

# Estrogen Metabolism (Functional)

Biohacker Report

REPORT CATEGORY —



DETOX

Sample Client

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# Table of Contents

## 03 How this works

- 04 Impact
- 05 Evidence
- 06 Some things to keep in mind

## 07 Introduction

## 08 Your genetics

## 11 Your 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

Sample Client

SEX AT BIRTH

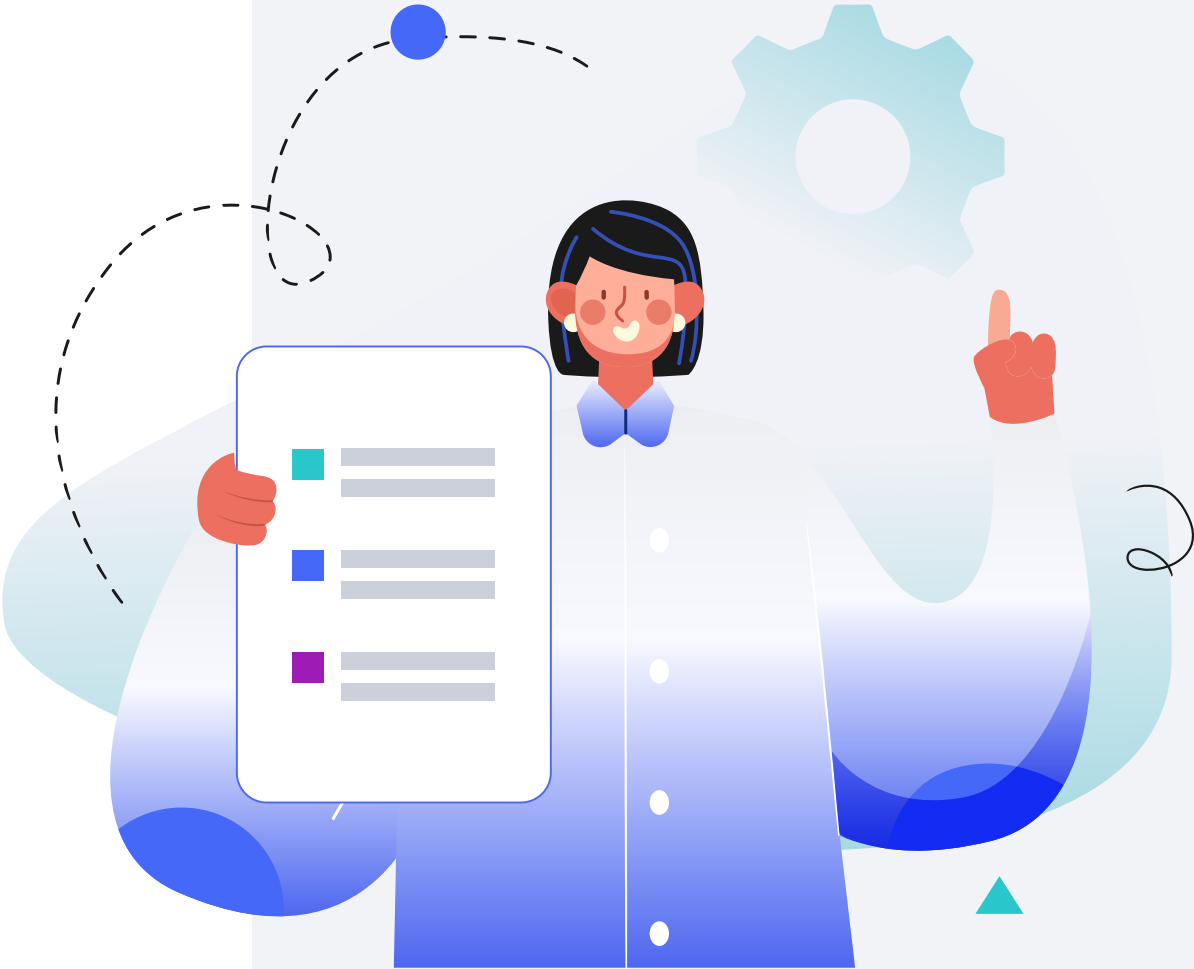
Male

HEIGHT

5ft 5" 165cm

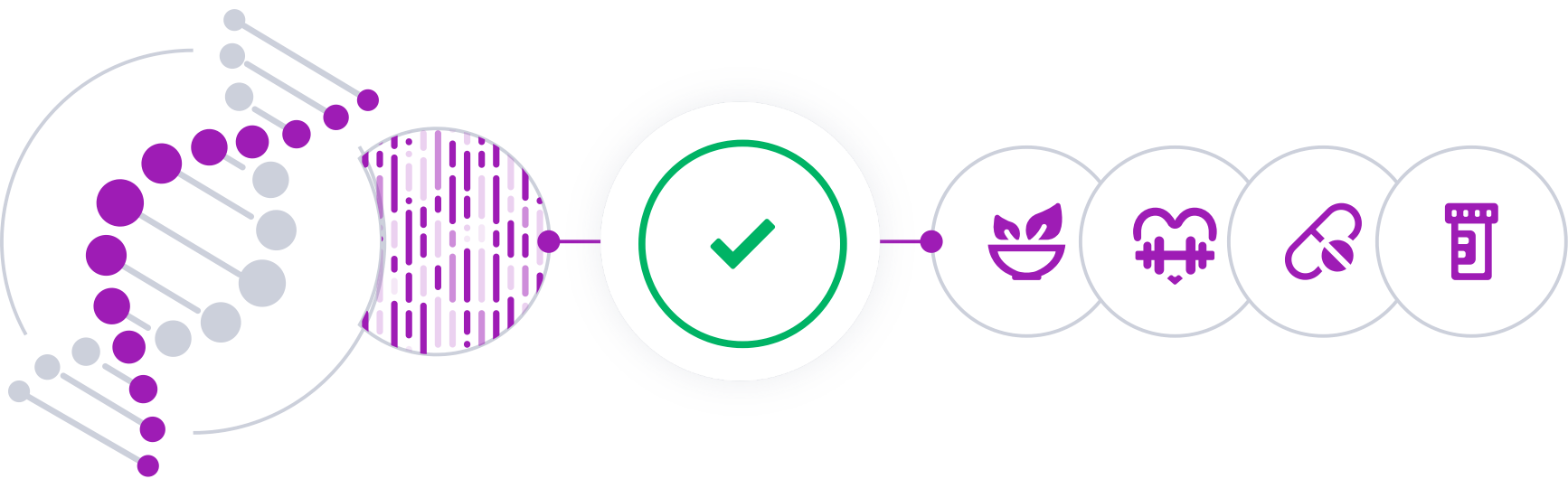
WEIGHT

137lb 62kg



# How this works

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

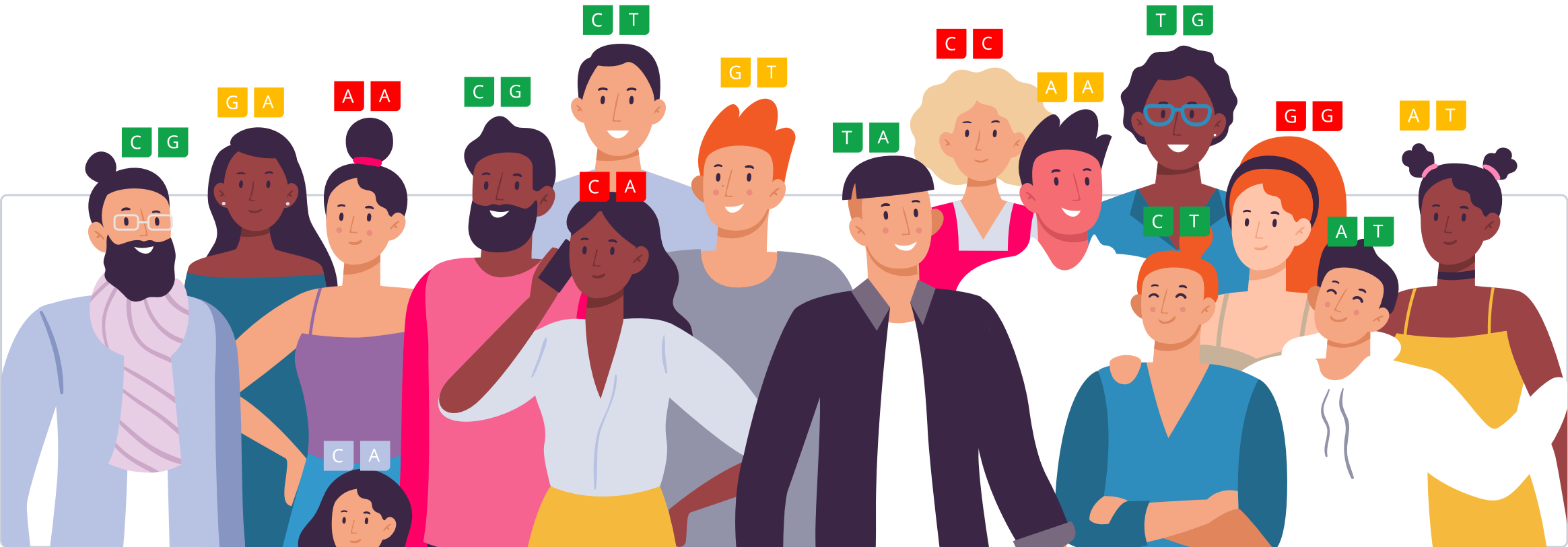


Similarly, our Trait Reports look at how your DNA influences your traits.



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

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



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

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

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



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

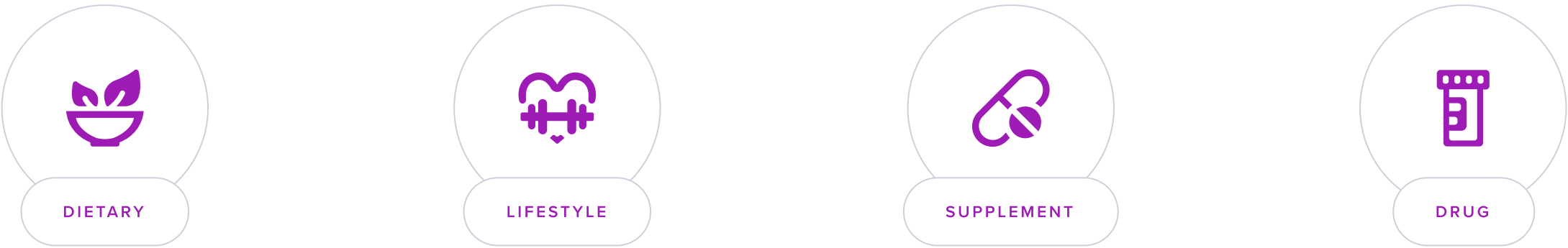
You have 2 risk alleles

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

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

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

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



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

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



# Impact

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

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

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

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

## Recommendation Evidence

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

## Genotype-specific Evidence

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



## Some things to keep in mind:

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

# Introduction

**Estrogens are sex hormones that maintain sexual and reproductive health.** Among them, estradiol is the most active one in the body. In females, estradiol is needed for breast development, menstruation, and pregnancy. In males, it impacts sex drive, sperm production, and the ability to get an erection [\[R\]](#), [\[R\]](#), [\[R\]](#).

Estradiol also has other important non-reproductive roles. It affects [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Cholesterol and blood sugar levels
- Body weight
- Bone and muscle mass
- Collagen production and skin moisture
- Brain function

Ovaries make most of the estradiol in women, but some of it is also made in the adrenal glands and fat tissue. **Levels increase in puberty, fluctuate naturally during the menstrual cycle, and decline with menopause** [\[R\]](#), [\[R\]](#).

In men, the main sources of estradiol are the testes and the adrenal glands [\[R\]](#), [\[R\]](#).

Estrogen metabolism, which primarily occurs in the liver, is crucial for maintaining hormonal balance. Alterations in estrogen balance can influence its activity, potentially leading to various health conditions such as hormone-related cancers, osteoporosis, and cardiovascular diseases. The main enzymes involved in estrogen metabolism include [\[R\]](#):

- **Cytochrome P450 enzymes (CYP450):** These enzymes are responsible for the initial hydroxylation of estrogens, leading to the formation of hydroxylated metabolites. CYP1A1, CYP1A2, and CYP3A4 are some of the main players.
- **Aromatase (CYP19):** This enzyme converts androgens into estrogens, particularly estrone and estradiol, in tissues such as the ovaries and adipose tissue.
- **17β-Hydroxysteroid dehydrogenase (17β-HSD):** This enzyme is involved in the interconversion of estrone and estradiol. It reduces estrone to estradiol and vice versa.
- **Sulfotransferases (SULTs) and UDP-glucuronosyltransferases (UGTs):** These enzymes are responsible for conjugating estrogen metabolites with sulfate or glucuronide groups, facilitating their excretion via urine or bile.



# Genetics of Estrogen Metabolism

Several genetic variants are associated with estrogen metabolism, impacting the body's ability to balance and regulate the levels of these hormones effectively.

**CYP19A1 (rs10046, C>T):** CYP19A1 encodes aromatase, an enzyme that converts androgens to estrogens. The rs10046 variant (C>T) can influence estrogen production, impacting hormone levels and balance.

**CYP1A1 (rs1048943, Ile462Val A>G):** This gene is involved in estrogen metabolism. The rs1048943 variant (Ile462Val A>G) can affect the conversion of estrogens, influencing hormonal balance and related health outcomes.

**CYP1A1 (rs762551):** The CYP1A1 rs762551 variant can influence estrogen metabolism, potentially altering estrogen breakdown and influencing hormone-related health outcomes, such as breast cancer risk or other estrogen-dependent conditions.

**CYP1A2 (rs366631, -163C>A):** CYP1A2 is involved in the metabolism of estrogens and other compounds. The rs366631 variant (-163C>A) can affect enzyme expression, influencing estrogen metabolism and potentially impacting hormone-related health outcomes such as breast cancer risk.

**CYP17A1 (rs743572, 34 T>C):** The CYP17A1 gene is involved in the production of steroid hormones, including estrogens. The rs743572 variant (34 T>C) can influence levels of these hormones, affecting hormone-related health outcomes.

**CYP1B1 (rs1800440, Asn453Ser A>G):** The CYP1B1 gene is involved in estrogen metabolism. The rs1800440 variant (Asn453Ser A>G) can affect estrogen breakdown efficiency, potentially influencing estrogen levels and impacting hormone-related health risks.



Predisposed to typical estrogen metabolism based on 18 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

| GENE    | SNP       | GENOTYPE |
|---------|-----------|----------|
| CYP19A1 | rs10046   | AA       |
| CYP1A1  | rs1048943 | TT       |
| TRIM4   | rs2740574 | TT       |
| CYP1A2  | rs762551  | AA       |
| SHBG    | rs6258    | CC       |
| TNFSF12 | rs6259    | GG       |
| CYP1B1  | rs1800440 | CT       |
| /       | rs366631  | AG       |
| COMT    | rs4680    | AG       |
| BORCS7  | rs743572  | AG       |
| CSK     | rs2606345 | AC       |
| CSK     | rs2470893 | TC       |
| UGT2B15 | rs1902023 | AC       |
| CYP1B1  | rs1056836 | GG       |
| CYP1A1  | rs4646903 | AA       |
| LMAN1L  | rs2069514 | GG       |
| CYP1A1  | rs4646422 | CC       |
| GSTP1   | rs1695    | AA       |
| CYP2D6  | rs1065852 | GG       |

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



**CYP1B1 (rs1056836, Leu432Val C>G):** Another CYP1B1 variant, rs1056836 (Leu432Val C>G), may affect the breakdown of estrogen, potentially influencing estrogen levels and associated risks.

**CYP1B1 (rs2606345):** This SNP in the CYP1B1 gene may affect the efficiency of estrogen metabolism. Alterations in this gene's activity can influence estrogen breakdown, potentially contributing to estrogen-related diseases or conditions, such as hormone-driven cancers.

**CYP3A4 (rs2740574, -392 A>G):** CYP3A4 is involved in metabolizing estrogens and other hormones. The rs2740574 variant (-392 A>G) can influence hormone breakdown, affecting overall balance.

**CYP3A4 (rs2470893):** The rs2470893 SNP of CYP3A4 may alter the enzyme's activity, influencing estrogen clearance rates and hormone balance.

**COMT (rs4680, Val158Met G>A):** COMT is responsible for breaking down catecholamines, including estrogen metabolites. The rs4680 variant (Val158Met G>A) can affect estrogen metabolism, impacting hormonal balance and potentially influencing mood and stress response.

**COMT (rs4646422, rs1065852):** Two more COMT variants, rs4646422 and rs1065852, may alter the enzyme's function and thus influence estrogen levels and their associated health risks.

**GSTP1 (rs1695, Ile105Val A>G):** GSTP1 plays a role in detoxification. The rs1695 variant (Ile105Val A>G) can impact the body's capacity to manage oxidative stress, indirectly affecting estrogen metabolism.

**SHBG (rs6259, Pro185Leu C>T; rs6258):** SHBG encodes sex hormone-binding globulin, which regulates the availability of hormones like estrogen. The rs6259 (Pro185Leu C>T) and rs6258 variants can influence SHBG levels, affecting estrogen bioavailability and balance.

**UGT2B15 (rs1902023, T>G):** UGT2B15 is involved in the detoxification of steroid hormones such as estrogen. The rs1902023 variant (T>G) can influence hormone clearance rates, affecting balance.

**UGT2B15 (rs4646903):** The rs4646903 variant of UGT2B15 may affect the enzyme's activity, influencing the

rate at which estrogen metabolites are cleared from the body. This could impact estrogen levels and associated risks for conditions such as breast cancer.

These genetic factors, along with lifestyle and environmental influences, play a crucial role in estrogen metabolism and balance. By understanding these genetic predispositions, individuals can adopt lifestyle and dietary strategies to support hormonal health and reduce the risk of estrogen-related conditions.

# Your Recommendations

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

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

| DOSAGE |                                  | DOSAGE |                            |
|--------|----------------------------------|--------|----------------------------|
| 1      | Avoid BPA (Bisphenol A) Exposure | 2      | Avoid DHEA Supplements     |
| 3      | Avoid Anabolic Steroids          | 4      | Avoid Endocrine Disruptors |
| 5      | Genistein30 mg                   | 6      | Limit Soy Intake           |
| 7      | Soy Isoflavones40 mg             |        |                            |



1



Avoid BPA (Bisphenol A) Exposure

IMPACT

1 / 5

EVIDENCE

1 / 5

## How to implement

To avoid BPA exposure, choose BPA-free products, particularly when selecting food containers, water bottles, and baby bottles. Prefer glass, porcelain, or stainless steel containers, especially for hot food or liquids. Reduce use of canned foods as they may be lined with BPA and avoid handling thermal paper receipts, as they can contain BPA. When possible, select fresh or frozen foods over canned goods.

## Description

Avoiding BPA (Bisphenol A) exposure involves minimizing contact with products or containers containing this chemical, which is commonly found in plastics and can potentially disrupt hormone regulation.

BPA (bisphenol A) is a chemical used to make certain plastics and resins. BPA-containing plastics are often used in containers that store food and beverages. Plastics marked with **recycling code 3 or 7** may contain BPA [\[R\]](#).

BPA is a well-known hormone disruptor. Research has linked BPA exposure to diabetes, heart disease, altered behavior, and more [\[R\]](#).

## How it helps

Avoiding BPA exposure enhances estrogen metabolism by mitigating the influence of this endocrine disruptor, which can lead to hormonal imbalances. Reducing BPA helps maintain optimal hormone regulation, thereby supporting overall hormonal health.

2



Avoid DHEA Supplements

IMPACT

1 / 5

EVIDENCE

1 / 5

## How to implement

Do not purchase or consume any supplements labeled as DHEA (dehydroepiandrosterone). If you currently have DHEA supplements, stop using them immediately and do not resume.

## Description

If you're taking DHEA supplements, reduce the dosage, or stop taking them until your levels go back to normal.

## How it helps

Avoiding DHEA supplements helps prevent further hormonal imbalance by regulating estrogen metabolism, particularly when existing DHEA levels are sufficient. This is crucial for maintaining optimal hormone levels and minimizing the risk of estrogen-related disorders.

3



Avoid Anabolic Steroids

IMPACT

1 / 5

EVIDENCE

1 / 5

## How to implement

Do not consume or inject any substances classified as anabolic steroids. This includes avoiding use for performance enhancement in sports or bodybuilding. Compliance should be permanent to avoid potential health risks.

## Description

Unless you have a condition that warrants the use of anabolic steroids, avoid them. Apart from having many potential adverse effects, long-term use of anabolic steroids can eventually impair testosterone production [R, R, R, R, R].

Also, refrain from using herbs that increase testosterone levels, such as tongkat ali, ashwagandha, fenugreek, or *Mucuna pruriens* [R, R, R, R, R].

## How it helps

Avoiding anabolic steroids helps maintain hormonal balance, which is crucial for optimal estrogen metabolism. This stability reduces the risk of metabolic disturbances that can lead to further health complications.

4



Avoid Endocrine Disruptors

IMPACT

1 / 5

EVIDENCE

1 / 5

## How to implement

Minimize exposure to endocrine disruptors by opting for organic foods to reduce pesticide intake, using glass or stainless steel instead of plastic containers for food and beverages, avoiding cosmetics and personal care products with parabens or phthalates, and regularly vacuuming and dusting your home to reduce contact with flame retardants found in household dust.

## Description

Avoiding exposure to endocrine disruptors, such as certain chemicals found in plastics and pesticides, is crucial for maintaining hormonal balance and reducing the risk of hormone-related health problems.

Endocrine disruptors are chemicals that interfere with the body’s hormone (endocrine) system by [\[R\]](#), [\[R\]](#):

- Blocking the function or activity of hormones
- Mimicking the function of hormones

Based on limited studies, long-term exposure to these chemicals can have negative effects on health [\[R\]](#), [\[R\]](#).

Endocrine disruptors can be found in cosmetics, food products, pesticides, and other common household items [\[R\]](#).

## How it helps

Avoiding endocrine disruptors is essential for optimizing estrogen metabolism, as these substances can mimic or block natural hormones, leading to imbalances that affect overall hormonal health. This reduction in exposure supports better regulation of estrogen levels, promoting functional hormonal balance.

5



Genistein

IMPACT

1 / 5

EVIDENCE

1 / 5

## How to implement

Take a genistein supplement daily, with a usual dosage range between 30 mg to 100 mg. It is best taken with food to enhance absorption. Continue this regimen daily for at least six months to evaluate its benefits fully.

TYPICAL STARTING DOSE

30 mg

## Description

Genistein is an isoflavone found in soy products that may offer potential health benefits, including antioxidant and anti-inflammatory properties. It has been studied for its potential role in hormone regulation and the reduction of certain cancer risks.

## How it helps

Genistein aids in estrogen metabolism by mimicking estrogenic activity and modulating hormonal balance, which can support healthy estrogen levels. Its antioxidant properties further enhance cellular protection, reducing oxidative stress linked to hormonal fluctuations.

6



Limit Soy Intake

IMPACT

1 / 5

EVIDENCE

1 / 5

## How to implement

Reduce your consumption of soy and soy-based products to no more than 1-2 servings per week. This includes foods like tofu, soy milk, soy sauce, and edamame. Ensure to read labels on packaged foods to check for hidden soy ingredients.

## Description

For individuals with specific allergies or sensitivities, limiting soy intake can help prevent uncomfortable symptoms and digestive issues.

**Soy is a common food in many cuisines around the world**, especially Asian cuisines [\[R\]](#).

It’s a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

However, eating too much soy over a long period of time is linked to uterine fibroids [\[R\]](#).

## How it helps

Limiting soy intake can help mitigate estrogen-related symptoms and prevent adverse reactions in individuals with sensitivities, as soy contains phytoestrogens that may interfere with hormonal balance and exacerbate functional estrogen metabolism issues.



7



Soy Isoflavones

IMPACT1 / 5

EVIDENCE1 / 5

## How to implement

Take a soy isoflavone supplement containing 40 to 80 milligrams daily, ideally with food to improve absorption. This dosage can be continued on a daily basis for several months, but it's recommended to reevaluate its effectiveness and any potential side effects with a healthcare provider periodically.

TYPICAL STARTING DOSE

40 mg

## Description

Soy isoflavones are natural compounds found in soybeans and soy products. They are phytoestrogens, which means they can mimic the effects of estrogen in the body and are associated with potential health benefits like menopausal symptom relief and improved heart health.

**Soy is a common food in many cuisines around the world**, especially Asian cuisines [\[R\]](#).

It's a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

Soy-based foods include [\[R\]](#):

- Tofu
- Tempeh
- Edamame
- Miso
- Natto

Soy protein and soy isoflavones are also available as supplements.

## How it helps

Soy isoflavones serve as phytoestrogens, which can bind to estrogen receptors and help alleviate menopausal symptoms by modulating estrogen levels in women. This can lead to reduced hot flashes and improved overall hormonal balance during menopause.