

Injuries (Functional)

Biohacker Report

REPORT CATEGORIES —



JOINT & TENDON
HEALTH



INJURIES

Sample Client

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DISCLAIMER

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

Personal information

NAME

Sample Client

SEX AT BIRTH

Male

HEIGHT

5ft 5" 165cm

WEIGHT

137lb 62kg



How this works

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



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



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

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



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

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

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



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

You have 2 risk alleles

Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

Similarly, the gauge tells you your relative risk score compared to our sample population, or it indicates a specific trait or haplotype you are more likely to have based on your genetic variants.

When applicable, we also list top evidence-based recommendations that may help lower your risk. The focus is on recommendations that may be of benefit to you, based on your genetics.

Our recommendations come in four categories: lifestyle, diet, supplements and drugs. The following icons tell you which category a recommendation falls into:



Our team of scientists also ranks each recommendation.
We rank based on impact and the strength of evidence in the medical literature.

Impact shows how strongly a recommendation will affect your health in a certain area.
Evidence is how much scientific support there is for the recommendation. Rankings are from 1 to 5 (low to high):



Impact

Impact scores range from 1-5. These scores reflect how much of an effect each recommendation can have. An impact score of 5 predicts the biggest effect.

When a recommendation affects something we can measure, we use those measurements to assign the impact score. For example, a recommendation that decreases cholesterol by 20% will have a higher impact score than one that decreases it by 5%.

Some recommendations affect things that we cannot directly measure, like stress or mood. For these, the impact score is based on how well they work relative to other recommendations and standard treatments. The best ones get the highest scores.

If there is a lot of research that shows a recommendation works especially well for your genotype, the impact score gets increased.

Recommendation Evidence

- 5 / 5
- Recommendations that are considered effective and generally recommended by experts and medical bodies.
-
- 4 / 5
- Recommendations that are considered likely effective and that have multiple independent meta-analyses and a great many studies supporting them.
-
- 3 / 5
- Recommendations that are considered possibly effective and have many studies supporting them
-
- 2 / 5
- Recommendations that have insufficient evidence, with two or several clinical trials supporting them, or many studies but with ambiguous results.
-
- 1 / 5
- Recommendations that have insufficient evidence, with a single clinical trial, or with many studies most of which didn't find support for the recommendation.
-
- 0 / 5
- No evidence in humans.

Genotype-specific Evidence

- High-quality
- Direct evidence that a recommendation helps more in people with your gene variant (many clinical trials, a few large clinical trials, or a meta-analysis).
- Medium-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a few clinical trials or one large clinical trial).
- Low-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a single clinical trial or more trials with inconsistent results).
- Indirect
- A recommendation may help more in people with your gene variant because it targets a specific gene or protein affected by your variant (e.g., MTHFR, dopamine).
- In theory
- A recommendation may help more in people with your gene variant because it targets a specific mechanism affected by your variant (e.g., inflammation, oxidative stress).

Some things to keep in mind:

- Genetics doesn’t play a considerable role in a condition or a trait.
- There is not enough research available to estimate a genetic predisposition.
- There are technical limitations to estimating or presenting a genetic predisposition.
- The topic is sensitive, and a genetic predisposition should only be estimated and presented by a healthcare professional.

Introduction

Injuries can result from various internal and external factors, including **genetic predisposition, physical overuse, and environmental conditions**. Not everyone responds to the same physical strain in the same way; factors such as **tissue resilience and recovery rate can vary widely** among individuals.

Genetics plays a significant role in determining one's susceptibility to injuries, especially in tissues like muscles, tendons, and ligaments. Understanding your genetic risk for injury can help in adopting preventive measures and adjusting exercise, diet, and recovery routines to reduce injury risk and improve long-term resilience.

Genetics of Injuries

Several genetic variants have been associated with injury susceptibility, particularly in relation to tissue strength, inflammation, and recovery. These variants can impact how well the body withstands physical strain, repairs tissue damage, and manages inflammation.

COL12A1 (rs970547, AluI A>G): The *COL12A1* gene is involved in collagen formation, which is essential for the structural integrity of tendons and ligaments. The rs970547 variant (AluI A>G) may influence the resilience of connective tissues, affecting susceptibility to ligament and tendon injuries.

GDF5 (rs143383, 5'UTR C>T): The *GDF5* gene plays a role in joint formation and tissue repair. The rs143383 variant (5'UTR C>T) has been associated with an increased risk of osteoarthritis and may also affect recovery and injury susceptibility in joint tissues, especially under high-impact physical activities.

VEGFA (rs699947, -2578 C>A): VEGFA is involved in blood vessel formation and tissue repair. The rs699947 variant (-2578 C>A) can influence blood flow to injured areas, impacting healing time. Individuals with this variant may experience slower recovery from tissue injuries due to reduced vascularization.

TNFA (rs1800629, -308 G>A): Tumor necrosis factor-alpha (TNFA) is a key mediator in inflammation. The rs1800629 variant (-308 G>A) can lead to an increased inflammatory response, which may affect tissue healing and increase susceptibility to inflammation-related injuries in muscles and tendons.

COL1A1 (rs1800012, 1546 G>T): The *COL1A1* gene encodes a major collagen protein in tendons and ligaments. The rs1800012 variant (1546 G>T) can influence collagen strength and resilience, making tissues more prone to tears or strains during intense physical activity.

COL3A1 (rs1800255, Ala698Thr G>A): Another collagen gene, *COL3A1*, contributes to the structural integrity of connective tissues. The rs1800255 variant (Ala698Thr



TYPICAL LIKELIHOOD

Typical likelihood of injuries based on 7 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CPNE1	rs143383	AA
COL1A1	rs1800012	AC
COL5A1	rs12722	TC
COL3A1	rs1800255	AG
VEGFA	rs699947	AC
COL12A1	rs970547	CC
TNF	rs1800629	GG

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

G>A) may decrease tissue flexibility, increasing the risk of injuries under physical strain.

MMP3 (rs3025058, A>G): The *MMP3* gene encodes an enzyme involved in tissue remodeling and repair. The rs3025058 variant (A>G) can influence the rate of tissue breakdown and repair, impacting recovery times and potentially leading to a higher risk of chronic injuries.

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	Avoid Strenuous Activity	2	Avoid Lifting Heavy Objects
3	Strength Training1 hour	4	Flexibility Training20 minutes
5	Avoid High-Impact Exercise	6	Reduce Wrist Strain
7	Physical Therapy30 minutes	8	Reduce Back Strain
9	Stretching15 minutes	10	Power Training1 hour

1



Avoid Strenuous Activity

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Refrain from participating in high-intensity physical activities such as running, heavy weightlifting, and high-impact sports. Opt instead for low-impact exercises like walking, swimming, or yoga. It's important to listen to your body's signals and rest as needed, avoiding these strenuous activities until advised otherwise by a health professional.

Description

Avoiding strenuous physical activity in certain medical conditions or during illness can help prevent injury and promote better recovery. It allows the body to conserve energy and supports the healing process.

Strenuous activity is physical activity that requires a lot of effort. Exercise done at 70-85% of a person’s heart rate is considered strenuous. Examples include [\[R\]](#):

- Running, cycling, or swimming at high speed
- Running or hiking uphill
- Jumping rope
- Single tennis
- Sports that involve a lot of running (soccer, basketball, hockey, etc.)

On the other hand, strenuous daily activities include [\[R\]](#):

- Lifting and carrying heavy objects
- Gardening with heavy digging
- Shoveling snow
- Fast dancing

How it helps

Avoiding strenuous activity facilitates optimal healing by minimizing stress on injured tissues, thus preventing exacerbation of the condition. This approach allows the body to conserve energy for recovery and can enhance overall therapeutic outcomes.

2



Avoid Lifting Heavy Objects

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Refrain from picking up items that require significant strain or exertion, typically defined as those weighing more than 25 pounds (11 kilograms), to avoid unnecessary pressure on your body. This restriction should be adhered to as long as your healthcare provider advises, which may be indefinitely for chronic conditions or for a specific recovery period following surgery or injury.

Description

Avoiding improper lifting techniques when handling heavy objects can help prevent back injuries and musculoskeletal strain. Practicing safe lifting methods and using proper equipment promotes spine and musculoskeletal health.

How it helps

Avoiding heavy lifting reduces the risk of back and muscle injuries by minimizing strain on the spine and surrounding musculature. This practice helps to maintain musculoskeletal integrity and promote healing in individuals with functional injuries.

3

Strength Training

IMPACT

1 / 5

EVIDENCE

1 / 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 enhances muscle support and stability, reducing the likelihood of reinjury by improving muscular endurance and coordination. This therapy promotes tissue repair and functional recovery, making it essential in managing injuries effectively.

4



Flexibility Training

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate flexibility training exercises, such as yoga or static stretching, into your routine for at least 20-30 minutes a day, three to five times a week. Focus on stretching all major muscle groups, holding each stretch for 10-30 seconds without bouncing, and breathing deeply to maximize benefits.

TYPICAL STARTING DOSE

20 minutes

Description

Flexibility training, such as yoga and stretching exercises, can improve joint range of motion, reduce the risk of injury, and promote better posture. Incorporating flexibility exercises into a fitness routine supports physical comfort and overall mobility.

How it helps

Flexibility training enhances joint range of motion and reduces muscle stiffness, which can decrease injury risk for individuals prone to functional injuries. By improving overall mobility and posture, it supports safer movement patterns during physical activities.

5



Avoid High-Impact Exercise

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Opt for low-impact activities such as swimming, cycling, or walking instead of running or jumping exercises. Engage in these alternative exercises for at least 150 minutes per week, spread out over several days to ensure rest periods between sessions.

Description

For individuals with certain medical conditions or joint issues, avoiding high-impact exercise can help prevent injuries and joint strain. Choosing lower-impact activities like swimming or cycling can provide similar cardiovascular benefits while minimizing the risk of overuse injuries.

How it helps

Avoiding high-impact exercise helps prevent further strain on injured areas, promoting recovery and reducing the risk of additional injuries. Engaging in lower-impact alternatives allows individuals to maintain fitness levels while safeguarding joint integrity.

6



Reduce Wrist Strain

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take regular breaks, ideally every 30 minutes, to stretch and rest your wrists when using a computer or engaging in activities that require repetitive motion. Ensure your workspace is ergonomically set up with the keyboard at elbow height and wrists in a neutral position. Use wrist supports if necessary.

Description

Wrist strain occurs when tendons or ligaments in the wrist get stretched or torn. It can happen suddenly or develop over time. Reducing wrist strain means implementing ergonomic practices and exercises to alleviate tension and discomfort in the wrist area, which can help prevent conditions like carpal tunnel syndrome and promote better hand and wrist health.

Wrist strain occurs when tendons or ligaments in the wrist get stretched or torn. It can happen suddenly or develop over time as a result of [\[R, R\]](#):

- Repetitive tasks
- Sudden force to the hands or fingers
- Temperatures that are too hot or cold
- Poor wrist posture

Activities that strain the wrist can cause pain and swelling. They may also contribute to carpal tunnel syndrome [\[R, R\]](#).

How it helps

Reducing wrist strain through ergonomic practices alleviates tension on tendons and ligaments, thus preventing overuse injuries and conditions such as carpal tunnel syndrome. This proactive approach enhances wrist functionality and promotes long-term joint health.

7



Physical Therapy

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Attend physical therapy sessions 2-3 times per week for a duration of 4-6 weeks, depending on your specific condition and the advice of your healthcare provider. Each session typically lasts about 30-60 minutes, where a licensed therapist will guide you through targeted exercises, stretches, and possibly other treatments like electrical stimulation or ultrasound therapy.

TYPICAL STARTING DOSE

30 minutes

Description

Physical therapy is a therapeutic practice focused on optimizing physical function and mobility through specialized exercises, manual techniques, and therapeutic modalities. It helps individuals recover from injuries, manage chronic conditions, and improve overall physical well-being by enhancing strength, flexibility, and pain management.

Physical therapy (physiotherapy) helps people regain or maintain their ability to move [\[R\]](#).

Physical therapy can involve [\[R\]](#):

- Joint or muscle exercises
- Corrective movements
- Massage
- Education and advice

People mainly use physical therapy to help with [\[R\]](#), [\[R\]](#):

- Pain and injury
- Stroke recovery
- Chronic health conditions
- Headaches

Mirror therapy uses a mirror placed between the arms or legs. The image of a moving arm or leg gives the illusion of normal movement in the affected one. This therapy stimulates different brain regions and aims to improve mobility [\[R\]](#).

Constraint-induced movement therapy is another type of physical therapy. It consists of restraining the healthy leg or arm to increase the use of the affected one [\[R\]](#).

How it helps

Physical therapy enhances recovery from functional injuries by employing targeted exercises and manual techniques that improve strength, flexibility, and mobility. This tailored approach facilitates healing and pain management, aiding individuals in returning to their daily activities.

8



Reduce Back Strain

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Maintain good posture while sitting and standing, avoiding bending or twisting at the waist. When lifting objects, bend your knees and lift with your leg muscles, not your back. Take breaks every 30 minutes to stretch or walk if you have a sedentary job. Implement these practices daily for ongoing back health.

Description

Reducing back strain entails adopting proper posture, lifting techniques, and ergonomic practices to prevent or alleviate stress on the back muscles and spine, promoting better musculoskeletal health.

The muscles, tendons, and bones of the back are extremely complex. Together, they hold up a large portion of the body’s weight. **Any mechanical stress on the back, especially if the muscles aren’t fit, can cause strain.** Hence, back strain is very common [\[R\]](#).

Back strain often develops in the workplace. Jobs that increase the risk of back strain include:

- Truck drivers [\[R\]](#)
- Nurses and physiotherapists [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Dentists [\[R\]](#)
- Farmers [\[R\]](#)
- Forklift operators [\[R\]](#)
- Domestic workers [\[R\]](#)

How it helps

By adopting proper posture and lifting techniques, individuals can effectively reduce mechanical stress on the spine and surrounding muscles, which minimizes the risk of injury and promotes optimal musculoskeletal health.

9



Stretching

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Incorporate stretching exercises into your daily routine, dedicating at least 10-15 minutes each day. Focus on major muscle groups such as the neck, shoulders, chest, back, hips, and legs. For best results, stretch both before and after other physical activities, holding each stretch for 15-30 seconds without bouncing.

TYPICAL STARTING DOSE

15 minutes

Description

Stretching involves gently elongating the muscles to improve flexibility, reduce muscle tension, and enhance joint mobility. Regular stretching can help prevent injuries, promote better posture, and increase overall physical comfort.

Stretching is a form of physical exercise that involves moving a muscle or group of muscles to their maximum range of motion. The most common types are **dynamic** (involving movement) and **static** stretching.

Stretching can help **improve flexibility, range of motion, and posture**. It may also relieve stress, reduce muscle soreness and tension, increase blood flow, and reduce the risk of injuries.

To get the most out of stretching, try to do it regularly, breathe deeply, and ease into the stretches.

How it helps

Stretching therapy enhances muscle flexibility and joint range of motion, reducing the risk of injuries by alleviating muscle tension. Improved flexibility facilitates better movement patterns, thus promoting functional stability and injury prevention.

10



Power Training

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Engage in power training exercises, such as squats, lunges, and bench presses, at least twice per week. Each session should include 3-5 sets of 6-10 repetitions for each exercise, with a focus on explosive, powerful movements. Rest for at least 48 hours between power training sessions to allow for muscle recovery.

TYPICAL STARTING DOSE

1 hour

Description

Power training, also known as strength or resistance training, involves exercises designed to increase muscle strength and power. It contributes to improved muscle tone, bone density, and overall physical fitness.

Power training involves exercises that utilize strength and speed. Optimal power indicates how quickly you can exert force to produce the desired movement. While an obvious form of training for sports activities, it can also apply to simple, daily tasks like how fast you can walk across a street to increasing your reaction times to help prevent a fall if you trip [\[R\]](#).

Some power training exercises include [\[R\]](#):

- Explosive push-ups
- Squat jumps
- Split jumps
- Medicine ball slams
- Reverse lunges
- Lateral jumps

Benefits of power training include [\[R\]](#):

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

Due to the potential stress and intensity of power training, consult with your doctor or a fitness professional before including it in your workout routine.

How it helps

Power training enhances muscular strength and speed, essential for functional recovery and injury prevention. By improving resilience and stabilizing muscles around vulnerable joints, it reduces the risk of re-injury and promotes overall functional performance.