

# Carbohydrate Metabolism

## DNA Health Report

REPORT CATEGORY —



NUTRITION

Sample Client

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DISCLAIMER

This report does not diagnose this or any other health conditions. Please talk to a healthcare professional if this condition runs in your family, you think you might have this condition, or you have any concerns about your results.

# Personal information

NAME

Sample Client

SEX AT BIRTH

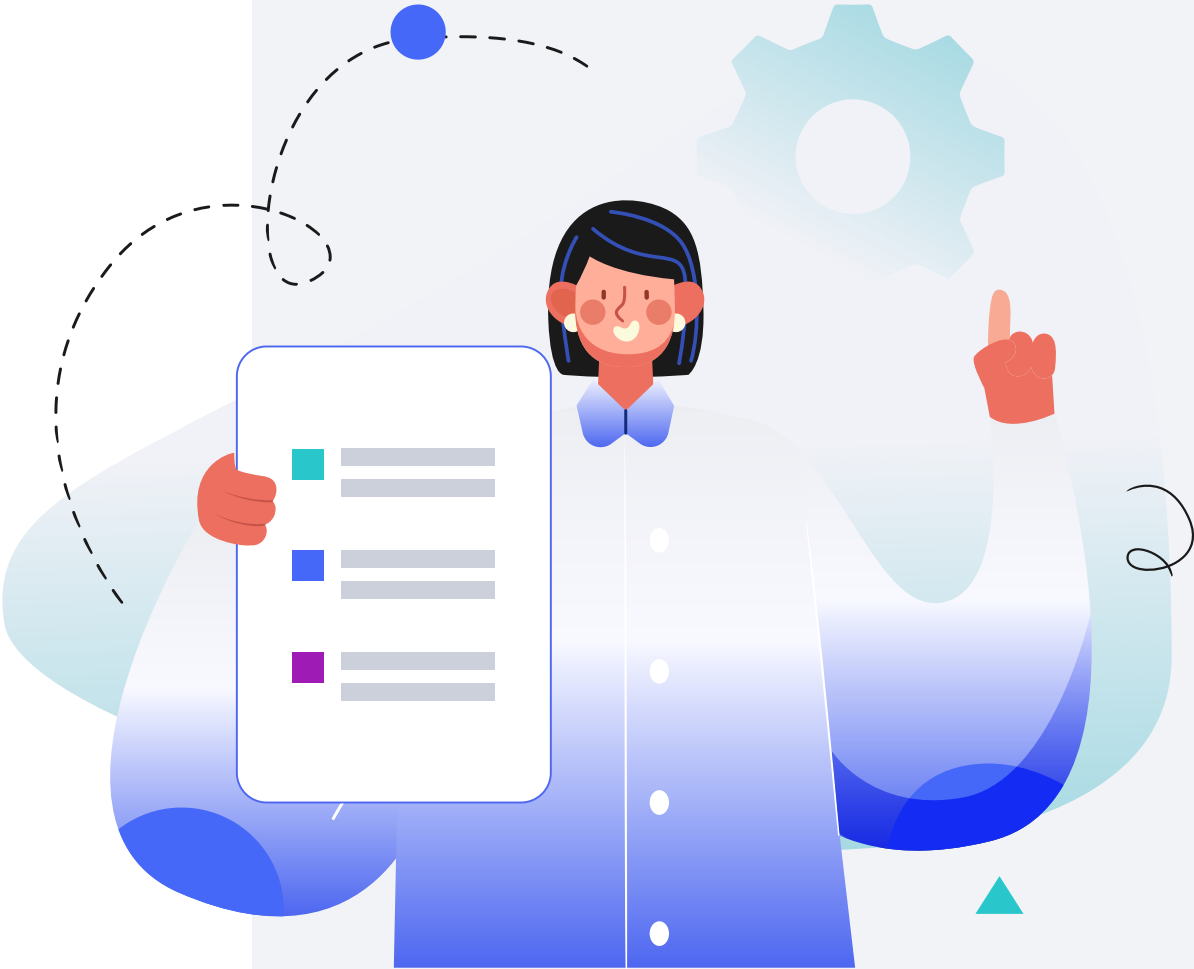
Male

HEIGHT

5ft 5" 165cm

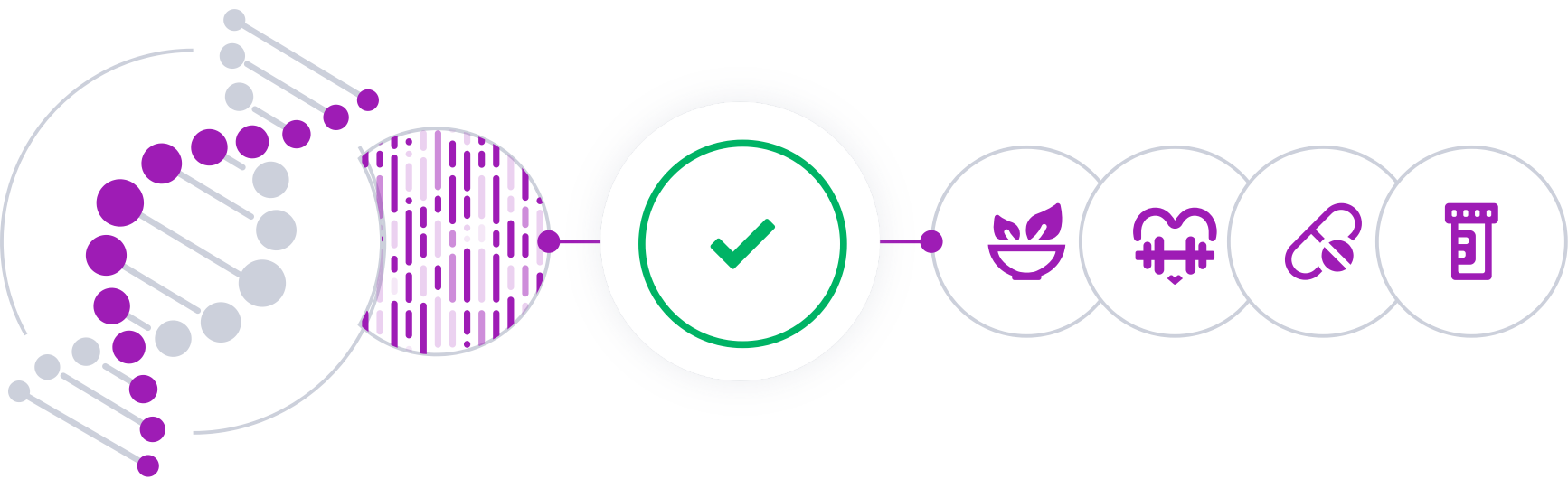
WEIGHT

137lb 62kg



# How this works

Our Wellness Reports analyze how your DNA influences your health.  
We then use this analysis to give you personalized risk estimates and recommendations.

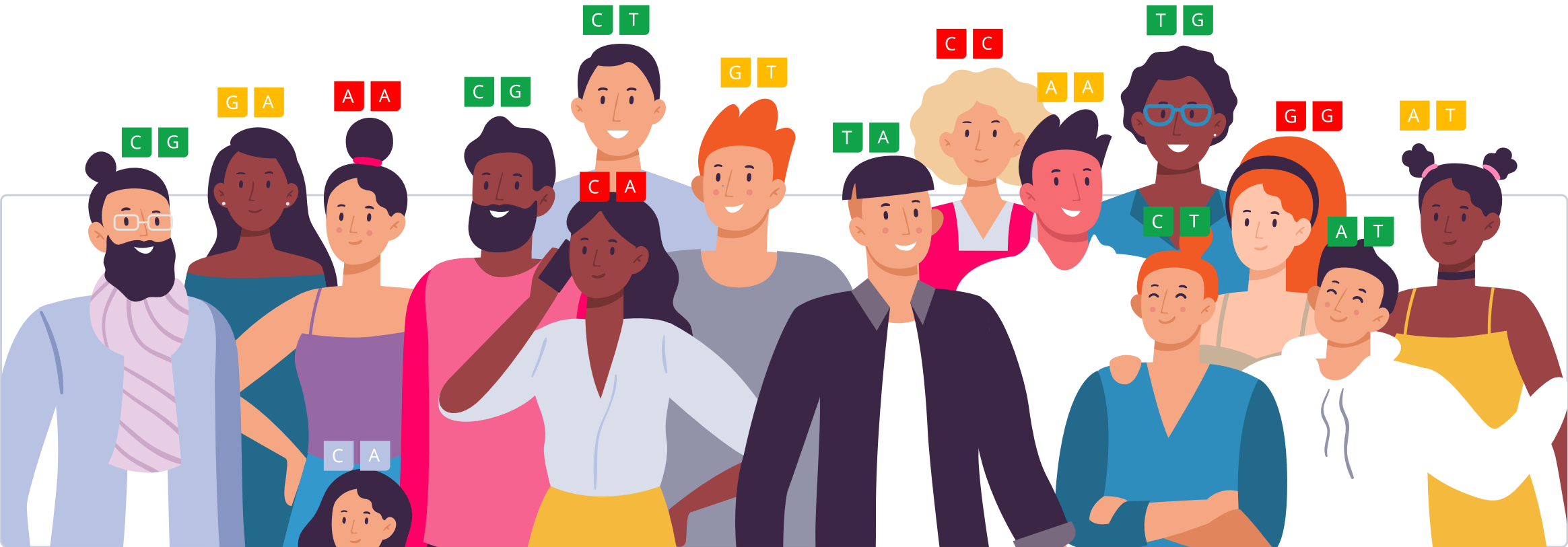


Similarly, our Trait Reports look at how your DNA influences your traits.



Your DNA is like an instruction manual — it contains a lot of information.  
You can think of it as a blueprint for your body.

Genetic variants are parts of DNA that differ from person to person. Some can make you more vulnerable to certain health issues, while others may influence traits such as eye color.





We use artificial intelligence and machine learning to analyze all this information.  
We then summarize your results as a risk score or display it on a gauge.

In total, we analyze up to 83 million genetic variants.

When we give a risk score, the risk icon tells you if you are at a higher or lower risk compared to other people:



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

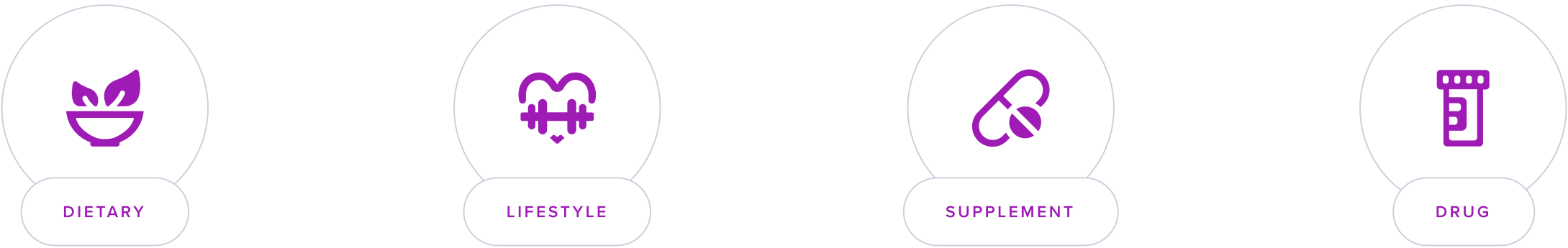
You have 2 risk alleles

Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

Similarly, the gauge tells you your relative risk score compared to our sample population, or it indicates a specific trait or haplotype you are more likely to have based on your genetic variants.

**When applicable, we also list top evidence-based recommendations that may help lower your risk. The focus is on recommendations that may be of benefit to you, based on your genetics.**

Our recommendations come in four categories: lifestyle, diet, supplements and drugs.  
The following icons tell you which category a recommendation falls into:



**Our team of scientists also ranks each recommendation.**  
**We rank based on impact and the strength of evidence in the medical literature.**

Impact shows how strongly a recommendation will affect your health in a certain area.  
Evidence is how much scientific support there is for the recommendation. Rankings are from 1 to 5 (low to high):



# Impact

Impact scores range from 1-5. These scores reflect how much of an effect each recommendation can have. An impact score of 5 predicts the biggest effect.

When a recommendation affects something we can measure, we use those measurements to assign the impact score. For example, a recommendation that decreases cholesterol by 20% will have a higher impact score than one that decreases it by 5%.

Some recommendations affect things that we cannot directly measure, like stress or mood. For these, the impact score is based on how well they work relative to other recommendations and standard treatments. The best ones get the highest scores.

If there is a lot of research that shows a recommendation works especially well for your genotype, the impact score gets increased.

## Recommendation Evidence

- 5 / 5
- Recommendations that are considered effective and generally recommended by experts and medical bodies.
- 
- 4 / 5
- Recommendations that are considered likely effective and that have multiple independent meta-analyses and a great many studies supporting them.
- 
- 3 / 5
- Recommendations that are considered possibly effective and have many studies supporting them
- 
- 2 / 5
- Recommendations that have insufficient evidence, with two or several clinical trials supporting them, or many studies but with ambiguous results.
- 
- 1 / 5
- Recommendations that have insufficient evidence, with a single clinical trial, or with many studies most of which didn't find support for the recommendation.
- 
- 0 / 5
- No evidence in humans.

## Genotype-specific Evidence

- High-quality
- Direct evidence that a recommendation helps more in people with your gene variant (many clinical trials, a few large clinical trials, or a meta-analysis).
- 
- Medium-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a few clinical trials or one large clinical trial).
- 
- Low-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a single clinical trial or more trials with inconsistent results).
- 
- Indirect
- A recommendation may help more in people with your gene variant because it targets a specific gene or protein affected by your variant (e.g., MTHFR, dopamine).
- 
- In theory
- A recommendation may help more in people with your gene variant because it targets a specific mechanism affected by your variant (e.g., inflammation, oxidative stress).

## Some things to keep in mind:

- Genetics doesn’t play a considerable role in a condition or a trait.
- There is not enough research available to estimate a genetic predisposition.
- There are technical limitations to estimating or presenting a genetic predisposition.
- The topic is sensitive, and a genetic predisposition should only be estimated and presented by a healthcare professional.

# Introduction

Carbs are the main source of energy in our modern diets. They include sugars, starches, and fiber. However, these are not all created equal [\[R\]](#).

Sugars are the simplest carbs. They are easy to digest and readily provide energy. When you eat sugars, your body absorbs them quickly, and your blood sugar spikes. Simple sugars are found in [\[R\]](#), [\[R\]](#):

- Sweets
- Soda
- Corn syrup
- Fruit juice
- Honey

Complex carbs are multiple sugars linked together. They are harder for the body to absorb and digest, and they release energy more slowly and steadily. Your blood sugar still rises after eating complex carbs, but it’s a much slower and shallower rise and fall. Complex carbs are found in foods such as [\[R\]](#), [\[R\]](#):

- Legumes (peas, beans)
- Whole grains
- Vegetables

Fiber is a special type of non-digestible complex carb. Because we don't absorb fiber, it can feed good bacteria found in the gut. Fiber is found in [\[R\]](#), [\[R\]](#):

- Whole grains
- Seeds
- Vegetables

Because they are rich in fiber, experts recommend whole grains to help control blood sugar levels. Studies have shown that whole grains offer many health benefits, including protecting against diabetes [\[R\]](#).

However, the way your body responds to carbs, including whole grains, may depend on your genetics [\[R\]](#), [\[R\]](#).



# Genetics

**For much of our history, we were all nomadic hunter-gatherers.** We ate what we could find: roots, plants, berries, nuts, fish, and meat. This varied by location, climate, and season. At this point in time, the way the body processed and responded to complex carbs wasn’t very relevant [R, R].

**About 12,000 years ago, farming changed that.** Suddenly, there were more starchy foods such as grains in our diets. More carbs meant more readily available energy. But this also meant more blood sugar spikes and a higher risk of metabolic disorders. Luckily, variants in genes like [TCF7L2](#) allowed us to process these new food sources in a more productive, less harmful way [R].

**The *TCF7L2* gene affects insulin release after eating foods like grains.** It is one of the genes most strongly associated with **diabetes**. Depending on which variant of this gene you carry, your body may respond differently to carbs [R].

The “farmer” variant ([rs7903146](#)-C) is linked to a better response to carbs. **In people with this variant, carbs don't tend to spike blood sugar.** The "hunter-gatherer" variant ([rs7903146](#)-T) is linked to a worse response to carbs [R, R, R].

Other variants also shape our genetic predisposition to carbohydrate metabolism. They include:

- ***PPARG* [rs1801282](#)-G:** linked to better metabolism and longevity markers on a low-carb diet [R, R, R]
- ***FTO* [rs9939609](#)-A:** linked to obesity, especially on a high-carb diet [R, R]
- ***IRS1* [rs2943641](#)-C:** linked to better carb metabolism (mixed evidence) [R, R, R]
- ***CETP* [rs5883](#)-T and [rs3764261](#)-C:** linked to lower obesity rates and better metabolic profiles on a low-carb/high-fat diet [R, R]

Additional variants that may have a smaller or indirect impact on carb metabolism include:

- ***ADIPOQ* -11391 G>A** (rs17300539): Associated with alterations in adiponectin levels, which can influence glucose and carbohydrate metabolism.



## Predisposed to typical carbohydrate metabolism based on 16 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

| GENE   | SNP        | GENOTYPE |
|--------|------------|----------|
| TCF7L2 | rs7903146  | CT       |
| AMY2B  | rs4244372  | AT       |
| IRS1   | rs2943641  | TC       |
| TAS1R2 | rs35874116 | TT       |
| SLC2A2 | rs5400     | GG       |
| FTO    | rs1121980  | GG       |
| ADRB2  | rs1042714  | GC       |
| ANKK1  | rs1800497  | GA       |
| LEPR   | rs1137101  | AG       |
| FTO    | rs9939609  | TT       |
| PPARG  | rs1801282  | CC       |
| CETP   | rs5883     | CC       |
| NLRC5  | rs3764261  | AA       |
| FABP2  | rs1799883  | CC       |
| ADRB3  | rs4994     | AA       |
| PPARG  | rs3856806  | CC       |
| RFC4   | rs17300539 | GG       |

The number of "risk" variants in this table doesn't necessarily reflect your overall result.



- **ADRB2 Gln27Glu C>G** (rs1042714): Linked to differences in  $\beta$ 2-adrenergic receptor function, which may affect glucose uptake and metabolism.
- **DRD2 C>T** (rs1800497): Linked to dopamine receptor function, which may influence eating behaviors (sugar and carb cravings) and glucose regulation.
- **TAS1R2 Ile191Val G>A** (rs35874116): Impacts the sweet taste receptor, potentially influencing sugar intake and carbohydrate metabolism.
- **SLC2A2 Thr110Ile C>T** (rs5400): Affects glucose transporter 2 (GLUT2), which is key in glucose sensing and carbohydrate metabolism (linked to higher sugar intake but better metabolism!)

# Your Recommendations

Your recommendations are prioritized according to the likelihood of it having an impact for you based on your genetics, along with the amount of scientific evidence supporting the recommendation.

You'll likely find common healthy recommendations at the top of the list because they are often the most impactful and most researched.

- 1

Mediterranean Diet
- 2

Low-Carbohydrate Diet

1



Mediterranean Diet

IMPACT

5 / 5

EVIDENCE

5 / 5

## How to implement

Incorporate a variety of primarily plant-based foods, such as fruits, vegetables, whole grains, nuts, and legumes, into every meal. Choose healthy fats, like olive oil, over saturated fats and consume fish and poultry at least twice a week. Limit red meat to a few times a month and include a moderate amount of dairy products. Opt for water and red wine in moderation as your beverages.

## Description

The [Mediterranean diet](#) is based on the traditional cuisine from the Mediterranean regions. It moderates the intake of red meat and dairy, while being rich in fruits and vegetables, whole grains, and healthy fats ([olive oil](#)).

The [Mediterranean diet](#) focuses on traditional cuisine from the Mediterranean regions. It’s rich in [\[R\]](#):

- [Olive oil](#)
- Fruits and vegetables
- Whole grains
- Nuts and seeds
- Fish

This type of diet may **reduce inflammation and protect the brain and heart** [\[R, R, R, R\]](#).

Limited intake of animal products, saturated fat, and refined sugar likely contribute to the health benefits of the Mediterranean diet [\[R\]](#).

## How it helps

The [Mediterranean diet](#) focuses on complex carb sources like vegetables and whole grains. They are rich in fiber, offer a range of health benefits, and have a milder impact on blood sugar (due to their lower glycemic index). At the same time, the diet limits harmful carbs like sugar and refined carbs.

This type of diet may **reduce inflammation and protect the brain and heart** [\[R, R, R, R\]](#).

The Mediterranean diet is a great choice for people who can tolerate moderate-to-high amounts of carbs.

2



Low-Carbohydrate Diet

IMPACT

4 / 5

EVIDENCE

3 / 5

## How to implement

Limit your daily intake of carbohydrates to less than 26% of your total daily calories. For a standard 2000-calorie diet, this means consuming no more than 130 grams of carbohydrates per day. Focus on including non-starchy vegetables, lean proteins, and healthy fats in your meals while minimizing the intake of sugars, bread, pasta, and other high-carb foods.

## Description

Low-carbohydrate diets can promote weight loss, improve blood sugar control, and support heart health. They may also be beneficial for individuals with certain medical conditions, such as epilepsy or metabolic syndrome.

## How it helps

A diet high in carbs, especially sugars and other refined carbs, may promote weight gain and metabolic problems.

For some people, low-carbohydrate diets can promote weight loss, improve blood sugar control, and support heart health.

The ability to digest and use carbs partly depends on genetics, so some people may be particularly well suited for low-carb diets.

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