



AN INDEPENDENT OVERVIEW
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SCIENTIFIC SUPPORT
FOR THE INCLUSION OF

A SAFE AND SUSTAINABLE LOWER CARBOHYDRATE OPTION

| In the Dietary Guidelines
for Americans

DGA WHITE PAPER



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INTRODUCTION

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More Flexibility



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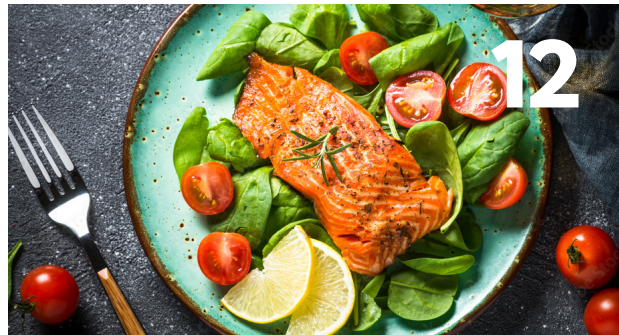
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INTRODUCTION

The Current 2020 Dietary Guidelines Need More Flexibility to Allow Precision Nutrition Advice

The current 2020-2025 Dietary Guidelines for Americans (DGA) provide little flexibility in the distribution of fat, protein and carbohydrates.

Previous guidelines have been based on the premise of “eat less, exercise more”, “calories in/calories out” and a “one-size-fits-all” approach that encouraged Americans to eat less fat. The results? Americans replaced those fat calories with calories from carbohydrates. This has been the trend since the DGAs were first introduced in 1980 [1]. What’s more, we replaced those fat calories with low-quality, high-glycemic carbohydrates such as processed grains and simple sugars.

Science is catching up with the idea that diets with different macronutrient distribution that align with a person’s unique metabolism—precision nutrition—may have a profound impact on overall health. This is particularly the case with carbohydrates, the macronutrient that has the biggest effect on insulin production. Insulin promotes fat storage and inhibits fat burning. Moreover, there is credible evidence that most Americans have some degree of insulin resistance involving carbohydrate intolerance, which means they do not metabolize carbohydrates in a healthy way [3, 4]. Lower carbohydrate diets (less than 130 grams per day) [5] have consistently demonstrated positive health outcomes in this burgeoning population.

“... most Americans have some degree of insulin resistance involving carbohydrate intolerance... lower carbohydrate diets have consistently demonstrated positive health outcomes in this burgeoning population.”

Simply stated, most Americans have poor metabolic health and could benefit from a lower carbohydrate diet than is recommended in the DGA.

Why has the DGA failed to acknowledge low-carbohydrate diets as another option for Americans? Many factors are likely at play, including government bureaucracy and political forces, but, most of all, biases of committee members, which includes a reluctance to back away from the long-standing low-fat dogma that has failed many Americans.

Acceptable Macronutrient Distribution Ranges as Defined by the DGA²



20% to 35% of daily calories should come from dietary fat



45% to 65% of daily calories should come from carbohydrates



Unintended Consequences of DGA:

The Obesity and Type 2 Diabetes Epidemics

Since the first DGA was released 40 years ago in 1980, the focus has been on limiting fat, especially saturated fat, and replacing those calories with carbohydrates. The increased carbohydrate intake among Americans has coincided with a marked rise in obesity, insulin resistance and type 2 diabetes¹, as well as an increase in death rates across multiple countries.⁶

Today, more than two-thirds of American adults are overweight or obese [4], one-half have either prediabetes or type 2 diabetes, and the numbers continue to rise. The economic burden of diabetes alone exceeds \$300 billion per year [7]. Meanwhile, traditional drug and lifestyle treatments have had limited success in curtailing the obesity and diabetes epidemics.

Overconsumption

And this weighty problem was even acknowledged and foreseen by previous Dietary Guidelines Advisory Committees (DGAC). The 2000 committee expressed concerns that the government's low-fat advice "could engender an overconsumption of total calories in the form of carbohydrates, resulting in adverse metabolic consequences of high-carbohydrate diets," adding, "Further, the possibility that overconsumption of carbohydrates may contribute to obesity cannot be ignored [8]."

In 2015, the DGA expert report explained that dietary advice should not emphasize total fat, because low-fat/high-carbohydrate "diets are generally associated with... indicators of increased risk for cardiovascular disease [9-11]." For this reason, the DGAC Vice Chair noted that "...there is no conventional message to recommend low-fat diets [12]." However, despite removing the "low-fat" language from the DGA, the current advice to consume between 20% and 35% of calories from fat is almost exactly the traditional low-fat diet, as defined in scientific literature [13].

“The increased carbohydrate intake among Americans has coincided with a marked rise in obesity, insulin resistance and type 2 diabetes¹, as well as an increase in death rates across multiple countries⁶.”

One result of this four-decades-long national experiment driven by the DGA is that this one-size-fits-all public health approach means Americans have decreased fat intake by 25% and increased carbohydrates by 30% [1]. Coupled with the fact that many Americans are insulin resistant, thanks to these low-fat dietary guidelines, it is not surprising that the obesity and type 2 diabetes epidemics persist and that only a small percentage of Americans are metabolically healthy [14].



The Role of Carbohydrates and Insulin Resistance

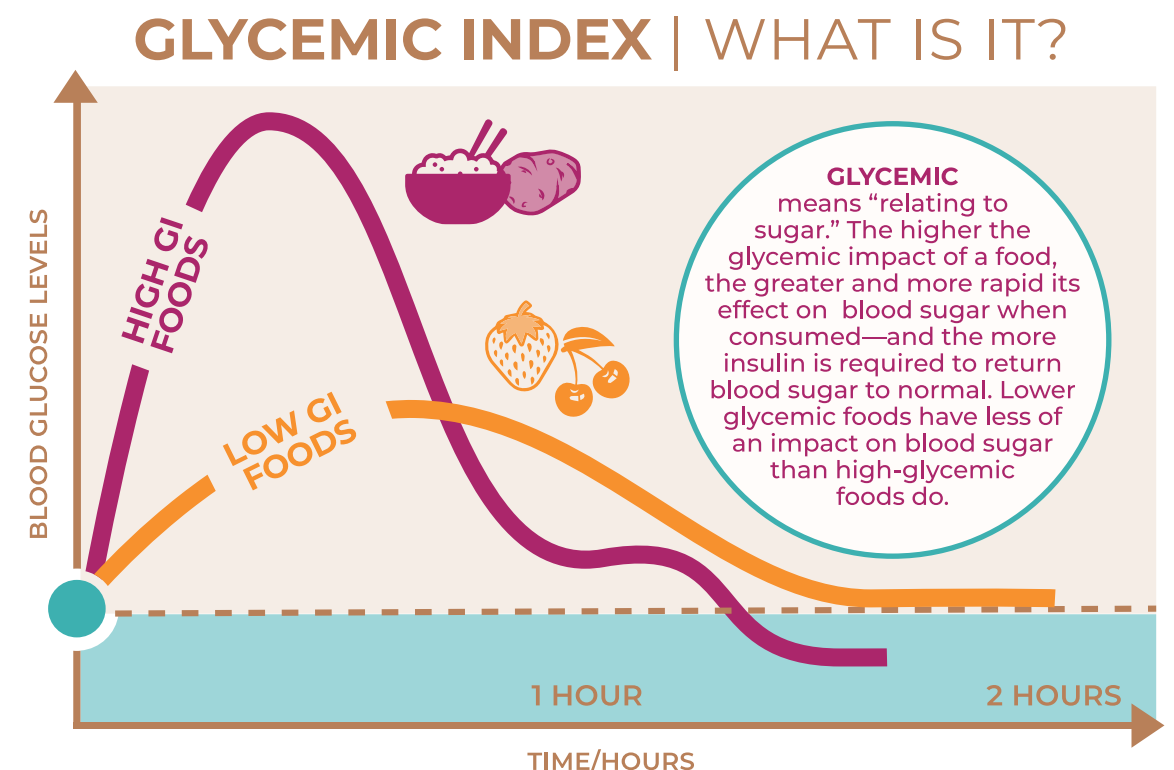
In the Obesity and Type 2 Diabetes Epidemics

Since fat is the most calorically dense macronutrient and excess body fat is the hallmark of obesity, low-fat and low-calorie diets have been the cornerstones of recommendations to manage both the obesity and type 2 diabetes epidemics. By contrast, an alternative hypothesis is that they are the result of eating too many carbohydrates in the form of rapidly digested sugars and starches.

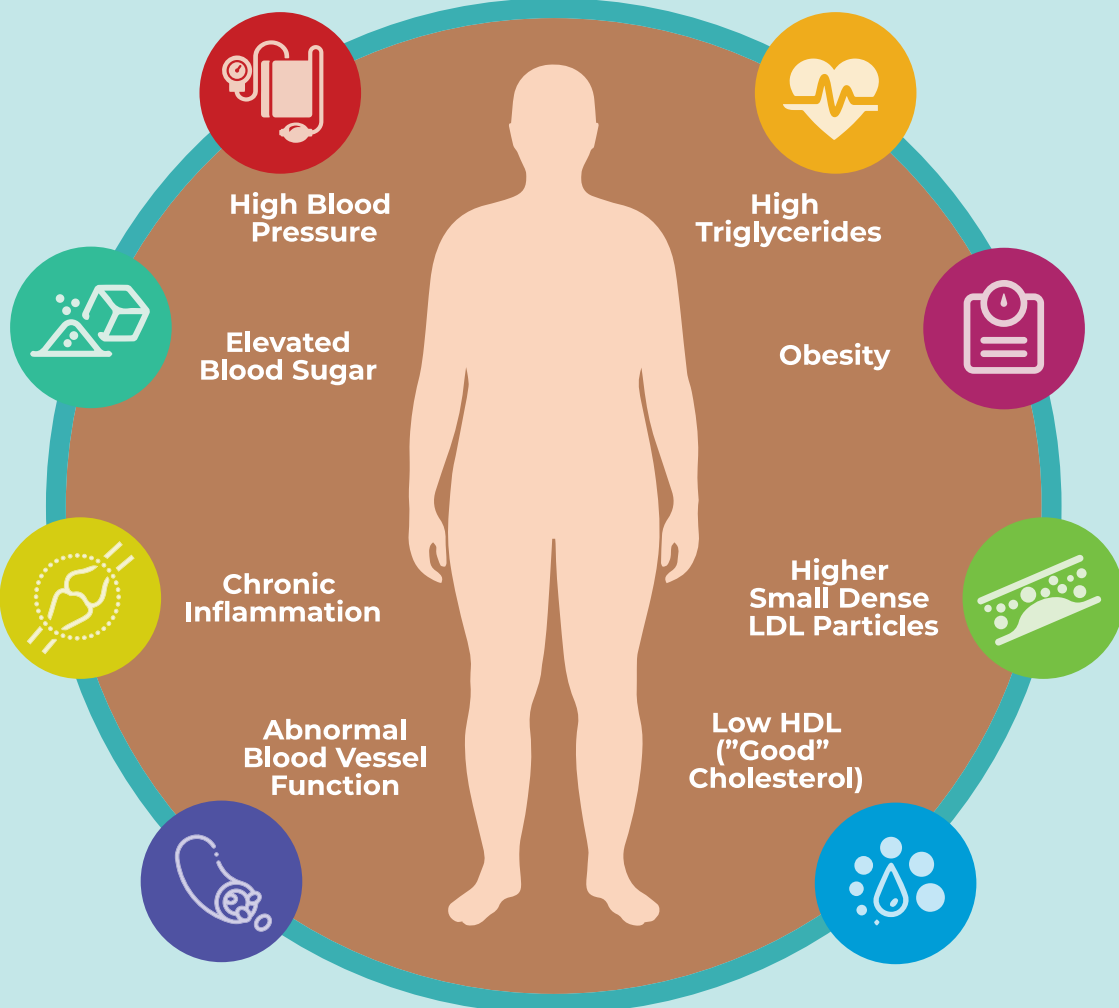
When a person reduces dietary carbohydrates and replace them with healthy fats and moderate protein intake, blood sugar and insulin levels do not increase as much after meals, which means their metabolism burns fat for fuel to a greater degree. By contrast, carbohydrate intake is the most potent stimulant of insulin secretion, the hormone that promotes fat storage and strongly inhibits your ability to mobilize and burn body fat [15].

Over time, high carbohydrate consumption overwhelms the body's ability to process the signals delivered by insulin, leading to a condition called insulin resistance. This then results in excessive insulin output, which is strongly linked to metabolic syndrome and a higher risk for cardiovascular disease [16, 17]. While insulin

resistance can be triggered by a diet high in carbohydrates [18-20], it can be reversed with carbohydrate restriction [21, 22], even in the absence of significant weight loss [23]. A variety of factors influence insulin resistance and carbohydrate sensitivity such as age, micronutrient status, exercise, sleep quality, inflammation and stress [24-27]. Nonetheless, a large percentage of Americans may be metabolically positioned to benefit from a low-carbohydrate diet. This would represent a break from the DGA to date, but supports the idea of precision nutrition, as one could personalize their carbohydrate intake based on individual metabolic needs, which would lead to improvements in metabolic health.



METABOLIC SYNDROME



A cluster of symptoms that predisposes an individual to diabetes and heart disease. These symptoms include:

- ✓ Obesity, particularly in the waist and stomach area
- ✓ High levels of triglycerides
- ✓ Higher levels of the small dense type of LDL "bad" cholesterol particles
- ✓ Low HDL "good" cholesterol
- ✓ High blood pressure
- ✓ Elevated blood sugar levels
- ✓ Chronic levels of inflammation
- ✓ Abnormal blood vessel function

Scientific Support For A Lower Carbohydrate Diet

As a Viable Option
In the DGA

There is scientific support for a lower carbohydrate diet as a viable option in the DGA that addresses the metabolically insulin-resistant population. Lower carbohydrate diets have a long record of safe use.

From a historical perspective, aboriginal hunting, fishing and herding cultures survived for millennia with little available dietary carbohydrates [28, 29]. And while ketogenic diets (KD) have been safely and successfully used for over 100 years in the treatment of epilepsy and diabetes [30-32], this record of therapeutic use has been overshadowed during the last half century with the emphasis on using pharmaceutical drugs to manage these conditions, as well as concerns over high saturated fat intake.

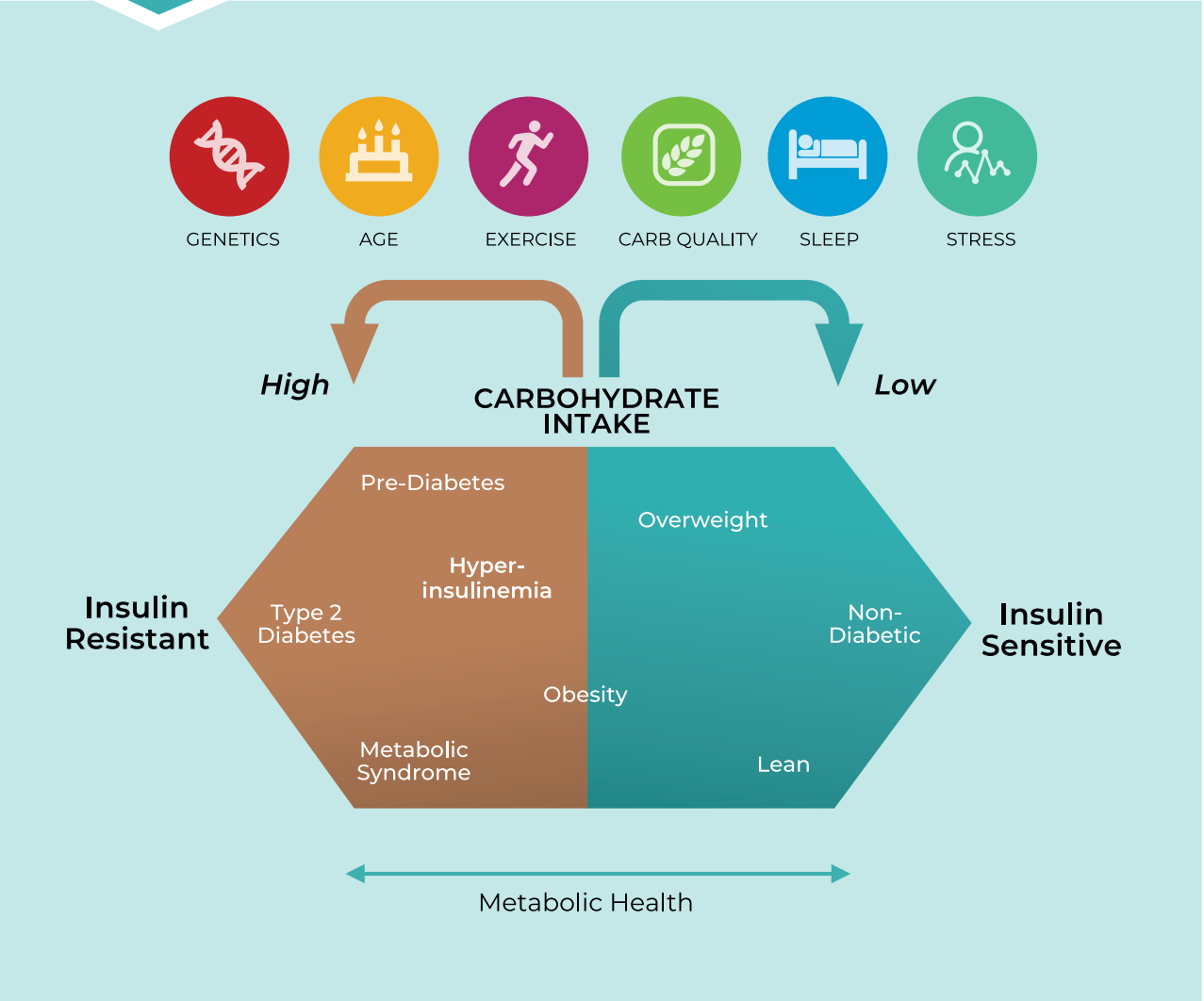
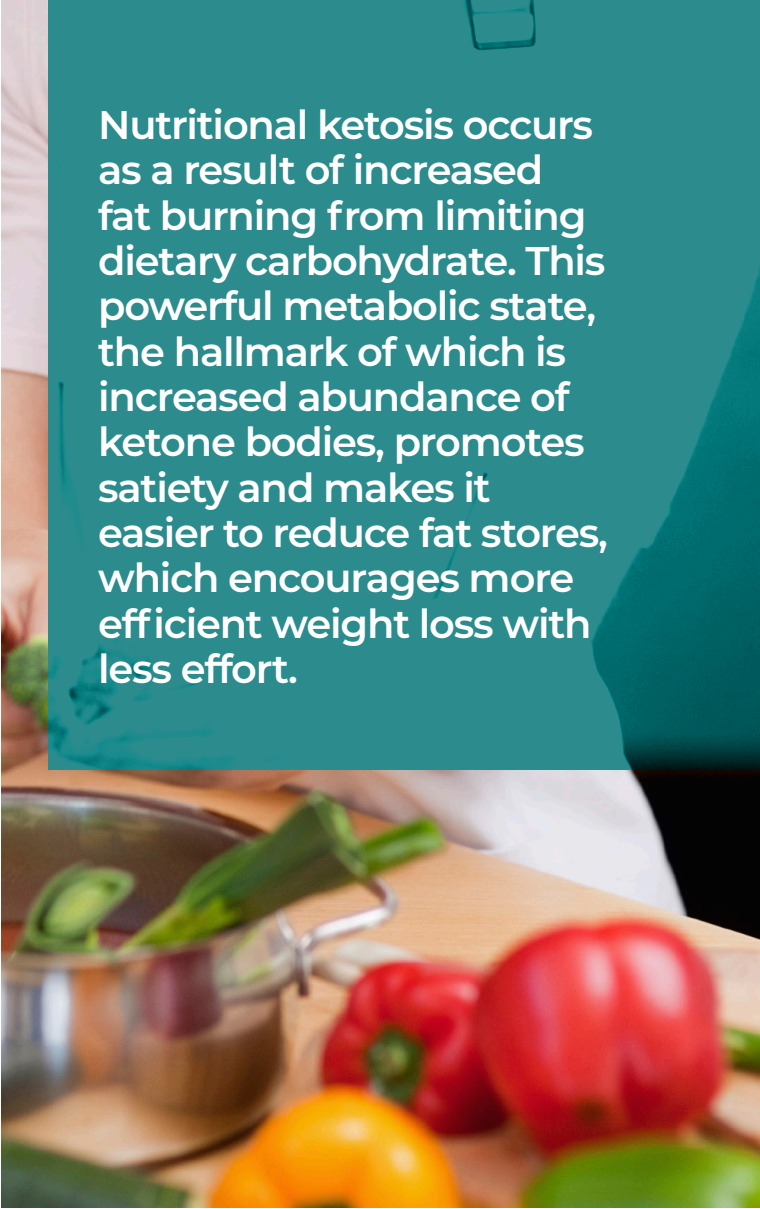
Many different types of lower carbohydrate diets have been studied varying in total calories, the quality and quantity of carbohydrates (less than 130 grams of carbohydrates per day), protein and fat, as well as the level of education/support provided and adherence rates. Through this a clear theme emerges — compared to low-fat diets, lower carbohydrate diets result in equal or superior weight loss as well as the improvement of multiple established risk factors associated with insulin resistance and cardiovascular disease (CVD) [21, 33-35].

How Do Lower Carbohydrate Diets Work?

There are many different types of lower carbohydrate diets. Ketogenic diets (KD) that result in the increased production of ketones into the range of nutritional ketosis usually require less than 50 grams per day of carbohydrates but may range from 30 grams to less than 70 grams per day depending on the person [10, 36, 37].

A safe, effective, palatable and sustainable lower carbohydrate diet, including a KD, focuses primarily on replacing sugar- and carbohydrate-dense foods with unprocessed, lower carbohydrate/high-fat foods, and adequate—but not high—protein intake. Counting calories is usually not necessary. Several studies show that if obese people in nutritional ketosis are told to eat until they are full, with no specific caloric limit, they spontaneously eat less and achieve sustainable weight loss [21, 38-40].

Nutritional ketosis occurs as a result of increased fat burning from limiting dietary carbohydrate. This powerful metabolic state, the hallmark of which is increased abundance of ketone bodies, promotes satiety and makes it easier to reduce fat stores, which encourages more efficient weight loss with less effort.



Different Levels of Carbohydrate Restriction

Very low-carbohydrate ketogenic diet (VLKD)	<30 g/d
Low-carbohydrate diet (LCKD)	30-50 g/d
Reduced-carbohydrate diets (LCD)	50-130 g/d



Overview: Macronutrients

Carbohydrates, Protein and Fat
Recommended allotments and individual sources.

Carbohydrates

Nutrient-dense, high-fiber vegetables are the basic foundation of a lower carbohydrate diet.

The daily carbohydrate allotment on a reduced carbohydrate diet (less than 130 grams per day [LCD]) breaks down as follows:

- 15-30 grams of carbohydrates from non-starchy vegetables
- ~85 grams of carbohydrates from other carbohydrate sources, including nuts, seeds, low-glycemic fruits, some whole grains, etc.
- 5-10 grams of carbohydrates from protein-based foods. Eggs, cheese and shellfish will carry a few residual grams of carbohydrate from natural sources, as well as added marinades and spices.
- 5-10 grams of carbohydrates from miscellaneous sources such as low-carb desserts, high-fat dressings or drinks with very small amounts of sugar.

Depending on the degree of carbohydrate restriction that works best for individual tolerances and needs, the approximate daily carbohydrate allotment in terms of food sources generally breaks down as follows on a ketogenic/low carb Diet:

5-10 grams



Carbohydrates from protein-based foods. Eggs, cheese and shellfish will carry a few residual grams of carbohydrate from natural sources, as well as added marinades and spices.

10-15 grams



Carbohydrates from non-starchy vegetables.

5-10 grams



Carbohydrates from nuts/seeds. Most nuts contain 5-6 grams of carbs per ounce.

5-10 grams



Carbohydrates from fruits such as berries, olives, tomatoes and avocados.

5-10 grams



Carbohydrates from miscellaneous sources such as low-carb desserts, high-fat dressings or drinks with very small amounts of sugar.

Protein

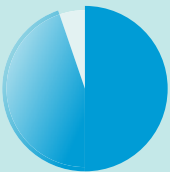
Consuming too much protein may alter levels of ketones and thus influence nutritional ketosis [41]. If a person eats too little protein, it may affect how full they feel after a meal and potentially lead to loss of muscle mass and function.

If one exercises moderately or vigorously, an individual may benefit from eating slightly more protein, but the recommended range noted is more than adequate to meet the needs of most active people who want to gain muscle. People with type 2 diabetes typically lose 8% of their lean muscle mass every decade from age 40 and 15% per decade from age 70 [42-44]. Thus, making sure they consume enough protein is important to offset this muscle loss. Resistance training may also help preserve and build lean tissue, even in older adults [45].

The daily protein allotment on low carbohydrate diets breaks down as follows:

- About 1.2 grams to 1.5 grams per kilogram of healthy body weight.
- Or generally speaking, three servings of protein a day (4 to 6 ounces, cooked, per serving).

The daily fat allotment on a KD diet breaks down as follows:



Consume **55 to 90%** of total calories from fat, preferably coming from monounsaturated and saturated fat

The daily fat allotment on a LCD breaks down as follows:



Consume **45 to 50%** of total calories from fat, preferably coming from a balance of unsaturated and saturated fats

Fat

Focus on foods high in monounsaturated and saturated fatty acids while limiting sources rich in omega-6 polyunsaturated fatty acids (e.g., seed oils such as soybean, peanut, safflower, sunflower and corn). The primary functions of dietary fat on a low-carbohydrate diet or a KD is to serve as fuel, add flavor and pleasure to meals, and to promote satiety.

While omega-6 polyunsaturated fats are essential, the amount needed to meet this requirement is very small. Finally, maintaining a good source of the long-chain omega-3 fatty acids, eicosapentaenoic acid and docosahexaenoic acid, is also important. This can be achieved by consuming fatty fish (salmon, tuna and sardines, etc.) twice per week.

The daily *added* fat allotment on a lower carbohydrate diet breaks down as follows:

- 2 to 4 servings of added fat a day (1 tablespoon per serving)

Examples of added fats:

Avocado oil	Grapeseed oil
Olive oil	Mayonnaise
Canola oil	High oleic safflower oil
Coconut oil	Sesame oil
Flaxseed oil	Salad dressings with no added sugar
Butter/Ghee	





Overview: Micronutrients

Essential Vitamins and Minerals
Recommended adequate levels and sources.

A well-formulated lower carb/KD is not associated with micro-nutrient deficiencies because unprocessed, natural foods that contain adequate essential vitamins and minerals are consumed [46].

Sodium & Potassium

Adequate sodium intake is particularly important because lower insulin and nutritional ketosis may trigger increased sodium excretion along with fluids. Sip on broth or add a little extra salt to foods for adequate sodium intake.

Sources of potassium:

- Vegetables
- Homemade broths made from vegetables or chicken or beef, including the bones
- Avocadoes
- Nuts and seeds
- Canned salmon
- Fish/shellfish
- Unprocessed meats

Calcium

The recommended dietary allowance for calcium in adults is 1,000 to 1,200 milligrams per day.

Sources of Calcium:

- Dairy foods, such as hard cheeses including Parmesan, cheddar, gouda and provolone
- Green vegetables including broccoli, spinach and kale
- Sour cream
- Tofu
- Sardines with bones
- Nuts and seeds
- Homemade broths made from chicken

Magnesium

Magnesium is an essential mineral. Because it is often lost during food processing, marginal deficiency in this nutrient is not uncommon in the general population. Good sources of magnesium include dark green vegetables, nuts/seeds, non-processed meats and homemade broths. It is important to capture the drippings from meat to retain magnesium.

Sources of Magnesium:

- Dark green vegetables
- Nuts and seeds
- Unprocessed meats
- Homemade broths made from vegetables or chicken or beef, including the bones

HYDRATION

To combat the potential diuretic effect of a lower carbohydrate diet, drink six to eight glasses of water a day, in addition to other fluid intake, such as zero-calorie seltzers and club soda, decaffeinated or regular coffee and tea, herbal tea and unsweetened soy and almond milks.

Vitamin D

It is increasingly apparent that many people are marginally deficient in vitamin D. This may reflect less sun exposure and use of sunscreens, which limit the natural vitamin D synthesis that occurs with sun exposure. Vitamin D-fortified milk is not recommended in appreciable amounts on a low-carbohydrate diet due to its sugar content. If regular sun exposure is not possible or practical, a vitamin D supplement or use of a multivitamin that includes vitamin D (~1000 IU) may be necessary.

Sources of Vitamin D:

- Fatty fish such as salmon
- Egg yolks
- Cheese

Fiber

Fiber slows the absorption of glucose and promotes satiety and gut health.

Sources of Fiber:

- Consume 12 to 15 grams of fiber a day in the form of non-starchy vegetables and 1 to 2 ounces of nuts/seeds.
- Other sources of dietary fiber may include whole grains, legumes and starchy vegetables depending on level of carbohydrate restriction

SUMMARY

Many Americans have varying degrees of insulin resistance as shown by the high prevalence of obesity, metabolic syndrome, prediabetes, type 2 diabetes, all of which increase the risk of cardiovascular disease and have all been demonstrated to be highly responsive to lower carbohydrate diets. The 2020 DGAC stated that its review process did not find any studies on the KD and included only one study on lower carbohydrate diets, generally. It appears that unrealistic inclusion criteria for the literature search resulted in the dismissal of a large and credible body of published research due to the fact that any study that had a primary outcome of weight loss was excluded.

Moreover, the lack of flexibility in the DGA as it pertains to lower carbohydrate approaches does not align with precision nutrition. Personalizing the level of dietary carbohydrate should be a high priority based on evidence that Americans have a wide spectrum of metabolic variability in their tolerance to high carbohydrate loads.

Lower carbohydrate diets are grounded across the timespan of human evolution, have well-established biochemical principles, and are now supported by multiple clinical trials in humans that demonstrate consistent improvements in multiple established risk factors associated with insulin resistance and cardiovascular disease. In addition, the American Diabetes Association (ADA) recently recognized a lower carbohydrate eating pattern as an effective approach

for patients with diabetes. Despite this, lower carbohydrate diets are not reflected in the DGA.

Furthermore, the stated purpose of the DGA is to provide dietary advice for "healthy" Americans, but when only 12% of Americans are considered metabolically healthy, the DGA should be geared toward the majority of Americans who would likely benefit from the inclusion of a lower carbohydrate dietary option.



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