the American Heart Association [25,26].

SCD and low FODMAP diets

Consumption of a Western diet and/or oral administration of antibiotics can potentially lead to gut dysbiosis in the form of reduced bacterial diversity, increased fungus, and intestinal inflammation [27]. The specific carbohydrate diet (SCD) is a restrictive long-term diet for healing the gut of microbial overgrowth [28,29]. During colonic transit some amount of disaccharides (lactose, sucrose, malt sugar) and

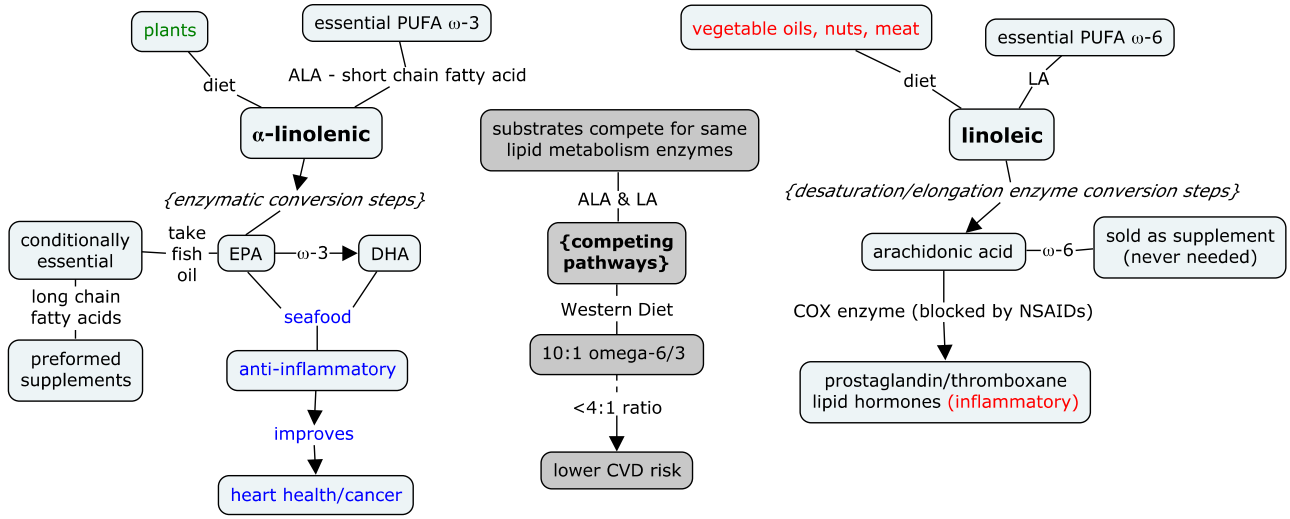

Figure 1: Both the inflammation-resolving and pro-inflammatory pathways use the same metabolic enzymes to compete for their respective polyunsaturated fatty acid (PUFA) substrates: Omega-3 ALA and omega-6 LA respectively. The ratio of omega-6: Omega-3 fats in Western, Mediterranean, and healthy plant-based diets can favor one pathway, having implications for cardiovascular disease (CVD) [21].

polysaccharides (starch) remain undigested by the intestinal enzymes, thus feeding microbes in the gastrointestinal (GI) tract. SCD prohibits starch, grains, and all sugars except monosaccharides (glucose, fructose, galactose) [30,31]. Fresh fruit and non-starchy vegetables are allowed. Searchable apps are available to tell you whether a food is legal [32], but patients must pay attention to the ingredients list on food labels (listed in order by weight). Preservatives, added sugars (cane juice, nectar, syrups, dextrose), and juice concentrates are banned, as are beer, sweet wines and liqueurs. Emulsifiers found in processed foods such as carrageenan and xanthum gums are prohibited. In animal models emulsifying detergents disrupt the colonic mucus, allow encroachment and alteration of gut microbiota, and promote colitis and obesity/metabolic syndrome [33]. Honey should be used as a sweetener rather than artificial sugar alcohols (sorbitol, mannitol, xylitol), which are polyols.

As in the paleo diet, processed deli meats are prohibited. In the first phase of SCD, a strict three-month period is needed to starve off pathogenic bacteria or Candida yeast. Thereafter, beans, lentils, dried fruit, and lactose-free aged cheeses and yogurt can be introduced one at a time to see if tolerated. To aid digestion, beans should be soaked overnight and drained prior to cooking. The FODMAP diet is a less restrictive and more short-term diet for patients with GI disorders that merely seeks to minimize trigger foods. Known as fermentable oligo-, di-, mono-saccharides and polyols (FODMAPs), these short-chain carbohydrates are poorly absorbed in the intestine and rapidly fermented by bacteria, contributing to GI symptoms such as bloating, pain, diarrhea, and flatulence [27]. Commonly reported triggers include lactose, fructose (apples, dates, pears, honey), gas-producing foods and cruciferous vegetables (beans, broccoli, cauliflower, avocado, garlic, and onion), wheat products, and polyol sweeteners [34]. Patients are advised to keep a food log detailing whether a given food exacerbates their symptoms.

The SCD and low FODMAP diets can provide symptom relief in structural and functional GI disorders: Crohn's disease, ulcerative colitis, small intestinal bacterial overgrowth, and irritable bowel syndrome (IBS). A key feature of GI disorders is that patients usually need to prepare their own food. Cases of drug-free remission have been reported using a long-term SCD diet [28,29]. FODMAP diets on the other hand do not reduce colonic inflammation and inhibit the growth of beneficial bacterial, with less than 60% of patients reporting adequate symptom relief [27,35]. IBS is a functional disorder with varying symptoms that can take years to diagnose. It is thought to affect 10–15% of the population and account for 20–40% of gastroenterologist visits [36]. One anecdotal indicator is abdominal cramping after eating a large portion of raw carrots. For those with IBS-D (frequent bowel movements), laxatives such as coffee, chocolate, and fibre supplements should be avoided. In inflammatory bowel disease, supplementation with vitamin D and curcumin, a phytochemical derived from the spice turmeric, has been shown to increase the efficacy of therapy [27].

Other diets

Gluten-free: Celiac disease is a rare, genetic autoimmune disorder affecting<1% of the population in which the patient reacts to gluten (wheat, barley and rye). Other individuals may show benefit from this diet because they actually have IBS and react to fructan sugars (FODMAPs) found in wheat breads and pasta [31,37].

Low-carb or ketogenic diets: While the average American consumes 50% of their calories from carbohydrates, very low-carbohydrate diets heavily restrict carbohydrate intake. The ketogenic diet was originally developed in 1970 to treat drug-resistant epilepsy in children. It restricts caloric composition to 2% carbs, 8% protein and 90% fat, since protein can be converted to glucose in the body but fat cannot [38]. Because it requires a trained dietician in a hospital setting, a more tolerable modified Atkins diet has since been designed for children over 2 years of age that is 6% carbs and 30% protein [39]. These diets limit carb intake to a target such as 50 gm per day or lower. They have been used successfully to lose weight, lower blood sugar and LDL levels, and even raise HDL cholesterol [40]. High-carbohydrate foods are excluded such as starchy fruits and vegetables, bread, pasta, grains and sugar, while fat consumption is increased in the form of nuts and cream, oil or butter. For diabetics, particular foods can be quantified using the glycemic index, a measure of a food's effect on blood glucose levels [41]. Over time, the resulting lack of glucose in the blood causes the body to produce ketone bodies. Known as ketosis, this fat-burning state causes the breath or urine to smell fruity. If ketone levels become extreme under starvation conditions, ketoacidosis of the blood can be fatal. The ketogenic diet in particular has been shown to outperform a conventional low-fat diet for long-term weight loss and is now being considered in the treatment of autism and even cancer [38,42,43]. When low-carb intake is considered in absence of nutritional quality, however, it is associated with reduced consumption of fibre and fruits and an increase in all-cause mortality [44].

DASH (Dietary approaches to stop hypertension): The DASH diet achieves balance through emphasizing fruits, vegetables, whole grains and low-fat dairy foods. It includes meat, fish, poultry, nuts and beans, but limits sugar-sweetened foods and beverages, red meat and added fats. Modest reductions in blood pressure are reported [45], but an intermittent fasting diet may produce better results [46].

Mediterranean: This cultural diet decreases mortality and the risk of heart disease and cancer [47,48]. It places emphasis on whole grains, olive oil, vegetables, fruit, legumes, nuts, fish and poultry in that order. Yogurt, cheese, and red wine are consumed in moderation. Red meat, eggs, refined grains, starch, and sweets are used sparingly. Olive oil, which is only 9% linoleic acid (omega-6), is used in place of other oils. Lowering the omega-6/omega-3 dietary ratio can result in a 70% decrease in cardiovascular mortality [49]. New epidemiological studies indicate that the Mediterranean diet also lowers the risk of dementia [50].

Calorie restriction: In the traditional energy balance paradigm, restricting calories in excess of one's energy expenditure limits fat gain. The obesity and cardio-metabolic epidemics are therefore attributed to overconsumption and inadequate physical activity. Separate from daily calorie restriction, intermittent fasting (IF) has been shown to be nearly as effective for weight loss [51] and, assuming adequate nutrient intake, improving cardiovascular function [52]. Moreover, IF has been shown to be as effective at lowering blood pressure as some hypertension medications [46,53].

Conclusions

The general public is starting to take an interest in the types of food they consume and their underlying ingredients. Nutrient density-the amount of micronutrients per calorie-should be a key determinant in making food choices. Some foods with the highest nutrient density such as kale or salmon have been dubbed super foods. Apps such as Cronometer are now available to log the micronutrient content from your food intake. The vegan, paleo, and specific-carb diets all share the basic tenet that half your plate should be comprised of fresh vegetables, making counting calories less of a concern compared to more balanced

eating plans. Both the vegan and paleo diets advertise the 80:20 rule that considerable health benefits can be obtained by following the diet 80% of the time. Both Paleo and SCD avoid starch and grains, but only the former prohibits all legumes including peas. The similarity of SCD, which aims to improve gut flora, to low-carb weight loss diets, which also avoid refined carbs, is interesting given emerging hypotheses on the relationship between obesity and the gut microbiome [54]. A misguided consequence of popular diets is that macronutrient composition often becomes the focus. For decades fat consumption was denigrated, but we now know nuts/seeds and seafood have a proven cardio-metabolic benefit. Even our view of saturated fat is becoming more nuanced. Dietary replacement of saturated fat with carbohydrates (including added sugars) has actually been shown to promote cardiovascular disease [55]. Carbohydrates are often vilified, but whole grains have a cardiovascular benefit when substituted for starchy processed foods. Fresh fruit and vegetables contain carbohydrates and even sugar, but their inverse association with cardio-metabolic disease has led them to be dubbed by some as unlimited carbs. A unifying picture for any effective long-term dietary strategy is that nutrition should defined in terms of the health benefits of particular food groups, rather than stressing the negative consequences of any one food or macronutrient [8].

A common theme in healthy eating plans is the emphasis on whole foods and low-glycemic vegetables, fruit, and legumes [56]. By comparison, products such as white rice, cereals, flour, white potatoes and sweet corn offer abundant calories in the form of easily digestible starch, which is quickly converted to glucose in the blood and is of no cardiovascular benefit. A plant-based diet index (PDI) was recently constructed, assigning positive scores for plant foods and negative scores for animal foods [57]. PDI alone was not found to associate with all-cause mortality or cardiovascular disease. The study went on to construct a healthful PDI (hPDI), in which only healthy plant foods were scored positive (vegetables, fruit, whole grains) as opposed to unhealthy plant foods (refined grains, potatoes, SSBs). Remarkably, hPDI scores above the median were associated with lower all-cause mortality. The success of hPDI reveals the importance of emphasizing healthy foods rather than the avoidance of one macronutrient food group.

Industrial processing further reduces the existing micronutrients available in a food. Fresh vegetables generally are higher in nutrients than canned products because water-soluble and oxygen-labile compounds such as B and C vitamins are susceptible to heat damage during initial thermal treatment [58]. Top sources of salt in the American diet are breads and processed/packaged foods. Besides being a cardiovascular risk if intake falls outside the range of 3-6 gm per day [59], sodium has known addictive properties [60]. Ultra-processed foods such as industrialized snacks, reconstituted meats containing nitrites, and frozen dinners are associated with higher overall cancer risk [61]. SSBs have been clearly shown to contribute to weight gain [62] and mortality [8,10]. Many packaged foods marketed as "reduced fat" or "all-natural" are sweetened with added sugars, which also promotes cardiovascular disease [63]. As featured in the 2014 film Fed Up, interpreting food labels has become particularly difficult, with over 60 different ingredient names being used for sugar [64]. The Western diet places a large emphasis on processed grains and animal protein, which are primarily macronutrients, when medical evidence suggests a healthy eating plan should be rich in vegetables, fruit, legumes, nuts and seeds. Industrial researchers continue the search for product formulations with enhanced nutrition [65,66], but whole foods remain our best bet for attaining health and wellness. An analysis of five lifestyle risk factors for premature mortality in the U.S. revealed that women and men could prolong life expectancy by 14.0 and 12.2 years by never smoking, maintaining a healthy weight, exercising regularly, eating a healthy diet, and consuming alcohol in moderation [67]. The study employed the Alternate Healthy Eating Index (AHEI), scoring 10 diet components: high intakes of vegetables, fruit, nuts, whole grains, polyunsaturated fats, and long-chain omega-3 fatty acids and low intakes of red and processed meats, SSBs, trans fats, and sodium. The AHEI, developed in 2002, is a much better predictor of chronic disease than the earlier Healthy Eating Index [68], which was based on fat intake and the degree to which your diet followed the U.S. Department of Agriculture's Food Guide Pyramid ("grains" was its primary component). The nutritional quality of food is clearly more important than the ratio of macronutrients consumed.

As with all dietary decisions, the ratio of plant-based to non-plant sources, or of starchy to low-glycemic foods, is ultimately a patient choice. The best diet is individualized, reasonable, and goal-oriented. Many patients start out being ambivalent about making a lifestyle change. Eliciting behavior change will require that the patient have a realistic plan as well as the confidence and values to support it. Motivational interviewing (MI) is a therapeutic technique that promotes self-determination rather than seeking to impose specific changes. MI has been shown to outperform traditional advice giving in the clinical treatment of disease for the metrics body mass index, cholesterol and blood pressure [69]. In some cases, change can be elicited from a single 15-minute encounter with a counselor of varying background: doctor, psychologist, nurse or dietician. In conjunction with lifestyle modification, diet and nutrition are an important health education opportunity for preventing cardio-metabolic disease in the general patient population. Discussion of nutritional principles and effective dietary strategies will be useful in preparing educational materials for patients with specific chronic illnesses.

References

1. Willett WC (2002) Balancing life-style and genomics research for disease prevention. Science 296: 695-698.
2. Risk Factors Collaborators GBD (2016) Global, regional, and national comparative risk assessment of 79 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990-2015: A systematic analysis for the Global Burden of Disease Study 2015. Lancet 388: 1659-1724.
3. Maizes V, Rakel D, Niemiec C (2009) Integrative medicine and patient-centered care. Explore 5: 277-289.
4. Chronic disease prevention and health promotion (2017) Centers for disease control and prevention.
5. Campbell TC, Campbell TM (2006) The china study.
6. Jacobs DR, Tapsell LC (2007) Food, not nutrients, is the fundamental unit in nutrition. Nutr Rev 65: 439-450.
7. Sandouk Z, Lansang MC (2017) Diabetes with obesity-Is there an ideal diet? Cleve Clin J Med 84: 4-14.
8. Stanhope KL, Goran MI, Bosy-Westphal A, King JC, Schmidt LA, et al. (2018) Pathways and mechanisms linking dietary components to cardiometabolic disease: Thinking beyond calories. Obes Rev In press.
9. Wang J, Light K, Henderson M, O'Loughlin J, Mathieu ME, et al. (2014) Consumption of added sugars from liquid but not solid sources predicts impaired glucose homeostasis and insulin resistance among youth at risk of obesity. J Nutr 144: 81-86.
10. Micha R, Penalvo JL, Cudhea F, Imamura F, Rehm CD, et al. (2017) Association between dietary factors and mortality from heart disease, stroke, and type 2 diabetes in the United States. JAMA 317: 912-924.
11. Willett WC (2012) Dietary fats and coronary heart disease. J Intern Med 272: 13-24.

12. Pollan M (2009) In defense of food: An eater's manifesto.

13. Monograph Working Group IARC (2015) Carcinogenicity of consumption of red and processed meat. Lancet 16: 1599-1600.

14. Domingo JL, Nadal M (2017) Carcinogenicity of consumption of red meat and processed meat: A review of scientific news since the IARC decision. Food Chem Toxicol 105: 256-261.

15. Domingo JL, Nadal M (2016) Carcinogenicity of consumption of red and processed meat: What about environmental contaminants? Environ Res 145: 109-115.

16. Schecter A, Cramer P, Boggess K, Stanley J, Papke O, et al. (2001) Intake of dioxins and related compounds from food in the U.S. population. J Toxicol Environ Health A 63: 1-18.

17. Boada LD, Henriquez-Hernandez LA, Luzardo OP (2016) The impact of red and processed meat consumption on cancer and other health outcomes: Epidemiological evidences. Food Chem Toxicol 92: 236-244.

18. Melina V, Craig W, Levin S (2016) Position of the Academy of Nutrition and Dietetics: Vegetarian diets. J Acad Nutr Diet 116: 1970-1980.

19. Sources and Statistics (2017) What the health, A.U.M. Films & Media.

20. Simopoulos AP (2006) Evolutionary aspects of diet, the omega-6/omega-3 ratio and genetic variation: Nutritional implications for chronic diseases. Biomed Pharmacother 60: 502-507.

21. Hall WL (2017) The future for long chain n-3 PUFA in the prevention of coronary heart disease: Do we need to target non-fish-eaters? Proc Nutr Soc 76: 408-418.

22. Welch AA, Shakya-Shrestha S, Lentjes MA, Wareham NJ, Khaw KT (2010) Dietary intake and status of n-3 polyunsaturated fatty acids in a population of fish-eating and non-fish-eating meat-eaters, vegetarians, and vegans and the product-precursor ratio of alpha-linolenic acid to long-chain n-3 polyunsaturated fatty acids: Results from the EPIC-Norfolk cohort. Am J Clin Nutr 92: 1040-1051.

23. Carrera-Bastos P, Fontes-Villalba M, O'Keefe JH, Lindeberg S, Cordain L (2011) The western diet and lifestyle and diseases of civilization. Res Rep Clin Cardiol 2: 15-35.

24. Raichlen DA, Pontzer H, Harris JA, Mabulla AZ, Marlowe FW, et al. (2017) Physical activity patterns and biomarkers of cardiovascular disease risk in hunter-gatherers. Am J Hum Biol 29: e22919.

25. Manheimer EW, van Zuuren EJ, Fedorowicz Z, Pijl H (2015) Paleolithic nutrition for metabolic syndrome: Systematic review and meta-analysis. Am J Clin Nutr 102: 922-932.

26. Pastore RL, Brooks JT, Carbone JW (2015) Paleolithic nutrition improves plasma lipid concentrations of hypercholesterolemic adults to a greater extent than traditional heart-healthy dietary recommendations. Nutr Res 35: 474-479.

27. Lewis JD, Abreu MT (2017) Diet as a trigger or therapy for inflammatory bowel diseases. Gastroenterology 152: 398-414.

28. Aleksandrova K, Romero-Mosquera B, Hernandez V (2017) Diet, gut microbiome and epigenetics: Emerging links with inflammatory bowel diseases and prospects for management and prevention. Nutrients 9: 962.

29. Kakodkar S, Farooqui AJ, Mikolaitis SL, Mutlu EA (2015) The specific carbohydrate diet for inflammatory bowel disease: A case series. J Acad Nutr Diet 115: 1226-1232.

30. Gottschall E (1994) Breaking the vicious cycle: Intestinal health through diet. Kirkton Press.

31. Haas SV, Haas MP (1955) The treatment of celiac disease with the specific carbohydrate diet; Report on 191 additional cases. Am J Gastroenterol 23: 344-360.

32. Breaking the Vicious Cycle (2018) The Specific Carbohydrate Diet, Kirkton Press.

33. Chassaing B, Koren O, Goodrich JK, Poole AC, Srinivasan S, et al. (2015) Dietary emulsifiers impact the mouse gut microbiota promoting colitis and metabolic syndrome. Nature 519: 92-96.

34. Varju P, Farkas N, Hegyi P, Garami A, Szabo I, et al. (2017) Low fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAP) diet improves symptoms in adults suffering from irritable bowel syndrome (IBS) compared to standard IBS diet: A meta-analysis of clinical studies. PLOS ONE 12: e0182942.

35. Staudacher HM, Lomer MCE, Farquharson FM, Louis P, Fava F, et al. (2017) A diet low in FODMAPs reduces symptoms in patients with irritable bowel syndrome and a probiotic restores Bifidobacterium species: A randomized controlled trial. Gastroenterology 153: 936-947.

36. Facts About IBS (2016) International foundation for functional gastrointestinal disorders.

37. Halford B (2018) Zeroing in on FODMAPs. Chem Eng News 96: 29-32.

38. Allen BG, Bhatia SK, Anderson CM, Eichenberger-Gilmore JM, Sibenaller ZA, et al. (2014) Ketogenic diets as an adjuvant cancer therapy: History and potential mechanism. Redox Biol 2: 963-970.

39. Kossoff EH, Cervenka MC, Henry BJ, Haney CA, Turner Z (2013) A decade of the modified Atkins diet (2003-2013): Results, insights, and future directions. Epilepsy Behav 29: 437-442.

40. Dashti HM, Al-Zaid NS, Mathew TC, Al-Mousawi M, Talib H, et al. (2006) Long term effects of ketogenic diet in obese subjects with high cholesterol level. Mol Cell Biochem 286: 1-9.

41. health.harvard.edu/diseases-and-conditions/glycemic-index-and-glycemic-load-for-100-foods.

42. Lee RWY, Corley MJ, Pang A, Arakaki G, Abbott L, et al. (2018) A modified ketogenic gluten-free diet with MCT improves behavior in children with autism spectrum disorder. Physiol Behav 188: 205-211.

43. Bueno NB, de Melo IS, de Oliveira SL, da Rocha Ataide T (2013) Very-low-carbohydrate ketogenic diet *v.* low-fat diet for long-term weight loss: A meta-analysis of randomised controlled trials. Br J Nutr 110: 1178-1187.

44. Noto H, Goto A, Tsujimoto T, Noda M (2013) Low-carbohydrate diets and all-cause mortality: A systematic review and meta-analysis of observational studies. PLOS ONE 8: e55030.

45. Appel LJ, Moore TJ, Obarzanek E, Vollmer WM, Svetkey LP, et al. (1997) A clinical trial of the effects of dietary patterns on blood pressure. New Engl J Med 336: 1117-1124.

46. Sutton EF, Beyl R, Early KS, Cefalu WT, Ravussin E, et al. (2018) Early time-restricted feeding improves insulin sensitivity, blood pressure, and oxidative stress even without weight loss in men with prediabetes. Cell Metab 27:1212-1221.

47. Machado d'Almeida KS, Spillere SR, Zuchinali P, Souza GC (2018) Mediterranean diet and other dietary patterns in primary prevention of heart failure and changes in cardiac function markers: A systematic review. Nutrients 10: 58.

48. Hodge AM, Bassett JK, Dugue PA, Shivappa N, Hebert JR, et al. (2018) Dietary inflammatory index or Mediterranean diet score as risk factors for total and cardiovascular mortality. Nutr Metab Cardiovas 28: 461-469.

49. de Lorgeril M, Renaud S, Mamelle N, Salen P, Martin JL, et al. (1994) Mediterranean alpha-linolenic acid-rich diet in secondary prevention of coronary heart disease. Lancet 343: 1454-1459.

50. Safouris A, Tsivgoulis G, Sergentanis TN, Psaltopoulou T (2015) Mediterranean diet and risk of dementia. Curr Alzheimer Res 12: 736-744.

51. Trepanowski JF, Kroeger CM, Barnosky A, Klempel MC, Bhutani S, et al. (2017) Effect of alternate-day fasting on weight loss, weight maintenance, and cardioprotection among metabolically healthy obese adults: A randomized clinical trial. JAMA Intern Med 177: 930-938.

52. Fontana L (2018) Interventions to promote cardiometabolic health and slow cardiovascular ageing. Nat Rev Cardiol.

53. Heran BS, Wong MM, Heran IK, Wright JM (2008) Blood pressure lowering efficacy of angiotensin converting enzyme (ACE) inhibitors for primary hypertension. Cochrane Database Syst Rev 4: 3823.

54. Zhang N, Ju Z, Zuo T (2018) Time for food: The impact of diet on gut microbiota and human health. Nutrition 51-52: 80-85.

55. Siri-Tarino PW, Chiu S, Bergeron N, Krauss RM (2015) Saturated fats versus polyunsaturated fats versus carbohydrates for cardiovascular disease prevention and treatment. Annu Rev Nutr 35: 517-543.

56. Tharanathan RN, Mahadevamma S (2003) Grain legumes-A boon to human nutrition. Trends Food Sci Tech 14: 507-518.

57. Kim H, Caulfield LE, Rebholz CM (2018) Healthy plant-based diets are associated with lower risk of all-cause mortality in US adults. J Nutr 148: 624-631.

58. Rickman JC, Barrett DM, Bruhn CM (2007) Nutritional comparison of fresh, frozen and canned fruits and vegetables. Part 1. Vitamins C and B and phenolic compounds. J Sci Food Agr 87: 930-944.

59. O'Donnell M, Mente A, Rangarajan S, McQueen MJ, Wang X, et al. (2014) Urinary sodium and potassium excretion, mortality, and cardiovascular events. New Engl J Med 371: 612-623.

60. Mattes RD (1997) The taste for salt in humans. Am J Clin Nutr 65: 692-697.

61. Fiolet T, Srour B, Sellem L, Kesse-Guyot E, Alles B, et al. (2018) Consumption of ultra-processed foods and cancer risk: Results from NutriNet-Sante prospective cohort. BMJ 360: 322.

62. Malik VS, Pan A, Willett WC, Hu FB (2013) Sugar-sweetened beverages and weight gain in children and adults: A systematic review and meta-analysis. Am J Clin Nutr 98: 1084-1102.

63. Yang Q, Zhang Z, Gregg E, Flanders WD, Merritt R, et al. (2015) Added sugar intake and cardiovascular diseases mortality among US adults. JAMA Intern Med 174: 516-524.

64. Added Sugar Is Hiding in 74% of Packaged Foods (2018) UCSF Sugar Science.

65. Valli V, Taccari A, Di Nunzio M, Danesi F, Bordoni A (2018) Health benefits of ancient grains. Comparison among bread made with ancient, heritage and modern grain flours in human cultured cells. Food Res Int 107: 206-215.

66. Warren FJ, Fukuma NM, Mikkelsen D, Flanagan BM, Williams BA, et al. (2018) Food starch structure impacts gut microbiome composition. mSphere 3: 86-18.

67. Li Y, Pan A, Wang DD, Liu X, Dhana K, et al. (2018) Impact of healthy lifestyle factors on life expectancies in the US population. Circulation.

68. McCullough ML, Feskanich D, Stampfer MJ, Giovannucci EL, Rimm EB, et al. (2002) Diet quality and major chronic disease risk in men and women: Moving toward improved dietary guidance. Am J Clin Nutr 76: 1261-1271.

69. Rubak S, Sandbaek A, Lauritzen T, Christensen B (2005) Motivational interviewing: A systematic review and meta-analysis. Br J Gen Pract 55: 305-312.