

Anemia

DNA Health Report

REPORT CATEGORY —



Sample Client

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DISCLAIMER

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

Personal information

NAME

Sample Client

SEX AT BIRTH

Male

HEIGHT

5ft 5" 165cm

WEIGHT

137lb 62kg



How this works

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



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



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

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



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

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

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



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

You have 2 risk alleles

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

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

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

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



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

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



Impact

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

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

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

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

Recommendation Evidence

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

Genotype-specific Evidence

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

Some things to keep in mind:

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

Introduction

Do you know what anemia is?

A lot of people get confused between anemia and iron deficiency.

This is an understandable mistake, because iron deficiency is actually the most common cause of anemia.

Anemia is where your body lacks enough healthy red blood cells to effectively carry oxygen around your body [\[R\]](#).

The word anemia actually stems from the Greek word, *anaimia*, which means lack of blood [\[R\]](#).

Anemia is incredibly common, affecting more than 3 million people in the US alone [\[R\]](#).

Common signs you may have anemia include feeling tired, lightheaded or short of breath [\[R\]](#).

A less common, and slightly strange side effect of iron deficiency anemia in particular is the compulsion to chew on ice.

This is a form of pica, a condition in which people are compelled to chew things with no nutritional value. Chewing ice specifically is called *pagophagia*, although doctors aren't sure why this occurs [\[R\]](#).

Of course if you chew ice this isn't a definite sign of anemia, some people are just...different.

There are many different types of anemia and the treatment you require depends on the form you have [\[R\]](#).

Different types of anemia have different causes. **One factor which may influence your risk of being anemic is your genetics** [\[R\]](#).

For example, if you carry a certain variant of the [TMPRSS6](#) gene, you may be more prone to iron deficiency anemia [\[R\]](#), [\[R\]](#).

Alternatively, if you carry particular variants of the [PTPN22](#) or [MTHFR](#) genes, you may be more likely to have anemia as a result of vitamin B12 or folate deficiency [\[R\]](#), [\[R\]](#), [\[R\]](#).

Read on to find out more about:

- **How your genetics play a role in anemia**
- **Your genetic risk score based on over 498,000 genetic variants**
- **Personalized recommendations based on your genetics**

Risk Factors And Genetics

Key Takeaways:

- Up to **90%** of differences in people's hemoglobin levels may be due to genetics.
- Other risk factors include iron or vitamin B deficiency, certain diseases and medications, infections, toxic chemicals, alcohol misuse, blood loss, pregnancy, and aging.
- About **1 out of 20** people in the United States may be anemic.
- If your genetic risk is high, you may reduce your overall risk by taking action on factors that you can change.
- Click the **Recommendations** tab for potential dietary and lifestyle changes and **next steps** for relevant labs.

Red blood cells contain a protein called hemoglobin. This protein binds oxygen and transports it throughout the body. People with **anemia** don't have as much hemoglobin or red blood cells as others. This means that their tissues have trouble getting enough oxygen [\[R\]](#), [\[R\]](#).

About 1 out of 20 people in the United States may be anemic [\[R\]](#).

To produce hemoglobin and red blood cells, your body needs nutrients from the foods you eat. Vitamin and mineral deficiencies that may cause anemia include [\[R\]](#):

- **Iron deficiency**
- B vitamin (folate or vitamin B12) deficiency

The following may also cause or contribute to anemia [\[R\]](#):

- Some diseases (e.g., HIV/AIDS, cancer, or Crohn's disease)
- Infections
- Some medications
- Toxic chemicals
- Alcohol misuse
- Blood loss, including during a period
- Pregnancy



TYPICAL LIKELIHOOD

Typical likelihood of anemia based on 477,517 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ZDHHC14	rs181143083	TT
TMPRSS6	rs4820268	GA
TMPRSS6	rs855791	AG
/	rs550503980	CC
TRIM33	rs576432148	AA
/	rs79798837	CT
TMPRSS6	rs228916	TT
BCL11A	rs1427407	GG
IGLV4-60	rs987710	GG
TRIB2	rs118096157	TT
RNF43	rs199598395	CC
VMP1	rs143341655	CC
MXRA8	rs138300056	CC
MAN1A2	rs560838965	AA
CHD1L	rs141591111	AA
MAN1A2	rs563763393	CC
/	rs372345235	CC
CD101	rs141796902	GG
KAZN	rs141034704	CC
SLC16A1	rs12057664	CC
TAF3	rs11102547	CC
/	rs181288106	CC
ACAP3	rs188074302	CC
NTNG1	rs78372720	CC

- Aging
- **Genetics** (e.g., sickle cell disease, thalassemia)

People with anemia may experience symptoms such as [\[R\]](#):

- Fatigue and weakness
- Pale or yellowed skin
- Irregular heartbeat
- Shortness of breath
- Dizziness
- Chest pain
- Cold hands and feet
- Headaches

Untreated anemia can cause extreme fatigue and make it difficult to live your day-to-day life. If severe, it can cause life-threatening complications [\[R\]](#), [\[R\]](#).

Treatment for anemia depends on the cause. For example, if it is caused by a deficiency of iron or vitamin B12, then getting more of the missing nutrient should solve the problem [\[R\]](#).

Other treatments for various types of anemia may include [\[R\]](#):

- Medication
- Blood transfusion

Up to 90% of differences in people's hemoglobin levels may be attributed to genetics. Genes involved in anemia may influence [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Red blood cell shape, function, or survival
- Iron metabolism
- Immune system function

GENE	SNP	GENOTYPE
CSF1	rs17025003	CC
GOLPH3L	rs192747147	GG
PPM1J	rs149411762	GG
NGF	rs138035321	GG
PLEKHN1	rs532486531	GG
RNPC3	rs75283501	GG
ACAP3	rs114544631	CC
/	rs544873223	TT
/	rs12070100	CC
CAPZA1	rs528523716	CC
SPAG17	rs186399968	TT
CELF3	rs184801923	CC
TMEM51	rs12073191	GG
ACP6	rs140851699	GG

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	Dietary Iron	2	Vitamin B1210 mcg
3	Maintain Optimal Iron Levels10 mg	4	Lactobacillus Plantarum10 billion CFU
5	Avoid Lead Exposure	6	Avoid Arsenic Exposure
7	Lactoferrin100 mg	8	Dietary Folate
9	Methylfolate400 mcg	10	Probiotics10 billion
11	Leafy Green Vegetables	12	Beef liver
13	Avoid Exposure to Heavy Metals	14	Vitamin C500 mg
15	Vitamin A700 mcg	16	Red Meat
17	Maintain Optimal Vitamin D Levels1000 iu	18	Spinach
19	Legumes	20	Riboflavin (Vitamin B2)25 mg
21	Avoid Cadmium Exposure	22	Folinic Acid
23	Spirulina500 mg	24	Dietary Protein
25	Bifidobacterium Lactis HN01910 billion CFU	26	Copper2 mg
27	Eggs	28	Lentils
29	Chicken Liver	30	Gold Kiwifruit
31	Dietary Vitamin C	32	Chlorella3 g

33

Dietary Pentadecanoic Acid

Dietary Iron

IMPACT

5 / 5

EVIDENCE

5 / 5

How to implement

Incorporate iron-rich foods into your daily meals, such as red meat, chicken, turkey, fish, beans, lentils, tofu, cooked spinach, and fortified cereals. Aim for at least 18 mg of iron per day for adult women and 8 mg per day for adult men. It's also beneficial to pair these foods with vitamin C-rich foods like oranges, strawberries, or bell peppers to enhance iron absorption.

Description

Iron (Fe) is an essential mineral. It helps make [hemoglobin](#), a protein that carries oxygen to cells. In this way, iron **increases energy** and supports **brain and immune system function** [[R](#), [R](#), [R](#)].

Foods rich in iron include [\[R\]](#):

- Oysters
- White beans
- Beef
- Chocolate
- Spinach
- Fortified cereals

Women should be getting **8-18 mg** of iron per day, while **men** should be getting **8 mg** [R].

Groups at risk of iron deficiency include [R]:

- Menstruating women
- Children
- Vegetarians
- Routine blood donors

How it helps

According to experts, iron deficiency anemia can be mitigated by consuming a diet rich in iron from sources like [R].

- Beef
- Beans
- Lentils
- Iron-fortified cereals
- Dark leafy greens

When necessary, through iron supplements or intravenous iron, especially in those who can't absorb iron orally due to conditions like gastrectomy or celiac disease [R, R].

The required dosage to treat iron deficiency in adults is typically 120 mg of elemental iron daily for 3 months, with a hemoglobin increase of 1 g/dL after one month indicating effective treatment [R].

Meta-analyses have demonstrated that iron supplementation and food fortification improve iron status and reduce anemia prevalence [R, R, R, R, R, R, R].

Foods fortified with iron, such as salt, wheat flour, milk, non-dairy beverages, rice, and soy sauce, may also increase hemoglobin and ferritin levels and reduce the rates of anemia and iron deficiency [R, R, R, R, R, R, R, R, R].

Please note: Increased iron intake from meat is linked to higher odds of diabetes and heart disease. Try to find a balance between plant and animal iron sources [R, R, R, R].

2



Vitamin B12

IMPACT3 / 5

EVIDENCE4 / 5

How to implement

Take a 50 mcg vitamin B12 supplement daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

10 mcg

Description

Vitamin B12 is a water-soluble vitamin primarily found in animal-based foods like meat, fish, and dairy products. It plays a crucial role in maintaining healthy nerve cells, DNA synthesis, and red blood cell formation. Vitamin B12 deficiency can lead to anemia, neurological issues, and fatigue.

[Vitamin B12](#) is important for [\[R\]](#), [\[R\]](#):

- Building DNA
- Nervous system function
- Energy production

You can get vitamin B12 from [\[R\]](#):

- Animal products (meat, fish, eggs, and dairy)
- Fortified foods
- Supplements

Adults should be getting **2.4 micrograms** of vitamin B12 every day [\[R\]](#).

How it helps

Vitamin B12 is essential for the body to produce enough healthy red blood cells. If you have anemia, taking B12 can help remedy any deficiencies causing your body's low red blood cell count.

Pernicious anemia is one type of anemia caused by vitamin B12 deficiency as a result of malabsorption. **Vitamin B12 replacement (oral and intravenous vitamin B12) helps manage this condition.** [Two small reviews](#) concluded that the oral dose required to manage **pernicious anemia is 1,000 mcg/day, while food vitamin B12 malabsorption is managed with 250 mcg/day.** An oral dose of 2,000 mcg/day or 1,000 mcg/day followed by 1,000 mcg weekly and monthly may be as effective as intravenous vitamin B12 [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

A [study of 280 women](#) found **higher rates of anemia and vitamin B12 deficiency among those who were lacto-vegetarian** [\[R\]](#).

In a [study of total gastrectomy patients with gastric cancer](#), **71.4% developed vitamin B12 deficiency and anemia.** Intravenous **vitamin B12 improved anemia** [\[R\]](#).

In a [non-placebo-controlled trial of 64 premature infants with anemia](#), the addition of vitamin B12 (3 mcg/kg per day) to treatment with erythropoietin, folate, and iron **improved anemia better than this treatment alone** [\[R\]](#).

However, [2 studies](#) found **no association between low vitamin B12 levels and anemia in the elderly.** Also, supplementation with vitamin B12 and folic acid **doesn't improve hemoglobin and other blood parameters in the elderly** according to a [meta-analysis of 7 trials](#) [\[R\]](#), [\[R\]](#), [\[R\]](#).

3



Maintain Optimal Iron Levels

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Check your iron levels. If they are below optimal, take a 10 mg iron supplement daily, preferably with a meal to enhance absorption and reduce stomach upset.

TYPICAL STARTING DOSE
10 mg

Description

Iron (Fe) is an essential mineral. It helps make [hemoglobin](#), a protein that carries oxygen to cells. In this way, iron **increases energy** and supports **brain and immune system function** [\[R\]](#), [\[R\]](#), [\[R\]](#).

Foods rich in iron include [\[R\]](#):

- Oysters
- White beans
- Beef
- Chocolate
- Spinach
- Fortified cereals

Women should be getting **8-18 mg** of iron per day, while **men** should be getting **8 mg** [\[R\]](#).

Groups at risk of iron deficiency include [\[R\]](#):

- Women
- Children
- Vegetarians
- Routine blood donors

Iron supplements are available for people who can't meet their needs through a balanced diet, but they should not be taken without consulting a doctor.

How it helps

Getting more iron from food or supplements may improve iron-deficiency anemia [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Iron-deficiency anemia is the most common type of anemia. People at risk for iron-deficiency anemia who may benefit from increased iron intake include [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Menstruating women
- Blood donors
- People with certain chronic health conditions (e.g., celiac disease)

Using iron cookware (such as cast iron) may also improve iron levels [\[R\]](#), [\[R\]](#).

Please note: *A high dose of iron can be toxic. If you are not deficient, it is best to get iron from food. Iron should only be taken for specific types of anemia. In some types of anemia, iron supplementation may cause harm. Talk to your doctor before taking iron supplements* [\[R\]](#).

4



Lactobacillus Plantarum

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Take a probiotic supplement containing *Lactobacillus plantarum* 299V daily. The typical dosage is 10 billion colony-forming units (CFUs). Continue for at least 4 weeks to assess benefits on digestive health.

TYPICAL STARTING DOSE
10 billion CFU

Description

[Lactobacillus plantarum](#) is a [probiotic](#) bacterium found in many fermented plant products such as sauerkraut, pickles, brined olives, and Korean kimchi [\[R\]](#).

People take *L. plantarum* supplements to improve [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Diarrhea
- Skin appearance
- IBD
- High cholesterol

How it helps

Supplementation with *Lactobacillus plantarum* 299v may improve iron absorption. This strain may also help improve iron levels in pregnant women [\[R\]](#), [\[R\]](#).

5



Avoid Lead Exposure

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Prevent lead exposure by using cold water for drinking and cooking, regularly cleaning dust from windowsills and floors, and ensuring that your home's paint is not chipping if it was built before 1978. For occupations involving potential lead exposure, use protective gear and follow safety protocols. Test your home for lead if it's old or you're concerned about contamination.

Description

Lead is a heavy metal. It is naturally found in the environment in small amounts [\[R\]](#), [\[R\]](#).

Exposure to lead can cause it to build up in the body. A buildup of lead can contribute to oxidative stress and cell damage. This is called **lead poisoning** [\[R\]](#), [\[R\]](#).

Lead is no longer used in the manufacturing of some products like gasoline and paint. However, it can still be found in some pipes, batteries, and the wall paint of older homes [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

Experts consider exposure to lead a risk factor for anemia [\[R\]](#).

Hemolytic anemia is a type of anemia caused by chemicals that damage red blood cells, such as heavy metals and drugs [\[R\]](#), [\[R\]](#).

An analysis of 12 studies found higher lead levels in children with iron deficiency anemia. High blood lead levels were associated with almost 3 times higher risk of iron deficiency anemia [\[R\]](#).

6



Avoid Arsenic Exposure

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Use a water filter certified to remove arsenic if you rely on well water, opt for arsenic-tested rice or rice products, and avoid using contaminated pesticides or herbicides in gardening or farming. Test your home for arsenic if you live in an area known for high levels of arsenic in soil or water. Limit consumption of foods known to accumulate arsenic such as rice and rice-based products, especially if you are pregnant, nursing, or preparing meals for young children.

Description

Avoiding arsenic exposure is essential for preventing potential health risks associated with arsenic contamination in drinking water and foods. Chronic exposure to arsenic has been linked to various health issues, including cancer and cardiovascular problems.

Arsenic is a [heavy metal](#) naturally found in the environment. It is used for mining, fracking, and industrial applications, such as the production of pesticides and wood preservatives, and the use of fossil fuels [\[R\]](#).

The main sources of exposure to arsenic are contaminated [\[R\]](#), [\[R\]](#), [\[R\]](#):

- **Drinking water**
- **Rice** and fish
- Air

Long-term exposure to high amounts of arsenic may be linked to health problems, including [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Skin disorders
- Heart disease
- High blood pressure
- Stroke
- Diabetes
- Cancer

Please note: *Soaking, washing until clear, and cooking rice with a high (1:6) water-to-rice ratio may help reduce rice’s arsenic content* [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

Research on over 3,000 people has associated elevated exposure to arsenic with increased risk of anemia, especially among pregnant women, and lower hemoglobin levels [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

7



Lactoferrin

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Take 100-200 mg of lactoferrin supplement per day, preferably on an empty stomach to enhance its absorption. Continue this regimen daily for 8 to 12 weeks to observe beneficial effects.

TYPICAL STARTING DOSE

100 mg

Description

Lactoferrin is a protein found in milk and other bodily fluids that has been studied for its potential health benefits, including immune system support and antimicrobial properties. It plays a role in promoting gut health.

Lactoferrin is a protein found in milk. It can bind to iron and travel all around the body [R].

Lactoferrin may help support [R, R]:

- Immunity
- Iron status

How it helps

Lactoferrin may help people with iron deficiency anemia. It may support healthy levels of iron and hemoglobin. Lactoferrin supplements may also be less upsetting to the stomach than iron supplements [R, R].

An RCT with 20 healthy young women found that iron can be equally absorbed from a standardized meal supplemented with lactoferrin (twice 4 weeks apart) or ferrous sulfate. **Ferritin and iron levels improved** in both groups [R].

Please note: *Lactoferrin should only be taken for specific types of anemia. In some types of anemia, increasing iron levels may cause harm. Talk to your doctor before taking lactoferrin supplements.*

8



Dietary Folate

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Increase your intake of folate-rich foods such as leafy green vegetables, fruits, nuts, and legumes. Aim to consume these foods daily, incorporating them into various meals throughout the day to meet the recommended dietary allowance of 400 micrograms for adults.

Description

Vitamin B9 (*folate*) plays an essential role in [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Making DNA
- Metabolism
- Energy production

Rich sources of folate include [\[R\]](#), [\[R\]](#):

- Beef liver
- Spinach
- Black-eyed peas
- Asparagus
- Citrus fruits

While folate deficiency is rare, it can happen in people who don’t eat enough fruits and vegetables. Alcoholics and lactating women may also be at increased risk [\[R\]](#).

Adults should get **400 micrograms (mcg)** of folate per day. Pregnant or breastfeeding women should get **500-600 mcg per day**. Supplements are usually in the form of *folic acid* or [L-methylfolate](#) (5-MTHF) [\[R\]](#), [\[R\]](#).

How it helps

Experts suggest that vitamin deficiency anemias can be mitigated by consuming a diet rich in various vitamins, including folate. It can be found in fruits, leafy vegetables, peas, beans, peanuts, and enriched grains [\[R\]](#).

Food fortification in the U.S. has increased hemoglobin levels and reduced anemia prevalence, demonstrating an effective public health strategy [\[R\]](#), [\[R\]](#).

9



Methylfolate

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Take an L-methyl folate supplement (400-800 micrograms daily), ideally with a meal, to improve absorption. This dosage is recommended for adults, including pregnant women, to support overall health, especially to reduce the risk of neural tube defects in developing fetuses. Continue daily use as part of your regular supplement routine.

TYPICAL STARTING DOSE

400 mcg

Description

Folate, a B-vitamin, is crucial for DNA synthesis, cell growth, and the formation of red blood cells. Adequate folate intake supports overall health and reduces the risk of neural tube defects during pregnancy.

Vitamin B9 (*folate*) plays an essential role in [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Making DNA
- Metabolism
- Energy production

SelfDecode recommends L-methylfolate as the preferred folate supplement for those who need one. It is superior to folic acid because it doesn't require activation, but the research is still ongoing [\[R\]](#), [\[R\]](#).

How it helps

Experts suggest that vitamin deficiency anemias can be mitigated by consuming a diet rich in various vitamins, including folate. It can be found in fruits, leafy vegetables, peas, beans, peanuts, and enriched grains [\[R\]](#).

Meta-analyses and various studies support the benefits of supplementation at increasing hemoglobin levels and reducing anemia rates in pregnant women, adolescents, and children [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

However, the benefits of combining folate with other supplements like vitamin B12 and iron may vary, with some studies indicating no additional advantages in non-pregnant women or elderly people. The complex etiologies of anemia in older adults often involve multiple factors, including iron, vitamin B12, and folate deficiencies, underscoring the need for targeted dietary strategies to address these deficiencies effectively [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

10



Probiotics

IMPACT

3 / 5

EVIDENCE

2 / 5

How to implement

Take a probiotic supplement containing 10 billion or more live cultures once daily, preferably with a meal or as directed by the packaging or a healthcare provider.

TYPICAL STARTING DOSE

10 billion

Description

Probiotics are live beneficial bacteria and yeasts that can support gut health and digestive function when consumed as supplements or found in fermented foods like yogurt and sauerkraut. They may be beneficial to gut health, immune function, blood sugar, and mood.

[Probiotic bacteria](#) are “good” bacteria found mainly in the large intestine. They support your body and mind by [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Maintaining gut health
- Supporting a healthy immune system
- Improving your mood
- Helping to maintain healthy blood sugar

Prebiotics are certain types of fiber and other complex carbs that serve as food for gut bacteria. **They support gut health by helping boost the activity and growth of “good” bacteria** [\[R\]](#), [\[R\]](#).

Prebiotics are also added to foods and supplements. Common prebiotic ingredients are [\[R\]](#), [\[R\]](#):

- Oligo-fructose
- Oligo-galactose
- [Inulin](#)

Mixtures of probiotics and prebiotics are known as **synbiotics** [\[R\]](#).

How it helps

Probiotics may improve iron levels and reduce the risk of anemia. Species that may help include [\[R\]](#), [\[R\]](#):

- *Lactobacillus plantarum*
- *L. acidophilus*

Probiotics may help by:

- Supporting iron absorption in the gut [\[R\]](#)
- Increasing the levels of B vitamins needed for red blood cell production [\[R\]](#)

11



Leafy Green Vegetables

IMPACT

3 / 5

EVIDENCE

2 / 5

How to implement

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

Description

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

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

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

How it helps

According to experts, iron deficiency anemia can be mitigated by consuming a diet rich in iron from sources like dark leafy greens [\[R\]](#).

A study found that supplementing the diet of Ghanaian school children with dried green leafy vegetables led to improvements in hemoglobin levels, effectively reducing the prevalence of anemia. This highlights the potential of leafy greens as a dietary intervention for anemia [\[R\]](#).

Research investigating the effect of consuming leafy green vegetables alongside garlic, which can potentially cause hemolytic anemia, found that the vegetables helped prevent the reduction in red blood cell counts and hemoglobin caused by garlic [\[R\]](#).

Another study focused on the effects of carotene-rich leafy vegetables on the prevalence of anemia and iron deficiency. It found that these vegetables improved hemoglobin levels and reduced the prevalence of anemia, underscoring the importance of such dietary sources in managing and preventing anemia [\[R\]](#).

12



Beef liver

IMPACT

3 / 5

EVIDENCE

1 / 5

How to implement

Incorporate beef liver into your diet 1-2 times per week, aiming for a serving size of about 3-4 ounces (85-113 grams) each time. This can be pan-fried, baked, or incorporated into dishes like stews or pate to make it more palatable.

Description

Beef liver is a commonly recommended organ meat due to its rich content of protein, B-vitamins, and minerals.

Chickpeas are a good source of vitamin B6, iron, folate, fiber, and rich in minerals like copper, zinc, and phosphorus. A ½ cup serving provides 1.1 mg of vitamin B6 or 65%DV.

How it helps

Research dating back to the early 20th century has demonstrated the extraordinary effectiveness of a high liver diet in treating pernicious anemia [\[R\]](#).

Liver is not only a rich source of iron and vitamin B12, but it also contains other active substances that are essential in promoting red blood cell formation and preventing anemia. Studies have found that certain liver extracts can significantly improve blood regeneration following anemia [\[R\]](#).

Detailed clinical studies have confirmed that liver therapy may induce remissions in pernicious anemia by increasing reticulocyte counts and enhancing red blood cell production [\[R\]](#).

13

Avoid Exposure to Heavy Metals

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

To avoid exposure to heavy metals, ensure you're not using cosmetic products with heavy metals, opt for organic foods to minimize pesticide exposure, and use filters for drinking water to remove possible contaminants. Check for lead-based paints in older homes and avoid cooking or storing food in uncoated metal containers. When possible, choose glass or BPA-free plastics instead.

Description

Heavy metals are elements naturally found in the environment. They are also used for agricultural, industrial, and medicinal purposes. Some can even be found in small amounts in your body [\[R\]](#), [\[R\]](#).

Long-term exposure to high amounts of heavy metals can be harmful to your health [\[R\]](#), [\[R\]](#).

Heavy metals that are most often linked to health problems include [\[R\]](#), [\[R\]](#):

- Lead
- Cadmium
- Arsenic
- Chromium
- Mercury

How it helps

Exposure to heavy metals like arsenic and lead is linked to anemia [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

This may be because heavy metals can damage red blood cells. It's also possible that low levels of iron increase the absorption of heavy metals such as lead [\[R\]](#), [\[R\]](#).

Lead can be found in [\[R\]](#):

- Contaminated soil
- Older cookware and utensils
- Cans
- Ammunition
- Older paint

Arsenic can be found in [\[R\]](#):

- Metal alloys
- Semiconductors
- Wood preservatives
- Contaminated water

If you're working with lead or arsenic, take steps to reduce exposure by using the required safety equipment, or changing clothes after working. In addition, if your water contains arsenic, you may want to install a water filter.

14



Vitamin C

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Take 500-2000 mg of vitamin C supplement daily. It can be taken at any time of the day, with or without food, according to personal preference or tolerance.

TYPICAL STARTING DOSE
500 mg

Description

[Vitamin C](#) is an essential nutrient. This means that our bodies can’t produce it on their own, so we have to get it from food or supplements [\[R\]](#).

Foods rich in Vitamin C include: [\[R\]](#)

- Citrus Fruits
- Peppers
- Brussel sprouts
- Kiwi
- Broccoli
- Tomato
- Cantaloupe
- Cauliflower
- Spinach

Vitamin C has antioxidant properties. It supports immunity, heart health, and wound healing [\[R\]](#), [\[R\]](#).

Vitamin C deficiency is called *scurvy*. In the past, many sailors suffered from it [\[R\]](#).

How it helps

A study involving 4,358 people linked high vitamin C intake from fruits and vegetables to increased hemoglobin levels [\[R\]](#), [\[R\]](#).

Systematic reviews and meta-analyses have demonstrated that while vitamin C boosts dietary iron absorption, it does not directly reduce anemia or iron deficiency unless coupled with iron supplementation [\[R\]](#).

Specifically, in trials with anemic or iron-deficient women, the combination of vitamin C (200-500 mg/day) and iron effectively improved hemoglobin, iron levels, and antioxidant status, although iron supplementation alone showed similar benefits [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Additionally, in schoolchildren and pregnant women, consuming vitamin C alongside iron-rich foods improved hemoglobin levels and decreased hospitalization rates due to anemia. Vitamin C (200-500 mg, 1x-3x/week) also proved beneficial in reducing the need for recombinant human erythropoietin in anemic people on hemodialysis [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

15



Vitamin A

IMPACT2 / 5

EVIDENCE2 / 5

How to implement

Take a vitamin A supplement daily with a fat-containing meal to enhance absorption. The recommended daily allowance (RDA) for most adults is 700-900 micrograms (mcg) for men and women, respectively. Ensure not to exceed the upper intake level (UL) of 3000 mcg per day to avoid toxicity.

TYPICAL STARTING DOSE

700 mcg

Description

Vitamin A is a fat-soluble vitamin essential for various bodily functions, including vision, immune system support, and skin health. It is found in foods like carrots, sweet potatoes, and spinach and is important for maintaining overall health.

Vitamin A is a nutrient important for [R](#), [R](#):

- Vision
- Immunity
- Gut health
- Skin health

Foods rich in vitamin A include [R](#):

- Beef liver
- Sweet potato
- Spinach
- Carrots
- Cheese

Vitamin A is also available in supplement form.

Women should be getting 700 micrograms of vitamin A per day, while men should be getting 900 micrograms [R](#).

How it helps

Vitamin A supplements may support healthy hemoglobin levels and reduce the risk of anemia [R](#), [R](#).

Please note: *A high dose of vitamin A or taking high amounts of vitamin A long-term can be harmful, especially in women planning pregnancy or already pregnant. Vitamin A may cause harm to the fetus Vitamin A may also interact with some medications. Talk to your doctor before supplementing with vitamin A* [R](#), [R](#).

16



Red Meat

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Limit your red meat consumption to no more than three portions per week, with each portion being about 3-4 ounces (85-113 grams), roughly the size of a deck of cards. Opt for leaner cuts of meat and consider replacing some red meat meals with poultry, fish, or plant-based protein sources.

Description

Proteins, fats, and carbs are macronutrients. You need these nutrients in large (‘macro’) amounts. They provide your body with the energy it needs to function properly [\[R\]](#).

You should choose high-quality foods that give you the “best” version of each macronutrient. For example, too much saturated fat and protein from certain animal sources may increase the risk of heart disease and infertility [\[R\]](#), [\[R\]](#), [\[R\]](#).

Red meat can be part of a balanced diet when consumed in moderation. It is a rich source of essential nutrients, including high-quality protein, which helps build and repair tissues, and important vitamins like B12, crucial for nerve health and red blood cell formation. Red meat also contains iron in its heme form, which is more readily absorbed by the body compared to non-heme iron from plant sources. This can be especially beneficial for individuals with iron deficiencies or higher iron needs.

However, it’s important to opt for lean cuts and control portion sizes to reduce the intake of saturated fats. Balance your diet by also incorporating a variety of protein sources such as poultry, fish, and legumes.

How it helps

Red meat is one of the most significant dietary sources of vitamin B12, which is vital for maintaining nerve health, producing red blood cells, and supporting DNA synthesis. It also provides heme iron, a form of iron that is more readily absorbed by the body compared to non-heme iron found in plant-based foods, reducing the risk of iron-deficiency anemia [\[R\]](#).

Protein deficiency is linked to anemia, where diminished serum iron and total iron-binding capacity result from inadequate protein intake. For instance, infants suffering from protein deficiency developed anemia, which was corrected with high-quality protein intake [\[R\]](#).

In line with this, a study of 280 women found higher rates of anemia and vitamin B12 deficiency among those who were lacto-vegetarian [\[R\]](#).

According to experts, iron deficiency anemia can be mitigated by consuming a diet rich in iron from sources like beef [\[R\]](#).

17



Maintain Optimal Vitamin D Levels

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Check your vitamin D levels, they should ideally be in the 30-66 ng/mL range. If your levels are lower than that, take a vitamin D supplement, 1000-4000 IU daily, to reach an optimal range.

TYPICAL STARTING DOSE

1000 iu

Description

Vitamin D, often referred to as the "sunshine vitamin," can be synthesized by the skin when exposed to sunlight, as well as being found in fish, eggs, and fortified milk. It helps regulate calcium absorption, promoting strong bones and a healthy immune system. Vitamin D deficiency can lead to conditions like rickets in children and osteoporosis in adults.

Your body needs [vitamin D](#) for strong bones. Vitamin D also plays a role in [\[R\]](#):

- Mood
- Immunity
- Heart health
- Blood sugar control

[Sunlight](#) is our main source of vitamin D. Experts recommend getting at least **5-15 minutes of midday sun, 2-3 times per week**. People with darker skin and those living at high latitudes may need longer periods of sun exposure [\[R\]](#), [\[R\]](#).

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

How it helps

Vitamin D deficiency may be associated with more than twice the risk of iron deficiency anemia [\[R\]](#), [\[R\]](#).

In line with this, supplementation with vitamin D may improve transferrin saturation and iron status [\[R\]](#).

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Spinach

IMPACT

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EVIDENCE

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How to implement

Incorporate one cup of fresh spinach or half a cup of cooked spinach into your daily diet. You can add spinach to salads, smoothies, omelets, or pastas to easily increase your intake.

Description

Spinach is a leafy green vegetable packed with essential nutrients, including vitamins A and K, iron, and folate. Incorporating spinach into the diet supports eye health, bone health, and overall nutrition.

Spinach is a good source of molybdenum, folate, calcium, and iron, as well as vitamins A, C, and K1. A ½ cup serving provides 8 mcg of molybdenum or 18%DV.

How it helps

A study showed that consuming green spinach leaves could increase hemoglobin levels in pregnant women with mild anemia. This suggests that spinach, due to its iron content, may help in managing anemia during pregnancy [\[R\]](#).

Similarly, another study found that red spinach juice combined with honey can increase hemoglobin levels in pregnant women in the second and third trimesters [\[R\]](#).

19



Legumes

IMPACT

1 / 5

EVIDENCE

2 / 5

How to implement

Incorporate a serving of legumes, such as beans, lentils, chickpeas, or peas, into your diet at least four times a week. A serving size is approximately half a cup cooked. Ensure to prepare them properly by soaking and rinsing beans, if applicable, to reduce anti-nutrients and improve digestibility.

Description

Legumes, such as beans, lentils, and chickpeas, are excellent sources of plant-based protein, fiber, and various vitamins and minerals. Including legumes in your diet can promote satiety and support digestive health.

Legumes are plants from the *Fabaceae* family. Their edible seeds are called **pulses**. Legumes are important food staples and sources of carbohydrates, fiber, protein, iron, and other key nutrients.

Common legumes include:

- Peanuts
- Beans
- Chickpeas
- Peas
- Lentils

How it helps

Iron absorption from common legumes like soybeans, black beans, lentils, mung beans, and split peas is quite low, typically less than 2%. This low absorption rate is due to the presence of phytic acid, which inhibits the uptake of iron, making legumes a poor source of bioavailable iron [\[R\]](#).

Despite the low iron bioavailability, legumes are valuable in diets as sources of fiber, protein, and other nutrients. They contribute to overall nutritional quality and may support health benefits beyond iron nutrition, particularly in vegetarian diets where they are a major protein source [\[R\]](#).

The bioavailability of iron from legumes can be improved through culinary and processing methods such as soaking, sprouting, and fermentation, or by consuming them with vitamin C-rich foods, which can counteract the effects of phytic acid [\[R\]](#).

20



Riboflavin (Vitamin B2)

IMPACT1 / 5

EVIDENCE2 / 5

How to implement

Take a riboflavin (vitamin B2) supplement daily, with a dose ranging from 5mg to 400mg, depending on the specific health concern or advice from a healthcare provider. Swallow the supplement with water, preferably with a meal to enhance absorption. This regimen can be continued long-term or as directed by a healthcare professional.

TYPICAL STARTING DOSE

25 mg

Description

Riboflavin is a water-soluble B vitamin found in various foods like dairy products, leafy greens, and lean meats. It plays a crucial role in energy production, metabolism, building red blood cells, and maintaining healthy skin and eyes.

[Vitamin B2](#) helps our cells create energy. It’s also known as riboflavin [\[R\]](#), [\[R\]](#).

This vitamin is important for [\[R\]](#), [\[R\]](#):

- Brain, liver, and gut health
- Building red blood cells

Riboflavin deficiency is rare in the US. People with gut, eating, or hormonal disorders may be at a higher risk. Alcohol abuse and certain medications can also deplete this vitamin [\[R\]](#), [\[R\]](#).

Good sources of riboflavin include [\[R\]](#), [\[R\]](#):

- Eggs
- Dairy
- Lean and organ meats
- Green vegetables
- Fortified cereals

How it helps

Riboflavin, also known as Vitamin B2, assists in enhancing the body's production of red blood cells, thereby directly influencing anemia. It also promotes iron absorption, a key element in the prevention and management of anemia.

A [non-placebo-controlled trial of riboflavin-deficient men](#) associated a **better riboflavin status after riboflavin supplementation with improved iron utilization, but not absorption** [\[R\]](#).

In a [non-placebo-controlled trial of 101 children \(74% of them with anemia\)](#), supplementation with riboflavin (6 mg/day) and ferrous sulfate **improved hemoglobin levels by 0.38 g/dL more than ferrous sulfate alone** [\[R\]](#).

The combination of riboflavin (5 mg/day), vitamin A (5000 IU/day), and iron-folate (200 mg FeSO4 and 250 mcg folic acid) taken for 60 days **increased hemoglobin levels better than iron and folic acid alone** in [2 placebo-controlled trials of 469 pregnant women](#) [\[R\]](#), [\[R\]](#).

21



Avoid Cadmium Exposure

IMPACT1 / 5

EVIDENCE2 / 5

How to implement

To avoid cadmium exposure, refrain from smoking or exposure to secondhand smoke, reduce consumption of foods high in cadmium like shellfish, liver, kidney meats, and certain leafy vegetables, and use ceramic or glass containers instead of plastic when microwaving food. Limit intake of cadmium-contaminated workplace air by using protective gear if you work in battery manufacturing, welding, or metal refining industries.

Description

Avoiding cadmium exposure is essential to prevent potential health risks associated with this heavy metal, such as kidney damage and increased cancer risk. Reducing exposure to cadmium-containing products and contaminated foods is crucial.

Heavy metals are elements naturally found in the environment. They are also used for agricultural, industrial, and medicinal purposes. Some can even be found in small amounts in your body [\[R\]](#), [\[R\]](#).

Long-term exposure to high amounts of heavy metals can be harmful to your health [\[R\]](#), [\[R\]](#).

Heavy metals that are most often linked to health problems include [\[R\]](#), [\[R\]](#):

- Lead
- Cadmium
- Arsenic
- Chromium
- Mercury

How it helps

Itai-itai disease is a condition caused by long-term exposure of the inhabitants of Toyama prefecture, Japan, to cadmium intoxication. The characteristic clinical features of this disease include renal tubular dysfunction, osteomalacia, and anemia [\[R\]](#).

Cadmium can lower the number of red blood cells, which causes anemia. It can also interfere with the absorption of important nutrients like iron and zinc.

22



Folinic Acid

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Folinic acid is administered in several forms, including oral tablets, injections, or infusions, depending on the medical condition being treated. Always use folinic acid as prescribed by a healthcare provider. The specific dose and frequency depend on the condition being treated and the individual patient’s response. Regular monitoring by a healthcare provider is necessary, especially when used in conjunction with chemotherapy, to adjust doses as needed and to manage any side effects.

Description

Folinic acid, also known as leucovorin, is a form of folic acid used in pharmacology, primarily to diminish the toxic effects of certain chemotherapy medications. Unlike folic acid, folinic acid doesn't require enzymatic conversion to become biologically active and can be directly utilized by the body. It plays a crucial role in DNA synthesis and repair, and in the methylation process, which is vital for cellular health and function.

The health benefits of folinic acid are mostly seen in its ability to counteract the side effects of methotrexate, a drug used to treat certain types of cancer and autoimmune diseases. Methotrexate can inhibit the body's ability to use folate, leading to deficiencies. Administering folinic acid can help prevent or mitigate these deficiencies, aiding in faster recovery of healthy cells.

Folinic acid is also used in the treatment of megaloblastic anemia when it's caused by a deficiency in folate and not effectively treated by folic acid due to metabolic or absorption issues. Additionally, there is research into its potential benefits in improving symptoms of mental health disorders such as depression, suggesting that it might aid in managing conditions related to folate metabolism abnormalities.

How it helps

In a non-placebo-controlled trial of 120 pregnant women in their 12th-16th week, supplementation with iron as ferrous bisglycinate (24 mg iron) combined with folinic acid was as effective as ferrous fumarate (66 mg iron) at managing iron deficiency [\[R\]](#).

23



Spirulina

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 1-8 g of spirulina supplements daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

500 mg

Description

Spirulina is a blue-green algae. It is rich in nutrients like protein, vitamins, and minerals, particularly vitamin B12 and iron, and is a source of antioxidants, chlorophyll, and phycocyanin. It can be found in powdered or tablet form as a supplement, and is often used to boost energy, support the immune system, and enhance overall nutrition. Additionally, spirulina.

[Spirulina](#) is a supplement made from blue-green algae that grows in fresh and marine water [\[R, R\]](#).

Dried spirulina is up to 70% protein. It’s also rich in vitamins, antioxidants, and healthy fats. This makes it a great source of nutrition for both people and livestock [\[R, R, R\]](#).

People use spirulina supplements to reduce [\[R, R\]](#):

- Cholesterol
- Blood pressure
- Blood sugar

How it helps

In a study of 30 senior citizens with a history of anemia, spirulina supplementation (for 12 weeks) increased measures of iron status, such as mean corpuscular hemoglobin, mean corpuscular volume, and mean corpuscular hemoglobin concentration. Older women benefited the most [\[R\]](#).

24



Dietary Protein

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Include a variety of protein sources such as meat, fish, eggs, dairy, beans, and nuts in your diet every day, aiming for at least 0.8 grams of protein per kilogram of body weight. For more active individuals or those looking to build muscle, increase intake to 1.2 to 2.0 grams per kilogram of body weight daily, spread out over all meals to maximize absorption.

Description

Protein is essential for building and repairing tissues, supporting muscle growth, and maintaining overall bodily functions. Adequate protein intake is crucial for overall health and well-being.

Foods that are high in protein include:

- Eggs
- Nuts
- Beef
- Chicken
- Fish
- Yogurt
- Tofu
- Pork
- Cottage cheese

How it helps

Protein deficiency is linked to anemia, where diminished serum iron and total iron-binding capacity result from inadequate protein intake. For instance, infants suffering from protein deficiency developed anemia, which was corrected with high-quality protein intake [\[R\]](#).

Additionally, a study on iron-deficient anemic people supplemented with salmon protein hydrolysate showed increases in hemoglobin levels, underscoring the role of dietary protein in enhancing iron absorption and utilization [\[R\]](#).

25



Bifidobacterium Lactis HN019

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

TYPICAL STARTING DOSE

10 billion CFU

Description

[Bifidobacterium animalis](#) is a [probiotic](#) bacterium that can be found in the healthy gut of most mammals, including humans. *B. lactis* was previously considered to be a separate species but was shown to be a subspecies of *B. animalis* [\[R\]](#), [\[R\]](#).

People mainly take *B. animalis* to support gut health [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

B. lactis HN019 is a strain known for its resilience to stomach acid and bile, which allows it to survive the harsh conditions of the gastrointestinal tract and colonize the gut effectively. It may help improve gastrointestinal function, alleviate symptoms of irritable bowel syndrome, enhance immune response, and reduce the risk of certain infections.

How it helps

In a placebo-controlled trial of 624 children, consuming milk fermented with *Bifidobacterium lactis* HN019 for 1 year reduced the risk of iron-deficiency anemia by 45% and increased weight gain by 0.13 kg/year [\[R\]](#).

26



Copper

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a copper supplement of 2 milligrams (mg) per day with water, preferably with a meal to reduce the risk of stomach upset. This dosage is for general maintenance of copper levels in adults and should not exceed the recommended amount without consulting a healthcare provider.

TYPICAL STARTING DOSE

2 mg

Description

Copper is an essential trace mineral that plays a vital role in various bodily functions, including the formation of red blood cells and the maintenance of healthy connective tissues.

A **copper supplement** of up to 900 micrograms per day can be taken to meet needs not achieved through diet.

Please note: only people who can't maintain healthy copper levels through their diets may need a supplement. Consult your doctor before supplementing.

How it helps

Copper is essential for several enzymes that regulate iron storage and transport, and copper deficiency can lead to symptoms of anemia. This is particularly critical because copper is involved in the formation of hemoglobin, and its deficiency can result in microcytic anemia, where red blood cells are smaller than normal and less capable of carrying oxygen efficiently. In line with this, copper supplementation can manage anemia that arises from copper deficiency [\[R\]](#).

27



Eggs

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate eggs into your diet 3-4 times a week, preferably for breakfast or as part of a balanced meal. They can be boiled, scrambled, or made into omelets, ensuring they are cooked thoroughly.

Description

Eggs are a nutrient-dense food rich in protein, vitamins, and minerals. They support various aspects of health, including muscle development, brain function, and eye health.

Eggs are great nutrition sources, with protein, healthy fats, arachidonic acid, and numerous vitamins and minerals.

How it helps

In a study among adolescent girls in Indonesia, the consumption of chicken eggs increased hemoglobin levels [\[R\]](#).

However, a study on young Malawian children who consumed one egg per day showed no significant impact on iron status or anemia prevalence [\[R\]](#).

28



Lentils

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate at least 1/2 cup of cooked lentils into your daily diet. You can add them to salads, soups, or rice dishes for a nutritious boost. Continue this practice as a regular part of your diet to benefit from their high fiber and protein content.

Description

Lentils are a nutritious legume that provides a good source of plant-based protein, fiber, and essential vitamins and minerals.

Lentils are loaded with iron, protein, fiber, vitamins, minerals, like thiamine, phosphorus, zinc, manganese, and copper. A ½ cup serving provides 3 mg of iron or 17%DV.

How it helps

Lentils, particularly when fortified with iron, may help in managing anemia. Studies have shown that consuming iron-fortified lentils (for 4 months) may improve iron status among various populations, such as adolescent girls in Bangladesh. In these studies, the consumption of iron-fortified lentils led to marked improvements in hemoglobin levels and a reduction in the prevalence of anemia [\[R\]](#).

29



Chicken Liver

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate chicken liver into your meals 1-2 times per week, aiming for portions of about 100 grams (3.5 ounces) per serving. You can cook it by pan-frying, baking, or incorporating it into dishes like pâtés or spreads.

Description

Chicken liver is a nutrient-dense food that is rich in iron, vitamin A, and other essential nutrients. It can be a valuable addition to the diet to support healthy blood and overall nutritional health.

How it helps

In a non-placebo-controlled trial of 60 children, consuming liver meatballs 3x/week for 90 days reduced the prevalence of anemia [\[R\]](#).

Chicken liver is rich in iron, which is essential in the production of red blood cells. It also has high amounts of vitamin B12, a nutrient that helps in creating healthy red blood cells.

30



Gold Kiwifruit

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Consume one to two gold kiwifruits daily, preferably raw and with the skin if possible for added fiber, to achieve the health benefits associated with its nutrient content.

Description

Gold kiwifruit is a variety of kiwi known for its high vitamin C content and potential digestive health benefits due to its fiber and enzyme content. Incorporating gold kiwifruit into the diet can support overall well-being.

How it helps

Gold Kiwifruit is high in vitamin C, which aids in the absorption of dietary iron, a mineral crucial for preventing and treating anemia. It also contains a decent amount of iron, further aiding in the treatment of this condition.

In a 16-week trial, consuming gold kiwifruit alongside iron-fortified cereal improved serum ferritin levels and decreased soluble transferrin receptor concentrations in women with low iron stores, potentially due to the kiwifruit's ascorbic acid, lutein, and zeaxanthin content [\[R\]](#).

31



Dietary Vitamin C

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate foods rich in Vitamin C into your daily diet, such as oranges, strawberries, red peppers, kale, and broccoli. Aim to consume 5 servings of fruits and vegetables per day to meet the recommended dietary allowance of Vitamin C, which is 90 mg for adult men and 75 mg for adult women.

Description

Vitamin C is an antioxidant that supports the immune system, collagen production, and wound healing. It also enhances iron absorption from plant-based foods and contributes to overall health.

[Vitamin C](#) is an essential nutrient. This means that our bodies can’t produce it on their own, so we have to get it from food or supplements [\[R\]](#).

Vitamin C has antioxidant properties. It supports immunity, heart health, and wound healing [\[R\]](#), [\[R\]](#).

Vitamin C deficiency is called *scurvy*. In the past, many sailors suffered from it [\[R\]](#).

How it helps

Vitamin C deficiency is a rare cause of anemia. It can make the blood vessels more fragile and increase bleeding [\[R\]](#), [\[R\]](#), [\[R\]](#).

In people without vitamin C deficiency, vitamin C may help support iron absorption and healthy hemoglobin levels [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

However, the effects may be negligible in people who get enough vitamin C in their diets. Most studies found that vitamin C did not help as part of standard treatment for iron-deficiency anemia [\[R\]](#), [\[R\]](#), [\[R\]](#).

32



Chlorella

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 3 to 5 grams of chlorella in tablet or powder form daily, ideally before meals to improve digestion. Continue this supplementation for at least 2 to 3 months to observe benefits.

TYPICAL STARTING DOSE

3 g

Description

[Chlorella](#) is a microalga from freshwater. People consume chlorella in rice, pancakes, or tea. It can also be found as a supplement [\[R\]](#) [\[R\]](#).

Chlorella is **rich in protein** and several micronutrients. It may be useful to [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#):

- Reduce blood sugar
- Lower cholesterol
- Reduce blood pressure
- Improve immunity

How it helps

In a placebo-controlled trial of 70 pregnant women, supplementation with chlorella (6 g/day) from the 12th-18th week of gestation until delivery reduced the risk of anemia, proteinuria, and edema [\[R\]](#).

Chlorella is rich in iron and vitamin B12, two crucial nutrients for producing red blood cells.

33



Dietary Pentadecanoic Acid

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

While there is no officially recommended daily intake for pentadecanoic acid, research suggests that **20–50 mg per day** may support health benefits such as improved metabolism, reduced inflammation, and enhanced cellular health. You can achieve this through a balanced diet rich in full-fat dairy and fatty fish or by taking supplements as directed. Always consult with a healthcare professional before starting supplementation, especially if you have specific health conditions or dietary restrictions.

Description

Pentadecanoic acid, also known as C15:0, is a 15-carbon saturated fatty acid that belongs to the group of odd-chain fatty acids. It is naturally found in [\[R\]](#):

- Full-fat dairy products (e.g., milk, butter, and cheese)
- Fatty fish (salmon, herring, mackerel, sardines, anchovies, tuna)
- Whole grains
- Seed oils (flaxseed, chia, hemp)
- Legumes (lentils, chickpeas)

Unlike even-chain fatty acids, pentadecanoic acid has unique biological properties that are being increasingly studied for its potential health benefits.

Supplementation with pentadecanoic acid has shown promise in supporting metabolic health by improving cholesterol levels, enhancing insulin sensitivity, and reducing inflammation. It may also promote cellular health by stabilizing cell membranes and improving mitochondrial function. Additionally, C15:0 has been linked to better immune system regulation, neuroprotection, and potentially reducing the risk of chronic diseases like diabetes and cardiovascular conditions. As an emerging "essential fatty acid," it is gaining attention for its role in promoting long-term health and wellness.

How it helps

C15:0 has been shown to alleviate anemia by stabilizing RBCs and boosting counts. In rabbit models on high-fat diets, 11 weeks of C15:0 treatment increased hemoglobin, hematocrit, and RBCs while lowering RDW and reticulocytes (immature RBCs) [\[R\]](#).

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.

	TIBC	379 mcg/dL		9 Nov 2025
	MCHC	33 g/dL		9 Nov 2025
	RDW	13.8 %		9 Nov 2025
	MCH	28.2 pg		9 Nov 2025
	Ferritin	102.2 ng/mL		9 Nov 2025
	MCV	85.6 fL		9 Nov 2025
	Vitamin B12	687 pg/mL		9 Nov 2025
	RBC	6.05 x10^6/mm3		9 Nov 2025
	Hematocrit	51.8 %		9 Nov 2025

	Hemoglobin	17.1 g/dL		9 Nov 2025
	Lipoprotein(a)	85.6 mg/dL		9 Nov 2025
	Transferrin	306 mg/dL		9 Nov 2025
	Iron	228 mcg/dL		9 Nov 2025