



LAB #: Sample Report
 PATIENT: Sample Patient
 ID: 0000000000
 SEX: Female
 DOB: 01/01/1964

AGE: 54

CLIENT #: 12345
 DOCTOR: Sample Doctor
 Doctor's Data, Inc.
 3755 Illinois Ave.
 St. Charles, IL 60174 U.S.A.

Vaginosis Profile

GRAM STAIN MICROSCOPY			
	Normal	Abnormal	Expected
Lactobacilli		None	Mod - Many
Curved Gram Negative Rods		Many	None
Small Gram Negative Rods		Many	None
Yeast	None		None
RBC's	None		None
WBC's	0		0 - 6
Clue Cells		Present	None
Eosinophils	N/A		None

Eosinophils reported and Wrights Stain performed when WBC's >6

BACTERIAL VAGINOSIS SCORE	
10	score interpretation: 0 - 3 BV not likely 4 - 6 BV indeterminate 7-10 BV highly suggestive

The BV score¹ is calculated based upon the gram stain results and is independent of the yeast, and bacterial cultures.
¹Nugent Scoring System. (Nugent et al. J. Clin. Micro. (1991)29:297-301)

YEAST CULTURE
No yeast isolated

Additional Gram Stain Findings:

BACTERIOLOGY CULTURE		
Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
NG Lactobacillus spp.	2+ Aerococcus urinae 1+ Beta strep, group B 1+ Bifidobacterium 1+ Staphylococcus spp not aureus	4+ Gardnerella vaginalis

NG = No Growth

SPECIMEN DATA

Comments:
 Date Collected: 06/11/2018
 Date Received: 06/12/2018
 Date Completed: 06/19/2018

Introductory paragraph

This test was performed to identify the cause(s) of symptoms associated with vaginitis. Infectious vaginitis is the most common type of vaginitis in women of reproductive age and is usually a result of abnormal vaginal microflora. Alterations in normal vaginal flora are antecedent to infections by dysbiotic bacteria, yeast or a pathogenic parasite (*Trichomonas vaginalis*). This comprehensive test utilizes two types of methodology: microscopic evaluation enhanced by standard cell staining techniques and culture. Gram staining differentiates bacterial species into two major groups (Gram-negative and Gram-positive). The microscopic evaluation can also reveal the presence of fungi (yeast) and important cell types that facilitate calculation of the Bacterial Vaginosis Score. Samples are also cultured for yeast to identify the species and perform susceptibility testing against natural and pharmaceutical agents.

Not all bacteria can be definitively classified by the Gram stain so samples are also cultured using standardized microbiological techniques. Expected/Beneficial bacteria (*Lactobacillus* species) are grown under anaerobic and aerobic conditions and their abundance is reported as no growth (NG) to 4+ (most abundant). Imbalanced bacteria are those bacteria that are neither typically harmful nor beneficial to the patient. Some imbalanced bacteria that present at a level of 1-2+, are reported as imbalance and susceptibility testing is not performed. When imbalanced bacteria grow in culture to a level of 3-4+ they are reported as Dysbiotic bacteria and susceptibility testing is performed; the results are reported to assist the attending clinician in developing the most efficacious treatment program. When abnormal test results are reported explanatory paragraphs are provided.

Note: Not all genera or species can be tested for susceptibility in the laboratory due to their specific growth requirements.

Lactobacilli - Abnormal

The level of Lactobacilli assessed by Gram stain or culture is abnormal in this sample. Healthy vaginal flora is composed of members of the *Lactobacillus* genus, which should constitute about 95% of the bacteria normally found in the vagina; they produce a protective biofilm on the mucosa. This predominance begins at the time of puberty, probably because of the effect of estrogens on the glycogen content of vaginal epithelial cells [1]. These bacteria have a beneficial effect by inhibiting growth, adhesion or spread of other microorganisms. The recognized mechanisms include:

- o secretion of organic acids keeping pH <4.5 [2,3]
- o production of antimicrobial substances (hydrogen peroxide, bacteriocins and biosurfactants)
- o competition for nutrients (arginine deaminase)
- o competition for receptors (adhesion on the epithelium)
- o steric exclusion (biosurfactants, adhesion on the epithelium or on the fibronectin)
- o co-aggregation

Lack of H₂O₂ producing lactobacilli predisposes women to bacterial vaginosis by allowing the overgrowth of *Gardnerella* and other anaerobic bacteria. Lactobacilli have also been known to interfere with adherence and colonization of pathogenic bacteria to the cells of the vagina possibly through production of a bacteriocin [2-4]. Three strains of *Lactobacillus* (*acidophilus*, *gasseri*, *jensenii*) were all found to

adhere to epithelial vaginal cells, displacing well-known vaginal pathogens, such as *G. vaginalis* and inhibiting the growth in vitro of *Escherichia coli*, *Streptococcus agalactiae*, and *Prevotella* spp. [5]. Loss of *Lactobacillus* results in bacterial vaginosis or vaginitis and possible urinary tract infections.[1,2] *Lactobacillus* has been known to decline when estrogen levels fall, such as in postpartum or menopausal women [1].

1. Schwebke JR. Gynecologic consequences of bacterial vaginosis. *Obstet Gynecol Clin North Am*, 30(4):685-694, 2003.
2. Faro S. *Vaginitis Differential Diagnosis and Management*. New York: CRC Press, 2004.
3. Tomas MS, Claudia Otero M, Ocana V, Elena Nader-Macias M. Production of antimicrobial substances by lactic acid bacteria in determination of hydrogen peroxide. *Methods Mol Biol*, 268:337-346, 2004.
4. Chan R, Bruce A, Reid G. Adherence of cervical, vaginal and distal urethral normal microbial flora to human uroepithelial cells and the inhibition of adherence of gram-negative uropathogens by competitive exclusion. *J Urol*, 131:596-601, 1984.
5. Boris S, Suarez JE, Vazquez F, Barbes C. Adherence of human vaginal lactobacilli to vaginal epithelial cells and interaction with uropathogens. *Infect Immun*, 66(5):1985-1989, 1998.

Curved Gram Negative Rods -Abnormal

Curved gram-negative rods were detected in this sample. The presence of curved gram negative rods is an indicator of *Mobiluncus* spp., an anaerobic bacteria associated with bacterial vaginosis (see the Bacterial Vaginosis Score). A prime example of the anaerobic bacterium is the *Mobiluncus* spp. *Mobiluncus* produces a toxin that could have an active role in the development of bacterial vaginosis[1]. Sensitivity testing cannot be performed on these anaerobic bacteria since they require a special oxygen-free environment. Metronidazole and Clindamycin are treatments of choice for vaginal anaerobes[2].

1. Taylor-Robinson AW, Borriello SP, Taylor-Robinson D. Identification and preliminary characterization of a cytotoxin isolated from *Mobiluncus* spp., 74(4):357-366, 1993.
2. Schwebke JR. Gynecologic consequences of bacterial vaginosis. *Obstet Gynecol Clin North Am*, 30(4):685-694, 2003.

Small Gram Negative Rods -Abnormal

Small gram-negative rods were detected in this sample. The presence of small gram-negative or gram-variable rods is an indicator of *Gardnerella vaginalis* and other anaerobic gram-negative bacteria that can be seen in bacterial vaginosis [1]. It has not been proven that any of these organisms alone are able to cause bacterial vaginosis, but their numbers are increased in cases of bacterial vaginosis (check the Bacterial Vaginosis Score). The normal *Lactobacilli* are replaced by an overgrowth of a mixed flora of aerobes and anaerobes, including *Gardnerella vaginalis* (in quantities of >105 CFU/mL) and *Prevotella* species [2].

1. Spiegel CA, Amsel R, Holmes KK. Diagnosis of Bacterial Vaginosis by Direct Gram Stain on Vaginal Fluid. *Journal of Clinical Microbiology*, July 1983: 170-177.
2. Washington W, Allen S, Janda W, Koneman E, Procop G, Schreckenberger P, Woods, G. *Color Atlas and Textbook of Diagnostic Microbiology*, 6th edition. Lippincott Williams and Wilkins; 2006. pg 834-838.

Bacterial Score - Abnormal

Gram stain shows grossly altered vaginal flora (7-10), indicative of bacterial vaginosis. Note: Gram stain scoring of vaginal smears for post menopausal women has not been standardized but clinical correlations have been reported.

Dysbiotic Bacteria

Dysbiotic bacteria were detected in culture from this sample. It is very important to refer to the Gram Stain Microscopy, Bacteriology Culture, and the presence or absence of Lactobacilli before considering if these organisms are vaginally pathogenic in this patient. Organisms found in this category may be colonizing without causing harm or they may represent contamination from the gastrointestinal tract. Lactobacillus species are known to be the dominant vaginal bacteria that control the normal flora by keeping potentially harmful bacteria in check [1]. For potential treatment options see the Bacterial Susceptibilities section in this report.

1. Faro S. *Vaginitis Differential Diagnosis and Management*. New York: CRC Press, 2004.

Gardnerella Vaginalis

The bacteria *Gardnerella vaginalis* (*G. vaginalis*) was detected in culture for this sample. It is present in almost all cases of Bacterial Vaginosis at levels 100-1,000 times higher than in non-infected women. However, *G. vaginalis* may be detected in 50-60% of women who do not meet the diagnostic criteria for BV ; carrier rates are as high as 10-40% in asymptomatic women.

For *Gardnerella vaginalis* CDC recommends treatment with metronidazole 500 mg. orally twice daily for seven days, or metronidazole gel 0.75%, one full applicator (5 g.) intravaginally, once a day for five days, or clindamycin cream 2%, one full applicator (5 g.) intravaginally at bedtime for seven days. It is important to advise patients receiving metronidazole as a treatment that they should avoid consuming alcohol during treatment and for 24 hours thereafter [1].

[1] <http://www.cdc.gov/std/treatment/2010/qanda/vaginitis.htm>