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Vaginal Microbiome – Patient Report

Name	Test User	**Age**	24
Country	United Kingdom	**Sample ID**	649317209708V
Sampling Date	01 Jan 2025 23:03	**Test Profile**	Vaginal Microbiome - Shotgun

Results at a glance

Microbiome balance	Unbalanced	**Beneficial bacteria**	Low protection
Health risks	Follow up (4 risks)	**Other Pathogens**	None detected

Welcome to your vaginal microbiome report.

The vaginal microbiome is the population of microorganisms that live in the vagina, including bacteria, fungi and viruses, and these microorganisms have a complex network of interactions with each other and with their human host. The vaginal microbiome has been linked to some very important health outcomes, including the risk of developing bacterial vaginosis or thrush, issues with fertility, pregnancy complications, and problems around menopause.

This test uses a technology called shotgun sequencing which is able to detect any type of microbe that may be in your sample. We report on the presence of beneficial bacteria, and also for bacteria and other microorganisms that could cause infections. Your results will give you an insight into the health of your vaginal microbiome, and may help you understand what the problem might be if you have any unwanted symptoms or recurrent infections. This report can be used to signpost you towards appropriate medical advice and further investigations, and help you make beneficial lifestyle choices.

This test is for your personal health research and results do not constitute a diagnosis. Any findings should be interpreted with the help of a healthcare professional before making decisions about whether treatment is required and which treatment is appropriate. Any discussion of possible treatments in the report is for general information to help you understand your choices.

This test can detect most of the common sexually transmitted infections (STIs) but only if the levels of microbe are high enough. This test should not be used as a replacement for more sensitive conventional STI tests, which are free in the UK via the NHS.

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This report will guide you through the key aspects of the vaginal microbiome that influence your health and wellbeing – section names are clickable. Background information and actionable advice is provided throughout. If you are new to vaginal microbiome testing you may want to check out the key terms first.

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The balance of the microbes in your microbiome is the key to good vaginal health.

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Microbiome balance

Here we look at the balance of microbes in your vaginal microbiome and give an insight into which have the biggest influence on your vaginal health.

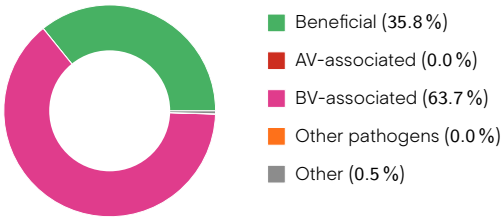
Background info: Microbiome balance

A healthy vaginal microbiome is dominated by **lactic-acid producing bacteria**☆, usually species of *Lactobacillus*, which create a protective vaginal environment. Other microbes are associated with different kinds of infection, grouped here into three categories: microbes associated with **bacterial vaginosis**☆; microbes associated with **aerobic vaginitis**☆; and other **pathogens**☆ such as **yeasts**☆ or STIs.

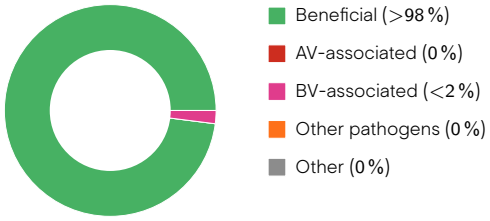
When you go through your report, keep in mind that the results are a snapshot of a dynamic, changing ecosystem. Whilst most people have a similar interaction between their body and the microbes present in it, certain individuals may be more sensitive or susceptible to infections. You should interpret your results in the context of any symptoms you have, ideally with the help of a trained healthcare professional; these results alone cannot be used to diagnose any disease.

Your microbiome balance is: Unbalanced

Your sample



Optimal sample



Your vaginal microbiome is unbalanced, with higher than normal levels of microbes associated with infections. The following sections of the report will give more information about which microbes are present and how they may be affecting your health.

Your vaginal pH

You reported a high measurement of pH 6 which could indicate an unhealthy vaginal environment.

Most abundant microbes

The table below lists the most abundant microbes in your vaginal microbiome. For a complete list of all detected microbes see the **Full taxonomy report**☆ section. Click on any microbe name for more information.

Taxonomic name	Group	Abundance (0 20 40 60 80 100)
Gardnerella vaginalis	BV-associated	46.1 %
Lactobacillus jensenii	Beneficial	30.7 %
Fannyhessea vaginae	BV-associated	10.8 %
Lactobacillus gasseri	Beneficial	4.8 %
Ureaplasma parvum	BV-associated	1.4 %
Prevotella corporis	BV-associated	1.4 %
Prevotella disiens	BV-associated	1.4 %
Hoylesella timonensis	BV-associated	0.6 %
Aerococcus christensenii	BV-associated	0.5 %
Gardnerella piotii	BV-associated	0.4 %

+10 more taxa (see **Full taxonomy report**☆)

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Health risks

Summary

Click on a health risk to jump to a detailed assessment.

Bacterial vaginosis (BV)	High risk
Aerobic vaginitis (AV)	Low risk
Sexually transmitted infections (STIs)	No STIs detected
Pelvic inflammatory disease (PID)	Possible risk
Cytolytic vaginitis (CV)	Low risk
Fungal/yeast infection (Thrush)	Yeast or fungi detected
Urinary tract infections (UTIs)	Medium risk

Background info: The vaginal microbiome and health

Vaginal health is important at all **life stages**☆ because early minor infections can progress to more serious infections and enable harmful secondary infections. If the protective state of the vaginal microbiome is disrupted, for example by a hormonal shift or antibiotics, then pathogenic bacteria such as *Gardnerella* can begin to grow causing a minor infection. The most common infections are **bacterial vaginosis**☆ and **aerobic vaginitis**☆.

Having an ongoing infection with reduced levels of protective bacteria means it is easier for other pathogens to join the infection. More advanced infections typically involve many different species that together make the infection harder to treat, for example through the formation of biofilm structures that protect the pathogens. The infection may then spread from the vagina to higher up the reproductive system, affecting the uterus (womb), fallopian tubes and ovaries. This can cause **pelvic inflammatory disease (PID)**☆, or lead to infertility or pregnancy complications.

Protection against sexually transmitted infections (STIs) is also reduced when the vaginal microbiome is disrupted. Some STIs may contribute to pelvic inflammatory disease and reproductive problems. Others, such as HIV or HPV, cause serious illness including cancer.

When reviewing these results please remember that the majority of vaginal infections are easily treatable, especially if detected early. Many symptoms are shared by different infections – see the **Symptom comparison chart**☆ to compare. These results do not equate to a diagnosis, and the information here should be interpreted alongside your symptoms and medical history before any decisions are made about treatments or lifestyle changes. You can review personalised suggestions for improved vaginal health in the **Recommendations**☆ section.

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Bacterial vaginosis (BV)

Background info: Bacterial vaginosis

BV☆ is a very common vaginal infection, caused by over-growth of anaerobic microbes when levels of protective bacteria drop. There are often no symptoms, though changes in vaginal discharge are common. Antibiotics and lifestyle changes can help treat BV and prevent reoccurrence.

Microbiome result

High risk; BV microbes make up 63.7 % of your microbiome

Taxonomic name	Group	Abundance	0 20 40 60 80 100
Gardnerella vaginalis	BV-associated	46.1 %	
Fannyhessea vaginae	BV-associated	10.8 %	
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Gardnerella piotii	BV-associated	0.4 %	
Peptoniphilus sp. SAHP1	BV-associated	0.3 %	
Prevotella bivia	BV-associated	0.3 %	
Porphyromonas asaccharolytica	BV-associated	0.2 %	
Finegoldia magna	BV-associated	0.2 %	
Hoylesella buccalis	BV-associated	0.2 %	

Symptoms summary – Symptoms relevant to this health risk are highlighted

Symptom	Sample information
Discharge odour	Fishy
Discharge colour	Yellow or green
Discharge consistency	Thick and lumpy
Vulvovaginal itching	No
Vaginal pH	High

Assessment

Your risk of BV is high, based on your microbiome result. As BV is often asymptomatic, your reported symptoms are not used in the risk calculation. However, having many symptoms may indicate a more advanced infection. See the **Recommendations**☆ section for advice on maintaining a healthy vaginal microbiome.

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Aerobic vaginitis (AV)

Background info: Aerobic vaginitis

AV☆ is similar to BV, but with aerobic (oxygen-using) microbes causing the infection. Vaginal discharge is likely to be different to a BV infection, and symptoms of pain and inflammation are more likely. AV can occur alongside BV in a mixed infection. Antibiotics are usually effective at treating AV.

Microbiome result

Low risk; AV microbes make up 0.0 % of your microbiome

Symptoms summary – Symptoms relevant to this health risk are highlighted

Symptom	Sample information
Discharge odour	Fishy
Discharge colour	Yellow or green
Discharge consistency	Thick and lumpy
Vulvovaginal itching	No
Vulvovaginal redness or inflammation	No
Vulvovaginal pain	Some (after sex)
Vaginal pH	High

Assessment

Your risk of AV is low, based on your microbiome result. Excluding pH, you also reported one or more symptoms of AV. Note that AV is sometimes asymptomatic, but equally some people experience AV symptoms from very low levels of pathogenic microbes. Also remember that AV symptoms are often similar to STI symptoms. Check out your STI results next, and see the **Recommendations**☆ section for suggested next steps.

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Sexually transmitted infections (STIs)

Background info: Sexually transmitted infections

STIs are often symptomless but can lead to serious complications including infertility and cancer. Bacterial STIs can share symptoms with other vaginal infections, and may co-occur with them. This test should not be used as a replacement for more sensitive conventional STI tests: a negative result here is not a diagnosis of no infection.

Microbiome result

No STIs detected

Symptoms summary – Symptoms relevant to this health risk are highlighted

Symptom	Sample information
Discharge odour	Fishy
Discharge colour	Yellow or green
Discharge consistency	Thick and lumpy
Vulvovaginal itching	No
Vulvovaginal redness or inflammation	No
Vulvovaginal pain	Some (after sex)
Vaginal pH	High
Pain when urinating	No

Assessment

No STIs were detected, but **this test should not be used as a replacement for more sensitive conventional STI tests**: a negative result here is not a diagnosis of no infection. You have two or more symptoms that are consistent with an STI. If you suspect that you might have an STI then visit your doctor or local sexual health clinic for further testing and treatment options.

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Pelvic inflammatory disease (PID)

Background info: Pelvic inflammatory disease

PID[☆] is an advanced vaginal infection that has spread upwards to the uterus, fallopian tubes, or ovaries, and can have serious consequences including infertility. PID could start as BV, AV or as certain STIs, so these infections are all risk factors for BV.

Microbiome result

Possible risk of PID: High BV risk

Symptoms summary – Symptoms relevant to this health risk are highlighted

Symptom	Sample information
Non-menstrual abdominal pain/tenderness	Reported
Bleeding between periods	No
General symptoms of infection	No
Discharge colour	Yellow or green
Discharge odour	Fishy

Assessment

Your microbiome results show a risk of infection, and you reported one or more specific symptoms of PID, which means there is a medium risk of PID. This is an indication of risk, not a diagnosis. As PID can lead to more serious complications it is important to seek treatment as soon as possible, so trust your instincts about your health and seek professional advice if you are concerned.

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Cytolytic vaginitis (CV)

Background info: Cytolytic vaginitis

CV[☆] is caused by an overgrowth of normally protective lactic acid bacteria, and often causes symptoms of irritation or pain, though it is extremely unlikely to cause serious complications.

Microbiome result

Your microbiome is 35.8 % beneficial microbiomes; you have a low risk of cytolytic vaginitis.

Taxonomic name	Group	Abundance	0 20 40 60 80 100
Lactobacillus jensenii	Beneficial	30.7 %	
Lactobacillus gasseri	Beneficial	4.8 %	
Lactobacillus iners	Beneficial	0.2 %	
Lactobacillus crispatus	Beneficial	0.1 %	

Symptoms summary – Symptoms relevant to this health risk are highlighted

Symptom	Sample information
Vulvovaginal itching	No
Vulvovaginal redness or inflammation	No
Vulvovaginal pain	Some (after sex)
Discharge colour	Yellow or green
Discharge odour	Fishy
Discharge consistency	Thick and lumpy
Vaginal pH	High

Assessment

It is unlikely that you have CV because you do not have a high proportion of beneficial microbes and you have two or more of the typical symptoms, though be aware that symptoms are shared with many other vaginal infections, especially yeast infections, which should always be ruled out first if CV is suspected.

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Fungal/yeast infection (Thrush)

Background info: Fungal/yeast infection

Vaginal yeast infections☆ are common, especially after taking antibiotics, during pregnancy, or for those with diabetes or weakened immune systems. Infections are often irritating or painful, but can be treated with over-the-counter medication, and rarely cause serious complications in otherwise healthy people.

Microbiome result

Yeast or fungi detected

Taxonomic name	Group	Abundance	0 20 40 60 80 100
Candida albicans	Fungal	<0.01 %	●

Symptoms summary – Symptoms relevant to this health risk are highlighted

Symptom	Sample information
Vulvovaginal itching	No
Vulvovaginal redness or inflammation	No
Vulvovaginal pain	Some (after sex)
Discharge colour	Yellow or green
Discharge odour	Fishy
Discharge consistency	Thick and lumpy
Vaginal pH	High

Assessment

Yeast or fungi detected in your sample, making it possible that you have a yeast or fungal infection. You have two or more symptoms of yeast infection, though remember that the symptoms are extremely similar to those of cytolytic vaginosis (above), and sometimes infections can be asymptomatic.

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Urinary tract infections (UTIs)

Background info: Urinary tract infections

UTIs☆ are caused by bacteria entering the urethra and travelling up to the bladder or kidneys. They are usually easily treated with antibiotics but can cause serious illness, especially in older people. A vaginal microbiome test is **not** the best way to test for pathogens that might be causing a UTI, but some useful results might be present. The vaginal and urinary microbiomes are linked, and both environments can contain bacteria that may cause infection in the other. If UTI pathogens are present in the vaginal microbiome this could be due to an ongoing UTI, or indicate a source of pathogens for recurrent infections. A lack of UTI bacteria in the vagina does not mean that no UTI is present – as this is not a urine test, ***symptom information is the most important indicator of infection***. Note that the symptoms table below does not include many relevant UTI symptoms as sample registration is tailored towards the vaginal microbiome.

Microbiome result

Your vaginal microbiome does not contain microbes that are associated with UTIs

Symptoms summary – Symptoms relevant to this health risk are highlighted

Symptom	Sample information
Pain when urinating	No
Non-menstrual abdominal pain/tenderness	Reported
General symptoms of infection	No

Assessment

Your risk of a UTI is medium as no UTI microbes were detected, but one or more symptoms were reported. This result is an indication of risk, not a diagnosis. Trust your instincts about your symptoms, including those not included here such as high urination frequency or unusual urine appearance, and contact your doctor if you are concerned.

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Symptom comparison chart

As different vaginal infections sometimes share common symptoms, this chart is designed to help you compare. Remember that not all symptoms may be present and that many infections can be asymptomatic.

Your reported symptom	Healthy	BV	AV	STI	PID	CV	Thrush	UTI
Yellow or green discharge			×	×	×			
Fishy smelling discharge		×			×			
Thick and lumpy discharge						×	×	
No vaginal itching	×							
No vaginal redness or inflammation	×	×						
Some vaginal pain after sex			×	×		×	×	
High pH (6)		×	×	×				
No pain urinating	×							
Reported abdominal pain					×			×
No symptoms of infection	×							
No non-menstrual bleeding	×							

Other pathogens

Other notable pathogens are listed here if detected. Click on any microbe name to jump to more information in the **Key microbes**☆ section.

No other pathogens from our target list were detected.

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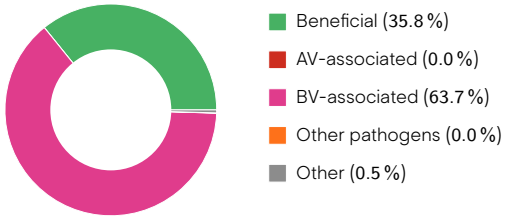
Beneficial bacteria

Beneficial bacteria make up 35.8 % of your total microbiome, a proportion which is usually associated with a high risk of infection. Your beneficial bacteria are dominated by microbes that are usually highly protective. See the **Recommendations** section for information about how to improve and maintain the proportion of beneficial bacteria in your microbiome.

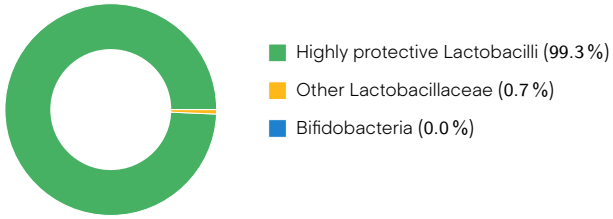
Background info: The role of lactic acid bacteria

A healthy vaginal microbiome is dominated by **lactic acid-producing bacteria**. These beneficial bacteria help to prevent infections by making the vaginal environment too acidic for other microbes to grow, and prevent other microbes from attaching to the cells lining the vagina. The most common beneficial bacteria are a few species of *Lactobacillus* that are specialised to the vaginal environment. More rarely, other microbes from the *Lactobacillaceae* or *Bifidobacterium* groups are dominant.

Your overall microbiome



Balance of beneficial bacteria



Some species of beneficial bacteria are known to create a more robust protective environment than others. Lifestyle and ethnicity influence which species are found in an individual, but the links are not yet fully understood. If your vaginal microbiome is dominated by beneficial bacteria *that is a good result, regardless of which species are present*. However, if you experience recurrent symptoms of vaginal infection, then the presence of less stably protective species might be a contributing factor. Click on any microbe name for more information.

Highly protective vaginal *Lactobacilli* – 99.3 % of your beneficial bacteria

This group includes the species *L. crispatus, L. jensenii, L. gasseri* and closely related species, and are associated with good health. These species are well adapted to the vaginal environment and provide more stable protection than other lactic acid-producing bacteria.

Lactobacillus jensenii	30.7 % of total microbiome	85.6 % of beneficial bacteria
Lactobacillus gasseri	4.8 % of total microbiome	13.3 % of beneficial bacteria
Lactobacillus crispatus	0.1 % of total microbiome	0.3 % of beneficial bacteria

Other *Lactobacillaceae* – 0.7 % of your beneficial bacteria

Lactobacillus iners is the other common vaginal *Lactobacillus* species. It has good protective properties when dominant, but is associated with less stable vaginal microbiomes. Other vaginal *Lactobacillaceae* can contribute to a healthy acidic vaginal environment, though they are less stably protective, and are more commonly found in the gut or as probiotics.

Lactobacillus iners	0.2 % of total microbiome	0.7 % of beneficial bacteria

Vaginal Bifidobacteria – None detected

This group includes species that are more usually found in gut or oral microbiomes but can occasionally create a healthy acidic vaginal environment. They have lower antimicrobial activity against pathogens and are likely to be less stably protective.

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Life stage summaries

Here you can find summaries of selected microbiome results and personal information that is relevant to important life stages.

General health

Beneficial bacteria in the vaginal microbiome are an important defence against infections. Mild infections may be asymptomatic or mildly irritating, but if left untreated could spread, making you feel very unwell and becoming harder to treat. Infections such as **BV**☆ or **AV**☆ increase the risk of secondary infections including STIs like HIV or HPV which can cause serious illness and cancer. The proportion of beneficial bacteria in your microbiome is less than optimal, making infections more likely.

Fertility

A healthy vaginal microbiome protects female fertility by preventing infections like BV, AV, or STIs that ascend higher into the reproductive tract and cause inflammation and damage in the uterus or fallopian tubes. Your BV and AV pathogen results showed a risk of infection and no STIs were detected. Repeated infections increase the risk to fertility. You reported having previous BV infections. Sexual health is important for everyone's fertility: vaginal infections may impact sperm motility, and infections of the male urinary tract (UTIs and STIs) can reduce sperm quality and production.

Pregnancy

Vaginal infections can occur during pregnancy, and there are rare but important risks associated with infections like BV and AV, such as preterm birth, miscarriage, or low birth weight. Your BV and AV pathogen results showed a risk of infection and no STIs were detected. **Thrush**☆ is common during pregnancy and is generally not considered dangerous to the foetus; yeast or other fungi were detected in your sample. Later pregnancy is usually associated with higher levels of protective bacteria due to higher oestrogen levels. However, screening for Group B Streptococcus (GBS) is recommended in late pregnancy due to the rare but potentially dangerous risk of infection for the newborn baby; this bacterium was was not detected in your sample, but this test is not a replacement for more sensitive conventional GBS tests taken between 35-37 weeks.

Menopause

Menopause is accompanied by a drop in oestrogen levels, which has the consequence of reducing the population of protective bacteria in the vagina. **Urinary tract infections**☆ are also more common after menopause, partly due to this loss of protective bacteria. Hormone replacement therapy (HRT) has been shown to restore the levels of protective bacteria; all decisions about medicines should be taken in consultation with a qualified healthcare professional. The proportion of beneficial bacteria in your microbiome is less than optimal, making infections more likely. You reported that you suffer from frequent UTIs. Sometimes microbes that are known to cause UTIs can be detected in the vaginal microbiome; UTI-associated bacteria were not detected in your sample.

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Recommendations

Here is a summary of your test results and actions you can take to improve your vaginal health. For fully personalized advice and before making any decisions about treatments, please consult with a qualified healthcare practitioner.

Health Risks

This test is intended as a tool for assessing disease risk and cannot be used to provide a formal diagnosis. Based on your microbiome analysis and the symptoms you reported, you have:

- a high risk of BV and thrush, which should be followed up with a qualified healthcare professional.
- a medium risk of PID and UTIs – continue to monitor your symptoms and follow up with a healthcare professional if you are concerned.
- a low risk of AV, STIs, and CV, but trust your instincts about your health and seek further advice if you are still concerned.

Treatment options

This information is intended to help your discussions with healthcare professionals about treatment options. It is important to treat vaginal infections, even if they are asymptomatic, because of the risk of more advanced infection, secondary infections, or transfer to a sexual partner. Taking a holistic approach to treatment, by combining lifestyle changes with medication, is more likely to lead to effective and longer-lasting rebalancing of the microbiome.

Antibiotics are usually effective at treating BV, AV, PID, UTIs and most non-viral STIs. Your doctor or other qualified healthcare professional will select an appropriate antibiotic based on the types of microbes involved and your medical history. Ask about options for the format of the medicine (e.g. tablet, cream, suppository) as some people respond better to local application of the drug.

A treatment plan may include **boric acid** which helps to acidify the vagina and break down biofilm structures that protect pathogenic microbes. Boric acid might be taken in advance of starting a course of antibiotics. Some people also benefit from supplements for **lactoferrin** (an antibacterial protein) and **vitamin D**.

Yeast infections will require **antifungal medication** that is often available without prescription. Check for the any underlying cause of the infection, such as diabetes, hormonal changes, or antibiotics.

Cytolytic vaginitis (CV) can often be treated successfully using **baking soda** products to raise the vaginal pH (make it more alkaline). Hard to treat cases may respond to antibiotics. Try to work out if the CV infection could be due to hormone levels (e.g. if experienced during the second half of your menstrual cycle) or probiotic use.

Probiotics may be useful if stably beneficial microbes are missing, particularly after illness or antibiotic treatment. Discuss possible probiotic supplements with a qualified healthcare practitioner, and be aware of any unwanted side effects such as **cytolytic vaginitis**☆. Your sample is missing stably protective lactic acid bacteria. You may benefit from a probiotic that contains one or more of the *Lactobacillus* species *L. crispatus*, *L. gasseri*, *L. jensenii*, *L. paragasseri*, or *L. mulieris*.

Hygiene and sex

The overall aim here is to minimise the disruption to your microbiome and the acidity of your vagina that can be caused by chemicals and the introduction of bacteria.

- Wash the exterior of your genitals gently with water; avoid douching or using chemical cleansing products. You reported that you douche and use washes/wipes.
- Wipe front to back. Many infections are caused by transfer of gut microbes from the anus.
- Change your period products frequently, following the manufacturer's instructions.
- Sexual partners should maintain good personal hygiene, and also aim for a healthy genital microbiome.
- Wash sex toys often and store them hygienically.
- Use condoms if possible, especially with new partners. Semen is alkaline and can disrupt the normal acidic environment of a healthy vagina, and condoms help to prevent STIs from spreading.

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General health

Overall health and lifestyle can influence the vaginal microbiome. These factors may affect the microbiome directly, for example due to the chemicals present in cigarette smoke, or as a secondary effect, for example by altering hormone levels.

- Smoking has been linked to **bacterial vaginosis**☆ and a decrease in protective **lactic acid bacteria**☆. You reported that you smoke.
- Excessive alcohol consumption may affect the vaginal microbiome, though studies are limited.
- Stress has been shown to increase the likelihood of bacterial vaginosis and hinder transition to a protective state dominated by lactic acid bacteria.

Other causes of fluctuations

Other causes of fluctuations in the vaginal microbiome are more difficult to control, but are important to keep an eye on so that you can understand which factors impact you most.

- Hormonal fluctuations during your menstrual cycle. During your period oestrogen levels are lower and menstrual blood makes the environment more alkaline, which makes it easier for potentially infectious organisms to grow. In the luteal phase high oestrogen could make cytolytic vaginitis more likely.
- Hormone changes at different life events, e.g. pregnancy, menopause. You reported that you are not pregnant and that you are not menopausal.
- Hormones as medication, e.g. contraceptives, HRT, or medication that alters hormone levels e.g. chemotherapy. You reported that you are taking hormonal contraception.
- Antibiotics may cause a decrease in levels of protective microbes – if you are prescribed antibiotics you should complete the entire course; any unintended effects on your microbiome(s) can be addressed after your infection has cleared. You reported no antibiotic use in the last 8 weeks.
- If you suffer from frequent vaginal infections, or frequent infections generally, ask your health professional to help your explore factors that may be compromising your immune system.

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Full taxonomy report

Taxonomic name	Group	Abundance	0 20 40 60 80 100
Gardnerella vaginalis	BV-associated	46.1 %	
Lactobacillus jensenii	Beneficial	30.7 %	
Fannyhessea vaginae	BV-associated	10.8 %	
Lactobacillus gasseri	Beneficial	4.8 %	
Ureaplasma parvum	BV-associated	1.4 %	
Prevotella corporis	BV-associated	1.4 %	
Prevotella disiens	BV-associated	1.4 %	
Hoylesella timonensis	BV-associated	0.6 %	
Aerococcus christensenii	BV-associated	0.5 %	
Gardnerella piotii	BV-associated	0.4 %	
Fenollaria massiliensis	Unknown	0.4 %	
Peptoniphilus sp. SAHP1	BV-associated	0.3 %	
Prevotella bivia	BV-associated	0.3 %	
Lactobacillus iners	Beneficial	0.2 %	
Porphyromonas asaccharolytica	BV-associated	0.2 %	
Finegoldia magna	BV-associated	0.2 %	
Hoylesella buccalis	BV-associated	0.2 %	
Lactobacillus crispatus	Beneficial	0.1 %	
Mobiluncus sp. Marseille-Q7826	Unknown	0.1 %	
Candida albicans	Fungal	<0.01 %	

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Key terms

Microbe / Microorganism

A general term for microscopic organisms, very small living things that can only be seen using a microscope, and include bacteria, fungi, viruses and other single-celled organisms. Microbes can exist in a huge range of environments, including soil, water, air, and they also exist on and within larger organisms (such as humans). Whilst some microbes can cause infections, many are beneficial or even essential for human health.

All organisms are classified by how closely related (or genetically similar) they are to each other, which also usually determines how similarly they behave. We normally talk about organisms at the level of *species*, which in sexual organisms describes those that are similar enough to produce fertile offspring. Species are grouped together into a *genus*. An example here would be the genus *Lactobacillus* which contains many different species that all produce lactic acid, but are adapted to exist in different environments, e.g. *Lactobacillus crispatus* in the vagina and *Lactobacillus acidophilus* in the gut. Sometimes it is useful to talk about *strains*, which are organisms from the same species that have a handful of genetic differences: these might not be important, or may result in key differences such as antibiotic resistance.

Microbiome

This is the term for a group of microbes that live in a particular habitat, either in the environment or in association with a host organism. For example, the vaginal microbiome is the collection of microbes living in the vagina, but there are microbiomes associated with almost all parts of the body, including the mouth, skin, and gut. When we talk about a microbiome we are often interested in the overall behaviours of the microbial community. For example, the vaginal microbiome could be creating an acidic environment which helps to protect against infections, and we would describe this as a healthy behaviour (or a healthy microbiome). Alternatively the combination of microbes in the vaginal microbiome might be causing inflammation, which would be an unhealthy behaviour. We can predict the behaviour of a microbiome by measuring which microbes are present and how many there are of each type.

Dysbiosis

This refers to an imbalance in a microbiome, away from a 'healthy' community of microbes, and is often associated with disease. In general this can be a useful description, but it is important to remember that the collection of microbes in a microbiome is always changing, that those changes may not always be harmful, that they are often temporary, and there is rarely only one definition of a 'healthy' microbiome. For example, many women will have temporary shifts in the make-up of their microbiome during their menstrual cycle and experience no ill effects.

Commensal

If a microorganism is commensal it is able to exist in the microbiome without harming the host or other microorganisms.

Pathogen / Opportunistic pathogen

A pathogen is an organism that can cause disease. An opportunistic pathogen is not normally harmful but is able to cause infections if the host's resistance to disease is reduced, for example after injury or another infection, or in immunocompromised people. Opportunistic infections often involve the microorganism invading parts of the body where they are not normally found, for example a commensal gut bacterium might become an opportunistic pathogen if it enters the bloodstream.

Vaginitis / Vulvovaginitis

A general term for inflammation of the vulva and/or vagina, most often caused by an infection, such as bacterial vaginosis, aerobic vaginitis, or a yeast infection.

Bacterial vaginosis / BV

This is one of the two main types of infection caused by an imbalance of the vaginal microbiome (dysbiosis; see also AV), and both are caused by excessive growth of non-Lactobacillus bacteria. In BV these are anaerobic bacteria, meaning they do not need oxygen to grow. A BV infection can increase the risk of other

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health problems, including STIs, pelvic inflammatory disease, and complications with fertility and pregnancy. If treatment is needed antibiotics are usually used – knowing which types of microorganism are present can help with antibiotic choice. BV can often be symptomless, but common symptoms include a whiteish watery discharge and fishy smell. There is usually no pain, itching or inflammation. Compare these symptoms to those listed below for aerobic vaginitis.

Aerobic vaginitis / AV

This is one of the two main types of infection caused by an imbalance of the vaginal microbiome (dysbiosis; see also BV), and both are caused by excessive growth of non-Lactobacillus bacteria. In AV these are aerobic bacteria which use oxygen to grow. As for BV, AV increases the risk of other health problems, and is usually treated with antibiotics. Symptoms include irritation and itching, pain (including during sex) or inflammation of the genitals, and thick yellow/green discharge. The infection sometimes causes a foul rotten smell. Compare these symptoms to those listed above for bacterial vaginosis.

Yeast infection / Thrush / Candidiasis

Yeast infections (commonly called thrush) can infect many parts of the body. A vaginal infection usually causes itching, soreness, and a white discharge. Candidiasis is the most common type of yeast infection and is caused by one of the *Candida* yeasts. Infections are treated using antifungal medication.

Urinary Tract Infection / UTI

A UTI can affect any part of the urinary system, including the urethra, bladder, kidneys, and the uterus in women. Symptoms include a burning sensation when urinating, a strong and frequent urge to urinate, often only passing a small amount of urine, cloudy or dark coloured urine, and pain in the lower abdomen. Fever or nausea are symptoms associated with a kidney infection, which is more serious. Women are more likely to suffer from UTIs than men due to having a shorter urethra, making it easier for infections to reach the bladder and kidneys. *Urethritis* refers to inflammation of the urethra, the tube which carries urine out of the body from the bladder. Often due to an infection.

Pelvic inflammatory disease / PID

This is an infection of the reproductive organs, including the uterus, fallopian tubes and ovaries. PID is caused by an infection of the vagina spreading higher into the reproductive organs, for example one of the bacteria involved in bacterial vaginosis or aerobic vaginitis, or an STI. In a minority of cases, severe or repeated PID can increase the risk of ectopic pregnancies or infertility. PID can often have no symptoms, but symptoms can include pain in the lower abdomen or during sex or whilst urinating, bleeding between periods or unusually heavy or painful periods, and unusual vaginal discharge. Serious infections cause severe pain, fever, nausea and vomiting. PID is treated by a course of antibiotics.

Cytolytic vaginosis

This infection is caused by an overgrowth of the normally protective lactic acid bacteria. It can cause itching and irritation in the vagina or vulva, or pain when urinating or during sex. A thick white discharge is another common symptom, which means this infection is often confused with a yeast infection or bacterial vaginosis. Possible causes include hormonal changes that increase oestrogen levels, diabetes, and probiotic use, and symptoms may be cyclical during the menstrual cycle.

Lactic acid bacteria

These bacteria metabolise carbohydrates to lactic acid. This activity has an important protective role in the vaginal environment by making the environment too acidic for most pathogens to grow. Whilst there are many species of lactic acid bacteria, only a few are well adapted to the vaginal environment, and these provide higher levels of protection by also producing antimicrobial compounds and preventing attachment of pathogens to the epithelial cells lining the vagina. In the vaginal microbiome the carbohydrate source for lactic acid bacteria is glycogen from the epithelial cells, and so factors that affect glycogen production such as oestrogen levels also affect the levels of lactic acid bacteria.

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Key microbes

Aerococcus christensenii

This occasional BV pathogen is not well studied, but has been identified as part of an ascending infection in a pregnant woman.

Candida albicans

Candida albicans is responsible for the majority of thrush infections. It is usually easy to treat with topical antifungal medication and rarely causes complications in healthy people if treated early.

Fannyhessea vaginae

Also known as Atopobium vaginae, this bacterium is often found in BV infections, almost always co-occurring with G. vaginalis. There is some evidence that F. vaginae and G. vaginalis cooperate to cause BV infections that are more difficult to treat and cause a higher risk of pregnancy complications.

Finegoldia magna

F. magna is often commensal on the human body but can act as an opportunistic pathogen.

Gardnerella piotii

G. piotii was only recently distinguished from G. vaginalis and so its unique characteristics in BV infections are unknown, but it is also likely to act as an early coloniser in the infection.

Gardnerella vaginalis

Gardnerella species are almost always involved in a BV infection, and are one of the early colonisers which create the conditions for other bacteria to grow and become infectious. G. vaginalis may also play a role in recurrent BV due to its ability to form biofilms – these are structures which protect the infectious bacteria and help them attach to the lining of the vagina.

Hoylesella buccalis

Previously named Prevotella buccalis, this is one of a few Prevotella-like species that have been found as part of BV infections, and may contribute to degradation of the protective vaginal mucus.

Hoylesella timonensis

Previously named Prevotella timonensis, this species is common in BV infections and has been shown to have strong attachment to the vaginal lining and an ability to degrade the vagina's protective mucus layer, thereby helping other pathogens to colonise.

Lactobacillus crispatus

L. crispatus is considered one of the most protective species of vaginal Lactobacillus. It produces lots of lactic acid and is associated with stable and healthy microbiomes.

Lactobacillus gasseri

L. gasseri is almost as good at producing lactic acid as L. crispatus (often considered the most protective Lactobacillus), and also creates a stable, protective and healthy vaginal microbiome.

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Lactobacillus iners

This is one of the most common species of vaginal Lactobacillus, however vaginal microbiomes which have L. iners as the dominant Lactobacillus species are more likely to experience disruptive changes to their microbiome.

Lactobacillus jensenii

L. jensenii is a very protective vaginal Lactobacillus species, though not very common. It is able to create a stable acidic environment and is associated with lower risk of health issues.

Peptoniphilus sp. SAHP1

This bacterium may be present in small amounts in healthy people, but has also been associated with BV and has the potential to act as an opportunistic pathogen causing invasive infection.

Porphyromonas asaccharolytica

Whilst often found in healthy vaginal microbiomes in low amounts, Porphyromonas species have been linked to BV and pregnancy complications, and have been shown to have the capability to degrade structural proteins in the vagina.

Prevotella bivia

P. bivia has been associated with secondary infections resulting from BV. This bacterium has been associated with increased risk of HIV infection, and with infections of the uterus and fallopian tubes.

Prevotella corporis

An anaerobic bacteria, usually an oral commensal, sometimes found as part of BV infections.

Prevotella disiens

This is one of the more common Prevotella species associated with BV infections. There is some evidence that it can be harmful to vaginal epithelial cells and form biofilms.

Ureaplasma parvum

U. parvum was only recently distinguished from Ureaplasma urealyticum, so not much is known for certain about its pathogenicity. It is often commensal in low amounts but is more prevalent in association with BV and AV infections.

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