GutWell

Gut Microbiome Analysis Report

Before looking at your results

Our gut microbiome report is based on the latest scientific and medical knowledge available in respected scientific and medical journals. You can learn about your gut microbiome in different sections of the report.

The human gut is inhabited by different microorganisms, mostly bacteria, but also fungi, viruses etc. Those microorganisms all together make up a gut microbiome. Most microorganisms in the gut are beneficial and play an important role in maintaining the body's health. The diversity, richness and composition of the microbiome is essential for a healthy gut and also in maintaining a healthy state in the whole body. The gut microbiome community depends mainly on lifestyle and environmental factors. A long-termed absence or imbalanced quantity of certain bacteria can lead to different health problems like obesity, digestion problems and autoimmune diseases.

Our gut microbiome analysis allows us to study your gut bacteria – to identify, which bacteria live in your gut, how abundant they are and how they affect your body. The DNA of your bacteria is analyzed in the lab, using the latest technology to provide quick and accurate results. Microbiome analysis can show whether your nutrition and gut ecosystem are well balanced or if you need to make changes in diet to influence your bacterial composition and to improve your health.

Keep in mind, that only persistent healthy eating habits can lead you to an improved gut microbiome composition.

Summary of the report provides you with conclusive information about the test results. Estimates in the results report are based on a comparison of bacteria abundances with the percentiles calculated on the basis of the reference group.

Conclusions of your gut microbiome test report section provides answers about your microbiome with recommendations for diet.

Results of specific bacteria abundances section includes information about specific bacteria abundances compared to the reference group. In addition, it contains a brief introduction about the bacteria.

APPENDIX 1. Your gut microbiome community charts includes charts of the phyla and genera of your gut microbiome.

APPENDIX 2. Food chart by nutrients provides additional supportive information about different food and nutrients they contain.

APPENDIX 3. Terms explanation provides the definitions of specific terms used in the report

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The analysis is based on the sequencing of V3-V4 regions of 16S rRNA gene. This technology enables us to classify bacteria down to species level, however the specificity and sensitivity of the classification in species level is lower than in the case of higher taxonomy levels

It should be taken into consideration that the result of a microbiome test and its interpretation may be incomplete. The amount of detected microorganisms is not conclusive and other microorganisms, that are not detected by this test may be present in the microbiome. The current interpretation of the microbiome test may be subject to change in the future due to the publication of new scientific studies. Any inaccurate or missing information, likewise any action that does not comply with the manual, may result in a misleading interpretation.

This report is provided to you for informational and educational purposes only, and does not replace a visit to a physician, nor does it replace the advice or services of a physician.

Name: Jane Smith
Date of Birth: DD.MM.YYYY
Order ID: XXXXXX
Sample ID: XXXX_1_ENG

Sample type: Feces
Collection date: DD.MM.YYYY
Reporting date: DD.MM.YYYY

Summary of the report

Summary	Result
Overall diversity of your microbiome is optimal.	⚪⚪🟢
Your microbiome does not favour obesity.	⚪⚪🟢
Low abundance of butyric acid producing bacteria in your gut microbiome indicates you may have a risk of inflammation.	⚪🟡⚪
The abundance of fibre degrading bacteria is optimal.	⚪⚪🟢
You get too little protein and fat from your diet.	⚪🟡⚪
The abundance of genera that include vitamin producers is too low.	🔴⚪⚪
The abundance of genera that include probiotic bacteria is slightly too low.	⚪🟡⚪
An increased abundance of pathogenic bacteria was not detected in your microbiome.	⚪⚪🟢

Researcher/Project manager   Company's seal

Conclusions of your gut microbiome test results

Is my gut microbiome rich and diverse?

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Yes, the overall diversity in your gut microbiome is within optimal range. The diversity of gut microbiome is estimated by the Shannon index. Your Shannon index is xxx and the optimal Shannon index based on the reference group is >xxx.

The diversity of gut microbiome is one of the indicators to estimate the risk of disease development. A diverse microbiome provides the body with all the important compounds and protects the gut from pathogens.

Recommendations: To keep your microbiome rich and diverse, eat various vegetables, fruits, and full grains to ensure enough fibres, minerals and vitamins from your diet. Avoid overuse of antibacterial cleaning products.

Does my gut microbiome favour obesity?

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No, your microbiome ecosystem does not favour obesity. This is indicated by the following:

- Overall diversity of your microbiome is optimal;
- Ratio of phyla *Firmicutes:Bacteroidetes* is low;
- The abundance of species *Akkermansia muciniphila* is high.

Gut bacteria can influence the energy use from ingested food and play a crucial role in development of obesity.

Recommendations: To keep your microbiome balanced we recommend eating more food full of fibres like fruits, vegetables and whole grains rather than easily digestible carbohydrates like white sugar, sweets and white bread.

Does my gut microbiome favour inflammation?

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Yes, your gut microbiome ecosystem slightly favours inflammation, because you have a rather low abundance of butyric acid producing bacteria.

Inflammation can be caused by bacteria and toxins leaking from the gut interior to exterior, where your immune system recognizes them as a foreign body. Therefore it is important that the gut epithelial cells and mucin layer makes together a tight gut barrier. Butyric acid induces mucin synthesis and tightens the junction between epithelial cells and therefore prevents inflammation.

Recommendations: Enrich your diet with food containing fibres, fructooligosaccharides and resistant starch, such as banana, potato, rice, pearl barley, chickpeas, beans, onion and raw oats.

Has pathogenic bacteria been detected in my gut?

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No, an increased abundance of pathogenic bacteria was not detected in your microbiome compared to the reference group.

NB! This analysis is not suitable for diagnostic use. There may be pathogenic bacteria in the microbiome that were not detected or not tested in this analysis.

Conclusions of your gut microbiome test results

Do I get enough various fibres from my diet?

Yes, you get enough various fibres from your diet, as the overall diversity and the abundance of fibre-degrading bacteria (genus *Prevotella*, *Bifidobacterium, Lactobacillus)* in your gut is high.

Sufficient fibre intake from food is important, because it increases the overall diversity of gut microbiome, which is important to sustain a healthy gut. Dietary fibre is decomposed by gut microbes into beneficial compounds that play a crucial role in our metabolism and even in immune system function.

Recommendations: Consume fibre-rich food like vegetables, fruits and full grains. Prefer whole-grain bread and pasta. Make sure the cereals you eat are whole-grain cereals that contain bran, or add extra wheat, rye or oat bran to your favourite cereal.

Do I get optimal amount of protein and fat from my diet?

No, a rather low abundance of genus *Bacteroides* indicates that you do not consume enough protein and fat.

Healthy daily protein consumption for adult is 0,8 g per 1 kg body weight, proteins should give 10-20% of daily calories.

Healthy daily fat consumption for adults is 25-30% of daily calories. Animal-based fat should be kept 1/3 of daily fat Intake and 2/3 should be covered with omega-3, omega-6 and omega-9 fatty acids consumed in a ratio of 1:1:3.

Recommendations: Consume more full-fledged proteins that contain all the essential amino acids in an appropriate amount and ratio, such as egg protein. Plant and animal proteins compliment each other, thus both animal (dairy, meat, egg) and plant-based proteins (legumes, cereals, soy products) should be consumed.

For fat intake, prefer food that contains more unsaturated fat instead of saturated.

Does my gut contain enough genera of vitamin-producing bacteria?

No, the abundance of genera that include vitamin-synthesizing bacteria is too low in your gut.

Vitamins play a crucial role in metabolism and immune system functioning. In addition to food intake, our body can get vitamins from gut microbes that produce vitamin K and different kinds of vitamin B. Such microbes are mainly lactic acid bacteria (*Lactobacillus*).

Recommendations: To increase the abundance of vitamin producers in your gut, eat fermented milk products like kefir, sour cream, cheese (especially Brie and Gouda) and fibre-rich full-grain cereals.

Does my gut contain enough genera of various probiotic bacteria?

No, your gut microbiota is slightly decreased in the amount of genera that include various probiotic bacteria.

Various probiotic bacteria play an important role in healthy gut microbiome, by supporting the digestion process and stabilizing the gut ecosystem. Principal probiotic bacteria belong to the genera *Lactobacillus* and *Bifidobacterium*.
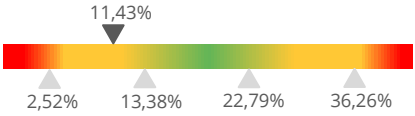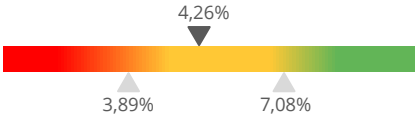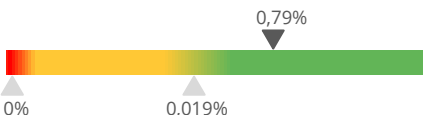
Recommendations: Probiotic bacteria are found in fermented milk (kefir, yogurt, cheese) and fermented vegetable (sauerkraut, pickles, kimchi, tofu) products.

The proliferation and abundance of probiotic bacteria is enhanced by the consumption of prebiotics (e.g inulin). Food rich in prebiotics are chicory, Jerusalem artichoke, onion, garlic, banana, unpeeled apple, asparagus and barley.
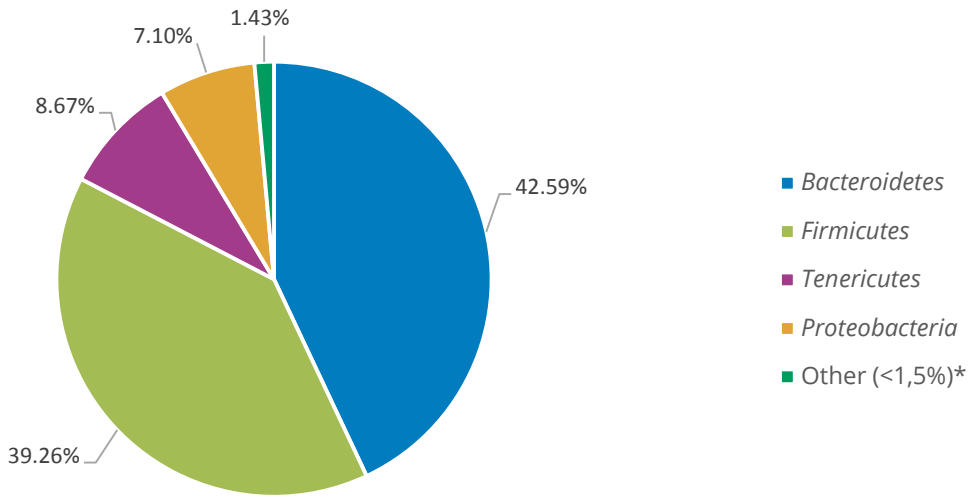
Results of specific bacteria abundances

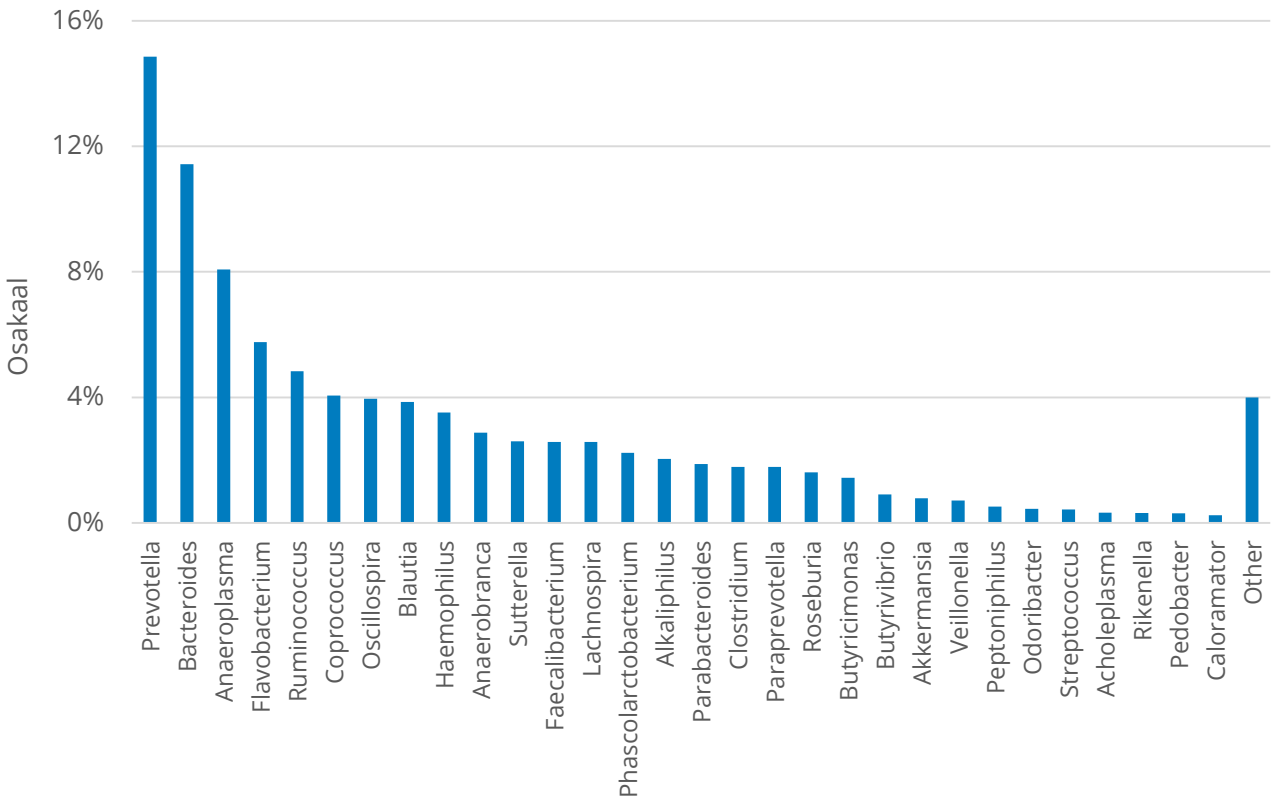| Bacteria	Result	Description
PHYLA		
Firmicutes	⚪⚪🟢	Abundance is optimal.
39,25% (56,9% / 66,26%)		One of the most abundant phyla in gut microbiome. They affect the absorption of fatty acids and lipid metabolism. High abundance of *Firmicutes*, compared to *Bacteroidetes* abundance, has been associated with lipid accumulation and obesity.
Bacteroidetes	⚪⚪🟢	Abundance is optimal.
34,2% (15,26% / 32,62%)		Another abundant phyla in gut microbiome. Higher abundance of *Bacteroidetes*, compared to *Firmicutes*, has been associated with lower weight.
GENUS		
Lactobacillus	🔴⚪⚪	This genus was not detected in your sample.
0% (0% / 0,0051%)		One of the main genus of probiotic bacteria. They are able to ferment indigestible carbohydrates into beneficial compounds and produce vitamins, in result of which protects the gut from pathogenic microbes.
		Major part of lactic acid bacteria, which ferment carbohydrates to lactic acid. They are widely used for milk fermentation to produce cheese, yoghurt, kefir and vegetable fermentation to produce kimchi, pickles and sauerkraut.
Bifidobacterium	⚪⚪🟢	Abundance is optimal.
0,19% (0,00002% / 0,0987%)		Another main genus of probiotic bacteria that is able to ferment indigestible carbohydrates into beneficial compounds and protect the gut from pathogenic microbes.
Prevotella	⚪⚪🟢	Abundance is optimal.
14,85% (0,00006% / 2,46%)		They break down fibres to beneficial compounds that support weight loss. High level of *Prevotella* compared to *Bacteroides* has been associated with plant-based and fibre rich diets.

Results of specific bacteria abundances

Bacteria	Result	Description

GENUS

Bacteroides
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11,43%

2,52% 13,38% 22,79% 36,26%

Abundance is slightly low.

One of the most dominant genera in gut microbiome. They break down fibre, but their higher abundance, compared to *Prevotella*, has been associated with a fat and protein rich diet.

Butyric acid producing bacteria
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4,26%

3,89% 7,08%

Abundance is slightly low.

These genera *(Anaerostipes, Flavonifractor, Faecalibacterium, Pseudobutyrivibrio, Roseburia, Subdoligranulum)* produce butyric acid, which is considered to have anti-inflammatory effect. In addition butyric acid is an important signal molecule that has a crucial role in our metabolism and immune system function.

SPECIES

Akkermansia muciniphila
● ● ●

0,79%

0% 0,019%

Abundance is optimal.

Species in which a higher abundance has been associated with a reduction in obesity, diabetes and inflammation. *A. muciniphila* is mucin-degrading bacteria, therefore it's high abundance indicates that intestinal epithelium is covered by enough mucus, which protects against gut leakage. The growth of this bacteria abundance is enhanced by polyphenols found in grapes and cranberries.

Oxalobacter formigenes
● ● ●

0%

0%

This species was not detected from your sample.

It is an oxalic acid degrading species. Oxalic acid is an organic acid found in many plants. After consumption, oxalic acid is mainly degraded in our gut by *Oxalobacter formigenes*. When there is lack of this bacteria or there is not enough of this bacteria, oxalic acid is absorbed from the gut and reaches the kidneys, where it precipitates with calcium and can form kidney stones. In the absence of this species, it is recommended to drink plenty of lemon water to dissolve the forming calcium compound.

APPENDIX 1

The most abundant phyla in your microbiome

Legend:
- Bacteroidetes
- Firmicutes
- Tenericutes
- Proteobacteria
- Other (<1,5%)*

Values: 42.59%, 39.26%, 8.67%, 7.10%, 1.43%

The most abundant genera in your microbiome**

* Includes all the phyla, which abundance is lower than 1,5%

** The abundance of the 30 most abundant genera is presented, the rest of the genera are summed up in the column „Other"

Food chart by nutrients

„Slow" carbohydrates	g/100g	„Fast" carbohydrates	g/100g	Fibre	g/100g
Whole-grain cereals (wheat, oat, barley, rye, buckwheat etc)	60-70	White sugar	99,8	Carob powder	40
Sourdough bread	56	Corn	77	Wheat bran, Rye bran	38
Dark (rye) bread	46	Candies	56-80	Flaxseeds	28
Brown rice (boiled)	28	White wheat	64	Oat bran	17
Whole-grain pasta (boiled)	20	Deep-fried chips	50	Nuts, seeds and almonds (chia seeds, pumpkin seeds, pistachio, cashew coconut etc)	5-15
Fruits (apple, pear etc)	8-15	White bread	45		
Berries (raspberries, strawberries etc)	7-14	White rice	27	Grains (quinoa, oat, brown rice, barley, buckwheat and other whole-grains etc)	5-10
Vegetables (carrot, tomato etc)	4-10	Wheat pasta	20	Dark chocolate	8
		Sweetened drinks	10	Legumes (lentil, kidney bean, split pea, chickpea, black pea etc)	6-8

Plant proteins	g/100g	Animal proteins	g/100g	Fibre (cont.)	g/100g
Algae products (Sprulina)	57	Meat (beef, pork, chicken, turkey jne)	23-27	Berries (strawberry, raspberry, blueberry, blackberry etc)	2-7
Hempseeds	25	Fish (tuna, salmon etc)	20-30	Jerusalem artichoke	3
Soybean products (tofu, tempeh, edamame etc)	15-18	Cheese (cream cheese, ricotta, cottage, feta, mozzarella etc)	17-26	Vegetables (carrot, beetroot, broccoli, artichoke, Brussels sprouts, spinach, tomato, etc)	1-5
Quinoa	13				
Lentils	9	Eggs	12	Fruits (pear, avocado, apple, banana etc)	1-3
Peas (green peas, chickpeas etc)	8	Yogurt	3-7		
Beans (kidney, black, pinto beans etc)	7-8	Milk	3		

Unsaturated fats	g/100g	Saturated fats	g/100g
Olive oil	81	Coconut oil	86
Nuts (walnuts, pistachio, cashew, pecan etc)	40-50	Butter	48
Almonds	45	Cheese	17-32
Seeds (pumpkin, sesame, sunflower etc)	35-40	Salami	15
Flaxseeds and chia seeds	25-27	Chicken skin	14
Avocado	11	Fatty meat (beef, pork etc)	6-9
Fish (tuna, salmon, etc)	2-4	Processed meat (sausage, wiener etc)	7-8

APPENDIX 3

Terms explanation

- **Autoimmune disease –** condition in which your immune system mistakenly attacks your own body.

- **„Fast" carbohydrates –** carbohydrates that quickly increase your blood sugar after eating. Measured by Glucemic Load (GL > 20 is considered to be „fast" carbohydrate).

- **Fibre –** substance that is indigestible to human body. It reaches the colon undigested, where it feeds certain gut bacteria. Consists of cellulose, lignin and pectin.

- **Fructooligosaccharides** – certain carbohydrates that contain fructose. These are found in many plants.

- **Genus –** taxonomic rank used in the biological classification of organisms. Covers a wider range of organism than in the species level.

- **Lactic acid bacteria –** bacteria that produce lactic acid during the fermentation of carbohydrates.

- **Microbes or microorganisms –** living organism that is too small to be seen with the naked eye. Includes bacteria, archaea, fungi, protists and microscopic animals.

- **Microbiome –** ecological community of microorganisms. Sometimes terms microbiome and microbiota are used separately, in which case microbiota refers to the group of microbes themselves and microbiome refers to the genomes of these microbes. In this report term microbiome is used in both cases.

- **Pathogen or pathogenic bacteria –** bacteria that can cause disease.

- **Phyla –** third highest taxonomic rank used in the biological classification of organisms. Other taxonomic ranks in descending order are class, order, family, genus, species.

- **Polyphenol –** organic chemicals that occur in plants. Considered beneficial, mainly because of antioxidant properties.

- **Prebiotic** – compounds that are the food for probiotic bacteria. These include mainly fibres.

- **Probiotic or probiotic bacteria –** live microorganisms intended to provide health benefits.

- **Reference group –** comparison group of healthy people (BMI 18-26), whose results give the optimal or suggested value range of an indicator.

- **Saturated fatty acid –** substance where all fatty acid chains are single bonds. Claimed to raise cholesterol levels and support the development of heart diseases.

- **„Slow" carbohydrates –** carbohydrates that increase your blood sugar slowly. Measured by Glucemic Load (GL < 10 is considered to be „slow" carbohydrate).

- **Unsaturated fatty acid –** substance that has at least one double bond within the fatty acid chain. Considered to improve cholesterol profile by lowering the so called „bad" cholesterol and increasing the „good" cholesterol.