UGENOME

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Methylation

DNA Health Report

REPORT CATEGORIES

NUTRITION

DETOX

Sample Client

Report date: 30 April 2026

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Personal information

NAME

Sample Client

SEX AT BIRTH

Male

HEIGHT

5ft 10" 178cm

WEIGHT

215lb 97.5kg

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.

Viewing this medical test requires a medical doctor or use one of our contracted genetic counselors. By accessing these results, you acknowledge and agree that you will consult with a licensed physician or one of our contracted genetic counselors to review and interpret the results, and you agree not to rely on this information as a substitute for professional medical advice, diagnosis, or treatment.

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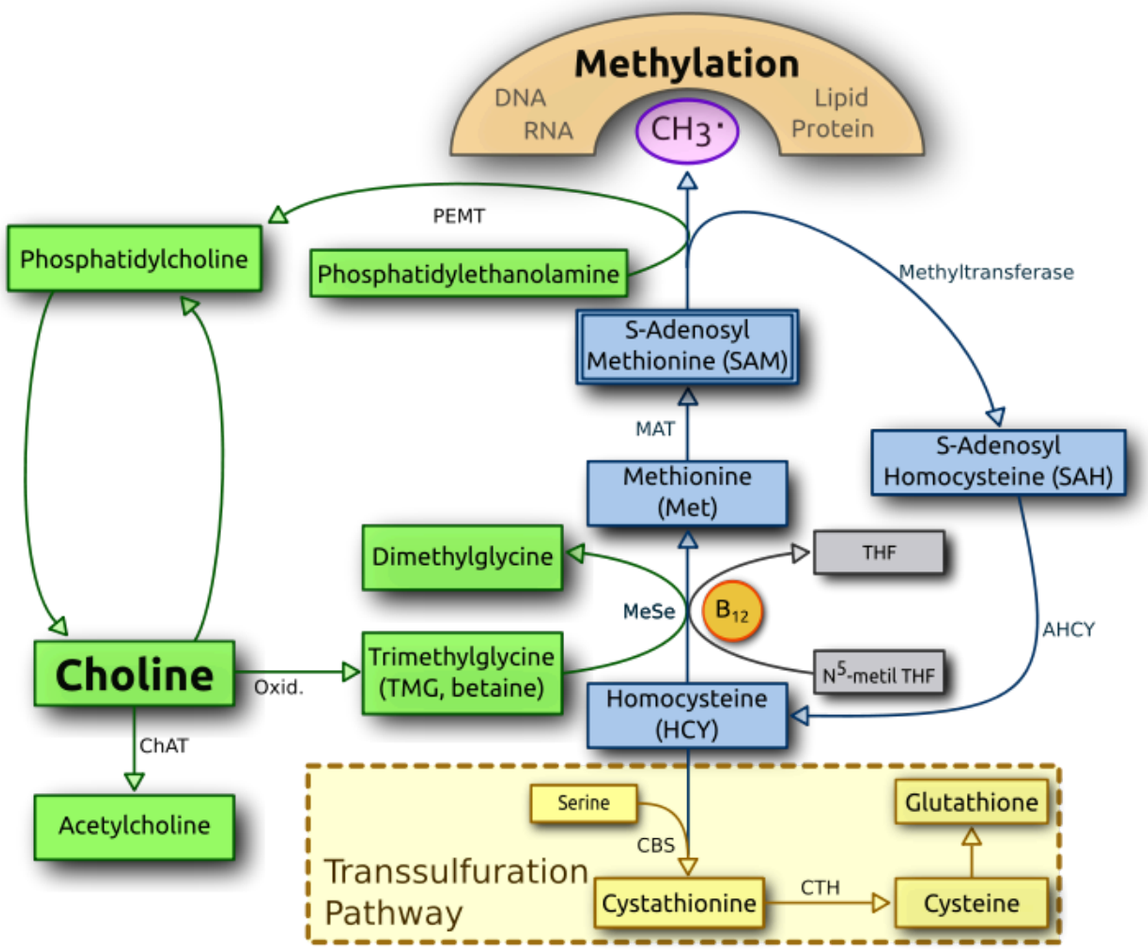
Introduction

On a chemical level, methylation is when a methyl group is transferred from one compound to another. Methyl groups are small backbones for organic compounds, the chemical compounds of all living beings that are found in every cell of your body.

Methyl groups are also switches that turn on or off genes based on environmental cues. This is called *epigenetics*. Additionally, methyl groups signal which hormones, brain chemicals, and amino acids need to be broken down and removed, maintaining a healthy balance in the body.

On a deeper level, the methylation cycle involves several steps outlined in the image below:



Starting from the **MTHFR** enzyme and folate you take in with food, the methylation cycle produces the active vitamin methylfolate that circulates in your bloodstream (5-methyl THF). This step is crucial for turning harmful homocysteine into methionine [R].

This pathway also relies on vitamin B12 and enzymes, including **MTR** and **MTRR**.

The other pathway for clearing homocysteine uses betaine derived from choline. It relies on the **CHDH** and **BHMT** enzymes.

In the next step, methionine obtained via these pathways creates SAM-e (S-adenosyl-methionine), a compound that provides a methyl group for methylation [R, R].

Methionine also helps produce phosphatidylcholine via the **PEMT** enzyme. This cycle reveals a close connection between the genes and enzymes involved in choline, folate & vitamin B12 metabolism [R, R].

The third pathway for clearing homocysteine, the so-called *transsulfuration pathway*, helps produce glutathione, a.k.a the "master" antioxidant. This pathway relies on vitamin B6 and the **CBS** enzyme.

These reactions — collectively known as the **one-carbon metabolism** — are vital for many aspects of physical and mental health. Issues with the methylation cycle play a role in heart health, mental health, fertility problems, birth defects, cancer, and more [R, R, R].

Methylation Genetics

Optimal function of the pathways discussed above depends on a number of enzymes that enable chemical reactions. Gene variants in some of those enzymes can alter their function and potentially compromise methylation.

Please note: Methylation is a complex process that goes way beyond the pathways and enzymes discussed in this report. There is insufficient evidence that any of the gene variants analyzed in this report impair methylation and its vital roles in the human body.
Image source: Pan S, et al. 2020

MTHFR

The *MTHFR* gene helps make an enzyme called methylenetetrahydrofolate reductase (MTHFR). It produces the active form of folate, methylfolate [R].

The whole methylation cycle depends on MTHFR, which is why it is called a "*rate-limiting enzyme*". Low MTHFR activity can make methylation as a whole much less productive [R].

Two of the most widely studied variants—**rs1801133 and rs1801131**—reduce MTHFR enzyme activity [R, R, R, R].

Studies found links between these variants, higher homocysteine, and [R, R, R, R, R, R]:

- Cognitive problems
- Heart disease and stroke
- Asthma and allergies
- Fertility and pregnancy issues
- Mental health issues
- Migraines

Read this blog post for more details about MTHFR variants and potential ways to reduce their impact.

LOWER ABILITY

Predisposed to lower methylation ability based on 45 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MTHFR	rs1801133	AA
MTHFR	rs2066470	GG
BHMT	rs3733890	AG
GNMT	rs9296404	TT
SHMT1	rs1979277	AA
MTR	rs2275565	GG
COMT	rs4680	GA
JMY	rs3797546	TC
MTRR	rs1801394	GA
PEMT	rs7946	CT
MTHFD1	rs2236225	GA
BHMT	rs651852	CT
CBS	rs234706	GA
CHDH	rs9001	TT
MTR	rs1805087	AA
FOLH1	rs61886492	GG
CPS1	rs1047891	AC
MTRR	rs1532268	TC
MAT1A	rs3851059	AG
TRDMT1	rs12780845	GA
BHMT2	rs625879	AC
SLC19A1	rs1051266	TC
PEMT	rs4646343	GT
PEMT	rs12936587	GA
MAT1A	rs7087728	GA
MS4A6A	rs558660	GG
MAT1A	rs2993763	AA
FOLR3	rs651933	GA
MTRR	rs1802059	AG
TCN1	rs526934	AG

Other Genes

The *PEMT* gene encodes an enzyme that produces phosphatidylcholine (PC) in the liver. This pathway supplies choline and thus plays a key role in the methylation cycle [R, R].

PEMT gene variants like **rs7946** **and** **rs12325817** are linked to:

- Choline deficiency
- Fatty liver
- Heart disease

The *MTHFD1* gene encodes an enzyme that helps produce active folate and supports homocysteine methylation. A variant in this gene, **rs2236225**, is linked to increased choline and folate needs [R, R, R].

The *MTRR* gene encodes an enzyme that helps turn homocysteine into methionine, using vitamin B12 and riboflavin. *MTRR* variants like rs1801394 have been linked to [R, R]:

- Higher homocysteine levels
- Congenital disorders (mixed evidence) [R, R, R]
- Some types of cancer [R, R]
- Male fertility issues (mostly in Asians) [R, R]
- ADHD in children [R]

The *CHDH* codes for choline dehydrogenase, an enzyme that turns choline into betaine or TMG. Betaine then supplies a methyl group needed for homocysteine clearance. CHDH gene variants like rs9001 are linked to choline deficiency and may thus affect methylation [R, R].

Variants in the following genes may also affect methylation and play a role in related health issues:

- *CBS*: a key component of the transsulfuration pathway [R, R, R]
- *BHMT*: helps turn homocysteine into methionine (betaine pathway)
- *COMT*: methylates important chemicals with the help of SAM-e [R]
- *SHMT1*, *DHFR*, and *FOLH1*: involved in folate metabolism [R, R, R, R]
- *GNMT and DNMT3B: play a role in SAM-e metabolism [R, R]*

GENE	SNP	GENOTYPE
COMT	rs4633	CT
BHMT	rs567754	CT
MTHFD1L	rs17349743	CT
MMAB	rs7134594	CT
CBS	rs2851391	CT
MAT1A	rs4934028	GA
MTHFR	rs1801131	TT
CHMP4B	rs819171	TT
ITCH	rs819147	TT
MTHFR	rs3737965	GG
FOLH1	rs202676	AA
PDXK	rs147242481	GG
TYMS	rs2853533	GG
DHFR	rs1643649	TT
AHCY	rs13043752	GG
PEMT	rs12325817	CC
GNMT	rs10948059	CC
NQO1	rs1800566	GG
OGG1	rs1052133	CC
MTHFD1L	rs6922269	GG

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

- *MTR*: helps turn homocysteine into methionine (folate pathway) [R]
- *MAT1A*: helps turn methionine into SAM-e [R]
- *TRDMT1*: plays a role in DNA methylation [R]
- *PDXK*: plays a role in vitamin B6 metabolism [R]
- *AHCY*: involved in homocysteine and SAM-e metabolism [R, R].
- *TYMS*: supports DNA methylation with the help of methyl-folate [R, R]

Your Recommendations

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

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

		DOSAGE
1	Betaine (TMG)	500 mg
2	Vitamin B12	10 mcg
3	Dietary Folate	
4	Beef liver	
5	Leafy Green Vegetables	
6	Dietary Vitamin B12	
7	Dietary Choline	
8	Eggs	
9	Choline Supplements	425 mg
10	SAM-e	200 mg
11	Methylsulfonylmethane (MSM)	1 g
12	Dietary Pyridoxine (Vitamin B6)	
13	Zinc	15 mg
14	Pyridoxine (Vitamin B6)	50 mg
15	Riboflavin (Vitamin B2)	25 mg

1 Betaine (TMG)

IMPACT 4 / 5

EVIDENCE 3 / 5

To take Betaine (TMG) as a supplement, consume 500-2000 mg daily, preferably with a meal to enhance absorption. It is recommended to start at the lower end of the dosage range and adjust based on personal tolerance and effectiveness. This supplement can be taken indefinitely for ongoing support of heart health and liver function.

TYPICAL STARTING DOSE

500 mg

2 Vitamin B12

IMPACT 4 / 5

EVIDENCE 3 / 5

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

TYPICAL STARTING DOSE

10 mcg

3 Dietary Folate

IMPACT 3 / 5

EVIDENCE 3 / 5

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.

4 Beef liver

IMPACT 3 / 5

EVIDENCE 2 / 5

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.

5 Leafy Green Vegetables

IMPACT 3 / 5

EVIDENCE 2 / 5

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.

6 Dietary Vitamin B12

IMPACT 3 / 5

EVIDENCE 2 / 5

Incorporate foods rich in vitamin B12 into your daily diet, such as beef, chicken, fish, and dairy products. If you are vegetarian or vegan, consider fortified cereals or plant-based milks. Aim to meet the recommended dietary allowance (RDA) for adults of 2.4 micrograms of vitamin B12 per day.

7 Dietary Choline

IMPACT 2 / 5

EVIDENCE 3 / 5

Increase your intake of choline-rich foods such as eggs, beef liver, chicken liver, fish, peanuts, and dairy products. Aim for an adult intake of about 425 mg to 550 mg of choline per day through these food sources, as part of your regular diet.

8 Eggs

IMPACT 2 / 5

EVIDENCE 2 / 5

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.

9 Choline Supplements

IMPACT 2 / 5

EVIDENCE 2 / 5

Take choline supplements at a dosage of 425 mg to 550 mg daily, depending on age and gender, with a glass of water. It is best to consume choline supplements with a meal for optimal absorption. Continue this regimen daily as part of your dietary supplement routine.

TYPICAL STARTING DOSE

425 mg

10 SAM-e

IMPACT 2 / 5

EVIDENCE 2 / 5

Take 400-1600 mg of SAM-e as a supplement daily, preferably on an empty stomach to enhance absorption. It is often recommended to start with low dosage and observe how your body responds over a few weeks, adjusting as necessary under the guidance of a healthcare provider.

TYPICAL STARTING DOSE

200 mg

11 Methylsulfonylmethane (MSM)

IMPACT 2 / 5

EVIDENCE 2 / 5

Take 1 to 3 grams of Methylsulfonylmethane (MSM) per day, divided into three doses. This can be in the form of capsules or powder that is mixed with water. It is recommended to start with a lower dose to assess tolerance, then gradually increase to the desired dose over a period of 1 to 2 weeks.

TYPICAL STARTING DOSE

1 g

12 Dietary Pyridoxine (Vitamin B6)

IMPACT 2 / 5

EVIDENCE 2 / 5

Increase your intake of vitamin B6 by eating more foods rich in this nutrient, such as bananas, chickpeas, tuna, salmon, chicken breast, and spinach. Aim for a balanced diet that includes these foods regularly, about 2-3 servings of B6-rich foods per day, to help meet the general daily requirement of 1.3mg for adults.

13 Zinc

IMPACT 2 / 5

EVIDENCE 2 / 5

Take a 15 mg zinc supplement daily, ideally with a meal to enhance absorption.

TYPICAL STARTING DOSE

15 mg

14 Pyridoxine (Vitamin B6)

IMPACT 2 / 5

EVIDENCE 2 / 5

Take a pyridoxine (vitamin B6) supplement daily. Requirements range from 1.3 to 1.7 milligrams per day for adults, but supplement doses usually start from 50 mg. Consult with a healthcare provider for higher doses or specific medical conditions that might benefit from increased supplementation.

TYPICAL STARTING DOSE

50 mg

15

Riboflavin (Vitamin B2)

IMPACT 2 / 5

EVIDENCE 2 / 5

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

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.