Vaginal dysbiosis refers to a shift in the health of vaginal flora and includes bacterial vaginosis (BV) and aerobic vaginitis. BV is the most common cause of vaginal infections for women of childbearing age, affecting up to 30% of women in the US [1]. BV is caused by an imbalance in the vaginal microbiome composition. Although symptoms may include vaginal discharge, burning, and itching, most women with BV have no symptoms. BV is associated with a specific microbiome profile that includes increased microbial diversity and a decrease in Lactobacillus species, leading to an increase in the pH of the vaginal environment and an increase in anaerobic species. Another type of vaginal dysbiosis is aerobic vaginitis, caused by the excessive growth of aerobic microorganisms (e.g. Staphylococcus aureus, Streptococcus agalactiae), with an observable effect on vaginal inflammation [2].

Certain taxonomic groups have been found to be increased in BV, including Aerococcus, Atopobium, Fusobacterium, Gardnerella, Megasphaera, Mobiluncus, Papillibacter, Parvimonas, Peptoniphilus, Peptostreptococcus, Porphyromonas, Prevotella and Sneathia [3-7]. A BV-related microbiome profile has been correlated with several health conditions including susceptibility to urinary tract infections (UTIs), sexually transmitted infections (STIs), delayed clearance of human papillomavirus (HPV), candidiasis, atrophic vaginitis, and risk of preterm labor [5,7-9].

Current diagnosis and treatment for vaginal dysbiosis includes a healthcare provider visit, pelvic exam and vaginal testing, and potential treatment with an oral or vaginal antibiotic. Targeting and improving the health of the vaginal microbiome is an emerging treatment area.

INDICATIONS FOR SMARTJANE TESTING

- Asymptomatic patient desiring screening
- Vaginal discharge, itching, or odor
- History of HPV or abnormal Pap smear
- History of STIs
- Pelvic or abdominal pain
RELEVANT SMARTJANE RESULTS

The following microbiome changes have been observed in patients with vaginal dysbiosis:

- Low levels of *Lactobacillus* [5,7].
- High levels of any of the following: *Aerococcus, Aerococcus christensenii, Atopobium, Atopobium vaginae, Dialister micraerophilus, Fusobacterium, Gardnerella, Gardnerella vaginalis, Gemella, Megasphaera, Mobiluncus, Mobiluncus curtisii, Mobiluncus mulieris, Papillibacter, Parvimonas, Peptoniphilus, Peptostreptococcus, Porphyromonas, Prevotella, Prevotella amnii, Prevotella timonensis, Sneathia, Staphylococcus aureus and Streptococcus agalactiae* [1,3,5-16].

CLINICAL TREATMENT SUGGESTIONS BASED ON SMARTJANE RESULTS

**MONITOR THE FOLLOWING CLINICAL MARKERS:**

- Increase in *Lactobacillus*.
- Decrease in the following: *Aerococcus, Aerococcus christensenii, Atopobium, Atopobium vaginae, Dialister micraerophilus, Fusobacterium, Gardnerella, Gardnerella vaginalis, Gemella, Megasphaera, Mobiluncus, Mobiluncus curtisii, Mobiluncus mulieris, Papillibacter, Parvimonas, Peptoniphilus, Peptostreptococcus, Porphyromonas, Prevotella, Prevotella amnii, Prevotella timonensis, Sneathia, Staphylococcus aureus and Streptococcus agalactiae*.

**INTERVENTIONS TO CONSIDER:**

- **Antibiotics:** Symptomatic patients with vaginal dysbiosis should consult with their healthcare provider as antibiotic treatment may be indicated. For example, for the case of bacterial vaginosis, it is recommended that asymptomatic non-pregnant women be treated with oral or intravaginal metronidazole or clindamycin [17]. In general, asymptomatic, non-pregnant women are not treated with antibiotics. For symptomatic pregnant women, oral antibiotics may be indicated.

- **Prescribe dietary changes:** Poor nutrition may be associated with higher rates of BV. A high fat diet and low intake of vitamin E and folic acid have been associated with BV [18]. High saturated fat in the diet may increase vaginal pH, thus increasing BV risk [19].

- **Consider contraceptive methods:** Compared with condom use, women taking combined oral contraceptives are less likely to have BV-associated bacteria, and are more likely to have beneficial *Lactobacillus* species. The same was not found with depot contraceptives or the levonorgestrel-releasing intrauterine device [20-21].

- **Consider probiotics:** Small studies have suggested that oral or vaginal probiotics may be beneficial for BV, though more studies are needed for determining optimal strain and dosing [22-23]. Small studies suggest benefit from oral and intravaginal *Lactobacillus rhamnosus* GR-1 and *Lactobacillus reuteri* RC-14 [24-25].

- **Consider prebiotics:** There is preliminary data suggesting that intravaginal prebiotics may help with growth of healthy bacteria in the vaginal microbiome [26].

- **Avoid douching:** Douching alters the vaginal microbiome and can increase the risk of BV as well as other health conditions [27].

- **Avoid smoking:** Cigarette smoking reduces *Lactobacillus* spp. and can increase the risk of BV [28].
**POTENTIAL OUTCOMES**

- Reduce symptoms of dysbiosis including discharge, itching, inflammation and odor.
- Reduce risk of dysbiosis-associated conditions such as STIs, UTIs, and delayed clearance of HPV.

**References**