SelfDecode™

MC4R (Weight/ Blood Sugar)

Gene Report

REPORT CATEGORIES —

WEIGHT & BODY FAT

BLOOD SUGAR CONTROL

Sample Client

Report date: 15 January 2026

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Personal information

NAME

Sample Client

SEX AT BIRTH

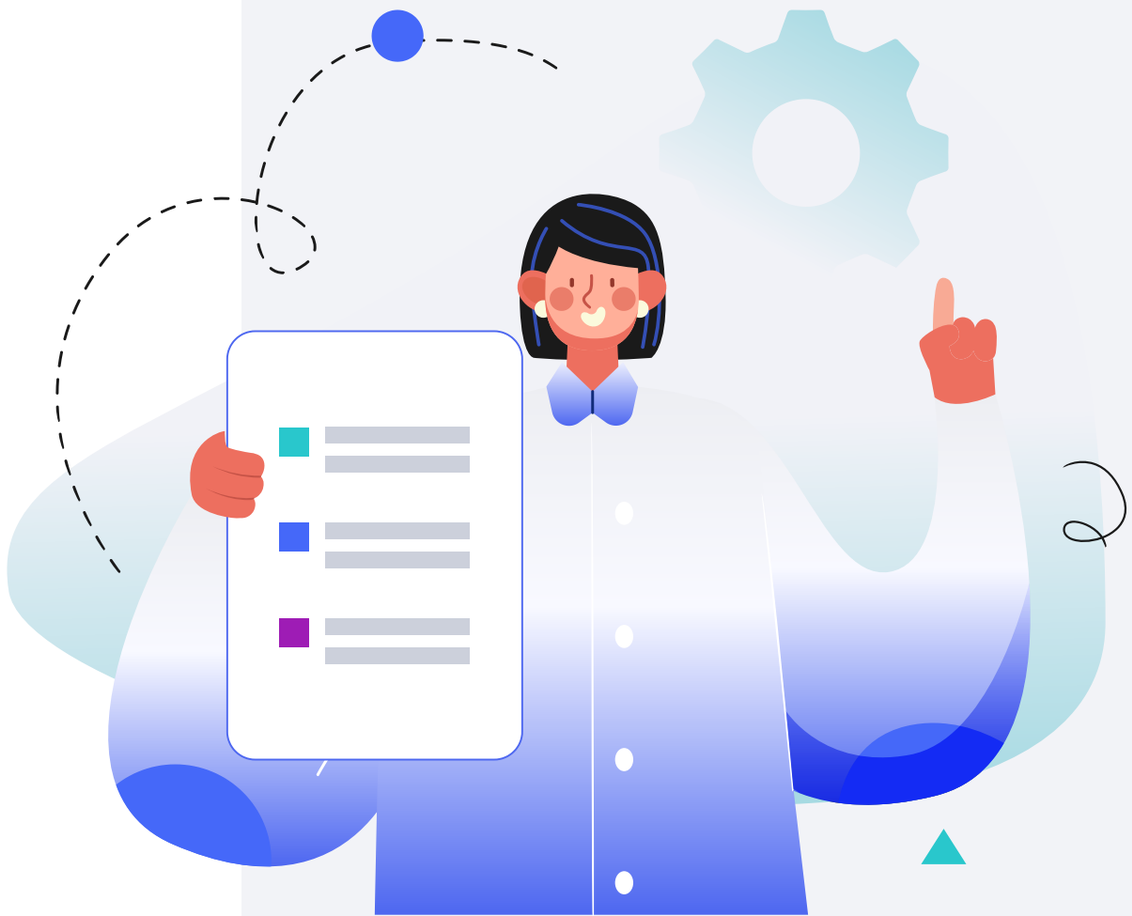
Male

HEIGHT

5ft 5" 165cm

WEIGHT

137lb 62kg

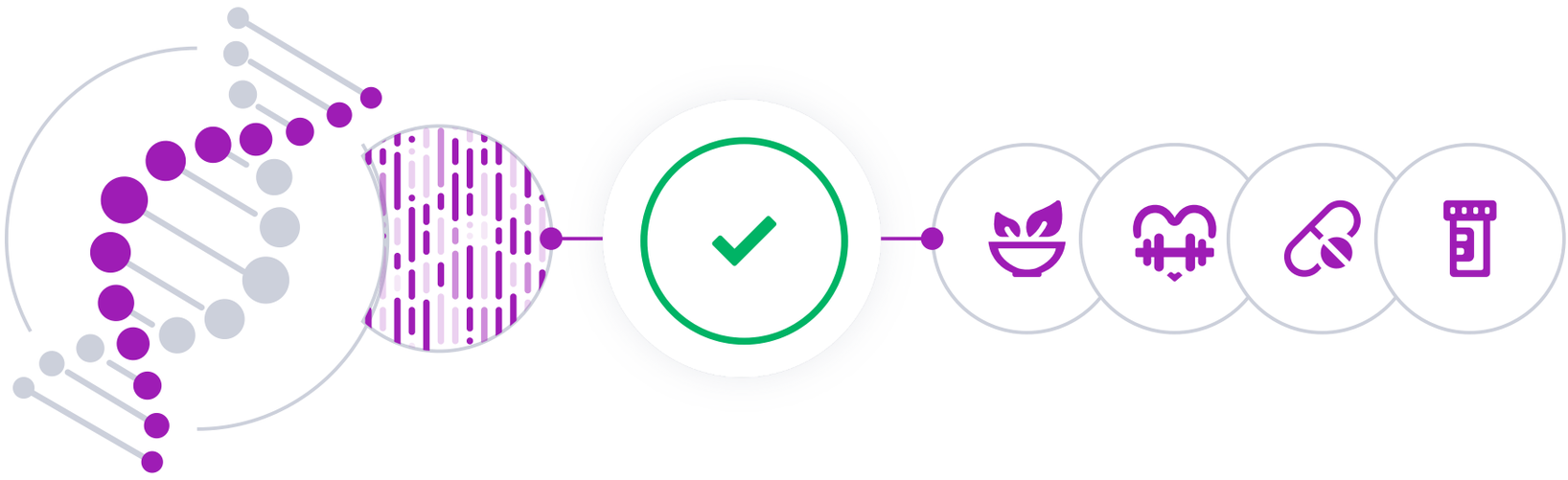


DISCLAIMER

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.

How this works

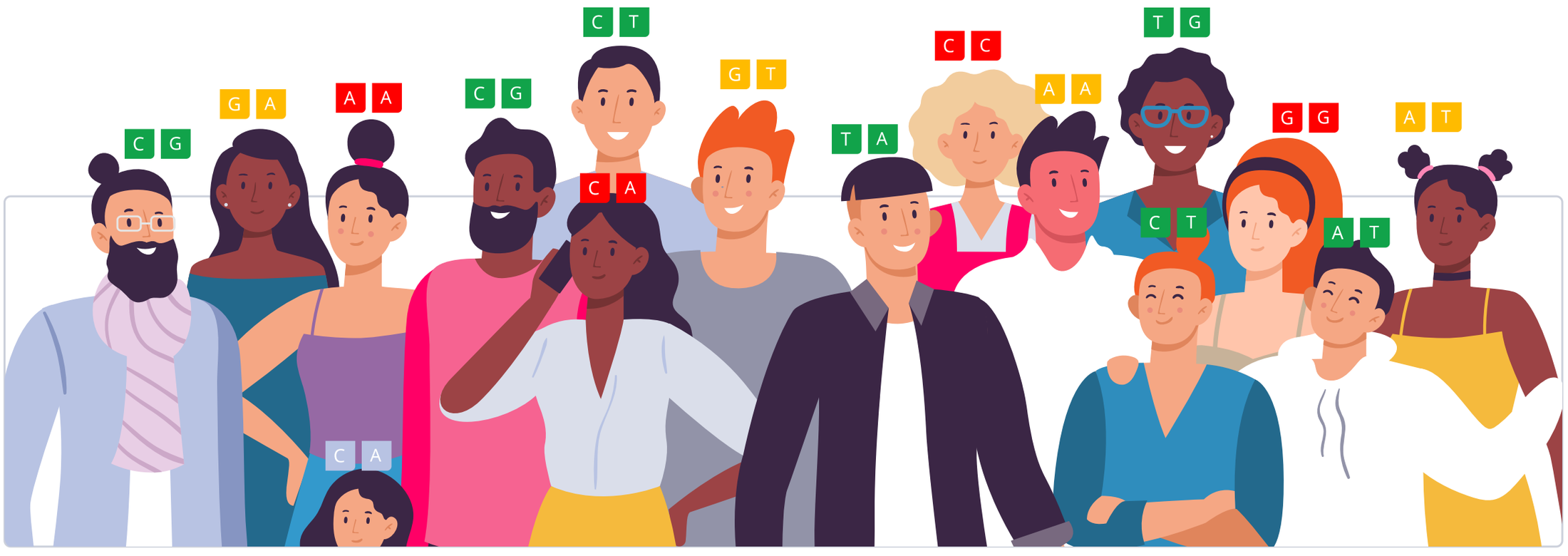
Our Wellness Reports analyze how your DNA influences your health.
We then use this analysis to give you personalized risk estimates and recommendations.



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.

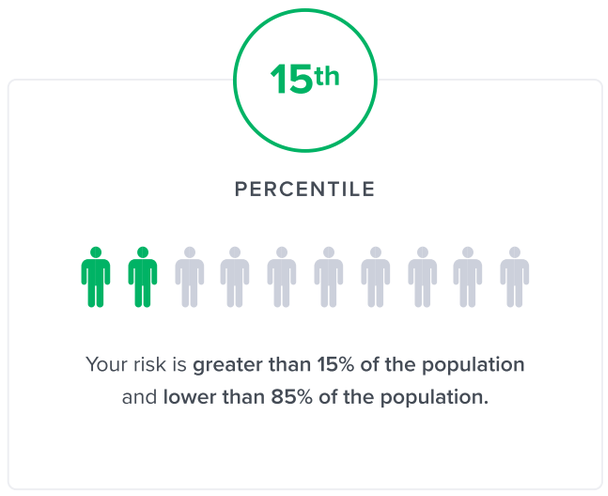
Genetic variants are parts of DNA that differ from person to person. Some can make you more vulnerable to certain health issues, while others may influence traits such as eye color.



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.

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

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



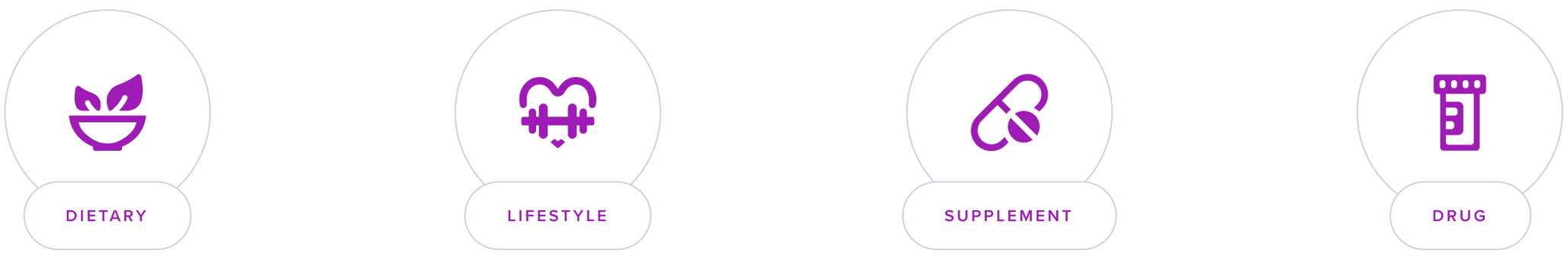
Genotype color info: AA You don't have any risk alleles | AA You have 1 risk allele | AA You have 2 risk alleles

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, afew 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

The *MC4R* gene encodes the melanocortin 4 (MC4) receptor, which binds alpha-melanocyte-stimulating hormone or a-MSH. The primary location of this receptor is the brain, more precisely the hypothalamus, where it controls food intake, metabolism, reproductive behavior, and more [R].

The MC4 receptor is a part of the leptin-melanocortin pathway in the hypothalamus. Leptin is a crucial hormone for appetite and weight control, released by fat tissue. When fat stores are adequate, leptin suppresses appetite by stimulating the production of a-MSH. On the other hand, low leptin reduces MC4R activity and thus promotes energy intake [R].

Even though leptin suppresses appetite and stimulates energy expenditure, excess levels are typical in obese people. Over-secretion leads to leptin resistance, a condition in which leptin loses the ability to reduce food intake via melanocortins [R].

MC4R is one of the most studied genes when it comes to obesity. Reduced activity of the MC4 receptor is the most common genetic cause of obesity, mediated by increased food intake [R, R].

Did you know? MC4R deficiency might have played a crucial role in our evolution. People with mutations that impaired MC4R function were prone to overeating, which likely brought them an evolutionary advantage during food shortages. However, now that food is abundant for the majority, these mutations are showing their other face and contributing to obesity [R].

Besides food intake, MC4R can also impact weight control via glucose and fat metabolism and growth stimulation [R].

MC4R Variants, Obesity & Diabetes

The most studied SNP near the *MC4R* gene is **rs17782313**.
The **"C" allele** is linked to:

- Higher BMI (8%) and obesity rates (12-30%) [R, R]
- Increased hunger, snacking, and overeating [R]
- Eating high-calorie foods high in fat [R, R]

Another important *MC4R* variant is **rs12970134**. The **"A" allele** is linked to:

- Obesity, higher BMI, and waist circumference [R, R, R]
- Food cravings and increased beverage consumption [R]
- High blood sugar and insulin resistance [R, R, R, R]

Other *MC4R* variants like **rs6567160** and **rs663129** have shown similar associations, They are almost always inherited together with the two main variants, so they all represent a single genetic factor [R, R, R, R, R].

"Bad" *MC4R* variants likely **reduce gene expression or receptor activity**, thus increasing food intake and hindering glucose and fat metabolism.

Learn more about the link between MC4R variants, weight, and food intake.

Learn more about the link between MC4R variants and blood sugar.

HIGHER ACTIVITY

Likely higher MC4R activity based on the genetic variants we looked at

55%

OF USERS SHARE THE SAME SCORE

You have the same genetic predisposition as **55% of our users.**

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MC4R	rs17782313	TT
MC4R	rs12970134	GG

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

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.

		DOSAGE
1	Limit Calorie Intake	
2	Eat More Protein and Less Carbs	
3	Practice Exercise Snacks	1 minutesute
4	Intermittent Fasting	
5	Sleep for 7+ Hours	
6	Capsaicin and Capsinoids	450 mg

1

Limit Calorie Intake

IMPACT 5 / 5

EVIDENCE 5 / 5

How to implement

Consume fewer calories than your body needs for maintenance. Calculate your daily caloric needs using an online calculator based on your sex, age, weight, height, and activity level, then reduce that number by 500-1000 calories per day to safely lose 1-2 pounds per week. Adjust the caloric intake as needed based on your progress.

Description

People often limit their calorie intake to help them lose weight [R, R].
However, moderate calorie restriction may also help you stay healthier and age better [R, R, R, R, R].

There are different ways to take in fewer calories. You can:

- **Eat low-calorie foods**, such as those rich in proteins, fiber, and water. Avoid fatty and sugary foods, which tend to be high in calories [R].
- **Try intermittent fasting**, which involves changing how often you eat [R].

If you are restricting your calories, make sure your diet remains healthy and balanced. Experts also recommend being physically active, to prevent the loss of muscle and bone mass.

How it helps

Increased energy intake, especially from high-calorie food and unhealthy snacks, is a primary cause of weight gain [R].

Mice without MC4R are prone to obesity and overeating. Obesity-associated MC4R mutations reduce gene expression and hinder the binding of alpha-MSH [R, R, R].

The activation of MC4 receptors triggered by high leptin levels is the primary “satiety signal” (a signal to stop eating). In mice without these receptors, leptin is unable to reduce appetite [R].

In lab animals, chronic activation of the MC4 receptors reduced abdominal fat and improved glucose metabolism, suggesting another crucial metabolic role of MC4R [R].

2

Eat More Protein and Less Carbs

IMPACT 5 / 5

EVIDENCE 4 / 5

How to implement

Include a source of lean protein such as chicken, fish, beans, or tofu in each meal, aiming for 20-30 grams per serving, while reducing carbohydrate-rich foods like bread, pasta, and sweets, aiming to make proteins about 30-40% of your daily caloric intake. Replace at least one carbohydrate-heavy meal or snack with a high-protein option daily.

Description

A diet that includes more protein and fewer carbohydrates can promote weight management and satiety, potentially aiding in weight loss efforts. Protein-rich foods can help control hunger and support muscle maintenance.

Proteins, fats, and carbs are macronutrients. You need these nutrients in large (‘macro’) amounts. They provide your body with the energy it needs to function properly [R].

For a healthier diet, experts recommend eating foods that are higher in protein but lower in fat and carbs [R, R].

This is because simple carbs can spike your blood sugar levels. Likewise, too much saturated fat can increase “bad” (LDL) cholesterol [R, R, R, R, R, R].

Eating a lot of high-carb or high-fat foods may lead to conditions like diabetes, obesity, and heart disease [R, R, R, R].

Meanwhile, protein boosts muscle mass and helps control your weight [R].

How it helps

Most weight loss experts recommend following a diet that’s high in protein but lower in carbs or fat [R, R].

This is because protein [R, R]:

- Boosts your metabolism
- Makes you feel more full
- Helps control your appetite

In contrast, carbs and fats make you crave junk food by activating the reward areas of your brain [R, R].

Simple carbs can also spike your insulin, which is linked to a higher risk of obesity [R].

Some low-carb diets that may help you lose weight include:

- **Keto diet**: low-carb and high-fat diet [R, R, R]
- **Atkins diet**: low-carb diet [R, R, R, R, R]
- **Paleo diet**: hunter-gatherer diet (limited carbs, dairy products, and legumes) [R, R, R]
- **Zone diet**: meals consist of 40% complex carbs, 30% protein, and 30% fat [R]

Sticking to a low-fat diet for 2-12 months may also support weight loss [R, R, R, R, R]. However, a **low-carb diet may be more effective** [R, R, R, R, R].

Mice lacking the MC4R gene don’t experience appetite reduction and fat burning in response to high-fat diets. Likewise, people with the discussed variants have increased intake of total energy and dietary fat, along with impaired metabolism [R, R].

Dietary protein contains much fewer calories per gram than fat (4 vs. 9 kcal). It can improve leptin sensitivity, which makes it a perfect fat replacement for people with MC4R variants [R, R].

Note: *In the long run, high-protein diets may contribute to heart disease, calcium loss, constipation, and other health problems. If you have problems with kidneys or bones, consult your doctor or dietitian before adopting a high-protein diet* [R, R].

3

Practice Exercise Snacks

IMPACT 4 / 5

EVIDENCE 5 / 5

How to implement

Integrate short bursts of physical activity, each lasting about 1 to 2 minutes, into your daily routine at least two to three times a day. These 'exercise snacks' can include activities like doing a set of stairs, rapid bodyweight exercises, pull-ups, push-ups, sit-ups, or brisk walking.

TYPICAL STARTING DOSE

1 minutesute

Description

Staying physically active is essential for maintaining overall health and well-being. **Exercise snacks** are brief, frequent bursts of physical activity integrated into daily routines, helping combat the health risks associated with prolonged sitting and sedentary behavior, such as obesity and cardiovascular issues. Examples include taking the stairs or doing quick exercises during work breaks.

Staying active can do wonders for your health. It can help you lose weight, improve your heart health, boost your mood, and more [R].

Exercise snacks are short, quick bursts of physical activity performed throughout the day, designed to break up prolonged periods of sitting or inactivity. These brief bouts of exercise can be as short as a few minutes and are incorporated into daily routines to boost overall physical activity levels.

Exercise snacks are crucial for health because they combat the negative effects of sedentary behavior, such as prolonged sitting, which is associated with an increased risk of obesity, cardiovascular diseases, diabetes, and musculoskeletal issues. They help improve blood circulation, regulate blood sugar levels, and enhance mood and cognitive function.

Examples of exercise snacks include taking the stairs instead of the elevator, doing a few minutes of bodyweight exercises (e.g., squats or push-ups) during work breaks, or walking briskly for a few minutes after meals. These short, frequent bursts of activity contribute to a more active lifestyle and can significantly benefit overall health by reducing the risks associated with excessive sitting.

How it helps

Sedentary people have an approximately 50% higher risk of being obese [R].

In line with this, **most experts agree that getting 150-300 minutes of exercise per week can help you control your weight.** For best results, try to push yourself a bit with **moderate or intense exercise** [R, R].

Exercise helps by burning calories and boosting your metabolism. It may also lower your appetite [R, R].

4

Intermittent Fasting

IMPACT 4 / 5

EVIDENCE 4 / 5

How to implement

Limit your daily eating to a specific window of time, typically within an 8-hour period such as from 12 pm to 8 pm, and fast for the remaining 16 hours of the day. Repeat this daily or for at least 3-4 days per week.

Description

Intermittent fasting is an eating pattern that involves cycling between periods of fasting and eating. It may help with weight management, improve metabolic health, and offer potential benefits for certain health conditions when done under proper guidance.

Intermittent fasting (IF) is a pattern of eating that alternates between periods of eating and fasting. The most popular IF method is called the 16/8 method, where you fast for 16 hours and eat during an 8-hour window.

People mainly practice IF to lose weight. Besides benefits related to weight reduction, IF may help lower the risk of [R]:

- Alzheimer's disease
- Joint pain
- Asthma
- Multiple sclerosis
- Stroke

Some types of intermittent fasting, such as Ramadan fasting, are also practiced for religious reasons.

How it helps

Intermittent fasting may reduce weight, but not BMI, better than continuous calorie restriction. Short-term intermittent fasting may also reduce weight. Intermittent fasting may also improve fasting blood glucose and HOMA-IR. In four studies with 355 participants, intermittent fasting led to better weight loss (1.70 kg). In six studies, significant reductions in BMI (1.56 kg/m2), fat mass (1.35%), fat-free mass (0.63%), body weight (2.49 kg), and waist circumference (-3.06 cm) were observed. In seven studies, IF decreased body weight by -1.89 kg, with greater effects in heavier populations and shorter studies (≤ 4 months). However, intermittent fasting didn't significantly outperform other diets in a meta-analysis of 9 studies [R, R, R, R, R, R, R, R, R, R].

Eighty-five studies from 25 countries conducted between 1982 and 2019 found that Ramadan intermittent fasting led to a small but significant weight reduction (approximately 1.022 kg). Time-restricted feeding showed greater weight loss than control regimens, particularly in observational studies [R, R].

Intermittent fasting may help by reducing the amount of calories you consume and enhancing your body's fat-burning processes.

PERSONALIZED TO YOUR GENES

People with your *CD36* gene variant may have higher appetite and waist-to-hip ratio. Intermittent fasting may help people struggling to control food cravings [R].

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
CD36	**rs1761667**	AG	

5

Sleep for 7+ Hours

IMPACT 3 / 5

EVIDENCE 3 / 5

How to implement

Ensure you allocate enough time in your schedule to achieve a minimum of 7 hours of sleep each night. This might involve going to bed earlier or adjusting your evening routine to promote relaxation and make it easier to fall asleep.

Description

Optimizing sleep involves adopting healthy sleep habits and creating a sleep-conducive environment to ensure restorative and sufficient sleep duration. It supports cognitive function, mood stability, and overall physical health. Most experts recommend getting **at least 7 hours of good-quality sleep each night**.

Sleep supports your body and mind [R, R]. More precisely, sleep helps:

- Support brain health [R, R]
- Maintain a healthy weight and appetite [R, R, R]
- Regulate blood pressure [R, R]
- Balance blood sugar [R, R]

Ways to sleep better include [R]:

- Reducing your bright light exposure (screen time) in the evenings
- Sticking to a regular sleep schedule
- Avoiding hunger or large meals before bed
- Avoiding nicotine, caffeine, and alcohol before bed
- Maintaining a sleep area that's cool, dark, and quiet

How it helps

Adults who don't get enough sleep are 25-55% more likely to be overweight or obese. In fact, the risk of obesity may increase by 9% for every hour of sleep lost [R, R, R, R].

Disrupting the natural sleep cycle may also promote weight gain. **People who work night shifts are more likely to be obese** [R, R, R].

Sleep may be even more important for weight control in children. The good news is that every 1-hour increase in sleep may lower their risk of weight gain by a whopping 21% [R, R, R, R, R].

In one study, animals in a constant light cycle had lower alpha-MSH levels, which suggests circadian rhythm problems may result in less MSH. On the other hand, moderate light (UV) exposure during the day can boost MSH and activate melanocortin receptors [R, R, R].

In one trial, restful sleep in non-obese individuals (8+ of uninterrupted sleep) normalized leptin levels. On the other hand, sleep deprivation can decrease leptin and prevent MC4R activation [R, R].

Sleep helps keep hunger hormones like ghrelin and leptin in balance. Thus, lack of sleep may increase junk food cravings and total food intake [R, R, R].

6

Capsaicin and Capsinoids

IMPACT 2 / 5

EVIDENCE 3 / 5

How to implement

Take a supplement containing 450 mg of capsaicin or capsinoids, once daily with a meal. Continue this routine daily as part of your supplement regimen.

TYPICAL STARTING DOSE

450 mg

Description

Capsaicin, found in chili peppers, is known for its potential to boost metabolism and promote weight loss. It can also provide pain relief when used topically in certain creams and ointments. Capsinoids are compounds similar to capsaicin, found in chili peppers, and may have similar metabolic and weight management benefits without the intense heat.

Capsaicin is the compound that makes chili peppers spicy [R].

People use **topical capsaicin** to relieve pain and **oral capsaicin** to aid weight loss [R, R].

Capsinoids are compounds similar to capsaicin. Unlike capsaicin, they are present in both sweet and chili peppers [R].

How it helps

Capsaicin (1-3 mg) may help you lose weight by [R, R, R, R]:

- Reducing your appetite
- Speeding up your metabolism

This amount of capsaicin is available in [R]:

- **50-150 mg** of a cayenne pepper extract
- **200-600 mg** of ground cayenne pepper

Combining capsaicin with ingredients like green tea and ginger may have similar effects [R, R, R].

Supplementing with **capsinoids (6-10 mg for 1-3 months)** may also support weight loss [R, R].

Capsaicin may be particularly beneficial for people with certain MC4R SNPs due to its potential to reduce leptin resistance. However, the research in this area is limited [R].

Next Steps

Remember, your genes only tell one important part of your health story!

Now that you've seen your DNA-based results for this health topic, let's take a look at other contributing factors.

Your lab results

Your lab results are impacted by the combined effect of your genes, environment and lifestyle.

Lab tests will give you the best picture of your current health status, while your genes provide insight into your health predispositions and which recommendations are best for you.

HbA1c	30 mmol/mol	26 36 48	29 Dec 2025
Glucose, Fasting	97 mg/dL	55 65 80 95 100 126	9 Nov 2025
Triglycerides	54 mg/dL	0 90 150 500	9 Nov 2025
Insulin, Fasting	9.08 uU/mL	1 6 19.6 25	9 Nov 2025
HbA1c (%)	4 %	4.3 4.5 5.4 5.6 6.5	29 Dec 2025