

LDL Particle Size

Biohacker Report

REPORT CATEGORY —



HEART & BLOOD
VESSELS

Sample Client

Report date: 15 January 2026

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omicsedge

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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

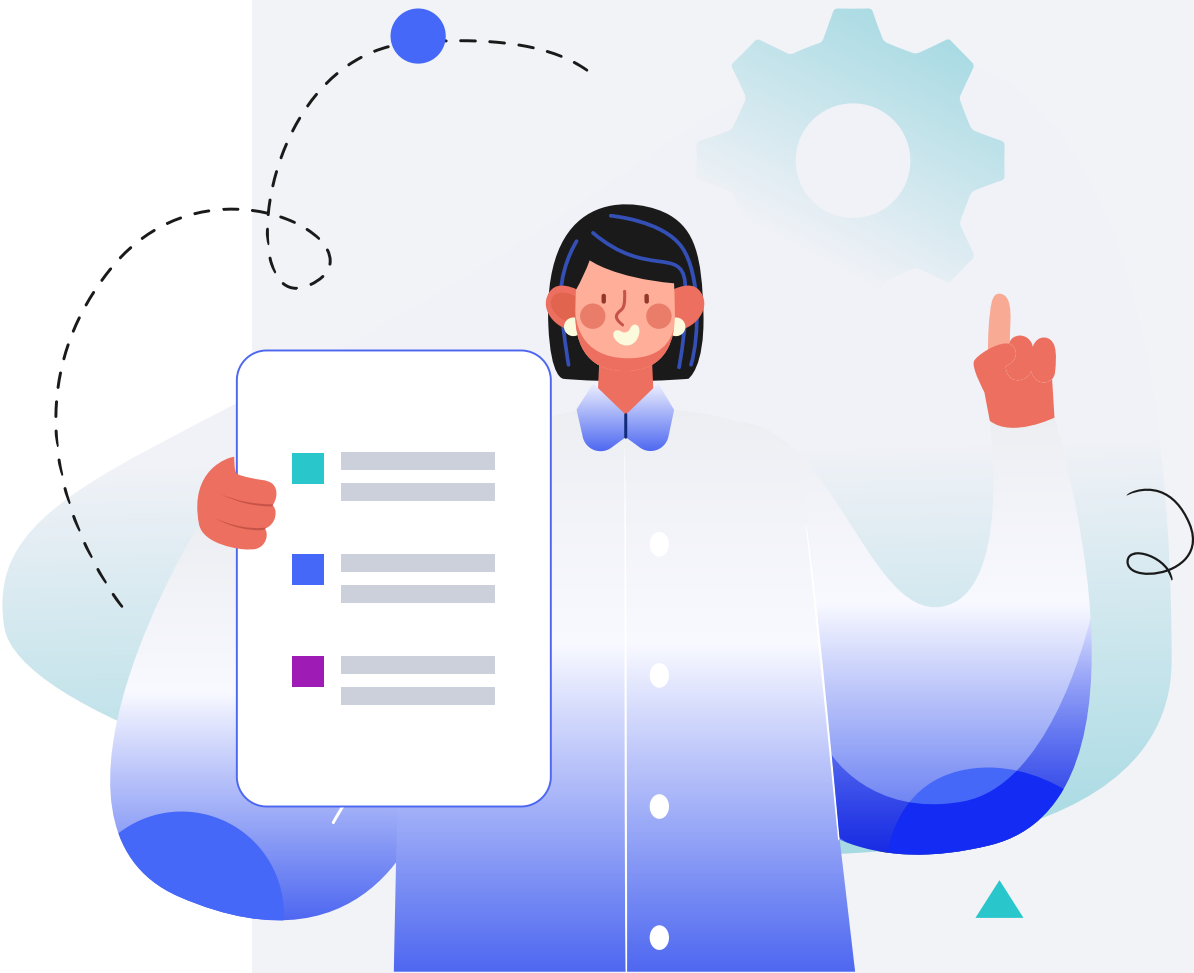
Male

HEIGHT

5ft 5" 165cm

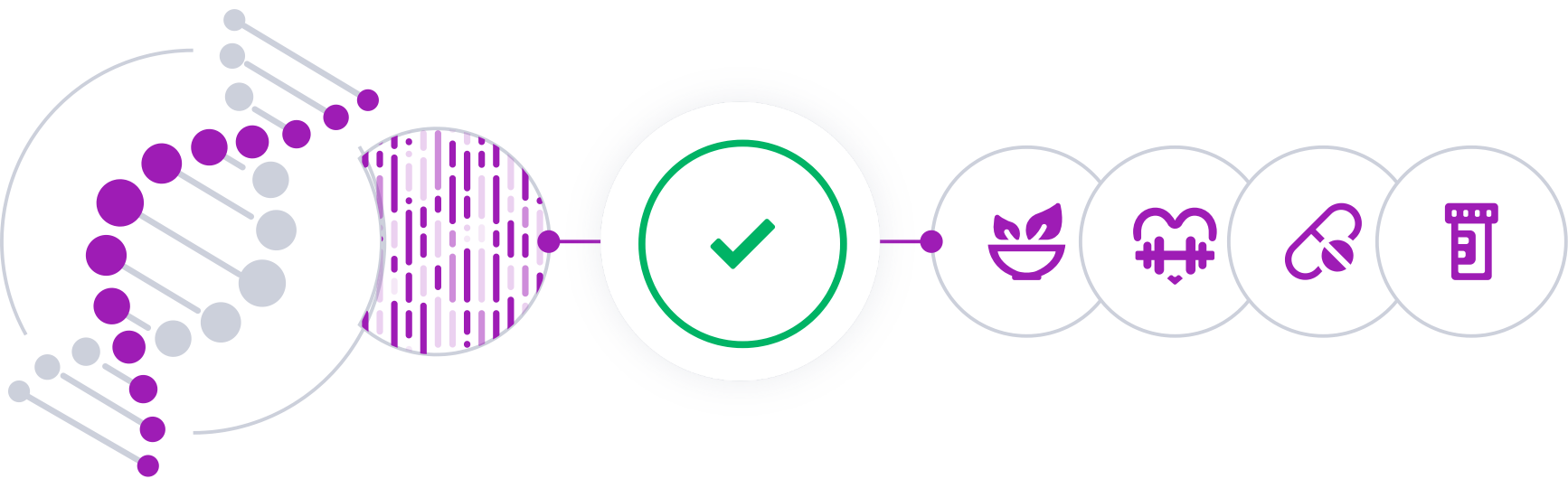
WEIGHT

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

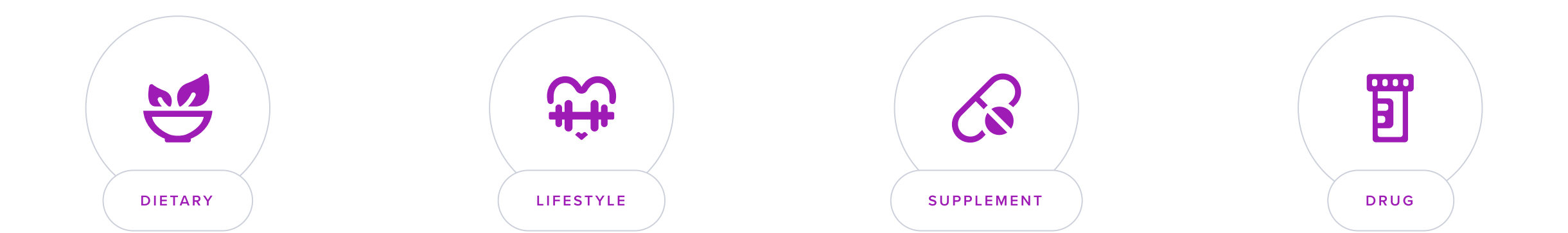
You have 2 risk alleles

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

When it comes to [LDL](#) particles, size matters -- and the bigger may be the better.

Research suggests that small LDL more easily goes into blood vessel walls, where it deposits as plaque, while larger particles tend to bounce off blood vessel walls [[R](#), [R](#), [R](#), [R](#), [R](#)].

That's why small LDL may be worse, even though it carries less cholesterol than the larger particles. Small LDL has been linked to a greater risk of [[R](#), [R](#), [R](#), [R](#)]:

- Atherosclerosis
- Heart disease
- Diabetes

Factors Affecting LDL Particle Size

Research suggests that small LDL more easily goes into blood vessel walls, where it deposits as plaque, while larger particles tend to bounce off blood vessel walls. That's why small LDL may be worse, even though it carries less cholesterol than the larger particles [R, R, R, R, R].

Up to **50%** of differences in people’s LDL particle size may be due to genetics [R].

Other factors that can raise small LDL levels include:

- Obesity [R]
- Physical inactivity [R, R]
- A diet high in simple carbs and saturated fat [R, R]



Predisposed to typical LDL particle size based on 57 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ANGPTL4	rs116843064	GG
TMEM116	rs73412716	GG
LPA	rs56393506	TC
APOH	rs1801689	CA
ADAM10	rs1077835	AG
APOE	rs157594	TT
ABCA1	rs1883025	CC
DSTN	rs2618566	TT
KLF14	rs553015785	AA
MLXIPL	rs71556736	CT
GCKR	rs1260326	TC
PKD2L1	rs603424	AG
TRIB1	rs2954025	CT
SOAT2	rs28883710	CT
POLK	rs767676	CT
PLTP	rs4810479	TC
IRS1	rs2943654	CT
SLC38A11	rs13389219	CT
TNXB	rs1061808	GT
PGS1	rs10642898	INS(CCG)C
APOE	rs7412	CC
PCSK9	rs11591147	GG
CD300LG	rs72836561	CC
APOB	rs577584	AA
PIGV	rs79598313	CC
SMARCA4	rs10412048	AA
SIDT2	rs964184	CC
SORT1	rs12740374	GG
NLRC5	rs12446515	TT
VEGFB	rs11231698	CC
SAMM50	rs3747207	AA
ALDH1A2	rs1601935	GG

GENE	SNP	GENOTYPE
TRPS1	rs13262459	TT
BLK	rs34962960	GG
MFHAS1	rs7012814	AA

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			DOSAGE
1	Omega-3 (Fish Oil)	500 mg	2	Choose Healthy Fats	
3	Avoid Sugary Foods & Drinks		4	Exercise At Least One Hour a Day	1 hour
5	DHA (Omega-3)	200 mg	6	Aerobic Exercise (Cardio)	1 hour
7	Practice Exercise Snacks	1 minutesute	8	Niacin Supplements	20 mg
9	Probiotics	10 billion	10	Mediterranean Diet	
11	Strength Training	1 hour	12	Limit Calorie Intake	
13	Walking	30 minutes	14	Tai Chi	1 hour
15	Strawberries		16	Flaxseed Oil	15 g
17	Avocado		18	Plant Sterols & Stanols	300 mg
19	Eat Fiber-Rich Foods		20	Psyllium	5 g
21	Myo-inositol	4 g	22	Barberry	500 mg
23	Alpha-Lipoic Acid	600 mg	24	Dairy Products	
25	Soy		26	Hydrogen Water	
27	Salmon		28	Barley	
29	Soy Protein	20 g	30	Oats	

1



Omega-3 (Fish Oil)

IMPACT3 / 5

EVIDENCE4 / 5

How to implement

Take 1-2 g of omega-3 (fish oil) supplement daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

500 mg

Description

Omega-3 fatty acids are essential fats found in fatty fish like salmon, flaxseeds, and walnuts. They are known for their potential cardiovascular and brain health benefits, including reducing the risk of heart disease and supporting cognitive function.

[Omega-3 fatty acids](#) are some of the healthiest fats we can eat. They help lower inflammation and protect the heart, brain, and eyes. Our bodies produce less omega-3s than we need for optimal health, so it's important to get enough through food or supplements [\[R\]](#), [\[R\]](#), [\[R\]](#).

There are three major types of omega-3s: ALA, EPA, and DHA [\[R\]](#), [\[R\]](#).

Fatty fish are rich in EPA and DHA. They include [\[R\]](#):

- Salmon
- Tuna
- Herring
- Sardines

For optimal protection, try to get at least **two servings of fatty fish per week**. Fish oil supplements are available for those who don't eat fish regularly [\[R\]](#).

How it helps

Supplementation with omega-3 fatty acids (1-4 g/day for 1-3 months) may help reduce the percentage of small LDL particles and increase average LDL particle size. Both DHA and highly purified EPA may be especially effective [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Omega-3 fatty acids may help by modifying fat metabolism to produce fewer small LDL particles [\[R\]](#).

2



Choose Healthy Fats

IMPACT

3 / 5

EVIDENCE

4 / 5

How to implement

Incorporate sources of unsaturated fats such as olive oil, avocados, nuts, seeds, and fatty fish into your daily diet. Aim for at least two servings of fatty fish per week and use olive oil for cooking and salad dressings. Replace saturated fats found in red meat, butter, and processed foods with these healthier options whenever possible.

Description

Choosing healthy fats, such as those found in avocados, nuts, and fatty fish, can support cardiovascular health, reduce inflammation, and promote overall well-being. A diet balanced in healthy fats can help manage cholesterol levels and reduce the risk of heart disease.

Based on their structure, the fats in our diet can be broadly divided into *saturated* and *unsaturated* fat. Trans fat is a type of unsaturated fat [\[R, R, R\]](#).

In large amounts, trans fat and saturated fat may have a negative impact on your heart and reproductive health. Processed foods and animal products like red meat and dairy are rich in these fats [\[R, R, R, R, R\]](#).

Some types of unsaturated fat can protect your heart and support fertility. **Experts say you should add more unsaturated fats to your diet.** Some good sources include [\[R, R, R\]](#):

- Nuts
- Seeds
- Fish

Unsaturated fats include polyunsaturated fats or PUFAs (omega-3 and omega-6) and monounsaturated fats or MUFAs [\[R, R\]](#).

How it helps

Compared to diets high in carbohydrates and low in fats, those higher in saturated and polyunsaturated fats are associated with larger LDL particles [\[R\]](#).

For instance, consuming more milk and dairy products may help reduce small LDL particles and increase average LDL particle size [\[R, R\]](#).

Omega-3 fatty acids, especially DHA, may reduce small LDL particles in both healthy people and those with metabolic syndrome. In line with this, people eating more salmon may have higher levels of large LDL particles [\[R, R, R\]](#).

Eating cholesterol-rich foods such as whole eggs may have beneficial effects on LDL particle size. However, some studies found no effects of dietary cholesterol on LDL particle size [\[R, R, R, R\]](#).

Conversely, **eating foods rich in trans fatty acids (such as margarines and shortenings) may increase small LDL levels** [\[R, R\]](#).



PERSONALIZED TO YOUR GENES

A diet high in healthy fats may increase LDL particle size more in people with your [APOE](#) gene variant [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
APOE	rs429358	TT	

3



Avoid Sugary Foods & Drinks

IMPACT3 / 5

EVIDENCE4 / 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

Eating a diet higher in refined sugars is associated with higher concentrations of small LDL particles [\[R\]](#), [\[R\]](#).

In line with this, limiting dietary carbohydrates may increase average LDL particle size. Adopting low-carbohydrate diets such as the ketogenic diet may help [\[R\]](#), [\[R\]](#), [\[R\]](#).

Compared to low-fat diets, low-carbohydrate diets may be more effective at reducing small LDL levels in people engaged in weight-loss interventions [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Limiting sugary foods can help by decreasing blood triglycerides. High levels of these fats are associated with higher small LDL concentrations [\[R\]](#), [\[R\]](#).

 PERSONALIZED TO YOUR GENES

A high-carb diet may reduce LDL particle size more in people with your *APOE* gene variant [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
APOE	rs429358	TT	

4



Exercise At Least One Hour a Day

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Dedicate a minimum of 60 minutes to moderate-intensity activities such as brisk walking, swimming, or cycling. Do this most days of the week, aiming for at least 5 days to optimize benefits.

TYPICAL STARTING DOSE

1 hour

Description

[Exercise](#) can do wonders for your health. It can help you lose weight, improve your heart health, boost your mood, and more [\[R\]](#).

There are many ways you can be active. You can walk, run, swim, dance, or play team sports. **Everything counts, and it's never too late to start!**

Try to get at least **60 minutes of moderate physical activity on most days**, including walking. **Getting a mix of cardio (min 150 min/day) and strength training (min 2 times a week) may be optimal.**

How it helps

Physical inactivity is associated with smaller LDL particles [\[R\]](#).

Similarly, **regular exercise reduces the amount of small LDL particles while increasing the average LDL particle size** [\[R\]](#).

Aerobic exercise may be most effective at increasing LDL particle size in the long term. However, a single bout of exercise may be ineffective [\[R, R, R\]](#).

Other exercise types that may help include:

- Walking [\[R\]](#)
- Tai chi [\[R\]](#)

Exercise may help by modifying fat metabolism to produce fewer small LDL particles [\[R\]](#).

5



DHA (Omega-3)

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Take an omega-3 supplement containing DHA at a dosage of 200-500 mg daily, preferable with a meal to improve absorption. It's recommended to continue this supplementation as part of your daily regimen to support heart, brain, and joint health.

TYPICAL STARTING DOSE
200 mg

Description

DHA is an omega-3 fatty acid found in fatty fish and algae-based supplements. It is essential for brain health and has been associated with cognitive function, cardiovascular health, and reducing inflammation in the body.

An **EPA/DHA supplement** can be taken to help meet omega-3 fatty acid needs not achieved through diet. Supplement amounts are generally 250-500mg/d though there are no current official recommendations other than for ALA.

How it helps

Supplementation with omega-3 fatty acids (1-4 g/day for 1-3 months) may help reduce the percentage of small LDL particles and increase average LDL particle size. Both DHA and highly purified EPA may be especially effective [R, R, R, R, R, R, R, R, R].

Omega-3 fatty acids may help by modifying fat metabolism to produce fewer small LDL particles [R].

6



Aerobic Exercise (Cardio)

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Engage in at least 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity activity each week. Distribute this time over at least 3 days per week, avoiding consecutive days of vigorous exercise to allow for recovery.

TYPICAL STARTING DOSE

1 hour

Description

Engaging in regular aerobic exercise, such as running, swimming, or cycling, offers numerous health benefits, including improved cardiovascular fitness, weight management, and mood enhancement. It supports overall physical and mental well-being while reducing the risk of chronic diseases.

Cardio, short for cardiovascular exercise, is any type of physical activity that temporarily increases your heart rate. Examples include **running, cycling, swimming, and brisk walking**.

Regular cardio exercise has many benefits for your overall health. It can help lower your risk of heart disease and diabetes, support weight loss, and improve your mood and energy levels. To get the most out of cardio, try to do it for at **least 30 minutes, 3-5 times a week**.

Interval training is a type of cardio that combines periods of high-intensity training with brief rest periods.

How it helps

Physical inactivity is associated with smaller LDL particles [\[R\]](#).

Similarly, **regular exercise reduces the amount of small LDL particles while increasing the average LDL particle size** [\[R\]](#).

Aerobic exercise may be most effective at increasing LDL particle size in the long term. However, a single bout of exercise may be ineffective [\[R, R, R\]](#).

Exercise may help by modifying fat metabolism to produce fewer small LDL particles [\[R\]](#).

7



Practice Exercise Snacks

IMPACT

3 / 5

EVIDENCE

3 / 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

Physical inactivity is associated with smaller LDL particles [\[R\]](#).

Similarly, **regular exercise reduces the amount of small LDL particles while increasing the average LDL particle size** [\[R\]](#).

Exercise may help by modifying fat metabolism to produce fewer small LDL particles [\[R\]](#).

8



Niacin Supplements

IMPACT3 / 5

EVIDENCE2 / 5

How to implement

Take a 20 mg niacin supplement daily, preferably with a meal to aid in absorption and minimize potential stomach upset.

TYPICAL STARTING DOSE

20 mg

Description

Niacin is an essential B vitamin that plays a vital role in metabolism, supporting heart health, maintaining healthy cholesterol levels, and promoting overall cellular function when included in a balanced diet or as a supplement.

[Niacin](#) (vitamin B3) is found in many foods. It supports your nervous system, skin, gut, and more [\[R\]](#).

Adults should get **16 mg** of niacin a day, and most people get enough from their diets [\[R\]](#).

Experts recommend getting niacin from food rather than supplements [\[R, R\]](#).

How it helps

Niacin greatly reduced small LDL levels in a study. However, **the treatment wasn’t well tolerated by 1 out of 5 patients** [\[R\]](#).

Combining niacin (1000-2000 mg/day) with statins may lower small LDL levels more than statins alone [\[R\]](#).

Niacin may help by:

- Reducing how much fat is produced by the liver [\[R, R, R\]](#)
- Increasing cholesterol removal from the blood [\[R, R, R\]](#)

Please note: *Niacin has been linked to liver damage and strokes. It may also cause flushing, bruises, and bleeding. Most doctors do not recommend taking niacin unless a person can’t take statins and has close medical supervision. Talk to your doctor before taking niacin* [\[R, R, R, R, R\]](#).

9



Probiotics

IMPACT3 / 5

EVIDENCE1 / 5

How to implement

Take a probiotic supplement containing 10 billion or more live cultures once daily, preferably with a meal or as directed by the packaging or a healthcare provider.

TYPICAL STARTING DOSE

10 billion

Description

Probiotics are live beneficial bacteria and yeasts that can support gut health and digestive function when consumed as supplements or found in fermented foods like yogurt and sauerkraut. They may be beneficial to gut health, immune function, blood sugar, and mood.

[Probiotic bacteria](#) are “good” bacteria found mainly in the large intestine. They support your body and mind by [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Maintaining gut health
- Supporting a healthy immune system
- Improving your mood
- Helping to maintain healthy blood sugar

Prebiotics are certain types of fiber and other complex carbs that serve as food for gut bacteria. **They support gut health by helping boost the activity and growth of “good” bacteria** [\[R\]](#), [\[R\]](#).

Prebiotics are also added to foods and supplements. Common prebiotic ingredients are [\[R\]](#), [\[R\]](#):

- Oligo-fructose
- Oligo-galactose
- [Inulin](#)

Mixtures of probiotics and prebiotics are known as **synbiotics** [\[R\]](#).

How it helps

Taking a supplement with two Lactobacillus strains ([L. plantarum](#) KY1032 and *L. curvatus* HY7601) may increase LDL particle size [\[R\]](#).

Probiotics may help by:

- Reducing how much cholesterol is made and absorbed [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Increasing cholesterol clearance [\[R\]](#)

10



Mediterranean Diet

IMPACT2 / 5

EVIDENCE3 / 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

Eating a Mediterranean diet may slightly reduce small LDL levels and increase average LDL particle size. This diet may be more effective if it’s enriched in [extra virgin olive oil](#) or nuts [\[R, R, R, R\]](#).

The Mediterranean diet may be a good choice because it is:

- Low in saturated fat [\[R\]](#)
- Focused on healthy fat sources like olive oil and fish [\[R\]](#)
- Rich in fiber [\[R\]](#)

11

Strength Training

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Engage in strength training exercises, such as weight lifting or bodyweight exercises, for 60 minutes per session, 2 to 3 times per week. Ensure you work all major muscle groups and rest each muscle group for at least 48 hours before exercising it again.

TYPICAL STARTING DOSE

1 hour

Description

Strength training, also called resistance or *anaerobic* training, contracts the muscles against an external resistance for short periods of time. This helps gain muscle strength, tone, and mass. This can include activities like weight lifting, pushups, and crunches.

Strength training, also known as resistance training, is a type of physical exercise that uses resistance to build strength, anaerobic endurance, and size [R]. Some of the most common strength training methods include [R]:

- Weight lifting
- Bodyweight exercises like push-ups, pull-ups, squats, and lunges.
- Resistance bands
- Plyometrics or explosive force exercises

The benefits of strength training are numerous, and include [R]:

- Increased muscle strength
- Improved bone health
- Reduced risk of injury
- Improved balance and coordination
- Enhanced mood
- Boost metabolism

Consult with a doctor before starting any new exercise program, especially if you have any health conditions.

How it helps

Physical inactivity is associated with smaller LDL particles [R].

Similarly, **regular exercise reduces the amount of small LDL particles while increasing the average LDL particle size** [R].

However, aerobic exercise may be more effective than strength training at increasing LDL particle size [R, R, R].

Exercise may help by modifying fat metabolism to produce fewer small LDL particles [R].

12



Limit Calorie Intake

IMPACT2 / 5

EVIDENCE3 / 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

Limiting calorie intake may help lower small LDL levels. Strategies that may help include [\[R, R, R, R, R\]](#):

- Intermittent fasting
- Eating low-calorie foods

Intermittent fasting strategies that may help include [\[R, R\]](#):

- Alternate-day fasting (fasting every other day)
- Periodic fasting (fasting 1 day per week)

Limiting calorie intake helps decrease triglyceride production. High levels of these fats are associated with higher small LDL concentrations [\[R, R\]](#).

Please note: *Limiting calorie intake too much or fasting for too long can cause malnutrition, anemia, eating disorders, and other health problems. Children, pregnant women, and people with certain chronic conditions or substance abuse disorders shouldn’t do intermittent fasting. Talk to your doctor before implementing any drastic calorie restriction* [\[R\]](#).

13



Walking

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Incorporate at least 30 minutes of brisk walking into your daily routine, aiming for a minimum of five days a week. This can be done in one continuous session or broken into shorter periods, such as three 10-minute walks throughout the day.

TYPICAL STARTING DOSE

30 minutes

Description

Walking is a low-impact form of exercise that can contribute to cardiovascular fitness, weight management, and improved overall health. It is used to support physical activity goals, enhance mood, and promote better cardiovascular health.

How it helps

Physical inactivity is associated with smaller LDL particles [\[R\]](#).

Similarly, **regular exercise reduces the amount of small LDL particles while increasing the average LDL particle size** [\[R\]](#).

Aerobic exercise may be most effective at increasing LDL particle size in the long term. However, a single bout of exercise may be ineffective [\[R, R, R\]](#).

Other exercise types that may help include:

- Walking [\[R\]](#)
- Tai chi [\[R\]](#)

Exercise may help by modifying fat metabolism to produce fewer small LDL particles [\[R\]](#).

14



Tai Chi

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Practice Tai Chi for 30 to 60 minutes at least twice a week. Choose a quiet, spacious area and follow along with a qualified instructor, either in person at a class or through an online video tutorial, to ensure proper technique and maximum benefit.

TYPICAL STARTING DOSE

1 hour

Description

Tai Chi is a traditional Chinese mind-body practice involving slow, flowing movements and deep breathing. It is known for its potential to reduce stress, improve balance, and enhance overall physical and mental well-being.

Tai chi involves gentle movements and breathing to strengthen and relax the mind and body. Practicing tai chi may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Manage pain
- Improve fitness
- Increase well-being
- Improve sleep and mood

How it helps

Physical inactivity is associated with smaller LDL particles [\[R\]](#).

Similarly, **regular exercise reduces the amount of small LDL particles while increasing the average LDL particle size** [\[R\]](#).

Aerobic exercise may be most effective at increasing LDL particle size in the long term. However, a single bout of exercise may be ineffective [\[R\]](#), [\[R\]](#), [\[R\]](#).

Other exercise types that may help include:

- Walking [\[R\]](#)
- Tai chi [\[R\]](#)

Exercise may help by modifying fat metabolism to produce fewer small LDL particles [\[R\]](#).

15



Strawberries

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Incorporate a serving of strawberries, which is approximately eight medium-sized strawberries (about 1 cup or 150 grams), into your daily diet. You can enjoy them as a snack, add them to your breakfast cereal or oatmeal, blend them into smoothies, or use them as a topping for salads and desserts.

Description

Strawberries are a delicious fruit rich in vitamin C, antioxidants, and dietary fiber. They provide essential nutrients and are associated with various health benefits, including improved immune function and heart health.

Strawberries (*Fragaria ananassa*) are one of the most consumed berries, both fresh and processed in juices, jams, yogurts, and desserts [R].

Strawberries have a high content of antioxidants and vitamins, such as [R, R]:

- Vitamin C
- Folate
- Flavonoids

How it helps

Consuming strawberries may help reduce small LDL particle levels while increasing average LDL particle size. Tested preparation include [R, R]:

- Freeze-dried strawberries (50 g/day for 8 weeks)
- Strawberry powder (4 servings/day for 3 weeks)

Strawberries may help in part through their high fiber content [R].

16



Flaxseed Oil

IMPACT2 / 5

EVIDENCE1 / 5

How to implement

Take 1 to 2 tablespoons (15-30 g) of flaxseed oil daily. It can be taken with or without food. For best results, use consistently for at least 2 months.

TYPICAL STARTING DOSE

15 g

Description

Flaxseed oil is a source of healthy fats, particularly alpha-linolenic acid (ALA), an omega-3 fatty acid. It can help support cardiovascular health and may have anti-inflammatory properties when used as part of a well-rounded diet.

[Flaxseed](#) is a common ingredient in bakery products. Some people also use it as a health food to support digestion [\[R\]](#).

Flaxseed is rich in many compounds, including [\[R\]](#):

- Vitamins and minerals
- Protein
- Fiber
- Omega-3 fatty acids ([ALA](#))

How it helps

In a placebo-controlled trial of 12 volunteers, consuming flaxseed oil (10 g/day) for 4-12 weeks markedly reduced small dense LDL cholesterol [\[R\]](#).

Flaxseed is rich in alpha-linolenic acid which can have beneficial effects on cholesterol and LDL particle size.

17



Avocado

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Incorporate half to one whole avocado into your daily diet. You can add it to salads, sandwiches, or use it as a healthy fat substitute for spreads or dressings.

Description

Avocado is a nutrient-dense fruit known for its creamy texture and healthy monounsaturated fats. It is packed with vitamins, minerals, and dietary fiber, and may support heart health, skin health, and overall nutrition.

[Avocado](#) is a fruit first cultivated in Mexico in 500 BCE [\[R\]](#), [\[R\]](#).

You can eat it raw in salads, sandwiches, and dips. Avocado oil has recently become popular, but it’s much less nutritious than the whole fruit.

Avocado is rich in antioxidants, vitamins, minerals, and fiber. It may support [\[R\]](#):

- Heart health
- Healthy weight
- Healthy aging

How it helps

Including avocados in a heart-healthy diet may further decrease small dense LDL cholesterol [\[R\]](#), [\[R\]](#).

18



Plant Sterols & Stanols

IMPACT2 / 5

EVIDENCE1 / 5

How to implement

Consume a total of 300 mg of plant sterols and stanols per day. This can be achieved by incorporating foods fortified with these compounds, such as certain margarines, orange juice, and yogurt drinks, into your daily diet or by taking a specific supplement that meets this dosage requirement.

TYPICAL STARTING DOSE

300 mg

Description

Plant sterols and stanols are plant compounds found in foods like fruits, vegetables, and whole grains. They are known for their cholesterol-lowering properties and can be beneficial when included in a diet aimed at reducing LDL cholesterol levels and promoting heart health.

Sterols and stanols are compounds in plants that are similar to cholesterol [\[R\]](#), [\[R\]](#).

They are naturally found in foods like **nuts, vegetable oils, and fruits**. However, people usually don’t eat enough of these [\[R\]](#).

Some companies add sterols and stanols to foods like **orange juice and margarine** [\[R\]](#), [\[R\]](#).

How it helps

In a placebo-controlled trial of 59 children, consuming a yogurt drink enriched with plant sterols (2 g) lowered small dense LDL cholesterol in those with elevated levels [\[R\]](#).

Similarly, dietary nuts are a source of sterols and stanols. They may lower small LDL levels [\[R\]](#), [\[R\]](#), [\[R\]](#).

Plant sterols have a structure similar to cholesterol and can help lower LDL cholesterol levels by blocking its absorption.

19



Eat Fiber-Rich Foods

IMPACT1 / 5

EVIDENCE2 / 5

How to implement

Incorporate foods high in fiber, such as fruits, vegetables, whole grains, and legumes, into your daily meals. Aim for a total dietary fiber intake of 25 to 30 grams per day, spread out over all meals.

Description

Fiber is a type of carb that your body can’t digest which supports digestion, heart health, and blood sugar control. You can get fiber by eating things like whole grains, fruits, nuts, seeds, and leafy greens.

Fiber is a type of carb that your body can’t digest. It supports digestion, heart health, blood sugar control, and more [\[R, R\]](#).

Adults should get 28 g of fiber every day. Most people in the US don’t get enough fiber [\[R, R\]](#).

You can get more fiber by eating [\[R, R\]](#):

- Whole grains
- Fruits
- Leafy greens
- Nuts and seeds
- Beans
- Broccoli

Fiber supplements, such as [psyllium husk](#), are available for people who don’t get enough fiber from their diets [\[R, R\]](#).

How it helps

Dietary fiber (14 g/day for 12 weeks) from oat, whole grains, or legumes may help reduce small LDL levels. However, wheat fiber may be ineffective [\[R, R, R\]](#).

Combining psyllium supplements (7.28 g/day) with plant sterols may increase LDL particle size [\[R\]](#).

Fiber may help by improving blood sugar control and fat metabolism [\[R\]](#).

20



Psyllium

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 5 grams of psyllium husk powder with at least 8 ounces of water. Do this once daily, preferably in the morning before breakfast. Continue this regimen daily for ongoing digestive health benefits.

TYPICAL STARTING DOSE

5 g

Description

Psyllium is a plant-based dietary fiber derived from the seeds of the *Plantago ovata* plant. It is primarily used both traditionally and today, as a dietary supplement due to its high soluble fiber content, aiding in digestive health and regulating bowel movements. The main compounds in psyllium are soluble fiber and mucilage.

[Psyllium husk](#) might be beneficial for gut health and heart health. But what exactly is this supplement and how does it work?

Psyllium is an herb that grows around the world. Its “husk,” the outer coating of the psyllium seed, is full of fiber. The health benefits of psyllium husk are due to this fiber.

How it helps

In a placebo-controlled trial of 113 obese adolescents, supplementation with psyllium (10 g/day for 7 weeks) reduced small dense LDL cholesterol levels [\[R\]](#).

Psyllium binds to cholesterol in the digestive system, which helps to change the composition and size of lipoproteins.

21



Myo-inositol

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 2 grams of myo-inositol supplement orally twice a day, preferably with meals to enhance absorption. This regimen should be followed daily for at least 6 months to observe significant benefits.

TYPICAL STARTING DOSE

4 g

Description

Myo-inositol is a naturally occurring compound that plays a role in various cellular functions. It is used in dietary supplements and is believed to have potential benefits for mental health, hormone regulation, and insulin sensitivity.

Inositol is a type of sugar that our bodies need to function. It was considered a vitamin (vitamin B8) until it was discovered that our bodies can make it from another common sugar, glucose [R].

[Myo-inositol](#) is the most common form of inositol. It plays a role in [R, R, R, R]:

- Heart health
- Normal blood sugar levels
- Mental health
- Cognitive function
- Reproductive health

Myo-inositol can convert to [D-chiro-inositol](#) in the body. These two forms of inositol are often combined in supplements. People use them to improve blood sugar control and PCOS [R, R, R].

How it helps

In a non-placebo-controlled trial of 17 hyperlipidemic subjects, supplementation with myo-inositol for 2 weeks lowered small LDL cholesterol. Myo-inositol was more effective in those who had metabolic syndrome [R].

22



Barberry

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a barberry supplement of 500-1000 mg daily, divided into two or three doses with meals for up to 12 weeks. Do not exceed the recommended dose without consulting a healthcare provider.

TYPICAL STARTING DOSE

500 mg

Description

Barberry is an herbal remedy used in traditional medicine for its potential to support digestive health and reduce inflammation. It contains compounds that may have antimicrobial and antioxidant properties.

How it helps

In a placebo-controlled trial of 84 participants with cardiovascular risk factors, supplementation with dried barberry (10 g/day) for 8 weeks lowered small dense LDL cholesterol, other blood lipids, and CRP levels [\[R\]](#).

23



Alpha-Lipoic Acid

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 600-1800 mg of alpha-lipoic acid daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

600 mg

Description

[Alpha-lipoic acid](#) is a natural antioxidant found in almost every cell in your body. People use alpha-lipoic acid to help with issues like skin aging, weight loss, and high blood sugar [\[R, R, R\]](#).

People use alpha-lipoic acid to help with [\[R, R, R, R\]](#):

- Complications of high blood sugar
- Skin aging
- Weight loss
- Carpal tunnel syndrome

How it helps

In a non-placebo-controlled trial of 22 obese men, receiving intravenous alpha-lipoic acid (600 mg/day) for 2 weeks improved lipid profile (including a decrease in small dense LDL cholesterol) and insulin sensitivity [\[R\]](#).

24



Dairy Products

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate 2-3 servings of low-fat or fat-free dairy products into your daily diet. One serving could be 8 ounces of milk, 1 cup of yogurt, or 1.5 ounces of cheese. Choose options that are low in added sugars and consume as part of balanced meals or snacks throughout the day.

Description

Dairy products, such as milk, yogurt, and cheese, are rich sources of calcium and protein. They are essential for bone health, providing nutrients that support strong bones and teeth, as well as overall nutritional well-being.

Dairy products are made from milk. They include [\[R\]](#):

- Cheese
- Yogurt
- [Kefir](#)
- Butter
- Cream

Dairy products contain high levels of [calcium](#). Calcium helps build strong bones [\[R\]](#).

How it helps

A study of 291 healthy men associated the intake of dairy products with fewer small dense LDL particles [\[R\]](#).

25



Soy

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate soy-based products such as tofu, soy milk, and edamame into your daily diet. Aim for at least one serving per day, equivalent to about a cup of soy milk, a half-cup of cooked soybeans, or a 3-ounce piece of tofu.

Description

Soy is a legume native to East Asia, and its health benefits include being a source of plant-based protein, fiber, and various vitamins and minerals. It is known for its potential to support heart health, reduce cholesterol levels, and provide essential nutrients in vegetarian and vegan diets.

Soy is a common food in many cuisines around the world, especially Asian cuisines [\[R\]](#).

It’s a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

Soy-based foods include [\[R\]](#):

- Soy beverages
- Tofu
- Tempeh
- Edamame
- Miso
- Natto

Soy protein and soy isoflavones are also available as supplements.

How it helps

Soy protein (55-71 g/day) may decrease the levels of small LDL while increasing those of large LDL particles [\[R\]](#).

Soy may reduce cholesterol by helping you burn fat [\[R\]](#), [\[R\]](#).

26



Hydrogen Water

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Drink 1.5 to 2 liters of hydrogen-rich water daily, spread out over the course of the day. It is best to start with a lower volume and gradually increase it to allow your body to adjust. This practice should be continued daily as a part of your lifestyle to maintain its potential benefits.

Description

Drinking hydrogen-rich water is believed to have antioxidant properties and may help combat oxidative stress in the body. Some studies suggest it could potentially support overall health and well-being.

How it helps

In a placebo-controlled trial of 30 patients with type 2 diabetes, consuming hydrogen-rich water (900 mL/day) for 8 weeks lowered small dense LDL cholesterol [\[R\]](#).

27



Salmon

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate at least two servings of salmon into your weekly diet, aiming for each serving to be about 3.5 ounces (100 grams), cooked. Choose wild-caught salmon when possible for higher omega-3 content.

Description

Salmon is a nutrient-rich fish known for its high content of omega-3 fatty acids, which can support heart health and reduce inflammation. It's also an excellent source of protein, vitamin D, and various minerals.

How it helps

In a clinical trial involving overweight adults, regular consumption of farmed Atlantic salmon for four weeks resulted in reduced triglyceride levels and increased HDL cholesterol. It also lowered large VLDL and chylomicron particle counts while raising large LDL particles in a dose-dependent manner. Salmon intake reduced total triglycerides, VLDL, and chylomicron triglyceride content, and altered lipoprotein particles in a way associated with reduced cardiovascular disease risk. Another study with healthy subjects showed that salmon consumption increased omega-3 levels and decreased triacylglycerols and heart rate. Salmon protein intake lowered serum glucose and triglycerides and increased certain amino acid concentrations. In HIV-infected patients with dyslipidemia, salmon oil reduced triglycerides. However, a separate trial found that salmon consumption did not significantly alter various health markers in overweight/obese participants. [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

28



Barley

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Include barley in your diet by adding it to soups, stews, or salads. You can also replace rice or other grains with cooked barley. Aim to consume barley-based meals 2-3 times a week for ongoing dietary benefits.

Description

Barley is a whole grain rich in fiber, vitamins, and minerals. Incorporating barley into your diet can support digestive health, provide sustained energy, and contribute to overall nutritional wellness.

How it helps

In a non-placebo-controlled trial of 25 participants, incorporating barley grains into the diet lowered small dense LDL cholesterol and other blood lipids [\[R\]](#).

Interestingly, combining barley leaf extract with the vitamins C and E prevented small dense LDL cholesterol oxidation in a non-placebo-controlled trial of 36 type 2 diabetes patients [\[R\]](#).

Beta-glucan, a type of soluble fiber found in barley, can help to improve lipid profiles and potentially impact LDL particle size.

29



Soy Protein

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Include 20 grams of soy protein in your daily diet. This can be achieved by consuming soy-based products such as tofu, soy milk, or soy nuts throughout the day.

TYPICAL STARTING DOSE

20 g

Description

Soy protein is a high-quality plant-based protein derived from soybeans. It is commonly used in vegetarian and vegan diets and may support muscle growth, weight management, and overall nutritional needs.

Soy is a common food in many cuisines around the world, especially Asian cuisines [\[R\]](#).
It's a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

Soy-based foods include [\[R\]](#):

- Tofu
- Tempeh
- Edamame
- Miso
- Natto

Soy protein and soy isoflavones are also available as supplements.

How it helps

Soy protein (55-71 g/day) may decrease the levels of small LDL while increasing those of large LDL particles [\[R\]](#).

Soy may reduce cholesterol by helping you burn fat [\[R\]](#), [\[R\]](#).

30



Oats

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate oats into your diet daily by having them for breakfast as oatmeal, or adding them to smoothies, baking recipes, or overnight oats. Aim for at least a half-cup (40 grams) of dry oats to reap the health benefits.

Description

Oats are a whole grain known for their high fiber content and nutritional value, like zinc, iron, and manganese. Including oats in one's diet can promote heart health, stabilize blood sugar levels, and provide sustained energy.

Oats are a good source for manganese, zinc, iron, magnesium, and vitamins B1 and B5. A ½ cup serving provides 0.7 mg of manganese or 30%DV.

How it helps

In a non-placebo-controlled trial of 36 overweight men, consuming oats (providing 14 g/day fiber) for 12 weeks lowered small dense LDL cholesterol and LDL particle number better than the same amount of fiber supplied by wheat [\[R\]](#).

Oats are high in beta-glucan, a type of soluble fiber that may improve cholesterol and affect LDL particle size.

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.