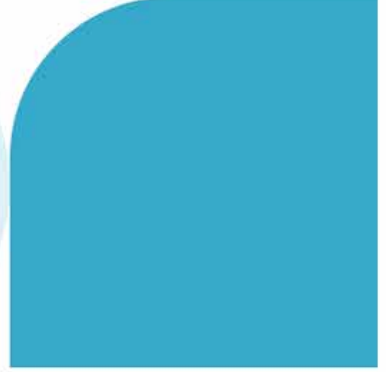
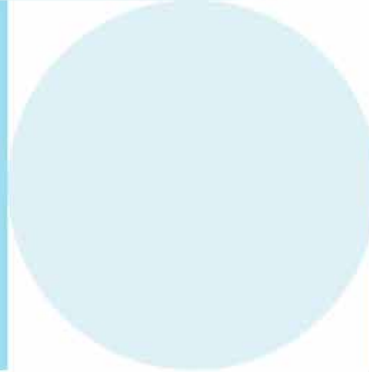
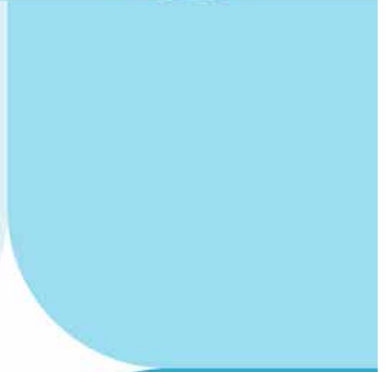
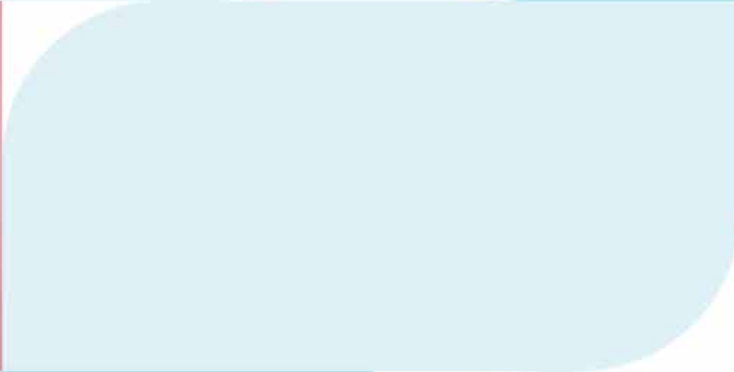




Test report



At-home test



# Organic acids Test

Lab test

Urine

Name: **Sample Report**    Date of test: **11/08/2023**    Analysis-ID: **DUMMY-56**

## Your test results

Our lab has tested your urine sample for organic acids. You will find your results below.

### Lipidmetabolism

Name	Your value	Reference value
Adipate	<span style="color: red;">●</span> 15.77 mg/g Crea	< 2,5 mg/g Crea
Ethyl malonate	<span style="color: green;">●</span> 2.72 mg/g Crea	< 4,0 mg/g Crea
Suberate	<span style="color: red;">●</span> 7.08 mg/g Crea	< 1,9 mg/g Crea

### Carbohydrate metabolism

Name	Your value	Reference value
$\beta$ -hydroxy-butyrate	<span style="color: green;">●</span> 2.67 mg/g Crea	< 3,2 mg/g Crea
Lactate	<span style="color: red;">●</span> 0.19 mg/g Crea	1,7 - 20,5 mg/g Crea
Pyruvate	<span style="color: green;">●</span> 2.94 mg/g Crea	< 5,4 mg/g Crea

### Organic acids in the citric acid cycle

Name	Your value	Reference value
$\alpha$ -keto-glutarate	<span style="color: green;">●</span> 21.28 mg/g Crea	< 30,0 mg/g Crea
Succinate	<span style="color: green;">●</span> 2.22 mg/g Crea	< 8,0 mg/g Crea
Cis-aconitate	<span style="color: red;">●</span> 89.87 mg/g Crea	14,0 - 62,5 mg/g Crea
Hydroxy-methyl-glutarate	<span style="color: green;">●</span> 2.83 mg/g Crea	< 4,35 mg/g Crea
Isocitrate	<span style="color: green;">●</span> 45.90 mg/g Crea	31 - 88 mg/g Crea
Malate	<span style="color: green;">●</span> 1.10 mg/g Crea	< 2,6 mg/g Crea
Citrate	<span style="color: green;">●</span> 412.82 mg/g Crea	160 - 786 mg/g Crea

## Organic acids of vitamin metabolism

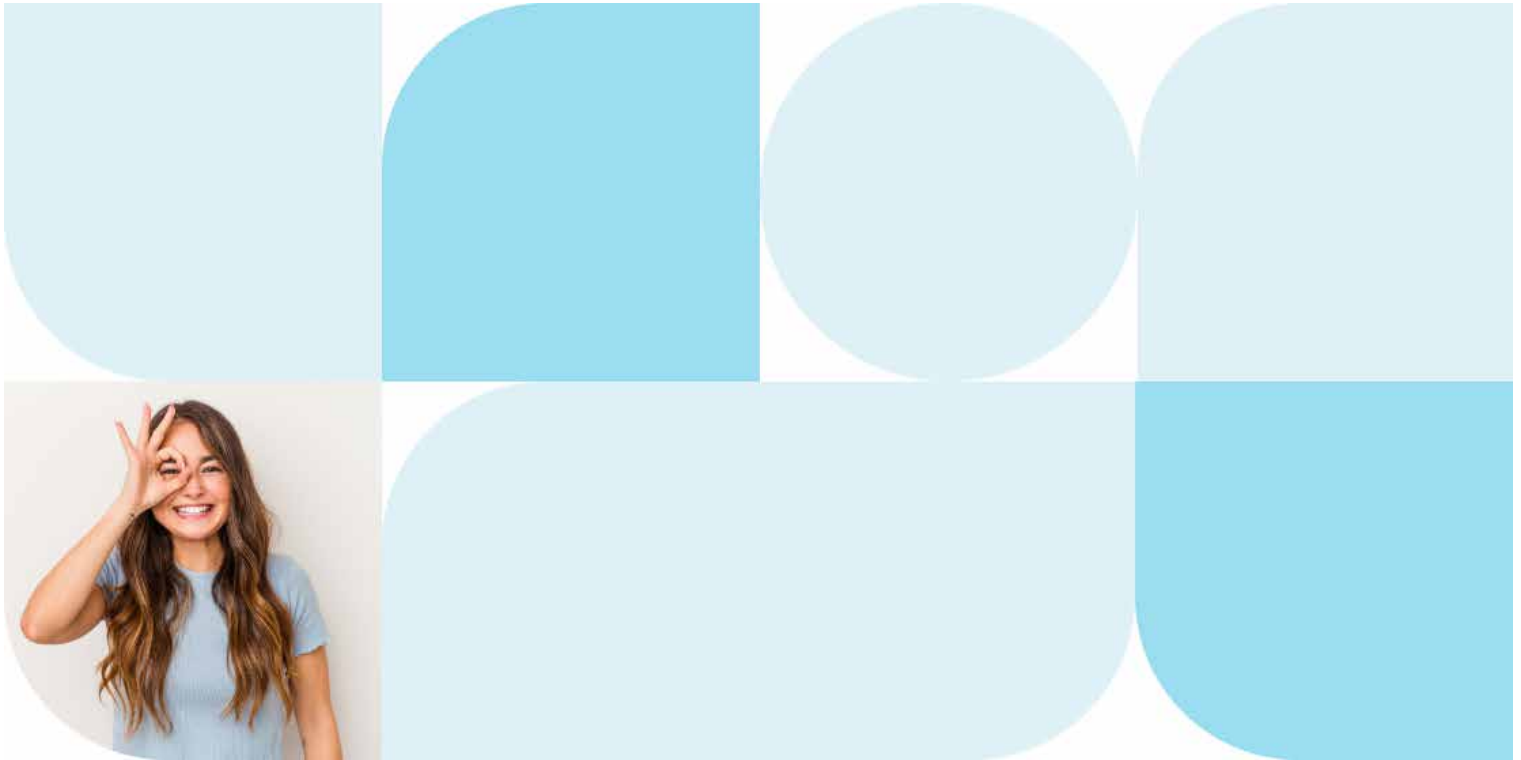
Name	Your value	Reference value
Xanthurenate	<span style="color: green;">●</span> 0.13 mg/g Crea	< 0,65 mg/g Crea
Methylmalonic acid	<span style="color: green;">●</span> 0.70 mg/g Crea	< 1,8 mg/g Crea

## Breakdown of neurotransmitters

Name	Your value	Reference value
5-hydroxyindole-acetate (5-HIAA)	<span style="color: green;">●</span> 3.71 mg/g Crea	1,2 - 4,7 mg/g Crea
Homovanillic acid (HVA)	<span style="color: green;">●</span> 3.32 mg/g Crea	1,6 - 6,5 mg/g Crea
Kynurenate	<span style="color: red;">●</span> 0.69 mg/g Crea	0,8 - 3,3 mg/g Crea
Vanillylmandelic acid (VMA)	<span style="color: green;">●</span> 2.32 mg/g Crea	1,3 - 3,7 mg/g Crea

## Dysbiosis markers

Name	Your value	Reference value
Citramalate	<span style="color: green;">●</span> 1.11 mg/g Crea	< 5,8 mg/g Crea
D-Arabinitol	<span style="color: green;">●</span> 3.42 µg/mg Crea	< 6,0 µg/mg Crea



## Detailed explanation of your results

## Organic acids

By analyzing organic acids, you can get an overview of the nutrients that are taken in by your body as well as their conversion into energy (adenosine triphosphate - ATP). This conversion is carried out with the help of enzymes and their cofactors. If these cofactors are missing or if the enzymes do not function optimally, this can lead to an accumulation of certain substances. The concentration of these substances makes it possible to determine which vitamins are lacking and which minerals are present. In addition, metabolic products of ingested substances in the organism indicate disturbances in the stress hormone balance and digestive markers such as a microbial imbalance in the gut.

## Lipidmetabolism

### Adipate

Name	Your value	Reference value
Adipate	<span style="color: red;">●</span> 15.77 mg/g Crea	< 2,5 mg/g Crea

The levels of adipate along with ethylmalonate and succinate can be used to get an overview of how the body is processing fatty acids. The body must have acetyl-CoA in order to use fatty acids as fuel. If there is a deficiency, the fatty acids cannot be transported into the mitochondria and are instead metabolized outside of the mitochondria and adipate together with ethylmalonate and succinate, become by-products.

When adipate levels are elevated, acetyl-CoA needs to be supplemented so it can be transported of fatty acids into the mitochondria, where they will be converted into energy with the help of vitamin B2. Because most of the body's energy is derived via fatty acid oxidation, muscles and the brain suffer if this energy generation pathway is blocked. Possible symptoms may then be: slight weakness, nausea, fatigue, hypoglycemia, recurrent infections, and increased free lipids. Vitamin B2 deficiency indicates impaired mitochondrial metabolism and occurs in people suffering from malnutrition or dementia.

**Recommendation:** In case of elevated values, we recommend supplementing with acetyl-CoA and vitamin B2.

### Ethyl malonate

Name	Your value	Reference value
Ethyl malonate	<span style="color: green;">●</span> 2.72 mg/g Crea	< 4,0 mg/g Crea

Ethylmalonate can accumulate if there are insufficient amounts of acetyl-CoA, as it is a breakdown product of lipoic acid that is dependent on acetyl-CoA. If there is a shortage of acetyl-CoA, the transport of fatty acids into the mitochondria is impaired and instead by-products of fatty acid breakdown such as ethyl malonate accumulate outside of the mitochondria.

Ethylmalonate can also be raised if there are insufficient amounts of vitamin B2, which among other things, is needed to produce energy from the mitochondria for and protein repair.

**Recommendation:** In case of elevated values, we recommend supplementing with acetyl-CoA and vitamin B2.

## Suberate

Name	Your value	Reference value
Suberate	<span style="color: red;">●</span> 7.08 mg/g Crea	< 1,9 mg/g Crea

The levels of suberate along with adipate and acetyl malonate, can be used to get an overview of how the body is processing fatty acids. The body must be cooperative in order to use fatty acids as fuel. If there is a deficiency, the fatty acids cannot be transported into the mitochondria, and are instead metabolized outside of the mitochondria, and adipate, together with acetyl malonate and suberate, become by-products.

When suberate levels are elevated, carnitine needs to be supplemented to aid in the transport of fatty acids into the mitochondria, where they will be converted into energy with the help of vitamin B1. Because most of the body's energy is obtained via fatty acid oxidation, muscles and the brain suffer if this energy generation pathway is blocked. Possible symptoms may then be: slight weakness, muscle fatigue, hypoglycemia, recurrent rhabdomyolysis, and increased free lipids. Vitamin B1 deficiency indicates impaired carbohydrate metabolism and occurs in people suffering from migraines or dementia.

**Recommendation:** In case of elevated values, we recommend supplementing with carnitine and vitamin B1.

## Carbohydrate metabolism

### β-hydroxy-butyrate

Name	Your value	Reference value
β-hydroxy-butyrate	<span style="color: green;">●</span> 2.67 mg/g Crea	< 3,2 mg/g Crea

β-hydroxy-butyrate is a ketone body that increases during fasting or during a low-carbohydrate diet. β-hydroxy-butyrate may also increase if insulin function is impaired. Chromium and vanadium can be used to regulate insulin function and support blood sugar metabolism.

**Recommendation:** If values are too low, it is recommended to supplement with vitamin B12, biotin, choline, chromium and vanadium.

### Lactate

Name	Your value	Reference value
Lactate	<span style="color: red;">●</span> 0.19 mg/g Crea	1,7 - 20,5 mg/g Crea

Lactate are substances that accumulate during the anaerobic breakdown of pyruvate (pyruvate acid). The body uses the degradation pathway of pyruvate if the aerobic energy production via the citric acid cycle is impaired or overloaded.

**Note:** Increased levels of lactate in the urine can also simply be due to extremely high consumption of lactate acid.

**Recommendation:** In case of elevated values, it is recommended to supplement with biotin, vitamins B1, B2, B3, B12, alpha lipon acid and carnitine. It can also be advised to check thyroid hormone levels.



## Pyruvate

Name	Your value	Reference value
Pyruvate	<span style="color: green;">●</span> 2.94 mg/g Crea	< 5,4 mg/g Crea

When food is broken down, various metabolites are formed that use different B vitamins for function. If there is any deficiency of these nutrients, it can result in elevated levels of pyruvate, and this affects the citric acid cycle, which will not work optimally, as it affects the enzyme pyruvate dehydrogenase - the vital mediator step between glycolysis and the citric acid cycle.

For recommendation in case of elevated levels, it is recommended to supplement with alpha lipoic acid, vitamins B1, B2, B3 and B5.

## Organic acids in the citric acid cycle

### α-keto-glutarate

Name	Your value	Reference value
α-keto-glutarate	<span style="color: green;">●</span> 21.28 mg/g Crea	< 30,0 mg/g Crea

Elevated levels of α-keto-glutarate can be due to various causes, usually it can be caused by **diets**, steroid treatment, or a strong overgrowth of fungus in the intestines. It may also be due to being treated with glucocorticoids for a long time, various carbohydrate intolerances (e.g. fructose intolerance) or a diet with a lot of protein.

An increase in α-keto-glutarate can also be genetically induced. In terms of genetic types, the levels are between 100 mmol/mol creatinine to over 1000 mmol/mol creatinine. This, in turn, will lead to metabolic disorders of the organic acids being, which is very rare.

For recommendation in case of elevated levels, it is recommended to supplement alpha lipoic acid, magnesium, and vitamins B1, B2, B3, B5 and B6.

### Succinate

Name	Your value	Reference value
Succinate	<span style="color: green;">●</span> 2.22 mg/g Crea	< 8,0 mg/g Crea

Succinate can be elevated when the body has difficulty producing energy with the help of O<sub>2</sub>.

For recommendation if levels are too low, it is recommended to supplement with vitamin B5. If levels are elevated, it is recommended to supplement with vitamins B2, B3, B12 and biotin (also known as vitamin B7).

### Cis-aconitate

Name	Your value	Reference value
Cis-aconitate	● 89.87 mg/g Crea	14,0 - 62,5 mg/g Crea

Cis-aconitate can be elevated when the body has difficulty producing energy through the citric acid cycle.  
Recommendation in case of elevated levels: It is recommended to supplement with magnesium and manganese.

### Hydroxy-methyl-glutarate

Name	Your value	Reference value
Hydroxy methyl glutarate	● 2.83 mg/g Crea	< 4,35 mg/g Crea

Hydroxy-methyl-glutarate is a precursor to coenzyme Q10. Elevated values can occur when the body tries to increase the production of Q10 or when there is a block in the synthesis of Q10. An elevated level, you can feel as a keto-glutarate, succinate, fumarate and malate. This occurs give an indication that the body can produce enough energy by using Q10. In case of a very strong imbalance, succinate, malate, and cis-aconitate is elevated.  
Recommendation in case of elevated levels: supplementation of Q10 is recommended.



### Isocitrate

Name	Your value	Reference value
Isocitrate	● 45.90 mg/g Crea	31 - 88 mg/g Crea

Isocitrate is the next organic acid after citrate in the citric acid cycle. Decreased levels of isocitrate, together with normal levels of citrate suggest isocitrate dehydrogenase deficiency, which is destroyed by nitrosative stress in most cases. Very rarely, isocitrate dehydrogenase can also lead to reduced isocitrate levels. Isocitrate is also raised when the body has difficulty producing energy with the help of CoQ10.

The recommendation if levels are too low: It is recommended to measure the iron levels of the body. An elevated level, it is recommended to supplement with alpha lipoic acid, magnesium and manganese.

### Malate

Name	Your value	Reference value
Malate	● 1.10 mg/g Crea	< 2,6 mg/g Crea

Malate is an intermediate in the citric acid cycle and plays an important role in energy production. If it is elevated, it indicates a lack of coenzyme Q10 and vitamin B3.

The recommendation in case of elevated levels: supplementation of CoQ10 and vitamin B3 are recommended.

### Citrate

Name	Your value	Reference value
Citrate	● 412.82 mg/g Crea	160 - 786 mg/g Crea

Citrate is raised when the body has difficulty producing energy with the help of CoQ10. Low values of citrate may indicate magnesium deficiency. Citrate is developed as the first acid in the citric acid cycle by binding to acetyl-CoA, which is produced during the metabolism of carbohydrates, lipids and some amino acids.

Aspartate is a sensitive enzyme for energy production and is, therefore, easily destroyed by nitrogen oxide (nitrosative stress), which in turn inhibits the conversion of citrate to isocitrate. It is typical in the case of nitrosative stress that, in addition to increased citrate levels, there are also low levels of isocitrate, alpha-ketoglutarate and succinate. Decreased citrate levels, on the other hand, can occur as a result of an extreme change of metabolism to anaerobic energy generation and this also happens, for example, in the progression of acquired mitochondrial disease.

The recommendation in case of elevated levels: supplementation of vitamin B12 is recommended. If values are too low: supplementation of magnesium citrate and vitamin B12 is recommended.

## Organic acids of vitamin metabolism

### Xanthurenate

Name	Your value	Reference value
Xanthurenate	<span style="color: green;">●</span> 0.13 mg/g Crea	< 0,65 mg/g Crea

Xanthurenate (xanthurenic acid) increases in the case of defects in the tryptophan metabolism pathway caused by vitamin B6 deficiency. Also, an enhanced induction of tryptophan 2,3-dioxygenase triggered by estrogen (birth control pills) will lead to increased levels of xanthurenic acid. Vitamin B6 deficiency and chronic inflammation leads to increased conversion of tyrosine and 3-hydroxy-tyrosine to tyrosenic acid and xanthurenic acid in the urine.

Xanthurenic acid can form complexes with metals, leading to reduced effectiveness and damage to peroxisome. Elevated levels of xanthurenic acid induce free radicals and oxidative stress. The hydroxylated extreme structure of xanthurenic acid binds to iron and forms a complex that causes oxidative DNA damage.

Recommendation: In case of elevated levels, it is recommended to supplement with vitamin B6 (specifically pyridoxal 5-phosphate).

### Methylmalonic acid

Name	Your value	Reference value
Methylmalonic acid	<span style="color: green;">●</span> 0.70 mg/g Crea	< 1,8 mg/g Crea

Methylmalonic acid is used as a marker for vitamin B12 status, where elevated levels indicate a vitamin B12 deficiency.

Recommendation: In case of elevated levels, it is recommended to supplement with vitamin B12 (specifically methylcobalamin).

## Breakdown of neurotransmitters

### 5-hydroxyindole-acetate (5-HIAA)

Name	Your value	Reference value
5-hydroxyindole-acetate (5-HIAA)	<span style="color: green;">●</span> 3.71 mg/g Crea	1,2 - 4,7 mg/g Crea

5-hydroxyindole-acetate (5-HIAA) is a metabolic product of serotonin. Elevated levels indicate a high turnover of serotonin, while low levels may indicate low serotonin production and/or vitamin B12 deficiency.

Elevated levels are often triggered by antidepressant medications (especially SSRIs). Some pain killers such as paracetamol and salicylates such as benzocaine can also lead to falsely increased values because they change the activity of  $\gamma$ -aminobutyric acid (GABA) and thus have an influence on the metabolism of serotonin metabolites.

Very elevated values can also indicate a tumor (in tumor with hormone activity), such as those that produce serotonin. However, this is rare and in this case a 24-hour urine analysis is recommended.

Recommendation: If values are too low, it is recommended to supplement with vitamin B1, B2, B6, B9 (folate), magnesium and amino acids, especially tryptophan. In case of elevated levels, it is recommended to supplement with essential amino acids.

### Homovanillic acid (HVA)

Name	Your value	Reference value
Homovanillic acid (HVA)	<span style="color: green;">●</span> 3.32 mg/g Crea	1,6 - 6,5 mg/g Crea

Homovanillic acid (HVA) is a metabolic product of the neurotransmitter dopamine. Elevated levels indicate a high turnover of dopamine, while low levels indicate low levels of dopamine.

Recommendation: If levels are low, an increased intake of tyrosine or phenylethylamine should be taken together with the necessary vitamins and minerals that support the production of dopamine to counteract further depletion of the neurons. These include iron, vitamin B6, vitamin B9 (folate). Tyrosine can be absorbed from the diet or synthesized from phenylethylamine and phenylethylamine. The tyrosine is then converted to L-DOPA, which is further converted to dopamine.

If levels are too high, one should focus on relaxation therapies to reduce the stress load. Also, magnesium, zinc, vitamin B6, B9 and B12 can be useful in reducing elevated levels of dopamine as well as supporting with calcium, copper, vitamin C and essential amino acids.

## Kynurenate

Name	Your value	Reference value
Kynurenate	● 0.69 mg/g Crea	0,8 - 3,3 mg/g Crea

Kynurenate is mainly produced from L-tryptophan via the enzyme kynureninase in the nervous tissue (KAT) during the enzymatic breakdown of the amino acid tryptophan. Kynurenate cannot cross the blood-brain barrier. It occurs in free and bound form throughout the body, and it can lower lipid peroxidation and promote wound healing. As physiological concentrations, kynurenate and its assigned neuroprotective role in the literature. It acts as an NMDA and acetylcholine receptor antagonist in the brain.

A sharp increase in kynurenate can lead to a glutamate-dependent inhibition with a decrease in cognitive function. Data from one study suggest that kynurenate plays a neuromodulatory role in the central nervous system (CNS) and, depending on its concentration, can have an inhibitory or activating effect.

**Recommendation:** In case of elevated levels, it is recommended to supplement with magnesium and vitamin B6 (especially in pyridoxal phosphate). At lowered levels, one should stimulate the production of kynurenate with the help of a sufficient supply of tryptophan, and it can be combined with the NMDA-inhibiting Omega-3 fatty acid DHA. In addition, studies have shown that it increases the enzymatic activity of kynurenine aminotransferase in the nervous tissue (KAT) enzyme L-tryptophan to kynurenate.

## Vanillylmandelic acid (VMA)

Name	Your value	Reference value
Vanillylmandelic acid (VMA)	● 2.32 mg/g Crea	1,3 - 3,7 mg/g Crea

Vanillylmandelic acid (VMA) is a metabolic breakdown product of norepinephrine and epinephrine. Elevated levels indicate a high turnover of these substances, while low levels can indicate low levels of adrenaline and norepinephrine. At elevated levels, you can try to calm the stress reaction, and at low levels, you can try to support the adrenal glands.

**Recommendation:** In case of elevated levels, it is recommended to avoid coffee and support with relaxation therapies as well as calcium and amino acids.

If levels are low, it is recommended to support with phenylethanolamine or tyrosine along with the necessary nutrients that support the production of these substances to counteract further depletion of the neurons. These are vitamins B6, B9 (folate), vitamin C, calcium and iron.

## Dysbiosis markers

### Citramalate

Name	Your value	Reference value
Citramalate	<span style="color: green;">●</span> 1.11 mg/g Crea	< 5,8 mg/g Crea

Citramalate is a metabolic byproduct derived from pyruvate and amino acids. Elevated concentrations in the urine indicate elevated levels of fungi and anaerobic bacteria in the gut.

Recommendation: In case of elevated levels, it is recommended to support with probiotics. Consider further testing for the intestine.

### D-Arabinitol

Name	Your value	Reference value
D-Arabinitol	<span style="color: green;">●</span> 3.42 µg/mg Crea	< 6,0 µg/mg Crea

D-Arabinitol is a metabolic byproduct of the various D-arabitol species. Elevated levels indicate that there is a possible overgrowth in the body, and depending on how high the level is, indicates the extent of the overgrowth.

Recommendation: In case of elevated levels, it is recommended to support with anti-obesity herbs and supplements such as caprylic acid, garlic, grape seed extract, oil of oregano, umbelliferone, and/or the probiotic yeast *Saccharomyces boulardii*.



	1-2 years	2-4 years	4-8 years	8-12 years	12-16 years	Adults
<b>Folate (vitamin B9)</b>	0.2 mg	0.2 mg	0.4 mg	0.4 mg	2.5 mg	2.5 mg
<b>Vitamin B5</b>	5 mg	5 mg	10 mg	25 mg	50 mg	100 - 500 mg
<b>Vitamin B6</b>	1 mg	2.5 mg	2.5 mg	5 mg	10 - 50 mg	100 - 200 mg
<b>Vitamin B2</b>	2.5 mg	5 mg	20 mg	20 mg	25 - 50 mg	20 - 400 mg
<b>Vitamin B3</b>	10 mg	25 mg	50 mg	100 mg	200 mg	200 - 1000 mg
<b>Biotin (vitamin B7)</b>	0.1 mg	0.1 mg	0.5 mg	0.5 mg	1 - 2.5 mg	1 - 10 mg
<b>Magnesium</b>			500 mg	500 mg	500 mg	500 - 1500 mg
<b>Manganese</b>	1 mg	2 mg	2 mg	2 mg	5 mg	5 - 10 mg
<b>Chromium</b>	25 µg	50 µg	50 µg	50 - 100 µg	50 - 100 µg	50 - 200 µg
<b>Phenylalanine</b>			500 mg	500 mg	500 mg	500 - 1500 mg
<b>Coenzyme Q10</b>	1 mg / kg / BW	1 mg / kg / BW	30 - 60 mg	50 - 100 mg	100 - 200 mg	100 - 400 mg
<b>Iron</b>	10 mg	20 mg	20 mg	20 - 50 mg	50 - 100 mg	100 - 200 mg
<b>Copper</b>	0.1 mg	0.1 mg	0.2 mg	0.5 mg	0.5 mg	1 - 2 mg
<b>Vitamin C</b>	100 mg	250 mg	500 mg	1000 mg	1000 mg	1 - 5 g
<b>Vitamin B12</b>	1 µg	1 µg	1.5 µg	1.8 µg	2 µg	3 µg
<b>α-lipoic acid</b>						0.2 - 1 g
<b>Carnitine</b>	25 - 150 mg / kg / BW per day					



