

Your Lady-Microbiome



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Sample-ID
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Bacterial Composition

Diversity of the microbiome (Shannon-Index)

Balance of the microbiome (Dysbiosis-Index)

Health

Endometriosis

Fertility

HPV Infection

Fungal Infection

What are bacteria doing in my vagina?

The vaginal microbiome consists of a variety of bacteria, viruses, fungi, and other microorganisms that reside in the vagina*. This community of microbes, particularly lactic acid bacteria, protects the mucous membranes and prevents the spread of harmful bacteria ^[1].

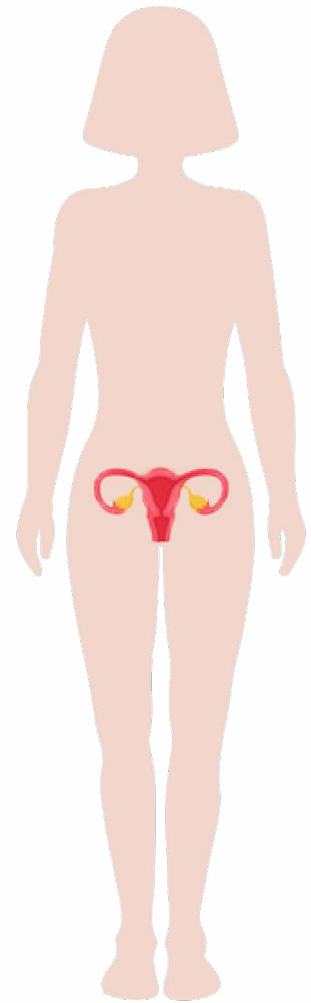
While microorganisms coexist with us humans for mutual benefit on and in our bodies, the microbiome only becomes noticeable in cases of health issues. Many of these microorganisms, especially bacteria, promote a healthy balance of the vaginal mucosa, while some „bad“ bacteria can lead to discomfort ^[2].

The composition of the bacterial community can vary from woman to woman and depends on various factors such as hormones, environment, diet, and hygiene habits. A balanced microbiome contributes to protective mucous membranes by inhibiting the spread of potentially harmful microorganisms. Just like in other parts of the body, microorganisms live in a balance that can be disrupted by external and internal influences ^{[2][3]}.

While research is still in its early stages, some studies suggest that targeted support of the vaginal microbiome may play a significant role in a healthy pregnancy and the protection of internal reproductive organs in the future. Additionally, a disrupted microbiome can affect various health issues, such as the transmission of infectious diseases. In the future, personalized prevention approaches may help protect and strengthen the bacterial community ^[3].

The vaginal mycobiome is a component of the vaginal microbiome composed of fungi. In addition to the bacterial microbiome, the mycobiome also plays a crucial role in the health and microbial balance of the vagina. ^{[33][34]}

In the following, we provide you with insights into the composition of the microorganisms in your microbiome. Over 2900 groups of bacteria in your microbiome are analyzed for this purpose. We also provide recommendations for improving vaginal health to support women's health.“



* A muscular hollow organ that connects the uterus to the vulva, which is the externally visible part of the female genitalia.

MICROBIAL COMPOSITION

Diversity of the vaginal microbiome

The diversity of the microbiome is an important indicator of its health. In most cases (e.g., in the gut), higher diversity is associated with a stable microbiome. This is because a greater variety of bacteria can help maintain the balance of the microbiome and limit the growth of harmful bacteria. However, the vaginal microbiome is primarily composed of lactic acid bacteria, so diversity in the vagina is naturally lower than in other parts of the body.

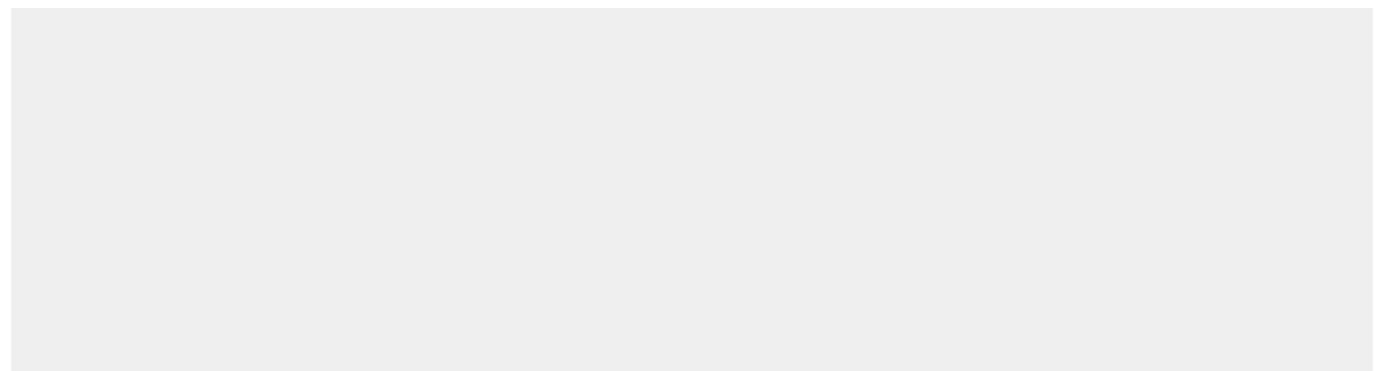
The Shannon Index is used to assess diversity and provides information about the bacterial diversity in your vaginal microbiome. A high value indicates that the microbiome community is relatively diverse. In the case of the vaginal microbiome, this often suggests a decrease in beneficial lactic acid bacteria.

MICROBIAL COMPOSITION

Dysbiosis of the vaginal microbiome

The Dysbiosis Index is another way to assess the balance of the microbiome. Dysbiosis refers to an imbalance in the bacterial groups in the vagina. The microbiome is compared to the average composition of reference individuals to determine dysbiosis ^[1].

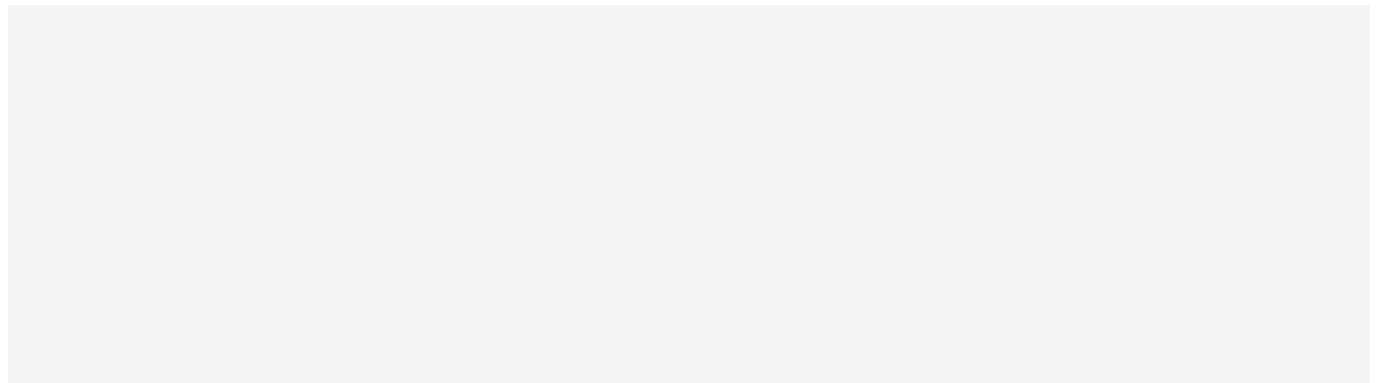
A low Dysbiosis Index value (green range) indicates a balanced microbiome, while high values (red range) are associated with dysbiosis. Vaginal microbiome dysbiosis is not a disease but increases the risk of bacterial vaginosis, where harmful bacteria that typically do not thrive in the vagina can overpopulate ^[2].



Is there a connection between the vaginal microbiome and endometriosis?

Endometriosis is a painful and complex condition in which tissue that normally lines the uterus grows outside the uterus. This abnormal growth can lead to inflammation, severe menstrual pain, pain during intercourse, and other severe symptoms, including infertility. Estimates suggest that about 10% of women of childbearing age are affected by endometriosis. While the exact cause of endometriosis is not fully understood, there is evidence to suggest that the vaginal microbiome could play a role in this condition ^[4].

Studies have shown that the bacterial community in the vagina of women with endometriosis may differ in composition and diversity compared to healthy women. It is suspected that these changes may exacerbate inflammatory reactions in the pelvic area and contribute to the development or worsening of endometriosis, including the growth and spread of uterine tissue. Below, we provide an overview of the bacteria that are present in altered amounts in the vaginal microbiome of women with endometriosis. These bacteria include *Gemella* and *Atopobium* ^{[5][6]}.



How does the vaginal microbiome affect female fertility?

Fertility, the ability to conceive or receive offspring, is an important aspect of women's reproductive health and a central theme in family planning. While many couples have no fertility issues, fertility problems can be a distressing challenge for others. Common causes of fertility problems include hormonal disorders, often associated with irregular or absent periods and issues with the reproductive organs, such as endometriosis. Male factors, such as reduced sperm quality or quantity, can also lead to infertility. Age also plays a role, as fertility in women tends to decrease after the age of 30 ^{[7][8]}.

In recent years, research has begun to investigate the potential link between vaginal bacteria and fertility more closely. The microbiome plays an important role in maintaining vaginal health. It is believed that a healthy vaginal microbiome increases the likelihood of successful implantation of a fertilized egg in the uterus. A balanced community of bacteria provides protection against infections that could affect the reproductive organs or implantation. Additionally, early studies suggest that the vaginal microbiome and female hormones may influence each other ^{[8][9][10]}.

Below, we provide an overview of the bacteria associated with infertility in women. These bacteria include *Staphylococcus* and *Enterococcus*, among others ^{[8][10]}.

How does the microbiome change with HPV infections?

Human papillomaviruses (HPV) are a group of viruses that can infect the skin and mucous membranes, including the genital areas of both men and women. HPV infections are widespread worldwide, with most people becoming infected with HPV at least once in their lifetime. In women, HPV infections are particularly relevant as some strains of the virus are associated with various health issues, including cervical cancer^{[11][12]}.

HPV is highly contagious and is mainly transmitted through sexual contact. There are many different strains of HPV, some of which are harmless and do not cause symptoms. Other strains can cause genital warts, while still others are considered high-risk strains because they can increase the risk of cervical cancer^[11]. HPV infections, especially by high-risk strains like HPV-16 and HPV-18, can increase the risk of cervical cancer. This occurs when the virus penetrates the cells of the cervix and causes changes in the cells that can ultimately lead to cancer^[13].

It is increasingly being researched whether the vaginal microbiome could play a role in HPV infections. Some studies have suggested that women with a balanced microbiome may have a lower risk of HPV infections. The beneficial bacteria in the vagina could strengthen the vagina's defense mechanisms and make it more difficult for the virus to penetrate. Additionally, it is possible that an HPV infection itself may influence the bacterial community in the vagina^{[11][2][11]}.

Below, we provide an overview of the bacteria associated with HPV infections. It has already been shown that, among others, *Prevotella* and *Sneathia* are elevated in women with HPV infections^{[12][13][14]}.

Does my microbiome promote the growth of fungi in the vagina?

Candida albicans is the most common fungus found in the vagina and is a natural component of the vaginal microbiome. Normally, *Candida* does not cause issues. However, under certain circumstances such as hormonal changes during pregnancy, breastfeeding, or menopause, antibiotic use, or a weakened immune system, *Candida* can overgrow and lead to a fungal infection.

A fungal infection in the vagina, also known as vaginal fungal infection or vaginal candidiasis, can cause unpleasant symptoms. The most common symptoms include itching in the vaginal area and a burning sensation, especially during urination or intercourse. Additionally, the vaginal discharge may be altered, often becoming thick and white during an infection.

Some women experience recurrent fungal infections, which may also indicate other health issues such as diabetes and a weakened immune system. In pregnant women, fungal infections can lead to complications. Untreated fungal infections also increase the risk of sexually transmitted infections. Women with diabetes or a weakened immune system are at a higher risk of more severe fungal infections. ^{[33][34]}

Below, we provide an overview of the most common fungi in the vaginal microbiome and whether they occur in elevated amounts in your case. ^{[35][36]}

Candida albicans

Candida glabrata

Candida krusei

Candida parapsilosis

Candida tropicalis

Your Result:

A result in the green range indicates that no pathogenic fungi were found in elevated amounts, while results in the red range mean that elevated levels of the respective fungus are present in your vagina. If your result is not in the green range, it should be clarified by a doctor.

RECOMMENDATIONS

How can I support the health of my vagina?

A healthy microbiome plays a crucial role in maintaining vaginal health and protecting against infections by creating an acidic environment in the genital area that restricts the growth of harmful microorganisms ^[1].

Vaginal health can be promoted through a healthy lifestyle and specific measures to maintain it. A balanced diet rich in fiber, fruits, and vegetables can help promote a healthy microbiome. Hormones play a significant role in regulating the vaginal microbiome ^{[15][16]}. During the menstrual cycle, the bacterial composition naturally undergoes changes. Estrogen levels rise before ovulation, promoting the growth of lactic acid bacteria, the „good“ bacteria that maintain the acidic environment. After menopause, estrogen levels decrease, which can lead to changes in the vaginal microbiome ^{[17][18]}. Some studies suggest that hormones in meat products may have an impact on the vaginal microbiome. In particular, hormones used in livestock farming to promote growth could potentially enter meat and affect hormonal balance in the body ^[19]. This could potentially result in changes in bacterial composition. Choosing meat products from organic or hormone-free sources can minimize the hormonal influence on the vaginal microbiome. Antibiotics can disrupt the microbiome, so they should only be taken as prescribed by a doctor, in the full prescribed dose ^[20].

Aggressive intimate care products can disrupt the balance. Therefore, it is preferable to use mild, pH-neutral soaps. Using a condom during sexual intercourse reduces the risk of sexually transmitted infections that can negatively affect the vaginal microbiome. Regular check-ups are essential to monitor the health of your vagina and vaginal microbiome ^[21]. Additionally, avoiding chronic stress is important, as it weakens the immune system and can thus influence the vaginal microbiome.



RECOMMENDATIONS

How can I support the health of my vagina?

Furthermore, choosing the right underwear can support vaginal health. Synthetic fabrics like nylon, polyester, and spandex are widespread in many types of underwear. These materials are often chosen for their durability and low cost but are not recommended for a healthy vagina ^[22]. The vaginal environment is naturally moist and warm and benefits from good airflow. Synthetic fabrics tend to trap moisture and reduce airflow, creating an ideal environment for bacterial growth. This can lead to an imbalance in the vaginal microbiome and promote infections, including bacterial vaginosis. There is evidence that wearing synthetic underwear, especially in women already prone to vaginal infections, can increase the risk of bacterial vaginosis. Women who experience recurrent infections may consider switching to underwear made of natural materials like cotton, as these can contribute to better ventilation and moisture regulation. Additionally, especially in cases of increased susceptibility to vaginal infections, it is important to avoid wearing thongs and G-strings, as these types of underwear can transfer bacteria from the anal area to the vaginal area. Therefore, it is also important to wipe from front to back after using the toilet to prevent the spread of intestinal bacteria to the vagina, especially if there is already an increased susceptibility to bacterial vaginosis. In addition, the thin straps of thongs and G-strings can cause friction and irritation during movement. These irritations can compromise the vaginal barrier and facilitate the penetration of harmful bacteria.



RECOMMENDATIONS

What is recommended for suspected endometriosis or for those already diagnosed with endometriosis to relieve symptoms?

If you suspect endometriosis, especially due to severe menstrual pain, you should consult a specialist in gynecology who specializes in the diagnosis and treatment of endometriosis. It is helpful for the treating physician to note the symptoms, their duration, and their intensity in advance ^{[4][5]}. Imaging techniques such as ultrasound or magnetic resonance imaging (MRI) can identify anomalies in the pelvic area indicative of endometriosis. The definitive diagnosis of endometriosis often requires a laparoscopy, a minimally invasive surgery ^[23]. During this procedure, the doctor can take tissue samples and assess the extent of the disease. Treatment options following a diagnosis include pain medication and hormonal therapies. Hormonal preparations can be used to regulate menstrual cycles and reduce the growth activity of endometriosis tissue. This can alleviate pain and inflammation. In some cases, surgery may be required to remove the endometriosis tissue. This can often be done minimally invasively and depends on the severity of endometriosis and other individual factors.

A healthy diet rich in fruits, vegetables, whole grains, and lean protein sources can reduce inflammation in the body. Some women experience an improvement in their symptoms by avoiding foods that may promote inflammation, especially sugary and processed foods ^[24]. Simultaneously, anti-inflammatory foods such as fatty fish (e.g., salmon), berries, leafy greens, nuts, and seeds can support symptom relief. Some studies suggest that the consumption of red meat, especially processed meat, may be associated with a higher risk of endometriosis. It is advisable to reduce red meat consumption or switch to lean meat and plant-based protein sources. Stress can worsen the symptoms of endometriosis, so stress management techniques such as regular exercise, adequate sleep, and relaxation exercises can help reduce stress.

RECOMMENDATIONS

How can fertility be promoted?

If there is suspicion of infertility due to symptoms during the menstrual cycle or difficulties in conceiving, a doctor who specializes in fertility should be consulted. Through various examinations, fertility and potential issues can be determined. These examinations include blood tests to check hormone levels, ultrasound examinations to assess the ovaries and uterus, and semen analyses for the partner to assess sperm quality. Fertility problems can often be treated with professional assistance, thanks to the current state of research. Various treatment options include hormonal therapies and in vitro fertilization (IVF) ^[25].

Fertility can be promoted through a combination of a healthy lifestyle, a balanced diet, and stress-reducing measures. In addition to an adequate intake of fruits, vegetables, whole grains, low-fat protein sources, and unsaturated fats in the diet, folic acid, iron, vitamin D, and omega-3 fatty acids are particularly important for fertility ^[26]. If necessary, it is advisable to take these nutrients as supplements in consultation with a doctor. Maintaining a healthy weight within the normal range is important, as overweight can affect fertility ^[27]. It is recommended to avoid or significantly reduce alcohol consumption and quit smoking, as excessive alcohol consumption and smoking can negatively affect fertility. Additionally, stress should be reduced, as chronic stress can negatively impact fertility. Regular physical activity is important for a healthy lifestyle. However, excessive exercise may have the opposite effect under certain circumstances ^[28].

The fertile phase in a woman's menstrual cycle can vary, but it typically falls in the middle of the cycle. The average menstrual cycle is about 28 days, with the first day of menstruation considered as day 1. In a 28-day cycle, ovulation usually occurs around day 14. Sperm can survive in the female reproductive tract for up to five days, and the egg is fertile for about 12-24 hours after ovulation ^[29]. Therefore, a period of about 6 days is often considered the fertile phase - the 5 days before ovulation and the day of ovulation itself. Therefore, timing intercourse correctly on a woman's most fertile days is important to increase the chances of pregnancy.

RECOMMENDATIONS

How can fertility be promoted?

Tracking the menstrual cycle can be supported by the basal temperature method. Basal temperature is the body's resting temperature. This method involves daily measurement of basal temperature every morning at the same time before getting out of bed. The temperature usually rises slightly after ovulation has occurred. Once the menstrual cycle has been tracked over several months, the day of ovulation can be more accurately predicted. Additionally, the consistency and appearance of cervical mucus change during the menstrual cycle. During ovulation, the mucus typically becomes clearer and more stretchy. In some cases, fertility tests can assist in determining ovulation. An ovulation test detects the rise in LH hormone in the urine, which typically occurs about 24-48 hours before ovulation, so positive test results can indicate impending ovulation^[30].

Infertility in women can be influenced by a variety of factors. Irregular or absent menstrual cycles may indicate hormonal problems that can affect fertility. Blocked or damaged fallopian tubes can prevent the egg from reaching the uterus, while uterine abnormalities can hinder the implantation of a fertilized egg.



What is recommended if there is suspicion of an HPV infection?

If there is suspicion of an HPV infection due to changes in the bacterial community, it is advisable to consult a gynecologist who will then make a diagnosis. Most HPV infections resolve on their own and do not require treatment. A healthy lifestyle, including a balanced diet, regular exercise, and adequate sleep, can help strengthen the immune system in fighting the HPV infection. If action is needed, your doctor will recommend the best steps for treating or monitoring the HPV infection based on your individual circumstances. If you have not already been vaccinated against HPV, vaccination may be considered depending on your health status. When sexual activities, especially sexual intercourse, are involved, barrier methods such as condoms (for both women and men) should be used to reduce the risk of HPV transmission ^[31].

Preventing HPV infections is important to reduce the risk of serious health problems, including cervical cancer. HPV vaccination can protect against the most common high-risk HPV types that can cause cancer, among other conditions. Vaccination is particularly effective when administered at a young age, before sexual activity begins. While condoms do not offer one hundred percent protection, they can reduce the risk of an HPV infection. Using condoms during sexual activity, especially with multiple sexual partners, can help minimize the transmission of HPV. Regular gynecological examinations and Pap smears are part of the early detection of HPV infections and related conditions. Therefore, regular check-ups should be attended. A healthy lifestyle that promotes immune system strength can make it more difficult for HPV to spread in the body. Smoking, in particular, is associated with an increased risk of HPV-related cancers ^[32].

What can I do about a fungal infection and prevent it in the future?

If you have signs or symptoms of a fungal infection in the vagina, it is important to consult a doctor to receive an accurate diagnosis and the proper treatment. Vaginal fungal infections, in particular, are typically treated with antifungals in the form of vaginal creams, tablets, or suppositories. Ensure that you use the prescribed medications according to your doctor's instructions or the instructions on the packaging. Most antifungals are applied over a specific period. During treatment, it's advisable to avoid irritating substances, such as perfumed soaps, intimate sprays, or tight synthetic underwear that could worsen the symptoms. ^[33]
^[37]

A balanced diet rich in vegetables, whole grains, and about 200g of fruit daily can strengthen the immune system and contribute to prevention. Particularly, reducing excessive sugar consumption can decrease the risk of fungal infections, as fungal growth is promoted by sugar.

It is also highly beneficial if underwear is washed at a minimum of 60°C. Additionally, breathable cotton underwear supports a healthy microclimate by wicking moisture away from the vaginal area. Loose-fitting clothing also contributes to air circulation. If the intimate area is regularly shaved, the razor should always be disinfected before use.

Aggressive hygiene products and the unnecessary use of antibiotics can disrupt the balance of the vaginal microbiome, promoting the proliferation of fungi. ^[37]^[38]

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Miscellaneous

Results report prepared by:

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Measuring method:

NGS

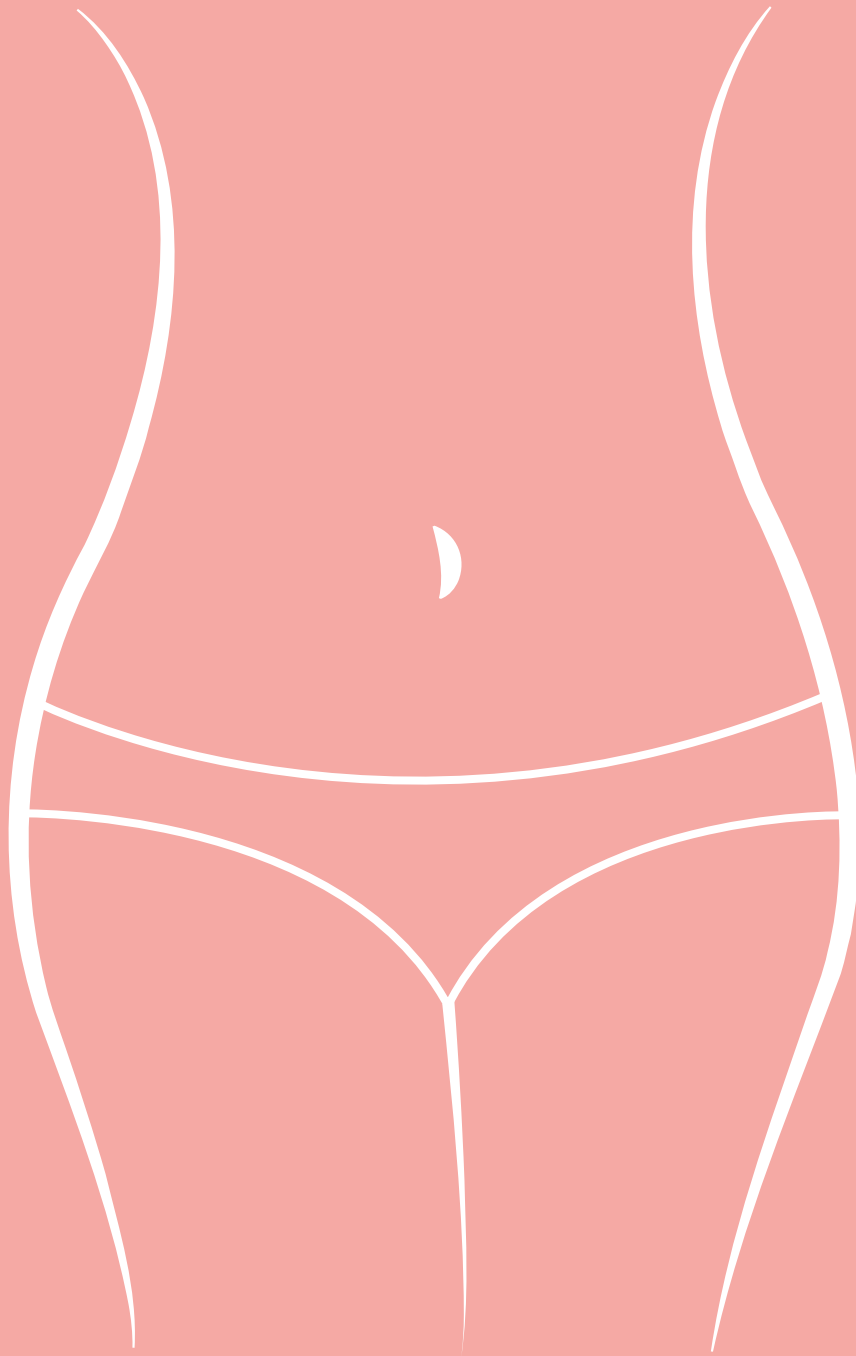
Next-Generation-Sequencing (16S rRNA Gene and ITS)

Primary sample or submitted material:

Vaginal 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 is based on data from adult reference individuals and may change in the future due to the publication of new scientific studies. 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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