

Fitness

Summary Report

REPORT CATEGORY —



FITNESS

John Doe

Report date: 30 October 2024

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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

John Doe

SEX AT BIRTH

Male

HEIGHT

5ft 11" 180.4cm

WEIGHT

177lb 80.3kg

REPORT PROVIDED BY

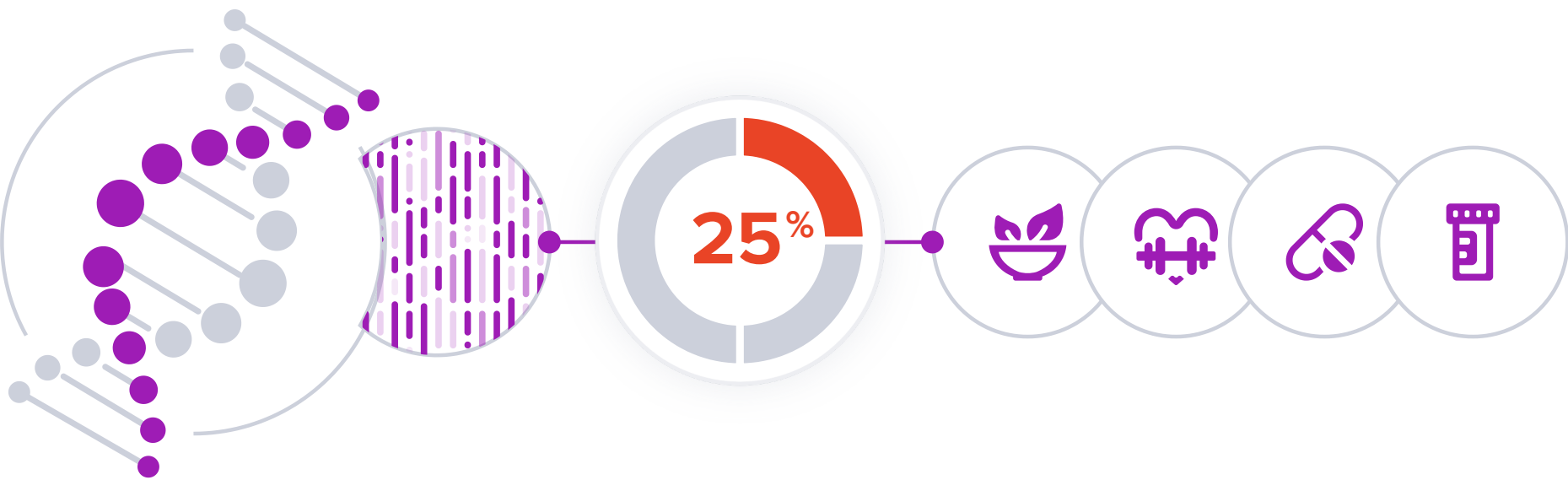
PlexusDx

✉ support@plexusdx.com

🌐 https://plexusdx.com

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.



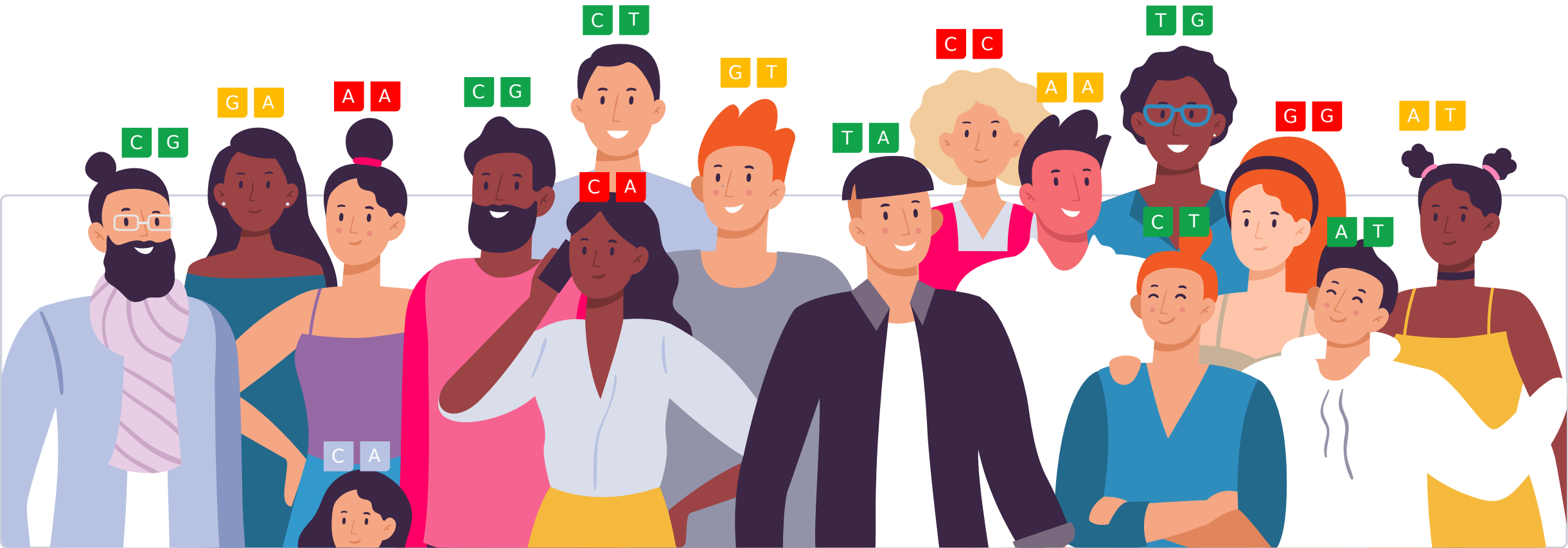
Similarly, our Trait Reports look at how your DNA influences your traits.

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.

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

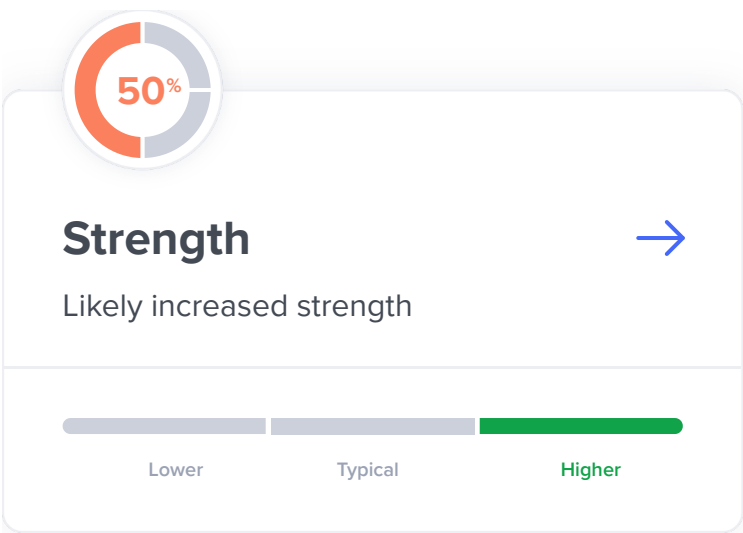
We use artificial intelligence and machine learning to analyze all this information. We then summarize your results as a risk score or display it on a gauge.



Breakdown

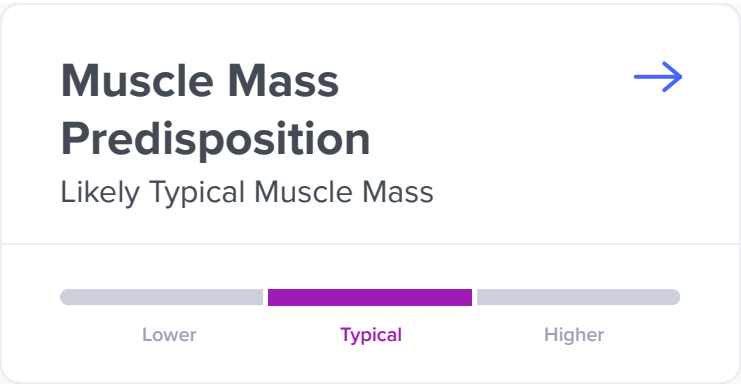
The **bar** tells you about your genetic predisposition to each type of performance: power, endurance, and strength. Each bar has three segments, corresponding to lower, typical, and higher performance.

The **gauge** tells you how much your training should focus on a particular performance type. For example, H (high) for strength means that you're genetically more suited for strength training. The chart tells you about the share of that performance in your overall training (50% in this example).



Optimal Sports

This section takes into account your genetics of power, strength, and endurance to suggest sports that may be the best picks for you. Some sports require more power, while others require more endurance or strength. That's why your genetics may be an important factor when choosing the right sport.

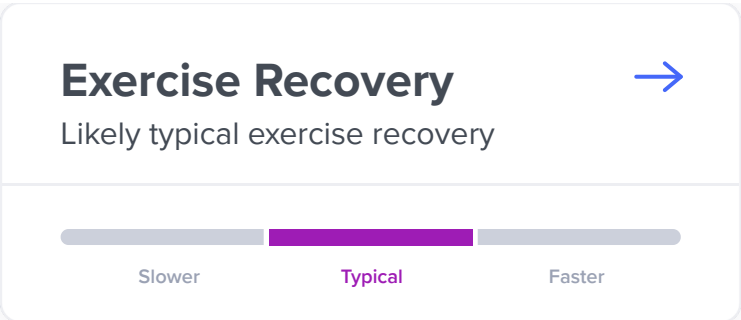


Muscle Mass

The bar tells you about your genetic predisposition for muscle mass. It has three segments, corresponding to lower, typical, or higher muscle mass

Exercise Recovery

The bar tells you how quickly you tend to recover from exercise, based on your genes. It has three segments, corresponding to slower, typical, and faster exercise recovery.

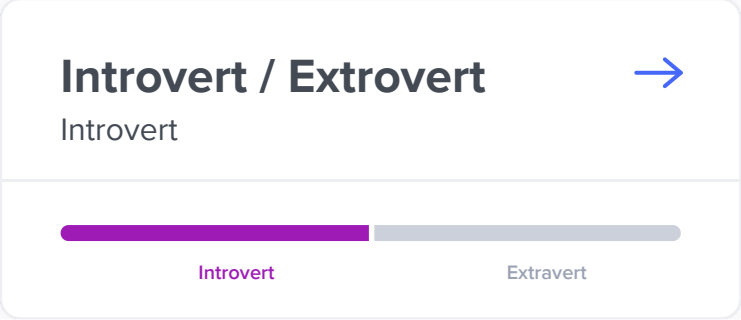


Injury Risk

The bars tell you about your genetic susceptibility to dierent sports injuries. Each bar has three segments, corresponding to lower, typical, or increased likelihood of an injury.

Personality

The bars tell you about your genetic predisposition to a particular personality trait. These traits may inuence your optimal sports choice.



Some things to keep in mind:

- The scores/gauges use the latest scientific studies. But they are not perfect and will change as the models improve.
- Not everyone with risk variants will develop a health condition.
- Genetics is not the whole story. Your health is most often a combination of genetics, lifestyle, and environmental factors. Great news, as this means that you can often change your lifestyle to lower your risk.
- Results might be more accurate for some ethnic groups than others. This depends on the studies used in each report.
- People without risk variants can also develop health conditions.
- It's important to work with your doctor to better understand your risks. Our reports do not diagnose or treat any health condition. They are not a substitute for medical advice. If you're diagnosed with a certain health condition, follow your doctor's advice.

Summary

If a fitness expert wanted to make an optimal training regime for you, one of the main things they would consider is your performance. There are three main types of performance: power, strength, and endurance. They are mainly influenced by your muscles, though endurance also depends on how well your heart and lungs work.

But here’s something that likely no fitness expert has told you before: your performance greatly depends on your genetics. The best part is that you can now check your genetic predisposition to different types of performance, which can be a huge help in designing your optimal training.

We have taken this a step further and analyzed your genetic predisposition to certain personality traits. This info gives a more complete picture about the optimal sports for your genes.

Fitness is not all about knowing your optimal training and sport type! This reports breaks down your genetic predisposition to other aspects of fitness, namely:

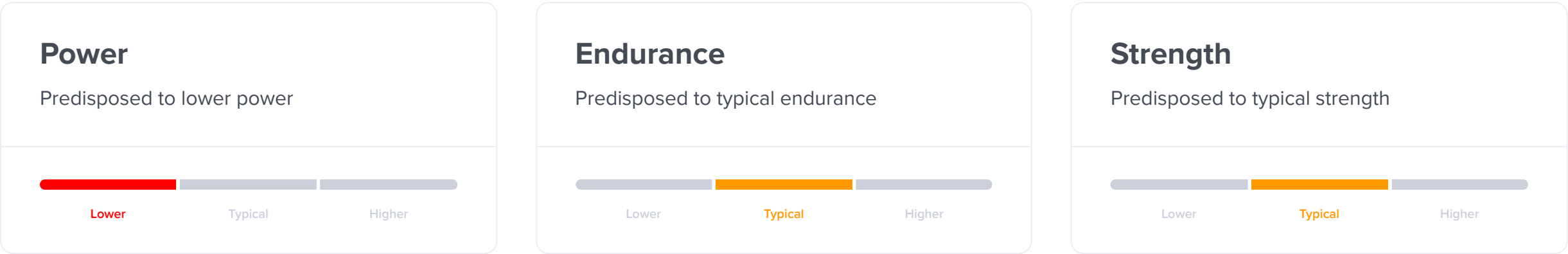
- Muscle mass
- Exercise recovery
- Sports injuries

This summary report contains:

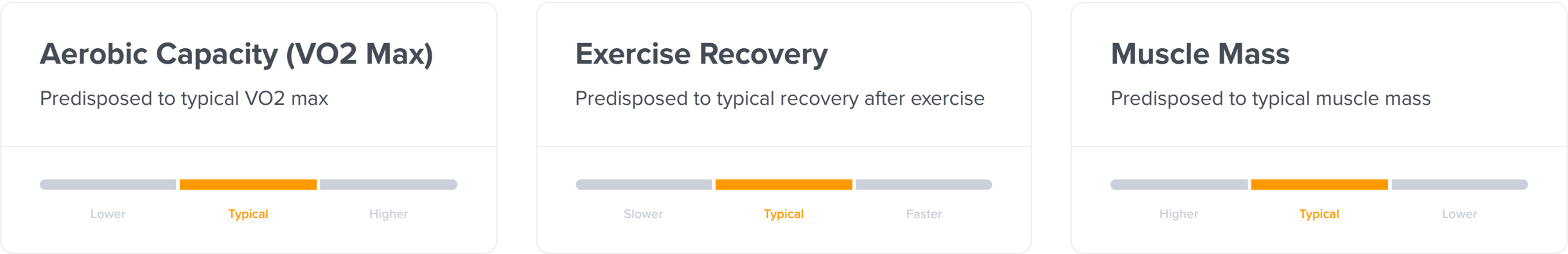
13 Genetic Results

Overview of Your Results

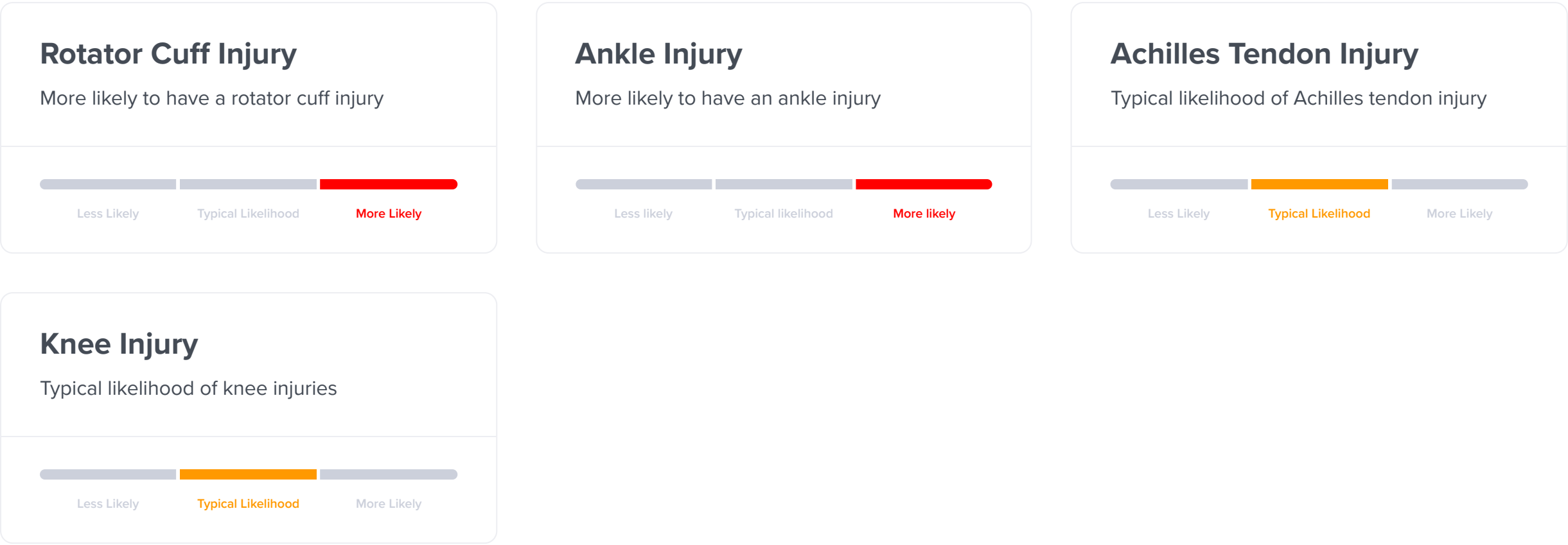
 Breakdown



 Muscle & Recovery



 Injury Risk



Personality

Leadership

Predisposed to typical leadership skills

Typical

Higher

Aggression

Predisposed to typical aggression

Typical

Higher

Extravert or Introvert?

Likely more introverted

Introvert

Extravert

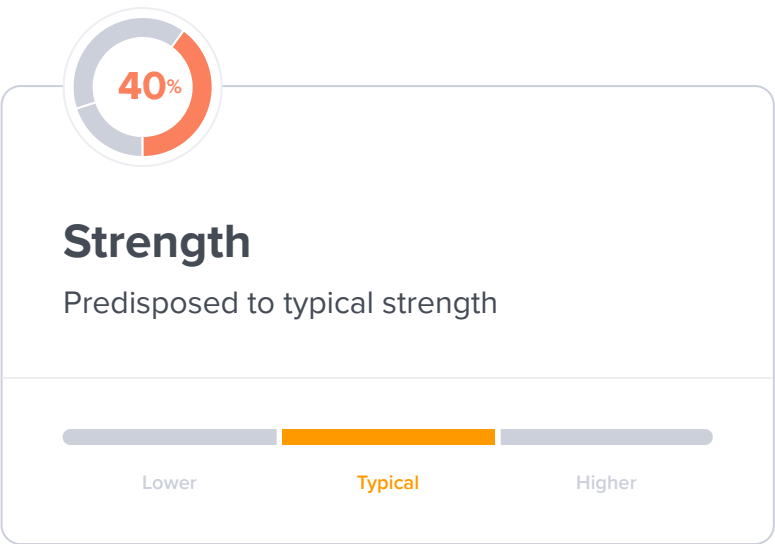
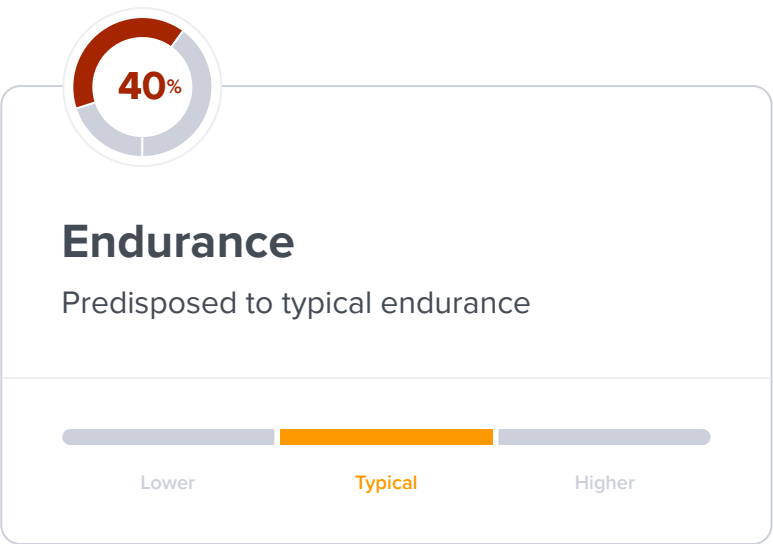
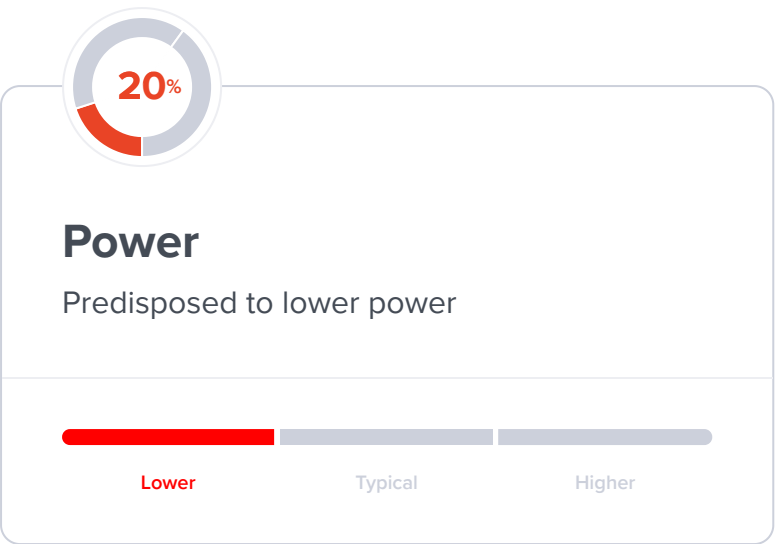
Your Results in Details



Breakdown

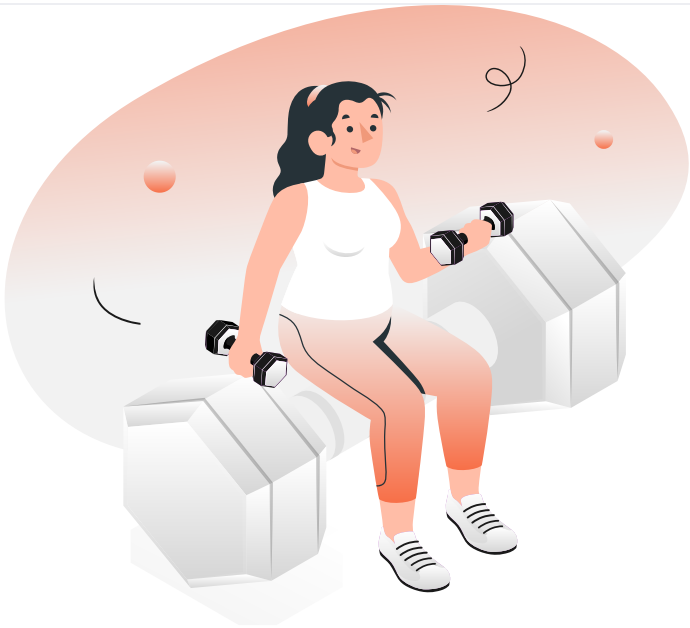
There are three types of muscle performance: power, endurance, and strength.

Your genes affect your muscle performance by changing the types and amount of your muscle fibers. Muscle fibers impact what activities we’re good at! **Fast-twitch fibers** support rapid movements, and they are common in power athletes. **Slow-twitch fibers** support milder long-term movements, and they are more common in endurance athletes [[R](#), [R](#)].

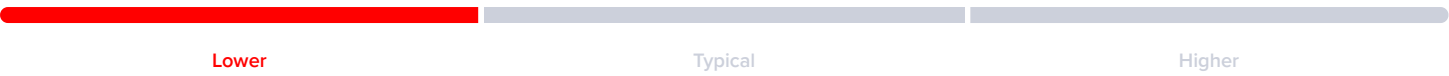


Power

Power is the ability to produce short, intense movements. Movements that require a lot of power include sprinting, jumping, and throwing [\[R\]](#).



Your Result



PERSONALIZED TO YOUR GENES

You don't carry the [ACTN3](#) variant linked to increased muscle power. People without this variant are less likely to be elite power athletes.

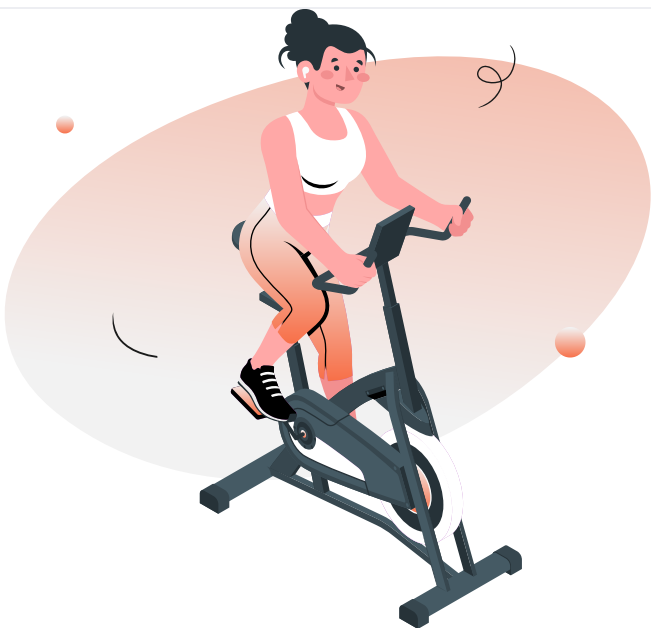
If you're interested in power training, stick with it! Training can overcome a low genetic predisposition for power. However, if you want to follow your genes, consider focusing on endurance and strength training.

Your Gene Table

GENE	VARIANT	GENOTYPE
ACTN3	rs1815739	TT

Endurance

Endurance is the ability to produce low-intensity movements for a long period of time. Activities that require a lot of endurance include cycling, running, and swimming [\[R\]](#).



Your Result



PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you likely have typical endurance.

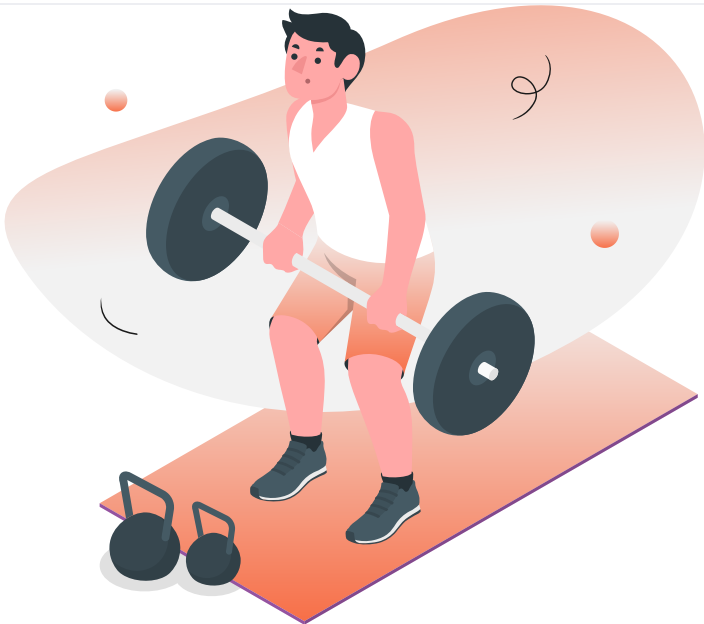
Consider building your endurance by doing regular aerobic exercise, such as brisk walking, jogging, swimming, or biking. Try to combine it with strength and power training for an optimal balance.

Your Gene Table

GENE	VARIANT	GENOTYPE
HFE	rs1799945	CC
GABPB1	rs7181866	AA
GABPB1	rs8031031	CC
NR1H3	rs7120118	TC
MYBPC3	rs1052373	CT
GABPB1	rs12594956	CA
SLC16A1	rs1049434	TT
TTN	rs10497520	CC
ADRB3	rs4994	AA
CHRNA3	rs4950	AA
GSTP1	rs1695	AA
GNB3	rs5443	CC
HIF1A	rs11549465	CC
RBFOX1	rs7191721	AA
CNDP2	rs6566810	TT
NFIA	rs1572312	GT
DES	rs7564856	GA
SATB1	rs4973706	CT
KDR	rs1870377	AT
GALNTL6	rs558129	AG

Strength

Strength is the maximum force applied in one movement. A good example of a movement requiring high strength is lifting weight in a single movement, like the bench press or squat [\[R\]](#).



Your Result



PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you likely have typical strength.

To build your strength, consider taking part in strength (resistance) training and getting more protein in your diet. Try to combine it with endurance and power training for an optimal balance.

Your Gene Table

GENE	VARIANT	GENOTYPE
HIF1A	rs11549465	CC
IL11RA	rs41274853	GG
MTHFR	rs1801131	TT
BDNF	rs10501089	CC
SLC16A1	rs1049434	TT
PITX3	rs2273555	GG
LEMD2	rs12055409	GA
PPARG	rs1801282	GC
IGF2	rs680	TC
/	rs9320823	TC
ZNF608	rs4626333	TC
LRPPRC	rs10186876	GA
TBC1D7	rs6905419	CC
ACVR1B	rs2854464	AA
ACTN3	rs1815739	TT
AMPD1	rs17602729	GG



Muscle & Recovery

Are some people genetically wired to be better athletes? You probably know someone that’s always involved in some type of intense athletic activity. While training and exercise habits are crucial, your genes also play a part! Your genetics influences your muscle mass, ability to do intense cardio, and the amount of time it takes for you to recover from exercise.

Aerobic Capacity (VO2 Max)

Predisposed to typical VO2 max



Exercise Recovery

Predisposed to typical recovery after exercise



Muscle Mass

Predisposed to typical muscle mass



Aerobic Capacity (VO2 Max)

Maximal oxygen uptake (VO2 max) is the maximum amount of oxygen (O2) that your body can absorb and use during exercise. In a nutshell, VO2 max indicates your aerobic fitness. A higher VO2 max means a higher ability for intense cardio exercise (e.g., running, swimming) [R, R, R].

About 45-70% of differences in people’s VO2 max may be due to genetics [R, R].

Your Result

Lower

Typical

Higher

PERSONALIZED TO YOUR GENES

Based on the genetic variants that we looked at, you are predisposed to a typical VO2 max. In other words, you may have typical ability for intense cardio exercise like running or swimming [R].

However, keep in mind that your fitness level has a major impact on VO2 max. Regular cardio workout will help you increase VO2 max.

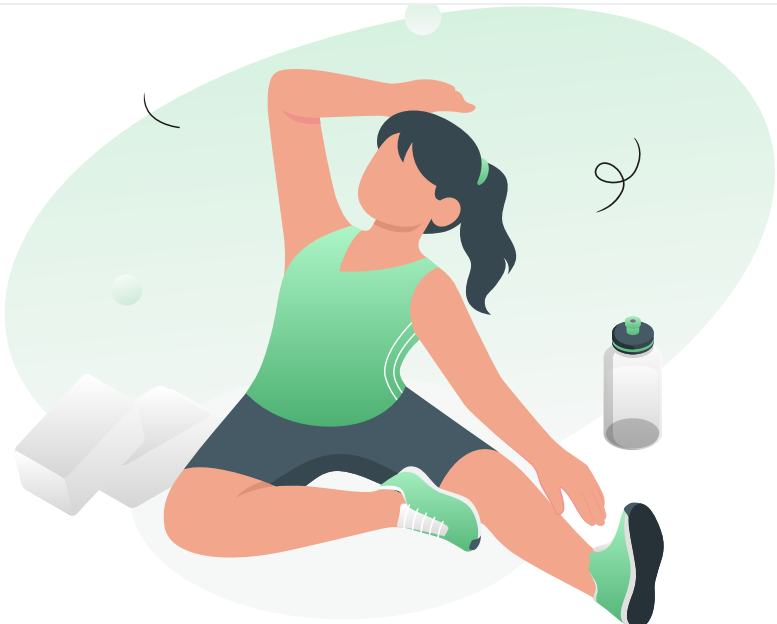


Your Gene Table

GENE	VARIANT	GENOTYPE
NUP93	rs78291913	CC
/	rs139077859	GG
KCND3	rs269071	GG
CCDC141	rs142556838	TC
SCN10A	rs6801957	CT
TGM2	rs4811602	GA
ERBIN	rs251295	GA
MOXD1	rs589756	CC
RSU1	rs11254160	GG
POLM	rs10232743	CC
KLRK1	rs10743889	GT
CCDC141	rs10497529	GG
SEC31B	rs11190709	AA

Exercise Recovery

Exercise puts stress on the body. Our bodies need time to recover after each bout. After exercise, it’s common to feel tired and sore. Some people may recover from exercise more quickly and easily than others. Part of the reason for this may be genetic.



Your Result



PERSONALIZED TO YOUR GENES

Based on the gene variants we looked at, your exercise recovery is likely typical.

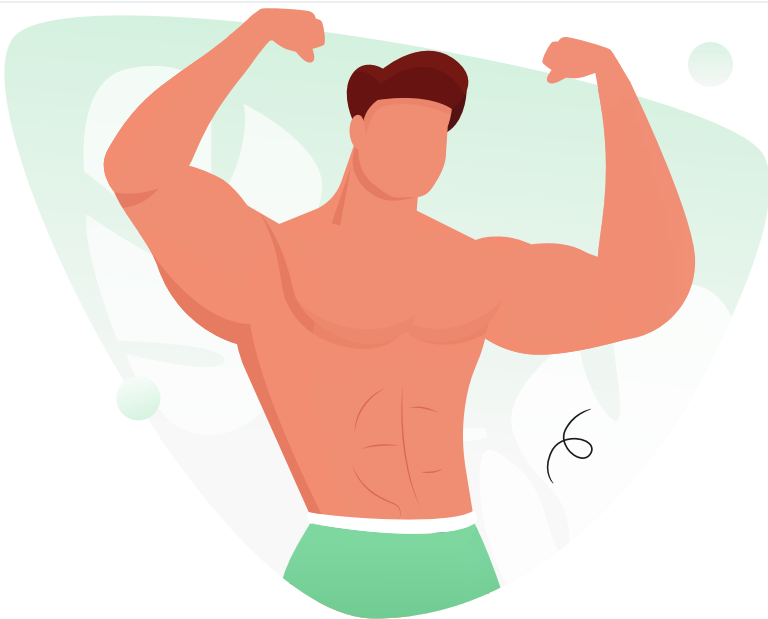
Using methods like massage and cold application may help speed up recovery.

Your Gene Table

GENE	VARIANT	GENOTYPE
SLC16A1	rs1049434	TT
FTO	rs9939609	AT
CYBA	rs4673	GG
IL1B	rs1143634	GG
IGF2	rs7924316	TT
IGF2	rs4244808	TT
CCR2	rs1799865	TT
COL5A1	rs12722	TT
IGF2	rs2230949	GG
SLC30A8	rs13266634	CT
STEAP1B	rs1800795	GC
IGF2	rs680	TC
IGF2	rs3213221	CG
SPP1	rs28357094	TG
MYLK	rs2700352	AG
IL1A	rs4848306	GA
CCL8	rs2857656	CG
HGF	rs5745697	GT
HGF	rs5745678	GA
SLC16A1	rs7169	AA

Muscle Mass

Muscle mass is the amount of all the muscles in your body. It mostly refers to muscles that you can control (skeletal muscles). A person having more body fat also has lower muscle mass because both are usually given as a percentage of total body weight [\[R, R, R\]](#).



Your Result



PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you likely have typical muscle mass. In other words, you may have a typical ratio of muscle to fat tissue.

If you want to increase your muscle mass, practice strength (resistance) training and increase the amount of protein in your diet.

Your Gene Table

GENE	VARIANT	GENOTYPE
STEAP1B	rs10242595	GG
IL1B	rs1143634	GG
FTO	rs9939609	AT
RPN1	rs111804884	TT
GJB2	rs73442383	TT
RASSF10	rs543716802	GG
AOAH	rs78185366	TT
LEO1	rs190878891	AA
USP34	rs183237934	TT
MARCHF1	rs150541056	TT
CCDC171	rs117635839	AA
ZMAT4	rs184622626	AA
FTO	rs9972653	TG
ZDHHC14	rs749547	AG
AQP6	rs706798	GA
PRUNE2	rs11145045	CT
MTCH2	rs4752856	GG
ZNF648	rs190210789	AA
PRELID2	rs574519712	CC
DOCK3	rs551736560	GG



Injury Risk

Joints, tendons, and ligaments are commonly injured body parts. Based on studies in families and twins, our genes can play a role in injuries. We looked at your genes to help understand your susceptibility to different injuries [\[R\]](#).

Rotator Cuff Injury

More likely to have a rotator cuff injury



Ankle Injury

More likely to have an ankle injury



Achilles Tendon Injury

Typical likelihood of Achilles tendon injury



Knee Injury

Typical likelihood of knee injuries



Rotator Cuff Injury

The rotator cuff is a group of muscles and tendons that surround the shoulder joint. They keep the upper bone of the arm within the shoulder socket and help you lift and rotate your arms. Symptoms of a rotator cuff injury include a dull pain in the shoulder, shoulder weakness, and movement difficulties [\[R\]](#), [\[R\]](#).

Your Result

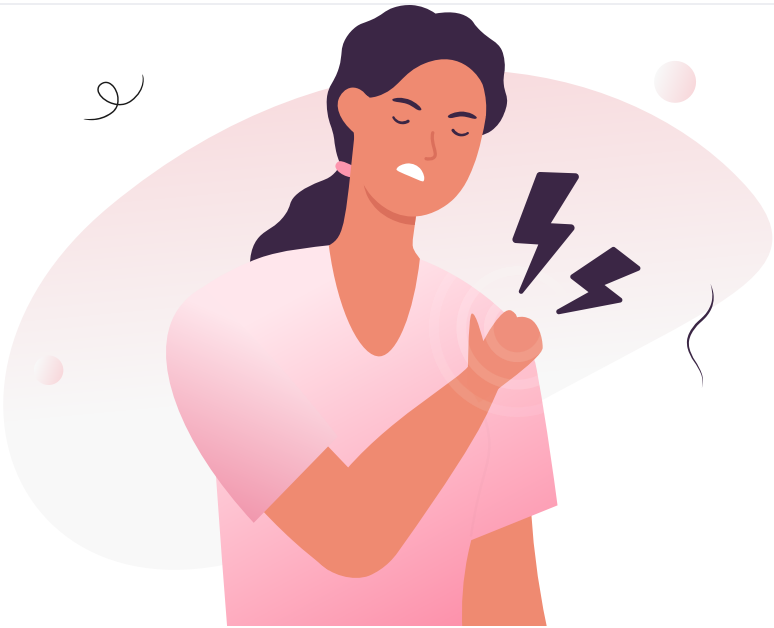


PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you may be more likely to develop a rotator cuff injury.

To prevent a rotator cuff injury, try to [\[R\]](#), [\[R\]](#):

- Strengthen your shoulder muscles (both large and small)
- Warm up properly with dynamic shoulder stretches
- Limit repetitive overhead arm movements
- Maintain a proper sitting posture
- Avoid lying on your shoulder while sleeping
- Avoid cigarette smoke



Your Gene Table

GENE	VARIANT	GENOTYPE
/	rs140539211	CC
STK24	rs912336	CC
DLC1	rs34045652	CC
MGAT2	rs1010586	CC
CPE	rs138457734	CC
STOML3	rs147482720	TT
ANXA1	rs74821598	TT
RORB	rs72727137	GG
USP6NL	rs3847425	CC
CCDC110	rs11727025	GG
KBTBD3	rs505416	GG
AOAH	rs3807160	GG
TRIL	rs2237352	CT
PLCB1	rs6140637	AA
RBMS2	rs117991841	CC
LONRF1	rs17769850	TT
QKI	rs55958453	AG
SIPA1L2	rs789644	CA
S100A12	rs143640806	AA
ZNF519	rs117141423	GG

Ankle Injury

The ankle is a joint that connects the bones of the foot to the bones of the leg. It has a wide range of motion: it can bend sideways, upward, and downward. An ankle sprain is the most common type of ankle injury [R].

Your Result



PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you may be more likely to develop an ankle injury.

To prevent an ankle injury, try to [R, R]:

- Maintain a healthy weight
- Be careful with sports that involve jumping or sudden changes in movement (e.g., basketball and soccer)
- Stretch and warm up properly and ease into your workout
- Work on your balance and core strength
- Strengthen your ankle and leg muscles with single-leg exercises
- Wear proper sports shoes and equipment (e.g., an ankle brace)
- Avoid exercising on uneven surfaces



Your Gene Table

GENE	VARIANT	GENOTYPE
PRPSAP2	rs1634423	TT
DEPTOR	rs149163456	CT
HIVEP1	rs1569733	TC
CCSER1	rs62309831	AG
TENM3	rs35619804	GA
UGDH	rs56118664	CC
/	rs139095264	GG
PRR16	rs4340940	CC
CHD9	rs72797642	AA
GATA3	rs142347570	AA
NPY2R	rs115005126	TT
RALGPS2	rs187271145	GG
NFIB	rs13286037	TT
SGO1	rs12489876	GG
RABEPK	rs117724125	CC
ASB18	rs78681719	TT
C8ORF48	rs73210044	GG
GRIA1	rs140053818	GG
DLC1	rs73208003	GG
NTS	rs10506913	AA

Achilles Tendon Injury

The Achilles tendon is a cord made of strong tissue. It is found in the lower back leg and connects the calf muscles to the heel bone. Common Achilles tendon injuries include inflammation (tendonitis) and rupture [\[R\]](#).

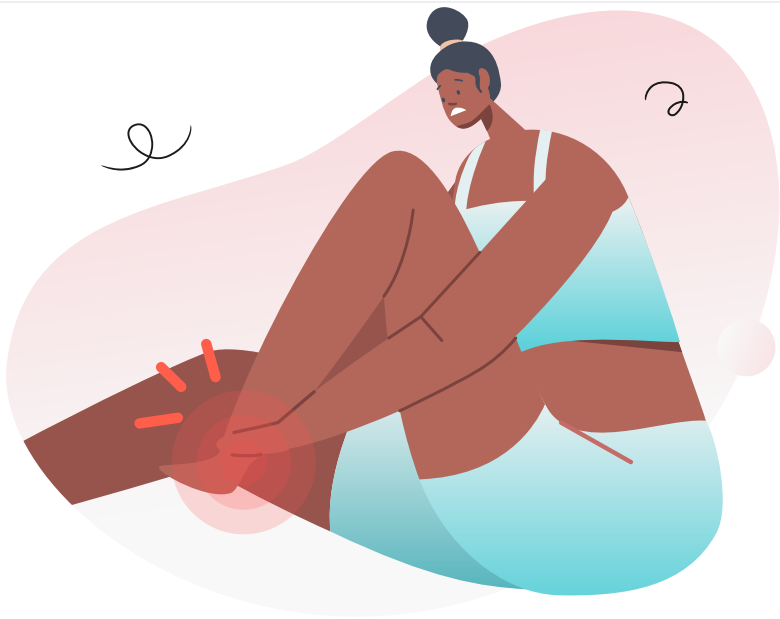
Your Result



PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you may have a typical likelihood of developing an Achilles tendon injury.

Try to take preventative measures to potentially decrease your risk. These include stretching and strengthening your calf muscles, warming up, and wearing proper sports shoes.



Your Gene Table

GENE	VARIANT	GENOTYPE
COL1A1	rs1800012	CC
MMP1	rs650108	GA
MMP1	rs591058	CC
VEGFA	rs699947	CA
CEP295NL	rs4789932	AG
COL5A1	rs12722	TT
CPNE1	rs143383	AG
FCN2	rs1134170	TT
MPP7	rs6481512	CT
SOX21	rs4454832	AG
MPP7	rs1249269	CT
MRPL43	rs4919510	GC
MICB	rs1800629	GG
TMEM158	rs183364169	CC
DPP6	rs4067493	CC
SOAT1	rs113435565	AA
/	rs11960097	TT
TRIML1	rs60713544	GG
ZNF648	rs57104447	TT
MPP7	rs1937810	TT

Knee Injury

The knee is a joint that connects the bones of the thigh and the lower leg. The knee is very complex and bears a great deal of stress from everyday activities and exercise. This makes it one of the most easily injured joints. The most common knee injuries include injuries to the anterior cruciate ligament (ACL), knee bursitis, and injuries to the meniscus [\[R, R\]](#).



Your Result



PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you may have a typical likelihood of developing a knee injury.

Try to take preventative measures, such as stretching and strengthening your thigh muscles, to potentially decrease your risk.

Your Gene Table

GENE	VARIANT	GENOTYPE
ZC3H11B	rs112081086	AA
PRRX1	rs151077542	GG
BRINP3	rs72727240	TT
XCL1	rs148262095	GG
SPAG17	rs139101248	GG
MAB21L3	rs79678808	AA
AURKAIP1	rs138046143	TT
CDC42BPA	rs56339347	AA
NEK7	rs138440178	CC
/	rs567271467	GG
/	rs567271467	GG
FCMR	rs1800895	CC
NR5A2	rs34004246	GG
SYT2	rs145533858	CC
/	rs192853607	GG
CDC42BPA	rs573881227	CC
USH2A	rs140693748	CC
LRIG2	rs140098571	CT
ZC3H11B	rs147060837	AA
/	rs146266096	CC



Personality

Physical features are crucial for fitness, but they are not everything! The sports you prefer can greatly depend on your personality as well. That’s why we analyzed your genetic predisposition to relevant personality traits. The results in this section will help make a complete picture of your optimal fitness regimen [\[R](#), [R](#), [R\]](#).

Leadership
Predisposed to typical leadership skills

TypicalHigher

Aggression
Predisposed to typical aggression

TypicalHigher

Extravert or Introvert?
Likely more introverted

IntrovertExtravert

Leadership

People tend to have different ideas about what makes a good leader. However, most agree that good leaders can help a group reach a common goal. Experts are still debating what sort of personality lends itself best to leadership. It turns out that good leaders are hard to define [\[R\]](#), [\[R\]](#), [\[R\]](#).

Leaders or captains are crucial in team sports. This type of personality helps them lead their teams toward better results [\[R\]](#).

Your Result

Typical

Higher

 PERSONALIZED TO YOUR GENES

Based on the genetic variants we looked at, you may have typical leadership skills.

You are not very likely to assume leadership roles, such as a manager at work or a captain in team sports.



Your Gene Table

GENE	VARIANT	GENOTYPE
COL8A1	rs11705896	GG
DENND1A	rs73665339	CC
DENND1A	rs55734239	GG
DENND1A	rs58139942	GG
DENND1A	rs113133993	CC
DENND1A	rs73665347	TT
DENND1A	rs73665340	GG
DENND1A	rs4836940	TT
DENND1A	rs73665342	AA
/	rs116266809	CC
DENND1A	rs75032775	GG
DENND1A	rs4838072	CC
DENND1A	rs73665346	CC
DENND1A	rs111849916	CC
DENND1A	rs112205541	CC
DENND1A	rs4838075	AA
DENND1A	rs73665345	GG
DENND1A	rs73665343	TT
DENND1A	rs73665344	TT
DENND1A	rs60775187	AA

Aggression

Aggression is the instinct that drives humans and animals to anger and violence. Excessive and uncontrolled aggression can cause major problems [\[R\]](#).

People with higher aggression may prefer contact and combat sports. However, anger can be draining and harmful. Even athletes benefit from learning to relax and soothe their temper [\[R\]](#), [\[R\]](#).

Your Result

Typical

Higher

 PERSONALIZED TO YOUR GENES

Based on the variants we looked at, your aggression is likely typical. This trait may influence your life choices, including your favorite sports.

Less aggressive people may prefer sports that don't involve physical contact.



Your Gene Table

GENE	VARIANT	GENOTYPE
QSER1	rs16924133	AA
FYN	rs2148710	TT
TRIM31	rs2844775	GG
IYD	rs670292	CG
ABAT	rs1299926	AA
GREM2	rs16840114	GA
PLEK	rs7578047	AA
PNLIP	rs12249434	CC
DPY19L1	rs6954895	TC
/	rs6834498	CC
E2F3	rs555017	AA
PHEX	rs3752433	C
UQCRFS1	rs8102754	TT
CSE1L	rs6012564	AA

Extravert Or Introvert?

Some people thrive on being in big groups. Others need a lot more quiet time alone to feel their best. We call these people extraverts and introverts. For example, an extravert is likely to be talkative, outgoing, and energetic. By contrast, an introvert is likely to be quiet, shy, and reserved.

In line with this, extraverts may be more likely to prefer team sports, while introverts may enjoy individual sports [\[R\]](#), [\[R\]](#).



Your Result

Introvert

Extravert

PERSONALIZED TO YOUR GENES

Based on the gene variants we looked at, you are likely more introverted. That means you may need more time alone to recharge and feel your best [R].

This trait may influence your choice of profession, hobbies, and sports. For example, you may enjoy individual sports more [R].

Your Gene Table

GENE	VARIANT	GENOTYPE
DAB2IP	rs1010235	AA
RASSF2	rs6084912	CC
MTMR9	rs2164273	AG
WSCD2	rs1426371	GA
PCDH15	rs6481128	AG
AFF3	rs113941013	TC
BRINP2	rs144530198	TC
LRGUK	rs137925278	AA
CCDC83	rs56160063	GG
RBFOX1	rs7498702	CC
GBE1	rs57590327	GG
EXOC4	rs117910294	AA
AADAT	rs114377628	TT
SLC29A3	rs556580453	GG
PPFIA2	rs142468221	TT
COL22A1	rs543281873	TT
RNF8	rs148082170	AA
PIAS1	rs111650392	CC
FOXP1	rs189489530	GG
SNX16	rs117898492	CC

Bones, Joints & Muscles

Summary Report

REPORT CATEGORIES —



JOINT & TENDON
HEALTH



BONE HEALTH

John Doe

Report date: 30 October 2024

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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

John Doe

SEX AT BIRTH

Male

HEIGHT

5ft 11" 180.4cm

WEIGHT

177lb 80.3kg

REPORT PROVIDED BY

PlexusDx

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🌐 <https://plexusdx.com>

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.



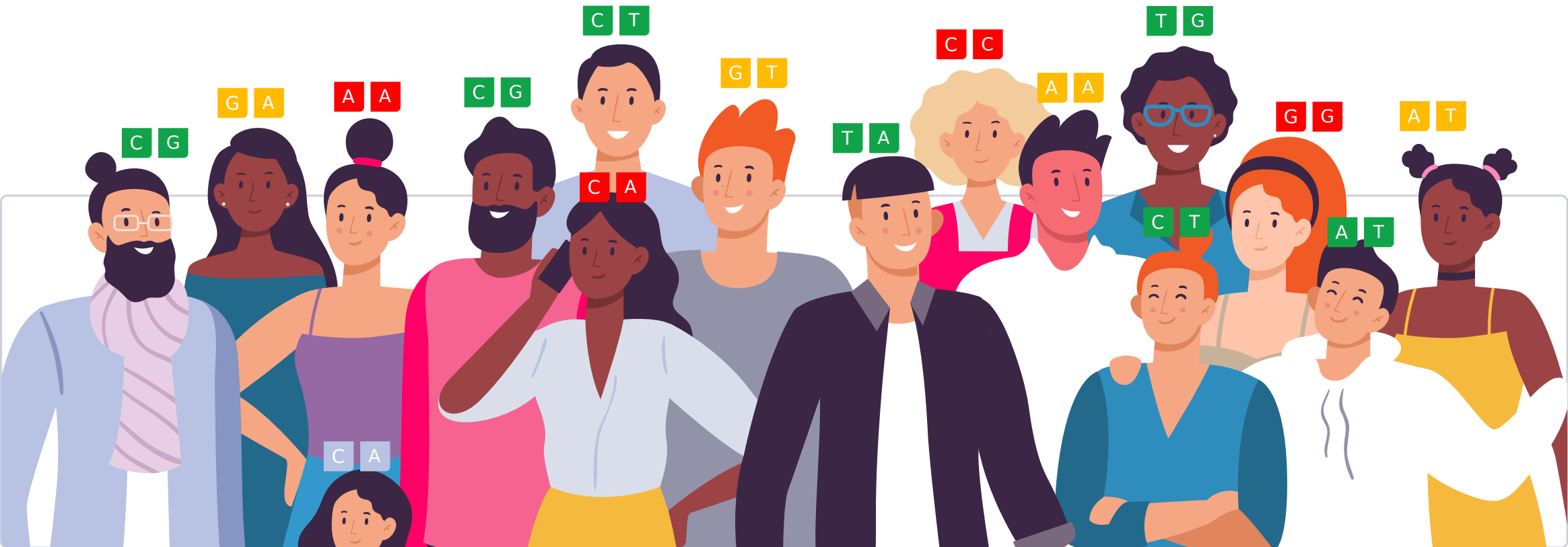
Similarly, our Trait Reports look at how your DNA influences your traits.



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.

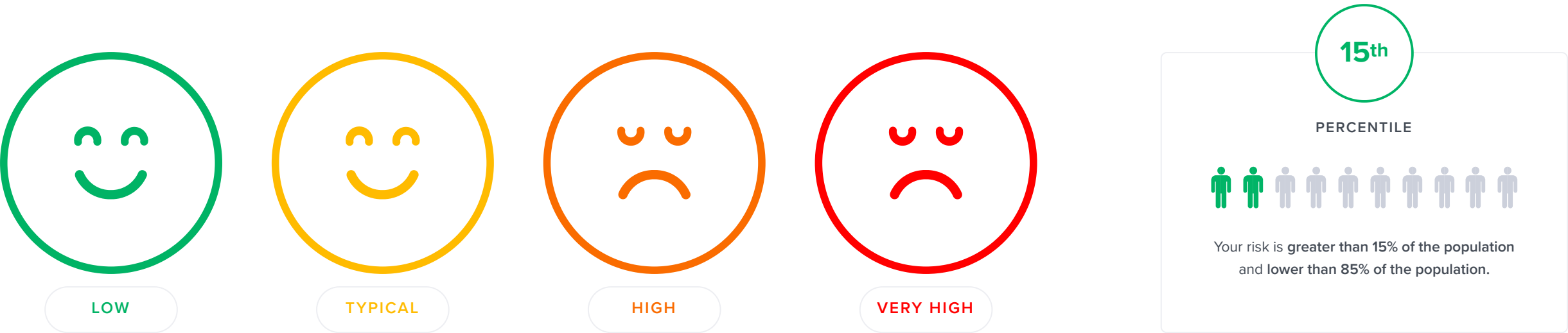
Our Summary Reports combine different Wellness and Trait Reports related to a certain health topic. They give you a more complete picture about different aspects of your health and wellness.



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:

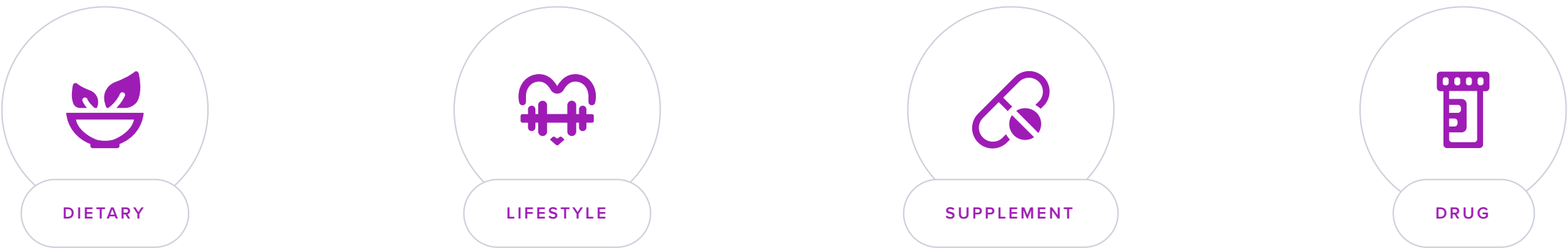


Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

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):



In Summary Reports, we combine top evidence-based recommendations for different conditions.

We focus on recommendations that help with more conditions included in a Summary Report.

For each recommendation, we list all conditions it may help with. We also include impact, evidence, regimen, personalized parts, and other details specific to each condition.

1

Recommendation

Helps with the following

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

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:

- The scores/gauges use the latest scientific studies. But they are not perfect and will change as the models improve.
- Not everyone with risk variants will develop a health condition.
- Genetics is not the whole story. Your health is most often a combination of genetics, lifestyle, and environmental factors. Great news, as this means that you can often change your lifestyle to lower your risk.
- Results might be more accurate for some ethnic groups than others. This depends on the studies used in each report.
- People without risk variants can also develop health conditions.
- It's important to work with your doctor to better understand your risks. Our reports do not diagnose or treat any health condition. They are not a substitute for medical advice. If you're diagnosed with a certain health condition, follow your doctor's advice.

Summary

Musculoskeletal health is vital to your everyday life. It gives you shape and form and allows all of the activities you perform—from walking up stairs, to eating food, to breathing air.

Given this body system is literally from head to toe, it should come as no surprise that your **genetic predispositions** can have a major impact. They include joint inflammation and pain, bone health, injuries, and more.

This comprehensive report will inform you about your musculoskeletal health genetics. Knowing and understanding these factors can help you make right decisions and **maintain healthy bones, joints, and muscles**.

This summary report contains:

24 Genetic Results

50 Recommendations

Overview of Your Results

Bones

TYPICAL NEED Vitamin K	TYPICAL NEED Vitamin D	TYPICAL NEED Calcium
Likely typical vitamin K need	Likely typical need for vitamin D	Likely typical need for calcium

Joints

TYPICAL LIKELIHOOD Shoulder & Neck Pain	MORE LIKELY Knee Pain	TYPICAL LIKELIHOOD Hip Pain
Typical likelihood of shoulder and neck pain	More likely to have knee pain	Typical likelihood of hip pain
TYPICAL LIKELIHOOD Back Pain	MORE LIKELY Jaw Disorders (TMJ)	TYPICAL LIKELIHOOD Carpal Tunnel Syndrome
Typical likelihood of back pain	More likely to have a TMJ disorder	Typical likelihood of carpal tunnel syndrome
LESS LIKELY Gout	TYPICAL LIKELIHOOD Joint Pain	
Less likely to have gout	Typical likelihood of osteoarthritis	

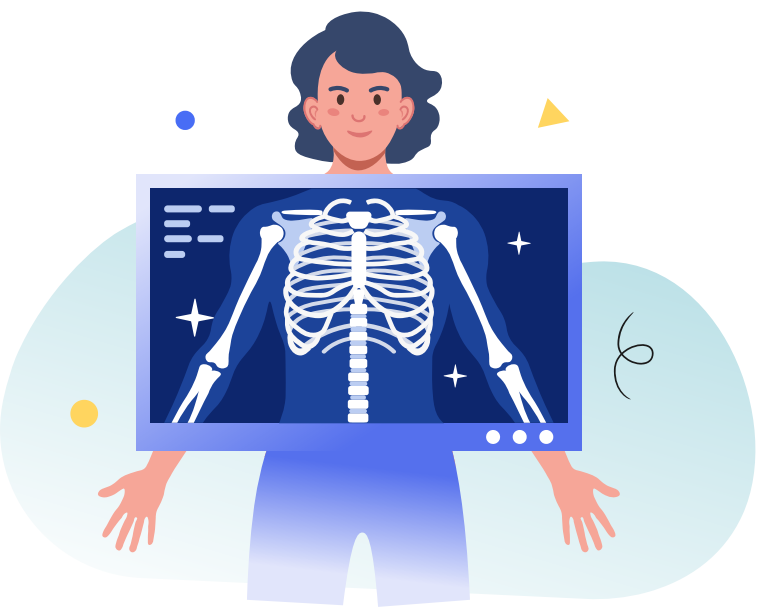
 Muscles

 TYPICAL LEVELS Creatine Kinase Predisposed to typical creatine kinase levels	 TYPICAL Endurance Predisposed to typical endurance	 TYPICAL Strength Predisposed to typical strength
 LOWER Power Predisposed to lower power	 TYPICAL Muscle Mass Predisposed to typical muscle mass	

 Injuries

 MORE LIKELY Groin Hernia More likely to get a groin hernia	 MORE LIKELY Low Back Injury More likely to have a low back injury	 TYPICAL LIKELIHOOD Knee Injury Typical likelihood of knee injuries
 MORE LIKELY Ankle Injury More likely to have an ankle injury	 MORE LIKELY Rotator Cuff Injury More likely to have a rotator cuff injury	 TYPICAL LIKELIHOOD ACL Injury Typical likelihood of tearing an ACL
 TYPICAL LIKELIHOOD Achilles Tendon Injury Typical likelihood of Achilles tendon injury	 TYPICAL LIKELIHOOD Tendon Injury Typical likelihood of having tendinopathy	

Your Results in Details



Bones

Your bones are a living, active part of your body just like everything else. Providing the framework to house your organs and let you accomplish daily activities is hard work!

Your genetics can affect how good your bones are at this. It plays a major role in conditions like **osteoporosis** and influences your needs for certain **nutrients** that are vital to bone health.



TYPICAL NEED

Vitamin K

Likely typical vitamin K need



TYPICAL NEED

Vitamin D

Likely typical need for vitamin D



TYPICAL NEED

Calcium

Likely typical need for calcium

Vitamin K

Key Takeaways:

- Genes involved in higher or lower vitamin K levels may influence vitamin K breakdown, fat metabolism, and collagen and bone formation.
- Having low vitamin K levels may contribute to bone health issues like osteoporosis.
- If you are at high genetic risk or lack vitamin K in your diet, taking action now may lower your overall risk for needing it.
- Click the **Recommendations** tab for potential dietary and lifestyle changes. Click the**next steps** tab for relevant labs.

[Vitamin K](#) is essential for **blood clotting** and **bone health**. Low vitamin K levels may play a role in [osteoporosis](#) and other bone problems. They may also increase blood clotting time, putting people at higher risk of bleeding. Good sources of vitamin K include green leafy vegetables, soy products, carrot juice, and pumpkins [\[R,R,R\]](#).

Genetics may influence vitamin K levels. Some gene variants may be linked to **higher vitamin K levels**. Examples include [\[R\]](#):

- "G" at [rs964184](#), near the [APOA5](#) and [ZNF259](#) genes
- "T" at [rs2108622](#), near the [CYP4F2](#) gene
- "C" at [rs4852146](#), near the [CTNAA2](#) gene

On the other hand, variants like [rs4645543](#)-T may be linked to **lower vitamin K levels**. It's located near the [COL22A1](#) and [KCNK9](#) genes [\[R\]](#).

Genes involved in vitamin K levels may influence [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Vitamin K breakdown ([CYP4F2](#))
- Fat metabolism ([APOA5](#))
- Other vitamin K-related genes ([CTNAA2](#))
- Collagen and bone formation ([COL22A1](#))

Genetically higher levels of vitamin K1 (phylloquinone) may be causally associated with:

- Stroke [\[R\]](#)
- Heart health [\[R\]](#)
- High blood sugar (lower diabetes risk) [\[R\]](#)

Keep in mind that your diet, environment, and other genetic variants also influence your vitamin K levels.



TYPICAL NEED

Likely typical vitamin K need based on 11 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
SIDT2	rs964184	CC
CTNNA2	rs4852146	TT
CYP4F2	rs2108622	CC
CYP4F11	rs12609820	TT
/	rs2192574	CT
ATG12	rs6862909	GG
CDO1	rs6862071	AA
CDO1	rs4122275	GG
KCNK9	rs4645543	CC
KCNK9	rs2199565	GG
KCNK9	rs7018214	TT

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

Vitamin D

Key Takeaways:

- Vitamin D is an essential nutrient that you need outside sources of to achieve adequate levels. It is important for mood, immunity, heart health, and blood sugar control.
- Vitamin D levels can be impacted by intensity and amount of sun exposure, age, skin color, and your genetics.
- If you are genetically predisposed to needing more vitamin D, you may want to consider supplementation and addressing possible issues like sun exposure.
- Click the **next steps** tab for relevant labs.

[Vitamin D](#) is an essential nutrient. **Your body needs vitamin D for strong bones.** Our skin naturally makes vitamin D when exposed to [sunlight](#). We also get small amounts of vitamin D from foods such as fatty fish, egg yolks, beef liver, and mushrooms [\[R,R\]](#).

Around **20-40%** of differences in people's vitamin D levels may be due to genetics [\[R\]](#).

Genes that influence vitamin D levels may play a role in its [\[R\]](#):

- Production
- Activation
- Transport
- Breakdown

Besides genetics, the following factors also influence vitamin D levels [\[R\]](#):

- Sun exposure
- Skin color
- Age

Genetically high vitamin D levels may be causally associated with positive outcomes for:

- Alzheimer's [\[R,R,R\]](#)
- COPD [\[R,R\]](#)
- Uterine fibroids [\[R\]](#)
- Migraines [\[R\]](#)
- Heart Failure [\[R,R\]](#)
- Psoriasis [\[R\]](#)
- Lupus [\[R\]](#)
- Delirium [\[R\]](#)
- Hypertension [\[R\]](#)



Likely typical need for vitamin D based on 1,766 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GC	rs2282679	GG
GC	rs7041	AA
/	rs558560635	GG
/	rs189918701	GG
/	rs375984409	GG
GC	rs11723621	GG
/	rs201561609	TT
GC	rs222026	TT
ADH1B	rs1229984	CC
RRAS2	rs117206369	TT
COPB1	rs148514005	CC
/	rs561089663	GG
PSMA1	rs577185477	TT
/	rs557657187	GG
COPB1	rs117913124	GG
PDE3B	rs188480917	CC
GC	rs565277381	TT
/	rs567415847	GG
/	rs529640451	CC
GC	rs113938679	GG

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

- Rosacea [R]
- Total Testosterone [R]
- Muscle loss [R,R]
- Muscle mass [R]
- CRP [R,R]
- Longevity [R,R]
- Lower cholesterol, lipoprotein particles, and phospholipids within VLDL and IDL [R]
- Higher HDL cholesterol [R]
- Lower triglycerides [R]
- Higher adiponectin [R]
- eGFR (lower) [R]
- Primary biliary cholangitis [R]

Genetically lower vitamin D levels may be causally associated with negative outcomes for:

- Multiple sclerosis [R,R,R,R,R,R,R,R]
- Pneumonia [R]
- Gut Inflammation: ulcerative colitis, non-infective colitis, and Crohn's disease [R]
- Lupus [R,R,R]
- Psoriasis [R,R]
- Longevity [R,R,R,R,R,R]

A blood test is the only reliable way to determine vitamin D status [R].

Calcium

Key Takeaways:

- The amount of calcium in the blood at any given time is controlled by vitamin D and parathyroid hormone.
- Much of the world's population is at risk for low calcium.
- Beyond diet, it is important to maintain adequate vitamin D levels as well.
- Dairy and fortified foods are the easiest ways to ensure adequate calcium intake.
- Click the **next steps** tab for relevant labs.

Calcium is the most abundant mineral in the human body. Ninety-nine percent of the calcium in the body is stored in the bones and teeth, and only a small amount is in your bloodstream at any time. **Vitamin D** and **parathyroid hormone** closely control the amount of calcium in your blood [R,R,R].

The recommended daily intake of calcium is 1,000 mg for women who have not gone through menopause and 1,200 mg for women who have. The recommended daily intake for men is 1,000 mg [R].

Many people do not get enough calcium in their diet [R, R, R, R].

Eating more dairy products is an easy way to incorporate more calcium into your diet. You can also add non-dairy calcium sources and calcium-fortified foods like cereal and orange juice [R].

Compared to supplements, calcium from food is easier to absorb and may be better for bone building. It is also unlikely to cause side effects [R, R, R].

Your gut needs vitamin D to be able to absorb calcium. Higher vitamin D levels are linked to higher calcium levels in the body and better bone health [R, R, R, R].

[Sunlight](#) is our main source of vitamin D. Foods like fish, eggs, and fortified milk provide small amounts of vitamin D. People lacking vitamin D should consider taking a supplement [R, R, R].



Likely typical need for calcium based on 49,961 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
PRSS3	rs10814041	GC
MECOM	rs784288	AA
AMT	rs34240317	AA
GAL	rs880610	GG
SEM1	rs4448201	CC
CDC42SE1	rs2864700	TT
SMOC1	rs3742909	GG
CPED1	rs10242100	AA
HOXC6	rs7308105	CC
TNFRSF11B	rs2062375	CC
ZBTB40	rs34414754	CA
FKBP11	rs3741619	AG
ETS2	rs11088458	GA
RSPO3	rs9482772	TC
/	rs12808199	AG
ARL4C	rs12151790	AG
DOK6	rs17184557	TA
STK39	rs578031265	CC
MARCO	rs115242848	CC
ALDH7A1	rs13182402	AA

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



 Joints

The connection point from one bone to the next is an arrangement of padding (cartilage) and connectors (ligaments) that allow your body to have flexibility and range of motion.

Problems with joint health can have a major impact on quality of life. Hence, it's crucial to understand your genetic predispositions to conditions like **arthritis, joint pain, and gout**. Knowing these factors can help you make more informed choices and reduce your risks.

 TYPICAL LIKELIHOOD

Shoulder & Neck Pain

Typical likelihood of shoulder and neck pain

 MORE LIKELY

Knee Pain

More likely to have knee pain

 TYPICAL LIKELIHOOD

Hip Pain

Typical likelihood of hip pain

 TYPICAL LIKELIHOOD

Back Pain

Typical likelihood of back pain

 MORE LIKELY

Jaw Disorders (TMJ)

More likely to have a TMJ disorder

 TYPICAL LIKELIHOOD

Carpal Tunnel Syndrome

Typical likelihood of carpal tunnel syndrome

 LESS LIKELY

Gout

Less likely to have gout

 TYPICAL LIKELIHOOD

Joint Pain

Typical likelihood of osteoarthritis

Shoulder & Neck Pain

Key Takeaways:

- About **1 in 5 adults** have neck or shoulder pain.
- Up to **65%** of differences in people's chances of having shoulder and neck pain may be due to genetics.
- Other risk factors include: poor posture, prolonged sitting, poor sleep position, injury and overuse, stress, and older age.
- If you have high genetic risk or are experiencing symptoms, take action on modifiable factors like posture and sleep position.
- Click the **Recommendations** tab for potential lifestyle changes and **next steps** for relevant labs.

Your shoulders and neck are made up of many muscles, tendons, bones, and nerves in a complicated web. **An injury to any part of this system can lead to pain** [R, R].

About 1 in 5 adults struggle with shoulder or neck pain [R, R].

Most of the time, shoulder or neck pain is nothing to worry about. But sometimes it can be a symptom of a bigger problem. It can sometimes progress and even become disabling [R, R].

Many people find their lives changed by shoulder and neck pain.

There is also a significant economic cost, as people may not be able to work [R].

Risk factors for shoulder and neck pain include [R, R, R, R]:

- Poor posture
- Prolonged sitting
- Poor sleep position
- Injury and overuse
- Stress
- Older age

The most common neck injury is called *whiplash*. It can cause pain, loss of mobility, and stiffness. Whiplash occurs when the neck suddenly bends back and forth. Car crashes, contact sports, or assault can all lead to whiplash [R, R].

Diagnosis and treatment of shoulder and neck pain depend on the underlying cause. Your doctor will decide on the appropriate strategy, which may include [R, R, R, R]:

- Medication



TYPICAL LIKELIHOOD

Typical likelihood of shoulder and neck pain based on 924,669 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CTRC	rs76827641	AA
UBE2J2	rs148734489	GG
ATAD3A	rs185493637	GG
SAMD11	rs150344285	GG
/	rs28676717	GG
/	rs201849880	TT
WNT4	rs139121331	CC
EFHD2	rs60181764	CC
/	rs12117533	GG
AJAP1	rs76062163	AA
CDK11A	rs2377229	AA
PLCH2	rs188383352	GG
VPS13D	rs564328546	TT
PRDM2	rs114362297	CA
C1ORF127	rs9430331	GA
CDK11A	rs187812406	GG
PRAMEF11	rs185548955	GG
NPHP4	rs9726616	CC
PRKCZ	rs72636362	AA
DHRS3	rs11582380	CC

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

- Physiotherapy
- Surgery

Many people also use complementary strategies to help manage shoulder and neck pain. These include [R](#), [R](#), [R](#):

- Heat or [cold](#) packs
- [Acupuncture](#)
- [Yoga](#)
- Electrical tools like [TENS units](#)
- Chiropractic adjustment

Up to 68% of differences in people's chances of having shoulder and neck pain may be attributed to genetics. Genes that may play a role in shoulder and neck pain influence [R](#), [R](#), [R](#), [R](#), [R](#):

- Brain function ([FOXP2](#))
- Pain perception ([KCNS1](#), [GCH1](#), [ADRB2](#))
- Inflammation ([SLC39A8](#), [ANXA1](#))

Knee Pain

Knee pain is a common complaint with many potential causes, including injuries, overuse, and arthritis.

A number of factors can increase your risk of having knee pain, including [\[R\]](#):

- Excess weight
- Poor flexibility and strength
- High-impact sports or occupations
- Previous injury
- Older age (for arthritis)
- Genetics

Genetics plays a role in many conditions that cause knee pain, such as injuries and osteoarthritis. Involved genes may affect inflammation, bone density, cartilage function, and more [\[R\]](#), [\[R\]](#), [\[R\]](#).



MORE LIKELY

More likely to have knee pain based on 947,637 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
COL27A1	rs919642	AA
CPNE1	rs6120946	AT
CPNE1	rs143384	AG
COL27A1	rs2808772	GA
EPHA5	rs201194999	CC
COL11A1	rs2622873	CT
ICA1L	rs62182810	AG
BRINP3	rs72727240	TT
MAB21L3	rs79678808	AA
CDC42BPA	rs56339347	AA
/	rs567271467	GG
CDC42BPA	rs573881227	CC
SCUBE1	rs528981060	GG
SLC39A8	rs13107325	CC
TGFB1	rs75621460	GG
TGFA	rs3771501	GG
H4C8	rs115740542	TT
GPR37L1	rs74136729	AA
PTPRC	rs79211001	AA
SGIP1	rs74810564	GG

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

Hip Pain

Hip pain is a common ailment with a wide variety of causes, such as arthritis, joint inflammation, or injuries. The two main types of hip pain are internal and external.

A number of factors can contribute to hip pain, including [R](#), [R](#), [R](#), [R](#):

- Obesity
- Older age
- Sedentary lifestyle
- Certain sports and professions
- Weak bones
- Poor diet
- **Genetics**



TYPICAL LIKELIHOOD

Typical likelihood of hip pain based on 420,074 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
KAZN	rs549908604	AA
HIPK1	rs149055514	AA
PBX1	rs506068	CC
PGLYRP3	rs117034852	TT
SEMA4A	rs531735825	CC
FNDC7	rs181938434	GG
PGLYRP3	rs118113194	CC
KIAA1614	rs144390511	CC
KAZN	rs115204536	TT
KIF1B	rs143020152	GG
VPS13D	rs138529300	CC
ATAD3C	rs111262777	AA
FAM20B	rs138336064	TT
CTTNBP2NL	rs116671687	CC
LHX4	rs78614038	CC
MAN1A2	rs189116872	TT
MAN1A2	rs116275925	AA
SSU72	rs180728791	CC
ASTN1	rs115115964	GG
RRNAD1	rs116417099	CC

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

Back Pain

Key Takeaways:

- Up to **25%** of differences in people's chances of developing back pain may be attributed to genetics. It is more likely to occur as you get older.
- Risk factors: injuries, health conditions, poor posture, aging, smoking, lack of fitness, overweight, your genetics.
- If you have high genetic risk or symptoms, take action now on your modifiable risk factors to reduce your overall risk.
- Click the **next steps** tab for relevant lifestyle factors.

Back pain is extremely common. In fact, up to 1 in 4 adults suffer from chronic lower back pain. **Up to 84% of people are estimated to have back pain at some point in their lives** [R].

Back pain can be acute or chronic. Acute back pain is brief (days or weeks) and usually has a clear cause. It normally resolves on its own and is fairly easy to treat. Chronic back pain is long-lasting (months or years). The cause can be tough to determine, which makes it harder to treat. **About 1 in 5 cases of acute back pain becomes chronic** [R].

Risk factors for lower back pain include [R, R]:

- Injuries
- Health conditions
- Poor posture
- Aging
- Smoking
- Lack of fitness
- Weight gain
- Genetics**

Back pain may come with other symptoms, such as increased sensitivity to pain and touch [R].

One type of back pain is called **sciatica**. Sciatica is pain in the lower back that radiates through the hips and down the back of the leg. It is caused by pressure on the sciatic nerve, which runs through these areas. Sciatica tends to occur on one side of the body [R, R, R].

Fortunately, mild sciatica often goes away on its own over time. However, more severe or long-lasting symptoms may need medical treatment [R].

Treatment options for back pain include [R, R, R]:

- Medication



TYPICAL LIKELIHOOD

Typical likelihood of back pain based on 13,559 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GSDMC	rs6651255	CT
ITGA1	rs13174042	CT
DCC	rs4384683	GG
MYC	rs7833174	CT
DIS3L2	rs1453867	CT
/	rs543634974	CC
MME	rs540690425	CC
SOX5	rs12310519	CC
CTSC	rs217095	TT
CCDC196	rs144740416	CC
CACNB2	rs189997399	AA
COL12A1	rs146452235	CC
ERI3	rs150678734	TT
UROS	rs186296138	GG
LRP1	rs149305474	GG
GML	rs147507753	TT
EGFR	rs145967840	CC
LRATD1	rs374707240	CC
NUDT15	rs9652197	TT
U2SURP	rs116472002	AA

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

- Hot or cold packs
- Physical therapy
- Surgery

Left untreated, some types of back pain can cause further problems. For example, severe sciatica can cause permanent nerve damage [\[R\]](#), [\[R\]](#).

Up to 25% of differences in people's chances of developing back pain may be attributed to genetics. Genes involved in back pain may influence [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Bone and joint development ([NFIB](#), [COL11A2](#))
- Inflammation ([HLA-DRB5](#))
- Nerve function ([MYO5A](#))

Genetically high levels of omega-3s may be causally associated with a lower risk of back pain [\[R\]](#).

Jaw Disorders (TMJ)

Key Takeaways:

- Genetics plays a role in factors that contribute to TMJ disorders, such as arthritis or teeth grinding. These genes may affect bone and cartilage structure, and mental health.
- Factors that may increase the risk of developing TMJ disorders include arthritis, jaw injury, teeth grinding or clenching, and connective tissue problems.
- TMJ disorders are common, affecting up to **30%** of adults.
- If you are at high genetic risk or have potential risk factors, take action now to help reduce the overall risk. If you have symptoms, talk to your healthcare professional.

Factors that may increase the risk of developing TMJ disorders include [\[R\]](#):

- Arthritis
- Jaw injury
- Teeth grinding or clenching
- Connective tissue problems
- Genetics**

Genetics plays a role in different factors that contribute to TMJ disorders, such as arthritis or teeth grinding. Depending on the underlying cause, involved genes may affect **bone and cartilage structure, mental health**, and more [\[R\]](#), [\[R\]](#).



MORE LIKELY

More likely to have a TMJ disorder based on 17,327 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
RXFP2	rs60249166	TT
BAHCC1	rs1531554	TC
DRD1	rs686	AG
DRD5	rs6283	TC
DRD3	rs6280	TC
ANKK1	rs1800497	AG
EPHA5	rs201194999	CC
COL11A1	rs2622873	CT
ICA1L	rs62182810	AG
SFRP1	rs10092633	GG
SP4	rs73271865	CC
DMD	rs73460075	G
SGCA	rs4794106	CC
TSPAN9	rs878962	GT
HTR2A	rs2770304	TT
HTR2A	rs6313	AA
SCUBE1	rs528981060	GG
SLC39A8	rs13107325	CC
TGFB1	rs75621460	GG
TGFA	rs3771501	GG

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

Carpal Tunnel Syndrome

Key Takeaways:

- Up to 45% of differences in people's chances of having carpal tunnel syndrome may be due to genetics.
- Risk factors include being female, repetitive wrist movement, obesity, diabetes, pregnancy, and rheumatoid arthritis.
- If you have a high genetic risk, you may reduce overall risk by taking action on your risk factors. If you are experiencing symptoms you may want to consult with your doctor.
- Click the **next steps** tab for relevant labs and lifestyle factors.

Carpal tunnel syndrome is a painful condition caused by pressure on the median nerve [R].

This nerve runs on the underside of the wrist and into the palm. It supports sensation and movement in parts of the hand. At the wrist, it runs through a passageway made of ligaments and bones called the *carpal tunnel*. Injuries and swelling can squeeze the nerve, causing carpal tunnel syndrome [R].

Up to 8% of working Americans may develop carpal tunnel syndrome at some point in their lives. **Women are three times more likely than men to develop it** [R, R, R].

Besides being female, other risk factors include [R, R]:

- Repetitive wrist movement
- Obesity
- Diabetes
- Pregnancy
- Rheumatoid arthritis
- **Genetics**

The first symptom of carpal tunnel syndrome is usually numbness or tingling in the thumb and fingers at night. Many people feel the need to "shake out" their hands during this phase [R, R].

Later, symptoms may include [R]:

- Tingling during the day
- Hand weakness
- Muscle wasting

In very severe cases, people may not be able to feel hot or cold in their fingers. Because of this, it's important to treat carpal tunnel syndrome as early as possible [R].



TYPICAL LIKELIHOOD

Typical likelihood of carpal tunnel syndrome based on 4,444 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
SERPINA1	rs112635299	GG
TNP1	rs10221933	GG
TBX18	rs62422907	GG
UMPS	rs4678145	GG
TNP1	rs1863190	TT
AEBP1	rs55841377	CC
EFEMP1	rs3791679	AG
ADAMTS14	rs747141	GA
/	rs1025128	GC
RAB28	rs6843953	CT
LNPK	rs847139	TC
HLA-C	rs3828889	TC
COL11A1	rs12406439	TC
DOCK8	rs76532765	GG
PID1	rs111883254	TT
ADAMTS10	rs62621197	CC
TTLL5	rs72725608	TT
ADAMTS17	rs72755233	GG
HLA-DQA1	rs9273364	TT
CRPPA	rs13221870	GG

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

Mild cases of carpal tunnel syndrome may be treated with wrist splinting and physical therapy [R, R].

If symptoms continue to worsen, treatment options include [R, R]:

- Medication
- Steroid injections
- Surgery

Up to 46% of differences in people's chances of developing carpal tunnel syndrome may be attributed to genetics. Genes involved in carpal tunnel syndrome may influence [R, R]:

- Nerve function ([ADAMTS17](#))
- Connective tissue function ([COL11A1](#), [ADAMTS10](#), [EFEMP1](#))

Gout

Key Takeaways:

- About **30%** of differences in people's chances of developing gout may be due to genetics. It is most common in middle age.
- Risk factors include a diet rich in purines, fructose, alcohol, high blood pressure, overweight, diabetes, kidney disease, and genetics.
- If you are at high genetic risk or have symptoms, take action now on your modifiable risk factors to help lower overall risk.
- Click the **next steps** tab for relevant labs and lifestyle factors.

Gout is a common type of arthritis. It is caused by urate crystals building up in the joints [R, R].

Urate crystals are formed from *uric acid*, a waste product. The body makes the most uric acid when it breaks down *purines*. These are compounds found in our cells and in many foods, such as meat and seafood [R].

The major symptom of gout is pain and swelling in the joints. The most commonly affected joint is the big toe. However, gout can also occur in other joints, such as the elbows, wrists, and fingers [R, R].

Gout comes and goes in cycles called flares. Flare-ups are often sudden and tend to occur at night. Afterward, the joint may be uncomfortable for days or weeks [R, R].

Left untreated, gout can cause [R]:

- *Tophi* (crystals around the joints and other parts of the body, just under the skin)
- Joint deformities
- Loss of bone
- Osteoarthritis

This condition is most common in middle-aged people. Younger people do not usually get gout, but if they do, it tends to be severe [R, R].

In addition to age, other risk factors for gout include [R, R]:

- A diet rich in purines (e.g., from red meat and shellfish)
- Fructose (fruit sugar)
- Alcohol (especially beer)
- Some medication
- High blood pressure
- Being overweight or obese



LESS LIKELY

Less likely to have gout based on 233 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
SLC2A9	rs13129697	GT
SLC2A9	rs75341455	TC
TRMT112	rs2078267	CC
INHBC	rs2229357	GG
PNPLA3	rs738409	CC
GCKR	rs1260326	TC
SPP1	rs2728127	AG
RREB1	rs11755724	GA
MTX1	rs760077	TA
MLXIP	rs28548845	CT
MAN2C1	rs1394125	GA
CARMIL1	rs9461183	AG
ABCG2	rs2231142	GG
NUDT9	rs114791459	GG
SPP1	rs114580333	GG
ADH1B	rs1229984	CC
PPM1K	rs4693211	TT
RPS6KA4	rs77085155	TT
HOXD1	rs72929103	CC
SLC2A9	rs6839820	TT

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

- Certain health conditions (e.g., diabetes, heart disease, and kidney disease)
- **Genetics**

Gout is a manageable condition with well-established treatments. For people with gout, a doctor may recommend [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Medication
- A low-purine diet
- Drinking more water
- Avoiding alcohol
- Weight management
- Exercise

About **30%** of differences in people's chances of developing gout may be attributed to genetics. Genes involved in gout may influence [\[R\]](#), [\[R\]](#):

- The immune response ([HLA-B](#))
- Uric acid levels ([ABCG2](#), [SLC2A9](#), [SLC22A11](#), [SLC22A12](#), [SLC17A1](#))

Moreover, genetically higher fasting insulin may be causally associated with a higher risk of gout. In contrast, genetically high testosterone levels may be causally associated with a lower risk of gout in men [\[R\]](#), [\[R\]](#), [\[R\]](#).

Joint Pain

Key Takeaways:

- Osteoarthritis will affect the majority of people over the age of 55. So, even with low genetic risk, the overall risk is still high for older people.
- About **50%** of the differences in people's chances of getting osteoarthritis may be due to genetics.
- Higher genetic risk may mean earlier onset and a greater impact from potential risk factors.
- Risk factors include: being female, joint injury or overuse, obesity, bone deformities, and diabetes.
- Click the **next steps** tab for relevant labs and lifestyle factors.

Osteoarthritis tends to affect knees, hands, and hips. People with this condition may experience [\[R\]](#), [\[R\]](#):

- Joint pain and stiffness
- Difficulty moving
- Weakness and balance problems

Most people with osteoarthritis are over the age of 55. In fact, older age is the number one risk factor for this condition. Other risk factors include [\[R\]](#), [\[R\]](#):

- Being a woman
- Joint injury or overuse
- Obesity
- Bone deformities
- Diabetes
- **Genetics**

About 50% of the differences in people's chances of getting osteoarthritis can be attributed to genetics. Genes that contribute to osteoarthritis may influence [\[R\]](#), [\[R\]](#), [\[R\]](#):

- [Collagen](#) production in the joints ([COL2A1](#), [COL11A1](#), and [COL1A1](#))
- Inflammation ([IL1B](#), [IL4R](#), [IL17A](#), [IL17F](#) and [IL6](#))
- Activity of joint cells ([ESR1](#))
- Bone formation ([FRZB](#), [VDR](#))
- Bone strength ([IGF1](#), [TGFB1](#), [TIMP3](#), and [ADAM12](#))

Genetically high levels of the following markers may be causally associated with a high risk of hip and knee osteoarthritis:

- IGF-1 [\[R\]](#), [\[R\]](#)
- Testosterone [\[R\]](#)



TYPICAL LIKELIHOOD

Typical likelihood of osteoarthritis based on 385,825 genetic variants we looked at

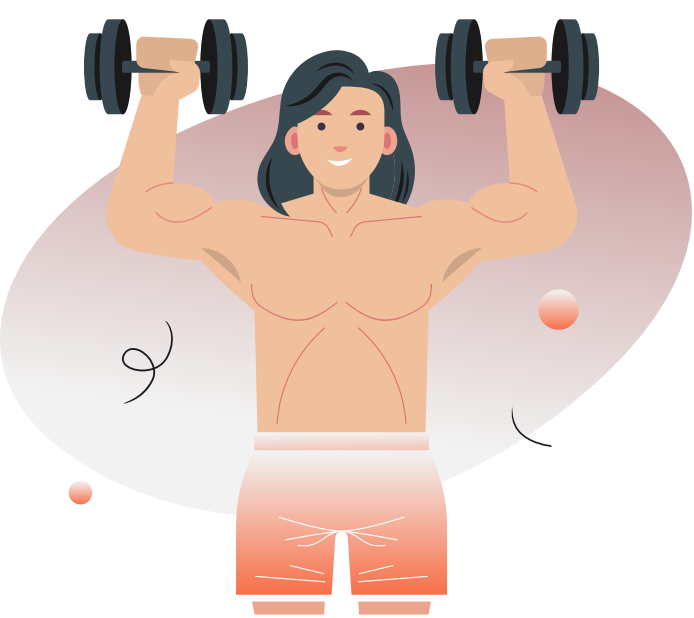


Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
EPHA5	rs201194999	CC
SRR	rs216175	AA
FAM53A	rs798726	CC
ANAPC4	rs34811474	GG
ER11	rs330050	GG
HLA-DPB1	rs2856821	TT
TGFB2	rs2785988	AA
SLC44A2	rs1560707	TT
DPEP1	rs1126464	GG
SLC44A2	rs10405617	AA
GLIS3	rs10974438	AA
TMEM241	rs10502437	GG
COL11A1	rs2622873	CT
ICA1L	rs62182810	AG
CSK	rs35206230	TC
LYZ	rs317630	TC
RAB28	rs1913707	GA
TSKU	rs1149620	AT
PRDM5	rs11729628	GT
SOCS2	rs2171126	CT

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

In contrast, genetically high ApoB levels may be associated with a lower risk [\[R\]](#).



 Muscles

Smile! It takes far less effort than frowning. Over 600 muscles make your body move in both obvious and subtle ways. **Skeletal muscles** provide movement for walking, jumping, or waving your hands in the air like you just don’t care!

Your genetics can affect muscles and their movement in a whole variety of ways. Examples include **muscle mass and muscle performance**, as well as indicators of **muscle damage**.

 TYPICAL LEVELS
Creatine Kinase

Predisposed to typical creatine kinase levels

 TYPICAL
Endurance

Predisposed to typical endurance

 TYPICAL
Strength

Predisposed to typical strength

 LOWER
Power

Predisposed to lower power

 TYPICAL
Muscle Mass

Predisposed to typical muscle mass

Creatine Kinase

[Creatine kinase](#) (CK), also known as creatine phosphokinase, is an enzyme that plays a role in energy production. Higher amounts of CK are found in tissues that use a lot of energy, such as the muscles [\[R\]](#), [\[R\]](#).

Up to **40%** of people’s differences in CK levels may be due to genetics [\[R\]](#).

Creatine kinase levels vary greatly by ethnicity — they are around **70%** higher in healthy African Americans, compared to people of European descent! Healthy black men and women may have higher values than the currently recognized normal range [\[R\]](#), [\[R\]](#), [\[R\]](#).

People who have greater muscle mass may have **higher CK levels**. That is why men usually have higher values than women [\[R\]](#), [\[R\]](#), [\[R\]](#).

CK is released and enters the blood when tissues are damaged. Hence, elevated levels of this enzyme may suggest [\[R\]](#), [\[R\]](#):

- Sports injury
- Heart damage
- Brain damage
- Muscle disease

Please keep in mind this report only shows your genetic predisposition to CK levels. Higher levels here don’t necessarily mean that you have high CK levels.



Predisposed to typical creatine kinase levels based on 222 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CKM	rs149354459	CC
CKM	rs11559024	TT
CKM	rs17357122	GG
CPN1	rs61751507	CC
KLF5	rs7318906	GG
LILRB5	rs12975366	TC
DBT	rs148081884	AA
GPAM	rs7896477	TT
SLC2A5	rs61785813	GG
/	rs181256170	TT
SORT1	rs139907312	GG
LRRC7	rs74848658	GG
SLC2A1	rs180989327	TT
PDCD11	rs17735658	AA
TEX36	rs78521018	GG
AIDA	rs113161870	AA
ADGRL2	rs868723	GG
FYB2	rs12081418	CC
UBXN11	rs189797544	CC
LMO4	rs191835412	GG

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

Endurance

Endurance is the ability to produce low-intensity movements for a long period of time (e.g., cycling, running, swimming). It's made up of **cardiorespiratory endurance** (the ability of the heart and lungs to deliver oxygen to muscles during longer, less intense periods of exercise) and **muscular endurance** (the ability of muscles to contract during longer, less intense periods of exercise) [R, R, R, R, R].

Some people may have greater endurance than others. This may be due to [R, R, R, R, R, R, R]:

- Fitness levels
- Age (endurance can actually improve with age!)
- **Genetics**

Up to 70% of people’s differences in endurance may be due to genetics. Genes involved may influence [R, R, R, R, R, R, R]:

- The body’s ability to use oxygen
- Heart function
- Muscle composition and efficiency

Some tips that may help you build endurance include:

- Doing the same exercise regularly and letting your body adapt to it over time
- Slowly increasing the amount and intensity of your workouts over time
- Getting at least than 150 min of cardio per week
- Switching between periods of high-intensity training and resting. This is called high-intensity interval training (HIIT).



Predisposed to typical endurance based on 32 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
HFE	rs1799945	CC
GABPB1	rs7181866	AA
GABPB1	rs8031031	CC
NR1H3	rs7120118	TC
MYBPC3	rs1052373	CT
GABPB1	rs12594956	CA
SLC16A1	rs1049434	TT
TTN	rs10497520	CC
ADRB3	rs4994	AA
CHRNA3	rs4950	AA
GSTP1	rs1695	AA
GNB3	rs5443	CC
HIF1A	rs11549465	CC
RBFOX1	rs7191721	AA
CNDP2	rs6566810	TT
NFIA	rs1572312	GT
DES	rs7564856	GA
SATB1	rs4973706	CT
KDR	rs1870377	AT
GALNTL6	rs558129	AG

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

Strength

Strength is the maximum force applied in one movement (e.g., in a single weight lift). The best way to build strength is to take part in strength (resistance) training. Methods include using weight machines, lifting free weights, and doing bodyweight exercises such as planks or pushups [R, R].

Some people are stronger than others. This may be due to many factors, such as [R, R, R, R, R, R, R, R, R, R, R]:

- Fitness level
- Age
- Diet
- **Genetics**

In fact, **about 50% of people’s differences in strength may be due to genetics**. Genes involved may influence the size and proportion of different muscle fiber types [R, R, R, R, R].



Predisposed to typical strength based on 17 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
HIF1A	rs11549465	CC
IL11RA	rs41274853	GG
MTHFR	rs1801131	TT
BDNF	rs10501089	CC
SLC16A1	rs1049434	TT
PITX3	rs2273555	GG
LEMD2	rs12055409	GA
PPARG	rs1801282	GC
IGF2	rs680	TC
/	rs9320823	TC
ZNF608	rs4626333	TC
LRPPRC	rs10186876	GA
TBC1D7	rs6905419	CC
ACVR1B	rs2854464	AA
ACTN3	rs1815739	TT
AMPD1	rs17602729	GG

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

Power

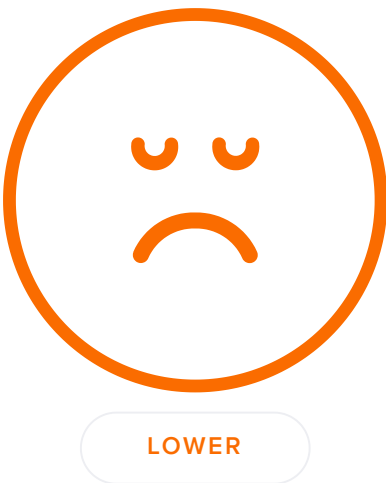
Power is the ability to produce short, intense movements (e.g., sprinting, jumping, throwing). Our muscles are made up of fibers. The type of fibers determines what a muscle is good at. **Fast-twitch fibers support rapid movements and are more common in power athletes** [R, R, R].

Fast-twitch muscle fibers contain higher amounts of a specific protein (alpha-actinin-3) that supports muscle power. The gene that helps make this protein is called [ACTN3](#) [R].

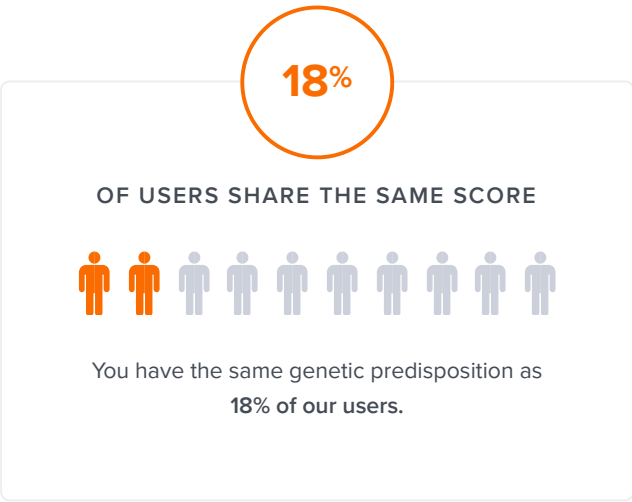
A specific *ACTN3* gene variant determines whether people produce this protein or not. People who produce this protein tend to have increased power performance. They are more likely to be elite power athletes [R, R, R].

However, fitness level and other lifestyle factors have a strong effect on your power. The impact of genetics is more pronounced in elite athletes because they have improved all other factors [R].

Also, other gene variants not included in this report may influence power performance.



Predisposed to lower power based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ACTN3	rs1815739	TT

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

Muscle Mass

Muscle mass is the amount of all the muscles in your body. It mostly refers to muscles that you can control (skeletal muscles). A person having more body fat also has lower muscle mass because both are usually given as a percentage of total body weight [\[R\]](#), [\[R\]](#), [\[R\]](#).

Genetic factors may influence your muscle mass. For example, genetically higher IGF-1 levels may be causally associated with higher muscle mass and a lower risk of muscle weakness and loss [\[R\]](#), [\[R\]](#).

However, your diet and the amount of exercise you get may alter your muscle mass over time [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

People also tend to lose muscle mass as they age. Some chronic health conditions may also affect muscle mass [\[R\]](#), [\[R\]](#), [\[R\]](#).

Many people try to build muscle to improve their strength and body image. However, muscle mass can also have a big impact on health and quality of life.

A combination of strength training and increased protein intake may help increase muscle mass [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Also, losing excess weight can increase the amount of muscles relative to fat (in % of total body weight).



Predisposed to typical muscle mass based on 132,810 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
STEAP1B	rs10242595	GG
IL1B	rs1143634	GG
FTO	rs9939609	AT
RPN1	rs111804884	TT
GJB2	rs73442383	TT
RASSF10	rs543716802	GG
AOAH	rs78185366	TT
LEO1	rs190878891	AA
USP34	rs183237934	TT
MARCHF1	rs150541056	TT
CCDC171	rs117635839	AA
ZMAT4	rs184622626	AA
FTO	rs9972653	TG
ZDHHC14	rs749547	AG
AQP6	rs706798	GA
PRUNE2	rs11145045	CT
MTCH2	rs4752856	GG
ZNF648	rs190210789	AA
PRELID2	rs574519712	CC
DOCK3	rs551736560	GG

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



Injuries

As anyone who has torn an ACL or sprained an ankle can tell you, injuries can be nasty. Although more common in athletes, they can affect anyone.

You may be surprised to hear that, besides a variety of external factors, **your genetics also influences your risk of injuries**. This section reveals your predisposition to different types of injuries. This knowledge will help you focus on prevention in certain areas and keep your bones, joints, and muscles healthy.



MORE LIKELY

Groin Hernia

More likely to get a groin hernia



MORE LIKELY

Low Back Injury

More likely to have a low back injury



TYPICAL LIKELIHOOD

Knee Injury

Typical likelihood of knee injuries



MORE LIKELY

Ankle Injury

More likely to have an ankle injury



MORE LIKELY

Rotator Cuff Injury

More likely to have a rotator cuff injury



TYPICAL LIKELIHOOD

ACL Injury

Typical likelihood of tearing an ACL



TYPICAL LIKELIHOOD

Achilles Tendon Injury

Typical likelihood of Achilles tendon injury



TYPICAL LIKELIHOOD

Tendon Injury

Typical likelihood of having tendinopathy

Groin Hernia

A hernia occurs when tissue from one body cavity bulges through an opening in your muscle wall into another. Groin (inguinal) hernia is the most common type of hernia.

Some groin hernias have no apparent cause. Others might occur as a result of [\[R\]](#):

- Increased pressure within the abdomen
- A preexisting weak spot in the abdominal wall
- Straining during bowel movements or urination
- Strenuous activity
- Pregnancy
- Chronic coughing or sneezing

Genetics can have an impact on your susceptibility to a groin hernia. Involved genes may affect collagen and elastin fibers, which can weaken the abdominal wall [\[R\]](#), [\[R\]](#).

Other risk factors for developing a groin hernia include [\[R\]](#):

- Male sex
- Older age
- Being white
- Premature birth and low birth weight
- Previous groin hernia or repair



MORE LIKELY

More likely to get a groin hernia based on 857,808 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ADAMTS6	rs370763	AA
EFEMP1	rs3791679	AG
EFEMP1	rs1346789	TC
ZC3H11B	rs2820443	CC
EFEMP1	rs10496052	TC
RBBP8	rs11659211	GG
RRP15	rs2799098	AA
EFEMP1	rs80172616	GA
TWIST2	rs80225179	CT
TGFB2	rs2820441	CA
CRISPLD2	rs4238714	CT
DLEU7	rs573666	CT
HMGA2	rs12810758	TC
HAND2	rs11722597	TC
LOX	rs10519694	CT
VGLL2	rs200889152	AC
PLCE1	rs3945750	CA
AGTR2	rs4969771	T
/	rs56976399	A
PATJ	rs2365498	GA

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

Low Back Injury

Key Takeaways:

- Up to **70%** of differences in people's chances of having a low back injury may be due to **genetics**.
- Other risk factors include occupations involving repetitive motions or heavy lifting, prolonged sitting/standing, over 40, obesity, smoking, lack of physical activity, previous injury, and certain health conditions.
- Lower back injuries are common among athletes, and account for **20%** of workplace injuries.
- If your genetic risk is high, you may lower overall risk by taking action on those factors that you can change.
- Click the **Recommendations** tab for potential dietary and lifestyle changes.

A low back injury refers to any type of damage or injury to the muscles, tendons, ligaments, or nerves in the low back. This can include **strains, sprains, herniated discs**, and more.

Up to **70%** of differences in people's chances of having a low back injury may be due to **genetics**. The research in this area is still young, but scientists have identified genes involved in **collagen production** [\[R\]](#)!

Other common risk factors for back injury include:

- Occupations involving repetitive motions, heavy lifting, or prolonged sitting or standing
- Age, particularly after 40
- Obesity
- Smoking
- Lack of physical activity
- Previous back injury
- Osteoporosis or other underlying conditions

It's important to note that back injuries are often caused by a combination of several of these factors, and not just one.



MORE LIKELY

More likely to have a low back injury based on 171,685 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GSDMC	rs6651255	CT
ITGA1	rs13174042	CT
DCC	rs4384683	GG
MYC	rs7833174	CT
DIS3L2	rs1453867	CT
/	rs543634974	CC
MME	rs540690425	CC
SOX5	rs12310519	CC
TEX35	rs180946349	AA
COG2	rs192174382	TT
CD1C	rs183230426	GG
FCRL5	rs72710051	GG
CD1A	rs186414191	AA
PGBD5	rs191270555	TT
PGBD5	rs187895488	GG
SFPQ	rs138217819	GG
FHAD1	rs115359709	GG
FOXD2	rs72690353	CC
CD1B	rs187608964	AA
SHCBP1L	rs191229707	CC

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

Knee Injury

The knee is a joint that connects the bones of the thigh and the lower leg. It allows the leg to bend and straighten, which is required to sit, squat, jump, and run. The knee is very complex and bears a great deal of stress from everyday activities. This makes it one of the most easily injured joints [R, R].

Some people may be more prone to knee injuries than others. Risk factors include [R]:

- Excess weight
- Lack of leg muscle flexibility or strength
- Practicing high-impact sports (running, basketball, soccer, hockey, skiing)
- Occupations involving frequent kneeling or squatting (construction, farming)
- Traumatic accidents (falls, motor vehicle crashes)
- **Genetics**

Depending on the type, up to 70% of differences in people’s chances of developing a knee injury may be due to genetics. Genes involved may influence [R, R, R]:

- Bone growth and development
- Ligament growth and repair
- Blood vessel development

Tips to help prevent a knee injury include [R]:

- Maintaining a healthy weight
- Stretching and strengthening your thigh muscles
- Avoiding high-impact activities, sudden movements, and overtraining
- Wearing proper sport shoes and protective equipment



TYPICAL LIKELIHOOD

Typical likelihood of knee injuries based on 299,714 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ZC3H11B	rs112081086	AA
PRRX1	rs151077542	GG
BRINP3	rs72727240	TT
XCL1	rs148262095	GG
SPAG17	rs139101248	GG
MAB21L3	rs79678808	AA
AURKAIP1	rs138046143	TT
CDC42BPA	rs56339347	AA
NEK7	rs138440178	CC
/	rs567271467	GG
/	rs567271467	GG
FCMR	rs1800895	CC
NR5A2	rs34004246	GG
SYT2	rs145533858	CC
/	rs192853607	GG
CDC42BPA	rs573881227	CC
USH2A	rs140693748	CC
LRIG2	rs140098571	CT
ZC3H11B	rs147060837	AA
/	rs146266096	CC

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

Ankle Injury

The ankle is a joint that connects the bones of the foot to the bones of the leg. It can bend sideways, upward, and downward. If a jump, fall, pivot, or step causes the ankle to bend in an odd way, the ligaments can stretch or tear. This is called a **sprained ankle** [R, R, R].

Some factors may increase the risk of ankle sprains. These include [R, R]:

- Taking part in sports that involve jumping or sudden changes in movement (e.g., basketball and soccer)
- Poor ankle strength, flexibility, or stability
- A previous ankle injury
- Wearing improper shoes
- Uneven surfaces
- Excess weight
- **Genetics**



MORE LIKELY

More likely to have an ankle injury based on 19,077 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
PRPSAP2	rs1634423	TT
DEPTOR	rs149163456	CT
HIVEP1	rs1569733	TC
CCSER1	rs62309831	AG
TENM3	rs35619804	GA
UGDH	rs56118664	CC
/	rs139095264	GG
PRR16	rs4340940	CC
CHD9	rs72797642	AA
GATA3	rs142347570	AA
NPY2R	rs115005126	TT
RALGPS2	rs187271145	GG
NFIB	rs13286037	TT
SGO1	rs12489876	GG
RABEPK	rs117724125	CC
ASB18	rs78681719	TT
C8ORF48	rs73210044	GG
GRIA1	rs140053818	GG
DLC1	rs73208003	GG
NTS	rs10506913	AA

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

Rotator Cuff Injury

The **rotator cuff** is a group of muscles and tendons that surround the shoulder joint. They keep the upper bone of the arm within the shoulder socket and help you lift and rotate your arms. When one or more of the rotator cuff tendons is torn, it becomes totally or partly detached from the bone of the arm. This usually occurs slowly over time, but can also be caused by traumatic injuries from falls or lifting heavy objects [\[R, R\]](#).

Some people may be more prone to rotator cuff injuries than others. Risk factors include [\[R, R, R\]](#):

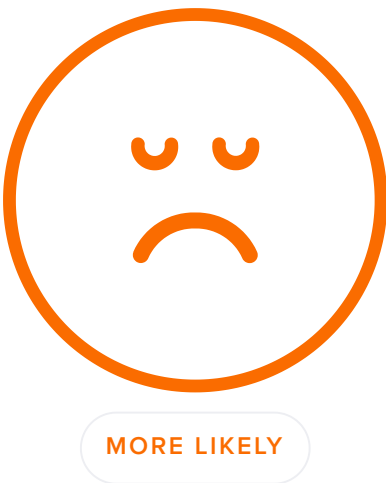
- Age (the risk tends to increase in people over 40 and tears are most common in those over 60)
- Taking part in sports that include repetitive arm lifting or overhead movements (e.g., tennis, baseball, weight-lifting, rowing)
- Occupations involving overhead work (e.g., carpentry, house painting, mechanics)
- Traumatic injuries and falls
- **Genetics**

In fact, up to 20% of differences in people’s chances of developing a rotator cuff injury may be due to genetics. Genes involved may influence [\[R, R, R\]](#):

- Tendon growth and repair
- Inflammation
- Blood vessel development

Tips to help prevent a rotator cuff injury include [\[R, R\]](#):

- Stretching and strengthening your shoulder muscles
- Limiting repetitive overhead arm movements
- Avoiding lying on your shoulder while sleeping
- Avoiding cigarette smoke



More likely to have a rotator cuff injury based on 734,008 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
/	rs140539211	CC
STK24	rs912336	CC
DLC1	rs34045652	CC
MGAT2	rs1010586	CC
CPE	rs138457734	CC
STOML3	rs147482720	TT
ANXA1	rs74821598	TT
RORB	rs72727137	GG
USP6NL	rs3847425	CC
CCDC110	rs11727025	GG
KBTBD3	rs505416	GG
AOAH	rs3807160	GG
TRIL	rs2237352	CT
PLCB1	rs6140637	AA
RBMS2	rs117991841	CC
LONRF1	rs17769850	TT
QKI	rs55958453	AG
SIPA1L2	rs789644	CA
S100A12	rs143640806	AA
ZNF519	rs117141423	GG

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

ACL Injury

The **anterior cruciate ligament (ACL)** is a strong band of tissue that connects the bone in your thigh to the bone in your shin. It helps stabilize the knee. Damage to the ACL may cause it to tear partially or completely. An ACL tear can occur if the knee moves suddenly or awkwardly. It can also occur if the side of your knee gets hit very hard [\[R, R, R\]](#).

An ACL injury is most likely to occur during exercise. For example, taking part in soccer, football, basketball, and skiing may increase the risk. Other risk factors include [\[R, R, R\]](#):

- Female sex
- Not warming up before exercising
- Using improper form during exercise
- Wearing improper sports equipment
- Exercising on artificial turf
- Working an intense job that requires you to jump, pivot, or climb
- **Genetics**

In fact, up to **70%** of differences in people’s likelihood of tearing an ACL may be due to genetics [\[R, R\]](#).

Treatment for a partial ACL tear includes the “RICE” method [\[R, R\]](#):

- **R**esting
- **I**cing the knee
- **C**ompressing the knee
- **E**levating the leg

Physical therapy and wearing a brace or using a crutch may also help. In more severe cases, surgery may be required [\[R\]](#).



Typical likelihood of tearing an ACL based on **71,152** genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MALRD1	rs118010763	TT
MGMT	rs112031232	AA
HSPG2	rs190446136	CC
MYOM3	rs140568949	AA
DOCK7	rs138219207	CC
AHCTF1	rs184856290	GG
PLXNA2	rs61813824	AA
SGMS1	rs151045759	CC
ARHGAP20	rs9704284	GG
PFKP	rs12413610	TT
NBPF3	rs7524699	CC
SHTN1	rs142967392	TC
DPP6	rs4067493	CC
SOAT1	rs113435565	AA
/	rs11960097	TT
ST6GALNAC3	rs289694	CC
IGSF21	rs9660827	CC
TCERG1L	rs2663012	CC
OR2T2	rs28693711	TT
UBE2J2	rs61766282	GG

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

Achilles Tendon Injury

The **Achilles tendon** is a cord made of strong tissue. It is found in the lower back leg and connects the calf muscles to the heel bone. The Achilles tendon helps you move around. Some common injuries to this tendon include **tendonitis** (inflammation of the tendon, usually due to overuse or damage) and **rupture** (partial or complete tear of the tendon) [R, R, R].

Some people may be more prone to Achilles tendon injuries than others. Risk factors include [R, R, R, R, R]:

- A “weekend warrior” exercise pattern (i.e. taking part in physical activity intermittently)
- Age (the risk tends to increase between age 30 and 40)
- Male sex
- Taking part in activities that include a lot of running, jumping, or sudden changes in movement (e.g., soccer, basketball, and tennis)
- Wearing improper shoes
- Lack of a warmup or cooldown
- Some medications
- Obesity
- **Genetics**

In fact, about 50% of differences in people’s chances of developing an Achilles tendon injury may be attributed to genetics [R].

Tips to help prevent an Achilles tendon injury include [R, R]:

- Stretching and strengthening your calf muscles
- Alternating high-impact sports with low-impact ones (e.g., alternating running with walking)
- Avoiding running on hard, uneven, or slippery surfaces
- Using proper equipment (e.g., well-fitting, cushioned running shoes)
- Slowly increasing the intensity of the activity



Typical likelihood of Achilles tendon injury based on 23 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
COL1A1	rs1800012	CC
MMP1	rs650108	GA
MMP1	rs591058	CC
VEGFA	rs699947	CA
CEP295NL	rs4789932	AG
COL5A1	rs12722	TT
CPNE1	rs143383	AG
FCN2	rs1134170	TT
MPP7	rs6481512	CT
SOX21	rs4454832	AG
MPP7	rs1249269	CT
MRPL43	rs4919510	GC
MICB	rs1800629	GG
TMEM158	rs183364169	CC
DPP6	rs4067493	CC
SOAT1	rs113435565	AA
/	rs11960097	TT
TRIML1	rs60713544	GG
ZNF648	rs57104447	TT
MPP7	rs1937810	TT

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

Tendon Injury

Key Takeaways:

- Up to **40%** of the differences in people's chances of developing tendinopathy may be due to genetics.
- Other risk factors include intense physical activity or certain sports, using improper training technique or equipment, doing repetitive tasks, age (over 40), being female, some chronic health conditions and medications.
- About 16 million tendon and ligament injuries occur in the U.S. each year.
- If you have a high genetic risk, you may lower your overall risk by taking action on those factors that you can change.

Tendons are cords made of strong tissue. They attach muscle to bone. There are many tendons throughout the body. Conditions in which tendons become inflamed and painful are called **tendinopathies** [\[R\]](#), [\[R\]](#).

Risk factors for tendinopathies include [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Taking part in intense physical activity or certain sports (e.g., baseball, golf)
- Using improper training technique or equipment
- Doing repetitive tasks (e.g., gardening, painting, typing)
- Age (over 40)
- Gender (women may be at a higher risk)
- Some chronic health conditions (e.g., obesity, diabetes)
- Some medications
- **Genetics**

Up to **40%** of the differences in people's chances of developing tendinopathy may be due to genetics. Involved genes may influence tendon function [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Interestingly, one study that examined the impact of genetics on tendon injuries was conducted on elite athletes from FC Barcelona [\[R\]](#).

Tips to help prevent a tendon injury include [\[R\]](#), [\[R\]](#):

- Stretching and strengthening your muscles
- Alternating high-impact sports with low-impact ones (e.g., alternating running with walking)
- Avoiding running on hard, uneven, or slippery surfaces
- Using proper equipment (e.g., protective gloves, well-fitting shoes)



TYPICAL LIKELIHOOD

Typical likelihood of having tendinopathy based on 6 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GJA1	rs11154027	TC
KLHL1	rs59988404	GG
TRIML1	rs60713544	GG
CERS5	rs57224706	AA
POLE2	rs3218791	GG
/	rs11232681	AA

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

- Slowly increasing the intensity of the activity

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.

- 1

Physical Therapy
- 2

Manual Therapy
- 3

Stretching
- 4

Stability Training
- 5

Core-Strengthening Exercises
- 6

Strength Training
- 7

Massage
- 8

Exercise Therapy
- 9

Acupuncture
- 10

Flexibility Training
- 11

Kinesio Taping
- 12

Low-Level Laser Therapy (LLLT)
- 13

Apply Heat
- 14

Collagen Peptides
- 15

Transcutaneous Electrical Nerve Stimulation (TENS)

1

Physical Therapy

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

How it helps

Ankle Injury



Serious ankle sprains may require immobilization and stabilization with braces, bandages, sports tapes, or even casts during the first days [\[R, R, R\]](#).

Once the pain and swelling are lessened enough, a healthcare professional may recommend exercise therapy to regain ankle strength, function, and stability. Exercise therapy may also reduce the risk of recurrent ankle sprains [\[R, R, R, R\]](#).

Jaw Disorders (TMJ)



As part of physical therapy, the following may help with TMJ disorders [\[R, R, R, R, R, R, R, R\]](#):

- Exercise therapy
- Massage and manual therapy
- Applying heat or cold
- Biofeedback
- Laser therapy
- Electrotherapy
- Ultrasound

If you think you might benefit from physical therapy for TMJ disorders, please consult a licensed therapist.

Knee Pain



If leg muscles and tendons are weak and out of shape, the risk of knee injury is high. Physical therapy includes different techniques and equipment that may [\[R, R\]](#):

- Strengthen the muscles and tendons
- Correct movement techniques
- Reduce pressure on the knees
- Protect and support the knee joint

Exercise therapy targeting the knees and hips may be the best choice for knee pain from different causes, including [\[R, R, R, R, R, R\]](#):

- Overuse
- Injuries
- Arthritis

Taping may be added to exercise therapy to help reduce pain in the short term (up to 4 weeks) [\[R, R, R\]](#).

Massage therapy and **laser therapy** (LLLT and HILT) may relieve pain from knee osteoarthritis, but they may not help with knee pain from other causes. Experts recommend **against laser therapy** for knee pain [\[R, R, R, R, R, R, R, R, R, R\]](#).

Experts recommend **against dry needling** for knee pain [\[R\]](#).

Low Back Injury



Physical therapy may help improve back pain and physical function in people with low back injuries. However, it may take some time to experience benefits [\[R, R, R, R\]](#).

Specific physical therapy techniques that may help include:

- Massage [\[R, R\]](#)
- Kinesio Taping [\[R\]](#)

Physical therapy may help with low back injuries by [\[R\]](#):

- Helping the spine move more smoothly
- Restoring normal muscle movement

Rotator Cuff Injury



Experts recommend physical therapy to improve pain, physical function, and quality of life in people with rotator cuff injury. Physical therapy may also help recover from rotator cuff surgery [\[R, R\]](#).

Beneficial physical therapy techniques include:

- Manual therapy [\[R, R\]](#)
- Exercise therapy [\[R, R, R\]](#)
- Kinesio taping [\[R\]](#)

However, the quality of the evidence is generally low.

Achilles Tendon Injury



Experts recommend stretching and strengthening exercises for Achilles tendon injuries. Particularly, eccentric weight bearing exercises (slowly letting down of a weight after raising it) may help reduce pain and recover function [\[R, R, R\]](#).

Physical therapists may also prescribe orthotic devices. These are shoe inserts or wedges that slightly elevate the heel to relieve strain and amount of force on the Achilles tendon. However, the evidence about their effectiveness is mixed and experts don’t recommend their use [\[R, R\]](#).

In people recovering from Achilles tendon surgery, early weight bearing is more effective and satisfactory to patients than ankle immobilization [\[R, R\]](#).

ACL Injury



Experts recommend physical therapy instead of surgery in less severe cases and for people whose physical activity level doesn’t put much stress on the knees [\[R\]](#).

Supervised exercises prescribed by a physical therapist may help reduce pain and swelling, restore knee function, and strengthen the muscles. The use of braces to stabilize the knee may increase the odds of recovery [\[R, R\]](#).

People recovering from ACL reconstruction surgery may be prescribed exercise therapy to increase muscle strength and knee function [\[R\]](#).

Conversely, bracing may not improve knee function after ACL reconstruction surgery [\[R\]](#).

 Back Pain

IMPACT



EVIDENCE



Physical therapy may help improve back pain and physical function. However, it may take some time to experience benefits [\[R, R, R, R, R, R\]](#).

As a part of physical therapy, **massage** may also help with back pain. However, the effects may only be short-term [\[R, R, R, R\]](#).

Kinesio Taping is a technique that uses special tapes to help support muscles and tendons. It may improve back pain and mobility. However, not all studies found these benefits [\[R, R, R, R, R\]](#).

The following types of **guided exercise** may help improve physical function and reduce pain:

- The McKenzie method (exercises designed to improve spinal mobility and posture) [\[R, R, R\]](#)
- Movement control exercises [\[R, R, R\]](#)
- Stabilization exercises [\[R, R, R, R, R\]](#)

Physical therapy may help with back pain by [\[R, R, R\]](#):

- Helping the spine move more smoothly
- Restoring normal muscle movement
- Increasing pain-relieving chemicals in the brain

 Carpal Tunnel Syndrome

IMPACT



EVIDENCE



In people with carpal tunnel syndrome, physical therapy may help improve symptoms and mobility. Helpful techniques include [\[R, R, R, R, R, R, R, R, R\]](#):

- Massage therapy
- Ultrasound
- Exercise-based therapies

 Hip Pain

IMPACT



EVIDENCE



According to experts and scientific research, physical therapy may help improve some cases of hip pain due to arthritis and injuries [\[R, R, R, R\]](#).

Potentially helpful types of physical therapy include:

- Exercise therapy [\[R, R, R, R, R, R, R\]](#)
- Manual therapy [\[R, R, R, R, R\]](#)
- Hydrotherapy [\[R\]](#)
- Dynamic tape [\[R\]](#)

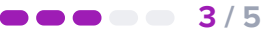
Please note: *Talk to your doctor or physiotherapist before trying out new exercises. People with certain types of pain should be careful not to over-exercise, as this may worsen pain.*

 Joint Pain

IMPACT



EVIDENCE



A study found that physical therapy, including exercise and manual therapy, significantly improved pain and function in patients with knee and hip osteoarthritis. This included improvements in walking speed, muscle strength, and daily activities such as climbing stairs and getting up from a chair [\[R\]](#).

Another study evaluated the effectiveness of manual physical therapy and exercise in osteoarthritis of the knee. It concluded that these treatments were effective for improving function, decreasing pain and stiffness, and increasing the distance walking in 6 minutes [\[R\]](#).

Research also supports that at least 12 supervised sessions of physical therapy are required initially to obtain sufficient clinical benefit for patients with knee and hip osteoarthritis. Supervised, active treatment helps maintain these effects over the long term [\[R\]](#).

 Knee Injury

IMPACT



EVIDENCE



Supervised exercises prescribed by a physical therapist may help reduce pain and swelling, restore knee function, and strengthen the muscles in people with knee injuries such as ACL and meniscal tears. The use of braces to stabilize the knee may increase the odds of recovery from ACL injuries [\[R, R, R\]](#).

In the case of ACL injury, physical therapy may replace surgery in less severe cases and for people whose physical activity level doesn’t put much stress on the knees [\[R\]](#).

People recovering from knee surgery may be prescribed exercise therapy to increase muscle strength and knee function. Bracing may not improve knee function after ACL reconstruction surgery [\[R, R, R\]](#).

 Shoulder & Neck Pain

IMPACT



EVIDENCE



Experts agree that exercise therapy may help with neck pain [\[R, R, R, R, R, R, R, R\]](#).

It may also help with pain from neck injuries like whiplash [\[R, R\]](#).

Exercise therapy may help with pain from shoulder injury, but the evidence is mixed [\[R, R, R, R, R, R, R\]](#).

Exercise therapy may help by [\[R, R, R\]](#):

- Improving posture
- Restoring normal muscle movement
- Boosting opioids and other pain-relieving compounds

Please note: *Talk to your doctor or physiotherapist before trying out new exercises. People with certain types of pain should be careful not to over-exercise, as this may worsen pain.*

 Tendon Injury

IMPACT



EVIDENCE



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries. Exercise therapy may help with injuries in the [\[R, R, R, R\]](#):

- Achilles tendon [\[R, R, R\]](#)
- Rotator cuff [\[R, R, R\]](#)
- Lateral elbow tendons [\[R, R\]](#)
- Kneecap [\[R, R, R, R, R\]](#)
- Glutes [\[R\]](#)

The following physical therapy techniques may also help with rotator cuff tendon injuries:

- Manual therapy [\[R, R\]](#)
- Kinesio taping [\[R, R\]](#)

2



Manual Therapy

How to implement

Schedule a session with a certified manual therapist, such as a physical therapist or chiropractor, once a week for at least 3 to 6 weeks. During these sessions, allow the therapist to apply hands-on techniques to manipulate muscles and joints aiming to improve mobility and reduce pain.

How it helps

 Ankle Injury



Manually manipulating the tissues can increase range of motion and decrease pain.

 Jaw Disorders (TMJ)



Manual therapy for TMJ involves targeted movements and massages in the jaw region by a trained professional. It can reduce jaw pain, improve mobility and correct jaw misalignment, easing various symptoms associated with TMJ disorder.

 Knee Pain



Manual therapy for knee pain involves hands-on techniques that move your joints and soft tissue to relieve pain and restore function. This can improve your movements, reduce knee stiffness, and lessen pain, making daily activities more comfortable.

 Low Back Injury



Manual therapy includes hands-on techniques that can mobilize the spine and soft tissues, aiding in recovery.

 Rotator Cuff Injury



Manual therapy, when integrated into a comprehensive physiotherapy program, has shown improvements in pain reduction and increased range of motion in people with chronic rotator cuff injuries [\[R\]](#).

A study compared manual therapy combined with a home exercise program to placebo treatment in people with chronic rotator cuff disease. While immediate additional benefits over placebo were not evident, the manual therapy group showed greater improvements in shoulder function and strength at a 22-week follow-up, suggesting the benefits of manual therapy may take time to manifest [\[R\]](#).

A case series demonstrated that a combined approach involving manual therapy, exercises, and patient education tailored to individual impairments may improve symptoms and function in people with subacromial impingement syndrome, a common issue associated with rotator cuff injuries [\[R\]](#).

 ACL Injury



Manual therapy techniques such as massage and joint mobilization can improve knee joint function and alleviate pain.

 Back Pain

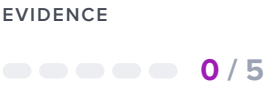


A study demonstrated that manual therapy improved pain intensity, functional disability, general health, and return to work for people with chronic low back pain compared to exercise therapy. The manual therapy group showed larger improvements in all outcome measures during the entire experimental period, including a follow-up at one year [\[R\]](#).

Another study found that manual therapy was more effective than exercise in reducing pain and improving functional status in people with chronic low back pain [\[R\]](#).

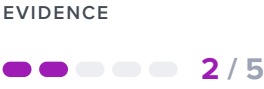
A comprehensive review and meta-analysis of manual therapy for low back pain revealed that manual therapy, especially spinal manipulation, is effective in treating low back pain [R].

 Hip Pain



Manual therapy for hip pain involves hands-on techniques to improve joint mobility and alleviate pain. Regular therapy may increase flexibility, enhance circulation, and reduce further wear-and-tear, thus preventing future pain.

 Tendon Injury



Manual therapy involves manipulating the tissues and joints to relieve pain and improve mobility. In the case of a tendon injury, it aids in reducing inflammation, improving blood circulation and accelerating the healing process of the damaged tissues.

According to research, manual therapy may help with rotator cuff tendon injuries [R, R].

3

Stretching

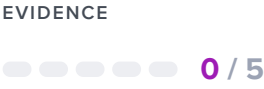
How to implement

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

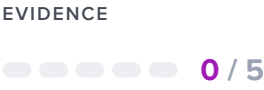
How it helps

 Ankle Injury



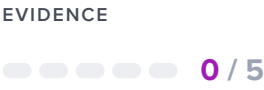
Regular stretching can help maintain flexibility and range of motion in the healing ankle.

 Knee Pain



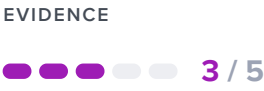
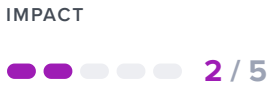
Stretching the muscles in the legs can help relieve tightness and pressure on the knee joint, easing pain.

 Low Back Injury



Regular stretching can improve flexibility in the spine and surrounding muscles, reducing tension and pain.

 Power



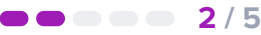
Static stretching may have small beneficial effects on power, especially in older adults [R].

Rotator Cuff Injury

IMPACT



EVIDENCE

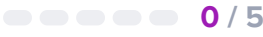


Stretching may improve shoulder flexibility without adversely affecting the strength of the shoulder's internal and external rotators. This suggests that stretching may not be detrimental before activities like throwing, which are relevant for people with rotator cuff issues [\[R\]](#).

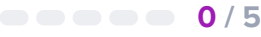
Proprioceptive exercises, which often include stretching components, may help manage shoulder pain and improve the quality of life for nursing professionals with rotator cuff disorders. This points to the broader applicability of stretching in managing rotator cuff conditions [\[R\]](#).

ACL Injury

IMPACT



EVIDENCE



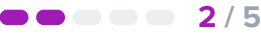
Stretching the muscles surrounding the knee joint can increase flexibility and aid in recovery.

Back Pain

IMPACT



EVIDENCE



A randomized controlled trial compared segmental stabilization exercises and muscular stretching for people with chronic low back pain. Both methods were effective in relieving pain and improving functional disability. However, segmental stabilization showed slightly superior results in terms of transversus abdominis muscle activation, which is important for back support [\[R\]](#).

Another study assessed the 'One Stretch' exercise among nurses with low back pain and found improvements in pain reduction and exercise habits [\[R\]](#).

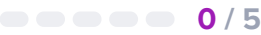
A clinical trial investigated the effects of stretching the hamstring, gastrocnemius, iliopsoas, and back muscles in chronic low back pain people. The results showed that adding gastrocnemius stretching to standard back and leg stretches could further reduce pain and improve functional activities [\[R\]](#).

Carpal Tunnel Syndrome

IMPACT



EVIDENCE



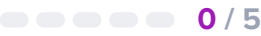
Regularly stretching the hands and wrists can prevent stiffness and improve flexibility, potentially reducing the symptoms associated with carpal tunnel syndrome.

Hip Pain

IMPACT



EVIDENCE



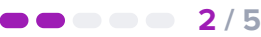
Regular stretching can ease tension in the hip muscles and increase flexibility, helping to reduce discomfort.

Joint Pain

IMPACT



EVIDENCE



Stretching, particularly techniques like static stretching and proprioceptive neuromuscular facilitation (PNF), improves pain, range of motion, and functional outcomes when combined with isokinetic exercises in people with knee osteoarthritis. PNF stretching was noted to be particularly effective for increasing muscle strength and range of motion at higher angular velocities [\[R\]](#).

A study found that rectus femoris stretching (for 4 weeks) enhanced pain relief, flexion range of motion, and spatiotemporal gait parameters such as step length and speed in patients with knee osteoarthritis [\[R\]](#).

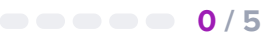
Passive muscle stretching was shown to improve hip abduction and muscle fiber size in people with osteoarthritis of the hip, indicating potential structural and functional benefits from regular stretching routines [\[R\]](#).

Knee Injury

IMPACT



EVIDENCE



Regular stretching improves flexibility and can alleviate tension around the knee, which might contribute to pain and restrict mobility.

Shoulder & Neck Pain



Experts recommend stretching the neck and shoulder after traveling long distances or working long hours [\[R\]](#).

Regular neck and shoulder stretching exercises (1-2x/day for 5 days/week for 4 weeks) may decrease pain and improve neck function among office workers suffering from chronic neck pain [\[R\]](#), [\[R\]](#), [\[R\]](#).

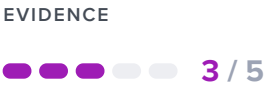
Strength



Chronic muscle stretching exercises may have small positive effects on muscle strength that increase with the number of repetitions. Sedentary people, women, and older people may benefit the most from stretching [\[R\]](#).

However, some studies suggest that stretching (about 4 sets of stretching of approximately 1-minute duration, 3-4 days/week for 4-24 weeks) may have detrimental effects on muscle strength in the short term. Stretching sessions far from strength training sessions may provide a strategy to minimize this risk [\[R\]](#).

Tendon Injury



Regular stretching can improve flexibility and reduce the risk of stiffness, aiding the healing process of injured tendons.

Research suggests that stretching and flexibility training can reduce muscle damage, increase tendon stiffness, decrease passive muscle stiffness, and improve range of motion, which may contribute to lower injury rates such as hamstring strains.

Below are some of the key findings:

- Flexibility training led to a significant increase in tendon stiffness (31.2%) and a decrease in passive muscle stiffness (-14.6%) [\[R\]](#).
- Using standard stretching protocol (SSP) is significantly related to lower hamstring strain rates in professional football clubs [\[R\]](#).
- Intensive stretching programs lead to shorter times of regaining normal range of motion and rehabilitation periods for hamstring injuries [\[R\]](#).
- Modified eccentric heel-drop program reported high patient satisfaction, reduced pain, and successful return to pre-morbid activity levels. This indicates that eccentric stretching exercises can be particularly beneficial for mid-substance rather than insertional tendinopathies [\[R\]](#).
- Combining eccentric training with static stretching exercises was superior in reducing pain and improving function compared to eccentric training alone [\[R\]](#).

4



Stability Training

How to implement

Integrate stability exercises into your workout routine 2-3 times per week. These exercises include activities such as using a stability ball, performing balance exercises on a balance board, or doing body-weight exercises that focus on balance and core strength, such as planks and single-leg stands. Spend approximately 20-30 minutes per session focusing on these exercises.

TYPICAL STARTING DOSE

30 minutes

How it helps

Ankle Injury



A meta-analysis of 12 trials found balance training effective in improving the dynamic posture stability of chronic ankle instability patients [\[R\]](#).

Injury prevention programs with balance training reduced ankle injuries by 36% in a study of 4,959 soccer players. FIFA programs reduced injuries by 37%, while balance exercises alone reduced them by 42% [\[R\]](#).

A meta-analysis of 15 trials and 457 volunteers found balance training more effective than regular exercise in improving functionality, ankle instability, and dynamic balance. Compared to strength training, balance training was only more effective for functionality improvement [\[R\]](#).

Stability training enhances ankle strength and flexibility, which can accelerate healing and reduce the risk of future injuries.

 Knee Pain

IMPACT

2 / 5

EVIDENCE

2 / 5

A study of 42 volunteers with patellofemoral pain syndrome found that adding postural stabilization exercises to therapeutic knee exercises further improved pain, flexibility, function, strength, endurance, and postural control [\[R\]](#).

In an 8-week trial of 31 women, hip muscle strengthening and movement control exercises improved pain, function, kinematics, and muscle strength better than quadriceps-strengthening exercises alone [\[R\]](#).

In a study of 31 female athletes with patellofemoral pain, a functional stabilization training program improved lower limb and trunk kinematics [\[R\]](#).

Stability training may help by improving joint support and mobility.

 Low Back Injury

IMPACT

1 / 5

EVIDENCE

1 / 5

A study aimed to compare the short-term effects of core stabilization exercise programs and traditional exercise programs on musculoskeletal injuries in soldiers. Those in the traditional exercise group with low back injuries had longer work restrictions (8.3 days) compared to the core stabilization group (4.2 days) [\[R\]](#).

In a study of 36 university football players with chronic low back pain, virtual reality balance training showed positive effects on radiological and biochemical aspects compared to combined physical rehabilitation and conventional exercises [\[R\]](#).

Stability training strengthens the core and lower back muscles, enhancing support to the spine and improving posture.

 Power

IMPACT

2 / 5

EVIDENCE

2 / 5

A meta-analysis of 20 trials concluded that balance training may improve postural sway and functional balance, with greater effects observed in longer programs. Mixed findings existed for jumping, agility, and neuromuscular control. Balance training outperformed plyometric/strength training in some areas but not in strength or sprint performance [\[R\]](#).

Another study found both plyometrics and dynamic stabilization/balance training similarly effective at improving hamstring strength and vertical jump in female athletes [\[R\]](#).

A study of soccer players found that core stability exercises improved lower limb strength balance. The second study on collegiate athletes showed significant improvements in balance and throwing performance after a five-week core stabilization program. In another study, trunk stability training was as effective as leg strength training in enhancing vertical takeoff velocity. Lastly, a study on female handball players found that a sling exercise-based core stability program led to a 4.9% increase in maximal throwing velocity [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

 ACL Injury

IMPACT

1 / 5

EVIDENCE

1 / 5

In a study of 26 male athletes post-ACL surgery, those who did eight weeks of core stability exercises before team training had improved core endurance, hip strength, knee angle, and reduced knee valgus angle during single-leg landing compared to controls [\[R\]](#).

Stability training strengthens the muscles around the knee, which can help maintain knee stability and prevent further injury to the ACL.

Back Pain

IMPACT

1 / 5

EVIDENCE

1 / 5

A study aimed to compare the short-term effects of core stabilization exercise programs and traditional exercise programs on musculoskeletal injuries in soldiers. Those in the traditional exercise group with low back injuries had longer work restrictions (8.3 days) compared to the core stabilization group (4.2 days) [\[R\]](#).

In a study of 36 university football players with chronic low back pain, virtual reality stability training showed positive effects on radiological and biochemical aspects compared to combined physical rehabilitation and conventional exercises [\[R\]](#).

Stability training strengthens the muscles that support the spine, improving posture and preventing injuries. This can alleviate back pain by reducing back strain.

Endurance

IMPACT

1 / 5

EVIDENCE

1 / 5

A six-week CST intervention effectively increased the isometric strength and endurance of selected core muscles but did not significantly enhance throwing velocity compared to standard training [\[R\]](#).

Another 6-week core stabilization training program improved balance and endurance in 13 healthy high school track and field athletes, supporting its use for similar athletes [\[R\]](#).

Stability training may help by strengthening the core muscles, which helps optimize body balance and stability.

Hip Pain

IMPACT

1 / 5

EVIDENCE

1 / 5

A of with 20 female patients with femoroacetabular impingement showed that adding trunk stabilization exercises to hip rehabilitation improved short-term clinical outcomes [\[R\]](#).

Stability training may help by strengthening the muscles around the hip joint. It also improves balance and alignment, which prevents uneven wear and tear of the joints.

Shoulder & Neck Pain

IMPACT

1 / 5

EVIDENCE

2 / 5

A meta-analysis of 6 studies found that stabilization reduced pain scores at 4-6 weeks, neck disability at 10-12 weeks, and reduced depression at 4-6 weeks. However, it had no impact on pain scores at 10-12 weeks or 6 months. Two other studies found no effect on shoulder pain [\[R\]](#), [\[R\]](#), [\[R\]](#).

Stability training strengthens muscles around the neck and shoulder, improving the support and alignment of these areas. This form of exercise can also increase flexibility and promote proper posture, which further helps in alleviating the pain.

Strength

IMPACT

2 / 5

EVIDENCE

2 / 5

A meta-analysis of 20 trials concluded that balance training may improve postural sway and functional balance, with greater effects observed in longer programs. Mixed findings existed for jumping, agility, and neuromuscular control. Balance training outperformed plyometric/strength training in some areas but not in strength or sprint performance [\[R\]](#).

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5

Core-Strengthening Exercises

How to implement

Incorporate exercises like planks, bridges, abdominal crunches, and leg lifts into your daily routine. Aim to do these exercises for 20-30 minutes, 3 times a week. Each exercise should be performed in sets of 10-15 repetitions.

TYPICAL STARTING DOSE

20 minutes

How it helps



Ankle Injury

IMPACT

0 / 5

EVIDENCE

0 / 5

Strengthening the core can improve overall stability and reduce the stress on the injured ankle.



Knee Pain

IMPACT

2 / 5

EVIDENCE

2 / 5

In 3 non-placebo-controlled trials of 959 patients with patellofemoral pain, practicing core strengthening exercises, both alone and as an add-on to physiotherapy, for 4-6 weeks improved pain, function, and strength. Patients with more pain, better function, greater lateral core endurance, and less anterior core endurance were more likely to obtain benefits. The combination of these exercises with whole-body vibration further improved pain and lower limb functionality in a non-placebo-controlled trial of 50 subjects with this condition. In a non-placebo-controlled trial of 113 patients with osteoarthritis of the knee, practicing core strengthening exercises 3x/week for 12 weeks as an add-on to conventional exercises further reduced pain in the short term [\[R, R, R, R, R\]](#).

Core-strengthening exercises may help by enhancing your body's overall stability and reducing the pressure on your knees.



Low Back Injury

IMPACT

3 / 5

EVIDENCE

3 / 5

Regular, gentle exercise may reduce the risk of painful conditions of the back, including low back injuries [\[R\]](#).

Training programs aimed at strengthening the core may reduce low back injury incidence and work restriction. Types of training that may work include [\[R, R, R\]](#):

- **Isometric training:** loading the spine while the trunk muscles contract to maintain the spine in a neutral position.
- **Isotonic training:** moving the lumbar spine through a range of motion while under load.
- **Motor control training:** isolated activation of the deep trunk musculature.

Physical readiness programs aimed at improving reaction to expected and unexpected sudden trunk loading may help people at high occupational risk of low back injuries, such as nurses [\[R, R\]](#).

Core-strengthening exercises may reduce the risk of low back injuries by strengthening the muscles that protect the back [\[R, R\]](#).

Please note: *Intense exercise may increase the risk of lower back injuries. Be careful to avoid exercises that involve heavy weight lifting, pulling, pushing, and bending sideways* [\[R, R\]](#).



Power

IMPACT

3 / 5

EVIDENCE

2 / 5

Non-placebo-controlled trials demonstrated the benefits of core strengthening exercises in various athletic groups. Cricket players who followed a 6-week core strengthening program experienced increased throwing velocity and core endurance. Soccer players saw improvements in sprinting ability and kicking performance after a 9-week core strength-training program. Female soccer players who engaged in pelvic and core strength training for 8 weeks showed enhanced vertical drop jump performance [\[R, R, R\]](#).

Core-strengthening exercises may help by providing a stronger base for your limbs to generate momentum.

 **ACL Injury**

IMPACT

1 / 5

EVIDENCE

1 / 5

In a non-placebo-controlled trial of 29 female soccer players, practicing pelvic and core strength training for 8 weeks improved ACL injury risk factors and vertical drop jump performance [\[R\]](#).

Core-strengthening exercises enhance stability in your knee joint, which is pivotal for ACL injury recovery. Furthermore, they fortify muscles around the knee, reducing strain on the ACL and preventing further injury.

 **Back Pain**

IMPACT

2 / 5

EVIDENCE

2 / 5

Core muscle strengthening exercises have been shown to improve both pain and functional outcomes in chronic lower back pain people. These exercises contribute to better spine stability, which is essential for alleviating pain and enhancing mobility [\[R\]](#).

Core strengthening integrated with other therapies like back school programs has also been found effective in reducing back-specific disability and improving pain-coping strategies in people with chronic low back pain. This integrated approach helps in developing long-term wellness-focused behaviors [\[R\]](#).

Core strengthening exercises are also effective in various settings, including recreational weightlifters with low back pain, demonstrating improvements in pain and disability [\[R\]](#).

 **Endurance**

IMPACT

2 / 5

EVIDENCE

2 / 5

Non-placebo-controlled trials demonstrated the benefits of core strengthening programs on endurance performance. Cross-country runners who engaged in a 6-week pelvic and core strengthening program experienced reduced race times. Untrained students benefited from 6 weeks of core strengthening exercises in terms of improved trunk endurance. A 12-week core stabilization exercise program reduced total trunk endurance time in healthy volunteers. Cricket players also saw improvements in core endurance after 6 weeks of core strengthening exercises. Additionally, both core strengthening and endurance training had similar effects on trunk flexor and extensor endurance in untrained students [\[R, R, R, R, R\]](#).

Core-strengthening exercises may help by enhancing your body's ability to sustain lengthy physical efforts.

 **Hip Pain**

IMPACT

2 / 5

EVIDENCE

2 / 5

A meta-analysis of 5 trials and 124 patients with femoroacetabular impingement concluded that supervised physiotherapy programs focused on core strengthening exercises are more effective than unsupervised, passive, and non-core-focused programs at improving functional outcomes [\[R\]](#).

Core-strengthening exercises improve stability and balance, reducing strain and pressure off your hips.

 **Joint Pain**

IMPACT

2 / 5

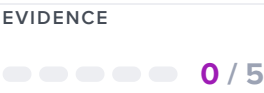
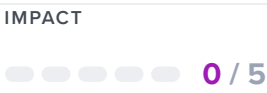
EVIDENCE

2 / 5

In 3 non-placebo-controlled trials of 959 patients with patellofemoral pain, practicing core strengthening exercises, both alone and as an add-on to physiotherapy, for 4-6 weeks improved pain, function, and strength. Patients with more pain, better function, greater lateral core endurance, and less anterior core endurance were more likely to obtain benefits. The combination of these exercises with whole-body vibration further improved pain and lower limb functionality in a non-placebo-controlled trial of 50 subjects with this condition. In a non-placebo-controlled trial of 113 patients with osteoarthritis of the knee, practicing core strengthening exercises 3x/week for 12 weeks as an add-on to conventional exercises further reduced pain in the short term [\[R, R, R, R, R\]](#).

Core-strengthening exercises enhance stability in the body, reducing unnecessary pressure and strain on the joints to alleviate joint pain. They also help improve posture and balance, which results in better joint alignment and less discomfort.

 Knee Injury



Core strengthening supports the lower back and hips, providing a stable base that can alleviate undue stress on the knee.

 Strength



Various non-placebo-controlled trials showed that core-specific training programs can lead to improved strength in different groups, such as Greco-Roman wrestlers and soccer players. These programs enhanced strength, sprinting abilities, and kicking performance. Additionally, core strengthening exercises showed benefits in improving trunk muscle endurance and strength in untrained individuals [\[R, R, R, R\]](#).

Core-strengthening exercises focus on training the muscles in your stomach, lower back, hips, and pelvis, which all contribute to your overall body strength.

6



Strength Training

How to implement

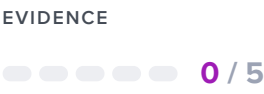
Engage in strength training exercises, such as weight lifting or bodyweight exercises, for 60 minutes per session, 2 to 3 times per week. Ensure you work all major muscle groups and rest each muscle group for at least 48 hours before exercising it again.

TYPICAL STARTING DOSE

1 hour

How it helps

 Ankle Injury



Strengthening the muscles around the ankle can provide better support and prevent future injuries.

 Low Back Injury



Strength training for the core and back muscles can provide better support for the spine and reduce injury recurrence.

 Power



Strength training may improve power across various populations, including athletes, middle-aged, older adults, and even people with spinal cord injuries [\[R, R, R, R, R, R, R, R, R\]](#).

Studied strength training techniques include [\[R, R, R, R\]](#):

- Traditional strength training
- High-velocity training
- Acute variable strength training
- Strength training combined with endurance training

Supervised training may be more beneficial, especially for older people. Moreover, the combination of strength training and vitamin D supplementation may improve power performance better than strength training alone in elderly people [\[R, R\]](#).

Despite the benefits of strength training in muscle strength and physical function, it may not help with power in overweight and obese people. Additionally, power may decline when strength training is ceased, especially in older and inactive people [R, R].

 Rotator Cuff Injury



Strength training (4x/week for 5 weeks), especially focused on eccentric external rotator muscle strength, increases the total exercise capacity of these muscles, potentially reducing shoulder rotator muscle imbalances and the risk of shoulder injuries in athletes engaged in overhead activities [R].

Resistance training has shown that gains in mean and peak torque for rotator cuff muscles may be maintained with reduced training frequencies, which is relevant for both rehabilitation and off-season training strategies [R].

Studies comparing different types of strength training (isokinetic vs isotonic) for the rotator cuff have found varied impacts on strength, power, and muscular balance, emphasizing the need for specific training protocols tailored to the needs of the rotator cuff for rehabilitation and performance enhancement [R].

 Achilles Tendon Injury



Strength training and gait retraining may reduce Achilles tendon injury risk [R].

Strength training, particularly heavy-load eccentric calf muscle training (for 12 weeks), may help with Achilles tendon injury by [R, R]:

- Improving strength
- Reducing pain
- Reducing injury risk

 ACL Injury



Strengthening the muscles around the knee helps support the joint, reducing the load on the ACL and facilitating recovery.

 Back Pain



A systematic review compared core strength training strategies for people with chronic low back pain and found core strength training to offer greater benefits than typical resistance training for alleviating chronic low back pain. The study emphasizes focusing on training the deep trunk muscles to alleviate chronic low back pain [R].

Another study evaluated the long-term effects of strength training on low back pain in primary care. It found that a group-based progressive strength training program reduced the recurrence of low back pain worsening and improved function [R].

 Endurance



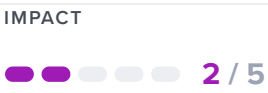
Strength training may improve local muscular endurance, walking endurance, middle- and long-distance performance, running economy, time-trial performance, and time to exhaustion in older and middle-aged participants and endurance athletes. However, high-repetition strength training may not improve endurance in competitive athletes [R, R, R, R, R, R].

Power (explosive) and strength (heavy-weight) training (for at least 4 weeks) may offer similar benefits [R].

In people with spinal cord injury, strength training improves local muscular endurance and other fitness components [R].

The combination of cardio and strength training (60-90 min) may improve cardiorespiratory endurance [R].

 Joint Pain



Strength training helps joint pain by strengthening the muscles surrounding your joints, thus providing more support and reducing the strain on them. Also, it improves flexibility and mobility, alleviating pain and preventing further joint damage.

According to health experts, gentle [exercise](#) is one of the best things you can do to manage joint pain [\[R, R, R, R, R\]](#).

Three studies with 189 participants over 50 years old with hip osteoarthritis found supervised progressive resistance exercises significantly improved function, reduced hip pain, and enhanced quality of life, but the evidence quality was low due to lack of blinding and imprecision [\[R\]](#).

 Knee Injury



Strength training helps a knee injury by strengthening the muscles surrounding your knee, which can provide added support and lessen strain on the knee joint. It also improves flexibility and balance, which can reduce the risk of future injuries.

 Muscle Mass



Strength training increases muscle mass while burning fat [\[R, R, R, R, R, R\]](#).

Here are some facts to consider [\[R, R, R, R, R, R, R, R\]](#):

- Higher weight loads aren’t necessarily more effective for building muscles.
- Increasing the number of sets may boost muscle gains, but doing too many sets can be counterproductive.
- Time of the day when exercise is performed doesn’t affect muscle gains.
- Machine and free weight exercises seem to be equally effective.
- Training to failure or training in hypoxia may not provide additional benefits.
- Eccentric training may be more effective than concentric training.

Besides athletes, strength training may also boost muscle mass in the following groups at risk of muscle loss [\[R, R, R, R, R, R, R, R, R\]](#):

- Older people, including postmenopausal women
- Obese people on weight loss diets
- People with chronic health conditions (cancer, HIV, joint pain, etc.)



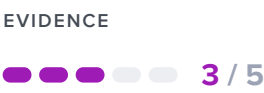
PERSONALIZED TO YOUR GENES

Strength training may increase muscle mass more in people with your [GLI3](#) gene variant [\[R\]](#).
Strength training may increase muscle mass more in people with your [LEPR](#) gene variant [\[R\]](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
GLI3	rs10263647	CC	
LEPR	rs1137101	GG	

 Shoulder & Neck Pain



Strength training may have moderate beneficial effects on pain, muscle strength, disability, and quality of life in people with chronic neck pain. Combining strength training with aerobic and stretching exercises may offer greater benefits [\[R, R, R, R\]](#).

 Strength



Strength training builds and maintains your muscles, which not only enhances your body's structural strength but also reduces the risk of injury. It boosts your metabolism which helps in better energy utilization, thereby preventing conditions related to low energy and strength.

 PERSONALIZED TO YOUR GENES

Strength training may improve muscle strength more in people with your [ACTN3](#) gene variant [R].

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
ACTN3	rs1815739	TT	

 Tendon Injury



Strength training, when done correctly, can help rebuild muscle and tendon strength around the injury.

Studies suggest that resistance training generally increases tendon stiffness and may improve tendon properties, which could be beneficial for tendon health, although some forms of resistance training may not alter certain tendon characteristics immediately or in all populations.

Below are some of the key findings:

- Both eccentric and heavy slow resistance training yield positive, equally good, lasting clinical results in patients with Achilles tendinopathy [R].
- Resistance training can impact opposite ends of the patella tendon force-elongation relationship in each sex, potentially minimizing tendon injuries [R].
- Resistance training improved muscle strength and cross-sectional area equally in old and very old subjects but **did not** affect tendon mechanical properties or dimension [R].
- Resistance training leads to increased muscle force and a 7% increase in tendon cross-sectional area [R].

7

 Massage

How to implement

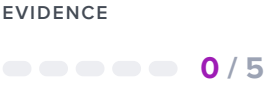
Schedule a massage session, ideally with a licensed therapist, for 30-60 minutes, once a week. Choose a type of massage that suits your specific needs, such as Swedish for relaxation or deep tissue for muscle tension.

TYPICAL STARTING DOSE

30 minutes

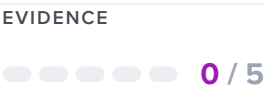
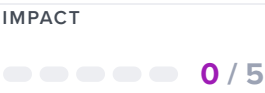
How it helps

 Ankle Injury



Massage can promote relaxation, ease pain, and improve blood flow to the injured area.

 Knee Pain



Massage can help relieve muscle tension around the knee, increase circulation, and reduce pain.

 Low Back Injury



As a part of physical therapy, massage may help with back pain from low back injuries. However, the effects may only be short-term [\[R\]](#), [\[R\]](#).

Massage may help by [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Lowering muscle tension
- Lowering stress
- Blocking pain signals
- Reducing inflammation

 Rotator Cuff Injury



Another study that included therapeutic massage in a rehabilitation program for junior dolphin swimmers with rotator cuff muscle efficiency issues found improvements in muscle strength, flexibility, and pain reduction [\[R\]](#).

A comprehensive review of manual therapies for rotator cuff disease, including massage, found that while manual therapy may not consistently improve function when used alone, it may effectively reduce pain and is generally considered safe with mild adverse effects [\[R\]](#).

 Back Pain



Experts suggest that massage may help with back pain caused by tense or overworked muscles. They point out that massage should be combined with exercise [\[R\]](#), [\[R\]](#), [\[R\]](#).

Massage may offer short-term improvements in pain and relaxation in people with low-back pain [\[R\]](#), [\[R\]](#).

 Carpal Tunnel Syndrome



Massage therapy can increase blood circulation and reduce inflammation in the carpal tunnel area. It may also alleviate pain and improve hand and wrist function.

 Hip Pain



Massage can help to relax tight muscles and fascia surrounding the hip, promoting pain relief and aiding in recovery.

 Joint Pain



Massage therapy may reduce pain and stiffness in people with osteoarthritis. Massage works best in combination with other strategies, such as exercise and physiotherapy [\[R\]](#), [\[R\]](#), [\[R\]](#).

Massage may help by [\[R\]](#), [\[R\]](#), [\[R\]](#):

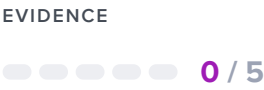
- Increasing blood flow
- Relaxing the muscles
- Lowering inflammation

- Promoting the release of feel-good chemicals

Some people like to use essential oils for massage. **Massage with [lavender](#) or [ginger](#) oil may help with joint pain** [\[R, R, R\]](#).

However, health experts say there’s **not enough evidence to recommend massage for osteoarthritis** [\[R, R\]](#).

 Knee Injury



Massage can support knee injury recovery by improving circulation, reducing muscle tension, and promoting relaxation.

 Shoulder & Neck Pain



Massage of the neck or shoulders (60 minute sessions, 1-4 times per week) may improve pain and mobility in the short term [\[R, R, R, R, R\]](#).

Massage may help relieve pain by [\[R, R, R, R\]](#):

- Lowering muscle tension
- Lowering stress
- Blocking pain signals
- Reducing inflammation

8



Exercise Therapy

How to implement

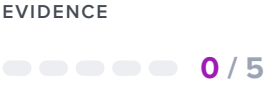
Begin by consulting with a physical therapist to assess your condition and create a personalized exercise plan. Follow the prescribed exercises consistently, focusing on areas needing improvement, such as strength, flexibility, or mobility. Start with gentle exercises, gradually increasing the intensity as you build strength. Ensure you perform the exercises correctly to avoid injury. Regularly check in with your therapist to adjust the plan based on your progress and feedback. Stay committed to the routine for the best results.

TYPICAL STARTING DOSE

1 hour

How it helps

 Jaw Disorders (TMJ)



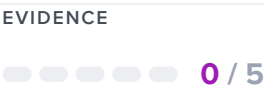
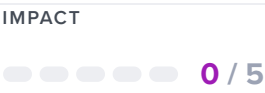
Exercise therapy for TMJ disorders can help reduce pain and improve jaw function. It does this by strengthening the jaw muscles, increasing flexibility, and promoting optimal alignment of the jaw joint.

 Knee Pain



Exercise therapy strengthens the muscles around your knee, improving stability and reducing pressure on the joint, thus helping to relieve knee pain. Additionally, it enhances joint mobility and flexibility, which can alleviate discomfort and aid in recovery.

Low Back Injury



Exercise therapy focuses on specific movements and exercises to restore function and reduce pain after a lower back injury.

Rotator Cuff Injury



A study evaluated the effect of 12 weeks of progressive early active exercise therapy after surgical repair of traumatic full-thickness rotator cuff tears. The study found no difference in shoulder function, pain, and quality of life compared with usual care at 12 weeks and 1 year post-surgery. However, both groups showed improvements over time in all outcomes, indicating the overall benefit of exercise post-surgery [\[R\]](#).

A qualitative study explored how exercise therapy influenced clinical outcomes in people with rotator cuff-related shoulder pain. It identified three causal explanations for the benefits of exercise: improved shoulder strength, changes to psycho-emotional status, and overall health effects. The success of exercise therapy was contingent on a strong therapeutic relationship, a structured program, and timely clinical progress [\[R\]](#).

ACL Injury



Structured exercise therapy can help rebuild strength and mobility in the knee joint, which is essential for recovery post-ACL injury.

Hip Pain



Exercise therapy strengthens muscles, tendons, and ligaments around the hip to support the joint, reducing the pain. Regular engagements in carefully selected exercises also improve the hip's movement range, preventing future discomfort and pain.

Knee Injury



Exercise therapy can help to restore strength and mobility in the knee, aiding the recovery process.

Tendon Injury



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries. Exercise therapy may help with injuries in the [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#):

- Achilles tendon [\[R\]](#) [\[R\]](#) [\[R\]](#)
- Rotator cuff [\[R\]](#) [\[R\]](#) [\[R\]](#)
- Lateral elbow tendons [\[R\]](#) [\[R\]](#)
- Kneecap [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#)
- Glutes [\[R\]](#)

9



Acupuncture

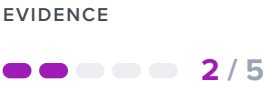
How to implement

Visit a licensed acupuncturist for a session, typically lasting between 30 to 60 minutes, once or twice a week. Depending on your specific condition, a course of treatment might range from a few weeks to several months.

TYPICAL STARTING DOSE
1 hour

How it helps

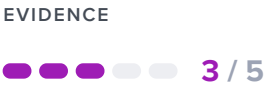
 Jaw Disorders (TMJ)



According to limited evidence, acupuncture may reduce pain in people with TMJ disorders. It may help by blocking pain signals [\[R, R, R, R\]](#).

Please note: *Acupuncture is generally safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information [\[R\]](#).*

 Knee Pain



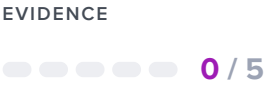
Acupuncture may improve knee pain from osteoarthritis. However, most studies are of low quality, and the benefits may be limited to the short term [\[R, R, R, R, R\]](#).

In line with this, experts say that acupuncture may help improve knee pain, but they also warn about limited evidence. According to them, acupuncture should only be applied as part of physical therapy [\[R, R\]](#).

Acupuncture may help by blocking pain signals [\[R, R, R\]](#).

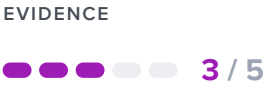
Please note: *Acupuncture is generally safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information [\[R\]](#).*

 Low Back Injury



Acupuncture can help relieve pain and improve function in people with lower back injury by stimulating nerves and muscles.

 Back Pain

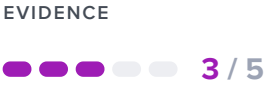


Acupuncture may help reduce chronic lower back pain. However, its effects may be limited to the short term. **Researchers and experts disagree on whether there is enough evidence to support its effectiveness** [\[R, R, R, R, R, R, R, R, R, R\]](#).

Acupuncture may have similar small benefits for acute low back pain. However, some **experts recommend against its use for acute back pain** [\[R, R, R, R\]](#).

Please note: *Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information [\[R\]](#).*

 Carpal Tunnel Syndrome



Acupuncture may help with symptoms and mobility in people with carpal tunnel syndrome. Electrical acupuncture may help those who are wearing a wrist splint. However, the overall evidence is of low quality. One review did not find any clear benefit of acupuncture [\[R, R, R, R\]](#).

Acupuncture may help by improving nerve signaling [\[R, R\]](#).

 PERSONALIZED TO YOUR GENES

Your **DIRC3** gene variant is linked to higher odds of carpal tunnel syndrome. It may affect nerve function. Acupuncture may help by improving nerve function [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
TNP1	rs1863190	TT	

 Hip Pain

IMPACT1 / 5

EVIDENCE1 / 5

According to a single study, electroacupuncture applied for at least 3 months may help reduce hip pain due to osteoarthritis [\[R\]](#).

Acupuncture may help by blocking pain signals [\[R\]](#).

Please note: Acupuncture is generally safe for most people, but it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a [licensed acupuncturist](#) for more information [\[R\]](#).

 Joint Pain

IMPACT1 / 5

EVIDENCE3 / 5

Acupuncture may lower pain by boosting your body’s opioids [\[R\]](#).

In some cases, health experts recommend acupuncture for joint pain [\[R\]](#), [\[R\]](#).

In the short term, it may help with pain from knee osteoarthritis. **However, the benefits are likely small, and most studies are of low quality** [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Acupuncture may have little to no effect on hip osteoarthritis [\[R\]](#).

Please note: Acupuncture is generally safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a [licensed acupuncturist](#) for more information [\[R\]](#).

 Shoulder & Neck Pain

IMPACT2 / 5

EVIDENCE2 / 5

Acupuncture may help improve lower neck and shoulder pain. However, the evidence is mixed and of low quality [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Acupuncture may help by releasing natural [opioids](#) and other chemicals that reduce pain [\[R\]](#), [\[R\]](#).

Please note: Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a [licensed acupuncturist](#) for more information [\[R\]](#).

 Tendon Injury

IMPACT1 / 5

EVIDENCE2 / 5

Acupuncture may relieve pain from tennis elbow. However, its effects may be short-lived [\[R\]](#).

Please note: Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a [licensed acupuncturist](#) for more information [\[R\]](#).

 Gout

IMPACT0 / 5

EVIDENCE0 / 5

Acupuncture is believed to relieve gout symptoms by reducing inflammation and pain through stimulating specific points on the body. This process encourages the body to release natural painkillers, thus enhancing its own healing ability.

10



Flexibility Training

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

How it helps

Ankle Injury

IMPACT

0 / 5

EVIDENCE

0 / 5

Improving flexibility can aid in the recovery process and prevent future injuries.

Knee Pain

IMPACT

0 / 5

EVIDENCE

0 / 5

Flexibility training such as stretching can improve the range of motion and reduce tension in the muscles around the knee, decreasing discomfort.

Power

IMPACT

1 / 5

EVIDENCE

1 / 5

Non-placebo-controlled trials reveal the benefits of flexibility training on power performance. Soccer players practicing it 4 times a week for 4 weeks improved explosiveness and speed. In men, 10 weeks of flexibility training increased jump height, and drop jump height when combined with resistance training. Among older adults, both flexibility and endurance training effectively improved lower extremity power and physical function [\[R\]](#), [\[R\]](#), [\[R\]](#).

Including flexibility training in your fitness routine may improve the range of motion around your joints and reduce the chances of muscle stiffness, injuries, and lower back pain.

Rotator Cuff Injury

IMPACT

1 / 5

EVIDENCE

1 / 5

Eccentric isokinetic resistance training, which is a form of flexibility training, has been shown to improve the function and structure of the external rotator cuff muscles. This type of training may increase the range of motion and potentially reduce the risk of further injury [\[R\]](#).

A study involving female athletes participating in overhead activities showed that strength training, which often incorporates flexibility components, increased the eccentric external total work without impacting concentric internal total work. This suggests that such training may reduce shoulder rotator muscle imbalances and lower the risk of shoulder injuries [\[R\]](#).

ACL Injury

IMPACT

0 / 5

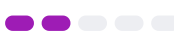
EVIDENCE

0 / 5

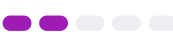
Improving flexibility can help restore the range of motion and reduce the risk of further injury.

Back Pain

IMPACT

 2 / 5

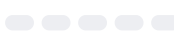
EVIDENCE

 2 / 5

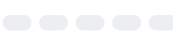
Certain types of flexibility training, such as yoga, William's exercise, and dynamic soft tissue mobilization, may help reduce back pain and improve flexibility. However, some studies indicate that flexibility may not play a significant role in pain reduction or functional improvement [\[R, R, R, R, R, R, R\]](#).

Hip Pain

IMPACT

 0 / 5

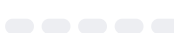
EVIDENCE

 0 / 5

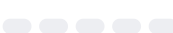
Increasing flexibility can help alleviate tightness and pain in the hip area by stretching the muscles and increasing range of motion.

Knee Injury

IMPACT

 0 / 5

EVIDENCE

 0 / 5

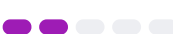
Stretching the muscles around the knee can improve flexibility, reduce stiffness, and prevent muscle imbalances which could hinder healing.

Strength

IMPACT

 2 / 5

EVIDENCE

 2 / 5

Non-placebo-controlled trials highlight the effects of flexibility training on strength. In one study with 40 volunteers, an 8-week hamstring flexibility program increased both flexibility and strength in females, while males increased only flexibility. In trained women, flexibility training improved leg press but not bench press strength. Adding flexibility training to resistance training slightly increased strength gains compared to resistance training alone in a 12-week trial with 43 participants. Similarly, combining flexibility training with a multi-component program improved strength, agility, and aerobic fitness in 142 older women [\[R, R, R, R, R\]](#).

However, resistance training was more effective than flexibility training in two trials involving 72 older adults [\[R, R\]](#).

Flexibility training may help by improving the range of motion of muscles and joints, leading to better muscle coordination.

11



Kinesio Taping

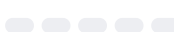
How to implement

Apply kinesio tape directly to the skin over the affected muscle or joint area. The tape should be stretched slightly to create tension after being applied over the pre-cleaned skin. Typically, kinesio tape can be worn for 3 to 5 days, including during showering, before it needs to be replaced.

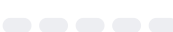
How it helps

Knee Pain

IMPACT

 0 / 5

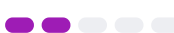
EVIDENCE

 0 / 5

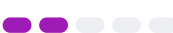
Kinesio taping provides support to your knee without restricting its movement, helping to minimize pain and inflammation. It can also aid in aligning the kneecap if it's off balance, contributing to pain relief and better knee functionality.

Low Back Injury

IMPACT

 2 / 5

EVIDENCE

 2 / 5

Kinesio Taping may improve back pain and mobility in people with low back injuries [\[R\]](#).

Kinesio Taping may help by [\[R\]](#):

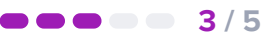
- Helping the spine move more smoothly
- Restoring normal muscle movement
- Improving blood flow
- Reducing pain perception

Rotator Cuff Injury

IMPACT



EVIDENCE

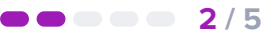


A study involving multiple trials assessed the benefits and harms of KT for rotator cuff disease. It found very low-certainty evidence suggesting that KT may not improve pain, function, pain on motion, or active range of motion compared to sham taping or other conservative treatments. However, KT may improve quality of life compared to conservative treatments, though this evidence is also of low certainty [\[R\]](#).

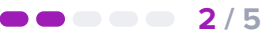
A study examining the immediate effects of KT on shoulder muscle strength and range of motion in healthy people found that KT did not cause differences in shoulder external rotation peak torque, and shoulder internal and external range of motion [\[R\]](#).

Back Pain

IMPACT



EVIDENCE



Kinesio taping may improve pain and disability in people with chronic low-back pain [\[R\]](#), [\[R\]](#), [\[R\]](#).

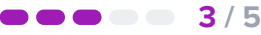
Other studies found insufficient evidence for benefits in pain or disability but confirmed benefits in range of motion, muscular endurance, and motor control. Kinesio taping may offer greater benefits when used as an add-on to other treatments [\[R\]](#), [\[R\]](#).

Strength

IMPACT



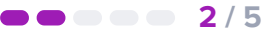
EVIDENCE



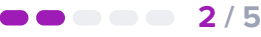
Kinesio Taping works by enhancing proprioception (i.e., body's ability to sense its location, movements, and actions), which can improve strength. It also provides support and stability to muscles and joints without restricting the body's range of motion.

Tendon Injury

IMPACT



EVIDENCE



Kinesio Taping provides external support to the injured tendon, thereby helping reduce pain and inflammation. It also aids in the recovery process by enhancing stability and proprioceptive feedback, quickening the healing process of the tendon.

According to research, kinesio taping may help with rotator cuff tendon injuries [\[R\]](#), [\[R\]](#).

12



Low-Level Laser Therapy (LLLT)

How to implement

Use a low-level laser therapy device, as directed by its manual or a healthcare professional, on the affected area. Generally, treatment involves applying the laser for a specified duration, often between 30 seconds to several minutes, per treatment area. Sessions can be conducted 2-3 times per week for a period of 4-12 weeks, depending on the condition being treated and the device used.

TYPICAL STARTING DOSE
30 seconds

How it helps

 Jaw Disorders (TMJ)



Low-Level Laser Therapy (LLLT) can help with TMJ disorders by reducing inflammation and promoting tissue regeneration in the jaw area. It can also provide pain relief by blocking the pain signals transmitted to your brain.

Several systematic reviews and meta-analyses evaluated low-level laser therapy (LLLT) for treating temporomandibular disorders (TMD). A 2011 review found no evidence supporting LLLT's effectiveness. In 2015, a meta-analysis showed that LLLT was not better than placebo for reducing chronic TMD pain but improved functional outcomes. In 2018, another review indicated that LLLT reduced pain intensity and increased interincisal opening for temporomandibular myofascial pain. A 2021 network meta-analysis recommended d1 laser therapy for short-term pain management. In 2022, LLLT with wavelengths ranging from 910-1100 nm was found more effective than TENS. A 2023 review suggested diode or GaAlAs lasers with specific parameters for different TMD types [\[R, R, R, R, R, R, R, R\]](#).

 Knee Pain



Low Level Laser Therapy (LLLT) can aid knee pain by stimulating cell repair and reducing inflammation in the afflicted area. This therapy essentially aids your body in healing itself, reducing the discomfort and stiffness associated with knee pain.

 Power



Applying low-level laser therapy (LLLT) before exercise **may improve muscle power**. Different phototherapy techniques may help, such as [\[R, R\]](#).

- Light-emitting diode therapy (LED therapy)
- Light Amplification by Stimulated Emission of Radiation therapy (LASER therapy),

Laser therapy may also lower blood lactate levels. The greatest benefits may come from [\[R\]](#):

- Wavelength: 655 to 950 nm
- Energy dose for small muscle groups: 20 to 60 Joules
- Energy dose for large muscle groups: 60 and 300 Joules
- Maximum power output: 200 mW per diode.

However, not all studies support LED therapy benefits. A low to moderate level of evidence supports LLLT at the moment [\[R\]](#).

 Back Pain



Low-Level Laser Therapy (LLLT) uses low-intensity lasers or light-emitting diodes (LEDs) to reduce inflammation and promote healing, which aids in relieving back pain. It is non-invasive and can target specific areas of your back for targeted relief.

Low-level laser therapy (LLLT) appears effective for short-term pain relief in chronic non-specific low back pain (CNLBP) when using higher laser doses and shorter pain duration. A systematic review of studies on musculoskeletal disorders also supports LLLT for pain reduction, especially when following dosage guidelines. However, evidence for LLLT's impact on function remains inconclusive, as it primarily addresses pain. Rigorous blinded trials are needed for more certainty in these findings. [\[R, R, R\]](#).

 Carpal Tunnel Syndrome



Low-Level Laser Therapy (LLLT) is beneficial for Carpal Tunnel Syndrome as it helps to reduce inflammation and pain, improving hand function. Its light beams can penetrate the tissues, stimulating cell repair and promoting healing in the carpal tunnel area.

Some experts say that laser therapy may help with carpal tunnel syndrome [\[R\]](#).

Low-level laser therapy may improve hand grip, pain, and symptom severity. It may work best when combined with a wrist splint. However, some studies found

mixed results for certain outcomes and the effects may only last short term [R, R, R, R, R, R].

A review of 8 RCTs (473 patients/631 wrists) on LLLT for mild-to-moderate carpal tunnel syndrome showed mixed results. LLLT improved grip strength but didn't significantly affect pain, functional status, or sensory nerve action potential. High-quality, longer-term trials are needed for a clearer understanding [R].

A review of 18 studies with 1462 adult patients found that LLLT reduced pain in musculoskeletal disorders (MD: -0.85). Higher effectiveness was observed when adhering to WALT guidelines for dosage recommendations [R].

 Creatine Kinase



Pre-application of low-level laser therapy may improve muscle endurance and promote recovery from muscle strength and injury (including creatine kinase) in athletes and sedentary populations. However, not all studies found this effect [R, R, R].

 Endurance



Low-Level Laser Therapy (LLLT) is beneficial to endurance as it aids in repairing tissues and reducing inflammation, hence enhancing muscle performance and recovery. Therefore, it can potentially increase one's endurance capacity for physical activities.

In a 2015 review of 13 RCTs, phototherapy (LLLT or LEDT) showed significant performance improvements when applied before exercise. Results were strongest with red or infrared wavelengths, power outputs of 50-200 mW, and doses of 5-6 J per point [R].

A 2018 review of 39 trials with 861 participants showed some evidence favoring phototherapy (LLLT or LEDT) within exercise protocols for performance improvement but emphasized the need for more rigorous studies due to methodological issues and variable parameters. Positive effects were seen with wavelengths from 655 to 950 nm, energy doses of 20-60 J for small muscles and 60-300 J for large muscles, and a maximal power output of 200 mW per diode [R].

A 2022 review of 24 studies in athletes found that LLLT before exercise improved lower-limb muscle strength, reduced soreness, and positively affected various biochemical markers. More robust trials are needed before making strong recommendations [R].

 Joint Pain



LLLT, in specific doses and wavelengths, significantly reduced pain and disability in knee osteoarthritis patients, with no reported adverse events, in a systematic review and meta-analysis of 22 trials [R].

A systematic review of 14 trials with 820 knee osteoarthritis patients found that combining LLLT with exercise therapy significantly reduced pain immediately and at follow-up. However, it did not affect knee ROM, muscle strength, or knee function. The recommended LLLT dosage is 4-8 J with a wavelength of 640-905 nm per point for 10-16 sessions at a frequency of 2 sessions/week, combined with a prescribed exercise therapy program involving major muscle groups [R].

LLLT may help by reducing inflammation and promoting tissue repair. It increases blood flow to the affected area, stimulating the body's healing process and easing discomfort.

 Knee Injury



In a randomized, double-blinded, placebo-controlled study on meniscal pathology patients, low-level laser therapy (LLLT) significantly improved knee pain compared to placebo (F = 154, p < 0.0001). Lysholm scores also improved in the LLLT group at 4 weeks (82.5 ± 4.6) and 6 months (82.2 ± 5.7) compared to placebo. LLLT may be a consideration for patients not opting for surgery [R].

 Shoulder & Neck Pain



Low-Level Laser Therapy (LLLT) aids in healing and reducing inflammation in shoulder and neck pain by stimulating the cells in the affected area, encouraging quicker repair and growth. This results in reduced pain and discomfort, promoting movement and flexibility in the neck and shoulder region.

A systematic review and meta-analysis of studies on low-level laser therapy (LLLT) for neck pain and musculoskeletal disorders found varying results. In acute and chronic neck pain, LLLT showed statistically significant pain reduction immediately after treatment, but the clinical significance was uncertain due to study heterogeneity. LLLT appeared effective in reducing pain in adult patients with musculoskeletal disorders, especially when following dosage guidelines. For shoulder musculoskeletal disorders, LLLT provided short-term pain relief but no additional benefit in shoulder function. In myofascial neck pain, LLLT significantly reduced pain, and improved pain pressure threshold and range of motion, suggesting its potential as an adjunct therapy alongside other treatments like manual and exercise therapy [R, R, R, R, R].

 Strength



Low-Level Laser Therapy (LLLT) can stimulate cellular function, promote healing and reduce inflammation which can enhance your overall physical strength. It's also used to treat musculoskeletal injuries, aiding in faster recovery and improved performance.

In a 2015 review of 13 RCTs, phototherapy (LLLT or LEDT) showed significant performance improvements when applied before exercise. Results were strongest with red or infrared wavelengths, power outputs of 50-200 mW, and doses of 5-6 J per point [R].

A 2018 review of 39 trials with 861 participants showed some evidence favoring phototherapy (LLLT or LEDT) within exercise protocols for performance improvement but emphasized the need for more rigorous studies due to methodological issues and variable parameters. Positive effects were seen with wavelengths from 655 to 950 nm, energy doses of 20-60 J for small muscles and 60-300 J for large muscles, and a maximal power output of 200 mW per diode [R].

A 2022 review of 24 studies in athletes found that LLLT before exercise improved lower-limb muscle strength, reduced soreness, and positively affected various biochemical markers. More robust trials are needed before making strong recommendations [R].

 Tendon Injury



Low-Level Laser Therapy (LLLT) helps promote healing in tendon injuries by delivering non-heat light waves directly into the tissue, stimulating cell regeneration and reducing inflammation. This process decreases pain and improves mobility in the affected area.

A meta-analysis of 17 randomized controlled trials on shoulder tendinopathy found that low-level laser therapy (LLLT) significantly reduced pain as monotherapy and with exercise, and showed greater improvement when part of physiotherapy treatment. LLLT was ineffective with inadequate doses, also improving shoulder function when used alone [R].

A meta-analysis of trials on lower extremity tendinopathy and plantar fasciitis revealed that low-level laser therapy (LLLT) reduced pain and disability compared to placebo, other interventions, and as an add-on treatment, with no reported adverse events [R].

A meta-analysis of 4 studies (119 participants) on low-level laser therapy for Achilles tendinopathy found low-certainty evidence that laser therapy with eccentric exercises didn't significantly improve pain or function compared to eccentric exercises and sham treatment. The results don't support routine laser therapy use for this condition due to limited evidence [R].

13



Apply Heat

How to implement

Place a warm, not hot, heating pad or a warm wet towel on the affected area for 15-20 minutes at a time. Do this several times a day, ensuring there's at least a 1-hour interval between sessions to avoid skin damage.

TYPICAL STARTING DOSE

15 minutes

How it helps

 **Jaw Disorders (TMJ)**

IMPACT

0 / 5

EVIDENCE

0 / 5

Applying heat can help relax the jaw muscles and increase blood circulation to the affected area, which can provide relief from pain and improve mobility in the temporomandibular joint.

 **Knee Pain**

IMPACT

0 / 5

EVIDENCE

0 / 5

Applying heat to the knee can increase blood flow, relax muscles, and decrease joint stiffness, providing pain relief.

 **Low Back Injury**

IMPACT

0 / 5

EVIDENCE

0 / 5

Applying heat to an injured lower back can promote blood flow, which aids in the healing process and reduces discomfort.

 **Back Pain**

IMPACT

2 / 5

EVIDENCE

2 / 5

A study demonstrated that continuous, low-level heat therapy provides pain relief, improves muscular strength, and increases flexibility in people with low back pain. This form of therapy is described as effective, safe, easy-to-use, and cost-effective for managing low back pain [R].

Another study found that combining continuous low-level heat wrap therapy with directional preference-based exercise improves functional outcomes compared to either intervention alone or control in the treatment of acute low back pain. This combination proved to be highly effective in reducing disability and improving pain relief [R].

 **Hip Pain**

IMPACT

0 / 5

EVIDENCE

0 / 5

Applying heat to the hip can relax muscles, increase blood flow, and provide relief from pain and stiffness.

 **Joint Pain**

IMPACT

2 / 5

EVIDENCE

2 / 5

A study on people with moderate knee osteoarthritis demonstrated that local heat application (for 4 weeks) decreased pain intensity and tenderness. It also reduced joint stiffness and physical function disabilities [R].

Another study evaluated the effects of local heat application (20-minute heat application every other day for 4 weeks) on pain, stiffness, physical function, and quality of life in people with knee osteoarthritis. It found that heat application every other day for four weeks decreased pain and disability while improving aspects of quality of life [R].

 **Knee Injury**

IMPACT

0 / 5

EVIDENCE

0 / 5

Applying heat to the knee can increase blood flow, reduce muscle tension, and promote healing by enhancing tissue elasticity.

 **Shoulder & Neck Pain**

IMPACT

2 / 5

EVIDENCE

2 / 5

Applying heat (for 30 minutes) may relieve neck and back pain and improve range of motion when used in addition to standard pain therapy. Heat may help by increasing pain tolerance [R, R, R].

14

Collagen Peptides

How to implement

Take 10-20 grams of collagen peptides daily, mixing the powder into a glass of water, juice, or a smoothie. It is recommended to consume this supplement on an empty stomach to improve absorption, ideally first thing in the morning or right before bedtime for a period of at least 8-12 weeks to observe beneficial effects.

TYPICAL STARTING DOSE
10 g

How it helps

Ankle Injury

IMPACT

1 / 5

EVIDENCE

1 / 5

Taking collagen peptides (5 g/day for 6 months) may reduce recurrent ankle injuries in people at risk [R].

Knee Pain

IMPACT

2 / 5

EVIDENCE

2 / 5

Collagen Peptides stimulate your body's natural production of collagen, a protein that helps maintain the health of your joints and reduces joint pain, including knee pain. Ingesting these over time may improve knee joint comfort and potentially alleviate knee pain.

Collagen peptides (5 g/day for 3 months) may reduce exercise-induced knee pain [R, R].

Taking collagen supplements (10 mg/day) may improve osteoarthritis [R].

You can get either whole collagen or collagen that has been broken down (hydrolyzed). Both types may help with joint pain and stiffness [R, R].

Power

IMPACT

1 / 5

EVIDENCE

1 / 5

Collagen peptides supply the body with amino acids that are used to make new collagen, a key protein for maintaining skin, bone, and joint health. Regular consumption of these supplements can potentially alleviate symptoms of conditions such as osteoarthritis by rebuilding the cartilage that cushions your joints.

In a double-blinded study, 50 healthy male athletes (aged 18-25) were given either HC + C (20 g hydrolyzed collagen + 50 mg vitamin C) or a placebo (20 g maltodextrin) for 3 weeks. The HC + C group showed improved Rate of Force Development (explosive strength) in squat and countermovement jump exercises during their training [R].

Achilles Tendon Injury

IMPACT

1 / 5

EVIDENCE

1 / 5

Taking collagen peptides (5 g/day for 3 months) may speed up the recovery process in people with Achilles tendinopathy engaged in a calf-strengthening program. Collagen may increase the thickness of the Achilles tendon, as well as the lower leg muscles [R, R].

Endurance

IMPACT

1 / 5

EVIDENCE

1 / 5

In a 12-week study, recreationally active women who took 15g of SCP daily during concurrent training (CT) showed greater endurance performance improvement compared to the placebo group. There were also improvements in fat-free mass (FFM) and heart rate at the anaerobic threshold in the treatment group [R].

 Joint Pain

IMPACT

2 / 5

EVIDENCE

2 / 5

Collagen Peptides, when consumed, stimulate the body to produce more natural collagen, a primary component of joints. This helps rebuild joint tissues, reduce inflammation, and can alleviate joint pain over time.

Collagen peptides (5 g/day for 3 months) may reduce exercise-induced knee pain [R, R].

Taking collagen supplements (10 mg/day) may improve osteoarthritis [R].

You can get either whole collagen or collagen that has been broken down (hydrolyzed). Both types may help with joint pain and stiffness [R, R].

 Knee Injury

IMPACT

0 / 5

EVIDENCE

0 / 5

Collagen peptides may support the repair of the damaged connective tissue and improve knee joint health.

 Strength

IMPACT

1 / 5

EVIDENCE

1 / 5

Collagen peptides may aid in increasing muscle mass and strength, as they possess the amino acids needed for muscle protein synthesis. When combined with resistance training, they could potentially enhance muscle growth and strength.

In a study involving 53 male subjects with sarcopenia, a 12-week resistance training program was conducted. Participants were given either collagen peptides (15 g/day) or silica as a placebo. Both groups showed improvements in fat-free mass, bone mass, muscle strength, and sensory-motor control, but the collagen peptide group exhibited significantly greater gains in these parameters [R].

In a study involving 77 premenopausal women who underwent 12 weeks of resistance training, those who consumed 15 g of collagen peptides daily alongside training showed a significant increase in hand-grip strength compared to those who only did resistance training. Both groups also experienced a significant gain in leg strength [R].

In a study with 57 young men, collagen peptides (COL) supplementation (15 g/day) combined with resistance training led to increased fat-free mass (FFM) compared to a placebo (PLA) group. Both groups improved strength, but COL showed better body composition results, possibly due to enhanced connective tissue adaptations [R].

 Tendon Injury

IMPACT

1 / 5

EVIDENCE

1 / 5

Taking collagen peptides (5 g/day for 3 months) may speed up the recovery process in people with Achilles tendinopathy engaged in a calf-strengthening program. Collagen may increase the thickness of the Achilles tendon, as well as the lower leg muscles [R, R].

15



Transcutaneous Electrical Nerve Stimulation (TENS)

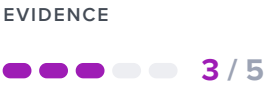
How to implement

Apply TENS unit electrode pads around the area in pain; begin with the device set to a low setting and gradually increase intensity to a comfortable level. Use the device for 15-30 minutes per session for pain relief, and it can be used multiple times a day as needed.

TYPICAL STARTING DOSE
30 minutes

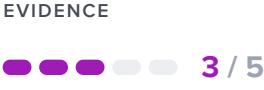
How it helps

 Groin Hernia



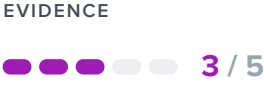
TENS may reduce pain after surgery for groin hernia repair [\[R\]](#).

 Jaw Disorders (TMJ)



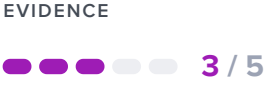
TENS may reduce pain and improve mouth opening in people with temporomandibular joint disorders. However, low-level laser therapy may be more effective [\[R, R, R\]](#).

 Back Pain



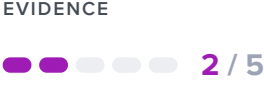
TENS may improve pain and disability in people with low-back pain in the short term. However, the evidence is mixed [\[R, R, R, R, R, R\]](#).

 Joint Pain



In people with knee osteoarthritis, TENS may reduce pain while improving physical function and walking ability. TENS may be more effective than electroacupuncture but less than interferential current [\[R, R, R, R\]](#).

 Shoulder & Neck Pain



TENS may reduce pain intensity in people with chronic neck pain. However, the evidence is of very low certainty [\[R\]](#).

Injuries

Summary Report

REPORT CATEGORY



John Doe

Report date: 30 October 2024

Table of Contents

03 How this works

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35 Recommendations

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

John Doe

SEX AT BIRTH

Male

HEIGHT

5ft 11" 180.4cm

WEIGHT

177lb 80.3kg

REPORT PROVIDED BY

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🌐 <https://plexusdx.com>

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.



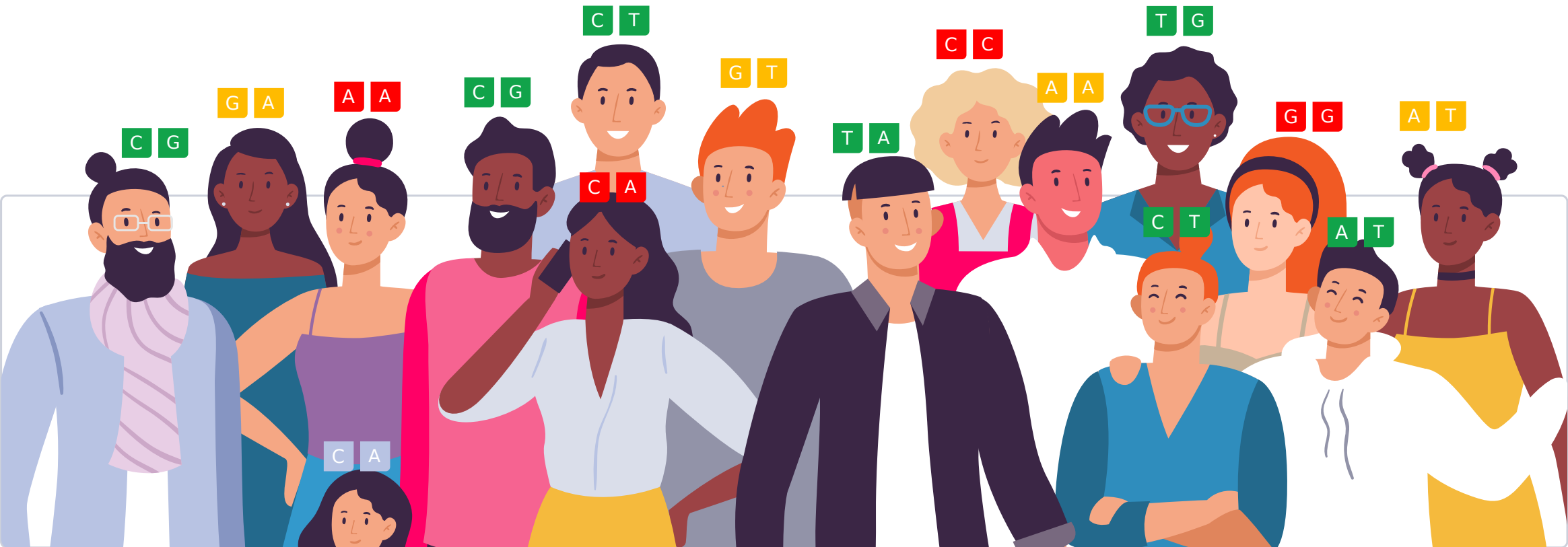
Similarly, our Trait Reports look at how your DNA influences your traits.



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.

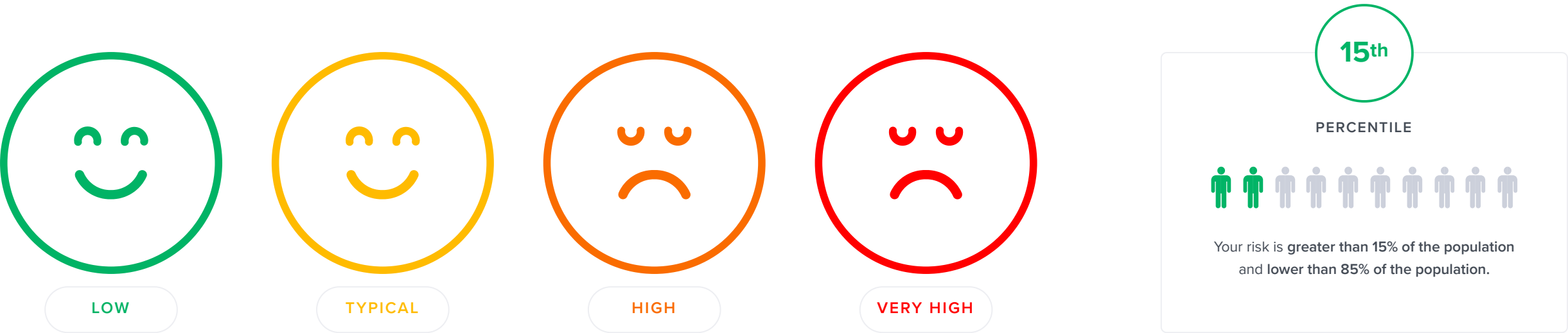
Our Summary Reports combine different Wellness and Trait Reports related to a certain health topic. They give you a more complete picture about different aspects of your health and wellness.



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:

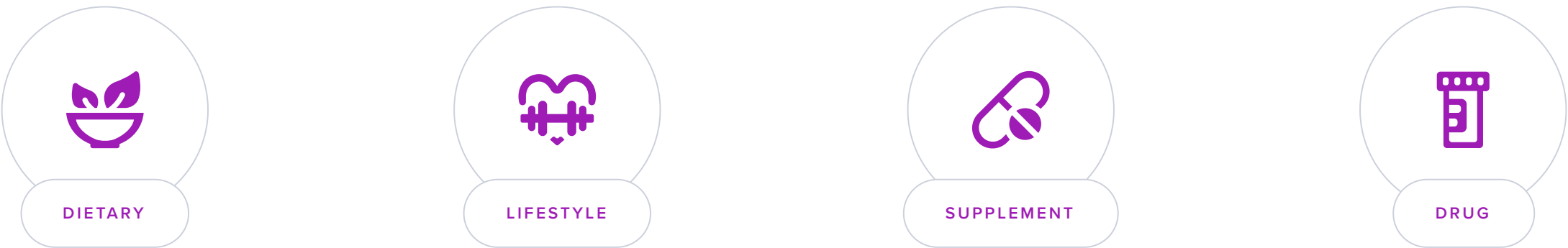


Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

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):



In Summary Reports, we combine top evidence-based recommendations for different conditions.

We focus on recommendations that help with more conditions included in a Summary Report.

For each recommendation, we list all conditions it may help with. We also include impact, evidence, regimen, personalized parts, and other details specific to each condition.

1



Recommendation

Helps with the following



Condition

IMPACT

4 / 5

EVIDENCE

4 / 5



Condition

IMPACT

4 / 5

EVIDENCE

4 / 5



Condition

IMPACT

4 / 5

EVIDENCE

4 / 5



Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

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:

- The scores/gauges use the latest scientific studies. But they are not perfect and will change as the models improve.
- Not everyone with risk variants will develop a health condition.
- Genetics is not the whole story. Your health is most often a combination of genetics, lifestyle, and environmental factors. Great news, as this means that you can often change your lifestyle to lower your risk.
- Results might be more accurate for some ethnic groups than others. This depends on the studies used in each report.
- People without risk variants can also develop health conditions.
- It's important to work with your doctor to better understand your risks. Our reports do not diagnose or treat any health condition. They are not a substitute for medical advice. If you're diagnosed with a certain health condition, follow your doctor's advice.

Summary

Injuries can significantly affect mobility, daily function, and quality of life. While accidents and physical activities are common causes of injury, genetics also plays a critical role in determining an individual’s susceptibility to certain types of injuries. Whether it's joint and tendon injuries, back and spine issues, or other injuries like fractures and concussions, understanding your genetic predisposition can help you take preventive measures and manage recovery more effectively.

This report explores the genetic factors that contribute to the risk of various injuries. By analyzing markers related to connective tissue strength, bone density, and muscle resilience, this report offers insights into why some individuals may be more prone to specific types of injuries.

Understanding your genetic profile can empower you to adopt tailored exercise routines, injury prevention strategies, and lifestyle changes that reduce the risk of injury and improve overall physical health.

This summary report contains:

20 Genetic Results

50 Recommendations

Overview of Your Results

Joint & Tendon Injuries

 TYPICAL LIKELIHOOD Knee Injury Typical likelihood of knee injuries	 TYPICAL LIKELIHOOD Achilles Tendon Injury Typical likelihood of Achilles tendon injury	 MORE LIKELY Ankle Injury More likely to have an ankle injury
 MORE LIKELY Rotator Cuff Injury More likely to have a rotator cuff injury	 TYPICAL LIKELIHOOD Tendon Injury Typical likelihood of having tendinopathy	 TYPICAL LIKELIHOOD Tendon Inflammation Typical likelihood of having tendon inflammation
 TYPICAL LIKELIHOOD ACL Injury Typical likelihood of tearing an ACL	 LESS LIKELY Tennis Elbow Less likely to have tennis elbow	 TYPICAL LIKELIHOOD Shoulder Impingement Typical likelihood of having shoulder impingement
 MORE LIKELY Hip Fractures More likely to have a hip fracture	 LOWER ACTIVITY COL5A1 (Injuries) Likely lower COL5A1 activity	

Back & Spine Injuries

 MORE LIKELY Low Back Injury More likely to have a low back injury	 TYPICAL LIKELIHOOD Herniated Disk Typical likelihood of herniated disk	 TYPICAL LIKELIHOOD Spinal Cord Injury Typical likelihood of spinal cord injuries
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 Other Injuries

 MORE LIKELY Falls More likely to fall	 TYPICAL LIKELIHOOD Fractures Typical likelihood of breaking a bone	 MORE LIKELY Groin Hernia More likely to get a groin hernia
 MORE LIKELY Abdominal Hernia More likely to have an abdominal hernia	 MORE LIKELY Concussion More likely to have a concussion	 TYPICAL LIKELIHOOD Pressure Ulcers Typical likelihood of pressure ulcers

Your Results in Details



Joint & Tendon Injuries

Joint and tendon injuries, such as ACL tears, rotator cuff injuries, and Achilles tendon injuries, are common in both athletes and non-athletes. This section focuses on genetic predispositions that may affect your susceptibility to joint and tendon injuries.

Understanding these genetic risks can help you take preventive measures, such as targeted strengthening exercises, proper conditioning, and managing physical strain.

 **TYPICAL LIKELIHOOD**

Knee Injury

Typical likelihood of knee injuries

 **TYPICAL LIKELIHOOD**

Achilles Tendon Injury

Typical likelihood of Achilles tendon injury

 **MORE LIKELY**

Ankle Injury

More likely to have an ankle injury

 **MORE LIKELY**

Rotator Cuff Injury

More likely to have a rotator cuff injury

 **TYPICAL LIKELIHOOD**

Tendon Injury

Typical likelihood of having tendinopathy

 **TYPICAL LIKELIHOOD**

Tendon Inflammation

Typical likelihood of having tendon inflammation

 **TYPICAL LIKELIHOOD**

ACL Injury

Typical likelihood of tearing an ACL

 **LESS LIKELY**

Tennis Elbow

Less likely to have tennis elbow

 **TYPICAL LIKELIHOOD**

Shoulder Impingement

Typical likelihood of having shoulder impingement

 **MORE LIKELY**

Hip Fractures

More likely to have a hip fracture

 **LOWER ACTIVITY**

COL5A1 (Injuries)

Likely lower COL5A1 activity

Knee Injury

The knee is a joint that connects the bones of the thigh and the lower leg. It allows the leg to bend and straighten, which is required to sit, squat, jump, and run. The knee is very complex and bears a great deal of stress from everyday activities. This makes it one of the most easily injured joints [R, R].

Some people may be more prone to knee injuries than others. Risk factors include [R]:

- Excess weight
- Lack of leg muscle flexibility or strength
- Practicing high-impact sports (running, basketball, soccer, hockey, skiing)
- Occupations involving frequent kneeling or squatting (construction, farming)
- Traumatic accidents (falls, motor vehicle crashes)
- **Genetics**

Depending on the type, up to 70% of differences in people’s chances of developing a knee injury may be due to genetics. Genes involved may influence [R, R, R]:

- Bone growth and development
- Ligament growth and repair
- Blood vessel development

Tips to help prevent a knee injury include [R]:

- Maintaining a healthy weight
- Stretching and strengthening your thigh muscles
- Avoiding high-impact activities, sudden movements, and overtraining
- Wearing proper sport shoes and protective equipment



TYPICAL LIKELIHOOD

Typical likelihood of knee injuries based on 299,714 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ZC3H11B	rs112081086	AA
PRRX1	rs151077542	GG
BRINP3	rs72727240	TT
XCL1	rs148262095	GG
SPAG17	rs139101248	GG
MAB21L3	rs79678808	AA
AURKAIP1	rs138046143	TT
CDC42BPA	rs56339347	AA
NEK7	rs138440178	CC
/	rs567271467	GG
/	rs567271467	GG
FCMR	rs1800895	CC
NR5A2	rs34004246	GG
SYT2	rs145533858	CC
/	rs192853607	GG
CDC42BPA	rs573881227	CC
USH2A	rs140693748	CC
LRIG2	rs140098571	CT
ZC3H11B	rs147060837	AA
/	rs146266096	CC

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

Achilles Tendon Injury

The **Achilles tendon** is a cord made of strong tissue. It is found in the lower back leg and connects the calf muscles to the heel bone. The Achilles tendon helps you move around. Some common injuries to this tendon include **tendonitis** (inflammation of the tendon, usually due to overuse or damage) and **rupture** (partial or complete tear of the tendon) [R, R, R].

Some people may be more prone to Achilles tendon injuries than others. Risk factors include [R, R, R, R, R]:

- A “weekend warrior” exercise pattern (i.e. taking part in physical activity intermittently)
- Age (the risk tends to increase between age 30 and 40)
- Male sex
- Taking part in activities that include a lot of running, jumping, or sudden changes in movement (e.g., soccer, basketball, and tennis)
- Wearing improper shoes
- Lack of a warmup or cooldown
- Some medications
- Obesity
- **Genetics**

In fact, about 50% of differences in people’s chances of developing an Achilles tendon injury may be attributed to genetics [R].

Tips to help prevent an Achilles tendon injury include [R, R]:

- Stretching and strengthening your calf muscles
- Alternating high-impact sports with low-impact ones (e.g., alternating running with walking)
- Avoiding running on hard, uneven, or slippery surfaces
- Using proper equipment (e.g., well-fitting, cushioned running shoes)
- Slowly increasing the intensity of the activity



Typical likelihood of Achilles tendon injury based on 23 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
COL1A1	rs1800012	CC
MMP1	rs650108	GA
MMP1	rs591058	CC
VEGFA	rs699947	CA
CEP295NL	rs4789932	AG
COL5A1	rs12722	TT
CPNE1	rs143383	AG
FCN2	rs1134170	TT
MPP7	rs6481512	CT
SOX21	rs4454832	AG
MPP7	rs1249269	CT
MRPL43	rs4919510	GC
MICB	rs1800629	GG
TMEM158	rs183364169	CC
DPP6	rs4067493	CC
SOAT1	rs113435565	AA
/	rs11960097	TT
TRIML1	rs60713544	GG
ZNF648	rs57104447	TT
MPP7	rs1937810	TT

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

Ankle Injury

The ankle is a joint that connects the bones of the foot to the bones of the leg. It can bend sideways, upward, and downward. If a jump, fall, pivot, or step causes the ankle to bend in an odd way, the ligaments can stretch or tear. This is called a **sprained ankle** [R, R, R].

Some factors may increase the risk of ankle sprains. These include [R, R]:

- Taking part in sports that involve jumping or sudden changes in movement (e.g., basketball and soccer)
- Poor ankle strength, flexibility, or stability
- A previous ankle injury
- Wearing improper shoes
- Uneven surfaces
- Excess weight
- **Genetics**



MORE LIKELY

More likely to have an ankle injury based on 19,077 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
PRPSAP2	rs1634423	TT
DEPTOR	rs149163456	CT
HIVEP1	rs1569733	TC
CCSER1	rs62309831	AG
TENM3	rs35619804	GA
UGDH	rs56118664	CC
/	rs139095264	GG
PRR16	rs4340940	CC
CHD9	rs72797642	AA
GATA3	rs142347570	AA
NPY2R	rs115005126	TT
RALGPS2	rs187271145	GG
NFIB	rs13286037	TT
SGO1	rs12489876	GG
RABEPK	rs117724125	CC
ASB18	rs78681719	TT
C8ORF48	rs73210044	GG
GRIA1	rs140053818	GG
DLC1	rs73208003	GG
NTS	rs10506913	AA

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

Rotator Cuff Injury

The **rotator cuff** is a group of muscles and tendons that surround the shoulder joint. They keep the upper bone of the arm within the shoulder socket and help you lift and rotate your arms. When one or more of the rotator cuff tendons is torn, it becomes totally or partly detached from the bone of the arm. This usually occurs slowly over time, but can also be caused by traumatic injuries from falls or lifting heavy objects [\[R, R\]](#).

Some people may be more prone to rotator cuff injuries than others. Risk factors include [\[R, R, R\]](#):

- Age (the risk tends to increase in people over 40 and tears are most common in those over 60)
- Taking part in sports that include repetitive arm lifting or overhead movements (e.g., tennis, baseball, weight-lifting, rowing)
- Occupations involving overhead work (e.g., carpentry, house painting, mechanics)
- Traumatic injuries and falls
- **Genetics**

In fact, up to 20% of differences in people’s chances of developing a rotator cuff injury may be due to genetics. Genes involved may influence [\[R, R, R\]](#):

- Tendon growth and repair
- Inflammation
- Blood vessel development

Tips to help prevent a rotator cuff injury include [\[R, R\]](#):

- Stretching and strengthening your shoulder muscles
- Limiting repetitive overhead arm movements
- Avoiding lying on your shoulder while sleeping
- Avoiding cigarette smoke



MORE LIKELY

More likely to have a rotator cuff injury based on 734,008 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
/	rs140539211	CC
STK24	rs912336	CC
DLC1	rs34045652	CC
MGAT2	rs1010586	CC
CPE	rs138457734	CC
STOML3	rs147482720	TT
ANXA1	rs74821598	TT
RORB	rs72727137	GG
USP6NL	rs3847425	CC
CCDC110	rs11727025	GG
KBTBD3	rs505416	GG
AOAH	rs3807160	GG
TRIL	rs2237352	CT
PLCB1	rs6140637	AA
RBMS2	rs117991841	CC
LONRF1	rs17769850	TT
QKI	rs55958453	AG
SIPA1L2	rs789644	CA
S100A12	rs143640806	AA
ZNF519	rs117141423	GG

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

Tendon Injury

Key Takeaways:

- Up to **40%** of the differences in people's chances of developing tendinopathy may be due to genetics.
- Other risk factors include intense physical activity or certain sports, using improper training technique or equipment, doing repetitive tasks, age (over 40), being female, some chronic health conditions and medications.
- About 16 million tendon and ligament injuries occur in the U.S. each year.
- If you have a high genetic risk, you may lower your overall risk by taking action on those factors that you can change.

Tendons are cords made of strong tissue. They attach muscle to bone. There are many tendons throughout the body. Conditions in which tendons become inflamed and painful are called **tendinopathies** [\[R, R\]](#).

Risk factors for tendinopathies include [\[R, R, R, R\]](#):

- Taking part in intense physical activity or certain sports (e.g., baseball, golf)
- Using improper training technique or equipment
- Doing repetitive tasks (e.g., gardening, painting, typing)
- Age (over 40)
- Gender (women may be at a higher risk)
- Some chronic health conditions (e.g., obesity, diabetes)
- Some medications
- **Genetics**

Up to **40%** of the differences in people's chances of developing tendinopathy may be due to genetics. Involved genes may influence tendon function [\[R, R, R, R, R\]](#).

Interestingly, one study that examined the impact of genetics on tendon injuries was conducted on elite athletes from FC Barcelona [\[R\]](#).

Tips to help prevent a tendon injury include [\[R, R\]](#):

- Stretching and strengthening your muscles
- Alternating high-impact sports with low-impact ones (e.g., alternating running with walking)
- Avoiding running on hard, uneven, or slippery surfaces
- Using proper equipment (e.g., protective gloves, well-fitting shoes)



TYPICAL LIKELIHOOD

Typical likelihood of having tendinopathy based on 6 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GJA1	rs11154027	TC
KLHL1	rs59988404	GG
TRIML1	rs60713544	GG
CERS5	rs57224706	AA
POLE2	rs3218791	GG
/	rs11232681	AA

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

- Slowly increasing the intensity of the activity

Tendon Inflammation

Potential risk factors for tendon inflammation include:

- Age: Tendinitis is more common as tendons become less flexible with age.
- Occupations that involve repetitive motions or forceful exertion.
- Certain sports, particularly those that involve repetitive movements.
- Incorrect posture at work or poor conditioning before exercise or playing sports.
- Genetics

There is some evidence to suggest that certain genetic factors may predispose individuals to tendinopathy, including tendinitis. People with specific genetic markers may have different collagen composition in their tendons, making them more susceptible to injury.



TYPICAL LIKELIHOOD

Typical likelihood of having tendon inflammation based on 1,657 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
TNP1	rs10203066	GG
LTBP3	rs4244811	GG
CENPK	rs2087927	GG
FTO	rs10521304	TC
NQO1	rs3790086	CC
KLHL1	rs59988404	GG
POLE2	rs3218791	GG
/	rs11232681	AA

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

ACL Injury

The **anterior cruciate ligament (ACL)** is a strong band of tissue that connects the bone in your thigh to the bone in your shin. It helps stabilize the knee. Damage to the ACL may cause it to tear partially or completely. An ACL tear can occur if the knee moves suddenly or awkwardly. It can also occur if the side of your knee gets hit very hard [\[R, R, R\]](#).

An ACL injury is most likely to occur during exercise. For example, taking part in soccer, football, basketball, and skiing may increase the risk. Other risk factors include [\[R, R, R\]](#):

- Female sex
- Not warming up before exercising
- Using improper form during exercise
- Wearing improper sports equipment
- Exercising on artificial turf
- Working an intense job that requires you to jump, pivot, or climb
- **Genetics**

In fact, up to **70%** of differences in people’s likelihood of tearing an ACL may be due to genetics [\[R, R\]](#).

Treatment for a partial ACL tear includes the “RICE” method [\[R, R\]](#):

- **R**esting
- **I**cing the knee
- **C**ompressing the knee
- **E**levating the leg

Physical therapy and wearing a brace or using a crutch may also help. In more severe cases, surgery may be required [\[R\]](#).



Typical likelihood of tearing an ACL based on 71,152 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MALRD1	rs118010763	TT
MGMT	rs112031232	AA
HSPG2	rs190446136	CC
MYOM3	rs140568949	AA
DOCK7	rs138219207	CC
AHCTF1	rs184856290	GG
PLXNA2	rs61813824	AA
SGMS1	rs151045759	CC
ARHGAP20	rs9704284	GG
PFKP	rs12413610	TT
NBPF3	rs7524699	CC
SHTN1	rs142967392	TC
DPP6	rs4067493	CC
SOAT1	rs113435565	AA
/	rs11960097	TT
ST6GALNAC3	rs289694	CC
IGSF21	rs9660827	CC
TCERG1L	rs2663012	CC
OR2T2	rs28693711	TT
UBE2J2	rs61766282	GG

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

Tennis Elbow

Several factors might increase your risk of developing tennis elbow:

- **Age:** It's most common in adults between 30 and 50.
- **Occupation:** Jobs that involve repetitive motions of the wrist and arm, such as painters, plumbers, and cooks, can lead to this condition.
- **Certain sports:** Participating in racket sports increases your risk of tennis elbow, especially if you employ poor stroke technique.
- **Genetics:** Some people might have a genetic predisposition that makes their tendons more susceptible to injuries from repetitive actions.

Managing tennis elbow involves rest, physical therapy, pain-relieving medications, and sometimes even surgery for severe cases. Preventive strategies include proper equipment use, strengthening exercises, and proper technique in activities involving repetitive arm movements.



LESS LIKELY

Less likely to have tennis elbow based on 1,670 genetic variants we looked at



Shoulder Impingement

Risk factors for shoulder impingement include [\[R\]](#):

- Age: It is more common in middle-aged and older adults due to wear and tear.
- Activities: Overhead activities common in some sports and jobs can lead to impingement.
- Trauma: A fall or blow to the shoulder can initiate impingement symptoms.
- Genetics

There isn't a strong genetic component linked to shoulder impingement syndrome. However, the anatomy of the shoulder joint, which can be influenced by genetics, may predispose individuals to develop impingement. For example, variations in the shape of the acromion or the genetic collagen makeup affecting tendon quality could make some people more susceptible.

The goal of treatment for shoulder impingement syndrome is to reduce your pain and restore shoulder function. Treatments for impingement syndrome include [\[R\]](#):

- Resting the shoulder and avoiding activities that cause pain.
- Physical therapy exercises to strengthen the muscles around the shoulder and improve the range of motion.
- Anti-inflammatory medications or steroid injections to reduce inflammation and pain.
- In persistent cases, surgical intervention may be necessary to increase the size of the subacromial space and relieve pressure on the rotator cuff.



Typical likelihood of having shoulder impingement based on 1,676 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ASTN2	rs562775223	CC
SIPA1L2	rs789644	CA
QKI	rs55958453	AG
AOAH	rs3807160	GG
RFC3	rs7139664	GA
CPNE1	rs2104009	AG
C5ORF63	rs145648292	GG
S100A12	rs143640806	AA
LONRF1	rs17769850	TT
KBTBD3	rs505416	GG
PLCB1	rs6140637	AA
EGFLAM	rs60486174	TA
ANXA1	rs74821598	TT
/	rs750968	CG
STK24	rs912336	CC
/	rs533950411	CC
USP6NL	rs3847425	CC
RORB	rs72727137	GG
CCDC110	rs11727025	GG
RBMS2	rs117991841	CC

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

Hip Fractures

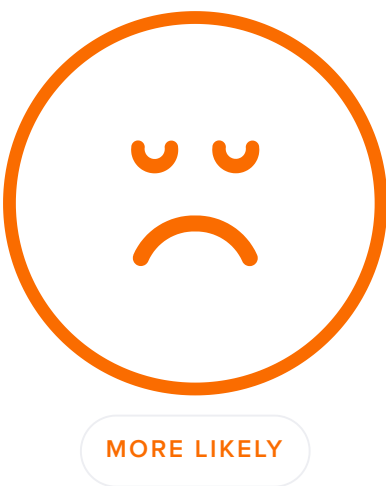
Treatment for hip fractures usually involves surgery, which is often required to repair the fracture and allow patients to return to their normal level of activity:

- Surgical repair: Depending on the type and severity of the fracture, surgery may involve the use of metal screws, plates, or rods to hold the bones in place.
- Hip replacement surgery: In cases where the blood supply to the femoral head is compromised or the joint is severely damaged, a partial or total hip replacement may be necessary.
- Nonsurgical treatment: In very rare cases, or where surgery is too risky due to other health problems, treatment may involve extended bed rest and pain management. However, prolonged immobility can increase the risk of complications like blood clots and bedsores.

Recovery often involves a combination of physical therapy, mobility aids (like walkers or canes), and a gradual increase in activity. The goals are to restore mobility, strengthen the muscles around the hip, and prevent future falls by improving balance and flexibility.

Preventive measures are crucial, especially for the elderly. They include:

- Maintaining bone health through adequate calcium and vitamin D intake
- Regular exercise to strengthen bones and muscles
- Home safety assessments to reduce fall risks, such as removing tripping hazards and installing grab bars in bathrooms



More likely to have a hip fracture based on 219,744 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MARCO	rs115242848	CC
HLA-DQA1	rs2071805	CC
VAR52	rs9262558	CC
SP7	rs144680237	CC
CPED1	rs3779381	AA
MRPL20	rs12408050	GG
WLS	rs2566755	TT
CTNNB1	rs389264	TT
HBZ	rs10794639	GG
LGR4	rs11030084	CC
RPL10L	rs12884871	CC
CTNNBL1	rs6063547	GG
CPED1	rs10242100	AA
HOXC6	rs7308105	CC
/	rs67174662	AA
ZBTB40	rs34414754	CA
FKBP11	rs3741619	AG
ETS2	rs11088458	GA
RSPO3	rs9482772	TC
/	rs2431108	TC

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

COL5A1 (Injuries)

Variants resulting in reduced type V collagen may increase the risk of injuries. This may be because carriers of these variants may have weaker ligaments, tendons, and muscles. One of such variants is [rs12722](#). Its minor ‘T’ allele has been associated with an increased risk of:

- Achilles tendon injury [\[R\]](#), [\[R\]](#)
- Anterior cruciate ligament injury [\[R\]](#), [\[R\]](#)
- Tennis elbow [\[R\]](#), [\[R\]](#)
- Carpal tunnel syndrome [\[R\]](#)
- Muscle cramps [\[R\]](#)

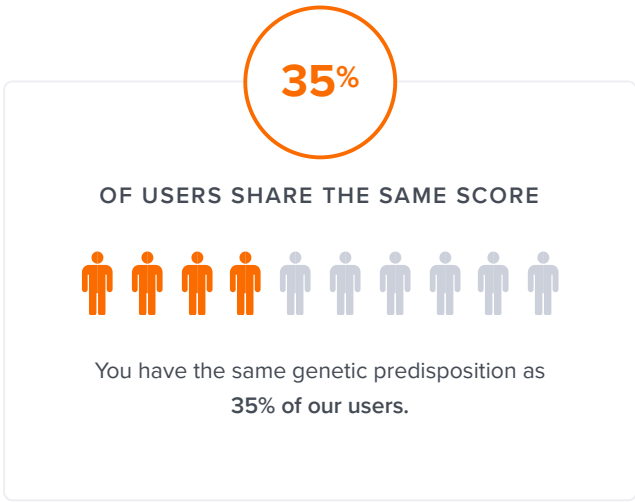
People with the ‘TT’ genotype may also have more severe (but not more frequent) muscle injuries. Probably due to the association of this variant with soft tissue injuries, carriers may have lower odds of elite rugby status [\[R\]](#), [\[R\]](#).

On the bright side, this genotype has also been associated with improved endurance performance in runners. Moreover, the ‘T’ variant may reduce the risk of rotator cuff injury [\[R\]](#), [\[R\]](#).



LOWER ACTIVITY

Likely lower COL5A1 activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
COL5A1	rs12722	TT

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



Back & Spine Injuries

Back and spine injuries, including herniated discs, low back pain, and spinal cord injuries, can have a profound impact on mobility and quality of life. This section examines the genetic factors that may increase your risk of back and spine injuries, particularly those affecting the strength and flexibility of spinal structures.

By understanding your genetic predisposition, you can take proactive steps to protect your back, including core-strengthening exercises, proper posture, and ergonomics.



MORE LIKELY

Low Back Injury

More likely to have a low back injury



TYPICAL LIKELIHOOD

Herniated Disk

Typical likelihood of herniated disk



TYPICAL LIKELIHOOD

Spinal Cord Injury

Typical likelihood of spinal cord injuries

Low Back Injury

Key Takeaways:

- Up to **70%** of differences in people's chances of having a low back injury may be due to **genetics**.
- Other risk factors include occupations involving repetitive motions or heavy lifting, prolonged sitting/standing, over 40, obesity, smoking, lack of physical activity, previous injury, and certain health conditions.
- Lower back injuries are common among athletes, and account for **20%** of workplace injuries.
- If your genetic risk is high, you may lower overall risk by taking action on those factors that you can change.
- Click the **Recommendations** tab for potential dietary and lifestyle changes.

A low back injury refers to any type of damage or injury to the muscles, tendons, ligaments, or nerves in the low back. This can include **strains, sprains, herniated discs**, and more.

Up to **70%** of differences in people's chances of having a low back injury may be due to **genetics**. The research in this area is still young, but scientists have identified genes involved in **collagen production** [\[R\]](#)!

Other common risk factors for back injury include:

- Occupations involving repetitive motions, heavy lifting, or prolonged sitting or standing
- Age, particularly after 40
- Obesity
- Smoking
- Lack of physical activity
- Previous back injury
- Osteoporosis or other underlying conditions

It's important to note that back injuries are often caused by a combination of several of these factors, and not just one.



MORE LIKELY

More likely to have a low back injury based on 171,685 genetic variants we looked at



PERCENTILE



Your risk is greater than 99% of the population and lower than 1% of the population.

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GSDMC	rs6651255	CT
ITGA1	rs13174042	CT
DCC	rs4384683	GG
MYC	rs7833174	CT
DIS3L2	rs1453867	CT
/	rs543634974	CC
MME	rs540690425	CC
SOX5	rs12310519	CC
TEX35	rs180946349	AA
COG2	rs192174382	TT
CD1C	rs183230426	GG
FCRL5	rs72710051	GG
CD1A	rs186414191	AA
PGBD5	rs191270555	TT
PGBD5	rs187895488	GG
SFPQ	rs138217819	GG
FHAD1	rs115359709	GG
FOXD2	rs72690353	CC
CD1B	rs187608964	AA
SHCBP1L	rs191229707	CC

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

Herniated Disk

Risk factors for a herniated disk include [\[R\]](#):

- Age: They are most common in people between the ages of 30 and 50.
- Weight: Excess body weight puts extra stress on the disks in the lower back.
- Occupation: Physically demanding jobs that involve lifting, pushing, or pulling increase the risk.
- Lifestyle and fitness: Sedentary lifestyle and lack of regular exercise can contribute to the development of a herniated disk.
- Frequent driving: Being seated for long periods combined with the vibration from a motor vehicle engine can put pressure on the spine.
- Smoking: Smoking is believed to lessen the oxygen supply to disks, causing them to break down more quickly.
- Genetics: There may be a genetic component that predisposes individuals to disk problems.

A herniated disk can be painful and debilitating, but most people respond well to conservative treatment including rest, physical therapy, and medications to relieve pain and inflammation, such as ibuprofen or naproxen. Some cases may require [\[R\]](#):

- Exercises and stretches to help improve flexibility and strength in the spine and supporting muscles.
- Cortisone injections or muscle relaxers.
- Surgery such as microdiscectomy or laminectomy in cases where when conservative treatments fail and if the symptoms are worsening.

Some strategies that may help prevent herniated disks include [\[R\]](#):

- Regular exercise to strengthen the muscles of the back and abdomen.
- Maintaining good posture while sitting.
- Using ergonomic furniture.
- Proper lifting techniques: Lifting with the legs, not the back, and avoiding twisting.
- Maintaining a healthy weight to reduce stress on the spine.
- Avoiding cigarette smoke.



Typical likelihood of herniated disk based on 856,888 genetic variants we looked at



Spinal Cord Injury

After a spinal cord injury, secondary events can occur, including inflammation, fluid accumulation and swelling that can cause additional damage. These complications can evolve over days or weeks. The extent of the injury and its impact on bodily functions are determined by both the location of the damage and the severity of the trauma.

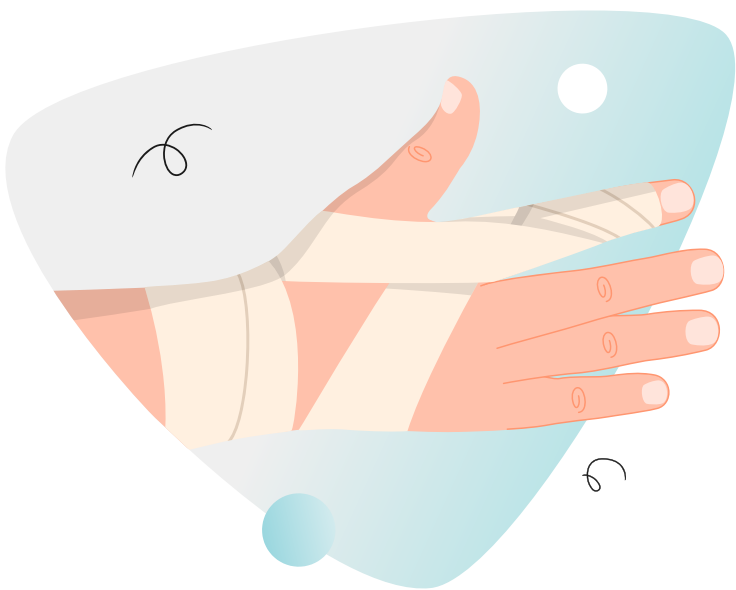
The level of the injury dictates the parts of the body that might become impaired, with higher injuries potentially affecting breathing and arm movement, and lower injuries possibly affecting leg movement and bladder control. Rehabilitation, medication, and sometimes surgery are part of the treatment to promote possible recovery of function and to prevent complications.



TYPICAL LIKELIHOOD

Typical likelihood of spinal cord injuries based on 12,843 genetic variants we looked at





Other Injuries

Injuries such as fractures, hernias, concussions, and pressure ulcers can arise from various causes and can be influenced by genetic factors. This section explores the genetic predispositions that may increase your risk for these injuries, including how your body responds to trauma, pressure, or repetitive strain.

By understanding these risks, you can adopt preventive strategies, such as improving bone density through nutrition or managing activities that may lead to falls or hernias.



MORE LIKELY

Falls

More likely to fall



TYPICAL LIKELIHOOD

Fractures

Typical likelihood of breaking a bone



MORE LIKELY

Groin Hernia

More likely to get a groin hernia



MORE LIKELY

Abdominal Hernia

More likely to have an abdominal hernia



MORE LIKELY

Concussion

More likely to have a concussion



TYPICAL LIKELIHOOD

Pressure Ulcers

Typical likelihood of pressure ulcers

Falls

Factors that might increase the risk of falls include:

- Older age.
- Muscle weakness or balance problems.
- Chronic health conditions like heart disease, arthritis, or dementia.
- Medications that affect balance, such as sedatives or antipsychotics.
- Vision problems.
- Foot pain or unsafe footwear.
- Environmental hazards like clutter, uneven surfaces, or poor lighting.
- Alcohol consumption.
- Vitamin D deficiency.
- **Genetics**

While external and health factors play more direct roles in the risk of falls, genetics can contribute to an individual's susceptibility to certain conditions that affect fall risk. For instance, genetic factors might influence bone density, muscle strength, and neurological functions that impact balance and coordination.



MORE LIKELY

More likely to fall based on 57,585 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
LGR4	rs11030084	CC
RPL10L	rs12884871	CC
CTNNBL1	rs6063547	GG
/	rs67174662	AA
/	rs2431108	TC
/	rs2709062	AG
NTNG1	rs76259395	GA
ZNF536	rs28633123	CT
INKA2	rs6658723	TC
BCL11A	rs974135	CT
DRD1	rs2471020	CT
TRERF1	rs72857666	CC
FHIT	rs7616516	GG
TSPAN4	rs28672671	GG
TSHZ3	rs2111530	AA
ARL14EP	rs494221	GG

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

Fractures

Factors that might increase the risk of fractures include:

- Osteoporosis or decreased bone density
- Older age
- Participation in high-risk sports or activities
- Previous fractures
- Falling or repeated trauma
- Low body weight or malnutrition
- Conditions that affect bone quality, such as cancer or certain endocrine disorders
- Genetics

Genetics can play a role in bone health and, consequently, susceptibility to fractures. Genes are involved in determining bone density, bone structure, and the rate at which bone is broken down and rebuilt. Having a family history of osteoporosis or frequent fractures may indicate a genetic predisposition.

Moreover, genetically high testosterone (in women) and alpha-linolenic acid may be causally associated with a lower risk of fractures [\[R\]](#), [\[R\]](#).



TYPICAL LIKELIHOOD

Typical likelihood of breaking a bone based on 909,144 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MARCO	rs115242848	CC
HLA-DQA1	rs2071805	CC
VAR52	rs9262558	CC
SP7	rs144680237	CC
CPED1	rs3779381	AA
MRPL20	rs12408050	GG
WLS	rs2566755	TT
CTNNB1	rs389264	TT
HBZ	rs10794639	GG
LGR4	rs11030084	CC
RPL10L	rs12884871	CC
CTNNBL1	rs6063547	GG
CPED1	rs10242100	AA
HOXC6	rs7308105	CC
/	rs67174662	AA
ZBTB40	rs34414754	CA
FKBP11	rs3741619	AG
ETS2	rs11088458	GA
RSPO3	rs9482772	TC
/	rs2431108	TC

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

Groin Hernia

A hernia occurs when tissue from one body cavity bulges through an opening in your muscle wall into another. Groin (inguinal) hernia is the most common type of hernia.

Some groin hernias have no apparent cause. Others might occur as a result of [\[R\]](#):

- Increased pressure within the abdomen
- A preexisting weak spot in the abdominal wall
- Straining during bowel movements or urination
- Strenuous activity
- Pregnancy
- Chronic coughing or sneezing

Genetics can have an impact on your susceptibility to a groin hernia. Involved genes may affect collagen and elastin fibers, which can weaken the abdominal wall [\[R\]](#), [\[R\]](#).

Other risk factors for developing a groin hernia include [\[R\]](#):

- Male sex
- Older age
- Being white
- Premature birth and low birth weight
- Previous groin hernia or repair



MORE LIKELY

More likely to get a groin hernia based on 857,808 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ADAMTS6	rs370763	AA
EFEMP1	rs3791679	AG
EFEMP1	rs1346789	TC
ZC3H11B	rs2820443	CC
EFEMP1	rs10496052	TC
RBBP8	rs11659211	GG
RRP15	rs2799098	AA
EFEMP1	rs80172616	GA
TWIST2	rs80225179	CT
TGFB2	rs2820441	CA
CRISPLD2	rs4238714	CT
DLEU7	rs573666	CT
HMGA2	rs12810758	TC
HAND2	rs11722597	TC
LOX	rs10519694	CT
VGLL2	rs200889152	AC
PLCE1	rs3945750	CA
AGTR2	rs4969771	T
/	rs56976399	A
PATJ	rs2365498	GA

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

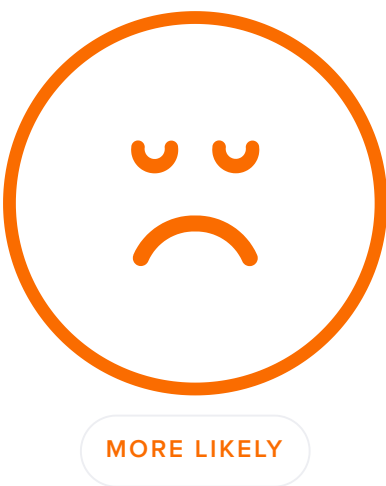
Abdominal Hernia

The following factors increase the risk of an abdominal hernia:

- Increased pressure in the abdomen: This can be due to heavy lifting, diarrhea, constipation, or persistent coughing or sneezing.
- Weakness in the abdominal wall: This may be present at birth or develop later in life, often exacerbated by factors like age, chronic strain, or surgical incisions.
- Pregnancy: It can put extra pressure on the abdomen.
- Obesity: It can contribute to weakened muscles and increased pressure within the abdomen.

For small hernias that are not causing discomfort, monitoring for changes may be sufficient. Those that are painful or enlarging may require surgery. It can often be performed laparoscopically, involving small incisions, or through traditional open surgery. The aim is to repair the weakened area of the muscle or tissue. Abdominal hernias can also be repaired through herniorrhaphy (by sewing the muscle layer together) or hernioplasty (by sewing a mesh patch over the weakened area).

Preventing an abdominal hernia involves maintaining a healthy weight, avoiding heavy lifting, and eating a fiber-rich diet to prevent constipation. Regular exercise can also help strengthen muscles and potentially reduce the risk of developing a hernia. For people with existing hernias, wearing a supportive truss as recommended by a healthcare provider can help relieve discomfort and prevent their worsening.



More likely to have an abdominal hernia based on 11,533 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ZC3H11B	rs4846567	TT
ZC3H11B	rs2820443	CC
LYPLAL1	rs2820444	AA
ZC3H11B	rs1415287	TT
ZC3H11B	rs1415288	CC
TGFB2	rs2820446	GG
ZC3H11B	rs2494196	AA
TGFB2	rs2785988	AA
ZC3H11B	rs4846569	TT
/	rs55893113	CC
ZC3H11B	rs12131794	AA
ZC3H11B	rs3902972	AA
ZC3H11B	rs7538503	GG
NUAK1	rs11112695	TA
NUAK1	rs66913103	CA
NUAK1	rs61941504	GC
NUAK1	rs67051635	CT
NUAK1	rs10861487	AG
NUAK1	rs11112691	TG
NUAK1	rs11611703	AG

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

Concussion

Factors that might increase the risk of getting a concussion include:

- Participation in high-impact or collision sports such as football, hockey, soccer, or boxing.
- Having had a previous concussion.
- Falling, especially in young children and older adults.
- Being involved in a motor vehicle accident.
- Being a pedestrian or cyclist struck by a vehicle.
- Being involved in military combat.
- Being a victim of physical abuse.

While the primary cause of a concussion is a physical trauma, **genetics can play a role in how an individual responds and recovers from a concussion.** Certain genetic factors might influence the brain's structural resilience to injury, susceptibility to inflammation following trauma, and the efficiency of neural repair mechanisms.



MORE LIKELY

More likely to have a concussion based on 341,037 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
PLXNA4	rs117985931	AA
SPATA5	rs144663795	GG

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

Pressure Ulcers

The development of pressure ulcers occurs in four stages, ranging from reddened skin that goes away after pressure is relieved to severe tissue damage that extends through muscle to bone. Complications from pressure ulcers can include cellulitis, bone and joint infections, cancer, and sepsis.

Preventive measures include frequent repositioning, skincare, and the use of support surfaces like mattresses, beds, and cushions specifically designed to reduce the risk of pressure sores. Effective management involves meticulous wound care, a holistic approach to health, nutritional support, and, in some cases, surgery to repair the damage.



TYPICAL LIKELIHOOD

Typical likelihood of pressure ulcers based on 2,463 genetic variants we looked at



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.

- 1

Physical Therapy
- 2

Strength Training
- 3

Stability Training
- 4

Core-Strengthening Exercises
- 5

Walking
- 6

Balance And Mobility Training
- 7

Massage
- 8

Manual Therapy
- 9

Stretching
- 10

Flexibility Training
- 11

Avoid Lifting Heavy Objects
- 12

Pilates
- 13

Kinesio Taping
- 14

Transcutaneous Electrical Nerve Stimulation (TENS)
- 15

Exercise Therapy

1

Physical Therapy

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

How it helps

Ankle Injury



Serious ankle sprains may require immobilization and stabilization with braces, bandages, sports tapes, or even casts during the first days [\[R, R, R\]](#).

Once the pain and swelling are lessened enough, a healthcare professional may recommend exercise therapy to regain ankle strength, function, and stability. Exercise therapy may also reduce the risk of recurrent ankle sprains [\[R, R, R, R\]](#).

Hip Fractures



Physical therapy helps in building muscle strength and improving mobility, which can be crucial for preventing falls and maintaining bone health after a fracture.

Low Back Injury



Physical therapy may help improve back pain and physical function in people with low back injuries. However, it may take some time to experience benefits [\[R, R, R, R\]](#).

Specific physical therapy techniques that may help include:

- Massage [\[R, R\]](#)
- Kinesio Taping [\[R\]](#)

Physical therapy may help with low back injuries by [\[R\]](#):

- Helping the spine move more smoothly
- Restoring normal muscle movement

Rotator Cuff Injury



Experts recommend physical therapy to improve pain, physical function, and quality of life in people with rotator cuff injury. Physical therapy may also help recover from rotator cuff surgery [\[R, R\]](#).

Beneficial physical therapy techniques include:

- Manual therapy [\[R, R\]](#)
- Exercise therapy [\[R, R, R\]](#)
- Kinesio taping [\[R\]](#)

However, the quality of the evidence is generally low.

 Achilles Tendon Injury

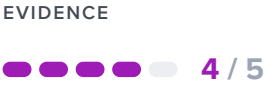
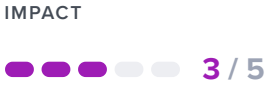


Experts recommend stretching and strengthening exercises for Achilles tendon injuries. Particularly, eccentric weight bearing exercises (slowly letting down of a weight after raising it) may help reduce pain and recover function [\[R, R, R\]](#).

Physical therapists may also prescribe orthotic devices. These are shoe inserts or wedges that slightly elevate the heel to relieve strain and amount of force on the Achilles tendon. However, the evidence about their effectiveness is mixed and experts don’t recommend their use [\[R, R\]](#).

In people recovering from Achilles tendon surgery, early weight bearing is more effective and satisfactory to patients than ankle immobilization [\[R, R\]](#).

 ACL Injury



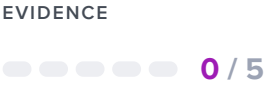
Experts recommend physical therapy instead of surgery in less severe cases and for people whose physical activity level doesn’t put much stress on the knees [\[R\]](#).

Supervised exercises prescribed by a physical therapist may help reduce pain and swelling, restore knee function, and strengthen the muscles. The use of braces to stabilize the knee may increase the odds of recovery [\[R, R\]](#).

People recovering from ACL reconstruction surgery may be prescribed exercise therapy to increase muscle strength and knee function [\[R\]](#).

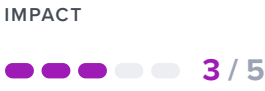
Conversely, bracing may not improve knee function after ACL reconstruction surgery [\[R\]](#).

 Fractures



Physical therapy provides targeted exercises to help rehabilitate the area affected by the fracture.

 Knee Injury



Supervised exercises prescribed by a physical therapist may help reduce pain and swelling, restore knee function, and strengthen the muscles in people with knee injuries such as ACL and meniscal tears. The use of braces to stabilize the knee may increase the odds of recovery from ACL injuries [\[R, R, R\]](#).

In the case of ACL injury, physical therapy may replace surgery in less severe cases and for people whose physical activity level doesn’t put much stress on the knees [\[R\]](#).

People recovering from knee surgery may be prescribed exercise therapy to increase muscle strength and knee function. Bracing may not improve knee function after ACL reconstruction surgery [\[R, R, R\]](#).

 Shoulder Impingement



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries, including tendon inflammation. Exercise therapy may help with inflammation of the [\[R, R, R, R\]](#):

- Achilles tendon [\[R, R, R\]](#)
- Rotator cuff [\[R, R, R\]](#)
- Lateral elbow tendons [\[R, R\]](#)
- Kneecap [\[R, R, R, R, R\]](#)
- Glutes [\[R\]](#)

The following physical therapy techniques may also help with rotator cuff tendon injuries:

- Manual therapy [\[R, R\]](#)

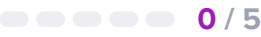
- Kinesio taping [\[R, R\]](#)

Spinal Cord Injury

IMPACT



EVIDENCE



Physical therapy can aid in improving strength, flexibility, and range of motion, helping individuals with spinal cord injury maintain mobility and manage pain.

Tendon Inflammation

IMPACT



EVIDENCE



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries, including tendon inflammation. Exercise therapy may help with inflammation of the [\[R, R, R, R\]](#):

- Achilles tendon [\[R, R, R\]](#)
- Rotator cuff [\[R, R, R\]](#)
- Lateral elbow tendons [\[R, R\]](#)
- Kneecap [\[R, R, R, R, R\]](#)
- Glutes [\[R\]](#)

The following physical therapy techniques may also help with rotator cuff tendon injuries:

- Manual therapy [\[R, R\]](#)
- Kinesio taping [\[R, R\]](#)

Tendon Injury

IMPACT



EVIDENCE



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries. Exercise therapy may help with injuries in the [\[R, R, R, R\]](#):

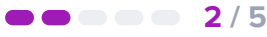
- Achilles tendon [\[R, R, R\]](#)
- Rotator cuff [\[R, R, R\]](#)
- Lateral elbow tendons [\[R, R\]](#)
- Kneecap [\[R, R, R, R, R\]](#)
- Glutes [\[R\]](#)

The following physical therapy techniques may also help with rotator cuff tendon injuries:

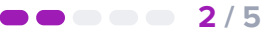
- Manual therapy [\[R, R\]](#)
- Kinesio taping [\[R, R\]](#)

Tennis Elbow

IMPACT



EVIDENCE



A study found that deep friction massage and stretching of the wrist extensor muscles, as part of a physical therapy regimen, significantly improved range of motion (ROM) and handgrip strength in patients with tennis elbow. This indicates the effectiveness of physical therapy techniques in managing the condition [\[R\]](#).

A survey of UK clinical practice revealed that 81% of healthcare professionals recommended exercise-based physiotherapy as the first-line intervention for tennis elbow. This highlights the widespread clinical endorsement of physical therapy for this condition [\[R\]](#).

Research comparing a combination of Mulligan mobilization and ultrasound therapy to ultrasound therapy alone, followed by a progressive exercise program, showed significant improvement in pain and grip strength. This study emphasizes the added benefits of combining manual therapy with conventional treatments in physical therapy for enhancing recovery in tennis elbow [\[R\]](#).

2

Strength Training

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

How it helps



Ankle Injury

IMPACT

0 / 5

EVIDENCE

0 / 5

Strengthening the muscles around the ankle can provide better support and prevent future injuries.



Falls

IMPACT

0 / 5

EVIDENCE

0 / 5

Strength training improves muscle strength and balance, which reduces the likelihood of falls.



Hip Fractures

IMPACT

0 / 5

EVIDENCE

0 / 5

Strength training increases muscle mass and bone density, helping to prevent fractures by making the bones stronger and more resilient.



Low Back Injury

IMPACT

0 / 5

EVIDENCE

0 / 5

Strength training for the core and back muscles can provide better support for the spine and reduce injury recurrence.



Rotator Cuff Injury

IMPACT

2 / 5

EVIDENCE

2 / 5

Strength training (4x/week for 5 weeks), especially focused on eccentric external rotator muscle strength, increases the total exercise capacity of these muscles, potentially reducing shoulder rotator muscle imbalances and the risk of shoulder injuries in athletes engaged in overhead activities [\[R\]](#).

Resistance training has shown that gains in mean and peak torque for rotator cuff muscles may be maintained with reduced training frequencies, which is relevant for both rehabilitation and off-season training strategies [\[R\]](#).

Studies comparing different types of strength training (isokinetic vs isotonic) for the rotator cuff have found varied impacts on strength, power, and muscular balance, emphasizing the need for specific training protocols tailored to the needs of the rotator cuff for rehabilitation and performance enhancement [\[R\]](#).



Achilles Tendon Injury

IMPACT

2 / 5

EVIDENCE

2 / 5

Strength training and gait retraining may reduce Achilles tendon injury risk [\[R\]](#).

Strength training, particularly heavy-load eccentric calf muscle training (for 12 weeks), may help with Achilles tendon injury by [\[R\]](#), [\[R\]](#):

- Improving strength
- Reducing pain
- Reducing injury risk

 ACL Injury



Strengthening the muscles around the knee helps support the joint, reducing the load on the ACL and facilitating recovery.

 Fractures



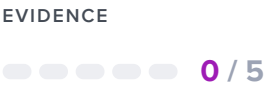
Carefully monitored strength training can help rebuild muscle and support around the fracture site, aiding recovery.

 Knee Injury



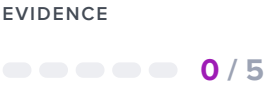
Strength training helps a knee injury by strengthening the muscles surrounding your knee, which can provide added support and lessen strain on the knee joint. It also improves flexibility and balance, which can reduce the risk of future injuries.

 Spinal Cord Injury



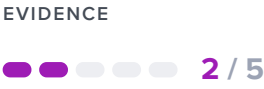
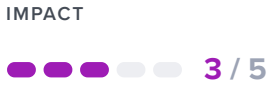
Strength training, when adapted for individuals with spinal cord injuries, can help improve muscle strength around the injured area, support body stability, and increase independence in daily activities. Focused training can also reduce the risk of secondary complications such as muscle atrophy.

 Tendon Inflammation



Specific strengthening exercises for the forearm can help improve muscle strength, which might aid in the recovery from tennis elbow and prevent further injury.

 Tendon Injury



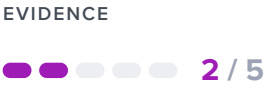
Strength training, when done correctly, can help rebuild muscle and tendon strength around the injury.

Studies suggest that resistance training generally increases tendon stiffness and may improve tendon properties, which could be beneficial for tendon health, although some forms of resistance training may not alter certain tendon characteristics immediately or in all populations.

Below are some of the key findings:

- Both eccentric and heavy slow resistance training yield positive, equally good, lasting clinical results in patients with Achilles tendinopathy [\[R\]](#).
- Resistance training can impact opposite ends of the patella tendon force-elongation relationship in each sex, potentially minimizing tendon injuries [\[R\]](#).
- Resistance training improved muscle strength and cross-sectional area equally in old and very old subjects but **did not** affect tendon mechanical properties or dimension [\[R\]](#).
- Resistance training leads to increased muscle force and a 7% increase in tendon cross-sectional area [\[R\]](#).

 Tennis Elbow



A study comparing eccentric and concentric graded exercise for chronic tennis elbow found that eccentric exercise (involving lowering a weight) was more effective than concentric exercise (involving lifting a weight). The eccentric exercise group experienced a faster regression of pain and a greater increase in muscle strength [\[R\]](#).

Another study highlighted the benefits of exercise in managing chronic tennis elbow. It demonstrated that patients who followed an exercise regimen improved pain and muscle strength compared to those who did not engage in a structured exercise program. This suggests the general efficacy of exercise, including strength training, in improving outcomes for tennis elbow [R].

3



Stability Training

How to implement

Integrate stability exercises into your workout routine 2-3 times per week. These exercises include activities such as using a stability ball, performing balance exercises on a balance board, or doing body-weight exercises that focus on balance and core strength, such as planks and single-leg stands. Spend approximately 20-30 minutes per session focusing on these exercises.

TYPICAL STARTING DOSE

30 minutes

How it helps

Ankle Injury



A meta-analysis of 12 trials found balance training effective in improving the dynamic posture stability of chronic ankle instability patients [R].

Injury prevention programs with balance training reduced ankle injuries by 36% in a study of 4,959 soccer players. FIFA programs reduced injuries by 37%, while balance exercises alone reduced them by 42% [R].

A meta-analysis of 15 trials and 457 volunteers found balance training more effective than regular exercise in improving functionality, ankle instability, and dynamic balance. Compared to strength training, balance training was only more effective for functionality improvement [R].

Stability training enhances ankle strength and flexibility, which can accelerate healing and reduce the risk of future injuries.

Falls



A meta-analysis of 6 trials found that balance training reduced falls in osteoporosis patients but had no significant impact on the Berg Balance Scale and Timed Up and Go test results [R].

Another meta-analysis of 10 trials with 684 patients found balance training may be effective in improving balance ability and reducing fear of falling in patients with osteoporosis [R].

A third meta-analysis of 8 studies and 404 participants found that perturbation-based balance training reduced fall risk and fall rates in older adults and those with Parkinson's disease [R].

Low Back Injury



A study aimed to compare the short-term effects of core stabilization exercise programs and traditional exercise programs on musculoskeletal injuries in soldiers. Those in the traditional exercise group with low back injuries had longer work restrictions (8.3 days) compared to the core stabilization group (4.2 days) [R].

In a study of 36 university football players with chronic low back pain, virtual reality balance training showed positive effects on radiological and biochemical aspects compared to combined physical rehabilitation and conventional exercises [R].

Stability training strengthens the core and lower back muscles, enhancing support to the spine and improving posture.

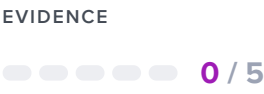
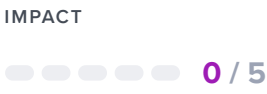
 ACL Injury



In a study of 26 male athletes post-ACL surgery, those who did eight weeks of core stability exercises before team training had improved core endurance, hip strength, knee angle, and reduced knee valgus angle during single-leg landing compared to controls [R].

Stability training strengthens the muscles around the knee, which can help maintain knee stability and prevent further injury to the ACL.

 Fractures



Stability training can help prevent falls by improving balance, particularly following lower extremity fractures.

4



Core-Strengthening Exercises

How to implement

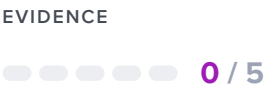
Incorporate exercises like planks, bridges, abdominal crunches, and leg lifts into your daily routine. Aim to do these exercises for 20-30 minutes, 3 times a week. Each exercise should be performed in sets of 10-15 repetitions.

TYPICAL STARTING DOSE

20 minutes

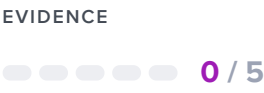
How it helps

 Abdominal Hernia



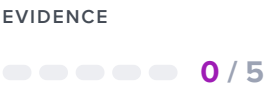
Strengthening your core muscles can help provide better support for your abdominal area, potentially reducing discomfort and preventing hernia progression.

 Ankle Injury



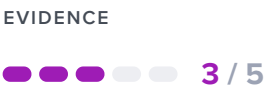
Strengthening the core can improve overall stability and reduce the stress on the injured ankle.

 Falls



Core-strengthening exercises help improve stability and posture, which are crucial in preventing falls by ensuring better balance and control.

 Low Back Injury



Regular, gentle exercise may reduce the risk of painful conditions of the back, including low back injuries [R].

Training programs aimed at strengthening the core may reduce low back injury incidence and work restriction. Types of training that may work include [R, R, R]:

- **Isometric training:** loading the spine while the trunk muscles contract to maintain the spine in a neutral position.

- **Isotonic training:** moving the lumbar spine through a range of motion while under load.
- **Motor control training:** isolated activation of the deep trunk musculature.

Physical readiness programs aimed at improving reaction to expected and unexpected sudden trunk loading may help people at high occupational risk of low back injuries, such as nurses [R, R].

Core-strengthening exercises may reduce the risk of low back injuries by strengthening the muscles that protect the back [R, R].

Please note: *Intense exercise may increase the risk of lower back injuries. Be careful to avoid exercises that involve heavy weight lifting, pulling, pushing, and bending sideways* [R, R].

 **ACL Injury**

IMPACT1 / 5

EVIDENCE1 / 5

In a non-placebo-controlled trial of 29 female soccer players, practicing pelvic and core strength training for 8 weeks improved ACL injury risk factors and vertical drop jump performance [R].

Core-strengthening exercises enhance stability in your knee joint, which is pivotal for ACL injury recovery. Furthermore, they fortify muscles around the knee, reducing strain on the ACL and preventing further injury.

 **Knee Injury**

IMPACT0 / 5

EVIDENCE0 / 5

Core strengthening supports the lower back and hips, providing a stable base that can alleviate undue stress on the knee.

5



Walking

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

How it helps

 **Abdominal Hernia**

IMPACT0 / 5

EVIDENCE0 / 5

Walking is a low-impact exercise that can help maintain general fitness and prevent weight gain, which can reduce pressure on the hernia.

 **Falls**

IMPACT2 / 5

EVIDENCE2 / 5

A meta-analysis of 11 studies involving participants with chronic diseases found that backward walking (BW) training improved balance performance significantly. BW reduced stability index scores and increased single-leg standing duration, suggesting it could benefit those at risk of falls [R].

 **Hip Fractures**

IMPACT0 / 5

EVIDENCE0 / 5

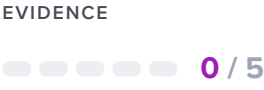
Walking is a weight-bearing exercise that helps maintain bone density and muscle strength, reducing the risk of hip fractures.

 Low Back Injury



Walking is a low-impact activity that increases blood flow and can aid in the healing process for lower back injuries.

 Knee Injury



Walking keeps the knee joint mobile and strengthens the surrounding muscles without overloading the joint.

6



Balance And Mobility Training

How to implement

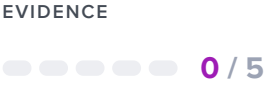
Incorporate balance and mobility exercises into your routine three to four times per week. Each session should last approximately 30 minutes and include activities such as standing on one foot, walking heel to toe, and tai chi or yoga. Start with simple exercises and gradually increase difficulty as your balance improves.

TYPICAL STARTING DOSE

30 minutes

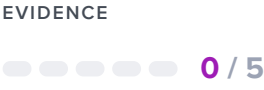
How it helps

 Ankle Injury



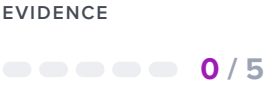
This improves proprioception and coordination, which can help prevent future injuries and aid in recovery.

 Falls



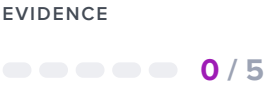
Balance and mobility training can improve muscle strength, coordination, and flexibility, reducing the risk of falls, especially for older adults.

 Hip Fractures



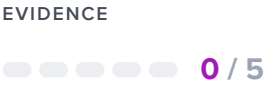
Balance and mobility training enhance stability and coordination, which can help prevent falls and subsequent hip fractures.

 Low Back Injury



Balance and mobility training can restore function and reduce the risk of further injury by improving stability.

 ACL Injury



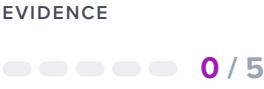
This training can aid in the restoration of stability and proprioception, which are often compromised after an ACL injury.

Fractures



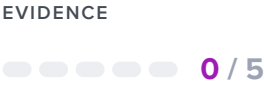
Balance and mobility training can help regain function and reduce the risk of falls post-fracture.

Knee Injury



Balance and mobility training help restore knee function and prevent future injuries by improving proprioception and coordination.

Spinal Cord Injury



Balance and mobility training can help improve movement and reduce the risk of falls in individuals with spinal cord injury by strengthening muscles and enhancing coordination.

7



Massage

How to implement

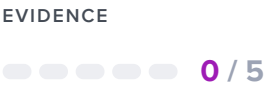
Schedule a massage session, ideally with a licensed therapist, for 30-60 minutes, once a week. Choose a type of massage that suits your specific needs, such as Swedish for relaxation or deep tissue for muscle tension.

TYPICAL STARTING DOSE

30 minutes

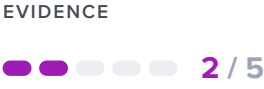
How it helps

Ankle Injury



Massage can promote relaxation, ease pain, and improve blood flow to the injured area.

Low Back Injury

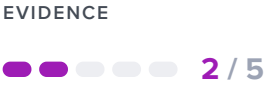


As a part of physical therapy, massage may help with back pain from low back injuries. However, the effects may only be short-term [\[R, R\]](#).

Massage may help by [\[R, R, R, R\]](#):

- Lowering muscle tension
- Lowering stress
- Blocking pain signals
- Reducing inflammation

Rotator Cuff Injury



Another study that included therapeutic massage in a rehabilitation program for junior dolphin swimmers with rotator cuff muscle efficiency issues found improvements in muscle strength, flexibility, and pain reduction [R].

A comprehensive review of manual therapies for rotator cuff disease, including massage, found that while manual therapy may not consistently improve function when used alone, it may effectively reduce pain and is generally considered safe with mild adverse effects [R].

 **Knee Injury**

IMPACT

0 / 5

EVIDENCE

0 / 5

Massage can support knee injury recovery by improving circulation, reducing muscle tension, and promoting relaxation.

 **Spinal Cord Injury**

IMPACT

0 / 5

EVIDENCE

0 / 5

Massage can help reduce muscle stiffness, alleviate pain, and improve circulation, which are common issues for individuals with spinal cord injuries.

8

Manual Therapy

How to implement

Schedule a session with a certified manual therapist, such as a physical therapist or chiropractor, once a week for at least 3 to 6 weeks. During these sessions, allow the therapist to apply hands-on techniques to manipulate muscles and joints aiming to improve mobility and reduce pain.

How it helps

 **Ankle Injury**

IMPACT

0 / 5

EVIDENCE

0 / 5

Manually manipulating the tissues can increase range of motion and decrease pain.

 **Low Back Injury**

IMPACT

0 / 5

EVIDENCE

0 / 5

Manual therapy includes hands-on techniques that can mobilize the spine and soft tissues, aiding in recovery.

 **Rotator Cuff Injury**

IMPACT

2 / 5

EVIDENCE

2 / 5

Manual therapy, when integrated into a comprehensive physiotherapy program, has shown improvements in pain reduction and increased range of motion in people with chronic rotator cuff injuries [R].

A study compared manual therapy combined with a home exercise program to placebo treatment in people with chronic rotator cuff disease. While immediate additional benefits over placebo were not evident, the manual therapy group showed greater improvements in shoulder function and strength at a 22-week follow-up, suggesting the benefits of manual therapy may take time to manifest [R].

A case series demonstrated that a combined approach involving manual therapy, exercises, and patient education tailored to individual impairments may improve symptoms and function in people with subacromial impingement syndrome, a common issue associated with rotator cuff injuries [R].

 ACL Injury



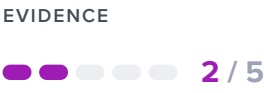
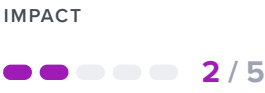
Manual therapy techniques such as massage and joint mobilization can improve knee joint function and alleviate pain.

 Shoulder Impingement



In people with rotator cuff tendinopathy, manual therapy may decrease pain. However, it’s unclear if it can also improve physical function [\[R\]](#), [\[R\]](#).

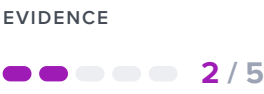
 Tendon Inflammation



In people with rotator cuff tendinopathy, manual therapy may decrease pain. However, it’s unclear if it can also improve physical function [\[R\]](#), [\[R\]](#).

Joint mobilization, a key component of manual therapy, may improve both pain and function in people with tennis elbow [\[R\]](#).

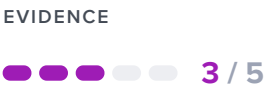
 Tendon Injury



Manual therapy involves manipulating the tissues and joints to relieve pain and improve mobility. In the case of a tendon injury, it aids in reducing inflammation, improving blood circulation and accelerating the healing process of the damaged tissues.

According to research, manual therapy may help with rotator cuff tendon injuries [\[R\]](#), [\[R\]](#).

 Tennis Elbow



Manual therapy appears to be beneficial for improving symptoms related to tennis elbow, including pain reduction and increased grip strength. Here are the key findings:

A meta-analysis of 20 studies shows joint mobilizations, especially mobilization with movement and Mill's manipulation, effectively improve pain and grip strength in people with tennis elbow [\[R\]](#).

A combination of Mulligan mobilization (a type of manual therapy) with ultrasound therapy and exercise showed improved outcomes such as pain relief and grip strength compared to ultrasound therapy alone for patients with tennis elbow [\[R\]](#).

The effectiveness of Cyriax manual therapy (another manual therapy technique) versus Muscle Energy Technique showed that both techniques are equally effective in decreasing pain, functional disability, and increasing grip strength in subjects with tennis elbow [\[R\]](#).

Manual mobilization with movement (MWM) has been specifically noted to help decrease pain and improve the strength of individuals with chronic lateral epicondylitis, a condition commonly known as tennis elbow [\[R\]](#).

9



Stretching

How to implement

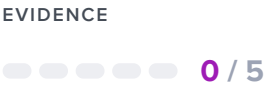
Incorporate stretching exercises into your daily routine, dedicating at least 10-15 minutes each day. Focus on major muscle groups such as the neck, shoulders, chest, back, hips, and legs. For best results, stretch both before and after other physical activities, holding each stretch for 15-30 seconds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

TYPICAL STARTING DOSE

15 minutes

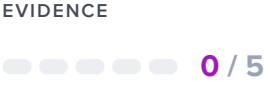
How it helps

Ankle Injury



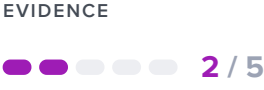
Regular stretching can help maintain flexibility and range of motion in the healing ankle.

Low Back Injury



Regular stretching can improve flexibility in the spine and surrounding muscles, reducing tension and pain.

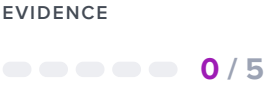
Rotator Cuff Injury



Stretching may improve shoulder flexibility without adversely affecting the strength of the shoulder's internal and external rotators. This suggests that stretching may not be detrimental before activities like throwing, which are relevant for people with rotator cuff issues [\[R\]](#).

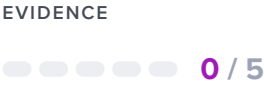
Proprioceptive exercises, which often include stretching components, may help manage shoulder pain and improve the quality of life for nursing professionals with rotator cuff disorders. This points to the broader applicability of stretching in managing rotator cuff conditions [\[R\]](#).

ACL Injury



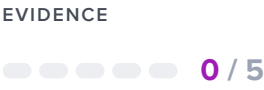
Stretching the muscles surrounding the knee joint can increase flexibility and aid in recovery.

Knee Injury



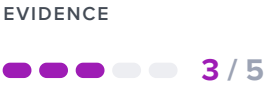
Regular stretching improves flexibility and can alleviate tension around the knee, which might contribute to pain and restrict mobility.

Spinal Cord Injury



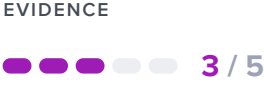
Stretching can help maintain muscle length and flexibility, preventing stiffness and contractures common after spinal cord injury.

Tendon Inflammation



Experts recommend stretching after exercise to reduce the risk of tendon inflammation. Regular stretching can improve flexibility and range of motion while reducing stiffness, potentially helping prevent tendon inflammation [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Tendon Injury



Regular stretching can improve flexibility and reduce the risk of stiffness, aiding the healing process of injured tendons.

Research suggests that stretching and flexibility training can reduce muscle damage, increase tendon stiffness, decrease passive muscle stiffness, and improve range of motion, which may contribute to lower injury rates such as hamstring strains.

Below are some of the key findings:

- Flexibility training led to a significant increase in tendon stiffness (31.2%) and a decrease in passive muscle stiffness (-14.6%) [\[R\]](#).
- Using standard stretching protocol (SSP) is significantly related to lower hamstring strain rates in professional football clubs [\[R\]](#).
- Intensive stretching programs lead to shorter times of regaining normal range of motion and rehabilitation periods for hamstring injuries [\[R\]](#).

- Modified eccentric heel-drop program reported high patient satisfaction, reduced pain, and successful return to pre-morbid activity levels. This indicates that eccentric stretching exercises can be particularly beneficial for mid-substance rather than insertional tendinopathies [R].
- Combining eccentric training with static stretching exercises was superior in reducing pain and improving function compared to eccentric training alone [R].

 Tennis Elbow



A study compared the effectiveness of deep friction massage versus stretching of wrist extensor muscles in people with tennis elbow. It found that stretching exercises improved the range of motion (ROM) of wrist flexion and extension, as well as handgrip strength, which is beneficial for the management of tennis elbow [R].

Another study found that stretching reduced symptoms at all follow-ups. The study emphasized the continuous symptom reduction and improvement in range-of-motion measurements, supporting stretching as a successful long-term management strategy for tennis elbow [R].

10



Flexibility Training

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

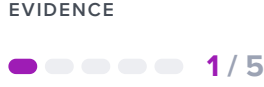
How it helps

 Ankle Injury



Improving flexibility can aid in the recovery process and prevent future injuries.

 Falls



Based on a single study, practicing flexibility training may reduce the risk of falls [R].

 Rotator Cuff Injury



Eccentric isokinetic resistance training, which is a form of flexibility training, has been shown to improve the function and structure of the external rotator cuff muscles. This type of training may increase the range of motion and potentially reduce the risk of further injury [R].

A study involving female athletes participating in overhead activities showed that strength training, which often incorporates flexibility components, increased the eccentric external total work without impacting concentric internal total work. This suggests that such training may reduce shoulder rotator muscle imbalances and lower the risk of shoulder injuries [R].

 ACL Injury



Improving flexibility can help restore the range of motion and reduce the risk of further injury.

 Knee Injury



Stretching the muscles around the knee can improve flexibility, reduce stiffness, and prevent muscle imbalances which could hinder healing.

11



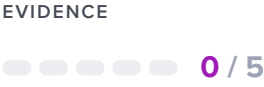
Avoid Lifting Heavy Objects

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.

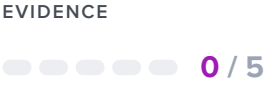
How it helps

 Abdominal Hernia



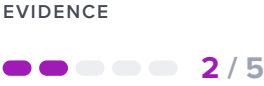
Lifting heavy objects can increase pressure on your abdominal area, which could exacerbate a hernia or cause it to recur.

 Groin Hernia



Avoiding heavy lifting is crucial because it can increase intra-abdominal pressure, potentially worsening the hernia and leading to further complications.

 Rotator Cuff Injury



Lifting heavy objects is recognized as a direct cause of rotator cuff injuries. A study noted that traumatic etiology, which includes lifting heavy objects, accounted for a portion of rotator cuff tears, indicating that heavy lifting may be a direct contributor to these injuries [\[R\]](#).

Another study showed that rotator cuff stress increases during upper limb weight-bearing lifts, which are common in people performing heavy manual labor. This stress is implicated in rotator cuff diseases, suggesting a link between lifting heavy objects and rotator cuff injuries [\[R\]](#).

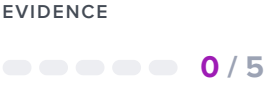
Rotator cuff myotendinous junction injuries were also reported in people engaged in activities involving heavy lifting, showing how such activities may contribute to shoulder injuries [\[R\]](#).

 Fractures



Not lifting heavy objects prevents undue strain on the skeletal structure during fracture healing.

 Knee Injury



Lifting heavy objects can put unnecessary strain on the knee; avoiding this helps minimize further injury and pain.

12



Pilates

How to implement

Engage in Pilates exercises for at least 20-30 minutes, 3 times a week. Focus on core strength, flexibility, and mindful breathing. It is suitable for both beginners and advanced individuals, adjusting the difficulty of exercises as necessary.

TYPICAL STARTING DOSE

30 minutes

How it helps



Falls

IMPACT

3 / 5

EVIDENCE

3 / 5

Multiple meta-analyses concluded that Pilates may improve postural and dynamic balance, while reducing the risk of falls, in older adults [R, R, R, R, R, R, R, R].



Low Back Injury

IMPACT

0 / 5

EVIDENCE

0 / 5

Pilates emphasizes core strength and could support the lower back, improving posture and reducing pain.



ACL Injury

IMPACT

1 / 5

EVIDENCE

1 / 5

In a non-placebo-controlled trial of 50 participants with ACL injury, practicing Pilates 3x/week for 12 weeks increased quadriceps strength [R].

Pilates strengthens the muscles surrounding the knee, which adds stability and can limit further ACL injury. It also improves flexibility, balance and body awareness, which could help prevent awkward, injury-causing movements.



Knee Injury

IMPACT

0 / 5

EVIDENCE

0 / 5

Pilates focuses on strengthening the core and improving alignment, which can indirectly support knee injury rehabilitation.

13



Kinesio Taping

How to implement

Apply kinesio tape directly to the skin over the affected muscle or joint area. The tape should be stretched slightly to create tension after being applied over the pre-cleaned skin. Typically, kinesio tape can be worn for 3 to 5 days, including during showering, before it needs to be replaced.

How it helps

 Low Back Injury



Kinesio Taping may improve back pain and mobility in people with low back injuries [R].

Kinesio Taping may help by [R]:

- Helping the spine move more smoothly
- Restoring normal muscle movement
- Improving blood flow
- Reducing pain perception

 Rotator Cuff Injury



A study involving multiple trials assessed the benefits and harms of KT for rotator cuff disease. It found very low-certainty evidence suggesting that KT may not improve pain, function, pain on motion, or active range of motion compared to sham taping or other conservative treatments. However, KT may improve quality of life compared to conservative treatments, though this evidence is also of low certainty [R].

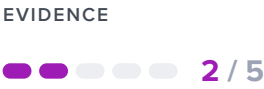
A study examining the immediate effects of KT on shoulder muscle strength and range of motion in healthy people found that KT did not cause differences in shoulder external rotation peak torque, and shoulder internal and external range of motion [R].

 Shoulder Impingement



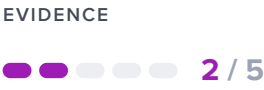
Kinesio taping may improve pain-free range of motion and quality of life in people with rotator cuff tendinopathy. However, the certainty of the evidence is very low [R, R].

 Tendon Inflammation



Kinesio taping may improve pain-free range of motion and quality of life in people with rotator cuff tendinopathy. However, the certainty of the evidence is very low [R, R].

 Tendon Injury



Kinesio Taping provides external support to the injured tendon, thereby helping reduce pain and inflammation. It also aids in the recovery process by enhancing stability and proprioceptive feedback, quickening the healing process of the tendon.

According to research, kinesio taping may help with rotator cuff tendon injuries [R, R].

14



Transcutaneous Electrical Nerve Stimulation (TENS)

How to implement

Apply TENS unit electrode pads around the area in pain; begin with the device set to a low setting and gradually increase intensity to a comfortable level. Use the device for 15-30 minutes per session for pain relief, and it can be used multiple times a day as needed.

TYPICAL STARTING DOSE
30 minutes

How it helps

 Groin Hernia



TENS may reduce pain after surgery for groin hernia repair [R].

 Hip Fractures



Perioperative TENS may improve early mobilization and physical function after hip fracture surgery [R].

 Spinal Cord Injury



In people with spinal cord injury, TENS may improve:

- Pain [R]
- Spasticity [R]
- Overactive bladder [R, R]

15



Exercise Therapy

How to implement

Begin by consulting with a physical therapist to assess your condition and create a personalized exercise plan. Follow the prescribed exercises consistently, focusing on areas needing improvement, such as strength, flexibility, or mobility. Start with gentle exercises, gradually increasing the intensity as you build strength. Ensure you perform the exercises correctly to avoid injury. Regularly check in with your therapist to adjust the plan based on your progress and feedback. Stay committed to the routine for the best results.

TYPICAL STARTING DOSE
1 hour

How it helps

 Low Back Injury



Exercise therapy focuses on specific movements and exercises to restore function and reduce pain after a lower back injury.

 Rotator Cuff Injury



A study evaluated the effect of 12 weeks of progressive early active exercise therapy after surgical repair of traumatic full-thickness rotator cuff tears. The study found no difference in shoulder function, pain, and quality of life compared with usual care at 12 weeks and 1 year post-surgery. However, both groups showed improvements over time in all outcomes, indicating the overall benefit of exercise post-surgery [R].

A qualitative study explored how exercise therapy influenced clinical outcomes in people with rotator cuff-related shoulder pain. It identified three causal explanations for the benefits of exercise: improved shoulder strength, changes to psycho-emotional status, and overall health effects. The success of exercise therapy was contingent on a strong therapeutic relationship, a structured program, and timely clinical progress [R].

 ACL Injury



Structured exercise therapy can help rebuild strength and mobility in the knee joint, which is essential for recovery post-ACL injury.

 Fractures



Exercise therapy can help restore movement and strength in areas affected by a fracture.

 Knee Injury



Exercise therapy can help to restore strength and mobility in the knee, aiding the recovery process.

 Shoulder Impingement



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries, including tendon inflammation. Exercise therapy may help with inflammation of the [R, R, R, R]:

- Achilles tendon [R, R, R]
- Rotator cuff [R, R, R]
- Lateral elbow tendons [R, R]
- Kneecap [R, R, R, R, R]
- Glutes [R]

 Spinal Cord Injury



Exercise therapy can help improve cardiovascular health, muscle strength, and overall physical function, which is crucial for individuals with spinal cord injury.

 Tendon Inflammation



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries, including tendon inflammation. Exercise therapy may help with inflammation of the [R, R, R, R]:

- Achilles tendon [R, R, R]
- Rotator cuff [R, R, R]
- Lateral elbow tendons [R, R]
- Kneecap [R, R, R, R, R]
- Glutes [R]

 Tendon Injury



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries. Exercise therapy may help with injuries in the [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Achilles tendon [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Rotator cuff [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Lateral elbow tendons [\[R\]](#), [\[R\]](#)
- Kneecap [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Glutes [\[R\]](#)

 Tennis Elbow

IMPACT



EVIDENCE



Experts say exercise therapy is the most effective strategy to improve pain, physical function, and quality of life in people with tendon injuries, including tendon inflammation. Exercise therapy may help with inflammation of the [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Achilles tendon [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Rotator cuff [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Lateral elbow tendons [\[R\]](#), [\[R\]](#)
- Kneecap [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Glutes [\[R\]](#)

Pain

Summary Report

REPORT CATEGORY —



John Doe

Report date: 30 October 2024

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03 How this works

- 06 Impact
- 06 Evidence
- 07 Some things to keep in mind

08 Summary

09 Overview of Your Results

10 Your Results in Details

- 10 Chronic Pain
- 13 Musculoskeletal Pain
- 22 Headaches

28 Recommendations

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

John Doe

SEX AT BIRTH

Male

HEIGHT

5ft 11" 180.4cm

WEIGHT

177lb 80.3kg

REPORT PROVIDED BY

PlexusDx

✉ support@plexusdx.com

🌐 <https://plexusdx.com>

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.



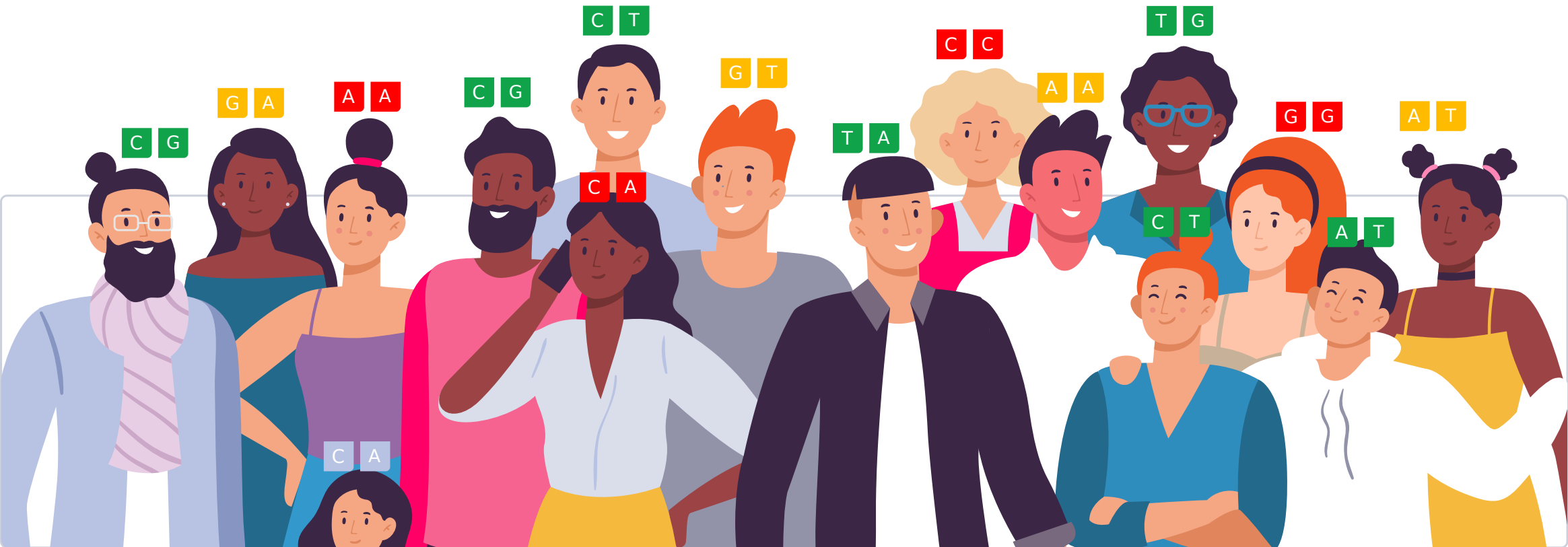
Similarly, our Trait Reports look at how your DNA influences your traits.



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.

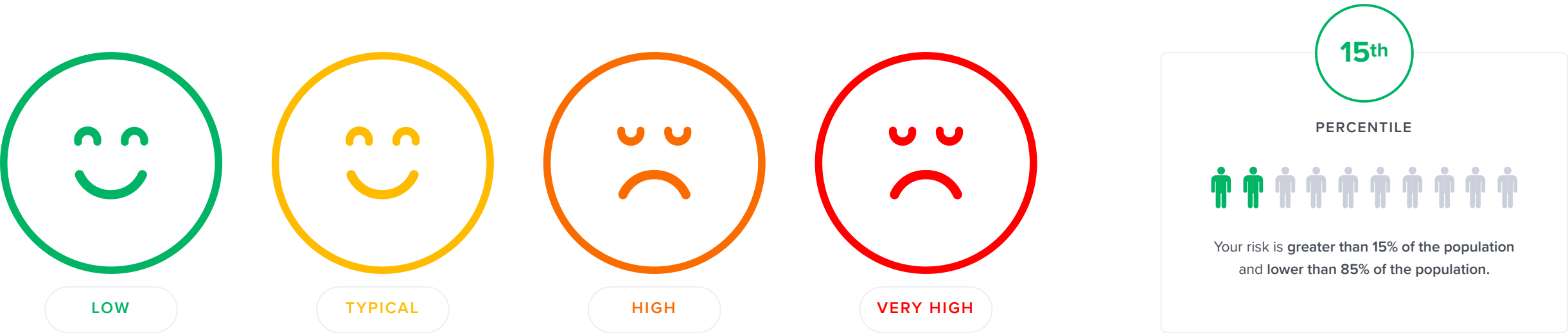
Our Summary Reports combine different Wellness and Trait Reports related to a certain health topic. They give you a more complete picture about different aspects of your health and wellness.



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:

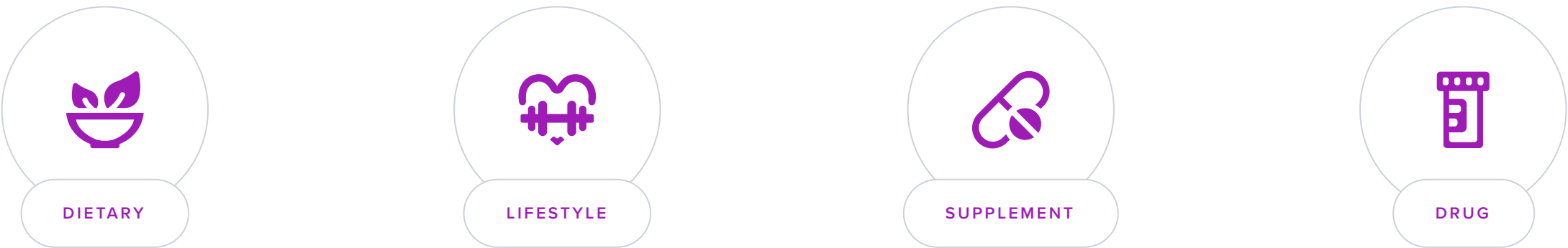


Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

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):



In Summary Reports, we combine top evidence-based recommendations for different conditions.

We focus on recommendations that help with more conditions included in a Summary Report.

For each recommendation, we list all conditions it may help with. We also include impact, evidence, regimen, personalized parts, and other details specific to each condition.

1

Recommendation

Helps with the following

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5



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:

- The scores/gauges use the latest scientific studies. But they are not perfect and will change as the models improve.
- Not everyone with risk variants will develop a health condition.
- Genetics is not the whole story. Your health is most often a combination of genetics, lifestyle, and environmental factors. Great news, as this means that you can often change your lifestyle to lower your risk.
- Results might be more accurate for some ethnic groups than others. This depends on the studies used in each report.
- People without risk variants can also develop health conditions.
- It's important to work with your doctor to better understand your risks. Our reports do not diagnose or treat any health condition. They are not a substitute for medical advice. If you're diagnosed with a certain health condition, follow your doctor's advice.

Summary

We all experience pain from time to time, from stubbing a toe to hurting our knee or having a migraine attack. What makes us all different is the amount of pain we experience and how we handle it. **There are lots of reasons for that, one of which is your DNA!**

Your genetic predispositions may make you prone to chronic pain, different painful conditions, or simply affect your pain thresholds. However, these risks can also be made better or worse through diet and lifestyle.

This comprehensive report will help you examine your pain genetics and make wiser health decisions regarding:

- Chronic pain
- Headaches
- Musculoskeletal pain

This summary report contains:

9 Genetic Results

50 Recommendations

Overview of Your Results

Chronic Pain

TYPICAL LIKELIHOOD

Chronic Pain

Typical likelihood of chronic pain

Musculoskeletal Pain

MORE LIKELY

Knee Pain

More likely to have knee pain

TYPICAL LIKELIHOOD

Hip Pain

Typical likelihood of hip pain

TYPICAL LIKELIHOOD

Back Pain

Typical likelihood of back pain

TYPICAL LIKELIHOOD

Shoulder & Neck Pain

Typical likelihood of shoulder and neck pain

TYPICAL LIKELIHOOD

Joint Pain

Typical likelihood of osteoarthritis

Headaches

TYPICAL LIKELIHOOD

Cluster Headaches

Typical likelihood of cluster headaches

MORE LIKELY

Migraines

More likely to have migraines

TYPICAL LIKELIHOOD

Headache

Typical likelihood of headaches

Your Results in Details





TYPICAL LIKELIHOOD

Chronic Pain

Typical likelihood of chronic pain



Chronic Pain

About 1 in 5 adults in the US deal with some kind of chronic pain. It is linked to numerous issues like opioid dependence and mental health disorders. Chronic pain is a major reason for lost productivity at work and reduced quality of life.

We tend to think of chronic pain as something to worry about when we are older. While generally true, younger people can experience it from a variety of causes too. **Your genetic predispositions can have a big impact on this.** Understanding these factors can help you mitigate the risks and make smarter health decisions!

Chronic Pain

Key Takeaways:

- About **1 in 5 Americans** report experiencing some form of chronic pain.
- Risk factors include being female, older age, poverty, previous injury, mental health problems, and your genetics.
- With a high genetic risk, you may want to be more mindful of other factors that can increase risk.
- Click the **next steps** tab for relevant lifestyle factors.

Pain is discomfort with a purpose. It tells us, loud and clear, that something is wrong [\[R\]](#).

There are two major types of pain [\[R\]](#):

- **Acute pain** happens right after damage to the body. It can last a few seconds or up to six months, while the body heals
- **Chronic pain** can happen even when there's no damage. It can last 6 months or more and doesn't always have an obvious cause

In the United States, 1 in 5 people report having some form of chronic pain. Types of chronic pain include [\[R\]](#), [\[R\]](#):

- Lower-back pain
- [Headaches](#)
- Widespread pain
- Nerve pain

It's important to identify and manage chronic pain. **Pain can have major, lasting effects on quality of life.** It can even impact mental health [\[R\]](#).

Unfortunately, chronic pain is difficult to diagnose. This is because people feel and describe pain differently. For example, older people might say they're sore or uncomfortable, whereas others might say something hurts [\[R\]](#).

It can also be difficult to find the underlying cause, if any. A doctor may have to rule out dozens of potential causes [\[R\]](#).

Chronic pain is also difficult to treat. People often turn to painkillers to help manage their discomfort [\[R\]](#).

The most common types of pain medications are [\[R\]](#), [\[R\]](#), [\[R\]](#):

- **NSAIDs** (like ibuprofen or naproxen). These reduce pain and inflammation.



TYPICAL LIKELIHOOD

Typical likelihood of chronic pain based on 611,315 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
SERPINA6	rs941601	TT
ADRB2	rs1042713	AG
HTR2A	rs6313	AA
ADRB2	rs2053044	GA
HTR1B	rs6296	GC
ANKK1	rs1800497	AG
COMT	rs4680	AG
MLN	rs11751591	GG
ANAPC4	rs34811474	GG
DCC	rs62098013	AA
FAM120AOS	rs10992729	CC
PCCB	rs6770476	TT
SLC24A3	rs2424248	AG
CA10	rs11079993	TG
UTRN	rs6926377	AC
SP4	rs7798894	AT
SDCCAG8	rs12071912	CT
FOXP2	rs12537376	AG
LRRTM1	rs4852567	GA
DCAKD	rs11871043	TC

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

- **Opioids** (like oxycodone, morphine, or fentanyl). These mimic the body's natural opioids. They create pleasant feelings and block pain.

Painkillers may work better for some people than others. Long-term use of opioids also comes with the risk of addiction and abuse. Thus, many people turn to alternative practices to manage pain. Acupuncture, massage, and yoga are all popular strategies [R, R, R, R, R].

Risk factors for chronic pain include [R, R]:

- Female gender
- Older age
- Poverty
- Previous injury
- Mental health problems
- **Genetics**

Genetics plays an important role in the development of chronic pain. Genes that contribute to pain tend to influence [R, R, R, R, R, R, R, R]:

- Brain chemistry ([DRD2](#), [HTR2A](#))
- Stress and adrenaline ([ADRA1A](#), [ADRB2](#), [FKBP5](#))
- Nerve activity ([SCN9A](#), [MYT1L](#))

Genetically high neutrophil levels may be causally associated with a lower risk of chronic pain [R].



Musculoskeletal Pain

Neck and wrist pain from hunching over and typing on that keyboard for too long? A demanding job is causing knee pain or recurrent back aches? **Our joints, tendons, and muscles are exposed to constant wear and tear, which can lead to various painful conditions over time.**

Your genetic predisposition may affect everything from the risk of a painful condition to how you react to and manage the pain. Use this knowledge to make smarter decisions and avoid pain more efficiently.



MORE LIKELY

Knee Pain

More likely to have knee pain



TYPICAL LIKELIHOOD

Hip Pain

Typical likelihood of hip pain



TYPICAL LIKELIHOOD

Back Pain

Typical likelihood of back pain



TYPICAL LIKELIHOOD

Shoulder & Neck Pain

Typical likelihood of shoulder and neck pain



TYPICAL LIKELIHOOD

Joint Pain

Typical likelihood of osteoarthritis

Knee Pain

Knee pain is a common complaint with many potential causes, including injuries, overuse, and arthritis.

A number of factors can increase your risk of having knee pain, including [\[R\]](#):

- Excess weight
- Poor flexibility and strength
- High-impact sports or occupations
- Previous injury
- Older age (for arthritis)
- Genetics

Genetics plays a role in many conditions that cause knee pain, such as injuries and osteoarthritis. Involved genes may affect inflammation, bone density, cartilage function, and more [\[R\]](#), [\[R\]](#), [\[R\]](#).



MORE LIKELY

More likely to have knee pain based on 947,637 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
COL27A1	rs919642	AA
CPNE1	rs6120946	AT
CPNE1	rs143384	AG
COL27A1	rs2808772	GA
EPHA5	rs201194999	CC
COL11A1	rs2622873	CT
ICA1L	rs62182810	AG
BRINP3	rs72727240	TT
MAB21L3	rs79678808	AA
CDC42BPA	rs56339347	AA
/	rs567271467	GG
CDC42BPA	rs573881227	CC
SCUBE1	rs528981060	GG
SLC39A8	rs13107325	CC
TGFB1	rs75621460	GG
TGFA	rs3771501	GG
H4C8	rs115740542	TT
GPR37L1	rs74136729	AA
PTPRC	rs79211001	AA
SGIP1	rs74810564	GG

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

Hip Pain

Hip pain is a common ailment with a wide variety of causes, such as arthritis, joint inflammation, or injuries. The two main types of hip pain are internal and external.

A number of factors can contribute to hip pain, including [R](#), [R](#), [R](#), [R](#):

- Obesity
- Older age
- Sedentary lifestyle
- Certain sports and professions
- Weak bones
- Poor diet
- **Genetics**



TYPICAL LIKELIHOOD

Typical likelihood of hip pain based on 420,074 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
KAZN	rs549908604	AA
HIPK1	rs149055514	AA
PBX1	rs506068	CC
PGLYRP3	rs117034852	TT
SEMA4A	rs531735825	CC
FNDC7	rs181938434	GG
PGLYRP3	rs118113194	CC
KIAA1614	rs144390511	CC
KAZN	rs115204536	TT
KIF1B	rs143020152	GG
VPS13D	rs138529300	CC
ATAD3C	rs111262777	AA
FAM20B	rs138336064	TT
CTTNBP2NL	rs116671687	CC
LHX4	rs78614038	CC
MAN1A2	rs189116872	TT
MAN1A2	rs116275925	AA
SSU72	rs180728791	CC
ASTN1	rs115115964	GG
RRNAD1	rs116417099	CC

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

Back Pain

Key Takeaways:

- Up to **25%** of differences in people's chances of developing back pain may be attributed to genetics. It is more likely to occur as you get older.
- Risk factors: injuries, health conditions, poor posture, aging, smoking, lack of fitness, overweight, your genetics.
- If you have high genetic risk or symptoms, take action now on your modifiable risk factors to reduce your overall risk.
- Click the **next steps** tab for relevant lifestyle factors.

Back pain is extremely common. In fact, up to 1 in 4 adults suffer from chronic lower back pain. **Up to 84% of people are estimated to have back pain at some point in their lives** [R].

Back pain can be acute or chronic. Acute back pain is brief (days or weeks) and usually has a clear cause. It normally resolves on its own and is fairly easy to treat. Chronic back pain is long-lasting (months or years). The cause can be tough to determine, which makes it harder to treat. **About 1 in 5 cases of acute back pain becomes chronic** [R].

Risk factors for lower back pain include [R, R]:

- Injuries
- Health conditions
- Poor posture
- Aging
- Smoking
- Lack of fitness
- Weight gain
- **Genetics**

Back pain may come with other symptoms, such as increased sensitivity to pain and touch [R].

One type of back pain is called **sciatica**. Sciatica is pain in the lower back that radiates through the hips and down the back of the leg. It is caused by pressure on the sciatic nerve, which runs through these areas. Sciatica tends to occur on one side of the body [R, R, R].

Fortunately, mild sciatica often goes away on its own over time. However, more severe or long-lasting symptoms may need medical treatment [R].

Treatment options for back pain include [R, R, R]:

- Medication



TYPICAL LIKELIHOOD

Typical likelihood of back pain based on 13,559 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GSDMC	rs6651255	CT
ITGA1	rs13174042	CT
DCC	rs4384683	GG
MYC	rs7833174	CT
DIS3L2	rs1453867	CT
/	rs543634974	CC
MME	rs540690425	CC
SOX5	rs12310519	CC
CTSC	rs217095	TT
CCDC196	rs144740416	CC
CACNB2	rs189997399	AA
COL12A1	rs146452235	CC
ERI3	rs150678734	TT
UROS	rs186296138	GG
LRP1	rs149305474	GG
GML	rs147507753	TT
EGFR	rs145967840	CC
LRATD1	rs374707240	CC
NUDT15	rs9652197	TT
U2SURP	rs116472002	AA

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

- Hot or cold packs
- Physical therapy
- Surgery

Left untreated, some types of back pain can cause further problems. For example, severe sciatica can cause permanent nerve damage [\[R\]](#), [\[R\]](#).

Up to 25% of differences in people's chances of developing back pain may be attributed to genetics. Genes involved in back pain may influence [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Bone and joint development ([NFIB](#), [COL11A2](#))
- Inflammation ([HLA-DRB5](#))
- Nerve function ([MYO5A](#))

Genetically high levels of omega-3s may be causally associated with a lower risk of back pain [\[R\]](#).

Shoulder & Neck Pain

Key Takeaways:

- About **1 in 5 adults** have neck or shoulder pain.
- Up to **65%** of differences in people's chances of having shoulder and neck pain may be due to genetics.
- Other risk factors include: poor posture, prolonged sitting, poor sleep position, injury and overuse, stress, and older age.
- If you have high genetic risk or are experiencing symptoms, take action on modifiable factors like posture and sleep position.
- Click the **Recommendations** tab for potential lifestyle changes and **next steps** for relevant labs.

Your shoulders and neck are made up of many muscles, tendons, bones, and nerves in a complicated web. **An injury to any part of this system can lead to pain** [R, R].

About 1 in 5 adults struggle with shoulder or neck pain [R, R].

Most of the time, shoulder or neck pain is nothing to worry about. But sometimes it can be a symptom of a bigger problem. It can sometimes progress and even become disabling [R, R].

Many people find their lives changed by shoulder and neck pain.

There is also a significant economic cost, as people may not be able to work [R].

Risk factors for shoulder and neck pain include [R, R, R, R]:

- Poor posture
- Prolonged sitting
- Poor sleep position
- Injury and overuse
- Stress
- Older age

The most common neck injury is called *whiplash*. It can cause pain, loss of mobility, and stiffness. Whiplash occurs when the neck suddenly bends back and forth. Car crashes, contact sports, or assault can all lead to whiplash [R, R].

Diagnosis and treatment of shoulder and neck pain depend on the underlying cause. Your doctor will decide on the appropriate strategy, which may include [R, R, R, R]:

- Medication



TYPICAL LIKELIHOOD

Typical likelihood of shoulder and neck pain based on 924,669 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CTRC	rs76827641	AA
UBE2J2	rs148734489	GG
ATAD3A	rs185493637	GG
SAMD11	rs150344285	GG
/	rs28676717	GG
/	rs201849880	TT
WNT4	rs139121331	CC
EFHD2	rs60181764	CC
/	rs12117533	GG
AJAP1	rs76062163	AA
CDK11A	rs2377229	AA
PLCH2	rs188383352	GG
VPS13D	rs564328546	TT
PRDM2	rs114362297	CA
C1ORF127	rs9430331	GA
CDK11A	rs187812406	GG
PRAMEF11	rs185548955	GG
NPHP4	rs9726616	CC
PRKCZ	rs72636362	AA
DHRS3	rs11582380	CC

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

- Physiotherapy
- Surgery

Many people also use complementary strategies to help manage shoulder and neck pain. These include [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Heat or [cold](#) packs
- [Acupuncture](#)
- [Yoga](#)
- Electrical tools like [TENS units](#)
- Chiropractic adjustment

Up to 68% of differences in people's chances of having shoulder and neck pain may be attributed to genetics. Genes that may play a role in shoulder and neck pain influence [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Brain function ([FOXP2](#))
- Pain perception ([KCNS1](#), [GCH1](#), [ADRB2](#))
- Inflammation ([SLC39A8](#), [ANXA1](#))

Joint Pain

Key Takeaways:

- Osteoarthritis will affect the majority of people over the age of 55. So, even with low genetic risk, the overall risk is still high for older people.
- About **50%** of the differences in people's chances of getting osteoarthritis may be due to genetics.
- Higher genetic risk may mean earlier onset and a greater impact from potential risk factors.
- Risk factors include: being female, joint injury or overuse, obesity, bone deformities, and diabetes.
- Click the **next steps** tab for relevant labs and lifestyle factors.

Osteoarthritis tends to affect knees, hands, and hips. People with this condition may experience [\[R\]](#), [\[R\]](#):

- Joint pain and stiffness
- Difficulty moving
- Weakness and balance problems

Most people with osteoarthritis are over the age of 55. In fact, older age is the number one risk factor for this condition. Other risk factors include [\[R\]](#), [\[R\]](#):

- Being a woman
- Joint injury or overuse
- Obesity
- Bone deformities
- Diabetes
- **Genetics**

About 50% of the differences in people's chances of getting osteoarthritis can be attributed to genetics. Genes that contribute to osteoarthritis may influence [\[R\]](#), [\[R\]](#), [\[R\]](#):

- [Collagen](#) production in the joints ([COL2A1](#), [COL11A1](#), and [COL1A1](#))
- Inflammation ([IL1B](#), [IL4R](#), [IL17A](#), [IL17F](#) and [IL6](#))
- Activity of joint cells ([ESR1](#))
- Bone formation ([FRZB](#), [VDR](#))
- Bone strength ([IGF1](#), [TGFB1](#), [TIMP3](#), and [ADAM12](#))

Genetically high levels of the following markers may be causally associated with a high risk of hip and knee osteoarthritis:

- IGF-1 [\[R\]](#), [\[R\]](#)
- Testosterone [\[R\]](#)



TYPICAL LIKELIHOOD

Typical likelihood of osteoarthritis based on 385,825 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
EPHA5	rs201194999	CC
SRR	rs216175	AA
FAM53A	rs798726	CC
ANAPC4	rs34811474	GG
ER11	rs330050	GG
HLA-DPB1	rs2856821	TT
TGFB2	rs2785988	AA
SLC44A2	rs1560707	TT
DPEP1	rs1126464	GG
SLC44A2	rs10405617	AA
GLIS3	rs10974438	AA
TMEM241	rs10502437	GG
COL11A1	rs2622873	CT
ICA1L	rs62182810	AG
CSK	rs35206230	TC
LYZ	rs317630	TC
RAB28	rs1913707	GA
TSKU	rs1149620	AT
PRDM5	rs11729628	GT
SOCS2	rs2171126	CT

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

In contrast, genetically high ApoB levels may be associated with a lower risk [\[R\]](#).



Headaches

Headaches are one of those conditions that anyone can experience at any age. When they are more regular and more severe, like migraines, they can become a major disruptor to your quality of life.

Your genetic predispositions can affect everything related to headaches, including causes, symptoms, and best ways to soothe them.



TYPICAL LIKELIHOOD

Cluster Headaches

Typical likelihood of cluster headaches



MORE LIKELY

Migraines

More likely to have migraines



TYPICAL LIKELIHOOD

Headache

Typical likelihood of headaches

Cluster Headaches

A cluster headache is a type of severe headache with bouts of frequent attacks, known as cluster periods.

Attacks may be triggered by [\[R\]](#):

- Alcohol
- High altitudes
- Bright light
- Heavy physical activity
- Heat
- Eating foods high in nitrites
- Certain medicines
- Illicit drugs like cocaine

Some of the risk factors for cluster headaches include [\[R\]](#):

- Male sex
- Age 20 to 40
- Smoking
- **Genetics**

Genetics may explain about **25%** of the differences in people’s odds of cluster headaches [\[R\]](#), [\[R\]](#).



TYPICAL LIKELIHOOD

Typical likelihood of cluster headaches based on 980 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
DUSP10	rs12121134	TT
MERTK	rs4519530	TC
ACOX3	rs532676091	CC
FAM83F	rs147178151	GG
ZFHX4	rs143338229	CC
GLIS3	rs17701298	AA
FSHR	rs150773296	GG
MPHOSPH6	rs74032638	GG
PDCD1LG2	rs56072800	CC
CASZ1	rs187005173	GG
/	rs940585704	AA
NBPF4	rs181656519	GG
ZNF536	rs192460713	GG
STK36	rs184611112	GG
ARHGAP22	rs4838415	GG
COLEC12	rs34395012	CC
/	rs56816776	GG
MADCAM1	rs3745925	CC
PKP3	rs148636348	GA
RASGEF1B	rs67356218	GA

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

Migraines

Key Takeaways:

- Up to **64%** of differences in people's chances of developing migraine may be due to genetics.
- Risk factors include: obesity, depression, stress, being female, blood vessel issues, brain chemical imbalances.
- If you have a high genetic risk, take action on modifiable risk factors to help reduce overall risk.
- About **16%** of Americans regularly have migraines. So, even if your genetic risk is low, you don't want to ignore this condition.
- Click the **Recommendations** tab for potential dietary and lifestyle changes and **next steps** for relevant labs.

About **16% of Americans regularly have migraines** [R](#).

For a long time, researchers thought migraines were only caused by widening blood vessels in the brain. However, new research suggests that it's more complicated. Possible causes include [R](#), [R](#):

- Blood vessel problems
- Changes in nerve pathways linked to pain
- Imbalances in serotonin or other brain messengers

Risk factors for migraines include [R](#):

- Obesity
- Depression
- Stress
- Being female

Migraines aren't just headaches, and pain isn't the only symptom.

People with migraines also commonly experience [R](#), [R](#):

- Nausea
- Sensitivity to bright light or loud sounds
- Fatigue
- Neck stiffness
- Dizziness
- Aura (flashing lights, moving lines, blind spots, etc.)

Migraine attacks can last from hours to days. They can even be bad enough to cause people to miss work. In fact, migraine is one of the most common causes of disability in people under 50 years old [R](#), [R](#), [R](#).

People sometimes go through periods with several migraines and then stretches with none [R](#).



MORE LIKELY

More likely to have migraines based on 109,603 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
TRPM8	rs10166942	TT
STAT6	rs11172113	TT
NAXE	rs2274316	CC
PHACTR1	rs9349379	GA
IRAG1	rs4910165	CG
MTHFR	rs1801133	AG
AOC1	rs2052129	GT
IFT43	rs75002882	GG
DHX36	rs13078967	AA
CARF	rs138556413	CC
NOS2	rs2297518	AG
AOC1	rs10156191	CT
LY6G5C	rs74434374	CC
NAXE	rs2274319	TT
MRPS6	rs28451064	GG
RABGAP1L	rs11487328	GG
HTR2C	rs3813929	T
PNPLA7	rs4278223	TT
SUGCT	rs10234636	TC
HPSE2	rs12260159	AG

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

Unfortunately, there is no "cure" for chronic, severe migraines. Instead, people with migraines are often prescribed medications to [R](#):

- Relieve symptoms during an attack
- Prevent the next attack

Up to 64% of differences in people's chances of developing migraine may be attributed to genetics. Genes involved in migraine may influence [R](#):

- Nerve cell activity ([COMT](#), [CACNA1A](#), [SCN1A](#))
- Sleep-wake cycles ([CLOCK](#), [CSNK1D](#))
- [DNA methylation](#) ([MTHFR](#))

Headache

Key Takeaways:

- About **45%** of the differences in people's chances of developing headaches may be due to genetics.
- Modifiable factors like diet and stress may be equally important, so make sure to address them.
- About **75%** of Americans will experience a headache this year. A good genetic result doesn't mean you should ignore potential risks.
- Click the **next steps** tab for relevant labs and lifestyle factors.

Nearly everyone suffers the occasional headache. In fact, around 95% of all people get them at some point in their life [R]. Some headaches are not caused by an underlying condition. These are called *primary* headaches. The main types are [R]:

- Tension headache
- Migraine
- Cluster headache

Tension headaches are the most common. People with these headaches often feel like something tight is pressing around their head [R, R].

Migraines are the second-most common type. These aren't just headaches, and pain isn't the only symptom. People with migraines often also experience symptoms like nausea and sensitivity to light or sound [R, R].

Only about 0.1% of people get cluster headaches. They're extremely painful and short, typically lasting between 15 minutes and 3 hours. They often cause [R, R]:

- Pain on one side of the head
- Tear production
- Runny nose
- Red eyes
- Drooping eyelids
- Sweating

Headaches caused by an underlying condition are called *secondary* headaches. They can be caused by [R]:

- Infection
- High blood pressure
- Nerve problems
- Head injury
- Medication overuse
- Tumors
- Stroke



Typical likelihood of headaches based on 439,774 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
TRPM8	rs10166942	TT
STAT6	rs11172113	TT
NAXE	rs2274316	CC
MAGI1	rs1495452	AG
PHACTR1	rs9349379	GA
IRAG1	rs4910165	CG
MTHFR	rs1801133	AG
AOC1	rs2052129	GT
HNRNPA2B1	rs76473094	CC
TGFBR3	rs10493859	CA
CHSY3	rs17635642	CC
FGF23	rs7308018	AA
DHX36	rs34097149	TT
STAT6	rs11172113	TT
GPN3	rs7300001	AA
TRPM8	rs2362290	GG
BTN3A2	rs2072806	CC
PLEKHA1	rs78438709	GA
PHACTR1	rs9349379	GA
HTR2A	rs6313	AA

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

Fortunately, **most headaches are mild and can be treated at home with common painkillers**. However, some may have underlying causes that require special treatment [\[R\]](#), [\[R\]](#).

Around 45% of the differences in people's chances of developing headaches may be attributed to genetics. Genes involved in headaches may influence [\[R\]](#), [\[R\]](#):

- Clearance of waste from the brain ([LRP1](#))
- Stress hormones ([CRHR1](#))
- Brain cell function ([STAT6](#))

This report focuses on headaches other than migraines. For personalized genetics-based information on migraines, check out our Migraines Report.

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.

- 1

Aerobic Exercise (Cardio)
- 2

Acupuncture
- 3

Meditation
- 4

Ginger
- 5

Yoga
- 6

Cold Applications
- 7

Omega-3 (Fish Oil)
- 8

Avoid Food Triggers
- 9

Avoid Sensory Triggers
- 10

Cognitive-Behavioral Therapy (CBT)
- 11

Acupressure
- 12

Low-Level Laser Therapy (LLLT)
- 13

Avoid Monosodium Glutamate (MSG)
- 14

Biofeedback
- 15

Butterbur

1

Aerobic Exercise (Cardio)

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

How it helps

 Knee Pain

IMPACT

3 / 5

EVIDENCE

3 / 5

A lack of physical activity may contribute to knee pain. If muscles and tendons are weak and out of shape, the risk of knee injury is high [R, R].

Regular **stretching and low-impact exercise** (including walking or cycling) offer the best protection against knee injuries and pain. On the other hand, high-impact activities and some sports may contribute to knee pain [R, R, R].

Educating people about proper exercise programs may reduce knee pain due to osteoarthritis [R].

Please note: *High-impact exercise may increase the risk of knee pain. Be careful with lifting heavy weights, intense running, and high-impact sports like skiing or basketball* [R, R].

 Migraines

IMPACT

4 / 5

EVIDENCE

4 / 5

Aerobic exercises, like brisk walking or cycling, can help reduce the frequency and severity of migraines by boosting your body's production of natural painkillers called endorphins. Furthermore, it helps to reduce stress and improves sleep, factors which can trigger migraines.

Four meta-analyses (the largest one with 21 trials and 1195 patients) found **low- to moderate-quality evidence** that aerobic exercise, **especially at high intensity, decreases the number of migraine days/month (by 0.6 days), attack duration (by 20-27%), pain intensity (by 20-54%), and medication use while increasing quality of life.** However, one of them found **strength training more effective** [R, R, R, R].

 Back Pain

IMPACT

4 / 5

EVIDENCE

4 / 5

Experts recommend exercise to prevent back pain. Chronic back pain is less likely to develop in people who exercise regularly [R, R, R, R, R, R, R, R, R, R].

Exercise may also help reduce pain intensity and improve mobility. **Low-impact exercises may be best.** Aerobic exercise such as walking may help [R, R, R, R, R, R].

Exercise may help by:

- Strengthening core muscles that support the back [R, R]
- Increasing pain-relieving chemicals in the brain [R]

 Chronic Pain

IMPACT

2 / 5

EVIDENCE

3 / 5

Aerobic exercise, like cardio, boosts the production of endorphins in your body, which are natural painkillers that also improve your mood. Regular exercise also helps to reduce inflammation and strengthen muscles, effectively managing and reducing chronic pain.

A [meta-analysis of 27 studies](#) concluded that aerobic exercise **reduces pain and improves aerobic capacity and quality of life (physical function)** in people with chronic pain. However, **a single bout of aerobic exercise only improves pain in healthy individuals but not in those with chronic pain** according to another [meta-analysis \(13 studies\)](#) [\[R\]](#), [\[R\]](#).

 Headache



Aerobic exercise helps in reducing tension and improves blood circulation, which can decrease the occurrence and severity of headaches. It also aids in stress reduction and better sleep, both of which are known triggers for headaches.

A [meta-analysis of 27 studies](#) concluded that aerobic exercise **reduces headache duration in people with tension-type headache** [\[R\]](#).

 Hip Pain



According to health experts, gentle [exercise](#) is one of the best things you can do to manage joint pain, including in the hip [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Types of exercise that can be good for hip joint pain include [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Walking
- Cycling
- Swimming
- Water aerobics
- Yoga
- Tai chi

However, not all studies found aerobic exercise beneficial for hip pain [\[R\]](#).

Aquatic exercise includes swimming and water aerobics. This type of exercise improves pain, strength, and flexibility without putting a lot of strain on the painful joints. People tend to stick to aquatic exercise better than other types of training because it’s more comfortable [\[R\]](#).

 Joint Pain



Aerobic exercise promotes circulation, bringing nutrients to joints, reducing inflammation, and strengthening the muscles that support joints. Ultimately, this decreases joint pain and promotes overall joint health.

A [meta-analysis of 8 studies](#) found both aerobic and resistance training **effective at reducing pain in people with knee osteoarthritis** [\[R\]](#).

[Two meta-analyses \(the largest one with 103 trials and 9134 participants\)](#) found that **aerobic, exercise is most effective at improving pain and performance.** Aerobic exercise was **more effective with an increased number of supervised sessions and when practiced 3x/week** [\[R\]](#), [\[R\]](#).

 Shoulder & Neck Pain



Experts agree that exercise therapy may help with neck pain. Strength training may be most effective, but adding aerobic exercise may further enhance its benefits [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

It may also help with pain from neck injuries like whiplash [\[R\]](#), [\[R\]](#).

Exercise therapy may help with pain from shoulder injury, but the evidence is mixed [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Exercise therapy may help by [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Improving posture
- Restoring normal muscle movement

- Boosting opioids and other pain-relieving compounds

Please note: *Talk to your doctor or physiotherapist before trying out new exercises. People with certain types of pain should be careful not to over-exercise, as this may worsen pain.*

2



Acupuncture

How to implement

Visit a licensed acupuncturist for a session, typically lasting between 30 to 60 minutes, once or twice a week. Depending on your specific condition, a course of treatment might range from a few weeks to several months.

TYPICAL STARTING DOSE

1 hour

How it helps

Knee Pain



Acupuncture may improve knee pain from osteoarthritis. However, most studies are of low quality, and the benefits may be limited to the short term [R, R, R, R, R, R].

In line with this, experts say that acupuncture may help improve knee pain, but they also warn about limited evidence. According to them, acupuncture should only be applied as part of physical therapy [R, R].

Acupuncture may help by blocking pain signals [R, R, R].

Please note: *Acupuncture is generally safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information [R].*

Migraines



Experts note that acupuncture may help reduce migraine pain and frequency [R, R, R, R, R, R, R, R].

It may help by releasing natural pain-relieving compounds [R].

Please note: *Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information [R].*

Back Pain



Acupuncture may help reduce chronic lower back pain. However, its effects may be limited to the short term. **Researchers and experts disagree on whether there is enough evidence to support its effectiveness** [R, R, R, R, R, R, R, R, R, R].

Acupuncture may have similar small benefits for acute low back pain. However, some **experts recommend against its use for acute back pain** [R, R, R, R].

Please note: *Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information [R].*

Chronic Pain

IMPACT



EVIDENCE



One of the top uses of acupuncture is chronic pain management [R, R].

In people with chronic pain, it may help improve [R, R, R, R, R, R]:

- Pain symptoms
- Mood
- Stress and tension

The effects of acupuncture may last a relatively long time. **Up to 90% of its benefits remain after 12 months.** However, you may need to stick with it for **at least 5 weeks** to maximize benefits [R, R, R, R, R].

Acupuncture may help by releasing natural [opioids](#) and other chemicals that reduce pain [R, R].

Please note: *Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information* [R].



PERSONALIZED TO YOUR GENES

The [HTR2A](#) gene encodes the [5-HT2A](#) serotonin receptor. Impaired [serotonin](#) signaling via this receptor may play a key role in chronic [pain](#) [R, R, R].

Your genotype for [rs6313](#) may affect serotonin signaling via the 5-HT2A receptor, thus contributing to chronic pain [R, R].

[Acupuncture](#) may help with different types of chronic pain partly by balancing serotonin levels and targeting the 5-HT2A receptor [R, R, R, R].

To learn more about this gene and how you may be able to counteract its effects, check out the HTR2A SelfDecode blog post [here](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
HTR2A	rs6313	AA	

Cluster Headaches

IMPACT



EVIDENCE



In a non-placebo-controlled trial of 180 patients with episodic cluster headaches, acupuncture at the sphenopalatine ganglion combined with conventional acupuncture reduced the degree of pain, number and duration of attacks, and quality of life better than conventional acupuncture alone [R].

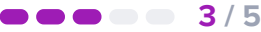
Acupuncture may help by reducing pain intensity and frequency.

Headache

IMPACT



EVIDENCE



According to experts, acupuncture may help with tension headaches. It may make headaches less frequent and improve quality of life in the short term [R, R, R, R, R, R].

It may also help with other types of headaches [R, R, R].

Acupuncture may help by releasing compounds that reduce pain [R, R].

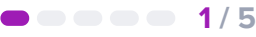
Please note: *Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a licensed acupuncturist for more information* [R].

 Hip Pain

IMPACT



EVIDENCE



According to a single study, electroacupuncture applied for at least 3 months may help reduce hip pain due to osteoarthritis [R].

Acupuncture may help by blocking pain signals [R].

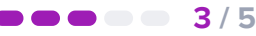
Please note: *Acupuncture is generally safe for most people, but it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a [licensed acupuncturist](#) for more information [R].*

 Joint Pain

IMPACT



EVIDENCE



Acupuncture may lower pain by boosting your body’s opioids [R].

In some cases, health experts recommend acupuncture for joint pain [R, R].

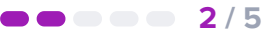
In the short term, it may help with pain from knee osteoarthritis. **However, the benefits are likely small, and most studies are of low quality [R, R, R, R, R].**

Acupuncture may have little to no effect on hip osteoarthritis [R].

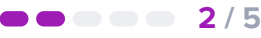
Please note: *Acupuncture is generally safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a [licensed acupuncturist](#) for more information [R].*

 Shoulder & Neck Pain

IMPACT



EVIDENCE



Acupuncture may help improve lower neck and shoulder pain. However, the evidence is mixed and of low quality [R, R, R, R, R].

Acupuncture may help by releasing natural [opioids](#) and other chemicals that reduce pain [R, R].

Please note: *Acupuncture is safe for most people. However, it may come with extra risks for pregnant women, people with pacemakers, and people with bleeding disorders. Consult your doctor or a [licensed acupuncturist](#) for more information [R].*

3



Meditation

How to implement

Set aside 10-20 minutes each day in a quiet space without distractions to practice meditation. Focus on your breath or perform guided meditation using an app or audio track.

TYPICAL STARTING DOSE
30 minutes

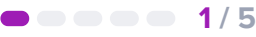
How it helps

 Knee Pain

IMPACT



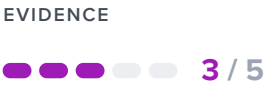
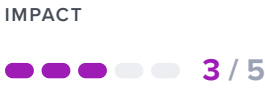
EVIDENCE



People experiencing job stress may have **2 times** higher rates of knee pain [R].

Meditation is a popular relaxation technique. According to limited evidence, it may reduce pain from knee osteoarthritis [R, R, R].

 Migraines



A non-placebo-controlled trial of 80 migraine patients found that practicing different meditation modalities (20 minutes/day for 30 days) reduced anger and pain more effectively than distraction techniques [R].

Another non-placebo-controlled trial of 131 children with migraine headaches found both transcendental meditation and progressive muscle relaxation equally effective at reducing primary headaches [R].

In a non-placebo-controlled trial of 92 migraine sufferers, spiritual meditation (20 minutes/day for 30 days) reduced migraine frequency and medication use [R].

Mindfulness meditation is the modality that has been most widely investigated in people with migraines. A meta-analysis of 10 trials and 315 patients found significant improvements in pain intensity and headache frequency. Mindfulness-based stress reduction and interventions lasting 8 weeks were especially effective [R].

In 3 non-placebo-controlled trials of 251 migraine patients, mindfulness-based stress reduction increased coping strategies while reducing headache days, headache-related disability, and psychological impairment. In one of them, it was as effective as headache education at improving migraine frequency but more effective at improving disability, quality of life, self-efficacy, pain catastrophizing, and depression [R, R, R].

Mindfulness-based cognitive training, which combines mindfulness meditation and cognitive-behavioral skills, reduced disability caused by headaches and migraine attacks in a non-placebo-controlled trial of 60 migraine patients [R].

Mindfulness meditation facilitated heart rate regulation, and thus recovery from a stressful event, in a non-placebo-controlled trial of 75 students suffering from headaches [R].

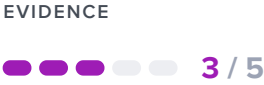
Meditation helps to manage stress and promotes deep relaxation, which can reduce the frequency and intensity of migraines.

 Back Pain



Meditation may slightly improve disability in the short term and pain in the long term in people with low back pain [R].

 Chronic Pain



Analysis of studies including more than 4,000 people with chronic pain suggested that mindfulness meditation (for at least 12 weeks) might lead to a slight reduction in pain and also have beneficial effects on depression and quality of life. The studies included people with the following conditions [R, R]:

- Fibromyalgia
- Back pain
- Arthritis
- Migraine

However, the quality of the evidence was considered low. Therefore, further well-conducted studies are necessary to confirm its benefits [R].

 Headache



A meta-analysis of 10 trials and 325 participants found mindfulness meditation effective at reducing headache intensity and frequency. Interventions using mindfulness-based stress reduction or lasting over 8 weeks were especially effective [R].

Guided imagery, another type of meditation, reduced headache intensity, frequency, and duration, in addition to improving vitality and mental health, in 2 non-placebo-controlled trials of 189 chronic tension-type headaches [R, R].

Meditation helps reduce stress and improve pain tolerance.

4



Ginger

How to implement

Take a 500 mg ginger supplement daily, preferably with a meal to enhance absorption and minimize potential stomach discomfort.

TYPICAL STARTING DOSE

500 mg

How it helps

 Knee Pain



Ginger extract (255-500 mg, 2x/day) may reduce knee pain due to osteoarthritis. However, some studies found that it may help only in the short term, if at all [R, R, R, R, R, R].

Ginger may also relieve knee osteoarthritis when combined with other ingredients, such as glucosamine, chondroitin, MSM, and boswellia. However, it’s not sure if and how much ginger contributes to these benefits [R, R].

Ginger may help by reducing inflammation [R, R].

 Migraines



In a placebo-controlled trial of 60 migraine patients, supplementation with ginger (400 mg) improved clinical response 1-2 hours after the onset of a migraine attack. However, ginger extract (200 mg, 3x/day for 3 months) wasn’t more effective than the placebo in another placebo-controlled trial of 107 patients [R, R].

In a non-placebo-controlled trial of 100 migraine patients, ginger powder was as effective as sumatriptan at treating migraine attacks and caused fewer adverse effects [R].

The combination of ginger and feverfew was an effective abortive treatment when initiated early during the mild headache phase in 2 trials (one of them placebo-controlled) of 90 people with a history of migraines [R, R].

A meta-analysis of 3 of these trials concluded that ginger supplementation substantially improves pain-free and pain scores at 2 hours, but not treatment responses or total adverse effects [R].

Ginseng may help by reducing inflammation, nausea, and vomiting [R, R, R].

 Back Pain



Ginger has anti-inflammatory properties that can relieve back pain by reducing inflammation, a common cause of back discomfort. It also helps in improving blood circulation, which can accelerate the healing process.

In a non-placebo-controlled trial of 140 patients with chronic back pain, receiving massages with ginger oil (30 min, 2x/week) for 5 weeks **reduced pain and disability** [R].

 Joint Pain



Ginger may lower inflammation and improve joint pain [R, R, R, R, R, R].

You can try massaging **ginger essential oil** onto painful joints twice a week. **Ginger gel** can be used four times a day [R, R, R].

Taking **ginger extracts** by mouth may improve osteoarthritis symptoms as well. However, the evidence for this is weak [R, R, R, R, R, R].

5



Yoga

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

How it helps



Knee Pain

IMPACT

2 / 5

EVIDENCE

2 / 5

People experiencing job stress may have **2 times** higher rates of knee pain [R].

Yoga combines relaxation and gentle exercise. It may improve pain and other symptoms of knee osteoarthritis [R, R, R].



Migraines

IMPACT

1 / 5

EVIDENCE

2 / 5

In a non-placebo-controlled trial of 72 people suffering from migraines with aura, practicing yoga for 3 months reduced headache intensity, frequency, anxiety, depression, and painkiller use [R].

Similarly, yoga used as an add-on to conventional therapy reduced headache frequency, headache intensity, and painkiller use in a non-placebo-controlled trial of 114 migraine patients [R].

However, a meta-analysis of 5 trials found significant overall effects of yoga on headache frequency, headache duration, and pain intensity in people with tension headache but not migraines [R].



Back Pain

IMPACT

3 / 5

EVIDENCE

4 / 5

Stress at work and home may increase the risk of back pain [R, R, R, R, R, R].

Stress may contribute to pain by increasing tension in the muscles. It may also increase sensitivity to pain [R, R].

Yoga may improve pain and functionality, but not quality of life, in people with back pain. Yoga may be most effective in the short term or when used as an add-on to conventional therapies [R, R, R, R, R, R, R, R].



Chronic Pain

IMPACT

1 / 5

EVIDENCE

1 / 5

Research in 145 people with chronic pain found that practicing yoga (2x-3x/week for 8-12 weeks) reduced pain intensity and interference while improving [R, R, R]:

- Pain management
- Energy
- Anxiety
- Social functioning



Headache

IMPACT

1 / 5

EVIDENCE

1 / 5

A meta-analysis of 5 trials found significant overall effects of yoga on headache frequency, headache duration, and pain intensity in people with tension headaches but not migraines [R].

Yoga may help by promoting relaxation, reducing stress, and improving blood flow to the brain. Specific poses like the 'Child's Pose' and 'Corpse Pose' can provide relief from headache symptoms and sometimes prevent them.

 **Joint Pain**

IMPACT

3 / 5

EVIDENCE

3 / 5

Regular yoga training may **improve joint pain, stiffness, and function** in people with osteoarthritis. Yoga may also help improve mood [R, R, R, R].

Most studies are small and of low quality. Hence, some experts say there is not enough evidence to recommend yoga for osteoarthritis [R].

Please note: *Choose a yoga program that avoids moves that cause joint pain. Consult your doctor or yoga instructor for more information* [R].

 **Shoulder & Neck Pain**

IMPACT

2 / 5

EVIDENCE

2 / 5

Yoga (20-90 minutes/session, 1-7 sessions/week for 1-9 weeks) may reduce neck pain and disability while improving mood and quality of life in the short term. However, more studies are needed to confirm these benefits [R, R].

6



Cold Applications

How to implement

Apply a cold pack or a bag of frozen peas wrapped in a towel to the affected area for 15-20 minutes, every 2-3 hours during the first 48 hours of experiencing pain or swelling.

TYPICAL STARTING DOSE

15 minutes

How it helps

 **Knee Pain**

IMPACT

0 / 5

EVIDENCE

0 / 5

Cold therapy helps reduce inflammation and numbs the affected area, temporarily relieving pain in the knee.

 **Migraines**

IMPACT

2 / 5

EVIDENCE

1 / 5

A study proposed a mechanism for cold therapy in migraine treatment by cooling blood in intracranial vessels. A randomized trial confirmed reduced pain with a frozen neck wrap targeting carotid arteries, suggesting its efficacy [R].

An uncontrolled study investigated cold therapy for migraine. Twenty-six patients showed reduced headache severity after cold gel cap application, supporting its efficacy [R].



PERSONALIZED TO YOUR GENES

The [DBH gene](#) codes for *dopamine beta-hydroxylase* (DBH), an enzyme that converts [dopamine](#) to [norepinephrine](#). Norepinephrine constricts blood vessels in the brain, which may prevent migraine [\[R, R\]](#).

Your genotype for [rs1611115](#) is associated with increased risk of migraines. The ‘C’ allele may produce lower levels of DBH, leading to decreased amounts of norepinephrine [\[R, R, R, R\]](#).

Applying a cold compress to the back of the neck may reduce the severity and duration of headaches, in part by increasing norepinephrine levels [\[R, R\]](#).

To learn more about this gene and how you may be able to counteract its effects, check out the SelfDecode blog post on this gene [here](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
DBH	rs1611115	CC	



Headache

IMPACT



EVIDENCE



Applying cold packs reduced post-traumatic headaches in a non-placebo-controlled trial of 23 patients. However, physical therapy was more effective [\[R\]](#).

Cold application may help by reducing pain perception, reducing inflammation, and constricting the blood vessels.



PERSONALIZED TO YOUR GENES

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YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
DBH	rs1611115	CC	

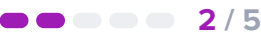


Joint Pain

IMPACT



EVIDENCE



According to health experts, cold applications may help with osteoarthritis. They relieve joint pain by decreasing blood flow to the affected area. This lowers swelling and inflammation. It also has a numbing effect [\[R, R, R\]](#).

Applying an ice pack for 30 minutes twice a day may help with pain from osteoarthritis [\[R\]](#).

7



Omega-3 (Fish Oil)

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

How it helps

 Knee Pain

IMPACT

1 / 5

EVIDENCE

2 / 5

In people with knee osteoarthritis, lower omega-3 levels may be linked to increased pain [R].

Supplementation with **fish oil** (0.5-1 g/day for 2 years) may reduce knee pain due to osteoarthritis. Higher doses may not be more effective.

Krill oil (4 g/day) may provide similar benefits [R, R, R].

However, omega-3s failed to improve chronic knee pain in one study [R].

 Migraines

IMPACT

1 / 5

EVIDENCE

2 / 5

A meta-analysis of 11 trials found that the intake of dietary omega-3 fatty acids reduces migraine duration by 3.44 hours but has no effect on the frequency and severity of migraine attacks [R].

In 2 placebo-controlled trials of 219 migraine patients, supplementation with omega-3 fatty acids (1.254-6 g/day) for 8-16 weeks wasn’t more effective than the placebo at reducing the frequency, duration, and severity of headaches [R, R].

Conversely, omega-3 fatty acids used as an add-on to amitriptyline reduced the number of headache days per month by over 80% in 66.7% of the patients who took them (versus 33.3% in those taking placebo) in a placebo-controlled trial of 51 patients [R].

In a large non-placebo-controlled trial of 25,871 participants, both omega-3 fatty acids (1 g/day) and vitamin D (2,000 IU/day) failed to reduce migraine frequency or severity [R].

The combination of omega-3 fatty acids (2,500 mg) and nanocurcumin (80 mg) reduced the frequency, severity, and duration of migraine attacks, as well as the levels of TNF-alpha, IL-6, hs-CRP, ICAM-1, COX2, iNOS, and VCAM, in 5 placebo-controlled trials of 380 migraine patients [R, R, R, R, R].

Omega-3 fish oil supplements can help to reduce inflammation in the body, which may lessen the severity of migraine attacks.

 Back Pain

IMPACT

2 / 5

EVIDENCE

1 / 5

Supplementing with **fish oil (1.2-2.4 g/day) or EPA** may improve back pain [R, R].

Fish oil may help with back pain by lowering inflammation [R, R, R].

Please note: Fish oil can interact with blood thinners (like aspirin, Plavix, Coumadin). Consult your doctor before taking fish oil [R].

 Chronic Pain

IMPACT

1 / 5

EVIDENCE

1 / 5

Omega-3 fatty acids, particularly docosahexaenoic acid (DHA), have been associated with reduced abdominal, pelvic, and lower back pain. Higher levels of omega-3s and DHA and a lower ratio of omega-6 to omega-3 fatty acids correlate with a lower likelihood of experiencing these types of pain [R, R].

In line with this, eating more oily fish (1.5 servings of oily fish/week) or marine food may decrease the chances of developing pain or experiencing worsening pain over 5 years. Consuming white fish or fish in general may not show the same benefits [R].

 **Joint Pain**

IMPACT

0 / 5

EVIDENCE

1 / 5

Experts suggest omega-3 fatty acids may help relieve pain and improve function. However, some recommend against omega-3s for osteoarthritis due to their lack of effect on this condition [R, R, R].

8



Avoid Food Triggers

How to implement

Identify foods that trigger negative reactions in your body, such as digestive issues, allergies, or headaches, and eliminate them from your diet entirely. This may require keeping a food diary for a few weeks to observe patterns and might involve cutting out common triggers like dairy, gluten, soy, or certain additives. Continuously monitor and adjust your diet to avoid these triggers as long as the symptoms persist.

How it helps

 **Migraines**

IMPACT

4 / 5

EVIDENCE

4 / 5

Experts agree that certain foods may trigger migraines [R, R, R, R].

In some people, migraines may be triggered by the following foods [R, R, R, R]:

- Alcohol
- Chocolate
- Cheese
- Coffee

Both caffeine intake and caffeine withdrawal may trigger migraines. Try to **limit caffeine to 200 mg per day** to avoid migraines [R].

Some foods may cause migraines by [R, R]:

- Increasing dehydration
- Stimulating pain signals
- Altering blood flow in the brain

 **Headache**

IMPACT

2 / 5

EVIDENCE

3 / 5

Some people may develop headaches after eating certain foods. Foods or ingredients that may trigger headaches include:

- Monosodium glutamate (MSG) [R, R, R, R]
- Histamine-rich foods (such as alcohol or aged cheese) [R, R, R, R, R, R, R]
- Gluten, in people with celiac disease [R, R]

Foods may trigger headaches by widening blood vessels [R, R, R, R].

9



Avoid Sensory Triggers

How to implement

Identify and keep a record of situations, environments, or objects that trigger unwanted sensory responses, such as bright lights for migraines or loud noises for auditory sensitivities. Actively avoid these triggers whenever possible, such as wearing sunglasses in bright environments or using noise-cancelling headphones in loud places. Implement these strategies consistently to minimize exposure to the identified triggers.

How it helps

Migraines

IMPACT

5 / 5

EVIDENCE

4 / 5

People who have migraines tend to process sensations differently. **Sensory triggers may cause or worsen migraines** [R, R, R].

Some people with migraines may be more sensitive to:

- Bright light [R, R, R, R, R, R, R, R]
- Loud noise [R, R, R, R, R]
- Strong smells [R, R, R, R, R, R]

Avoiding these triggers may help prevent migraines. For example, special eyeglasses with filters may help by blocking bright light [R].

PERSONALIZED TO YOUR GENES

People with your **TRPM8** gene variant may be more sensitive to light and sound during a migraine [R].

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
TRPM8	rs6724624	CC	

Headache

IMPACT

3 / 5

EVIDENCE

2 / 5

Sensory triggers have the potential to cause headaches in some people. These include:

- Bright light (such as from the sun) [R]
- Noise [R]

Digital screens can also act as sensory triggers. Prolonged use of devices such as computers and smartphones may trigger headaches by increasing eye strain [R].

Tips to reduce digital eye strain include [R, R]:

- Taking frequent breaks
- Adjusting the brightness of your device screen to match the ambient light
- Blinking more frequently
- Using artificial tears

Glasses that block certain wavelengths of light from digital screens may also reduce eye strain. However, the benefit of “blue-light glasses” on eye strain is mixed. Also, they may not help with headaches [R, R, R, R, R].

Certain odors may also trigger or worsen headaches. However, the link seems to be stronger in people with migraines [R, R].

 PERSONALIZED TO YOUR GENES

People with your **TRPM8** gene variant may be more sensitive to light and sound during a headache [R].

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
TRPM8	rs6724624	CC	4 / 5

10

Cognitive-Behavioral Therapy (CBT)

How to implement

Schedule weekly sessions with a certified cognitive-behavioral therapist for a period of 5 to 20 weeks. Engage actively in exercises assigned by your therapist both during sessions and as homework to apply CBT strategies to daily life.

How it helps

 **Migraines**

IMPACT

4 / 5

EVIDENCE

4 / 5

Experts agree that **cognitive-behavioral therapy (CBT)** may help prevent migraines [R, R, R].

Talk therapy may also make migraines shorter and less intense [R, R, R].

Talk therapy may help by [R, R]:

- Changing thoughts and behaviors related to pain
- Providing people with coping strategies
- Training the brain to send fewer pain signals

 **Back Pain**

IMPACT

3 / 5

EVIDENCE

3 / 5

Experts recommend considering psychological therapies such as cognitive-behavioral interventions to manage low back pain, especially if psychosocial risk factors are present [R, R].

Cognitive-behavioral therapy may yield long-term improvements in pain, disability, and quality of life in people with chronic low-back pain. It may also improve fear-avoidance beliefs [R, R, R].

The combination of cognitive-behavioral therapy with physical therapy may offer greater benefits than physical therapy alone [R, R].

 **Chronic Pain**

IMPACT

3 / 5

EVIDENCE

3 / 5

Cognitive behavioral therapy (CBT) is the type of psychotherapy most commonly used for chronic pain [R, R]. Research, including meta-analyses covering thousands of participants, shows that CBT may improve [R, R, R, R, R, R]:

- Pain intensity
- Physical function
- Mood (e.g., anxiety)
- Negative thoughts related to pain
- Sleep quality

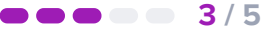
When CBT is combined with exercise, even over the phone, also helps, although the effects on pain and disability may be considered small [R, R, R].

 Headache

IMPACT



EVIDENCE



A meta-analysis of 13 trials found that psychological therapy may improve stress symptoms in adults with tension-type headaches [R].

In a non-placebo-controlled trial of 87 headache patients, cognitive-behavioral therapy reduced headache intensity, frequency, and catastrophizing while improving coping strategies [R].

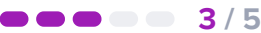
Mindfulness-based cognitive therapy improved pain intensity, interference, and catastrophizing, activity engagement, and self-efficacy in a non-placebo-controlled trial of 19 headache patients. The benefits were maintained for 6 months [R].

 Shoulder & Neck Pain

IMPACT



EVIDENCE



Stress is often associated with pain in the upper body, including the neck and shoulders [R].

Cognitive behavioral therapy (CBT) is the type of psychotherapy most commonly used for chronic pain. It aims to change the thoughts, emotions, and behaviors related to pain [R, R].

Research shows that CBT may help with shoulder and neck pain [R, R, R]:

- Reducing pain intensity
- Improving physical function
- Lessening pain catastrophizing
- Decreasing depression

11



Acupressure

How to implement

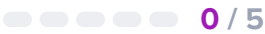
Apply firm pressure on specific acupoints related to your condition using your fingers or a blunt object for 1-3 minutes. Repeat this process 2-3 times a day for several weeks to potentially observe improvements.

TYPICAL STARTING DOSE
1 minute

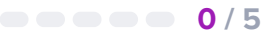
How it helps

 Knee Pain

IMPACT



EVIDENCE



Acupressure can help alleviate knee pain by targeting specific pressure points to reduce pain and improve circulation.

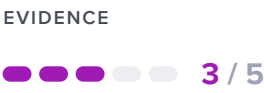
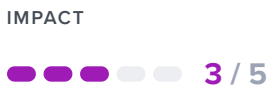
Migraines



In a non-placebo-controlled trial of 98 patients suffering from chronic migraine with aura, the use of acupressure as an add-on to sodium valproate for 8 weeks reduced nausea but had no effects on pain or quality of life [R].

Acupressure may help by promoting relaxation and pain relief.

Back Pain

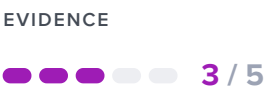


A study compared the efficacy of acupressure with physical therapy in reducing low back pain. The results indicated that acupressure lowered post-treatment pain scores compared to physical therapy. At a 6-month follow-up, people in the acupressure group continued to experience lower pain scores, suggesting long-term benefits [R].

A systematic review evaluated the efficacy of acupressure for chronic low back pain and found that it led to clinical reductions in pain. The review supported the use of acupressure as an effective, safe, and low-cost nonpharmacologic method to treat chronic low back pain [R].

A systematic review examining the application of acupressure in managing different types of pain, including low back pain, found that acupressure was effective in relieving a variety of pains in different populations [R].

Chronic Pain



A review of three high-quality studies involving 303 people with chronic pain found that acupressure (1-1.5 hours/session for 4-6 weeks) may help reduce low back pain and chronic headaches. Acupressure may offer greater benefits than [R]:

- Standard therapy
- Thermotherapy
- Exercise

Headache



In a non-placebo-controlled trial of 28 patients with chronic headaches, one month of acupressure therapy relieved pain more effectively than one month of muscle relaxant medication [R].

In a non-placebo-controlled trial of 85 women with menstrual headaches, the combination of auricular acupressure and body acupuncture effectively relieved pain [R].

Acupressure can help alleviate headache symptoms by promoting relaxation and pain relief through the application of pressure to specific points on the body.

Hip Pain



Acupressure may help alleviate hip pain by targeting specific points to release muscle tension and improve circulation in the affected area.

Joint Pain

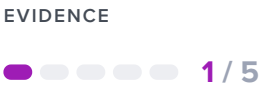


Acupressure provides benefits in managing osteoarthritis, particularly in reducing pain levels, whether as a main or complementary therapy. However, more clinical trials with proper methodology are needed to confirm the effectiveness of acupressure for osteoarthritis [R].

A study found that self-administered acupressure and exercise (for 16 weeks) decreased pain and stiffness and improved the range of motion and walking speed in people with knee osteoarthritis compared to other interventions [R].

Acupressure therapy, when combined with standard therapy, showed improvement in pain, depression, anxiety, and stress among people with knee osteoarthritis [R].

 Shoulder & Neck Pain



Acupressure (for 3-4 weeks) may help manage neck and shoulder pain by [R, R, R]:

- Reducing pain intensity
- Alleviating muscle stiffness
- increased neck range of motion
- Improving functional mobility

Combination with aromatic lavender essential oil or massage may offer greater benefits and reduce stress levels [R, R].

12

Low-Level Laser Therapy (LLLT)

How to implement

Use a low-level laser therapy device, as directed by its manual or a healthcare professional, on the affected area. Generally, treatment involves applying the laser for a specified duration, often between 30 seconds to several minutes, per treatment area. Sessions can be conducted 2-3 times per week for a period of 4-12 weeks, depending on the condition being treated and the device used.

TYPICAL STARTING DOSE

30 seconds

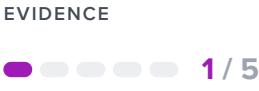
How it helps

 Knee Pain



Low Level Laser Therapy (LLLT) can aid knee pain by stimulating cell repair and reducing inflammation in the afflicted area. This therapy essentially aids your body in healing itself, reducing the discomfort and stiffness associated with knee pain.

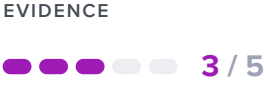
 Migraines



Low-Level Laser Therapy (LLLT) helps to reduce migraines by lowering the inflammation and promoting nerve cell function. When applied to the head, it can reduce migraine intensity and frequency.

A clinical trial with 36 chronic migraine patients showed that botulinum toxin A (BT-A) and low-level laser therapy (LLLT) reduced headache days, pain intensity, and acute medication usage. BT-A reduced anxiety, while LLLT improved sleep. Both treatments are effective for chronic migraine with no significant differences [R].

 Back Pain



Low-Level Laser Therapy (LLLT) uses low-intensity lasers or light-emitting diodes (LEDs) to reduce inflammation and promote healing, which aids in relieving back pain. It is non-invasive and can target specific areas of your back for targeted relief.

Low-level laser therapy (LLLT) appears effective for short-term pain relief in chronic non-specific low back pain (CNLBP) when using higher laser doses and shorter pain duration. A systematic review of studies on musculoskeletal disorders also supports LLLT for pain reduction, especially when following dosage guidelines. However, evidence for LLLT's impact on function remains inconclusive, as it primarily addresses pain. Rigorous blinded trials are needed for more certainty in these findings. [\[R\]](#), [\[R\]](#), [\[R\]](#).

Chronic Pain



A study reviewed 4 studies and suggested that using infrared lasers (with powers above 70 mW) may help relieve pain. However, more research is needed to determine the best settings [\[R\]](#).

An analysis of 9 studies involving 325 people with fibromyalgia showed improvements after LLLT in [\[R\]](#):

- Pain severity
- Tender points
- Fatigue
- Stiffness
- Anxiety
- Depression

However, adding LLLT to the standard exercise didn’t show additional benefits.

Research in people with diabetic peripheral neuropathy showed that LLLT therapy may [\[R\]](#), [\[R\]](#):

- Reduce neuropathic pain
- Improve nerve function
- Decrease foot ulcer risk

LLLT may alleviate pain by lowering [\[R\]](#):

- Oxidative stress
- Inflammation
- Hemorrhage

Joint Pain



LLLT, in specific doses and wavelengths, significantly reduced pain and disability in knee osteoarthritis patients, with no reported adverse events, in a systematic review and meta-analysis of 22 trials [\[R\]](#).

A systematic review of 14 trials with 820 knee osteoarthritis patients found that combining LLLT with exercise therapy significantly reduced pain immediately and at follow-up. However, it did not affect knee ROM, muscle strength, or knee function. The recommended LLLT dosage is 4-8 J with a wavelength of 640-905 nm per point for 10-16 sessions at a frequency of 2 sessions/week, combined with a prescribed exercise therapy program involving major muscle groups [\[R\]](#).

LLLT may help by reducing inflammation and promoting tissue repair. It increases blood flow to the affected area, stimulating the body's healing process and easing discomfort.

Shoulder & Neck Pain



Low-Level Laser Therapy (LLLT) aids in healing and reducing inflammation in shoulder and neck pain by stimulating the cells in the affected area, encouraging quicker repair and growth. This results in reduced pain and discomfort, promoting movement and flexibility in the neck and shoulder region.

A systematic review and meta-analysis of studies on low-level laser therapy (LLLT) for neck pain and musculoskeletal disorders found varying results. In acute and chronic neck pain, LLLT showed statistically significant pain reduction immediately after treatment, but the clinical significance was uncertain due to study heterogeneity. LLLT appeared effective in reducing pain in adult patients with musculoskeletal disorders, especially when following dosage guidelines. For shoulder musculoskeletal disorders, LLLT provided short-term pain relief but no additional benefit in shoulder function. In myofascial neck pain, LLLT significantly reduced pain, and improved pain pressure threshold and range of motion, suggesting its potential as an adjunct therapy alongside other treatments like manual and exercise therapy [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

13



Avoid Monosodium Glutamate (MSG)

How to implement

Carefully check food labels and ingredient lists of packaged foods to avoid products containing monosodium glutamate (MSG). When dining out, request meals without added MSG. This practice should be consistent for all meals and snacks.

How it helps

 Migraines

IMPACT

3 / 5

EVIDENCE

3 / 5

A review concluded that 12-60% of migraine patients report specifically food items as migraine triggers. Foods identified as migraine triggers include cheese, chocolate, citrus fruits, hot dogs, monosodium glutamate, aspartame, fatty foods, ice cream, caffeine withdrawal, and alcoholic drinks, especially red wine and beer. Tyramine, phenylethylamine, histamine, nitrites, and sulfites are involved in the mechanism of food intolerance headache [R, R].

A study of 684 patients with migraines and tension headaches found that 44.2% of those with migraines had dietary triggers. The most common ones were coffee (19%), chocolate (7.5%), and the additive monosodium glutamate (5.6%). Both coffee and chocolate were approximately 2x times more commonly associated with migraines than with tension headaches [R].

 Headache

IMPACT

2 / 5

EVIDENCE

3 / 5

A study of 684 patients with headaches identified monosodium glutamate as a trigger in 5.6% of them [R].

In line with this, the intake of sodium glutamate (75-150 mg/kg) triggered headaches in 4 placebo-controlled trials of 40 healthy volunteers and 61 sensitive people [R, R, R, R].

Glutamate may trigger headaches through its vasodilator effects [R, R, R].

14



Biofeedback

How to implement

Attend biofeedback sessions once or twice a week for about 8 to 10 weeks. During these sessions, a therapist will guide you through exercises to control different body functions, such as heart rate or muscle tension, using monitors that provide feedback on your physiological state. Practice the techniques learned during sessions at home daily to improve symptoms and manage your condition.

How it helps

 Migraines

IMPACT

3 / 5

EVIDENCE

3 / 5

A meta-analysis of 55 studies found medium-sized, durable effects of biofeedback on migraines, especially on frequency of attacks and perceived self-efficacy. Blood-volume-pulse feedback yielded higher effect sizes than peripheral skin temperature feedback and electromyography feedback. Another meta-analysis (5 studies and 137 participants) found that biofeedback reduces migraine frequency, attack duration, and headache intensity in children and adolescents [R, R].

Biofeedback training helps control bodily functions, like heart rate or muscle tension, which can directly impact migraines.

 Back Pain



Biofeedback training has small-to-moderate effects on pain intensity, depression, disability, muscle tension, and cognitive coping in both the short and long term in people with chronic back pain[R].

Biofeedback may help by reducing muscle tension and pain [R]

 Chronic Pain



Neurofeedback is a form of biofeedback that measures brain activity in real time. It may reduce pain by more than **30%** [R].

Neurofeedback may help by [R, R]:

- Altering the activity of brain regions linked to pain
- Reducing muscle tension

Note that the evidence to support biofeedback for chronic pain is of low quality.

 Headache



Two meta-analyses (the largest one with 94 studies) concluded that biofeedback has medium-to-large effects lasting for ~15 months on chronic headaches (both tension-type and migraines). The largest effects were on headache frequency, followed by muscle tension, self-efficacy, anxiety, depression, and medication use. Biofeedback was more effective than relaxation techniques and headache monitoring and its combination with relaxation techniques was more effective than either intervention alone. Biofeedback was especially effective in children and adolescents [R, R].

The effects are medium to strong according to a non-placebo-controlled trial of 70 patients with headaches [R].

In a non-placebo-controlled trial of 62 people with tension-type headaches due to forward head posture, biofeedback was more effective than physical therapy and stretching at improving posture, disability, attention, and stress [R].

A system combining biofeedback and virtual reality improved pain, daily functioning, and quality of life in an uncontrolled trial of 9 children with chronic headache [R].

However, biofeedback provided no additional benefits in terms of headache frequency and severity to relaxation therapy in a non-placebo-controlled trial of 64 people with headaches [R].

Biofeedback may reduce headaches by helping control physiological variables such as heart rate and brain activity in response to painful stimuli. It also promotes relaxation, especially if combined with relaxation techniques [R].

 Shoulder & Neck Pain



Biofeedback (for 3-12 weeks) may help reduce pain and discomfort in people with shoulder and neck pain. Studied biofeedback training modalities include [R, R, R, R, R, R, R]:

- Electromyographic (EMG) biofeedback
- Visual biofeedback
- Visual electromyography biofeedback

15



Butterbur

How to implement

Take a 75 mg butterbur supplement twice daily with meals to help manage your condition. Continue this regimen as advised by your healthcare provider.

TYPICAL STARTING DOSE

75 mg

How it helps



Migraines

IMPACT

3 / 5

EVIDENCE

3 / 5

In a placebo-controlled trial of 60 migraine patients, supplementation with butterbur extract (50 mg, 2x/day) for 12 weeks reduced the frequency of attacks by 60% (from 3.4 to 1.8 per month). The response rate was 45% [\[R\]](#), [\[R\]](#).

In a 4-month placebo-controlled trial of 245 adults, there was a 48% decrease in migraine frequency in the group given butterbur extract (50-75 mg, 2x/day), compared to 26% for the placebo group. In total, 68% of patients who received 75 mg butterbur reported improvement [\[R\]](#).

In a survey of 108 children and adolescents, the rate of reported migraine attacks decreased by at least 50% in 77% of participants. After 4 months of treatment with butterbur (50-150 mg/day), 91% of patients felt “substantially” or “at least slightly improved” [\[R\]](#).

In a small placebo-controlled trial of 58 primary school children with migraine, butterbur root extract failed to prevent migraines during the 12-week treatment but was effective during an 8-week follow-up period. However, music therapy was more effective in both periods [\[R\]](#).

Butterbur root extract is currently recommended by both the Canadian Headache Society and the American Headache Society for short-term prevention and treatment of migraines [\[R\]](#), [\[R\]](#).

Butterbur’s active compounds petasines limit the production of multiple inflammatory molecules [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Please note: Raw, unprocessed butterbur contains harmful substances called pyrrolizidine alkaloids (PA), which cause liver damage and may even cause cancer. For this reason, it is important to choose butterbur supplements that have been produced by a reputable manufacturer. The products are typically labeled “PA-free” [\[R\]](#), [\[R\]](#).

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Weight & Body Fat

Summary Report

REPORT CATEGORY —



WEIGHT & BODY FAT

John Doe

Report date: 23 October 2024

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- 06 Impact
- 06 Evidence
- 07 Some things to keep in mind

08 Summary

09 Overview of Your Results

11 Your Results in Details

- 11 Weight Management
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- 29 Weight Genes

45 Recommendations

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

John Doe

SEX AT BIRTH

Male

HEIGHT

5ft 11" 180.4cm

WEIGHT

177lb 80.3kg

REPORT PROVIDED BY

PlexusDx

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🌐 <https://plexusdx.com>

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.



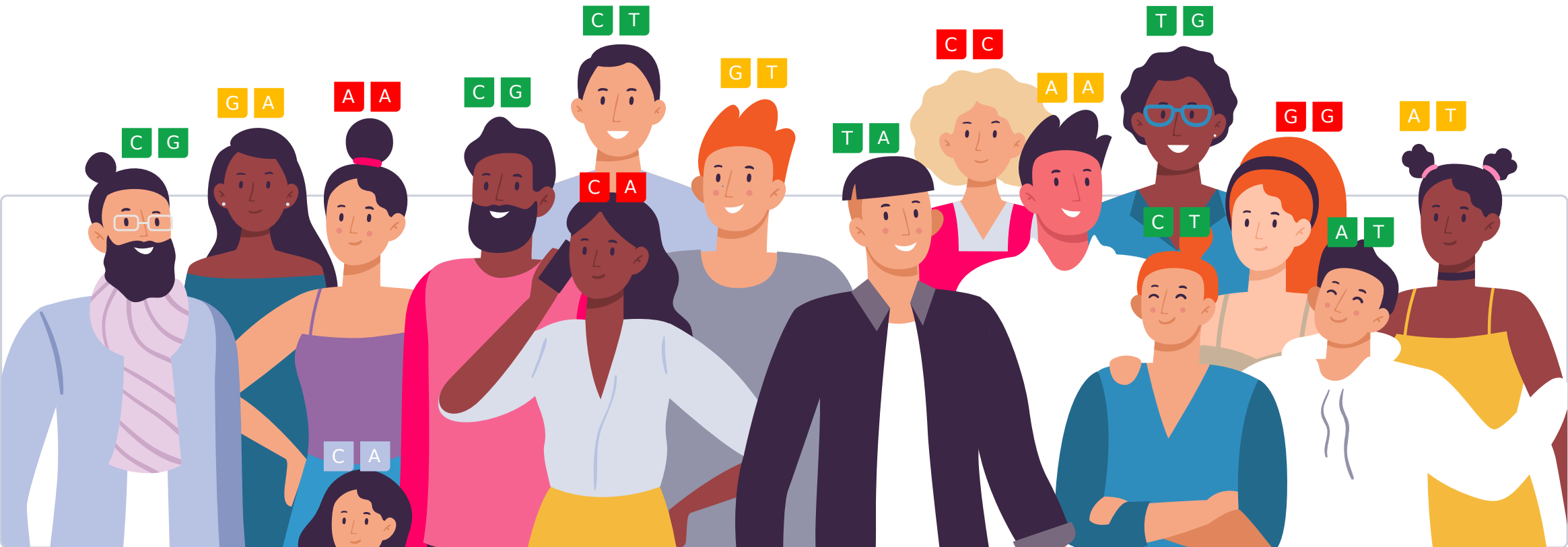
Similarly, our Trait Reports look at how your DNA influences your traits.



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.

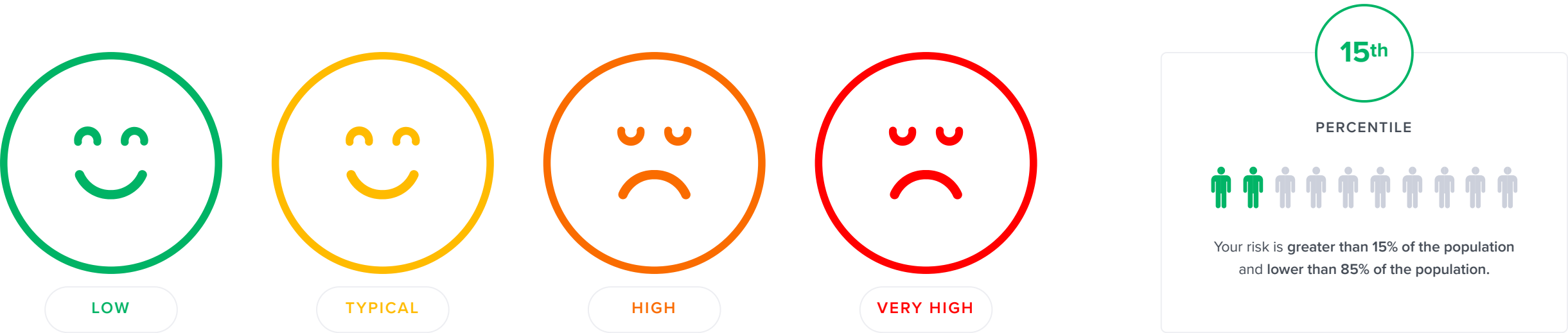
Our Summary Reports combine different Wellness and Trait Reports related to a certain health topic. They give you a more complete picture about different aspects of your health and wellness.



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.

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

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

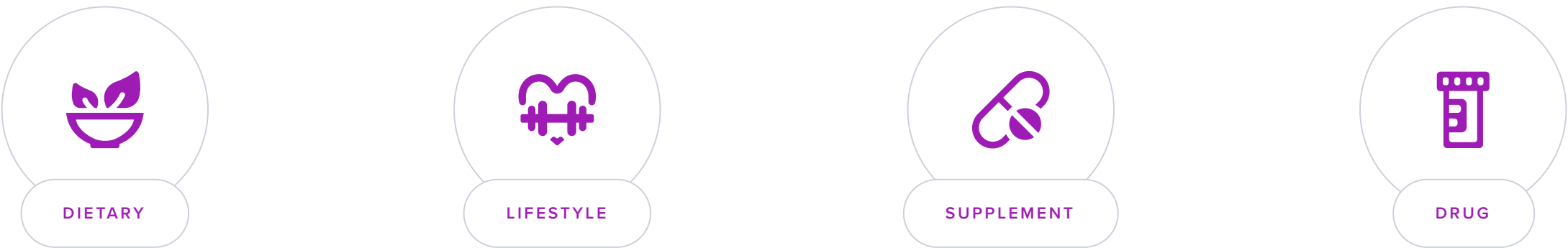


Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

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):



In Summary Reports, we combine top evidence-based recommendations for different conditions.

We focus on recommendations that help with more conditions included in a Summary Report.

For each recommendation, we list all conditions it may help with. We also include impact, evidence, regimen, personalized parts, and other details specific to each condition.

1

Recommendation

Helps with the following

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5

Condition

IMPACT

4 / 5

EVIDENCE

4 / 5



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:

- The scores/gauges use the latest scientific studies. But they are not perfect and will change as the models improve.
- Not everyone with risk variants will develop a health condition.
- Genetics is not the whole story. Your health is most often a combination of genetics, lifestyle, and environmental factors. Great news, as this means that you can often change your lifestyle to lower your risk.
- Results might be more accurate for some ethnic groups than others. This depends on the studies used in each report.
- People without risk variants can also develop health conditions.
- It's important to work with your doctor to better understand your risks. Our reports do not diagnose or treat any health condition. They are not a substitute for medical advice. If you're diagnosed with a certain health condition, follow your doctor's advice.

Summary

Weight management and body fat distribution are influenced by a combination of environmental factors, lifestyle choices, and genetics. **Genetic predispositions** can significantly affect your tendency to gain or lose weight, how your body stores fat, and how efficiently your metabolism operates.

For some, genetic variants may lead to a higher likelihood of weight gain, a slower metabolic rate, or difficulty in maintaining weight loss. For others, genetics may contribute to being underweight or having issues with regulating hunger and satiety.

This report explores the genetic markers associated with weight problems, metabolic function, and fat distribution. By analyzing these genetic factors, the report offers insights into potential challenges related to weight management, including tendencies toward being overweight, weight regain, and metabolic syndrome. It also highlights key markers and genes, such as leptin, ghrelin, and FTO, that play critical roles in regulating hunger, fat storage, and energy balance.

By understanding your genetic predispositions, you can take targeted actions to improve weight management through personalized diet plans, exercise routines, and lifestyle modifications that align with your genetic profile.

This summary report contains:

23 Genetic Results

50 Recommendations

Overview of Your Results

Weight Management



TYPICAL LIKELIHOOD

Overweight

Typical likelihood of being overweight or obese



TYPICAL LIKELIHOOD

Weight Regain

Typical likelihood of weight regain



HIGHER

Tendency to Overeat

Higher predisposition to overeat



LESS LIKELY

Metabolic Syndrome

Less likely to have metabolic syndrome



TYPICAL LIKELIHOOD

Underweight

Typical likelihood of being underweight

Metabolism & Body Composition



TYPICAL

Metabolic Rate

Predisposed to typical metabolic rate



HIGHER LEVELS

Visceral Fat

Predisposed to more visceral fat



TYPICAL LEVELS

Belly Fat

Predisposed to typical amount of belly fat

Weight Markers



HIGHER LEVELS

Leptin

Predisposed to higher leptin levels



TYPICAL LEVELS

Adiponectin

Predisposed to typical adiponectin levels



TYPICAL LEVELS

Ghrelin

Predisposed to typical ghrelin levels

 Weight Genes

 TYPICAL FTO (Weight) Likely typical FTO genetics	 INTERMEDIATE ACTIVITY MC4R (Weight/ Blood Sugar) Likely intermediate MC4R activity	 LOWER ACTIVITY LEPR (Weight/Leptin Resistance) Likely lower LEPR activity
 LOWER ACTIVITY UCP1 (Weight) Likely lower UCP1 activity	 LOWER ACTIVITY UCP2 (Weight) Likely lower UCP2 activity	 LOWER ACTIVITY UCP3 (Weight) Likely lower UCP3 activity
 WORSE GENETICS ADRB2 (Weight) Likely worse ADRB2 genetics	 TYPICAL ACTIVITY ADRB3 (Weight) Likely typical ADRB3 activity	 TYPICAL ACTIVITY CD36 (Fat Preference/Weight) Likely typical CD36 activity
 LOWER ACTIVITY CLOCK (Sleep & Weight) Likely lower CLOCK activity	 TYPICAL ACTIVITY TFAP2B (Weight/Diet) Likely typical TFAP2B activity	 LOWER ACTIVITY PPARG (Metabolism) Likely lower PPARG activity

Your Results in Details



Weight Management

Weight issues, such as being overweight, underweight, or having difficulty maintaining weight, are often driven by both lifestyle and genetic factors. This section focuses on the genetic predispositions that may contribute to common weight problems, including tendencies toward overeating, weight regain, and metabolic syndrome.

Understanding your genetic risk factors can help you tailor your diet, exercise routine, and weight management strategies to better suit your body’s unique needs. By addressing these predispositions early, you can work toward achieving a healthy weight and maintaining long-term weight stability.



TYPICAL LIKELIHOOD

Overweight

Typical likelihood of being overweight or obese



TYPICAL LIKELIHOOD

Weight Regain

Typical likelihood of weight regain



HIGHER

Tendency to Overeat

Higher predisposition to overeat



LESS LIKELY

Metabolic Syndrome

Less likely to have metabolic syndrome



TYPICAL LIKELIHOOD

Underweight

Typical likelihood of being underweight

Overweight

Key Takeaways:

- Up to **70%** of people's differences in weight may be due to genetics.
- Up to **42% of adults** and **19% of children** in the US meet the medical criteria for obesity.
- Weight gain affects conditions like high blood sugar and heart disease. However, it is highly modifiable by diet and exercise. So, even if your genetic risk is high, there's a lot you can do to reduce its impact.
- Click the **Recommendations** tab for useful weight control tips and **next steps** for relevant labs.

People are finding it harder than ever to manage their weight. **Global obesity rates have skyrocketed** [\[R, R, R\]](#).

Some health experts even say we're in an "obesity epidemic." **Up to 42% of adults and 19% of children in the US meet the medical criteria for obesity** [\[R, R, R\]](#).

Doctors can use *body mass index* (BMI) to tell if someone is obese. To calculate your BMI, divide your weight by the square of your height (kg/m²). There are many online calculators that can help you do this [\[R, R\]](#).

In Western countries, people with a **BMI of 25 and over** are considered **overweight**. A **BMI of 30 or greater** is considered **obese**. In some Asian countries, a BMI of 25 and over is considered obese [\[R, R, R\]](#).

BMI isn't the only important measure of healthy weight, however. Body composition is also important because muscle is more dense than fat. Thus, a muscular athlete and an obese person can have similar BMIs [\[R, R\]](#).

For this reason, doctors and researchers often use other body weight measurements, including [\[R, R\]](#):

- Waist circumference (WC)
- Waist-to-hip ratio (WHR)
- Percentage of body fat (%BF)
- Lean (muscle) mass



TYPICAL LIKELIHOOD

Typical likelihood of being overweight or obese based on 455,505 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
FTO	rs9939609	AT
NPC1	rs1808579	CC
NPC1	rs1805081	TT
MC4R	rs17782313	CT
GNPDA2	rs10938397	AG
SH2B1	rs7498665	GA
SEC16B	rs591120	CG
KCTD15	rs29941	AG
NEGR1	rs3101336	TC
IL6R	rs2229238	TT
STEAP1B	rs10242595	GG
LEP	rs4731426	CG
STEAP1B	rs1800795	GC
SOCS3	rs9892622	AA
PGS1	rs4969170	AA
UCP2	rs2075577	GG
CNTF	rs1800169	GA
UCP2	rs647126	AA
LEPR	rs1137100	AA
LEPR	rs1137101	GG

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

Some people worry about body weight because they value how they look. However, **body weight impacts both mental and physical health**. Obesity may increase the risk of [\[R\]](#), [\[R\]](#):

- High blood pressure
- High [cholesterol](#)
- Heart disease
- [High blood sugar](#)
- Reproductive issues and erectile dysfunction
- Breathing problems during sleep
- Joint and bone disorders
- Some cancers

In theory, you gain weight when you consume more calories than you burn. Your body stores the extra energy as fat [\[R\]](#), [\[R\]](#), [\[R\]](#).

In reality, it's more complicated than that. To stick to a healthy weight, you'll need to manage many factors, including [\[R\]](#), [\[R\]](#), [\[R\]](#):

- **Diet.** Pay attention to the amount and type of food you eat, meal timing, and portion size.
- **Lifestyle.** It's better to live an "active" lifestyle than a "sedentary" one and to allow your body to get the sleep it needs.
- **Environment.** What are your family habits? Do you have social support? What is your stress level? These things have a surprising effect on weight management.
- **Medical conditions.** Anything that changes your metabolism or ability to exercise can also affect body weight.
- **Genetics.** Some gene variants may make it easier or harder to manage your weight.

Doctors may recommend a variety of strategies to help reach and maintain a healthy weight. These include [\[R\]](#):

- Reducing how much food you eat
- Choosing low-calorie foods
- Choosing more plant-based foods
- Exercising
- Counseling or support groups

Your genes may help determine how well you respond to these strategies.

Rarely, obesity can become a serious health problem. In these cases, doctors may prescribe [weight loss](#) drugs or surgery [\[R\]](#).

Up to 70% of differences in weight may be attributed to genetics.

Genes that may contribute to body weight influence [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Food choices ([FTO](#), [IRX4](#))
- Appetite ([LEP](#), [POMC](#), [MC4R](#), [NPY](#))
- Meal timing ([CLOCK](#))

- Fat and sugar metabolism ([FTO](#), [UCP2](#), [TCF7L2](#))

Genetically high bioavailable testosterone may be causally associated with a high risk of obesity (in women). In contrast, genetically high choline, omega-3 fatty acids, and DHA may be causally associated with a lower risk of obesity [[R](#), [R](#)].

Weight Regain

A lot of people who are overweight focus on losing weight by dieting or exercising. However, many people who have lost weight while on a diet will tell you it’s hard to keep the weight off once the diet is over. In fact, it’s very common to regain up to 50% of weight lost within a year after losing it [\[R\]](#)!

Different people may find it easier or harder to keep the weight off. Some of those differences may be genetic.

Genes linked to weight regain may influence [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- The way fat is stored in the body
- Inflammation
- Feelings of hunger
- Feelings of reward from eating food



TYPICAL LIKELIHOOD

Typical likelihood of weight regain based on 54 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
BDNF	rs6265	CC
ALOX5AP	rs4769873	CC
ALOX5AP	rs9578196	CC
ALOX5AP	rs9315051	AA
LEP	rs2071045	TT
FTO	rs9939609	AT
LEP	rs4731426	CG
PPARG	rs1801282	GC
TUB	rs4385931	GG
ALOX5AP	rs3885907	CC
APP	rs2830054	TT
TFAP2B	rs987237	AA
CCK	rs10865918	AC
APP	rs466448	AG
CCK	rs11571842	TC
PPARGC1A	rs2932976	GA
FAM241A	rs17044137	AT
PEX11A	rs894160	CT
ANKK1	rs1800497	AG
KCTD15	rs29941	AG

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

Tendency To Overeat

Genetics may play a role in how often you feel hungry. One related gene is [FTO](#), known as fat mass and obesity-associated gene [\[R\]](#).

A variant near this gene is associated with:

- Increased appetite [\[R, R\]](#)
- Higher food intake [\[R, R\]](#)
- Feeling less full after meals [\[R, R, R\]](#)
- Eating in the absence of hunger [\[R, R\]](#)
- Food cravings and emotional eating [\[R, R\]](#)

It is important to remember that a number of other gene variants may also influence hunger. Additionally, lifestyle and environmental factors play an important role in appetite control and how much we eat.

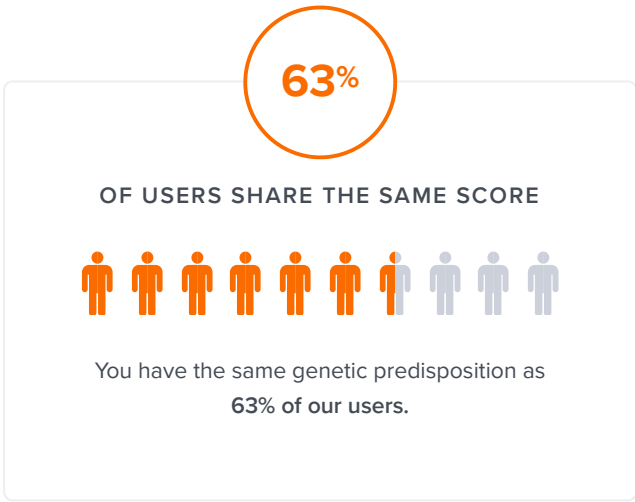
Some choices that may help you eat less include [\[R, R, R, R, R\]](#):

- Only eating when physically hungry
- Drinking more water
- Eating more protein
- Replacing sugary snacks with more filling foods



HIGHER

Higher predisposition to overeat based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
FTO	rs9939609	AT

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

Metabolic Syndrome

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 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
CLPTM1	rs483082	TT
MLXIPL	rs12056034	AG
GALNT2	rs2281721	TC
FADS2	rs1535	GA
FTO	rs56094641	GA
MC4R	rs66922415	GA
PABPC4	rs11206374	AG
CMIP	rs2925979	CT
GCKR	rs1260326	TC
KLF14	rs10260148	CT
LIN7C	rs56133711	GA
NAT2	rs4921913	CT
SNX10	rs1534696	AC
INO80E	rs3814883	CT
GSR	rs10954772	CT
RPL17	rs1105654	GA
TRPS1	rs3808439	AG
HLA-DQA2	rs5021727	AG
NCKAP5L	rs7138803	GA
MLLT10	rs9971210	CG

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

Underweight

There are a variety of reasons why a person may be underweight. Sometimes, multiple underlying causes may be related. Causes of being underweight include:

- Dietary restrictions or lack of access to nutritious foods.
- High physical activity level.
- Medical conditions that accelerate metabolism, decrease appetite, or cause vomiting such as thyroid disorders, diabetes, cancer, or digestive diseases.
- Mental health issues that affect appetite and body image such as depression, anxiety, or eating disorders like anorexia nervosa and bulimia.

Genetics can play a role in determining your natural body type and metabolism. People with a family history of being naturally thin or underweight might have a higher tendency to be underweight themselves [\[R\]](#).

It is best to see your healthcare provider if you lose weight unexpectedly. Your provider or a dietitian can help you develop a plan to gain weight in a healthy way. The plan should include [\[R\]](#):

- Eating regular snacks (5 to 6 smaller meals during the day) with a focus on proteins, carbohydrates, and healthy fats.
- Adding extras to your dishes for more calories, focusing on nutrient-rich and calorie-dense foods.
- Trying smoothies and shakes with a blend of high-calorie, nutritious ingredients. Meal replacement drinks may also be part of your weight-gain effort.
- Watching what and when you drink. Drinking enough throughout the day is important but beverages can make you feel full. If that's the case for you, avoid drinking during a meal or before.
- Exercise, especially strength training, to help you gain weight by building up your muscles and stimulating your appetite.



TYPICAL LIKELIHOOD

Typical likelihood of being underweight based on 1,665 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ANK2	rs7656666	AA
/	rs6833159	TC
NRXN3	rs12882679	GA
ADGRB3	rs117763955	CC
PCGF2	rs118080693	CC
DPF3	rs17180754	GG
DCC	rs35721894	AA

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



Metabolism & Body Composition

Metabolism and body composition play crucial roles in how your body processes energy, stores fat, and maintains weight. Factors like **metabolic rate**, **visceral fat**, and **belly fat** are influenced by both genetics and lifestyle.

By identifying your genetic predisposition to metabolic rate and fat distribution, you can make informed decisions about your diet, exercise, and strategies to optimize body composition and metabolic health.



TYPICAL

Metabolic Rate

Predisposed to typical metabolic rate



HIGHER LEVELS

Visceral Fat

Predisposed to more visceral fat



TYPICAL LEVELS

Belly Fat

Predisposed to typical amount of belly fat

Metabolic Rate

Key Takeaways:

- Being high or low metabolism is not inherently problematic. Knowing what yours is allows you to adjust various diet, exercise, and lifestyle choices to properly manage it.
- Your metabolic rate influences movement, thinking, breathing, body temperature, and healing rate.
- High metabolic rate may be affected by being younger, being bigger, as well as more active. Low metabolic rate tends to be affected by the opposite of these. Your genetics may impact the influence of these factors.

Your metabolic rate is the number of calories you burn in a day to maintain bodily functions. A lower metabolic rate or a "slower metabolism" means your body needs fewer calories to do basic functions. Others may need to burn more calories to support these functions. These people have a higher metabolic rate or a "faster metabolism" [R,R,R].

Is metabolism related to body weight? If so, is it possible to burn more calories by boosting your metabolic rate?

Differences in metabolic rate may be due to both genetic and environmental factors. Factors that can contribute to a slower metabolism include [R, R, R, R, R]:

- Being smaller
- Having less muscle mass
- Being older
- Being less active
- Not getting enough sleep

People with slower metabolism need fewer calories to get them through the day. They also tend to gain weight more easily.

Factors that can contribute to a faster metabolism include [R, R, R, R]:

- Being larger
- Having more muscle mass
- Being younger
- Being more active

People with faster metabolism need more calories to get them through the day. They also find it harder to gain weight.

Metabolic rate may not change much from age 20 to 60. While you may not change how many calories your body needs to perform



Predisposed to typical metabolic rate based on 137,802 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CCND2	rs76895963	TT
TP53	rs78378222	TT
CCND3	rs33966734	CA
PARD3B	rs1470545	CC
DCAF16	rs1472852	AA
L3MBTL3	rs7740107	AA
DLEU7	rs3118914	GT
HMGA2	rs1351394	CT
ZFHX4	rs61729527	TC
MGA	rs117183161	AA
MC4R	rs76227980	CC
SH3YL1	rs62106258	TT
ZBTB26	rs369508364	CC
CDKN1C	rs143840904	CC
FANCC	rs370727606	GG
ACAN	rs28584580	AA
PAM	rs78408340	CC
ADAMTS10	rs62621197	CC
DLG5	rs117543413	CC
COQ5	rs76929617	AA

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

automatic functions, **you can burn more calories by being more active**. Regular exercise can help maintain a healthy weight and support overall health [\[R](#), [R](#), [R](#), [R](#), [R](#)].

If you're concerned about your weight or you think your metabolism is too slow or too fast, talk with your doctor.

Visceral Fat

Key Takeaways:

- About 40% of the differences in levels of visceral fat may be due to genetic factors
- High visceral fat levels have been related to high blood pressure, heart disease, and type 2 diabetes.
- Risk factors include a diet high in saturated fat and sugar, a lack of physical activity, stress, aging, and menopause.
- If your genetic risk is high or you have a low risk but more visceral fat than you want, take action on factors that you can change.

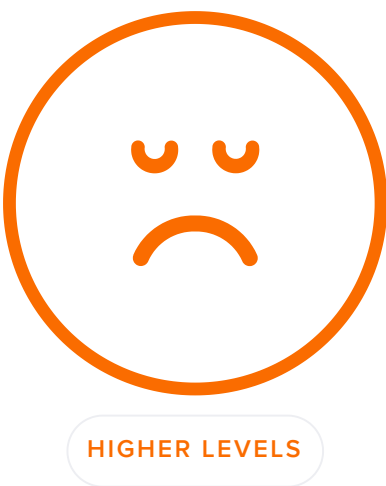
If we asked you to picture body fat, the first thing that would likely come to mind is *subcutaneous fat*. This fat is found under the skin of the belly, thighs, and other areas. However, there is another type of body fat called *visceral fat*. This type of body fat hides in the abdomen and surrounds organs like the liver, stomach, and intestines. It may have a greater impact on health than subcutaneous fat [R, R].

Factors that may increase the amount of visceral fat include [R, R, R, R]:

- A diet high in saturated fat and added sugar
- A lack of physical activity
- Long-term stress
- Aging
- Menopause
- **Genetics**

In fact, **about 40% of the differences in levels of visceral fat may be due to genetic factors** [R].

For example, genetically high bioavailable testosterone may be causally associated with lower hip circumference in men and genetically high free testosterone may be causally associated with lower body fat [R, R].



Predisposed to more visceral fat based on 818,294 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MC4R	rs2229616	CC
SH3YL1	rs62106258	TT
ADH1B	rs1229984	CC
ADARB1	rs76040172	GG
FTO	rs56094641	GA
UHRF1BP1	rs9469899	AA
MC4R	rs538656	TG
SEC16B	rs539515	CA
/	rs114593013	GA
KCNH5	rs79733879	TC
LIN7C	rs11030112	GA
MEF2C	rs2304608	CA
GNPDA2	rs10938398	GA
SH2B1	rs7498665	GA
NCKAP5L	rs7132908	GA
PPARG	rs7649970	TC
LRFN2	rs9471333	TC
RSPO3	rs9482772	TC
GSTM4	rs7550711	CC
SH3YL1	rs13393304	AA

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

Belly Fat

Factors that might contribute to the accumulation of belly fat include:

- **Genetics:** some people may be genetically predisposed to accumulate fat in the abdominal area. Specific variants can influence body fat distribution, metabolism, and response to exercise and diet.
- **Age:** As people age, they tend to gain more abdominal fat.
- **Diet:** High intake of sugary foods, beverages, and high-fat foods can promote abdominal fat.
- **Lack of physical activity:** Sedentary lifestyles can lead to weight gain and increased belly fat.
- **Poor sleep:** Lack of sleep or poor-quality sleep may result in weight gain, including in the abdominal area.
- **Stress:** Chronic stress can lead to weight gain, especially around the midsection due to increased cortisol levels.
- **Hormonal changes:** Conditions like PCOS (polycystic ovary syndrome) or hormonal shifts during menopause can lead to an increase in belly fat.



Predisposed to typical amount of belly fat based on 728,984 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
PAX7	rs140068450	GG
KCNIP4	rs191089506	AA
EPHA4	rs151197313	GG
DACT3	rs115034159	CC
SPTBN1	rs149660479	TT
NDUFAF1	rs144284546	CC
/	rs141736521	GG
KIAA1217	rs143713405	GG
SPTBN1	rs139247782	CC
/	rs57914885	TT
IL1RAP	rs73184209	TT
/	rs149272992	CC
SFRP1	rs138170590	GG
CHRM2	rs187398437	TT
SH3RF2	rs186498547	CC
FUT9	rs116997611	TT
DNAJC13	rs61748103	GG
INPP4B	rs183291101	GG
CHMP4B	rs150618140	CC
SLC48A1	rs149188661	CC

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



Weight Markers

Hormones like **leptin, adiponectin, and ghrelin** are key regulators of hunger, satiety, and fat metabolism. These hormones play an essential role in weight management by signaling when you're full, regulating fat storage, and controlling appetite. This section explores how genetic variations in these hormones can influence your weight and body fat.

By understanding your genetic predisposition to these weight hormones, you can adjust your diet and lifestyle to better manage hunger and improve your body's ability to maintain a healthy weight.

 **HIGHER LEVELS**
Leptin

Predisposed to higher leptin levels

 **TYPICAL LEVELS**
Adiponectin

Predisposed to typical adiponectin levels

 **TYPICAL LEVELS**
Ghrelin

Predisposed to typical ghrelin levels

Leptin

Low leptin levels have been associated with:

- Low body mass index (BMI) [R, R]
- Cold exposure [R]
- Alcohol [R]
- Exercise [R, R]
- Short-term fasting [R]
- Sleep deprivation [R]
- Anorexia [R]

Leptin deficiency can also be caused by disorders such as:

- Congenital leptin deficiency [R]
- Congenital and acquired lipatrophy (localized loss of fat tissue) [R]

Symptoms of low leptin levels vary depending on the underlying cause and may include [R, R, R, R]:

- Feeling hungry more often
- Difficulty losing weight (slower metabolism)
- High or low percentage of body fat
- Absent period (in women)
- Weak and brittle bones (osteoporosis)
- Frequent infections

In contrast, the following have been associated with elevated leptin levels:

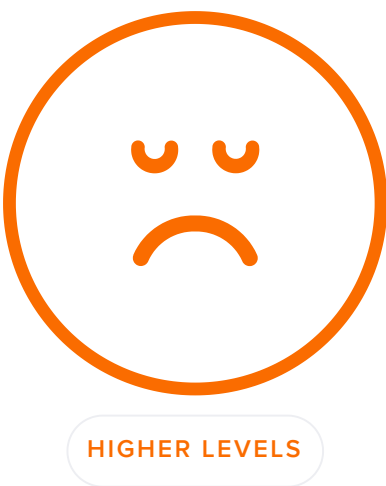
- Overeating, especially high-fat and high-sugar foods [R, R]
- Emotional stress [R]
- Inflammation [R, R]
- Obesity [R]
- Pregnancy [R]
- Pre-eclampsia [R]
- Gestational diabetes [R]
- Sleep apnea [R]

Chronically high leptin levels can lead to leptin resistance. Symptoms of leptin resistance include [R]:

- Weight gain and difficulty losing weight
- Urge to snack soon after meals

Leptin resistance is associated with obesity, metabolic syndrome, and other related health issues like type 2 diabetes and cardiovascular diseases.

Maintaining healthy leptin levels primarily involves a balanced diet, regular physical activity, adequate sleep, and stress management. For



Predisposed to higher leptin levels based on 2,670 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
LEP	rs10487505	GG
KLF14	rs972283	GG
ARHGAP40	rs6071166	CC
SLC38A11	rs13389219	CT
TIPARP	rs900400	CT
GCKR	rs780093	TC
GCKR	rs1260326	TC
TIPARP	rs900399	GA
KLHL31	rs3799260	TC
SLC38A11	rs6738627	GA
LEP	rs17151919	GG
ZNF800	rs62621812	GG
LEP	rs791600	GG

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

individuals struggling with weight or metabolic health, consulting with a healthcare provider is crucial. They can offer guidance on diet, exercise, and lifestyle adjustments to improve leptin sensitivity and overall health.

Adiponectin

Whether low adiponectin levels actually *cause* these conditions or are just a biomarker for their onset and progression remains unknown, but the production of this hormone is reduced in people with [R](#), [R](#), [R](#), [R](#), [R](#):

- Obesity
- Heart disease
- Diabetes
- Asthma
- Preterm birth
- Sleep deprivation

Conversely, high adiponectin levels have been associated with [R](#), [R](#), [R](#), [R](#), [R](#):

- Autoimmune diseases such as rheumatoid arthritis, osteoarthritis, and lupus
- Heart failure and high blood pressure
- Kidney disease
- Aging
- Calorie restriction

Therefore, focusing on improving your adiponectin levels is unlikely to improve your health. However, some beneficial steps you can take to improve your overall health will likely increase your adiponectin levels. These steps include:

- Losing weight if you are overweight [R](#)
- Regular exercise [R](#), [R](#)
- Eating a healthy, balanced, diet rich in unsaturated fats such as [olive oil](#) [R](#), [R](#), [R](#)
- Taking cold showers [R](#)

Foods, beverages, and supplements that may increase adiponectin levels include:

- Banana [R](#)
- Berries such as grapes and raspberries [R](#), [R](#)
- [Coffee](#) [R](#)
- [Coenzyme Q10](#) [R](#)



Predisposed to typical adiponectin levels based on 37 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
WDR11	rs10886863	CC
ITIH1	rs1108842	AA
RGMA	rs4777845	TT
RFC4	rs182052	AA
ACADVL	rs222852	AA
PDE3A	rs11045172	AA
/	rs4716055	TT
TCTN2	rs6488898	AG
IRS1	rs1515110	GT
CMIP	rs2925979	CT
DVL2	rs507506	GG
HCAR2	rs601339	GA
PDE3A	rs7955516	AA
CITED2	rs668459	CC
RBMS2	rs2657888	GG
ZNF664	rs7978610	CG
ARL15	rs6450176	AG
TMEM263	rs10778506	TC
LYPLAL1	rs2061155	TC
FAM13A	rs13131633	TC

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

Ghrelin

[Ghrelin](#) is a hormone mainly produced by the stomach. Ghrelin is considered the “hunger hormone” because it stimulates appetite, promotes eating, and increases fat storage. It also plays important roles in immunity, muscle growth, and brain health [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Genetics may influence ghrelin levels. For example, variants of the [GHRL](#) gene, which helps produce ghrelin, are linked to lower ghrelin levels [\[R\]](#).

Several other factors may change ghrelin levels, including [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- **Time of the day:** Ghrelin levels are higher at night and lower during the day
- **Food intake:** Ghrelin is highest when the stomach is empty and lowest after a meal
- **Type of meals:** Carbohydrate-rich meals lower ghrelin levels the most, followed by fat-rich meals and high-protein meals

Although counterintuitive, [obese people may have lower levels of hunger hormone](#) than lean people. However, after a meal, ghrelin levels in obese people seem to drop less, which may keep them hungry. Research on this matter is still ongoing [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Other health conditions linked to **low ghrelin levels** include:

- Type 2 diabetes [\[R\]](#)
- Hyperthyroidism (overactive thyroid) [\[R\]](#)
- Gastritis due to *Helicobacter pylori* infection [\[R\]](#)
- Stomach surgery [\[R\]](#), [\[R\]](#)

High ghrelin levels may result from sleep deprivation and chronic stress. People with **anorexia may also have high levels of hunger hormone** but be less sensitive to it than healthy people. Other health conditions linked to high ghrelin levels include [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Lung disease [\[R\]](#)
- Rare genetic disorders [\[R\]](#)

Keep in mind that this report is not about the rare genetic disorders mentioned above. They are very rare and usually diagnosed in infancy.



Predisposed to typical ghrelin levels based on 12 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CNTNAP2	rs192092592	AA
ALX4	rs143653572	CC
MAF	rs76823993	CC
PAX5	rs138296128	CC
BANK1	rs142224718	TT
BRINP1	rs139359241	GG
EPDR1	rs74483218	GG
BRK1	rs143729751	GG
TRMT6	rs187860960	CC
AKT3	rs112426408	AA
AKT3	rs80240706	CC
/	rs77563704	CC

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



Weight Genes

Several genes have been identified as playing a major role in weight regulation, metabolism, and fat storage. This section covers key genes like **FTO**, **MC4R**, and **LEPR**, which influence weight, blood sugar levels, and the body's response to hormones like leptin. Other genes, such as **UCP1**, **UCP2**, and **ADRB3**, regulate energy expenditure and fat metabolism.

Understanding your genetic predisposition through these genes can guide you in developing a personalized weight management plan, focusing on strategies that align with your genetic strengths and challenges for better long-term results.

 **TYPICAL**
FTO (Weight)

Likely typical FTO genetics

 **INTERMEDIATE ACTIVITY**
MC4R (Weight/ Blood Sugar)

Likely intermediate MC4R activity

 **LOWER ACTIVITY**
LEPR (Weight/Leptin Resistance)

Likely lower LEPR activity

 **LOWER ACTIVITY**
UCP1 (Weight)

Likely lower UCP1 activity

 **LOWER ACTIVITY**
UCP2 (Weight)

Likely lower UCP2 activity

 **LOWER ACTIVITY**
UCP3 (Weight)

Likely lower UCP3 activity

 **WORSE GENETICS**
ADRB2 (Weight)

Likely worse ADRB2 genetics

 **TYPICAL ACTIVITY**
ADRB3 (Weight)

Likely typical ADRB3 activity

 **TYPICAL ACTIVITY**
CD36 (Fat Preference/Weight)

Likely typical CD36 activity

 **LOWER ACTIVITY**
CLOCK (Sleep & Weight)

Likely lower CLOCK activity

 **TYPICAL ACTIVITY**
TFAP2B (Weight/Diet)

Likely typical TFAP2B activity

 **LOWER ACTIVITY**
PPARG (Metabolism)

Likely lower PPARG activity

FTO (Weight)

An SNP in this gene, [rs9939609](#), has shown a robust association with obesity across different ages and ethnic groups. Carriers of the minor 'A' allele tend to gain more weight and have higher rates of obesity [\[R, R, R\]](#).

Many human studies suggest that the 'A' allele at rs9939609 is associated with:

- Higher levels of [ghrelin](#) or the "hunger hormone" [\[R\]](#)
- Higher food intake [\[R, R, R\]](#)
- Increased preference for higher-calorie foods [\[R, R, R\]](#)
- Increased enjoyment of food [\[R\]](#)
- Not feeling full after meals [\[R, R, R\]](#)
- Eating in the absence of hunger [\[R, R\]](#)
- Food cravings [\[R\]](#)
- Emotional and binge eating [\[R\]](#)

In contrast, the 'T' allele is linked to normal body weight, more satiety after meals, and possibly healthier dietary choices [\[R, R, R\]](#).

In addition to its potential influence on appetite and hunger control, this *FTO* SNP may also have metabolic effects that affect how the body actually processes the food we eat. For example, several studies suggest that the 'A' allele of rs9939609 may be linked with higher [insulin resistance](#) and [blood sugar](#) [\[R, R, R, R\]](#).

Following on this, a meta-analysis of data from over 40,000 Scandinavians found that people diagnosed with type-2 diabetes were more likely to carry the 'A' allele for this SNP. The authors also concluded that having the 'A' allele may make a person more likely to develop type-2 diabetes over time. However, another meta-analysis of over 150,000 people found this association significant only in some populations [\[R, R\]](#).

The good news is that **healthy dietary choices may reduce and even cancel out the harmful effects of the 'A' variant!**

Multiple studies have associated an increased intake of [dietary fat](#), specifically saturated and trans fat, with obesity in carriers of the 'A' allele [\[R, R, R, R, R, R, R\]](#).

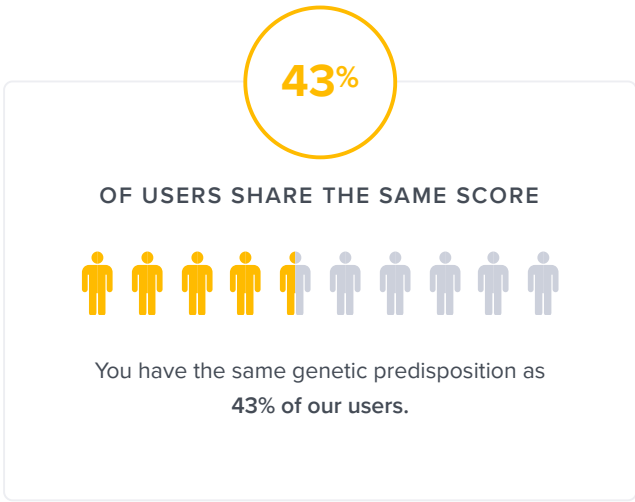
Carriers of this variant eating a low-fat diet or replacing saturated fat with healthy fats such as PUFA and MUFA may see greater reductions in [\[R, R, R, R, R\]](#):

- [Weight](#) and abdominal fat
- [Total cholesterol](#)



TYPICAL

Likely typical FTO genetics based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
FTO	rs9939609	AT

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

- [LDL](#)
- [CRP](#) (inflammation)
- Insulin resistance

Additionally, carriers of the ‘A’ variant may benefit from increasing their intake of [dietary protein](#). While a low-protein diet has been associated with higher BMI and waist circumference in people with the ‘AA’ genotype, ‘A’ carriers eating a high-protein diet may see greater improvements in their [R](#), [R](#), [R](#):

- Appetite and food craving control
- Total cholesterol
- Triglycerides
- LDL
- Insulin resistance

However, two meta-analyses failed to confirm these associations. One of them even came to the opposite conclusion: the link between FTO variants and BMI was **stronger** in those who consumed more protein. Further analysis of different populations confirmed this finding only in whites [R](#), [R](#).

A 3-year-long study concluded that people with the 'AA' genotype may lose weight better on a [Mediterranean diet](#) compared to people with the ‘TT’ genotype. In addition, according to another study, this type of diet may protect people with the 'AA' genotype against diabetes [R](#), [R](#).

MC4R (Weight/ Blood Sugar)

The most studied SNP near the *MC4R* gene is [rs17782313](#). The "C" allele is linked to:

- Higher BMI (8%) and obesity rates (12-30%) [\[R, R\]](#)
- Increased hunger, snacking, and overeating [\[R\]](#)
- Eating high-calorie foods high in fat [\[R, R\]](#)

Another important *MC4R* variant is [rs12970134](#). The “A” allele is linked to:

- Obesity, higher BMI, and waist circumference [\[R, R, R\]](#)
- Food cravings and increased beverage consumption [\[R\]](#)
- High blood sugar and insulin resistance [\[R, R, R, R\]](#)

Other *MC4R* variants like [rs6567160](#) and [rs663129](#) have shown similar associations, They are almost always inherited together with the two main variants, so they all represent a single genetic factor [\[R, R, R, R, R\]](#).

“Bad” *MC4R* variants likely **reduce gene expression or receptor activity**, thus increasing food intake and hindering glucose and fat metabolism.

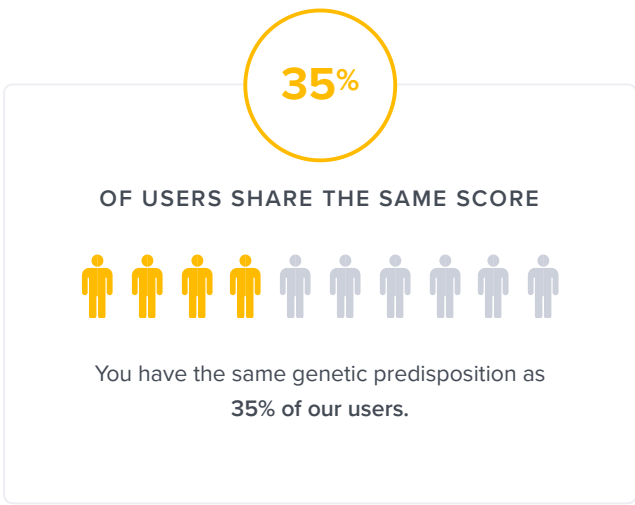
[Learn more about the link between MC4R variants, weight, and food intake.](#)

[Learn more about the link between MC4R variants and blood sugar.](#)



INTERMEDIATE ACTIVITY

Likely intermediate MC4R activity based on 2 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MC4R	rs17782313	CT
MC4R	rs12970134	AG

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

LEPR (Weight/Leptin Resistance)

Many *LEPR* variants are currently under investigation for their possible link to leptin resistance and obesity. The most important one is [rs1137101](#).

At rs1137101, the ‘GG’ genotype is associated with higher weight, higher BMI, and increased daily intake of calories. People with the ‘GG’ genotype at rs1137101 are also likely to have higher [cholesterol](#), higher blood sugar, and insulin resistance [\[R\]](#).

A recent meta-analysis has confirmed a link between this variant and obesity. The risk was **19% higher per each “G” allele** [\[R\]](#).

This variant likely reduces the number or activity of leptin receptors, potentially contributing to leptin resistance [\[R\]](#), [\[R\]](#).

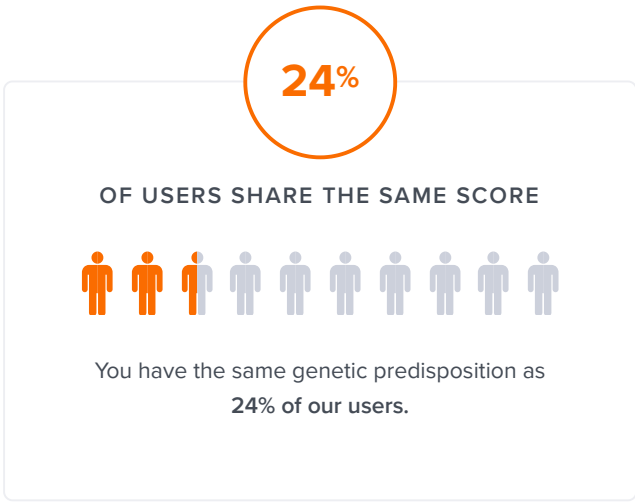
Studies have linked another variant, [rs12405556-T](#), to higher weight and blood lipid levels. This variant is often inherited together with rs1137101-G, meaning many people carry either both or none of them [\[R\]](#).

Other LEPR SNPs—like rs1137100, rs11208659, and rs11804091—have been linked to weight gain and obesity as well. However, the supporting evidence is weaker [\[R\]](#), [\[R\]](#).



LOWER ACTIVITY

Likely lower LEPR activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
LEPR	rs1137101	GG

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

UCP1 (Weight)

One of the best-studied SNPs in the *UCP1* gene is [rs1800592](#) (also known as the “-3826 A>G” polymorphism). It helps determine how your body uses and stores the energy that you get from food [\[R\]](#).

The 'T' allele is linked to increased activity of the *UCP1* gene. It's associated with a higher resting metabolic rate, higher body heat production, and less weight gain. According to some researchers, this variant helps turn more of the energy from food into heat instead of body fat (white fat) [\[R, R\]](#).

Conversely, the 'C' allele is linked to *decreased* activity of the *UCP1* gene. It's associated with a lower resting metabolic rate, lower body heat production, higher weight gain, and a higher BMI. If less of the energy acquired from food is turned into heat, then more of it would get stored as body fat [\[R, R\]](#).

According to several studies, the 'C' allele (and especially the 'CC' genotype) is associated with increased weight gain as well as a higher chance of being obese [\[R, R, R, R, R, R, R, R\]](#).

For example, people with the 'CC' genotype were found to have lower basal metabolic rates than people with the ‘T’ allele. In other words, they burned less energy when resting. In fact, one study reported that 'C' carriers may burn as much as 200 fewer calories per day than people with the 'TT' genotype [\[R, R\]](#)!

Apart from burning less energy when resting, people with the 'CC' genotype also produced less heat when exposed to cold [\[R, R\]](#).

We all lose brown fat as we age. However, in one study, people with the 'CC' genotype had less brown fat at a younger age than people with the ‘T’ allele [\[R\]](#).

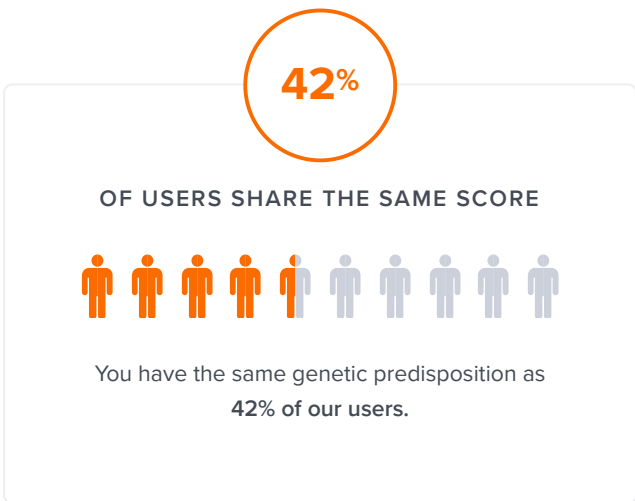
Several studies link the 'C' allele and the 'CC' genotype to metabolic disturbances commonly associated with being overweight. In various studies, the ‘C’ allele has been associated with elevated blood pressure, greater [insulin resistance](#), and higher [LDL cholesterol](#) and [triglycerides](#) [\[R, R, R, R, R, R\]](#).

Fun fact: worldwide, about 30% of people have the 'TT' genotype, which is associated with higher resting metabolism and increased heat production. But this genotype is much more frequent in Europe, where 58% of people have it! Many researchers believe that the *UCP1* gene and the rs1800592 SNP are in part responsible for human adaptation to colder climates [\[R\]](#).



LOWER ACTIVITY

Likely lower UCP1 activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CLGN	rs1800592	CT

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

However, although today we consider the 'T' allele beneficial in terms of its potential effect on body weight, this allele is essentially linked to lower metabolic efficiency. In other words, people with this allele may “waste” more of the energy that they get from food on generating body heat. It is plausible that the more efficient 'C' allele may be advantageous when food is scarce and the climate is warm [\[R\]](#).

UCP2 (Weight)

The minor ‘T’ variant of the [rs659366](#) increases *UCP2* expression in the fatty tissue, pancreas, and liver [\[R, R, R\]](#).

This allele showed a [protective effect from obesity](#) in studies on Austrian and Iranian adults, and Turkish children. Similarly, the major ‘C’ allele was associated with obesity in Danish and Egyptian adults, and Korean, Hungarian, and Spanish children [\[R, R, R, R, R, R, R\]](#).

However, no association between this polymorphism and obesity was found in some studies on Danish and Italian adults, and German children. The ‘T’ variant was even associated with *increased* obesity rates and body fat in Danish, Egyptian, Russian, Spanish, Mexican, Balinese, Indonesian, and Indian adults, and Spanish children [\[R, R, R, R, R, R, R, R, R, R\]](#).

Despite these discrepancies, all meta-analyses agree that the ‘T’ variant is associated with lower obesity rates and BMI in European but not in Asian populations [\[R, R, R, R\]](#).

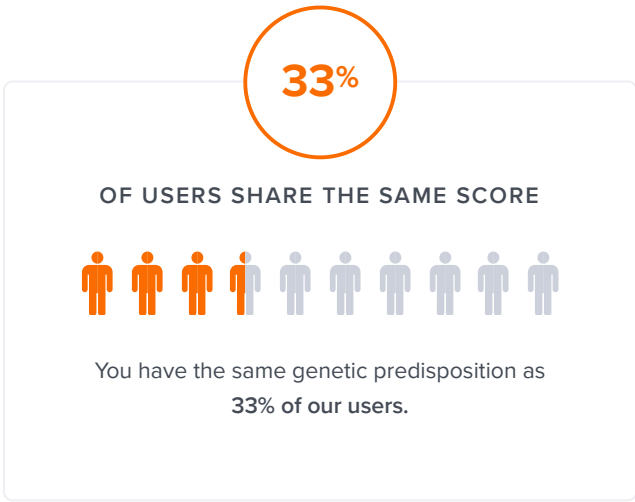
However, this variant may have negative effects on blood lipids, glucose control, and diabetic outcomes [\[R, R, R, R, R, R, R, R, R\]](#).

Another variant usually inherited with this one (‘A’ at [rs660339](#)) has been associated with obesity in Asians but seems to have the opposite effect in Europeans [\[R, R, R\]](#).



LOWER ACTIVITY

Likely lower UCP2 activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
UCP2	rs659366	CC

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

UCP3 (Weight)

The most widely-investigated *UCP3* polymorphism by far is [rs1800849](#), also known as -55C/T. A study in Pima Indians found that the minor allele ‘A’ increases *UCP3* expression, and possibly the levels of the protein, in the muscles [\[R\]](#).

Some studies suggest that the minor variant at this polymorphism may [protect from obesity](#), especially in Caucasians. The mixed results observed may be due to differences in the diet, physical activity, and genetic background of the different populations. Importantly, different *UPC2* and *UPC3* variants are inherited together and their combinations may influence their effects on weight [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

This variant has been associated with a higher waist circumference, waist to hip ratio, and abdominal fat in multiple populations. However, a Spanish study found no relationship between this polymorphism and fat mass or distribution in obese. Another study on American women associated it with increased lean mass and calorie intake [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Two meta-analyses confirmed the association of the ‘A’ variant with increased susceptibility to type 2 diabetes in Asians but not in Europeans [\[R\]](#), [\[R\]](#).

The minor variants at the [rs647126](#) and [rs2075577](#) polymorphisms, which are usually inherited together, were associated with increased BMI in Dutch men. Based on their effect, the authors of the study speculated that these variants may reduce UCP3 activity [\[R\]](#).



LOWER ACTIVITY

Likely lower UCP3 activity based on 3 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
UCP3	rs1800849	GG
UCP2	rs647126	AA
UCP2	rs2075577	GG

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

ADRB2 (Weight)

The [rs1042714](#) polymorphism (also known as Q27E) has been most widely researched. Its minor ‘G’ variant was associated with approximately 20% higher odds of obesity in a meta-analysis of 18 studies [\[R\]](#).

An older meta-analysis came to a similar conclusion. However, the authors observed a significant link between rs1042714-G and obesity only in populations with lower frequencies of this allele, such as Asians and Native Americans [\[R\]](#).

In two studies with 150 women, those with the ‘G’ allele had more fat mass and impaired burning [\[R\]](#), [\[R\]](#).

This variant has also been linked to:

- Increased risk of cardiovascular events in coronary artery disease patients [\[R\]](#)
- Increased risk of Graves’ disease in Caucasians [\[R\]](#)

On the bright side, this variant may decrease the risk of asthma in both adults and children [\[R\]](#).

Normally, leptin helps burn excess fat stores by stimulating the sympathetic activity in fat tissue. However, according to one clinical trial, this pathway may be suppressed in people with the above SNP. The ‘G’ allele carriers had higher leptin levels, but it failed to boost catecholamines, indicating leptin resistance [\[R\]](#).

Interestingly, this SNP doesn't seem to alter the function of beta-2 receptors. Scientists are still looking for the exact mechanism behind its effects on sympathetic activity and fat burning. It may be just a marker for another variant with functional consequences [\[R\]](#).



WORSE GENETICS

Likely worse ADRB2 genetics based on 1 genetic variant we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ADRB2	rs1042714	CG

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

ADRB3 (Weight)

Over 100 studies have examined the relationship between one *ADRB3* variant—[rs4994](#) or Trp64Arg— and body-weight measures. The A>G switch at rs4994 changes one amino acid in the beta-3 receptor structure. The “mutant” receptor had a reduced ability to produce cAMP and burn fat in test tubes [\[R\]](#), [\[R\]](#), [\[R\]](#).

One meta-analysis included 97 studies, involving 44,800 participants. Among East Asians, those with the "G" allele had, on average, 0.31 units higher body mass index, which would equal 0.8-1 kg. In European descendants, the difference was four times smaller and wasn't statistically significant [\[R\]](#).

The same group of authors conducted the largest study of 4,854 European (UK) subjects and confirmed the lack of association between this SNP and BMI [\[R\]](#).

In a meta-analysis of 16 studies and 12,500 children and adolescents, rs4994-G correlated with 23% higher obesity rates. Once again, the effect stemmed from East Asian subjects, who had 47% higher odds of obesity per copy of the "G" allele [\[R\]](#).

A study of 329 adults from Saudi Arabia found a significant link between this SNP and obesity. People with the "G" allele also had a higher waist-hip ratio, blood lipids, leptin, and insulin levels [\[R\]](#).

Research has associated the same variant with other conditions, such as:

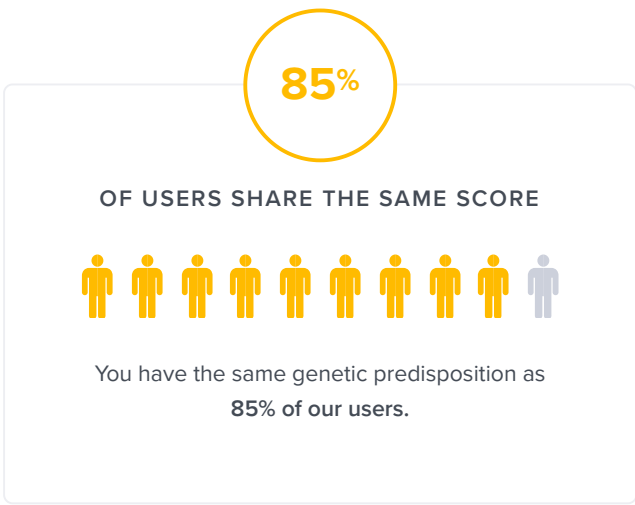
- Diabetes [\[R\]](#), [\[R\]](#)
- High blood pressure [\[R\]](#)
- Heart disease [\[R\]](#)

Those genetic effects were also more pronounced in East Asians.



TYPICAL ACTIVITY

Likely typical ADRB3 activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ADRB3	rs4994	AA

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

CD36 (Fat Preference/Weight)

The CD36 receptor has a complicated relationship with diet and may affect everything from taste preferences to fat metabolism [R].

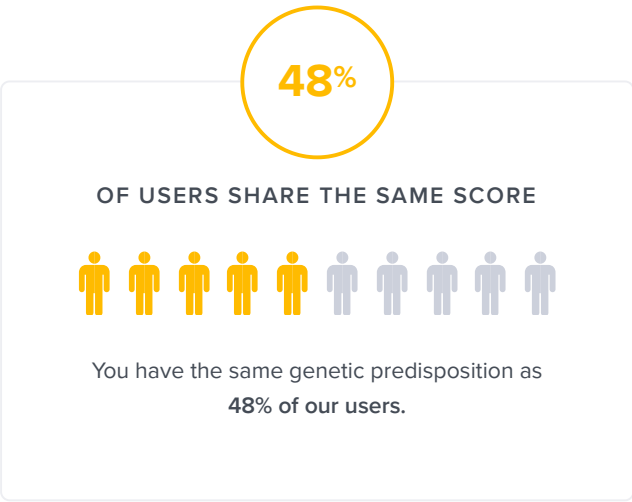
The ‘G’ allele at [rs1761667](#) is associated with a number of metabolic changes compared to the ‘AA’ genotype. For example, people with at least one copy have increased appetite and food intake. However, the ‘G’ allele is also associated with lower BMI [R, R, R].

The ‘A’ allele, meanwhile, is associated with reduced production of the CD36 receptor, increased preference for fatty foods, and increased BMI [R, R].



TYPICAL ACTIVITY

Likely typical CD36 activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CD36	rs1761667	GA

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

CLOCK (Sleep & Weight)

The [rs1801260](#) polymorphism is the most studied SNP in the *CLOCK* gene. Its minor 'G' allele increases CLOCK activity and has been associated with many sleep-related traits, such as [\[R\]](#):

- Abnormal and less stable circadian rhythms [\[R, R\]](#)
- Shorter sleep duration (≤ 6 h per day) [\[R, R, R\]](#)
- Being an evening person [\[R, R, R\]](#)
- Less activity overall, being active later in the day, and being sleepier during the morning [\[R, R\]](#)

This variant has also been linked to:

- Higher prevalence of obesity [\[R, R\]](#)
- Higher ghrelin (hunger hormone) levels and lower satiety [\[R, R\]](#)
- Higher insulin and insulin resistance [\[R\]](#)
- Low compliance with dietary programs, such as the Mediterranean diet [\[R\]](#)
- More difficulty losing weight from diets or bariatric surgery [\[R, R, R\]](#)

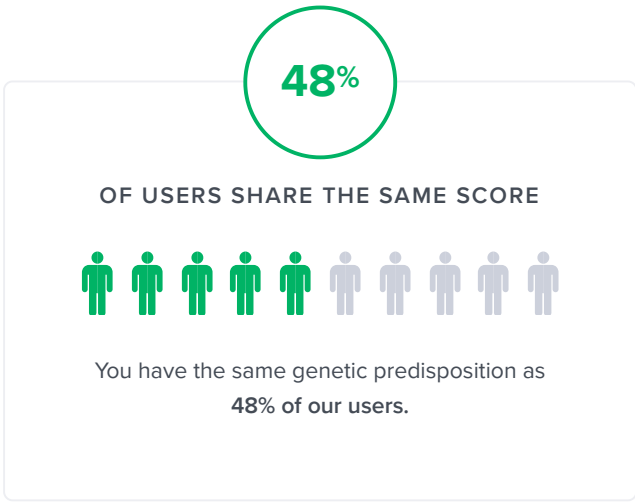
There is a link between how the *CLOCK* gene affects circadian rhythms and sleep on one hand, and metabolic balance and eating behavior on the other [\[R, R\]](#).

Studies have found that sleep deprivation disrupts metabolism by increasing the levels of the stress hormone cortisol and decreasing insulin sensitivity. Furthermore, a lack of sleep increases the levels of the hunger hormone ghrelin, which increases hunger and appetite -- thereby increasing the risk of obesity [\[R, R, R, R, R, R\]](#).



LOWER ACTIVITY

Likely lower **CLOCK** activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
CLOCK	rs1801260	AA

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

TFAP2B (Weight/Diet)

Variations in the *TFAP2B* gene have been associated with increased weight and belly fat and type 2 diabetes. The majority of [obesity](#) and [diet-related](#) research focused on a SNP labeled [rs987237](#). Its minor “G” allele may increase *TFAP2B* expression in fat cells [\[R\]](#), [\[R\]](#), [\[R\]](#).

In a huge meta-analysis of over 195,000 people, the “G” allele was associated with a higher body mass index (BMI) [\[R\]](#).

The “G” allele was associated with 24% obesity rates in a meta-analysis that included 34,600 European participants. Another large review of 16 trials found a link between this variant and waist circumference, which is a measure of abdominal obesity [\[R\]](#), [\[R\]](#).

In a study of 642 obese adults, those with the “GG” genotype lost 2.6 kg more on a high-fat diet, compared with a low-fat diet. The “AG” carriers also preferred a high-fat diet, but the effect was less significant. On the other hand, people with the “AA” did better on a low-fat diet. The authors also discovered a similar but weaker pattern for waist size reduction [\[R\]](#).

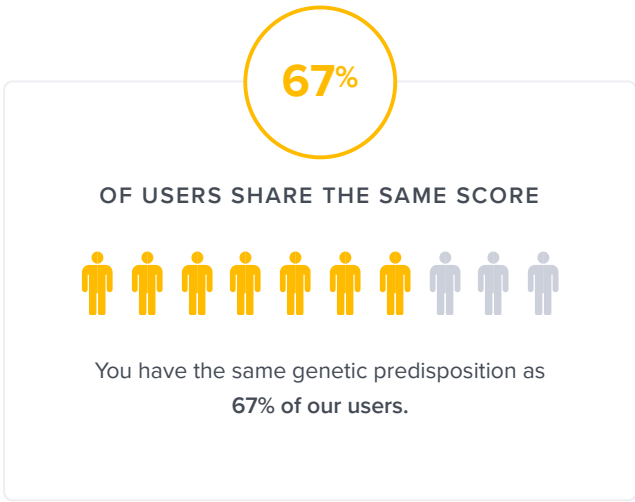
One trial analyzed weight maintenance in 468 European people who completed a weight loss program. Those following a high-protein diet regained 1.84 kg more per each “G” allele. On the other hand, the “AA” carriers did better on a high vs. low-protein diet [\[R\]](#).

To sum up, the “G” allele is associated with obesity. As opposed to those with the “AA” genotype, “G” carriers may do better on a high-fat diet compared to a high-protein diet for losing weight and maintaining weight loss.



TYPICAL ACTIVITY

Likely typical TFAP2B activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
TFAP2B	rs987237	AA

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

PPARG (Metabolism)

Out of the different SNPs in the *PPARG* gene, researchers have mostly focused on [rs1801282](#) (*Pro12Ala*, referred to as rs1805192 in some studies). Its ‘G’ allele changes one amino acid in the PPAR-γ structure, reducing its ability to activate target genes [\[R, R\]](#).

In a large meta-analysis of 75 studies and 49,000 subjects, the ‘G’ allele correlated with a slightly higher BMI. The link was more robust in European populations. A 2015 meta-analysis of 56 trials came to a similar conclusion. Another meta-analysis associated the ‘G’ allele with 55% higher obesity rates [\[R, R, R\]](#).

However, some studies failed to confirm a relationship between this variant and body weight, and some even observed a protective effect of the ‘G’ allele [\[R, R, R, R, R\]](#).

Among 978 elderly subjects, rs1801282-G correlated with 66% higher obesity rates. The lack of physical activity and increased intake of carbs amplified this genetic effect [\[R\]](#).

Interestingly, three studies found that people with rs1801282-G respond better to physical activity when it comes to metabolic improvements [\[R, R, R\]](#).

This variant may also affect [weight loss from the Mediterranean diet](#). Several studies found that ‘G’ carriers lost more weight when eating a [Mediterranean diet](#) rich in MUFAs, PUFAs, and extra virgin [olive oil](#) but lost less or even gained it when eating a diet low in these and high in saturated fats [\[R, R, R, R, R\]](#).

PPAR-γ can be a double-edged sword when it comes to regulating [blood sugar levels](#). While its activity in the liver and pancreas enhances glucose metabolism and insulin sensitivity, excess PPAR-γ activity in fat cells can accumulate fatty acids and other factors that contribute to [insulin resistance](#) and elevated blood sugar [\[R, R, R, R\]](#).

This may explain why the ‘C’ variant has been associated with higher blood sugar and increased rates of type 2 diabetes. In one of the studies, obesity further increased the risk of type 2 diabetes associated with this variant [\[R, R, R, R\]](#).

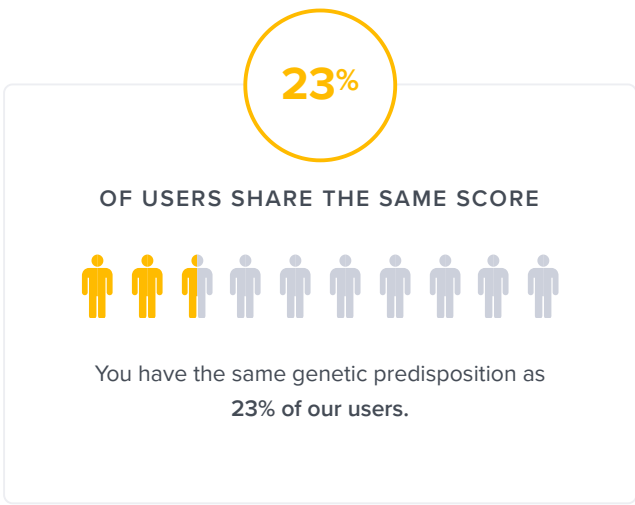
Two other variants, ‘C’ at [rs1899951](#) and ‘C’ at [rs17036160](#), have also been associated with high blood sugar and type 2 diabetes. However, they act as a single genetic factor because the three variants are usually inherited together [\[R, R\]](#).

Finally, the ‘G’ variant of rs1801282 has also been associated with



LOWER ACTIVITY

Likely lower PPARG activity based on 1 genetic variant we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
PPARG	rs1801282	GC

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

reduced rates and severity of [acne](#) [R, R].

Your Recommendations

Your recommendations are prioritized according to the likelihood of it having an impact for you based on your genetics, along with the amount of scientific evidence supporting the recommendation.

You’ll likely find common healthy recommendations at the top of the list because they are often the most impactful and most researched.

- 1

Aerobic Exercise (Cardio)
- 2

Keto Diet
- 3

Avoid Sugary Foods & Drinks
- 4

High-Intensity Interval Training (HIIT)
- 5

Fruits And Vegetables
- 6

Regular Sleep Schedule
- 7

Cinnamon
- 8

Yoga
- 9

Eat Fiber-Rich Foods
- 10

Eat More Protein and Less Carbs
- 11

Limit Calorie Intake
- 12

Paleo Diet
- 13

Whole-Food Plant-Based Diet
- 14

Apple Cider Vinegar
- 15

Chia Seeds

1

Aerobic Exercise (Cardio)

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

How it helps

Tendency to Overeat



Physical exercise programs including cardio may reduce overeating in people with binge eating disorder [\[R\]](#).

Walking 200 minutes/week for 12 weeks reduced the likelihood of overeating and eating in response to internal cues in a non-placebo-controlled trial of 49 stress eaters [\[R\]](#).

Regular cardio increases metabolism and can reduce the urge to overeat by promoting satiety and improving mood.

Visceral Fat



Aerobic exercise, or cardio, helps to reduce visceral fat as it burns more calories, which results in a deficit leading to weight loss. Moreover, it specifically increases your heart rate, which stimulates the breakdown of visceral fat.

Three [meta-analyses](#) ([the largest one with 35 studies](#)) concluded that **aerobic exercise (30-60 min, at least 3x/week for 12-16 weeks) reduces visceral fat by over 30 cm2 in women and over 40 cm2 in men** [\[R\]](#), [\[R\]](#), [\[R\]](#).

Adiponectin



Cardio exercises like running or biking can help increase your body's production of adiponectin, a hormone that regulates glucose levels and fatty acid breakdown. This makes it beneficial for weight management, blood sugar control, and cardiovascular health.

A [meta-analysis of 28 trials](#) concluded that aerobic exercise **reduces serum leptin (by 2.24 ng/mL) and increases adiponectin (by 0.44 µg/mL)** [\[R\]](#).

Belly Fat



Most experts agree that getting 150-300 minutes of exercise per week can help you control your weight. For best results, try to push yourself a bit with **moderate or intense exercise**. Both aerobic and strength exercise may be similarly effective at reducing belly fat area [\[R\]](#), [\[R\]](#).

Exercise helps by burning calories and boosting your metabolism. It may also lower your appetite [\[R\]](#), [\[R\]](#).

However, it might take a while to see the results of your hard work. **The benefits of moderate or intense exercise may only show after 12 weeks** [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Note that exercise may be less effective at helping you lose weight than limiting your calorie intake. However, **it will likely help you maintain a lower weight in the long run** [\[R\]](#), [\[R\]](#), [\[R\]](#).

Metabolic Rate



Most experts agree that getting 150-300 minutes of exercise per week can help you control your weight. For best results, try to push yourself a bit with moderate or intense exercise [R, R].

A single bout of aerobic exercise may increase metabolic rate in the short term, especially in men. Adding aerobic exercise to a low-calorie diet may prevent the decrease in metabolic rate due to the diet [R, R].

Exercise helps by increasing the amount of calories burnt during and a few hours after the workout [R, R].

Overweight



Most experts agree that getting 150-300 minutes of exercise per week can help you control your weight. For best results, try to push yourself a bit with moderate or intense exercise [R, R].

Exercise helps by burning calories and boosting your metabolism. It may also lower your appetite [R, R].

Multiple meta-analyses (the most recent one with 43 trials and 3,552 participants) found that both aerobic and resistance training are equally effective for weight loss. Exercise programs lasting 8-40 weeks reduced weight (by 1.6-1.7 kg), waist circumference (by 1.95-2.12 cm), and belly fat area (by 5.39-13.05 cm2) [R, R, R, R, R].



PERSONALIZED TO YOUR GENES

Cardio exercise may cause greater loss of weight and fat mass in people with your [ADIPOQ](#) gene variant [R].
Cardio exercise may cause greater loss of weight and fat mass in people with your [ADIPOQ](#) gene variant [R].

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
RFC4	rs266729	CC	
GENE	SNP	GENOTYPE	EVIDENCE
ST6GAL1	rs1501299	TG	

Weight Regain

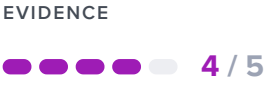


Most experts agree that getting 150-300 minutes of exercise per week can help you control your weight and prevent weight regain. For best results, try to push yourself a bit with moderate or intense exercise [R, R].

Aerobic exercise may help prevent weight regain in people who lost weight with diet or diet plus exercise. It may also help those who underwent bariatric surgery [R, R, R].

Aerobic exercise helps by burning calories and boosting your metabolism. It may also lower your appetite [R, R].

Metabolic Syndrome



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].

When stratified by exercise type, **aerobic exercise may be most effective for improving anthropometric measurements and HDL cholesterol**, while strength training may be more effective for LDL cholesterol and systolic blood pressure. **Combined exercise may offer the greatest benefits** [R, R].

In obese children with metabolic syndrome, aerobic exercise may improve waist circumference, BMI, triglycerides, HDL cholesterol, and systolic blood pressure [R].

 PERSONALIZED TO YOUR GENES

Cardio exercise may reduce the risk of metabolic syndrome more in people with your [LPL](#) gene variant [R].

GENE	SNP	GENOTYPE	EVIDENCE
LPL	rs3779788	CT	

2

Keto Diet

How to implement

Adopt a diet that consists of about 70-80% fat, 10-20% protein, and 5-10% carbohydrates. Eliminate or significantly reduce the intake of sugar and starches like bread, pasta, rice, and potatoes, focusing instead on high-fat foods like meats, fatty fish, eggs, butter, and healthy oils, as well as low-carb vegetables like leafy greens. This dietary pattern should be maintained consistently for a period of at least 3-4 weeks to achieve ketosis, after which it can be adjusted based on individual goals and responses.

How it helps



Tendency to Overeat

IMPACT3 / 5

EVIDENCE3 / 5

The Keto diet promotes satiety due to high fat content and modest protein levels, reducing overall food intake. When in ketosis, your body utilizes fat for energy instead of glucose which may also lead to weight loss.

A meta-analysis of 24 studies concluded that ketogenic low-carbohydrate diets reduce hunger and desire to eat while increasing satiety/fullness [R].



Visceral Fat

IMPACT3 / 5

EVIDENCE3 / 5

The Keto diet focuses on high-fat, low-carb foods that promote metabolic changes in your body. This leads to fat burning for energy, instead of carbs, helping reduce visceral fat accumulations.

A meta-analysis of 18 trials concluded that ketogenic diets decrease visceral adipose tissue by 28.91 g [R].



Overweight

IMPACT4 / 5

EVIDENCE5 / 5

The Keto diet works by reducing your intake of carbs and increasing healthy fats, leading your body to a metabolic state called ketosis which uses fat as a primary fuel source. This, along with the fact that fats are more satisfying and reduce hunger, often leads to weight loss.

Multiple meta-analyses (the largest one with 18 studies) concluded that eating a very low-carbohydrate ketogenic diet lowers body weight (by 2.87-15.6 kg), BMI (by 1.44-5.3 kg/m2), waist circumference (by 3.23-12.6 cm), fat mass (by 1.40 kg), fat-free mass (by 0.81 kg), lean body mass (by 0.63 kg), and body fat percentage (by 2.81%). This diet may be more effective than other weight-loss interventions [R, R, R, R].

The combination of exercise and low-carbohydrate ketogenic diets decreases waist circumference according to a meta-analysis of 7 trials and 278 overweight and obese participants. Similarly, a meta-analysis of 13 trials and 244 participants found that combining strength training with a ketogenic diet decreases body mass (by 3.67 kg), fat mass (by 2.21 kg), fat-free mass (by 1.26 kg), BMI (by 1.37 kg/m2), and body fat percentage (by 2.27%) [R, R].

A meta-analysis of 14 studies concluded that eating a ketogenic diet lowers fasting glucose weight (by 8.66 kg), waist circumference (by 9.17 cm), and BMI (by 3.13 kg/m2) in patients with type 2 diabetes. Another meta-analysis (8 studies and 648 patients) found that very low-carbohydrate ketogenic diets decrease weight at 3 months (by 2.91 kg) and 6 months (by 2.84 kg) in people with this condition. In overweight patients with type 2 diabetes, ketogenic diets significantly decrease body weight and waist circumference according to a meta-analysis of 8 studies. A meta-analysis of 14 studies found that ketogenic diets lower weight in diabetic patients regardless of diabetic status [R, R, R, R].

Ketogenic diets also lower body fat percentage in athletes according to a meta-analysis of 8 studies [R].

In cancer patients, ketogenic diets reduce body weight (by 2.99-3.992 kg), fat mass (by 1.48 kg), and BMI (by 1.08 kg/m2) according to 3 meta-analyses (the largest one with 10 trials) [R, R, R].

3



Avoid Sugary Foods & Drinks

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.

How it helps



Tendency to Overeat

IMPACT

0 / 5

EVIDENCE

0 / 5

Sugary foods can spike blood sugar levels and lead to a cycle of cravings and overeating.



Visceral Fat

IMPACT

4 / 5

EVIDENCE

3 / 5

Consuming a lot of carbs and sugar-sweetened drinks is linked to high visceral fat levels. Likewise, eating pastry may increase visceral fat [R, R, R, R, R].

Diets low in carbs may help reduce visceral fat. Drinking less sugary beverages may also help [R, R, R, R, R].

Sugary foods are higher in calories. Extra calories that our bodies don't use get converted into fat [R].

 PERSONALIZED TO YOUR GENES

People with your **MC4R** gene variant may have more visceral fat. They may process carbs less well [R]. Try limiting high-carb and sugary foods.

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
MC4R	rs1350341	AG	

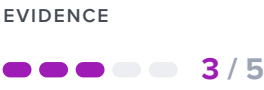
 Belly Fat



Increased intake of dietary sugars is linked to an increase in body weight, which indirectly suggests a potential increase in waist circumference due to overall weight gain [R, R].

Consumption of SSBs is associated with an increase in waist circumference by **14%**, although the increase was not statistically significant in some studies. Soda drinks, a type of SSB, specifically showed a significant increase in waist circumference by **31%** [R].

 Metabolic Syndrome



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].

4



High-Intensity Interval Training (HIIT)

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

How it helps

 Tendency to Overeat



A meta-analysis of 13 randomized controlled studies found that both high-intensity interval training (HIIT/SIT) and moderate-intensity continuous training (MICT) temporarily reduced appetite immediately after exercise. HIIT/SIT was slightly more effective in suppressing hunger 30-90 minutes post-exercise, but results varied in other appetite measures [R].

High-intensity interval exercise (HIlex) delayed lunch request compared to rest, but not moderate-intensity exercise (MICex). However, overall energy intake remained similar across conditions, resulting in a negative energy balance. HIlex likely affects eating behavior by delaying meal initiation [R].

However, in another study, 12 healthy males completed four trials in random order: moderate-intensity exercise (MIE) in normoxia, MIE in hypoxia, high-intensity interval exercise (HIIE) in normoxia, and HIIE in hypoxia. Hypoxia suppressed appetite and lowered ghrelin while HIIE raised PYY during exercise in hypoxic conditions. No differences in GLP-1 were observed [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].

 Visceral Fat



High-intensity interval training is a time-efficient strategy to decrease fat mass deposits, including those of abdominal and visceral fat mass. HIIT may offer similar benefits to moderate-intensity continuous training [\[R, R\]](#).

 Belly Fat



Numerous studies highlight the effectiveness of HIIT for reducing body fat, especially in women and overweight/obese individuals. HIIT outperformed MICT, with sprint interval training showing promise [\[R, R, R, R, R, R, R, R\]](#).

When it comes to abdominal obesity in particular:

- HIIT is more effective than MICT in reducing waist circumference [\[R\]](#).
- It may reduce WC in people with obesity and metabolic syndrome [\[R, R, R\]](#).
- It may not be effective in people with musculoskeletal disorders [\[R\]](#).

 Metabolic Rate



Most experts agree that getting 150-300 minutes of exercise per week can help you control your weight. For best results, try to push yourself a bit with **moderate or intense exercise** [\[R, R\]](#).

Both continuous and HIIT exercise may be similarly effective at speeding up metabolism, but HIIT may be more effective when combined with whole-body electromyostimulation. Adding exercise to a low-calorie diet may prevent the decrease in metabolic rate [\[R, R, R\]](#).

Exercise helps by increasing the amount of calories burnt during and a few hours after the workout [\[R, R\]](#).

 Overweight



HIIT exercises can help with being overweight by burning a significant amount of calories in a short amount of time and improving your metabolic rate. Additionally, it boosts the body’s ability to burn fat, even hours post-workout, contributing to weight loss and preventing obesity.

Numerous studies highlight the effectiveness of HIIT for reducing body fat, especially in women and overweight/obese individuals. HIIT outperformed MICT, with sprint interval training showing promise. Combining HIIT with fasting or a Low-Carb High-Fat (LCHF) diet yielded favorable results, improving body composition and VO2max. HIIT was beneficial for obese adolescents and individuals with Type 2 diabetes, enhancing weight, BMI, blood pressure, and metabolic markers [\[R, R, R, R, R, R, R, R\]](#).

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

 Metabolic Syndrome



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* [\[R\]](#).

5

Fruits And Vegetables

How to implement

Increase your intake of fruits and vegetables to at least five servings per day, aiming for a variety of types and colors to ensure a broad range of nutrients. Each serving size should roughly be the amount you can fit in one hand. Try to incorporate at least one serving of fruits or vegetables into every meal and snack throughout the day.

How it helps



Tendency to Overeat

IMPACT

0 / 5

EVIDENCE

0 / 5

Fruits and vegetables are less calorie-dense and high in fiber, contributing to fullness without excess calorie intake.



Visceral Fat

IMPACT

3 / 5

EVIDENCE

3 / 5

A higher intake of fruits and vegetables is negatively associated with visceral or liver fat content in middle-aged men and women [\[R\]](#).

Dietary intake of fruits and green vegetables is associated with beneficial gene expression in both visceral and subcutaneous adipose tissues, suggesting a protective role against adiposity [\[R\]](#).



Overweight

IMPACT

3 / 5

EVIDENCE

3 / 5

A meta-analysis of 17 studies and 563,277 participants found an inverse association between fruit and vegetable consumption and weight, waist circumference, and adiposity. Similarly, interventions aimed at increasing fruit and vegetable intake reduce the prevalence of obesity in children and adolescents according to a meta-analysis of 22 studies and 12,678 participants [\[R\]](#), [\[R\]](#).

In overweight or obese people, increased fruit and vegetable intake may have large effects on body weight (-2.81 kg) according to a meta-analysis of 16 studies and 3,719 participants [\[R\]](#).

In line with this, 2 meta-analyses (the most recent one with 12 trials and 1,151 studies) associated the adoption of a vegetarian diet with a weight reduction of 2.02-4.6 kg. The reduction was higher in people following a vegan diet, consuming a vegetarian diet with energy restriction, and following these diets for over 1 year [\[R\]](#), [\[R\]](#).

Fruits and vegetables are rich in fiber and water, which may help promote satiety, but low in calories.



Weight Regain

IMPACT

0 / 5

EVIDENCE

0 / 5

Fruits and vegetables are low in calories and high in fiber, vitamins, and minerals, which are essential for a healthy weight.



Metabolic Syndrome

IMPACT

3 / 5

EVIDENCE

3 / 5

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 line with this, a high dietary intake of fruits and vegetables has been associated with lower odds of metabolic syndrome. **Fruits may be especially protective.** In people with this condition, increasing fruit and vegetable consumption may lower diastolic blood pressure [R, R, R, R].

6

Regular Sleep Schedule

How to implement

Go to bed and wake up at the same time every day, even on weekends and holidays. This helps regulate your body's internal clock, leading to better sleep quality. Aim for 7-9 hours of sleep per night.

How it helps



Tendency to Overeat

IMPACT

0 / 5

EVIDENCE

0 / 5

Maintaining a regular sleep schedule helps regulate hormones that control hunger and fullness, possibly decreasing the tendency to overeat.



Visceral Fat

IMPACT

3 / 5

EVIDENCE

3 / 5

Moreover, short sleep duration may be causally associated with increased visceral fat [R].

Studies have also shown that correcting sleep disorders such as obstructive sleep apnea (OSA) not only improves sleep quality but also leads to significant reductions in visceral fat [R].



Overweight

IMPACT

3 / 5

EVIDENCE

2 / 5

People with irregular sleep schedules may be at increased risk of being overweight or obese. This may be because irregular sleep patterns are associated with greater calorie and fat intake [R, R, R, R, R].

Consistent sleep patterns can aid in regulating hormones that control hunger and satiety.



Weight Regain

IMPACT

0 / 5

EVIDENCE

0 / 5

A consistent sleep schedule can regulate hormones that control hunger and appetite, which may help to prevent overeating and subsequent weight regain.

7

Cinnamon

How to implement

Take a 500 mg cinnamon supplement once daily, ideally with a meal to aid absorption. This can be in the form of a capsule or tablet. Continue this regimen as long as it aligns with your health goals and under the guidance of a

TYPICAL STARTING DOSE

healthcare provider.

500 mg

How it helps

Tendency to Overeat

IMPACT1 / 5

EVIDENCE2 / 5

Cinnamon aids in controlling appetite by slowing down the process of food moving from the stomach to the intestine, making you feel fuller for longer. It also helps regulate blood sugar levels, which can reduce cravings and overeating.

In an [open randomized crossover clinical trial with 21 healthy volunteers](#), a single intake of cinnamon infusion (2 g, Cinnamomum sp.) **did not affect energy metabolism** (energy expenditure, diet-induced thermogenesis, respiratory quotient, substrate oxidation) **but reduced feeling of satiety and increased energy intake** in the first meal after treatment [\[R\]](#).

On the contrary, another [RCT with 27 people](#) found that milk rice meal supplemented with either cinnamon (4 g), acetic acid (28 mmol), or the combination of cinnamon + acetic acid found that the combination reduced 2-hour postprandial blood glucose and **increased the satiety score at 15 and 30 minutes** [\[R\]](#).

Another [RCT with 15 healthy subjects](#) found that cinnamon (1 and 3 g) **reduced postprandial serum insulin and increased glucagon-like peptide 1 (GLP-1)** without affecting blood glucose, glucose-dependent insulintropic polypeptide (GIP), ghrelin, **satiety**, or gastric emptying rate [\[R\]](#).

Visceral Fat

IMPACT2 / 5

EVIDENCE2 / 5

Cinnamon helps control insulin levels and decreases blood sugar, which can assist with managing visceral fat. It also has a potential impact on fat metabolism, aiding in weight loss and belly fat reduction.

In a meta-analysis of 35 trials on metabolic diseases, ≤ 1.5 g/day of cinnamon lowered cholesterol, triglycerides, LDL, glucose, insulin, waist size, and improved HDL, systolic and diastolic blood pressure [\[R\]](#).

A systematic review and meta-analysis of 12 trials (786 subjects) found cinnamon supplementation aids weight loss, reducing body weight, BMI, waist circumference, and fat mass. There are more significant effects in younger subjects and those with a BMI ≥ 30 kg/m². Effective at ≥ 2 g/day for ≥ 12 weeks [\[R\]](#). However, a [systematic review and meta-analysis of 18 clinical trials with patients with type 2 diabetes \(T2DM\)](#) found that supplementation with cinnamon reduced FBS **but not** HbA1C, body weight, body mass index, and waist circumference, insulin or insulin resistance [\[R\]](#).

Similarly, in another [systematic review and meta-analysis of 9 clinical trials with T2D people](#), cinnamon reduced systolic blood pressure and diastolic blood pressure **without affecting** body weight, body mass index, or **waist circumference** [\[R\]](#).

Overweight

IMPACT2 / 5

EVIDENCE2 / 5

Cinnamon has been shown to modestly reduce BMI, body weight, and waist-hip ratio in various studies. Effects are more notable in individuals under 50 years and with higher initial BMI. Higher doses (≥ 2 g/day) and longer use (≥ 12 weeks) enhance these benefits. However, its impact on waist circumference and body fat mass is less clear. In those with PCOS or type 2 diabetes, cinnamon improves metabolic markers without significantly changing weight or BMI [\[R, R, R, R, R, R\]](#).

Weight Regain

IMPACT2 / 5

EVIDENCE2 / 5

Cinnamon can help control blood sugar, which affects how hungry or energetic you feel and helps you drop weight. It also may slow down the breakdown of carbs in the digestive tract, which can suppress your appetite and prevent weight regain.

Obesity and Weight Management: Cinnamon has been shown to modestly reduce BMI, body weight, and waist-hip ratio in various studies. Effects are more notable in individuals under 50 years and with higher initial BMI. Higher doses (≥ 2 g/day) and longer use (≥ 12 weeks) enhance these benefits. However, its impact on waist circumference and body fat mass is less clear.

PCOS and Type 2 Diabetes: In PCOS, cinnamon improves metabolic markers without significant changes in weight or BMI. In type 2 diabetes, it reduces fasting blood sugar, but effects on HbA1C, body weight, BMI, and waist circumference are limited.

Cinnamon shows potential in lowering body weight and BMI, especially in specific groups like PCOS patients, but its effectiveness varies and does not significantly influence overall body composition in type 2 diabetes.

References: [\[R\]](#) ,[\[R\]](#) ,[\[R\]](#) ,[\[R\]](#) ,[\[R\]](#) ,[\[R\]](#)

 **Metabolic Syndrome**

IMPACT

3 / 5

EVIDENCE

3 / 5

Supplementation with cinnamon **may lower total cholesterol, LDL cholesterol, and triglycerides while raising HDL cholesterol in people with metabolic syndrome** [\[R\]](#).

Cassia cinnamon (120-6,000 mg/day for 4-18 weeks) may improve blood sugar control in the general population [\[R\]](#) ,[\[R\]](#) ,[\[R\]](#) ,[\[R\]](#).

It may help by [\[R\]](#) ,[\[R\]](#) ,[\[R\]](#):

- Preventing oxidative stress
- Reducing [insulin resistance](#)

However, health experts say there’s not enough evidence to recommend cinnamon supplementation for diabetes [\[R\]](#).

Cinnamon (up to 6 g/day for up to 5 weeks) may help lower triglycerides. It may be especially helpful in people with high blood sugar [\[R\]](#) ,[\[R\]](#).

Cinnamon may help the body clear triglycerides. It may also reduce their production by supporting healthy blood sugar levels [\[R\]](#) ,[\[R\]](#).

Please note: *Cassia cinnamon is high in coumarin. This substance may harm the liver in large amounts. Consult your doctor before supplementing with high doses of Cassia cinnamon* [\[R\]](#) ,[\[R\]](#) ,[\[R\]](#).

8



Yoga

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

How it helps

 **Tendency to Overeat**

IMPACT

2 / 5

EVIDENCE

1 / 5

Yoga, especially Hatha, may reduce emotional eating [\[R\]](#) ,[\[R\]](#).

Yoga can increase body awareness and mindfulness, which may discourage overeating by favoring recognition of physical hunger and fullness cues.

 **Visceral Fat**

IMPACT

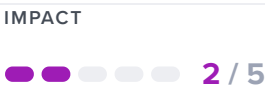
1 / 5

EVIDENCE

1 / 5

In a non-placebo-controlled trial of 16 healthy postmenopausal women, practicing yoga for 16 weeks decreased visceral fat area [\[R\]](#).

 Overweight



Yoga (1-7 days/week for at least 2 weeks) may help you lose weight by [\[R\]](#), [\[R\]](#):

- Increasing energy use
- Reducing stress
- Reducing impulsive eating

However, the studies are small and of moderate quality [\[R\]](#), [\[R\]](#).

 Metabolic Syndrome



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** [\[R\]](#).

9



Eat Fiber-Rich Foods

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.

How it helps

 Tendency to Overeat



Fiber increases satiety and delays gastric emptying, which can help control appetite and reduce overeating.

 Visceral Fat



Fiber intake is linked to lower levels of visceral fat [\[R\]](#).

In line with this, eating whole-grain wheat bread (2.5 slices/day for 12 weeks) may help reduce visceral fat in people who are overweight or obese [\[R\]](#).

Other forms of fiber that may help reduce visceral fat include:

- Barley that contains β -glucan (4.4 g/day for 12 weeks) [\[R\]](#)
- Resistant maltodextrin (15 g/day for 12 weeks) [\[R\]](#)

Increased fiber intake may help lower calorie intake and maintain a healthy weight. It may also decrease fat production [\[R\]](#), [\[R\]](#).



PERSONALIZED TO YOUR GENES

People with your [FTO](#) gene variant may have more visceral fat. Getting more fiber may reduce the impact of this variant on body fat [\[R\]](#), [\[R\]](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
FTO	rs3751812	TG	

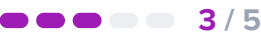


Belly Fat

IMPACT



EVIDENCE



Fiber makes you feel more full and thus eat less. **In fact, getting 14 g more fiber per day is linked to a 10% lower calorie intake** [\[R\]](#).

Meta-analyses on dietary fiber and waist circumference have observed the following:

- A **10-g/day increase in total fiber intake** is linked to a decrease of **0.08 cm/year** in waist circumference [\[R\]](#).
- A **10-g/day increase in cereal fiber intake** is linked to a reduction of **0.10 cm/year** in waist circumference [\[R\]](#).
- Isolated soluble fiber supplementation in overweight and obese individuals results in a significant reduction in waist circumference [\[R\]](#), [\[R\]](#).
- Viscous fiber supplementation may not help reduce WC [\[R\]](#).

The following dietary and supplemental sources of fiber may support weight loss:

- [Resistant starch](#): 10-40 g/day for 4-12 weeks [\[R\]](#), [\[R\]](#), [\[R\]](#)
- [Psyllium](#): 6-16 g/day for 6-24 weeks [\[R\]](#)
- [Flaxseed](#): at least 30 g/day for 12 weeks [\[R\]](#)
- Indigestible dextrin: 34 g/day for 12 weeks [\[R\]](#)

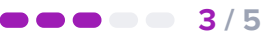


Overweight

IMPACT



EVIDENCE



Fiber makes you feel more full and thus eat less. **In fact, getting 14 g more fiber per day is linked to a 10% lower calorie intake** [\[R\]](#).

Supplementing with fiber may support weight loss. Sources of fiber include:

- [Resistant starch](#): 10-40 g/day for 4-12 weeks [\[R\]](#), [\[R\]](#), [\[R\]](#)
- [Psyllium](#): 6-16 g/day for 6-24 weeks [\[R\]](#)
- [Flaxseed](#): at least 30 g/day for 12 weeks [\[R\]](#)
- Indigestible dextrin: 34 g/day for 12 weeks [\[R\]](#)

Some fiber-rich diets that may help you control weight include:

- The Mediterranean diet [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Vegetarian diets [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- The DASH diet [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)



PERSONALIZED TO YOUR GENES

People with your [TCF7L2](#) gene variant may lose more weight on a high-fiber diet [\[R\]](#).
People with your [FTO](#) gene variant are less likely to be obese if they get more fiber [\[R\]](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
TCF7L2	rs7903146	CC	
GENE	SNP	GENOTYPE	EVIDENCE
FTO	rs3751812	TG	



Weight Regain



Fiber assists in weight management by increasing satiety and reducing overall calorie absorption.



Metabolic Syndrome



People with a high dietary intake of fiber may be at decreased risk of metabolic syndrome [\[R\]](#), [\[R\]](#).

Getting enough fiber in your diet has many beneficial effects. Lowering blood pressure is one of them [\[R\]](#), [\[R\]](#).

Dietary fiber may help reduce blood sugar levels. **People who eat more fiber may be at a lower risk of diabetes.** This is because **fiber delays the absorption of sugar**, which prevents blood sugar spikes. It may even boost your response to insulin [\[R\]](#), [\[R\]](#), [\[R\]](#).

Health officials recommend eating more fiber (3-10 g) to improve your cholesterol levels. Fiber stops your gut from absorbing too much cholesterol. By doing so, it lowers cholesterol levels in the blood [\[R\]](#), [\[R\]](#), [\[R\]](#).

Adding fiber-rich foods to the diet may reduce triglycerides. However, not all studies showed this effect [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Fiber makes you feel more full and thus eat less. **In fact, getting 14 g more fiber per day is linked to a 10% lower calorie intake** [\[R\]](#).

10



Eat More Protein and Less Carbs

How to implement

Include a source of lean protein such as chicken, fish, beans, or tofu in each meal, aiming for 20-30 grams per serving, while reducing carbohydrate-rich foods like bread, pasta, and sweets, aiming to make proteins about 30-40% of your daily caloric intake. Replace at least one carbohydrate-heavy meal or snack with a high-protein option daily.

How it helps

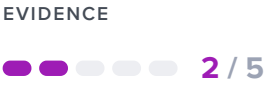


Tendency to Overeat



Protein has a higher satiety index than carbs, helping reduce the urge to overeat by keeping you full longer.

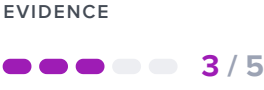
 Visceral Fat



A study found that a low carbohydrate, high protein diet (for 4 weeks) led to a reduction in visceral fat compared to a high carbohydrate diet. This effect was particularly noticeable in obese people with type 2 diabetes [R].

A study comparing low carbohydrate to high carbohydrate diets (for 3 months) in diabetic people found that the low carbohydrate group had improved insulin sensitivity and a larger decrease in visceral fat. This suggests that reducing carbohydrate intake can have specific benefits for those with metabolic issues [R].

 Belly Fat



Most weight loss experts recommend following a diet that’s higher in protein and lower in carbs or fat [R, R].

This is because protein [R, R]:

- Boosts your metabolism
- Makes you feel more full
- Helps control your appetite

On the other hand, simple carbs spike your [insulin](#), which is linked to a higher risk of obesity [R].

However, high-protein low-carb diets have shown less convincing results when it comes to belly fat in particular. They may modestly reduce waist circumference and may not be more effective than other diets [R, R, R].

 Metabolic Rate



Most weight loss experts recommend following a diet that’s high in protein but lower in carbs or fat [R, R].

Research suggests that getting more calories from protein (as opposed to either carbohydrates or fat) may support weight loss, metabolism, and satiety. High-protein diets appeared to increase fat burning and weight loss and reduce appetite in a handful of human studies [R, R, R, R].

Some low-carb diets that may help you lose weight include:

- **Keto diet:** low-carb and high-fat diet [R, R, R]
- **Atkins diet:** low-carb diet [R, R, R, R, R]
- **Paleo diet:** hunter-gatherer diet (limited carbs, dairy products, and legumes) [R, R, R]
- **Zone diet:** meals consist of 40% complex carbs, 30% protein, and 30% fat [R]

Note: *In the long run, high-protein diets may contribute to heart disease, calcium loss, constipation, and other health problems. If you have problems with kidneys or bones, consult your doctor or dietitian before adopting a high-protein diet* [R, R].

 Overweight



Most weight loss experts recommend following a diet that’s high in protein but lower in carbs or fat [R, R].

This is because protein [R, R]:

- Boosts your metabolism
- Makes you feel more full
- Helps control your appetite

In contrast, carbs and fats make you crave junk food by activating the reward areas of your brain [R, R].

Simple carbs can also spike your [insulin](#), which is linked to a higher risk of obesity [R].

Some low-carb diets that may help you lose weight include:

- **Keto diet:** low-carb and high-fat diet [R, R, R]
- **Atkins diet:** low-carb diet [R, R, R, R, R]
- **Paleo diet:** hunter-gatherer diet (limited carbs, dairy products, and legumes) [R, R, R]
- **Zone diet:** meals consist of 40% complex carbs, 30% protein, and 30% fat [R]

Sticking to a low-fat diet for 2-12 months may also support weight loss [R, R, R, R, R]. However, a low-carb diet may be more effective [R, R, R, R, R].

Note: In the long run, high-protein diets may contribute to heart disease, calcium loss, constipation, and other health problems. If you have problems with kidneys or bones, consult your doctor or dietitian before adopting a high-protein diet [R, R].

 PERSONALIZED TO YOUR GENES

People with your **FTO** gene variant may lose more weight on a high-protein diet [R].

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
FTO	rs1558902	AT	

 Weight Regain



Eating more protein can increase metabolism and reduce appetite, while keeping carbs moderate helps prevent spikes in blood sugar that can lead to weight gain.

 Metabolic Syndrome



Low-carb, high-protein diets may improve metabolic syndrome factors such as excess weight and waist circumference, insulin resistance, high cholesterol, or high triglycerides [R, R].

Most weight loss experts recommend following a diet that’s high in protein but lower in carbs or fat. However, a low-carb diet may be more effective [R, R].

Note: In the long run, high-protein diets may contribute to heart disease, calcium loss, constipation, and other health problems. If you have problems with kidneys or bones, consult your doctor or dietitian before adopting a high-protein diet [R, R].

11



Limit Calorie Intake

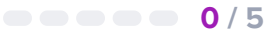
How to implement

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.

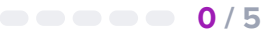
How it helps

Tendency to Overeat

IMPACT



EVIDENCE



Limiting calorie intake is crucial in managing the tendency to overeat and maintaining a healthy weight.

Visceral Fat

IMPACT



EVIDENCE



A study on intermittent versus daily calorie restriction demonstrated that both methods effectively reduced visceral fat as estimated by waist circumference reduction. While daily calorie restriction reduced waist circumference by about 6.5%, intermittent calorie restriction achieved similar reductions in the short term and slightly better results in moderate-term trials [\[R\]](#).

Belly Fat

IMPACT



EVIDENCE



To promote weight loss, experts recommend lowering your calorie intake by 30% of your daily requirement [\[R\]](#), [\[R\]](#).

Eating fewer calories and intermittent fasting may support short-term weight loss equally. On the other hand, people who eat fewer calories may maintain their weight loss better in the long run [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Combining time-restricted eating with caloric restriction results in significantly greater reductions in waist circumference: **2.36 cm** vs 1.27 cm [\[R\]](#).

A good way to limit calorie intake is to eat more low-calorie foods. These include soups and foods rich in protein and fiber. You can also try eating a low-calorie snack before a meal [\[R\]](#), [\[R\]](#), [\[R\]](#).

Overweight

IMPACT



EVIDENCE



To promote weight loss, experts recommend lowering your calorie intake by 30% of your daily requirement [\[R\]](#), [\[R\]](#).

Eating fewer calories and intermittent fasting may support short-term weight loss equally. On the other hand, people who eat fewer calories may maintain their weight loss better in the long run [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Types of intermittent fasting that may be especially helpful for weight loss include:

- **Alternate-day fasting:** fasting every other day [\[R\]](#)
- **Time-restricted eating:** eating within a certain time frame each day [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)

A good way to limit calorie intake is to eat more low-calorie foods. These include soups and foods rich in protein and fiber. You can also try eating a low-calorie snack before a meal [\[R\]](#), [\[R\]](#), [\[R\]](#).

These methods can help make you feel more full and thus eat less [\[R\]](#), [\[R\]](#), [\[R\]](#).

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* [\[R\]](#).



PERSONALIZED TO YOUR GENES

People with your [UCP3](#) gene variant may lose more weight on a low-calorie diet [\[R\]](#).
People with your [VEGFA](#) gene variant may lose more weight by eating fewer calories [\[R\]](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
UCP3	rs1800849	GG	
GENE	SNP	GENOTYPE	EVIDENCE
VEGFA	rs1358980	CC	



Weight Regain



Keeping calorie intake in check is crucial for avoiding weight regain and maintaining a healthy weight.



Metabolic Syndrome



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 [\[R\]](#), [\[R\]](#), [\[R\]](#).

12



Paleo Diet

How to implement

Adopt a diet that includes lean meats, fish, fruits, vegetables, nuts, and seeds, resembling the diet of our hunter-gatherer ancestors. Exclude all dairy products, legumes, grains, added sugar, and processed foods. This should be a consistent dietary approach, not a short-term diet, to observe its benefits on health and well-being.

How it helps



Tendency to Overeat



In a non-placebo-controlled trial of 13 patients with type 2 diabetes, eating a Paleo diet for 2 consecutive 3-month periods was found more satiating per calorie than eating a diabetes diet. This diet also increased satiety and the levels of satiety hormones in a non-placebo-controlled trial of 69 participants with metabolic syndrome [\[R\]](#), [\[R\]](#).

The Paleo diet can help curb overeating by keeping you satiated with its high protein and fiber content.



Visceral Fat



In a non-placebo-controlled trial of 69 participants with metabolic syndrome, eating a Paleo diet for 10 weeks reduced visceral fat [\[R\]](#).

The Paleo diet encourages a reduced intake of processed foods and sugars, which can contribute to lowering visceral fat.

 **Overweight**

IMPACT

3 / 5

EVIDENCE

3 / 5

Numerous studies and meta-analyses confirm that adopting a Paleo diet leads to substantial improvements in body weight, BMI, and waist circumference. On average, individuals following a Paleo diet experience a weight loss of around 3.52 kg, reduced BMI, and decreased waist circumference. These effects are even more pronounced in the short term [\[R, R, R, R, R, R, R\]](#).

The Paleo diet may help by focusing on whole, unprocessed foods that promote satiety, thus reducing calorie intake. It also stabilizes blood sugar, helping to avoid energy spikes and crashes that can stimulate overeating.

 **Metabolic Syndrome**

IMPACT

3 / 5

EVIDENCE

3 / 5

Adopting a Paleo diet may reduce waist circumference, triglycerides, systolic and diastolic blood pressure, and fasting glucose while raising HDL cholesterol in people with metabolic syndrome [\[R\]](#).

The Paleo diet (for 4-24 weeks) may lower total cholesterol, LDL cholesterol, and triglycerides, while increasing HDL cholesterol [\[R, R\]](#).

A meta-analysis of 67 trials comparing 13 different dietary approaches concluded that the Paleolithic diet is the second most effective one (after DASH) for lowering blood pressure [\[R\]](#).

13



Whole-Food Plant-Based Diet

How to implement

To implement a plant-based diet, fill your meals with fruits, vegetables, legumes, seeds, and whole grains. Aim for at least 5 servings of fruits and vegetables per day, include legumes in your meals several times a week, and choose whole grains over refined grains. Adjust your diet gradually over a few weeks to avoid digestive discomfort.

How it helps

 **Tendency to Overeat**

IMPACT

1 / 5

EVIDENCE

1 / 5

A vegan diet, inherently rich in high-fiber fruits, vegetables, and whole grains, can enhance satiety, helping control your hunger and reduce overeating. Additionally, the typically lower caloric density of such foods allows for larger portions, promoting feelings of fullness without excess calorie intake.

In a non-placebo-controlled trial of 60 men, eating a vegan snack increased satiety (by 9-25%) and postprandial levels of GLP-1, amylin, and PYY [\[R\]](#).

 **Visceral Fat**

IMPACT

1 / 5

EVIDENCE

1 / 5

A vegan diet, which is rich in fiber from plant-based foods, can help reduce visceral fat by improving gut health and boosting metabolism. Additionally, such diets are often lower in calories, which can assist in weight loss and consequently reduce the amount of visceral fat.

In a non-placebo-controlled trial of 168 healthy volunteers, eating a vegan diet for 16 weeks caused a smaller decrease of *Bacteroides fragilis*, which was associated with a greater loss of body weight, fat mass, visceral fat, and a greater increase in insulin sensitivity [\[R\]](#).

An uncooked vegan diet also altered the gut microbiome in a non-placebo-controlled trial of 18 healthy volunteers [R].

In a non-placebo-controlled trial of 43 rheumatoid arthritis patients, eating an uncooked vegan diet rich in lactobacilli for 1-month improved disease activity and changed the fecal microbiota [R].

 Belly Fat



Following a plant-based diet (for 1-24 months) may support weight loss. The fiber in a plant-based diet may help reduce weight and waist circumference by [R, R, R]:

- Improving the body’s response to insulin
- Reducing appetite

It may offer greater benefits when combined with calorie restriction [R, R].

In one meta-analysis, plant-based diets significantly reduced waist circumference by **4.3%** in individuals with type 2 diabetes compared to regular meat-eating diets [R].

Other meta-analyses showed a WC reduction of about 2.2 cm on plant-based diets [R].

 Overweight



Following a vegetarian diet (for 1-24 months) may support weight loss. The fiber in a vegetarian diet may help by [R, R]:

- Improving the body’s response to insulin
- Reducing appetite

Plant-based diets may offer greater benefits when combined with calorie restriction [R, R].

This type of diet may also support weight loss in people with type 2 diabetes [R].

 Weight Regain



A plant-based diet often leads to a lower calorie intake and can include many foods that promote satiety.

 Metabolic Syndrome



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].

However, a meta-analysis found no protective effects of the vegetarian diet on the development of metabolic syndrome. This diet was, however, associated with lower systolic blood pressure, diastolic blood pressure, and fasting glucose, and higher HDL cholesterol [R].

In line with this, a high dietary intake of fruits and vegetables has been associated with lower odds of metabolic syndrome. **Fruits may be especially protective.** In people with this condition, increasing fruit and vegetable consumption may lower diastolic blood pressure [R, R, R, R].

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

14

Apple Cider Vinegar

How to implement

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

How it helps



Tendency to Overeat

IMPACT

0 / 5

EVIDENCE

0 / 5

Apple cider vinegar may help control overeating by increasing feelings of fullness after meals, reducing your calorie intake. It contains acetic acid that slows down stomach emptying, making you feel satiated for longer.



Visceral Fat

IMPACT

1 / 5

EVIDENCE

1 / 5

Apple Cider Vinegar may help in reducing visceral fat by promoting satiety, reducing blood sugar, and lowering insulin levels. Hence, its regular consumption can aid in weight loss and fat reduction.

In a placebo-controlled trial of 155 obese participants, consuming 500 mL/day of a beverage with 15-30 mL vinegar for 12 weeks reduced visceral fat [\[R\]](#).



Overweight

IMPACT

2 / 5

EVIDENCE

2 / 5

Apple vinegar (15-30 mL/day, in salads or diluted in water, for 12 weeks) may reduce body weight and fat by [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Decreasing appetite
- Reducing fat production

15

Chia Seeds

How to implement

Incorporate 1 to 2 tablespoons of chia seeds into your daily diet. You can add them to yogurt, smoothies, oatmeal, or salads. Do this regularly as part of your daily meals.

How it helps



Tendency to Overeat

IMPACT

0 / 5

EVIDENCE

0 / 5

Chia seeds are high in fiber, promoting a sense of fullness, which could potentially curb overeating. Also, they expand when exposed to water in your stomach, further reducing hunger and assisting in weight management.



Visceral Fat

IMPACT



EVIDENCE



Chia seeds are high in fiber and protein, which can help reduce visceral fat by making you feel full and reducing calorie intake. Additionally, they are a good source of omega-3 fatty acids that can further assist in reducing this fat by increasing metabolism and promoting fat burn.



Overweight

IMPACT



EVIDENCE



Chia seeds may promote weight in overweight subjects and type 2 diabetes patients. However, the evidence is mixed and some studies only found benefits in some metabolic parameters other than weight [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Chia seeds are high in fiber, which aids in controlling hunger and promoting a feeling of fullness, which can help reduce calorie intake. They also balance your blood sugar levels, helping in preventing overeating.



Metabolic Syndrome

IMPACT



EVIDENCE



Supplementation with chia seeds may lower postprandial glucose and diastolic blood pressure in all sorts of populations, including people with metabolic syndrome [\[R\]](#).

Chia seeds may also improve fasting glucose [\[R\]](#), [\[R\]](#), [\[R\]](#).