Gut-Microbiome

Sample Report

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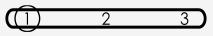

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Disease-causing bacteria

What do the bacteria in my gut do?

The microbiome is a community of bacteria, fungi, and viruses that inhabit our bodies. These microorganisms can be found in various parts of the body, particularly on the skin, in the mouth, and in the gut [1][2]. Bacteria make up the largest portion of the human microbiome.

Although microorganisms are ubiquitous and coexist with humans to mutual benefit, they often go unnoticed in our daily lives. Many of these microorganisms play important roles in the body, including digestion, vitamin production, and support of the immune system in the gut. However, some microorganisms can contribute to health problems [1][3].

In recent years, it has been repeatedly shown that changes in the composition of the microbiome can pose potential health risks [1][2][4]. To date, scientific research has mainly focused on changes in the bacterial community within the microbiome. Some of the bacteria in the gut are permanently resident and contribute to nutrient absorption and protection against harmful bacteria, while others may enter the gut through external influences and disrupt the balance of the microbiome.

The microbiome is unique to each individual and varies according to diet and health status [1][2][4]. Changes in the microbiome have been associated with many health issues [5][6]. In the following, we provide insights into the balance of your microbiome compared to a reference population of healthy adults, as well as information about bacteria in your gut that may potentially lead to health impairments. Over 1800 groups of bacteria in your microbiome will be analysed.

Diversity of the gut microbiome

The diversity of the microbiome is an important indicator, as a microbiome with higher diversity is generally more stable than one with low bacterial variety [7]. Therefore, increased diversity is often associated with a healthy microbiome. This is because a greater variety of bacteria can help maintain the balance of the microbiome and limit the spread of harmful bacteria.

A stable microbiome is able to recover and rebuild itself when perturbed. However, if the microbiome is disrupted, for example, due to changes in diet or the use of various medications such as antibiotics, it can lose its stability and become more susceptible to diseases [8].

The Shannon Index is used to assess diversity and provides information about the variety of bacteria in your gut [9]. A low value indicates reduced microbiome diversity, leaving room for pathogenic bacteria [10]. High values indicate greater bacterial diversity, which is associated with a well-balanced microbiome.

Your Result:

Your Shannon index with 3.4 falls within a range that is classified as slightly increased, indicating a higher diversity of your microbiome. This means that your microbiome is stable and positively supports the immune system.

Dysbiosis of the gut microbiome

The Dysbiosis Index is another way to assess the balance of the microbiome [10]. Dysbiosis in the gut refers to an imbalanced composition of bacterial groups in the gut. Your microbiome is compared to the average composition of the microbiome in healthy individuals.

To calculate the Dysbiosis Index, the following bacterial strains are taken into account:

Actinobacteria mainly metabolises carbohydrates [11][12].

Bacteroidetes are among the most common gut bacteria and are involved in the breakdown of complex carbohydrates from dietary fibre. Representatives of this group are also important producers of gut-supporting substances [13].

Firmicutes can metabolise long-chain carbohydrates. The species within Firmicutes are highly diverse, with some species specialising in the metabolism of proteins or other substances [12].

Proteobacteria metabolize proteins and carbohydrates and are more prevalent in a protein-rich diet. These bacteria promote inflammatory processes in the gut through their toxic metabolic byproducts [11][12][14][15].

A low value in the Dysbiosis Index (green range) indicates a balanced microbiome, while high values (red range) are associated with dysbiosis.

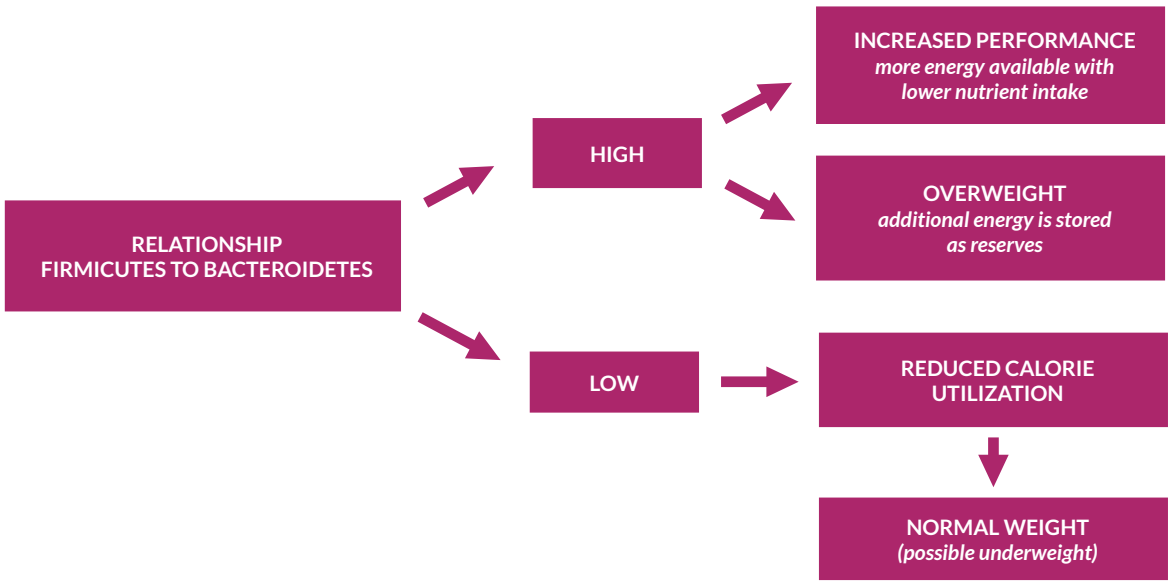
Your Result:

Your dysbiosis index with 3.34 falls within a range that is classified as slightly decreased, indicating a good balance of your microbiome.

What impact does your microbiome have on energy utilization (caloric intake)?

In humans, the bacterial groups Firmicutes and Bacteroidetes, each consisting of many different bacterial species, are by far the largest representatives in the gut.

Firmicutes bacteria can break down indigestible dietary fibre, providing the body with more energy. This means that a high ratio of Firmicutes to Bacteroidetes can lead to efficient nutrient absorption and, on the other hand, can contribute to obesity if this energy is not expended but stored in the body. Conversely, a result with fewer Firmicutes indicates poorer calorie utilisation, which can also lead to underweight if the required energy is not obtained through other digestive processes [16][17][18][19][20].



Your Result:

Your ratio of Firmicutes to Bacteroidetes indicates an average calorie utilization. Consequently, your gut absorbs an average amount of energy from the food you consume.

Which enterotype am I?

Although the gut microbiome is highly individual, there are some commonalities among people that have led to the definition of three different enterotypes. These enterotypes are based on the idea that the gut microbiome of individuals can be categorised into distinct groups characterised by specific bacteria [21][22]. Even though most individuals exhibit the characteristics of a specific enterotype, it is occasionally possible for the microbiome to be associated with two enterotypes equally.

There are three recognised enterotypes:

- **Enterotype 1:** Bacteroides (dominant bacteria)
  This enterotype is predominantly found in individuals who consume a diet rich in meat.

- **Enterotype 2:** Prevotella (dominant bacteria)
  This enterotype is mainly found in vegetarians and vegans.

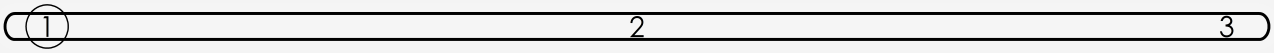
- **Enterotype 3:** Ruminococcus (dominant bacteria)
  This enterotype is the most common and is associated with a mixed diet.

These differences between enterotypes can have an impact on metabolism and are also influenced in the long term by individual dietary habits [21]. Age, gender, and geographic origin, on the other hand, have little influence on enterotypes.

While enterotype 1 specializes in the metabolism of animal proteins and fats, as well as the production of vitamins (biotin, B2, B5, and C), individuals with enterotype 2 are better at digesting fibre and produce increased amounts of folic acid and vitamin B1 in the gut. Enterotype 3 is typically found in individuals with a balanced combination of animal and plant-based foods in their diet [21][22].

Furthermore, the dominant bacteria in enterotypes 2 and 3 support the regulation and maintenance of the intestinal mucosa [21][23][24].

Your Result:



Your gut microbiome reflects the characteristics of Enterotype 1, which suggests that your diet is largely based on animal proteins and fats. Additionally, the bacteria in your gut are actively involved in producing vitamins such as biotin, B2, B5, and C. More details on how you can support your microbiome will be provided in the section with recommendations.

Protein Metabolism

Proteins are essential building blocks of cells and are involved in all body processes such as cell construction, hormone and enzyme production, and antibody production (immune defence). After proteins are consumed from food, they are broken down into their components, amino acids, in the intestines and then absorbed by the intestines as an energy source, along with fats and carbohydrates. While the body can produce many amino acids on its own, others must be obtained through diet [25][26][27].

Additionally, the bacteria in the gut produce the building blocks of proteins, contributing to an adequate supply of all amino acids [28]. Furthermore, amino acids are converted into other substances that influence the intestinal mucosa. The most important bacteria for protein digestion are Bacteroides [29]. Excessive protein consumption is often associated with a decrease in beneficial gut bacteria such asBifidobacterium and Rothia, and an increase in Proteobacteria, which can lead to gastrointestinal discomfort [15][28][30][31][32].

Your Result:

Your gut breaks down proteins into their components less effectively than an average healthy microbiome. This means that your body utilizes proteins less efficiently through your microbiome.

Carbohydrate Metabolism

Carbohydrates are important sources of energy for the body, especially for the brain, as the brain can only derive energy from carbohydrates, unlike other nutrients. Carbohydrates can be classified into short-chain, long-chain, and indigestible long-chain carbohydrates (fibre).

Short-chain carbohydrates are sugar molecules found in sweet foods that can be quickly absorbed by the body. When more simple carbohydrates are absorbed by the body, excess energy can be stored as fat. Long-chain carbohydrate chains such as starch (found in potatoes, pasta, etc.), which are composed of many sugar molecules, are absorbed more slowly by the body than short-chain sugar molecules. Additionally, there are complex carbohydrates called fibre (e.g., cellulose or pectin) in plant-based foods that the human body cannot use as an energy source. However, fibre serves as a source of nutrition for certain gut bacteria, which break down these complex carbohydrates and produce other important molecules for the body [33]. Specifically, bacteria such as Coprococcus, Ruminococcus, Roseburia, Anaerostipes, Bifidobacterium, and Faecalibacterium prausnitzii support the intestinal mucosa by digesting fibre and producing butyrate [34].

Fibre also has a positive effect on gut health by stimulating intestinal activity and preventing constipation while promoting digestion. A fibre-rich diet is also believed to have positive effects on the cardiovascular system, cholesterol levels, and high blood pressure [35]

Your Result:

Your gut breaks down undigestible carbohydrates more effectively than an average healthy microbiome. This means that the microbiome in your body likely produces increased amounts of butyrate, which supports the intestinal mucosa.

Fat Metabolism

Fats or fatty acids, along with carbohydrates and proteins, provide energy to the body. Fats are also essential building blocks for cells, required for the production of many hormones, and play a crucial role in the absorption of fat-soluble vitamins A, D, E, and K. Once fats from the diet reach the intestines, they are broken down into smaller components and absorbed into the bloodstream.

Excessive intake of fats from the diet leads to surplus energy being stored as reserves in adipose tissue, which the body can utilise when needed, such as during physical activities. Additionally, fat stores act as insulation against cold temperatures. If insufficient energy is consumed, blood sugar levels decrease, and the liver utilises the energy from broken-down fats to produce glucose.

Fats can be classified as saturated and unsaturated fatty acids based on their structure and composition. Saturated fatty acids, primarily found in animal-based foods except for coconut and palm oil, are increasingly associated with health problems like heart diseases.

On the other hand, unsaturated fatty acids present in plant-based foods and fish products, especially omega-3 fatty acids, have positive effects on health. Excessive fat intake, particularly saturated fats, promotes obesity and related health issues such as elevated blood lipid levels, hypertension, or cardiovascular diseases. Moreover, it is believed that high amounts of fat contribute to reduced diversity and alterations in the gut microbiome [36][37].

Your Result:

Your gut metabolizes fats just as well as an average healthy microbiome. This means that the microbiome in your body likely contributes to fat absorption in an average manner.

Vitamin Production

Vitamins are molecules that play a vital role in many metabolic pathways, immune system function, and other processes in the body. With the exception of vitamin D, the body cannot produce vitamins on its own and therefore needs to obtain them through dietary intake.

Vitamins are synthesised in plants, making plant-based foods good sources of vitamins. However, some vitamins can also be obtained through animal-based foods [38].

The bacteria in the gut supplement the absorption of vitamins from the diet by producing certain vitamins and making them available to the body [39]. In the following, we provide an overview of water-soluble vitamins and how your gut bacteria contribute to the absorption of these vitamins [38][39][40].

Your Result:

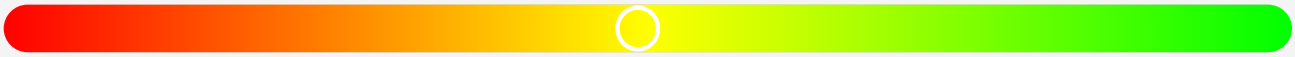
Results in the green range indicate that your gut bacteria contribute well to the absorption of the respective vitamins, while results in the yellow range suggest moderate involvement of the microbiome in the absorption of the respective vitamins. If your results are in the red range, your gut bacteria produce the respective vitamins minimally, thus not contributing significantly to their absorption.

What impact does the microbiome have on my gut health?

Some bacteria in the gut microbiome produce butyrate, which plays an important role in maintaining the health of the intestinal mucosa. Butyrate contributes to the maintenance of the intestinal mucosa, serving as a protective barrier that prevents pathogenic bacteria or other harmful substances from entering the bloodstream. By supporting the gut bacteria, inflammation in the intestine can be reduced or prevented [41].

When the balance of the microbiome is disrupted, such as by antibiotics or an unhealthy diet, it can lead to a deficiency of bacteria that produce butyrate, thereby promoting inflammation. One bacteria species particularly involved in butyrate production is Faecalibacterium prausnitzii. Additionally, some studies have shown that an excessive presence of Proteobacteria promotes inflammatory processes in the gut [15][42].

Your Result:



Compared to healthy reference individuals, the microbiome in your gut suggests an average protection of the intestinal mucosa.

Does my gut health affect my brain?

The gut, including the gut microbiome, is connected to other organs in the body, and changes in the microbiome can have effects on many processes outside the gut. This includes the brain, which receives a variety of signals from the gut and vice versa, with signals being transmitted through the vagus nerve [45]. This communication occurs through various mechanisms, including the production of neurotransmitters, modulation of the immune system, and regulation of inflammation. It is believed that this gut-brain communication can have effects on mood, behaviour, and cognitive function.

Dysbiosis has been associated with various neurological disorders, including anxiety disorders, depression, autism, and neurodegenerative diseases such as Alzheimer's and Parkinson's [45]. It is suspected that changes in the gut microbiome may play a role in the development and progression of mental disorders such as depression [45][46]. Certain groups of bacteria, such as Anaerostipes and Lachnospiraceae, have been linked to an increased prevalence of depression. On the other hand, other bacteria, like Faecalibacterium, are often less abundant in the microbiome of individuals with mental disorders and may have a protective effect in healthy individuals [47][48][49].

Your Result:

In your microbiome, comparable amounts of bacteria commonly associated with mental disorders were found compared to healthy reference individuals. This means that you do not have an increased susceptibility to mental illnesses.

Why are skin conditions associated with the gut?

The gut microbiome and the skin are in constant communication, contributing to maintaining a healthy immune system and, consequently, the health of the skin. If the gut becomes more permeable due to detrimental changes in the microbiome, it can lead to increased inflammation in the body. Many skin conditions, such as psoriasis and atopic dermatitis (eczema), are associated with chronic low-grade inflammation in the body [50].

Dysbiosis, an imbalance in the gut microbiome, can promote chronic inflammation by disrupting immune system regulation, thereby causing or exacerbating various skin issues [50][51][52]. The findings of several studies suggest that certain bacteria, including Blautia and Ruminococcaceae, are more prevalent in the gut of patients with psoriasis [53][54][55][56]. Additionally, in a disrupted microbiome, certain bacteria can produce increased amounts of metabolites that directly affect the skin. These substances can influence sebum production and, thus, contribute to acne development [57].

Your Result:

In comparison to healthy reference individuals, comparable amounts of bacteria commonly associated with inflammatory skin conditions were found in your microbiome. Therefore, your microbiome does not indicate such diseases.

What influence does the gut microbiome have on my heart health?

Current research findings indicate that the gut microbiome can influence various factors that affect the risk of heart disease. It has been observed that certain bacteria in the gut contribute to the production of metabolites that can influence cholesterol levels. An imbalanced microbiome can lead to increased production of substances that promote cholesterol absorption, thus favouring the formation of arterial deposits [58]. In addition, inflammatory reactions triggered by dysbiosis can also increase the risk of heart disease [58][59]. Heightened inflammatory response in the body has been associated with a higher likelihood of artery narrowing due to deposits (atherosclerosis), heart attacks, and strokes [60][61][62].

The gut microbiome can also indirectly affect heart health by regulating metabolism and the handling of nutrients in the body. A disrupted microbiome can impair the metabolism of fatty acids and other nutrients, leading to an increased risk of obesity, diabetes, and other risk factors for heart disease [58]. Some studies have linked cardiovascular diseases to elevated levels of specific bacterial groups such as Enterococcus and Desulfovibrio. Other bacterial groups like Roseburia and Faecalibacterium are often reduced in individuals with cardiovascular diseases and are therefore considered protective bacteria [61][62][63][64].

Your Result:

Slightly decreased amounts of bacteria commonly associated with cardiovascular diseases were found in your microbiome compared to average healthy reference individuals. Therefore, your microbiome does not indicate such conditions.

How does my gut influence the functions of my liver?

The gut microbiome and the liver are closely connected and engage in constant communication [65][66]. The gut microbiome produces a variety of metabolic byproducts and signalling molecules that enter the bloodstream and reach the liver. These substances can influence liver function and support liver detoxification. Additionally, the gut microbiome affects inflammatory responses in the body, including liver inflammation.

In cases of dysbiosis, it can lead to impaired liver health. Increased or disrupted intestinal permeability can result in not only the absorption of nutrients and vitamins but also harmful bacteria and their metabolic byproducts into the bloodstream, which then reach the liver. In turn, the liver influences the gut microbiome by producing and secreting bile, which is essential for fat digestion and maintaining a healthy gut flora. Impaired liver function can affect the microbiome and contribute to deteriorated gut health and other health problems.

In addition to dysbiosis, certain bacteria have been associated with liver diseases, particularly non-alcoholic fatty liver disease (NAFLD) and liver inflammation. NAFLD is a common liver disease characterized by excessive fat accumulation in the liver without alcohol consumption as the primary cause. As NAFLD progresses, it can develop into an inflammatory form of the disease that can lead to liver damage. Fatty liver diseases are closely linked to metabolic disorders such as obesity and diabetes. Some bacteria implicated in NAFLD include Streptococcus, Enterobacteriaceae, and Escherichia [67][68].

Your Result:

Compared to average healthy reference individuals, comparable amounts of bacteria associated with fatty liver disease were found in your micorbiome. Therefore, your microbiome does not indicate such conditions.

How does the microbiome affect my joint health?

There is growing evidence suggesting that the gut microbiome plays a role in the development and progression of arthritis. Arthritis is an inflammatory joint disease that can cause pain, stiffness, and swelling [69]. Studies have shown that alterations in the microbiome may be associated with an increased susceptibility to arthritis [70]. A disrupted balance in the microbiome can lead to increased permeability, allowing harmful bacteria and substances from the gut to enter the bloodstream. These can trigger an immune response and promote inflammation in the body, including the joints. Moreover, certain bacteria in the gut can directly interact with the immune system and release pro-inflammatory or anti-inflammatory signals. Additionally, an imbalance in the gut microbiome can contribute to an overactive immune response and chronic inflammation. Furthermore, there are initial indications that probiotics and prebiotic substances, by supporting microbial balance, may reduce inflammation and alleviate symptoms of arthritis. One bacterium that has been associated with arthritis is Prevotella copri [71][72].

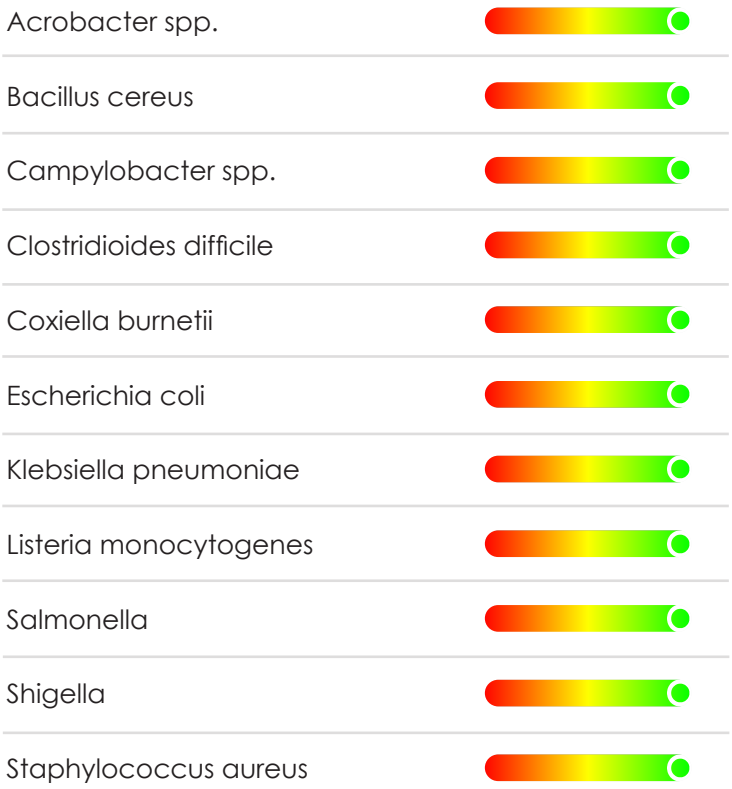
Your Result:

Comparable levels of bacteria associated with arthritis were found in your micorbiome compared to average healthy reference individuals. Therefore, your microbiome does not indicate joint problems.

Are there bacteria in my gut that could harm me?

Disease-causing bacteria in the gut can lead to health problems. Among these bacteria are Clostridium difficile and Staphylococcus aureus, which can cause intestinal infections, primarily in older individuals. Taking antibiotics can also disrupt the balance in the microbiome, potentially promoting infections with disease-causing bacteria [73][74][75][76][77].

Below is an overview of gut bacteria that can potentially cause diseases.



Your Result:

A result in the green range means that no pathogenic bacteria were found above the threshold value, while results in the orange range indicate quantities of the respective bacteria close to the threshold. Results in the red range mean that the threshold value has been significantly exceeded, and these bacteria may potentially cause health problems.

How can I support my gut microbiome through my diet?

A balanced gut microbiome not only contributes to gut health and nutrient processing but is also an important part of our overall well-being.

Microbial composition

For high diversity and a healthy balance of gut bacteria, a varied diet rich in fibre is crucial. Fibre is a complex carbohydrate that serves as an important food source for gut bacteria [33]. While plant-based foods like fruits, vegetables, whole grains, legumes, and nuts are high in fibre, processed and animal-based foods are practically devoid of fibre.

If your microbiome exhibits low diversity and/or an imbalance, especially when combined with symptoms, you should seek medical attention.

Diet

A healthy lifestyle can be actively supported by consuming prebiotic foods such as artichokes, eggplants, bananas, chicory, honey, leeks, asparagus, Jerusalem artichokes, and onions. Additionally, consuming probiotic foods like apple cider vinegar, pickles, yogurt, kimchi, kombucha, miso, tempeh, and sauerkraut can strengthen the microbiome, as these foods contain gut-friendly bacteria through fermentation. These gut-friendly bacteria, along with essential vitamins and other nutrients, can also be supplied to the body in the form of probiotics or dietary supplements. Probiotics and pro- and prebiotic foods are particularly helpful for restoring microbial balance more quickly after taking antibiotics or in general.

If the ratio of Firmicutes to Bacteroidetes suggests overweight and you do not engage in regular physical exercise, it is advisable to consume fewer processed products high in simple carbohydrates and saturated fats. This is because bacteria from the Firmicutes group preferentially break down these substances. Unlike Bacteroidetes, it is believed that Firmicutes have a greater tendency for fat storage than other gut bacteria.

If you experience gut discomfort, physical impairments due to improper diet, or lack of improvement after dietary changes, it is recommended to consult a nutritionist or physician for further information.

Dietary recommendations based on enterotypes

Enterotype 1 is often associated with a high consumption of animal-based foods. Therefore, for this enterotype, an increased intake of fibre-rich (prebiotic) foods is recommended to promote microbiome diversity. Additionally, plant-based protein sources such as legumes can replace animal protein sources, as consuming animal products is associated with increased intake of saturated fats. On the other hand, the World Health Organization (WHO) recommends choosing foods with unsaturated fats (e.g., nuts) as the preferred fat source [WHO, Healthy diet, 29.04.2020].
The dominant gut bacteria of enterotype 1 mainly produce vitamins biotin, B2, B5, and C, so attention should be paid to adequate intake of other vitamins [21][22].

Enterotype 2 is characterized by a plant-based diet, resulting in a high intake of fibre. Unlike plant-based protein sources, most animal-based foods contain all essential amino acids (building blocks of proteins). Therefore, soy products such as soy milk, soy yogurt, and tofu should be included in the diet frequently, as soy is one of the few plant-based protein sources that contains all essential amino acids in larger quantities [82]. Additionally, incorporating various protein sources (lentils, beans, chickpeas, soy products, etc.) into your diet ensures sufficient intake of all essential amino acids.

The dominant gut bacteria of enterotype 2 mainly produce vitamin B1 and folate, so attention should be paid to adequate intake of other vitamins [21][22]. In a diet rich in plant-based foods, sufficient intake of vitamin B12 should also be ensured, as this vitamin is scarce in plant-based foods [83].

Enterotype 3 is typically observed in individuals who consume both animal-based and plant-based foods. As with all dietary patterns, it is important to make the daily food intake varied and high in fibre to supply the body with all nutrients. Therefore, it is recommended to follow the general dietary recommendations of the WHO [WHO, Healthy diet, 29.04.2020] and incorporate as much fruit, vegetables, legumes, and unprocessed grain products into your daily meals while avoiding excessive salt and sugar consumption. Additionally, prioritize foods rich in unsaturated fats and low in saturated fats.

How can I support my metabolism?

Analysing the protein, fat, and carbohydrate metabolism, as well as vitamin production, provides information about your intestinal mucosa and the supply of vitamins by gut bacteria.

A sufficient intake of **proteins** through diet is important to support the body in all its functions. However, an excessively high protein content in the diet can not only alter the composition of the microbiome but also promote health problems [28][30]. Therefore, aiming for an average breakdown of proteins in the gut is recommended. In case of significant deviations, we recommend adjusting your diet and, if necessary, seeking advice from a nutritionist.

Adequate digestion of indigestible **carbohydrates** promotes your health through bacterial diversity in the gut and the production of gut-protective substances. If your microbiome indicates a lower ability to process long-chain carbohydrates, you should incorporate more fibre-rich and plant-based foods into your diet and potentially minimise the consumption of refined sugar. Increased sugar consumption not only alters the composition of the microbiome but also promotes the accumulation of body fat [14][34].

Fats complement proteins and carbohydrates as an energy source in the diet. You should aim to cover about 30% of your daily energy needs through fats and avoid a caloric surplus through high fat intake, which can increase the risk of obesity.
However, avoiding fat-rich foods is not recommended, as unsaturated omega-3 fatty acids found in fatty fish and walnuts are essential for the body and can only be obtained through diet. Generally, unsaturated fats are healthier for the body and should therefore make up the majority of fat intake. These fats are mainly found in plant oils such as olive oil and flaxseed oil. If your results indicate increased fat intake or a high proportion of saturated fats, you should consciously incorporate unsaturated fats from plant oils into your meal plan.

If your microbiome contributes less to the production of certain **vitamins** compared to healthy reference individuals, it does not necessarily mean you have a vitamin deficiency. A lower number of vitamin-producing bacteria (specific for each vitamin) simply suggests that the daily requirement of these vitamins should be largely met through diet. Even though bacteria contribute to vitamin uptake through their own production of vitamins, it is advisable to prefer a diet rich in vitamins and pay particular attention to adequate intake of the vitamins mentioned in your results section. Additionally, the daily vitamin requirements can also be met or supported through the intake of dietary supplements.

What do my results say about my intestinal mucosa?

The production of butyrate by gut bacteria is an important step in the development and maintenance of the intestinal mucosa [32]. Inflammation-promoting bacteria and low levels of butyrate-producing bacteria indicate an irritated intestinal mucosa. If you have found low levels of butyrate-producing bacteria in your gut, you should pay more attention to a fibre-rich diet to promote these bacteria in your gut. Additionally, if you have increased amounts of Proteobacteria, especially in combination with intestinal discomfort, you should consult a doctor to identify possible chronic inflammatory processes in the gut.

Gut-Brain-Axis

Depression is one of the most common mental disorders affecting a growing number of people, particularly in the Western world. In addition to the influence of the microbiome on various processes in the brain, changes in behaviour and eating habits often accompany depression [47]. This means that dysbiosis can be further exacerbated by the symptoms of the illness itself. Dysbiosis may not only contribute to the underlying condition but also lead to a reduced production of vitamins, butyrate, or other substances in the gut. Therefore, a balanced, fibre-rich diet should be emphasized in individuals with mental disorders, and assistance with cooking, for example, should be provided. This could alleviate digestive problems often associated with conditions like depression and support the adequate absorption of nutrients.
Some studies have also linked lower intake of omega-3 fatty acids and vitamin D to depression, suggesting that individuals with mental disorders should increase their consumption of omega-3-rich foods such as walnuts, flaxseeds, and fatty fish. Additionally, daily walks in the sunlight should be incorporated into one's routine to ensure sufficient vitamin D production. In winter months with limited sunlight, it is important to supplement with vitamin D to prevent deficiency [78]. Furthermore, it is advisable to incorporate a variety of protein sources to meet the body's requirements for the amino acid tryptophan, as tryptophan is needed for the production of the happiness hormone serotonin [79].

Gut-Skin-Axis

Skin conditions such as psoriasis and eczema are often accompanied by chronic inflammation, especially in the gut. Therefore, it is increasingly believed that diet plays a significant role in the progression of these diseases. The underlying inflammation in the gut is caused by a disrupted intestinal mucosa, allowing unwanted harmful substances to be absorbed from the gut [57]. The production of a substance called butyrate by bacteria is crucial for the formation and maintenance of the intestinal mucosa. Therefore, butyrate-producing bacteria in the gut should be promoted through a fibre-rich diet and the intake of probiotics. While sugar promotes inflammation in the body, unsaturated fatty acids have anti-inflammatory properties. A low-sugar diet rich in unsaturated fatty acids can positively influence the course of skin diseases. In particular, eczema is often associated with food allergies, so it is important to investigate any potential intolerances that may promote inflammatory processes when consuming certain foods, especially in cases of eczema [50].

Gut-Heart-Axis

In addition to reduced physical exertion in the form of exercise and smoking, dietary habits and resulting conditions such as obesity and diabetes significantly contribute to the risk of cardiovascular diseases. A diet rich in saturated fats from animal products and trans fats from processed foods leads to an excess of fats in the bloodstream. The excessive circulation of blood fats is further facilitated by increased sugar intake, as the body converts excess sugar into fats. These fats are either stored as reserves in adipose tissue (promoting obesity and diabetes) or deposited as plaques in blood vessels. The accumulation of plaques in blood vessels is a gradual process. The resulting narrowing of blood vessels leads to increased blood pressure, requiring the heart to exert more force to pump blood. Over time, this can result in the blockage of blood vessels and subsequently lead to stroke or heart attack. Therefore, it is advisable to avoid saturated fats and products high in sugar and trans fats as much as possible. According to current scientific knowledge, unsaturated fats, unlike saturated fats, do not lead to deposits in blood vessels and can even have a positive impact on cardiovascular diseases [58].

In addition to the gut microbiome, the oral microbiome also influences heart health by contributing to the regulation of blood pressure. If necessary, analysing the oral microbiome can be helpful in improving heart health.

Gut-Liver-Axis

A healthy liver, as a central organ of metabolism, is important for our overall health, and it is supported by a balanced diet rich in fibre and antioxidants [80]. Excessive consumption of saturated fats, especially from animal products, sugary beverages, and processed foods, promotes the accumulation of fat in the liver. Overweight and obesity are risk factors for liver diseases. Therefore, maintaining a healthy weight through a balanced diet and regular physical activity is important to prevent the accumulation of fat in the liver. Additionally, excessive alcohol consumption can damage the liver and increase the risk of liver diseases. It is advisable to consume alcohol in moderation or avoid it altogether.
In addition to alcohol and high consumption of unsaturated fats, smoking, excessive use of medications, and toxic chemicals burden the liver. Medications should only be taken in the recommended dosage as instructed by your doctor.

Gut-Joint-Axis

To prevent arthritis, regular exercise is important to keep the joints flexible and strong. Joint-friendly activities such as swimming, cycling, or yoga can help strengthen the joints and improve mobility. If necessary, especially if you have an existing diagnosis or joint impairment, it is recommended to consult a doctor or physiotherapist before starting a training program.

It has been shown that smoking in particular, promotes inflammatory reactions in the joints [81]. Consuming foods rich in anti-inflammatory nutrients such as omega-3 fatty acids, antioxidants, and vitamins can contribute to the prevention of these inflammatory reactions. Engaging in physical activities to regulate body weight is also a good preventive measure, as excess weight puts additional strain on the joints. A healthy diet can help reduce or maintain body weight and prevent inflammation in the joints, relieving the joints and reducing the risk of arthritis. Additionally, paying attention to good posture and ergonomic workplace design is important to avoid unnecessary strain on the joints. Using ergonomic chairs, appropriate footwear, and aids such as cushions or wrist supports can help relieve joint stress.

What should I do if I suspect pathogenic bacteria or inflammatory bowel diseases?

If you have elevated levels of pathogenic bacteria in your microbiome, it is advisable to consult a doctor (our analysis does not replace a diagnosis by a doctor!).

A positive finding of pathogenic bacteria in our report does not necessarily indicate an infection, as individual susceptibility varies and can be influenced by risk factors such as antibiotic use.

Literature

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[WHO, Healthy diet, 29.04.2020]
https://www.who.int/news-room/fact-sheets/detail/healthy-diet; Zugriff am 24.05.2023

Notes

Miscellaneous

Report created by:

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Measurement Method:

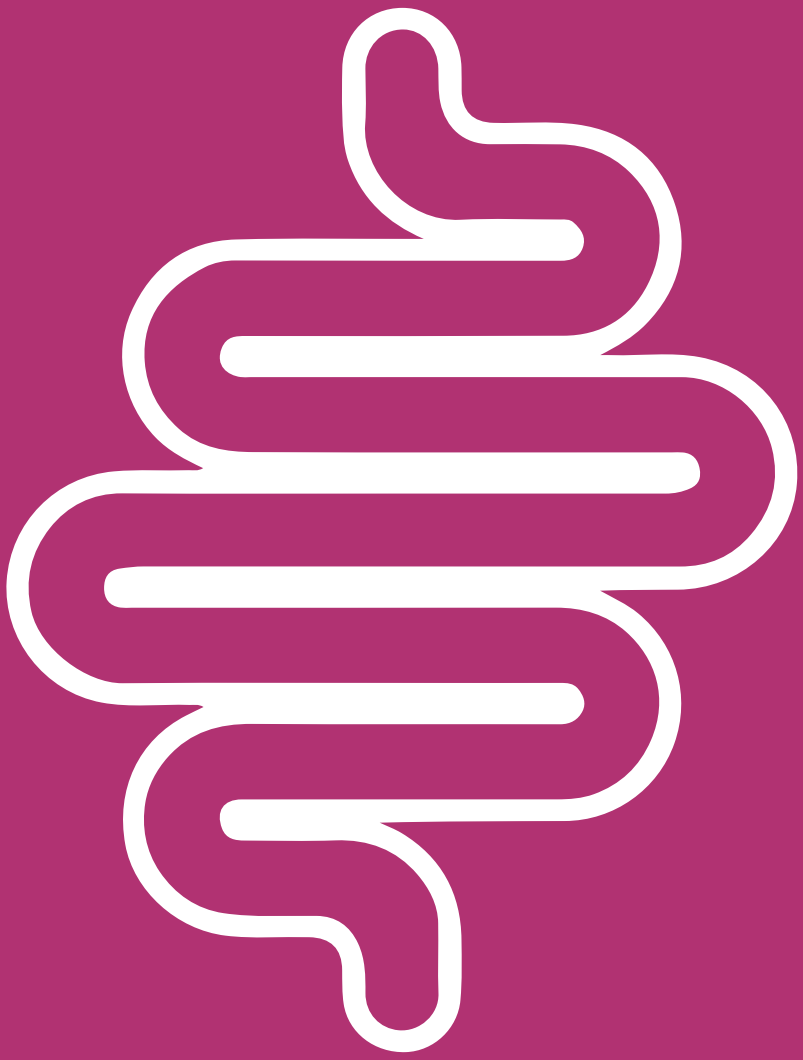
NGS
Next-Generation-Sequencing (16S rRNA Gen)

Primary sample or submitted material:

stool sample

Disclaimer:

The analysis is based on the sequencing of the 16S rRNA gene, which allows for the classification of bacterial strains in the microbiome. The results of the microbiome test and its interpretation may be incomplete. The number of detected microorganisms is not exhaustive, and there may be other microorganisms present that were not captured by the sequencing. The current interpretation of the microbiome test may change in the future as new scientific studies are published. Inaccurate or missing information can lead to misleading interpretation. This report is provided solely for informational and educational purposes and does not replace a visit to a doctor or the advice or services of a physician.



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