

FOXO3 (Longevity)

Gene Report

REPORT CATEGORY —



Sample Client

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Personal information

NAME

Sample Client

SEX AT BIRTH

Male

HEIGHT

5ft 5" 165cm

WEIGHT

137lb 62kg

DISCLAIMER

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



How this works

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



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



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

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



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

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

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



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

You have 2 risk alleles

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

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

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

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



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

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



Impact

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

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

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

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

Recommendation Evidence

5 / 5

Recommendations that are considered effective and generally recommended by experts and medical bodies.

4 / 5

Recommendations that are considered likely effective and that have multiple independent meta-analyses and a great many studies supporting them.

3 / 5

Recommendations that are considered possibly effective and have many studies supporting them

2 / 5

Recommendations that have insufficient evidence, with two or several clinical trials supporting them, or many studies but with ambiguous results.

1 / 5

Recommendations that have insufficient evidence, with a single clinical trial, or with many studies most of which didn't find support for the recommendation.

0 / 5

No evidence in humans.

Genotype-specific Evidence

High-quality

Direct evidence that a recommendation helps more in people with your gene variant (many clinical trials, a few large clinical trials, or a meta-analysis).

Medium-quality

Direct evidence that a recommendation helps more in people with your gene variant (a few clinical trials or one large clinical trial).

Low-quality

Direct evidence that a recommendation helps more in people with your gene variant (a single clinical trial or more trials with inconsistent results).

Indirect

A recommendation may help more in people with your gene variant because it targets a specific gene or protein affected by your variant (e.g., MTHFR, dopamine).

In theory

A recommendation may help more in people with your gene variant because it targets a specific mechanism affected by your variant (e.g., inflammation, oxidative stress).

Some things to keep in mind:

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

Introduction

The [FOXO3](#) gene encodes a transcription factor, a protein that binds to DNA and regulates the activity of other genes. For instance, FOXO3 regulates insulin signalling and protein metabolism in muscles [\[R\]](#).

FOXO3 is involved in tumor suppression, immune function, DNA repair, and resistance to oxidative stress, which may explain its link with [increased longevity](#) [\[R\]](#), [\[R\]](#), [\[R\]](#).

In worm and fly models, increased FOXO3 expression increased lifespan. FOXO3 appears to promote tissue regeneration, autophagy (the cellular recycling system), and the growth of stem cells [\[R\]](#), [\[R\]](#).

In rodents, FOXO3 also appears to increase the production of regulatory T cells ([Tregs](#)), which regulate the immune response, promote tolerance of harmless proteins, and prevent autoimmunity. Mice without a functional FOXO3 gene were also many times more likely to develop cancer and die young [\[R\]](#).

FOXO3 also plays a role in managing oxidative stress. Mice without FOXO3 are highly susceptible to [reactive oxygen species](#) in their bones, resulting in decreased bone mass and increased risk of fracture (osteoporosis). The antioxidant effect of FOXO3 has not yet been investigated in aged mice [\[R\]](#), [\[R\]](#).

FOXO3 Genetics

In the last decade or so, a large body of research has linked certain variants in the FOXO3 gene with longer lifespan. They include [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- ‘G’ at [rs12212067](#)
- ‘G’ at [rs768023](#)
- ‘C’ at [rs2253310](#)
- ‘A’ at [rs2802288](#)
- ‘G’ at [rs12202234](#)
- ‘G’ at [rs17069665](#)
- ‘C’ at [rs9398171](#)
- ‘G’ at [rs3800230](#)
- ‘C’ at [rs1935952](#)
- ‘T’ at [rs9400239](#)
- ‘T’ at [rs479744](#)
- ‘G’ at [rs2802292](#)
- ‘T’ at [rs4946936](#)
- ‘A’ at [rs6911407](#)
- ‘C’ at [rs2764264](#)

Interestingly, the effects of some of these variants may be strongest in people who spend more time in nature [\[R\]](#).

The ‘G’ allele of rs12212067 has also been associated with a milder course of [Crohn’s disease](#), as well as with stronger effects of beneficial (sweet potatoes) and harmful (wasabi, mustard, tomatoes) foods on this condition [\[R\]](#), [\[R\]](#).

Many of these variants have been associated with increased FOXO3 levels [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).



TYPICAL ACTIVITY

Likely typical FOXO3 activity based on 14 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
FOXO3	rs12212067	TT
FOXO3	rs4946936	CC
FOXO3	rs12202234	CC
FOXO3	rs17069665	AA
FOXO3	rs9398171	TT
FOXO3	rs3800230	TT
FOXO3	rs9400239	CC
FOXO3	rs479744	GG
FOXO3	rs2764264	TT
ARMC2	rs6911407	AA
FOXO3	rs2802292	GG
ARMC2	rs768023	GG
FOXO3	rs2802288	AA
FOXO3	rs2253310	CC
FOXO3	rs1935952	CC

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

Your Recommendations

Your recommendations are prioritized according to the likelihood of it having an impact for you based on your genetics, along with the amount of scientific evidence supporting the recommendation.

You’ll likely find common healthy recommendations at the top of the list because they are often the most impactful and most researched.

DOSAGE		DOSAGE			
1	Exercise At Least One Hour a Day	1 hour	2	Dietary Antioxidants	
3	Avoid Food Triggers		4	Green Tea	400 mg
5	Curcumin	500 mg	6	Theaflavins	
7	Limit Calorie Intake		8	Resveratrol	150 mg

1

Exercise At Least One Hour a Day

IMPACT

5 / 5

EVIDENCE

5 / 5

How to implement

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

TYPICAL STARTING DOSE

1 hour

Description

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

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

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

How it helps

Moderate physical activity changes the composition of the gut flora by increasing beneficial species [\[R\]](#), [\[R\]](#).

Physical [exercise](#) helps prevent IBD, but some people with active disease may be unable to adjust their physical activity. Staying physically fit by exercising regularly is essential as a means of prevention [\[R\]](#), [\[R\]](#), [\[R\]](#).

Moreover, **getting more exercise may increase lifespan**. The more people exercise, the more longevity tends to improve [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Both cardio and resistance exercises may help. Some studies suggest that higher-intensity exercise may be more beneficial [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Interestingly, exercise increases FOXO3 levels [\[R\]](#), [\[R\]](#).

2



Dietary Antioxidants

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate foods rich in antioxidants, such as fruits (berries, oranges, plums), vegetables (spinach, kale, bell peppers), nuts (walnuts, almonds), and seeds (flaxseeds, chia seeds) into your daily meals. Aim for at least 5 servings of fruits and vegetables per day, ensuring a variety of colors to cover different antioxidants.

Description

Dietary antioxidants are compounds found in foods that help neutralize harmful molecules called free radicals, potentially reducing the risk of oxidative stress-related diseases and supporting overall health. Examples include vitamins C and E, beta-carotene, and polyphenols.

Our cells sometimes produce molecules called **reactive oxygen species (ROS)** [\[R\]](#).

High levels of ROS can cause [oxidative stress](#) and damage our cells. Oxidative stress plays a role in many health conditions, including [\[R\]](#):

- High blood sugar
- Type 2 diabetes
- Heart disease

Antioxidants are substances that help combat ROS [\[R\]](#).

Antioxidants are found in many plants. Good sources include [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Fruits like tomatoes, berries, and pomegranates
- Vegetables like onions, spinach, and celery
- Chocolate
- Olive oil
- Wine

How it helps

Higher blood levels of antioxidants are linked to increased longevity [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

In line with this, a higher intake of antioxidants may support a longer life. Antioxidants that may help include **carotenoids**, **vitamin C**, and **flavonoids** [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Adding a variety of plant-based foods to your diet is an excellent way to get more antioxidants. High-antioxidant foods include [\[R\]](#), [\[R\]](#):

- Berries
- Sweet potato
- Peppers
- Leafy greens (e.g., kale, spinach)
- Nuts
- Dark chocolate

Antioxidants may help by reducing oxidative stress [\[R\]](#), [\[R\]](#).

Many polyphenols commonly found in plants we eat (especially fruits and vegetables) are capable of inducing FOXO3. These include:

- EGCG from [green tea](#) [\[R\]](#)
- [Theaflavins](#) [\[R\]](#), [\[R\]](#)
- Epicatechins from cocoa [\[R\]](#), [\[R\]](#)
- [Resveratrol](#) from grapes, wine, peanuts, Japanese Knotweed
- [Curcumin](#) [\[R\]](#)

- [Quercetin](#) from [capers](#), apples, berries, broccoli, onions, and many other sources [\[R\]](#)
- [Luteolin](#) from carrots, cabbage, artichokes, tea, celery, and apples [\[R\]](#)
- [Apigenin](#) from celery, onions, oranges, and many herbs [\[R\]](#)

3



Avoid Food Triggers

IMPACT

3 / 5

EVIDENCE

3 / 5

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.

Description

Food triggers are specific substances or ingredients in one's diet that can exacerbate or induce adverse reactions, such as allergies, sensitivities, or digestive issues, often leading to symptoms like inflammation, bloating, or discomfort.

A "trigger" is something that prompts or worsens the symptoms of a health condition.

Food triggers can lead to a wide range of symptoms in people who are sensitive to them. These may include [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Gut problems
- Skin problems
- Migraines

How it helps

Experts agree that limiting certain foods can help manage some symptoms of IBD. However, they urge people to eat a healthy and varied diet [\[R\]](#), [\[R\]](#), [\[R\]](#).

The most common food **triggers for IBD** include [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Hot and spicy foods (like mustard and wasabi)
- Fatty and fried foods
- Dairy (lactose)
- High-fiber foods (like raw vegetables)
- Nightshades (like tomatoes and potatoes)
- Sweets and sugary drinks
- Coffee and alcohol

In a study of people with Crohn’s disease, carriers of the ‘G’ variant often experienced worsened symptoms after eating wasabi, tomatoes (especially raw), mustard, and [ginger](#) [\[R\]](#).

In the same study, people with this variant often benefited from eating sweet potatoes, Jerusalem artichokes, green beans, beefsteak, and peas [\[R\]](#).

4



Green Tea

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Consume 400 mg of green tea extract daily. This can be taken in the form of capsules or tablets available that specify the amount of green tea extract. Ensure the supplement is taken according to the product's specific instructions, usually once a day with water.

TYPICAL STARTING DOSE

400 mg

Description

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

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

Tea contains antioxidants called **flavonoids**, which may help prevent [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Heart disease
- Cancer
- Diabetes

How it helps

Higher blood levels of antioxidants are linked to increased longevity [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

In line with this, a higher intake of antioxidants may support a longer life. Antioxidants that may help include **carotenoids**, **vitamin C**, and **flavonoids** [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

A promising polyphenol to induce *FOXO3* and promote longevity is EGCG, which is found primarily in [green tea](#) at reasonable concentrations [\[R\]](#).

Please note: polyphenols from green tea may bind to iron and form insoluble complexes, which reduces iron absorption in the gut. If you have anemia, consult your healthcare provider before using green tea [\[R\]](#).

5



Curcumin

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Take a 500 mg curcumin supplement daily with food. To enhance absorption, take it with a meal that contains fats or oils since curcumin is fat-soluble.

TYPICAL STARTING DOSE
500 mg

Description

Curcumin is a compound found in turmeric known for its anti-inflammatory and antioxidant properties. It has been studied for its potential to reduce inflammation, support joint health, and contribute to overall well-being.

[Turmeric](#) is a yellow spice from India. It may reduce inflammation and [oxidative stress](#) [R].

The most important active compound in turmeric is **curcumin**. People use curcumin for [R, R, R, R, R, R]:

- Joint pain
- Hay fever
- Mood
- High blood sugar
- Gut health
- Liver health

How it helps

Curcumin inhibits multiple proteins involved in the immune response [R].

In people with **ulcerative colitis**, curcumin may help relieve symptoms. It may be most helpful when combined with medication. However, the evidence is mixed [R, R, R, R].

In a study on people with Crohn’s disease, carriers of the ‘G’ variant often reported benefits from eating curry dishes with turmeric [R].

Please note: curcumin may interfere with iron absorption due to its iron-chelating properties, potentially exacerbating anemia or making it harder to manage. If you have anemia, consult your healthcare provider before using curcumin or turmeric supplements [R, R, R].

6



Theaflavins

IMPACT2 / 5

EVIDENCE2 / 5

How to implement

Take a supplement containing 100-200mg of theaflavins daily, preferably with a meal to enhance absorption. This regimen should be maintained consistently for at least 3 to 6 months to evaluate its benefits on health.

Description

Theaflavins are antioxidants found in black tea, particularly after fermentation. They are associated with various potential health benefits, including supporting heart health and reducing oxidative stress.

How it helps

Regular consumption of black tea may lower the risk of all-cause mortality by 11% and heart disease-related death by 13% [\[R\]](#).

Moreover, each additional cup of black tea consumed daily (about 250 mL, containing 280 mg of flavonoids) may reduce the risk of dying from [\[R\]](#).

- Heart disease by 2-4%
- Stroke by 2%
- Any cause by 1.5%

[Theaflavins](#), a class of polyphenols found in black tea, stimulated FOXO3 activity in multiple cell studies [\[R\]](#), [\[R\]](#).

7



Limit Calorie Intake

IMPACT2 / 5

EVIDENCE0 / 5

How to implement

Consume fewer calories than your body needs for maintenance. Calculate your daily caloric needs using an online calculator based on your sex, age, weight, height, and activity level, then reduce that number by 500-1000 calories per day to safely lose 1-2 pounds per week. Adjust the caloric intake as needed based on your progress.

Description

People often limit their calorie intake to help them lose weight [\[R, R\]](#). However, moderate calorie restriction may also help you stay healthier and age better [\[R, R, R, R, R\]](#).

There are different ways to take in fewer calories. You can:

- **Eat low-calorie foods**, such as those rich in proteins, fiber, and water. Avoid fatty and sugary foods, which tend to be high in calories [\[R\]](#).
- Try [intermittent fasting](#), which involves changing how often you eat [\[R\]](#).

If you are restricting your calories, make sure your diet remains healthy and balanced. Experts also recommend being physically active, to prevent the loss of muscle and bone mass.

How it helps

Limiting calorie intake may support a healthy weight and healthy aging. It may also reduce cholesterol levels and inflammation [\[R, R\]](#).

In line with this, multiple studies on yeast, worms, flies, and small mammals note that calorie restriction might increase lifespan. **However, similar studies have not been conducted in humans** [\[R, R\]](#).

In one study on humans, reducing calorie intake by 11% reduced some measures of aging in participants’ DNA. However, it didn’t reduce estimated biological age [\[R, R\]](#).

Interestingly, intermittent fasting and calorie restriction activate FOXO3 [\[R\]](#).

Please note: *There is no clinical evidence to support this recommendation. Limiting calorie intake too much or fasting for too long can cause malnutrition, anemia, eating disorders, and other health problems. Talk to your doctor before making any drastic changes to your calorie intake* [\[R\]](#).

How to implement

TYPICAL STARTING DOSE

150 mg

Description

Resveratrol is a natural compound found in red grapes, red wine, and some berries. It is known for its potential antioxidant properties and its role in promoting heart health.

- Berries
- Red grapes
- Red wine
- Peanuts

It's purported to have anti-inflammatory and antioxidant effects [[R](#), [R](#), [R](#)].

How it helps

One review study found that resveratrol supplements extended the lives of about 60% of animal models; however, results varied widely from one species to another. Researchers don't currently agree on whether resveratrol significantly affects human lifespan [R].

Interestingly, resveratrol has been identified among the supplements inducing FOXO3 activity [R].

Next Steps

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

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

Your lab results

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

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