SelfDecode™

Metabolic Syndrome

DNA Health Report

REPORT CATEGORIES

- HEART & BLOOD VESSELS
- WEIGHT & BODY FAT
- BLOOD SUGAR CONTROL

Sample Client

Report date: 03 September 2025

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Table of Contents

Personal information

NAME

Sample Client

SEX AT BIRTH

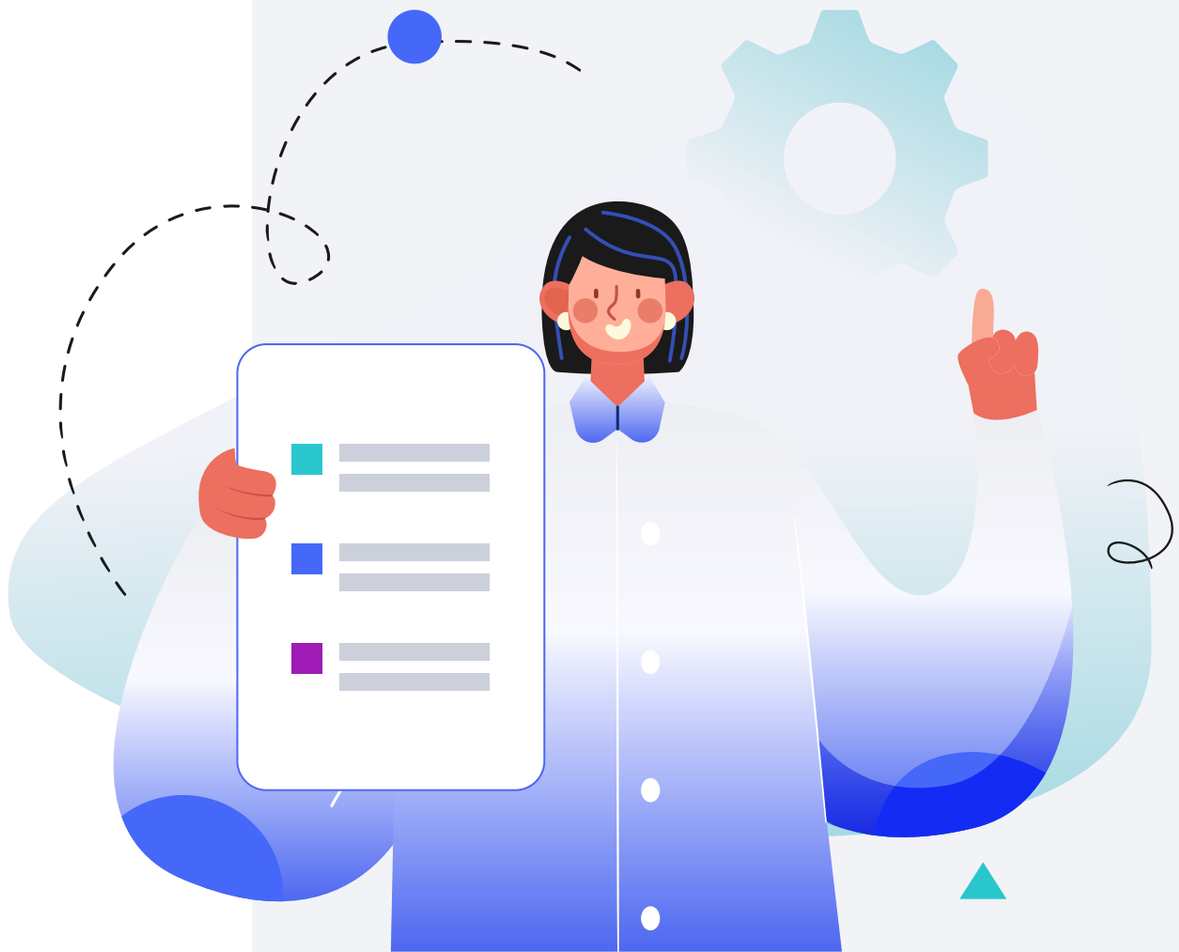
Male

HEIGHT

5ft 9" 175.0cm

WEIGHT

165lb 75.0kg



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.

Introduction

Metabolic syndrome is a cluster of conditions that occur together, increasing the risk of heart disease, stroke, and type 2 diabetes. These conditions include increased blood pressure, high blood sugar, excess body fat around the waist, and abnormal cholesterol or triglyceride levels.

Having just one of these conditions doesn't mean an individual has metabolic syndrome, but any of these conditions increase the risk of disease. Having more than one of these might increase the risk even more.

Common manifestations of metabolic syndrome include:

- A waist circumference greater than 40 inches for men and 35 inches for women.
- A blood pressure reading of 130/85 mm Hg or higher.
- Fasting blood sugar levels of 100 mg/dL or higher.
- HDL cholesterol levels less than 40 mg/dL for men and 50 mg/dL for women.
- Triglyceride levels of 150 mg/dL or higher.

Risk Factors and Genetics

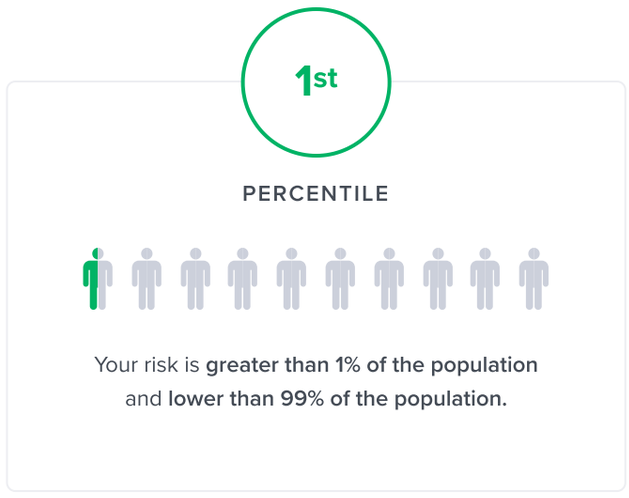
Factors that might increase the risk of developing metabolic syndrome include:

- Age: Risk increases with age.
- Obesity, particularly abdominal obesity.
- Insulin resistance.
- A history of diabetes in one's family.
- A history of gestational diabetes or having given birth to a baby weighing more than 9 pounds.
- Other diseases: A history of nonalcoholic fatty liver disease, polycystic ovary syndrome, or having had a cardiovascular disease or stroke.
- Hormonal imbalance, like low testosterone in men.
- Lack of physical activity.
- An unhealthy diet high in fats and sugars.
- Genetics

Genetics plays a significant role in metabolic syndrome. Specific genetic factors might make certain individuals more susceptible to the conditions that contribute to metabolic syndrome. Family history, particularly if parents or siblings have had diabetes, heart disease, or a stroke, can be an indicator of increased risk.

LESS LIKELY

Less likely to have metabolic syndrome based on 636,870 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
TCF7L2	rs7903146	CT
MTNR1B	rs10830963	CG
LPL	rs328	CC
WSB2	rs7973260	AG
MLXIPL	rs12056034	AG
TRIB1	rs2980888	TC
CLPTM1	rs483082	TG
GALNT2	rs2281721	CT
INO80E	rs3814883	TT
GSR	rs10954772	TT
VEGFA	rs998584	CA
C1QTNF4	rs7124681	AC
GCKR	rs1260326	TC
ATP1B2	rs1143015	AG
HLA-C	rs9378248	AG
NAT2	rs4921913	CT
HLA-DQA2	rs5021727	GA
NCKAP5L	rs7138803	GA
ADRB3	rs4994	AA
MC4R	rs17782313	TT

GENE	SNP	GENOTYPE
SIDT2	rs964184	CC
CD300LG	rs72836561	CC
PCSK7	rs662799	AA
SIDT2	rs651821	TT
ADAL	rs139974673	TT
ARAP2	rs73123462	CC
ZDHHC18	rs114165349	GG
HNF4A	rs1800961	CC
RSPO3	rs577721086	TT
ILRUN	rs11754773	AA
PPP1R3B	rs9987289	GG
HMGA1	rs76376137	TT
FADS2	rs1535	AA
SLC39A8	rs13107325	CC
FTO	rs56094641	AA
MC4R	rs66922415	AA
PABPC4	rs11206374	GG
PLG	rs11751347	CC
CMIP	rs2925979	CC
KLF14	rs10260148	CC
SEC16B	rs10913469	TT
BPTF	rs11871285	GG
SNX15	rs35661464	CC
TUBG2	rs12945575	CC
LIN7C	rs56133711	GG
SNX10	rs1534696	AA
RPL17	rs1105654	AA
TRPS1	rs3808439	GG
GAD1	rs12472667	CC
MLLT10	rs9971210	CC

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	Tea	
2	Practice Exercise Snacks	1 minutesute
3	High-Intensity Interval Training (HIIT)	30 minutes
4	Strength Training	1 hour
5	Yoga	30 minutes
6	Avoid Sugary Foods & Drinks	
7	Limit Calorie Intake	
8	Walking	30 minutes
9	Probiotics	30 billion CFU
10	Avoid Organochlorine Pesticide Exposure	
11	Sleep for 7+ Hours	
12	Limit Red Meat Intake	
13	Avoid PCBs	
14	L-Carnitine	1 g
15	Spirulina	500 mg

1

Tea

IMPACT 4 / 5

EVIDENCE 5 / 5

How to implement

Drink 1-3 cups of tea daily, choosing from green, black, or herbal varieties according to preference. It's beneficial to consume tea throughout the day, either hot or cold, for ongoing hydration and health benefits.

Description

Tea is a beverage made by steeping the leaves of the Camellia sinensis plant in hot water. It comes in various types, including black, green, white, and herbal teas, and is known for its diverse flavors and potential health benefits due to polyphenols and other bioactive compounds.

Green and black tea are made from the same plant (*Camellia sinensis*). This plant is processed in different ways to make each type of tea [R, R].

Tea contains many active compounds. These include antioxidants like EGCG and amino acids like L-theanine. Active components of tea help support [R, R, R, R, R, R, R, R]:

- Heart health
- Cognition
- Immunity
- Relaxation

How it helps

A meta-analysis of 10 studies concluded that tea intake **protects against metabolic syndrome by lowering DBP, SBP (only black tea), diabetes incidence (only green tea), and LDL (only green tea).** Similarly, **tea extract reduces BMI and blood glucose while increasing HDL in obese people, thus helping prevent metabolic syndrome**, according to a meta-analysis of 16 trials and 1090 participants [R, R].

2

Practice Exercise Snacks

IMPACT 4 / 5

EVIDENCE 4 / 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

Low levels of physical activity and prolonged sedentary behavior have been associated with an increased risk of metabolic syndrome. For instance, high screen time may increase the risk by about 64% [R, R, R, R].

In contrast, leisure-time physical activity may be protective [R, R].

3

High-Intensity Interval Training (HIIT)

IMPACT 4 / 5

EVIDENCE 4 / 5

How to implement

Engage in HIIT workouts for at least 30 minutes per session, 3 times a week. Each session should include short bursts of intense exercise, such as sprinting or fast cycling, for 30-60 seconds followed by a period of rest or lower-intensity exercise for 1-2 minutes. Adjust intensity and duration based on personal fitness level.

TYPICAL STARTING DOSE

30 minutes

Description

HIIT is a time-efficient form of exercise that involves short bursts of intense activity followed by brief rest periods. It can help improve cardiovascular fitness, burn calories, and build muscle strength in a shorter amount of time compared to traditional steady-state cardio workouts.

HIIT (high-intensity interval training) is a type of interval training that alternates short bouts of intense anaerobic exercise with short periods of rest or low-activity exercise for recovery. Popular examples include **CrossFit and Tabata**.

HIIT improves all types of muscle performance faster than other fitness modalities. HIIT is also more effective at improving heart health and burning fat than other, lower-intensity workouts.

To make the most gains from HIIT, make sure to allow for sufficient resting times. Otherwise, you won't be able to fully recover.

How it helps

Low levels of physical activity and prolonged sedentary behavior have been associated with an increased risk of metabolic syndrome. For instance, **high screen time may increase the risk by about 64%** [R, R, R, R].

HIIT may help prevent metabolic syndrome by reducing fasting glucose, systolic and diastolic blood pressure, and waist circumference while increasing HDL cholesterol. In people with metabolic syndrome, HIIT may improve BMI, waist circumference, blood pressure, fasting glucose, HDL cholesterol, and triglycerides. However, continuous high-intensity training may be more effective for blood pressure [R, R].

Please note: *Intense exercise may not be suitable for people with chronic health conditions. Talk to your doctor before starting a new exercise regimen* [R].

4

Strength Training

IMPACT 4 / 5

EVIDENCE 4 / 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

Low levels of physical activity and prolonged sedentary behavior have been associated with an increased risk of metabolic syndrome. For instance, **high screen time may increase the risk by about 64%** [R, R, R, R].

In people with metabolic syndrome, exercise training may reduce BMI, body mass, waist circumference, systemic blood pressure, fasting glucose, triglycerides, and LDL cholesterol while increasing $VO2_{max}$ and HDL cholesterol [R].

Strength training may have beneficial effects on **components such as obesity, high HbA1c, and elevated systolic blood pressure** [R].

Strength training helps build lean muscle mass, improve insulin sensitivity, and increase resting metabolic rate, aiding in the management and prevention of metabolic syndrome.

5

Yoga

IMPACT 4 / 5

EVIDENCE 3 / 5

How to implement

Practice yoga for at least 20 to 30 minutes a day, most days of the week. Choose a style that matches your fitness level and goals, and consider attending a class or using online resources to guide your practice.

TYPICAL STARTING DOSE

30 minutes

Description

Yoga is a mind-body practice that combines physical postures, breathing exercises, and meditation. It enhances flexibility, strength, and mental well-being and is used for stress reduction, relaxation, and overall health improvement.

Yoga combines breathing, stretching, and relaxation techniques. Practicing yoga may help [R, R, R]:

- Reduce stress
- Improve fitness
- Lower blood pressure and heart rate
- Manage pain

How it helps

Yoga may reduce risk factors for metabolic syndrome **as effectively as effective as exercise.** By reducing stress and increasing energy expenditure, yoga may help lower [R]:

- Blood sugar [R, R, R]
- Total and LDL cholesterol[R, R, R]
- Blood pressure [R]
- Weight [R, R]
- Triglycerides [R, R, R, R, R, R]

In people with this condition, **yoga may reduce waist circumference and systolic blood pressure** [R].

6

Avoid Sugary Foods & Drinks

IMPACT 4 / 5

EVIDENCE 3 / 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 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

A high glycemic dietary index has been associated with an increased risk of metabolic syndrome. In line with this, people who eat more carbs may be at increased risk of this condition [R, R].

Sugar-sweetened beverages may increase the risk of metabolic syndrome, type 2 diabetes, and excess weight [R, R, R, R].

Sugary foods can spike your blood sugar and insulin. **Over time, this can lead to insulin resistance and increase the risk of type 2 diabetes** [R, R, R].

People who eat more sugary foods also tend to have higher triglycerides [R, R].

7

Limit Calorie Intake

IMPACT 4 / 5

EVIDENCE 3 / 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

People who eat a high-calorie diet may be at increased risk of metabolic syndrome [R].

In line with this, different fasting modalities **may improve metabolic syndrome parameters such as body weight, BMI, body fat percentage, fasting insulin, and insulin resistance** in people with metabolic syndrome. Fasting during Ramadan may also help people with metabolic syndrome [R, R, R].

8

Walking

IMPACT 4 / 5

EVIDENCE 3 / 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

Low levels of physical activity and prolonged sedentary behavior have been associated with an increased risk of metabolic syndrome. For instance, high screen time may increase the risk by about 64% [R, R, R, R].

In contrast, leisure-time activity may be protective [R, R].

Regular walking increases physical activity, potentially helping with metabolic syndrome.

PERSONALIZED TO YOUR GENES

Your *SERPINA12* gene variant has been associated with an increased risk of metabolic syndrome. Walking at least 60 min/day may cancel out the negative effects of this variant [R].

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
SERPINA12	**rs2236242**	TA	

9

Probiotics

IMPACT 4 / 5

EVIDENCE 3 / 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

30 billion CFU

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

Supplementation with probiotics and synbiotics **may improve cardiometabolic and anthropometric factors such as fasting insulin, triglycerides, total, LDL, and HDL cholesterol, systolic blood pressure, IL-6, BMI, waist circumference, and body fat** in people with metabolic syndrome and related disorders. However, the evidence is mixed for some of these parameters [R, R, R].

Probiotics may also reduce blood sugar levels and improve insulin resistance in the general population [R, R, R, R, R].

The following probiotics may help [R, R, R, R]:

- *L. acidophilus*
- *L. casei*
- *L. rhamnosus*
- *B. breve*
- *B. longum*
- *B. animalis*

Probiotics (taken for at least 8 weeks) **may also help lower total and LDL cholesterol** by [R, R, R]:

- Reducing how much cholesterol is made and absorbed [R, R, R, R]
- Increasing cholesterol clearance [R]
- Reducing fat storage and increasing fat breakdown [R, R]

Helpful probiotics include:

- *Lactobacillus acidophilus* [R, R, R, R, R, R, R]
- *L. plantarum* [R, R, R, R, R]
- *L. reuteri* [R, R, R]
- *L. casei* [R, R, R]
- *Bifidobacterium animalis* [R, R, R, R, R, R]
- *B. bifidum* [R, R, R]
- *Streptococcus thermophilus* [R, R, R]

Products containing multiple probiotics may help more [R].

Probiotics (for at least 8 weeks) **may reduce body weight and fat.** Probiotics with multiple bacteria may offer greater benefits. The most commonly studied probiotics include [R, R]:

- *L. gasseri* [R, R, R]
- *L. rhamnosus* [R, R, R]
- *L. plantarum* [R, R, R]
- *L. acidophilus* [R, R]
- *Bifidobacterium breve* [R, R, R]
- *B. animalis* [R, R, R]
- *Streptococcus thermophilus* [R, R]

Probiotics may help by improving the gut microbiome [R].

10

Avoid Organochlorine Pesticide Exposure

IMPACT 3 / 5

EVIDENCE 4 / 5

How to implement

Minimize exposure by choosing organic fruits and vegetables, thoroughly washing produce before consumption, and avoiding areas where organochlorine pesticides are applied. Consider using air purifiers in homes close to agricultural areas to reduce indoor pesticide levels.

Description

Reducing organochlorine pesticide exposure involves minimizing contact with pesticides like DDT, which can accumulate in the body and potentially lead to adverse health effects, including disruption of hormonal functions and carcinogenicity.

How it helps

Reducing exposure to organochlorine pesticides can help with Metabolic Syndrome as these chemicals can disrupt the body's endocrine system, influencing metabolism, and hence leading to obesity, one of the components of Metabolic Syndrome. Avoidance reduces this risk, helping manage and prevent the condition.

A meta-analysis of 22 studies identified organochlorines such as **DDT, heptachlor, HCB, DDT, and trans-nonachlor or chlordane as pesticides increasing the risk of type 2 diabetes** [R].

Two meta-analyses (the largest one with 23 studies) associated exposure to **p,p'-DDE with 33-44% higher risk of type 2 diabetes, but not gestational diabetes** [R, R].

Another meta-analysis (43 studies) found that **DDT exposure increases the risk of type 2 diabetes by 61%, while DDE increases it by 67%**. The association was **strongest in Asian populations** [R].

A meta-analysis of 41 studies associated high exposure to chlorinated pesticides with **2-fold higher risk of type 2 diabetes** [R].

A meta-analysis of 12 studies and 6789 participants concluded that exposure to **hexachlorocyclohexane increases their risk of metabolic syndrome by 36%, while transnonchlor increases it by 25%** [R].

Another meta-analysis (7 studies) associated exposure to **oxychlordane with 96% higher risk of type 2 diabetes, trans-nonachlor with a 143% higher risk, and heptachlor epoxide with 88% higher risk** [R].

A study of 749 non-diabetic participants found a **strong association between organochlorines and insulin resistance** [R].

11

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

Sleeping less than 7 hours per night may increase the risk of metabolic syndrome, as well as that of components such as obesity, hypertension, and high blood sugar [R, R, R, R].

In children and adolescents, long sleep duration may be protective against this condition [R].

Shift work may also increase the risk of metabolic syndrome. The risk may be higher in those working several or rotating shifts, as well as in those doing shift work for many years [R, R, R, R, R].

Poor sleep can alter [R, R, R]:

- Appetite
- Food cravings
- Sugar metabolism
- Insulin sensitivity
- Blood pressure

12

Limit Red Meat Intake

IMPACT 3 / 5

EVIDENCE 3 / 5

How to implement

Limit your red meat consumption to no more than three portions per week, with each portion being about 3-4 ounces (85-113 grams), roughly the size of a deck of cards. Opt for leaner cuts of meat and consider replacing some red meat meals with poultry, fish, or plant-based protein sources.

Description

Limiting red meat intake involves reducing the frequency and portion sizes of beef, pork, and lamb in your diet. The recommendation encourages choosing alternative protein sources such as poultry, fish, beans, and legumes. It emphasizes moderation to improve health outcomes--including lower risks of heart disease and cancer--and promotes a balanced and varied diet.

How it helps

Plant-based diets have been associated with a decreased risk of metabolic syndrome and improved metabolic risk factors. This may be because these diets are lower in energy, saturated fat, and red and processed meats while being higher in fruits, vegetables, and fiber [R].

In contrast, a high intake of red and processed meat has been associated with an **increased risk of metabolic syndrome** [R, R].

13

Avoid PCBs

IMPACT 3 / 5

EVIDENCE 3 / 5

How to implement

To avoid PCBs (Polychlorinated Biphenyls), do not use old electrical equipment manufactured before 1977, avoid consuming fish from contaminated waters, especially larger species such as shark and swordfish which are higher in the food chain, and check for and properly dispose of any old fluorescent lighting fixtures that may contain PCBs. Pay attention to local advisories regarding the safety of locally caught fish and wildlife.

Description

PCBs are toxic chemicals that can cause cancer, reproductive problems, and developmental problems. Avoiding exposure to PCBs is important for protecting your health.

Polychlorinated biphenyls (PCBs) are man-made chemicals. They were used in the industry until their **ban in 1979**. PCBs are considered **persistent organic pollutants** (POPS) due to their slow degradation in the environment. They may also **accumulate** in the food chain and the human body [R, R].

We may be exposed to PCBs through contaminated [R, R]:

- **Food** (e.g., fish, meat, rice)
- Soil
- Air

PCBs may have toxic effects on [R, R]:

- Immunity
- Nervous system
- Reproductive system
- Hormone levels

They may also increase the risk of cancer and reduce lifespan [R, R].

How it helps

Avoiding PCBs (Polychlorinated Biphenyls), which are harmful industrial chemicals, can be beneficial for Metabolic Syndrome. These chemicals can disrupt metabolic processes, potentially worsening insulin resistance and other symptoms of this condition.

A meta-analysis of 2 studies and 1095 women associated exposure to PCBs with **70% higher risk of type 2 diabetes** [R].

Another meta-analysis (48 studies) associated high PCB levels with a **2.3-fold higher risk of type 2 diabetes** [R].

A meta-analysis of 22 studies associated exposure to PCBs with diabetes and metabolic syndrome. Specifically, **DL-PCB-126 increased the risk of metabolic syndrome while DL-PCB-118, PCB-153, and PCB-180 increased the risk of diabetes** [R].

Exposure to PCBs also **increases the risk of gestational diabetes (by 14%)** according to 2 meta-analyses (the largest one with 42 studies). A study of 208 pregnant women associated **PCB-153, PBDE-28, and total PCBs with respectively 25%, 19%, and 37% higher risk of gestational diabetes** [R, R].

14

L-Carnitine

IMPACT 3 / 5

EVIDENCE 3 / 5

How to implement

Take 500 mg of L-carnitine supplement daily with a glass of water, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

1 g

Description

L-carnitine is an amino acid-like compound that plays a role in energy metabolism and helps prevent toxic substances from building up in cells. It is often used in dietary supplements for its potential to support muscle recovery, reduce fatigue, and enhance athletic performance.

L-carnitine is a compound that helps you burn fat. It also prevents toxic substances from building up in cells [R].

Your body can usually make enough carnitine to meet its needs. You can also get it from **meat and dairy products** [R].

People use L-carnitine for [R, R, R, R, R, R]:

- Heart problems
- Overactive thyroid
- Fertility problems
- Blood sugar control
- Weight control

How it helps

Supplementation with L-carnitine (0.75-3 g/day for 8-24 weeks) may lower fasting glucose, triglycerides, waist circumference, and blood pressure while increasing HDL cholesterol [R].

L-carnitine may help by:

- Boosting insulin sensitivity [R]
- Helping the body burn fats for energy [R]

15

Spirulina

IMPACT 3 / 5

EVIDENCE 3 / 5

How to implement

Take 1-8 g of spirulina supplements daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

500 mg

Description

Spirulina is a blue-green algae. It is rich in nutrients like protein, vitamins, and minerals, particularly vitamin B12 and iron, and is a source of antioxidants, chlorophyll, and phycocyanin. It can be found in powdered or tablet form as a supplement, and is often used to boost energy, support the immune system, and enhance overall nutrition. Additionally, spirulina.

Spirulina is a supplement made from blue-green algae that grows in fresh and marine water [R, R].

Dried spirulina is up to 70% protein. It's also rich in vitamins, antioxidants, and healthy fats. This makes it a great source of nutrition for both people and livestock [R, R, R].

People use spirulina supplements to reduce [R, R]:

- Cholesterol
- Blood pressure
- Blood sugar

How it helps

Supplementation with spirulina may lower fasting glucose, fasting insulin, total cholesterol, LDL cholesterol, and VLDL cholesterol while increasing HDL cholesterol in people with metabolic syndrome and related disorders [R].

Spirulina (1-10 g/day for 2-12 months) may also reduce LDL cholesterol and raise HDL cholesterol in the general population, especially in people with [R, R, R, R, R]:

- Obesity
- High blood pressure
- High blood sugar

Spirulina may stop your gut from absorbing too much cholesterol from food. It may also prevent some of the toxic effects of LDL cholesterol [R, R, R].

Spirulina (1-10 g/day for at least 2 months) may help lower triglycerides by [R]:

- Increasing the breakdown of triglycerides
- Reducing inflammation

Spirulina (1-5 g/day for at least 12 weeks) may also reduce body weight and fat by reducing appetite [R, R].
Please note: *Use caution when buying spirulina supplements. Buy these products only from trusted providers. Some spirulina products may contain toxic contaminants* [R].