

Heart Rate Recovery

Biohacker Report

REPORT CATEGORY —



Sample Client

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Personal information

NAME

Sample Client

SEX AT BIRTH

Male

HEIGHT

5ft 5" 165cm

WEIGHT

137lb 62kg

DISCLAIMER

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



How this works

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



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



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

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



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

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

Heart rate recovery (HRR) is the difference between your peak heart rate during exercise and your heart rate soon after you stop. It is measured in beats per minute (bpm). **Normal HRR after one minute of rest is typically 18 bpm or higher** [\[R\]](#).

Your HRR can tell a lot about your overall health and fitness. **People who have a low HRR are generally in poor shape.** They may also be more likely to have conditions like [\[R\]](#):

- Heart disease
- Diabetes
- High blood pressure

Calculating your HRR typically requires wearing a heart rate monitor. HR is measured right after the most intense part of your workout, and then measured again after a specific rest period. For a so-called “fast phase” measurement, this period can vary anywhere from **10 to 60 seconds** [\[R\]](#).

Contributing Factors and Genetics

Heart rate recovery (HRR) is the difference between your peak heart rate during exercise and your heart rate soon after you stop. **Normal HRR after one minute of rest is typically 18 bpm or higher.**

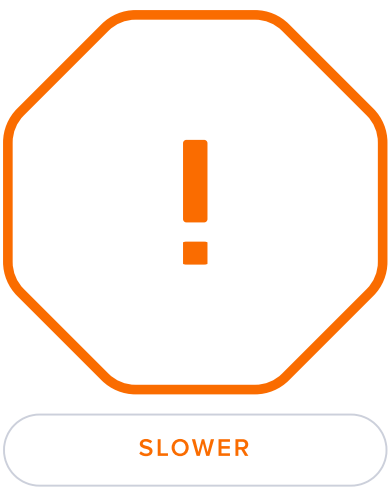
About **60%** of the differences in people’s HRR may be due to genetics. Many involved genes play a role in nerve function [\[R\]](#), [\[R\]](#).

Factors that can affect your ability to recover heart rate after exercise include [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Fitness level
- Age
- Sleep quality

HRR can also depend on the exercise and resting methods [\[R\]](#).

Talk to your healthcare provider if you have a poor HRR. While it’s been linked to certain health problems, it may simply mean you need more physical activity.



Predisposed to lower HRR based on 704,947 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
SOX5	rs4963772	GG
SYT10	rs6488162	TC
CAV1	rs1997571	GA
RGS6	rs17180489	CG
GIGYF1	rs221789	CC
C19ORF12	rs55954001	GG
INPPL1	rs7130652	GG
SERINC2	rs11589125	CC
NEGR1	rs61765646	TT
NEGR1	rs12740789	GG
SATB1	rs73043051	TT
PAX2	rs10748799	CT
RNF220	rs272564	AC
GRIK2	rs2224202	GA
SNX2	rs4836027	CT
TGM2	rs6127466	AA
GNG11	rs180253	AA
TBX3	rs61928421	CC
TFPI2	rs180238	TT
ACHE	rs3757868	GG
CHRM2	rs17168815	GG
CAPS	rs8108862	CC
PRDM6	rs151283	CC
/	rs12906962	TT
/	rs13022107	TT

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	Exercise At Least One Hour a Day	1 hour	2	Aerobic Exercise (Cardio)	1 hour
3	Strength Training	1 hour	4	Sleep for 7+ Hours	
5	Paced Breathing	5 minutes	6	Omega-3 (Fish Oil)	500 mg
7	Beetroot Juice		8	Avocado	
9	Drink at Least 8 Glasses of Water a Day		10	Leafy Green Vegetables	
11	Yoga	30 minutes			

1

Exercise At Least One Hour a Day

IMPACT

5 / 5

EVIDENCE

4 / 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

While all types of exercise help improve HRR, **cardio may be most effective** [\[R, R, R, R\]](#).

Physically fit people also have better HRR after psychological stress [\[R, R\]](#).

2



Aerobic Exercise (Cardio)

IMPACT

4 / 5

EVIDENCE

4 / 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

While all types of exercise help improve HRR, **cardio may be most effective** [\[R, R, R, R\]](#).

It may improve HRR in healthy people and those with certain health conditions, including [\[R, R, R, R, R, R\]](#):

- Coronary artery disease (by 5.5 bpm)
- Heart failure (by 6 bpm)
- Lung disease (COPD)

3



Strength Training

IMPACT3 / 5

EVIDENCE4 / 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

Strength training builds muscle mass, which can improve metabolic rate and cardiovascular health, aiding in better heart rate recovery post-exercise.

Two systematic reviews (the most recent one with 33 studies) concluded that **fit individuals have faster heart rate recovery after psychological stress** [\[R, R\]](#).

A meta-analysis of 26 studies (6 of them measuring this parameter) found that **all types of physical training improve heart rate recovery after exercise** in young and middle-aged individuals [\[R\]](#).

According to one study, strength-trained athletes have accelerated heart rate recovery after exercise compared to sedentary control men [\[R\]](#).

4



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

Sleep problems may reduce HRR. Examples include [\[R, R, R, R, R, R, R\]](#):

- Sleep deprivation (by 5 bpm)
- Short sleep duration
- Low sleep quality
- Sleep disturbances
- Sleep apnea

In people with sleep apnea, using an **airflow device** at night may improve HRR [\[R\]](#).

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

5



Paced Breathing

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Sit in a comfortable position or lie down. Inhale slowly through your nose for 4 seconds, hold your breath for 7 seconds, and then exhale slowly through your mouth for 8 seconds. Repeat this breathing pattern for 5-10 minutes daily, or whenever you feel stressed or anxious.

TYPICAL STARTING DOSE

5 minutes

Description

Paced breathing is a relaxation technique that involves controlling the rhythm and depth of breaths. It can help reduce stress, anxiety, and lower blood pressure, promoting relaxation and mental well-being.

How it helps

Paced breathing, or controlled breathing at a set rate, can help in resetting the autonomic nervous system, which plays a role in heart rate recovery after exercise, leading to improvements over time.

Paced slow breathing can benefit cardiovascular function, including responses to hypoxia, by increasing tidal ventilatory volume and affecting central and cardiovascular responses [R].

Slow-paced breathing enhances self-regulation abilities in athletes, and using an inhalation/exhalation ratio with a longer exhalation phase is recommended for better heart rate recovery [R].

6



Omega-3 (Fish Oil)

IMPACT

2 / 5

EVIDENCE

2 / 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

People with higher omega-3 levels may have better HRR. This link may be stronger in women [\[R\]](#), [\[R\]](#).

Omega-3 supplementation (560-585 mg DHA + 140-225 mg EPA daily) may increase HRR by up to **5 bpm**. Higher doses of pure DHA (975 mg/day for 30 days) may also help [\[R\]](#), [\[R\]](#), [\[R\]](#).

Please note: *Omega-3s can interact with blood thinners (like aspirin, Plavix, Coumadin). Consult your doctor before supplementing* [\[R\]](#).

7



Beetroot Juice

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Consume 200-250ml of beetroot juice daily, at least 1-2 hours before engaging in physical activity or as part of your breakfast routine. This regimen should be maintained consistently for at least 2 weeks to start noticing benefits in terms of increased stamina and blood pressure regulation.

Description

Beetroot juice is a concentrated source of dietary nitrates, known for their potential to enhance athletic performance and improve blood pressure regulation. It is often consumed by athletes to enhance stamina and aid in recovery.

Beetroot (*Beta vulgaris*) contains iron, nitrates, sodium, potassium, and betalaine [R].

Beets are an inexpensive and mineral-rich vegetable that are widely used in Western cooking. Compared to other vegetables with high iron content, beets have a low price and are easy to store [R].

How it helps

Beetroot juice is high in dietary nitrates that can improve blood flow, enhance oxygen usage, and may aid in better heart rate recovery after exercise.

According to one study, beetroot extract improves heart rate recovery to baseline resting levels after exercise [R].

8



Avocado

IMPACT

1 / 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

Avocados contain healthy monounsaturated fats which are known to reduce levels of bad cholesterol - a factor that could slow heart rate recovery. They're also high in potassium, an electrolyte that assists in nerve function and heart health.

In a [placebo-controlled trial of 16 healthy women](#), supplementation with avocado pulp (600 mg) before running on a treadmill at a submaximal level **sped up the recovery of HR, systolic blood pressure, HRV, and skin conductance** [\[R\]](#).

9



Drink at Least 8 Glasses of Water a Day

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Consume a total of at least 64 ounces (or approximately 1.9 liters) of water over the course of the day. This can be divided into 8 glasses, each containing 8 ounces of water. Aim to drink evenly throughout the day to avoid dehydration.

Description

Water is an essential nutrient for nearly every process in your body, helping to mainting brain and gut function, maintain a health weight, as well as energy and performance levels, among others.

Water is essential for life. It supports nearly every process in your body [\[R\]](#).

Water helps maintain [\[R\]](#):

- Energy and performance levels
- Brain function
- Gut function
- Healthy weight

Most experts recommend drinking **around 8 glasses (64 oz. or 2 L) of water daily**. You might need more or less than this, depending on how active you are, where you live, or what your overall health is like [\[R\]](#).

How it helps

According to one small study, optimal hydration during exercise may help improve HRR [\[R\]](#).

10



Leafy Green Vegetables

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate at least one serving of leafy green vegetables, such as spinach, kale, or Swiss chard, into your diet daily. This can be done by adding them to salads, smoothies, or as a side dish to your meals.

Description

Leafy green vegetables like spinach and kale are packed with vitamins, minerals, and antioxidants. Incorporating them into your diet can promote overall health by providing essential nutrients, supporting digestion, and reducing the risk of chronic diseases like heart disease and certain cancers.

Leafy green vegetables, also called leafy greens, or greens, are edible plant leaves, which can include stalks and shoots as well. Common examples include: lettuce, spinach, kale, chard, endive, and fennel.

Leafy greens contain a host of vitamins and minerals, as well as fiber. Most of them are a particularly good source of vitamin K.

How it helps

A diet rich in fruits and vegetables provides antioxidants and essential nutrients that support overall heart health and may assist in faster heart rate recovery.

According to one study, a higher intake of green leafy vegetables may reduce the risk of cardiovascular disease through favorable changes in cardiac autonomic function [R].

11



Yoga

IMPACT

1 / 5

EVIDENCE

1 / 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

A randomized controlled trial revealed that regular yoga practice increased parasympathetic tone and decreased depressive symptoms and perceived stress in women. This contributed positively to heart rate recovery and HRV. Another study indicated that an 8-month yoga intervention significantly enhanced leg press strength. This suggests indirect benefits on cardiovascular health (including heart rate recovery) [\[R\]](#), [\[R\]](#).

Next Steps

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

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

Your lab results

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

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

