Popular Diets and Athletes

Premises, Promises, Pros, and Pitfalls of Diets and What Athletes Should Know About Diets and Sports Performance

Christine Rosenbloom, PhD, RDN, CSSD

Popular diets often appeal to athletes because they promise an easy way to reduce body fat, increase muscle mass, and improve health. This article examines 4 popular diets: raw food diets, gluten-free diets, intermittent fasting, and the Paleolithic (''Caveman'') diet and discusses their premises, promises, pros, and pitfalls. Special emphasis is placed on what athletes should know if they choose to follow a popular diet. Diet plans often need modification to ensure that sufficient energy, macronutrient and micronutrient intakes are met to fuel sports training and competition.
Nutr Today. 2014;49(5):244–248

Athletes are interested in the latest and greatest diet to fuel performance, reduce body fat, increase lean muscle, and improve health. Many athletes hear about popular diets from friends, family, teammates, coaches, and increasingly through social media. Many of the diets that are popular today tout that they are not "diets" but are lifestyle plans. As such, some, such as the Paleolithic (Paleo) diet, take on devoted followers with a fervor that is often reserved for religion or politics. Fortunately, there are some resources to help athletes sort through the pros and cons of diets, but evaluations are geared for the general public and may not address the unique needs of athletes. The purpose of this article is to look at some of the popular diets and evaluate the premise, the promise, the pros, and the pitfalls of the diets with an emphasis on sports performance. Diets evaluated include the raw food diet, the gluten-free diet, the Fast diet, and the Paleo diet.

For the past 4 years, US News & World Report ranks the best diets. The 2014 rankings reviewed and rated 32 of the most popular diets.[1] To compile the rankings, detailed profiles were developed through a variety of sources and then reviewed by a nationally recognized panel of experts. The diets are scored by a variety of criteria, and then diets are ranked from best to worst in 8 categories:

1. best overall diets
2. best commercial diets
3. best weight-loss diets
4. best diabetes diets
5. best heart-healthy diets
6. best healthy eating diets
7. easiest diets to follow
8. best plant-based diets

The Table shows how 3 of the 4 diets included in this review were ranked in the annual survey. All but the gluten-free diet is included in the 2014 review; however, there is a detailed profile of the gluten-free diet on the US News & World Report Web site.[2]

THE RAW FOOD DIET

Raw food diets have been around since the late 1880s when a Swiss physician, Max Bircher-Benner, "cured" his jaundice by eating raw apples.[3] He popularized the diet that today takes on many forms as a raw food diet. There is no one seminal book on the raw food diet; indeed, a search of Amazon.com revealed more than 21 000 books devoted to raw foods. Raw food diets are frequently vegan, but not always. Raw meats, cheeses, and milk can be included. Raw foods are defined as those that have never been heated greater than 115°F and never processed, microwaved, irradiated, genetically modified, or treated with herbicides or pesticides. There is very little research on the health benefits of raw food diets because it would be difficult to randomly assign an individual to the strict diet for any length of time, so the few studies that have been done are of cross-sectional designs.

Premise. Those who promote the raw food diet say that raw foods are healthier than cooked foods because cooking destroys most of the vitamins and minerals and all of the phytonutrients in foods. Cooking also destroys the enzymes in raw foods, which proponents of the diet believe are necessary for good health.

Promises. The promises of the raw food diet are many: promotes weight loss, improved health, detoxification of the body, and prevention and reversal of diabetes; imparts clarity of the mind; and gives 1 more energy. The diet is also environmentally friendly.

Christine Rosenbloom, PhD, RDN, CSSD, is professor emerita of nutrition at Georgia State University, Atlanta. She currently consults with athletes of all ages through her business, Chris Rosenbloom Food and Nutrition Services, LLC. She is editor-in-chief of *Sports Nutrition: A Manual for Professionals* (fifth edition, 2012) published by the Academy of Nutrition and Dietetics, as well as their online *Sports Nutrition Care Manual*.

Dr Rosenbloom is a member of the speaker's bureau for the Gatorade Sports Science Institute and a research report writer for Unilever.

Correspondence: Christine Rosenbloom, PhD, RDN, CSSD, 179 Honeysuckle Lane, Hartwell, GA 30643 (chrisrosenbloom@gmail.com).

DOI: 10.1097/NT.0000000000000043

TABLE Ranking of Popular Diets by US News and World Report Best Diets 2014[a]

Category	Raw Foods Diet	Fast Diet	Paleo Diet
Best diets overall	29	28	31
Best weight-loss diets	2	20	32
Best diabetes diets	23	25	31
Best heart-healthy diets	21	26	31
Best diets for healthy eating	31	28	29
Easiest diets to follow	32	18	27
Best plant-based diets	11	Not ranked	Not ranked

[a]Diets were ranked in each category from 1 to 32 with 1 = best diet and 32 = worst diet in that category. Information taken from Reference 1.

Pros. The diet is rich in fruits and vegetables and therefore is high in most vitamins and minerals that are abundant in produce. It is also high in dietary fiber and phytonutrients. It eliminates foods that are high in added sugars, salt, and fat. Weight loss will occur as most who follow the diet eat about half of the calories they would usually eat.[4] Raw food dieters often become expert at dehydrating foods, sprouting grains, and blending fruits and vegetables to add variety to the diet.

Pitfalls. The diet is difficult to follow, and meal preparation can be tedious. Eating out is a challenge, and although some establishments offer vegan items, they may not be raw. Not all of the premises for the healthfulness of raw foods are true. Cooking helps to make some nutrients more bioavailable, not less well absorbed. Lycopene, the carotenoid that gives tomatoes its red color, is better absorbed when foods are cooked, up to 55% greater absorption than in the raw state.[5] Other vegetables, such as kale, carrots, spinach, mushrooms, asparagus, cabbage, and peppers deliver more nutrients when cooked versus raw.[6]

Cooking meat improves digestibility as well as destroying pathogens that may be in raw foods. Consuming raw foods such as sprouts, raw milk, and raw milk cheeses and yogurt increases the risk of food-borne illnesses. The Centers for Disease Control and Prevention examined dairy food-borne illness outbreaks between 1993 and 2006. Sixty percent of the dairy-related outbreaks were linked to raw milk products.[7] Harvard biological anthropologist Richard Wrangham says that cooking food is what makes us human.[8]

What Athletes Should Know About the Raw Food Diet. The biggest concern about the raw food diets for active people is getting adequate energy and protein. Athletes have an increased need for calories and protein for training and competition, and eating a raw food diet makes it challenging to get needed energy and macronutrients. While research on raw food diets is limited, there is concern that bone mineral density could be reduced. In a cross-sectional study of 18 males and females who had followed a raw food diet for an average of 3.6 years, bone mineral density was significantly lower at the lumbar spine and hip compared with an age- and gender-matched group of individuals who ate a mixed diet.[9] In this small study, the researchers also found that body mass index was lower (average of 20.5 kg/m^2) in the raw food diet group when compared with the group who ate a mixed diet (25.4 kg/m^2).

In another larger cross-sectional study, with 216 men and 297 women consuming a raw food diet for an average of 3.7 years, researchers wanted to learn about body weight and raw foods consumption.[10] They divided the participants into 5 groups based on the percentage of raw foods they consumed as part of their diet: 70% to 79%, 80% to 89%, 90% to 94%, 95% to 99%, or 100%. The average weight loss was 9.9 kg for men and 12 kg for women over the course of following a raw food diet. Body mass index was classified as underweight (>18.5 kg/m^2) in 15% of the men and 25% of the women. Of particular concern for athletes is that 30% of the women younger than 45 years had amenorrhea; those consuming more than 90% of raw foods had more menstrual irregularities than did those who had fewer raw foods in their diets.

Athletes who consume raw food diet may have shortfalls of calcium, iron, and vitamin B_{12}, and supplementation may be needed.

GLUTEN-FREE DIET

When top world-ranked professional tennis player Novak Djokovic credited his success in Grand Slam tournaments to his dedication to fitness and a gluten-free diet, athletes took notice.[11] Tennis players at every level were asking if a gluten-free diet would help them win more matches and make them healthier. A gluten-free diet is absolutely necessary for good health for individuals who are definitively diagnosed with celiac disease, an autoimmune disease that is triggered when gluten is consumed. In 2003, researchers at the University of Maryland reported that celiac disease occurs more frequently than was previously believed and that 1 in 133 Americans may have celiac disease.[12] More recent research has identified that a separate condition, currently called nonceliac gluten sensitivity (NCGS) has emerged, which is considered by some, but not all experts, as being distinct from celiac disease and wheat allergy, while sharing many of the same symptoms related to gluten ingestion.[13] Nonceliac gluten sensitivity is an emerging disease, but as yet there are no known prevalence rates and no biomarkers to confirm the diagnosis. What is clear is that some individuals with NCGS report improvement of symptoms when gluten is withdrawn from the diet.

Researchers hypothesize not only that gluten may be culprit in symptom management but also that wheat amylase-trypsin inhibitors and low-fermentable poorly absorbed short-chain carbohydrates (referred to as FODMAPs) may be involved.[13] However, these findings are still being debated among clinical experts, and self-diagnosis is not in order.

The food industry was quick to respond to the desire for gluten-free foods, and today many people, including athletes, are eating gluten-free, even though they do not have celiac disease or NCGS.

Premise. Gluten cannot be digested by many Americans and therefore should be eliminated for good health. This premise has been popularized by books such as *Wheat Belly* by William Davis (Rodale Press, 2011) and more recently expanded in *Grain Brain* by David Perlmutter (Little, Brown & Co, 2013).

Promises. A gluten-free diet for individuals with celiac and NCGS promises symptom-free management of the disease; for others without clinical disease, promises of weight loss and general good health are made. Some gluten-free book authors make promises that removing gluten from the diet will improve digestive health and prevent/cure eczema, chronic fatigue, headaches, attention-deficit/hypersensitivity disorder, autism, depression, chronic inflammation, and thyroid disease, in addition to curing infertility.

Pros. Eliminating gluten found in wheat, rye, barley, triticale, spelt, bulgur, semolina, farro, and einkorn improves symptoms in those with celiac disease and NCGS. There are alternative carbohydrate food sources for active individuals who must avoid gluten, including rice, corn, quinoa, amaranth, millet, potatoes, buckwheat, tapioca, and wild rice.

Pitfalls. Many athletes are becoming part of the group that says eating gluten-free is a healthy lifestyle. They may be unnecessarily restricting common grain carbohydrate sources. Marketing analysis of the gluten-free food industry predicts double-digit growth for the next several years and is being fueled by those who do not have celiac disease or NCGS.[14] Twenty-eight percent of Americans claim to be eliminating bread and baked goods from their diets because of wheat, and 23% claim gluten is the reason for not eating bread. There is no evidence that a gluten-free diet will result in weight loss. Indeed, many gluten-free packaged products are higher in fat, calories, and sugar than gluten-containing foods. With so many new gluten-free snack foods (cookies, crackers, and chips), a gluten-free diet can be high in calories and lead to weight gain. However, gluten-free foods seem to carry a health halo with many consumers, athletes included.

What Athletes Should Know About the Gluten-Free Diet. Athletes with clinically diagnosed celiac disease and possibly also with NCGS should be under the care of a registered dietitian nutritionist who can help them plan a gluten-free diet to fuel performance. Athletes who choose gluten-free without having celiac disease or NCGS should be aware that they may not get adequate carbohydrate to fuel training and performance. Carbohydrate needs can vary between 5 and 12 g/kg of body weight, depending on intensity and duration of activity.[15] Athletes should also know that many gluten-free products are higher in sugar and fat and may not be suited for a peak performance diet. Gluten-free does not mean healthier.

THE FAST DIET

British journalist and physician, Michael Mosley, introduced intermittent fasting as a diet book in 2013.[16] The book suggests intermittent fasting for 2 days each week (500 calories for women and 600 calories for men) as a weight loss strategy and as a path to improved health. Some athletes who are trying to lose weight have expressed interest in this approach because it appears to be an easy way to lose weight prior to their sports season.

Premise. Intermittent fasting on a "5:2" plan (5 days of normal eating and 2 days of fasting) can help achieve a weight loss of 1 or more pounds per week and reduces the risk of chronic disease. The fasting days do not have to be consecutive to be in compliance with the diet.

Promises. Weight loss and protection against cardiovascular diseases and cancer.

Pros. Reducing calories for 2 days each week could result in weight loss if calories are held constant on nonfasting days. This could be an easy diet for those who have trouble with portion control, and it could help individuals "jumpstart" a weight loss plan. It could also help educate dieters on how many calories are in their favorite foods, as they learn how little food it takes to achieve 500 and 600 calories on the fasting days. There may be some mood enhancement with intermittent fasting. Many cultural and religious practices encourage intermittent fasting (although intermittent fasting is defined as 200–500 calories for a period of 7–21 days in 1 comprehensive review found in the study of Michalsen and Li[17]). Mood enhancement is reported when individuals fast intermittently, and some chronic inflammatory degenerative disease symptoms, such as rheumatoid arthritis symptoms, appear to be reduced with fasting.[17]

Pitfalls. While the authors claim the diet results in weight loss and reduces disease, there is no evidence to support those claims for this particular type of intermittent fasting. There is no guarantee that dieters will hold food intake constant and not eat more calories on nonfasting days. This plan is also not recommended for pregnant or lactating women or those with diabetes. For athletes, the biggest challenge is having sufficient energy to support hard training.

What Athletes Should Know About the Fast Diet. Athletes in training and competition need carbohydrate, protein,

and fat to support demands of training. Intermittent fasting could impair the ability to train at high intensities unless athletes fasted on nonexercise days. Most competitive athletes train daily, sometimes twice a day, and limiting calories and nutrients is not advised. In addition, ingestion of protein and carbohydrate consumed shortly after a weight training session enhances muscle protein synthesis and muscle accretion. Resistance exercise coupled with food intake results in elevated insulin levels, which in turn promotes protein synthesis.[18]

THE PALEO DIET

The Paleo diet or "Caveman" diet was the most "googled" diet search of 2013.[19] The Paleo diet was popularized by Loren Cordain, the self-professed "founder of the Paleo movement," in 2001 (*The Paleo Diet*, 2001, Wiley), and was followed by *The Paleo Solution* in 2010 (Robb Wolf and Loren Cordain, Victory Belt Publishing). The Paleo way of eating is also promoted by CrossFit, a popular fitness program with gyms all across the world. The CrossFit nutrition philosophy is to "eat meat and vegetables, nuts and seeds, some fruit, little starch, and no sugar. The Cavemen model is perfectly consistent with the CrossFit prescription."[20] The Paleo diet has become so popular that as of this writing there were 4980 books on Amazon.com with "paleo" in the title, and 1504 of those were paleo cookbooks. There were 8 books on Paleo cocktails and several for "Paleo pets."

Premise. Modern life has ruined our food supply. Returning to the diet eaten by our distant ancestors will restore health and eliminate or reduce most acute and chronic diseases.

Promises. The Paleo diet promises weight loss, improved health, prevention of chronic "Western" diseases, and an eating plan better matched to our biology than the current diet consumed by most Americans.

Pros. The diet encourages the consumption of lean, protein-rich foods such as wild game, grass-fed beef, and fish that are lower in saturated fats than most farm-raised protein-rich foods. The eating plan also encourages consumption of most green and nonstarchy vegetables, fresh fruits, nuts, and the plant-based oils from olives, grapeseed, walnuts, and coconut. The plan is high in dietary fiber and low in sugar, salt, and saturated fats. Despite what many believe, the Paleo is not low in carbohydrate but it is less than what most competitive athletes need to support training. The Paleo diet principles may help a dieter be more mindful of foods that are more healthful than others. Katz and Meller[21] state that the anthropology literature supports, in principle, a Paleolithic diet as humans were adapted to a diet rich in plants, fiber, potassium, and omega-3 fats and low in sodium.

Pitfalls. The Paleo diet has many detractors, and the chief argument against the eating plan is that it is impossible to accurately identify the Paleolithic diet and replicate it in the modern world even if we could identify the foods consumed in the distant past. Plants and animals were very different than today's organic fruits and vegetables and wild game, assuming that we can mimic the diet of our distant ancestors is impossible.[22] The Paleo diet also eschews any food that comes from modern agriculture including wheat, oats, barley, and other grains, dairy foods, legumes, and peanuts. Those restrictions on traditionally carbohydrate-rich foods make it a challenge for active people to get the nutrients they need. Enriched grains are good sources of thiamin, niacin, riboflavin, and iron and are needed in energy pathways to support exercise metabolism. Marlene Zuk, a professor of ecology, evolution, and behavior at the University of Minnesota, takes aim at the Paleo diet in her book, *Paleofantasy: What Evolution Really Tells Us About Sex, Diet, and How We Live* (2013, W. W. Norton & Company). Dr Zuk argues that there is no one Paleo diet because the diets of early man differed depending on when they lived (10 000 years ago vs 100 000 years ago) and where they lived (Inuit Americans in the Arctic ate very differently than our early ancestors on the Australian or African continent). She also argues that human biology has adapted and that we are not the same as our early ancestors. To say that we should not change our eating habits based on the development of agriculture and we should eat only wild greens and meat does not make sound evolutionary sense. Other concerns about the Paleo diet include the elimination of entire food groups. There is a potential for nutrient shortfalls when entire food groups are avoided and there is a sense of deprivation when avoiding the many foods that are not considered "paleo."

What Athletes Should Know About the Paleo Diet. Avoiding grains, starchy vegetables, and dairy foods makes it challenging to get the needed carbohydrate and micronutrients needed for athletes, especially for those in intermittent high-intensity sports such as tennis, soccer, and American football and long-distance endurance sports such as triathlons, distance running, and swimming. A case in point, in the book, *The Paleo Diet for Athletes* (Loren Cordain and Joe Friel, 2012 [revised], Rodale Books), athletes are advised to eat some "non-Paleo" foods immediately before, during, and after exercise to provide sufficient carbohydrate. Female athletes should pay special attention to getting adequate calcium if dairy foods are eliminated.

CONCLUSIONS

All weight-loss diets work in the short term, but there is no research to support improved athletic performance and long-term benefits to health by following any of these diets. Athletes who want to follow any popular diet plan should recognize the limitations inherent in diets and work with a sports dietitian to modify the plan to meet their unique

nutrition needs. Just as there is no "ideal" weight for every athlete, there is no ideal diet that will deliver all the promises made for a specific eating plan. In the author's experience, many athletes claim to be following a popular diet but take a "soft" approach to the plan. For example, an athlete told me he was on the Paleo diet while he was eating a sub sandwich that contained processed deli meats and cheese... definitely not an approved Paleo meal. He responded that he "mostly follows" a Paleo diet but finds it hard to eat Paleo on campus, and he cannot afford organic, free-range chicken and grass-fed beef. He appeared to like the idea of the Paleo diet more than the actual diet. Situations such as the one just described can be teachable moments to help athletes adapt to some of the principles of a popular diet while not compromising fuel for athletic performance, good taste, and affordable foods.

Pagoto and Applehans[23] argued that we should end the diet debates because the only consistent finding in the research on diets is adherence. Only those individuals who can stick with the diet plan for the long haul will see results. They sum up the issue that frustrates health professionals by saying, "the ongoing diet debate exposes the public to mixed messages… that heavily reinforces a fad diet industry that derives billions of dollars from a nation that is not getting healthier." Unfortunately, just like the general public, many athletes still want the latest and greatest diet.

References

1. Best Diets US News & World Report Rankings 2014. http://health.usnews.com/health-news/health-wellness/articles/2014/01/07/us-news-best-diets-how-we-rated-32-eating-plans. Accessed May 27, 2014.
2. Gluten-free diets. http://health.usnews.com/best-diet/gluten-free-diet. Accessed May 27, 2014.
3. Biography of Max Bircher-Benner. http://www.zurichdevelopmentcenter.com/aboutzurichdevelopmentcenter/locationhistory/biographybircher.htm. Accessed May 27, 2014.
4. Raw foods diet. http://www.webmd.com/diet/raw-foods-diet. Accessed June 2, 2014.
5. Unlu NZ, Bohn T, Frances DM, Nagaraja HN, Clinton SK, Schwartz SJ. Lycopene from heat-induced *cis*-isomer-rich tomato sauce is more bioavailable than from all-*trans* rich tomato sauce in human subjects. *Br J Nutr*. 2007;98(1):140–146.
6. Subramanian S. Fact of fiction: raw veggies are healthier than cooked ones. Scientific American. May 31, 2009. http://www.scientificamerican.com/article/raw-veggies-are-healthier/. Accessed June 2, 2014.
7. Raw (unpasteurized) milk. Centers for Disease Control and Prevention. http://www.cdc.gov/Features/RawMilk/. Accessed June 3, 2014.
8. Wrangham R. *Catching Fire: Cooking Made Us Human*. New York, NY: Basic Books; 2009.
9. Fontana L, Shaw JL, Holloszy JO, Villareal DT. Low bone mass in subjects on a long-term raw vegetarian diet. *Arch Intern Med*. 2005;165(6):684–689.
10. Koebnick C, Strassner C, Hoffman I, Letizmann C. Consequences of a long-term raw food diet on body weight and menstruation. *Ann Nutr Metab*. 1999;43(2):69–79.
11. For 'Novak Slam' Djokovic must top Nadal in Paris. June 9, 2012. http://www.usta.com/Pro-Tennis/Grand-Slams/French-Open/for_novak_slam_djokovic_must_top_nadal_in_paris/. Accessed June 3, 2014.
12. Fasano A, Berti I, Gerarduzzi T, et al. Prevalence of celiac disease in at risk and non-at-risk groups in United States: a large multicenter study. *Arch Intern Med*. 2003;163(3):286–292.
13. Catassi C, Bai JC, Bonaz B, et al. Non-celiac gluten sensitivity: the new frontier of gluten related disorders. *Nutrients*. 2013;5:3836–3853.
14. Watson E. What's the size of the U.S. gluten-free prize? $490M, $5BN, or $10BN? Food Navigator USA. http://www.foodnavigator-usa.com/Markets/What-s-the-size-of-the-US-gluten-free-prize-490m-5bn-or-10bn. Accessed June 4, 2104.
15. Burke LM, Hawley JA, Wong SHS, Jeukendrup AE. Carbohydrates for training and competition. *J Sports Sci*. 2011;29(S1):S17–S27.
16. Mosley M, Spencer M. *The Fast Diet*. New York, NY: Atria Books; 2013.
17. Michalsen A, Li C. Fasting therapy for treating and preventing disease: current state of evidence. *Forsch Komplementmed*. 2013;20(6):444–453.
18. Loucks AE. Energy balance and energy availability. In: Maughan RJ, eds, *Sports Nutrition*. Chichester, UK: Wiley Blackwell; 72–87.
19. Paleo diet tops most googled diets of 2013. Huffington Post. December 7, 2013. http://www.huffingtonpost.com/2013/12/17/most-googled-diets-of-2013_n_4426726.html. Accessed June 5, 2014.
20. What is CrossFit? http://www.crossfit.com/cf-info/what-is-crossfit.html. Accessed June 5, 2014.
21. Katz DL, Meller S. Can we say what diet is best for health? *Annu Rev Public Health*. 2014;35:83–103.
22. Graber C. Michael Pollan explains what's wrong with the Paleo Diet. Mother Jones. January 17, 2014. http://www.motherjones.com/environment/2014/01/michael-pollan-paleo-diet-inquiring-minds. Accessed June 7, 2014.
23. Pagoto SL, Applehans BM. A call for an end to the diet debates. *JAMA*. 2013;310(7):8687–8688.