

Adenoviruses and Weight Gain

Biohacker Report

REPORT CATEGORIES —



IMMUNITY &
INFECTIONS



WEIGHT & BODY FAT

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

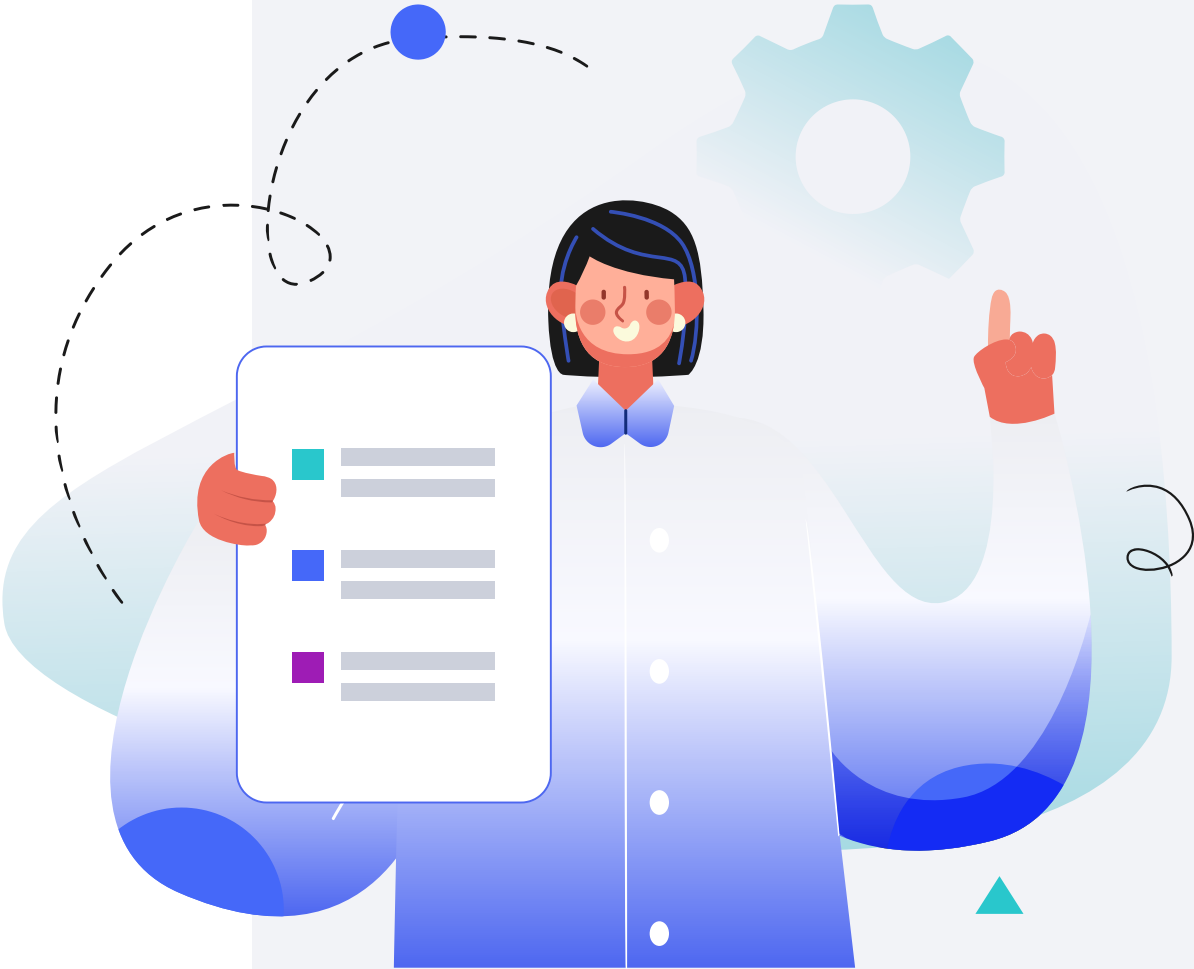
Male

HEIGHT

5ft 5" 165cm

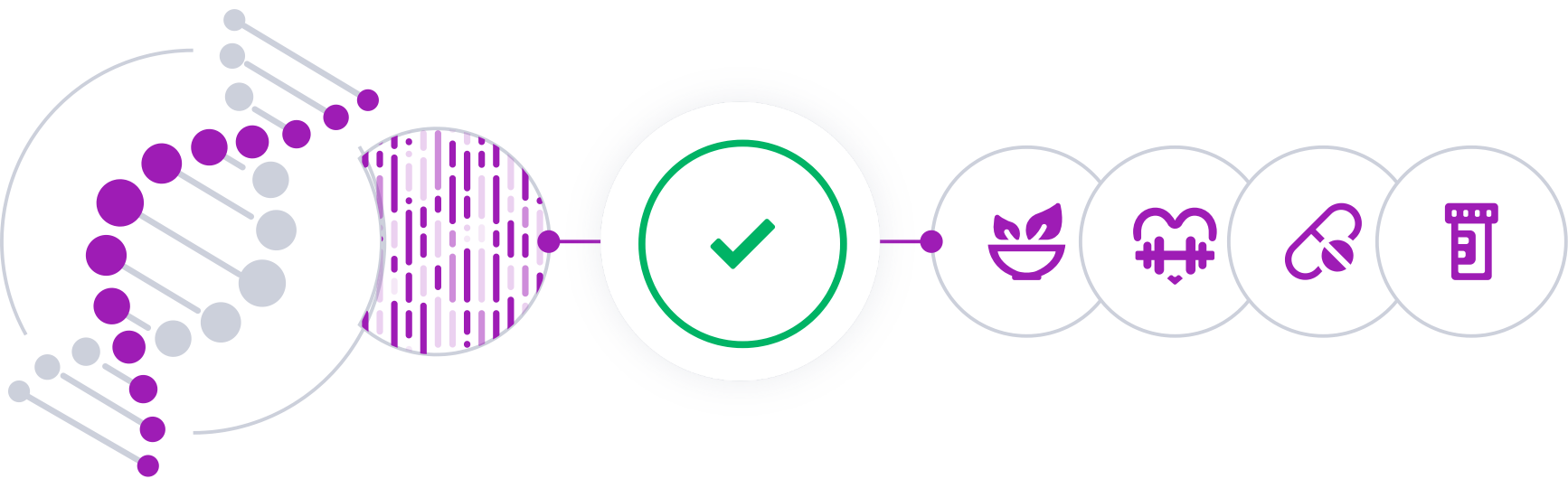
WEIGHT

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.

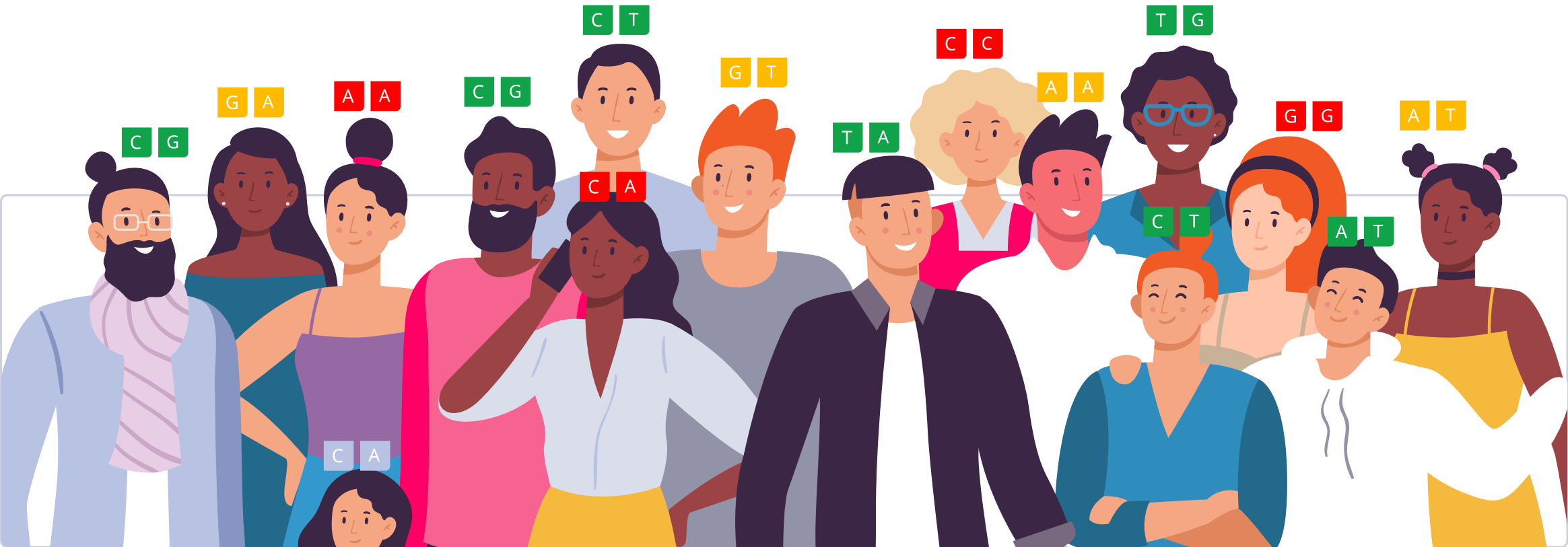


Similarly, our Trait Reports look at how your DNA influences your traits.



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

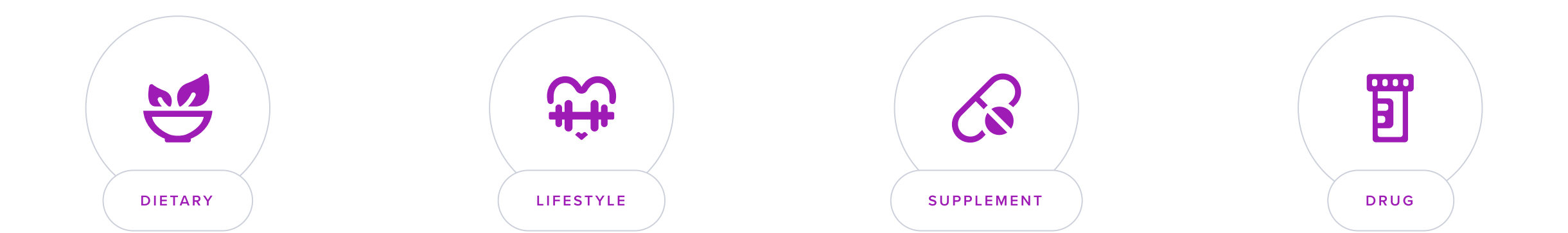
You have 2 risk alleles

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

Adenoviruses are a family of viruses that cause a range of illnesses, from mild respiratory infections to severe gastrointestinal distress. Examples of illnesses caused by adenoviruses include [\[R\]](#):

- Common cold
- Gastroenteritis
- Croup
- Viral pink eye
- Bronchitis
- Viral pneumonia

Interestingly, infection with two species of adenoviruses (Ad-5 and Ad-36) has been associated with fat cell creation (*adipogenesis*) and higher inflammation (but better blood sugar control) in animal studies. Research suggests these viruses alter the metabolism of cells to produce more fat cells, ultimately increasing their ability to store glucose as fat [\[R, R, R\]](#).

In line with this, being antibody-positive for these viruses has been associated with an increased risk of obesity in both adults and children [\[R, R\]](#).

Genetics of Adenovirus-Induced Weight Gain

The [PCSK1](#) gene helps produce proprotein convertase 1/3 (PC1/3), an enzyme abundant in the brain and endocrine system. PC1/3 activates a range of hormones and peptides involved in [\[R, R\]](#):

- Temperature control
- Nutrient absorption
- Appetite and feeding behavior
- [Glucose](#) and fat metabolism
- Energy expenditure

The ‘C’ allele of the [rs6232](#) polymorphism has been associated with both 15% higher obesity rates and 67% higher risk of Ad-36 positivity. Another variant of this gene, the ‘G’ allele of [rs6235](#), has been associated with 7% higher obesity rates and 34% higher risk of Ad-36 positivity [\[R, R\]](#).

[BDNF](#) (brain-derived neurotrophic factor) is a component produced mainly in brain cells. It plays many key roles that support your brain’s ability to grow and learn. It plays a role in multiple cognitive and mental health aspects, as well as in weight control [\[R, R\]](#).

The ‘G’ allele of [rs4923461](#) has been associated with slightly higher rates of Ad-36 infection [\[R\]](#).

The [CXADR](#) gene encodes a receptor used by coxsackie B virus and adenovirus 2 and 5 to infect cells in the skin and intestines [\[R\]](#).

Two variants, the ‘G’ alleles of [rs2824292](#) and [rs437470](#), have been associated with a reduced number of CXADR receptors. This may make carriers less susceptible to adenovirus-induced weight gain [\[R\]](#).

The [IL10](#) gene codes for [interleukin-10](#) (also abbreviated as IL-10), a cytokine with a complex relationship with



Typical likelihood of adenovirus-induced weight gain based on 7 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
LGR4	rs4923461	GA
CXADR	rs2824292	GA
IL10	rs1800871	GG
PCSK1	rs6232	TT
PCSK1	rs6235	CC
CXADR	rs437470	AA
PPARG	rs1801282	CC

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

inflammation. Most of the time, IL-10 is **anti-inflammatory** and suppresses the activity of [Th1](#) cells, [Th2](#) cells, [neutrophils](#), macrophages, and [natural killer cells](#) [[R](#), [R](#), [R](#)].

The ‘G’ allele of [rs1800871](#), linked to higher inflammation, has been associated with higher BMI and waist circumference. Interestingly, the same study found that circulating IL-10 levels were higher in obese people and were associated with higher weight, BMI, waist circumference, waist-to-hip ratio, fat mass, and adenovirus titers [[R](#), [R](#)].

The [PPARG](#) gene encodes a protein called PPAR-γ (peroxisome proliferator-activated receptor-gamma). PPAR-γ affects metabolic health and response to diet, acting as a master regulator between [[R](#), [R](#)]:

- Nutrient intake
- Weight control
- Inflammation
- Fat burning
- [Insulin sensitivity](#)

Out of the different SNPs in the *PPARG* gene, researchers have mostly focused on [rs1801282](#) (*Pro12Ala*, referred to as rs1805192 in some studies). Its ‘G’ allele has been associated with higher obesity rates. Interestingly, a study found that Ad-36 infection increases *PPARG* expression [[R](#), [R](#), [R](#), [R](#), [R](#), [R](#)].

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		DOSAGE		
1	Lactobacillus Rhamnosus GG	10 billion CFU	2	Vinegar
3	Apple Cider Vinegar		4	Akkermansia
5	Avoid Processed Carbs		6	Avoid Artificially Sweetened Beverages
7	Avoid Overeating		8	Acarbose
9	Avoid Sugary Foods & Drinks			

1



Lactobacillus Rhamnosus GG

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

TYPICAL STARTING DOSE

10 billion CFU

Description

Lactobacillus rhamnosus GG (LGG) is a probiotic that has been shown to have a number of health benefits, including reducing the risk of diarrhea, improving gut health, and boosting the immune system. LGG can be taken as a supplement or found in some yogurts and other fermented foods.

How it helps

Lactobacillus Rhamnosus GG enhances gut microbiota balance, which can improve nutrient absorption and metabolic processes. This probiotic may also help regulate appetite and reduce inflammation, supporting weight management in individuals affected by adenoviruses.

2



Vinegar

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate 1-2 tablespoons of vinegar into your diet daily, either by using it as a salad dressing or by diluting it in a glass of water. It is important to not exceed this amount to avoid adverse effects.

Description

Vinegar is a liquid produced through fermentation, often used in cooking and as a condiment. It may have health benefits such as aiding digestion and potentially helping with blood sugar control in some individuals due to its acetic acid content.

[Vinegar](#) is often used in cooking to add sour flavor and to preserve foods through pickling. Some people also use vinegar for cleaning.

As a health food, vinegar may help [\[R\]](#), [\[R\]](#):

- Reduce blood sugar
- Control weight

How it helps

Vinegar, particularly due to its acetic acid content, helps regulate blood sugar levels by improving insulin sensitivity, which can be beneficial for individuals affected by adenoviruses experiencing weight gain. This regulation may support weight management by reducing appetite and preventing excessive glucose spikes.

3



Apple Cider Vinegar

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate 1-2 tablespoons of apple cider vinegar into your diet daily by diluting it in a large glass of water. Consume this mixture before meals to potentially benefit from its effects.

Description

Apple cider vinegar is a fermented liquid made from crushed apples and is known for its potential health benefits. It is rich in acetic acid and may aid in weight management, improve digestion, and help regulate blood sugar levels, often used as a natural remedy for various conditions like acid reflux and insulin resistance.

[Vinegar](#) is often used in cooking to add sour flavor and to preserve foods through pickling. Some people also use vinegar for cleaning [\[R\]](#).

Apple cider vinegar is one of the most common vinegars produced from apples. As a health food, apple cider vinegar may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Reduce blood sugar
- Lower cholesterol
- Fight infections

How it helps

Apple cider vinegar may help mitigate weight gain associated with adenoviruses by enhancing metabolic rate and promoting fat oxidation, while its acetic acid content can aid in regulating blood sugar levels, contributing to improved appetite control.

4



Akkermansia

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take Akkermansia muciniphila as a supplement in capsule form, usually one capsule per day. It is best consumed with a glass of water, preferably in the morning. Follow this routine for a duration as advised by a healthcare provider, but commonly for a period of at least 8 to 12 weeks to observe potential benefits.

Description

Akkermansia is a type of gut bacteria that resides in the human digestive system. It has been studied for its potential role in gut health and its association with metabolic and immune functions.

How it helps

Akkermansia supplementation can enhance gut health by promoting the integrity of the intestinal barrier, which may mitigate inflammation linked to adenovirus infections and assist in regulating glucose metabolism, potentially aiding weight management.

5



Avoid Processed Carbs

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Eliminate or significantly reduce foods such as white bread, pastries, sodas, and other processed or refined sugars from your daily diet. Instead, focus on consuming whole grains, fruits, and vegetables. Aim to maintain this dietary change consistently over time to achieve and sustain health benefits.

Description

Processed carbs, like white bread and chips, are foods that have been changed from their natural state. They often have sugars and unhealthy fats added in, which can lead to weight gain and other health problems. Avoiding processed carbs and sticking with whole grains, fruits, and vegetables is better for maintaining a healthy weight and avoiding illnesses like diabetes and heart disease.

How it helps

Avoiding processed carbohydrates can mitigate weight gain associated with adenovirus infections by promoting stable blood sugar levels and improving insulin sensitivity, thereby enhancing metabolic health.

6



Avoid Artificially Sweetened Beverages

IMPACT

1 / 5

EVIDENCE

1 / 5

Description

Artificially sweetened beverages (ASBs) are drinks sweetened with non-caloric or low-calorie synthetic sweeteners instead of sugar. These beverages are often marketed as healthier alternatives to sugar-sweetened beverages, potentially aiding in weight management and reducing sugar intake.

However, their health benefits are contentious, with studies suggesting potential risks, including associations with increased appetite, weight gain, and aging. They are also associated with a heightened risk for certain metabolic disorders, including [\[R\]](#), [\[R\]](#), [\[R\]](#)..:

- Obesity
- Type 2 diabetes
- High blood pressure
- Heart disease

These beverages are also linked to a higher risk of death from any cause. Consequently, their long-term health impact remains a subject of ongoing research and debate [\[R\]](#), [\[R\]](#).

How it helps

Avoiding artificially sweetened beverages can help mitigate weight gain associated with adenovirus infections, as these drinks may stimulate appetite and disrupt metabolic responses, leading to poor weight management.

7



Avoid Overeating

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Consume meals slowly, taking time to chew your food thoroughly and pausing between bites to allow your body to signal when it is full. Aim to stop eating when you feel about 80% full rather than waiting until you feel uncomfortably full. Implement this practice at every meal and snack, making it a consistent part of your daily eating habits.

Description

People who overeat take in more food than their body needs. Overeating may contribute to obesity and diabetes, as well as digestive and sleep problems.

People who overeat take in more food than their body needs.

Overeating may contribute to [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Obesity
- Diabetes
- Digestive problems
- Sleep problems

How it helps

Avoiding overeating helps mitigate the risk of weight gain exacerbated by adenovirus-induced metabolic changes. By controlling caloric intake, individuals can maintain a healthier weight and prevent additional complications related to obesity and metabolic disorders.

8



Acarbose

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Acarbose is usually taken orally, with the first bite of each main meal. The typical dose and frequency are determined by a healthcare provider based on your medical condition and response to treatment. Swallow the tablet whole with water, and avoid crushing or chewing it. To maximize its benefits, combine acarbose with a balanced diet and regular physical activity. If you miss a dose, take it with your next meal; do not double the dose.

Description

Acarbose is an oral medication used to manage blood sugar levels in individuals with type 2 diabetes. It belongs to the class of drugs known as *alpha-glucosidase inhibitors*, which work by slowing down the digestion and absorption of carbohydrates in the intestines to prevent sudden spikes in blood sugar levels after meals. It is often used in combination with other antidiabetic medications or lifestyle changes like diet and exercise for optimal results.

In addition to diabetes management, acarbose has been studied for potential benefits in reducing the risk of cardiovascular complications associated with metabolic syndrome and for weight management in specific populations. However, its use may cause gastrointestinal side effects, such as bloating or gas, due to undigested carbohydrates reaching the colon.

How it helps

Acarbose aids in weight management and ameliorates postprandial hyperglycemia by inhibiting enzyme activity that breaks down carbohydrates in the intestine, thus slowing glucose absorption. This is particularly beneficial for patients affected by adenoviruses who may experience weight gain due to altered metabolic states.

9



Avoid Sugary Foods & Drinks

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

To avoid sugary foods, eliminate or significantly reduce consumption of foods and beverages high in added sugars such as sodas, candies, baked goods, and sugary cereals from your diet. Instead, opt for natural sugar sources like fruits. Aim to do this daily for ongoing health benefits.

Description

High-sugar foods like baked goods, sweets, and sugary drinks, can spike your blood sugar levels. Consuming a lot of these types of foods can contribute to health issues like diabetes, obesity, insomnia, and heart disease.

High-sugar foods and refined carbs have a high glycemic index (GI). This means they tend to spike your blood sugar levels. They include [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Sugary drinks
- Baked goods
- Sweets
- White bread
- White rice
- Pasta

Eating a lot of sugary foods can contribute to:

- Diabetes [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Weight gain and obesity [\[R\]](#), [\[R\]](#)
- Insomnia [\[R\]](#)
- Heart disease [\[R\]](#)

You may also want to avoid processed sugars and sugary drinks. They may have a role in increasing IL-1B [\[R\]](#), [\[R\]](#).

How it helps

Avoiding sugary foods and drinks helps mitigate weight gain associated with adenovirus infections by stabilizing blood sugar levels and reducing excessive calorie intake. This adjustment can minimize metabolic disturbances and support overall health recovery.