



LAB #: F\$\$\$\$\$\$\$\$\$\$\$
 PATIENT: GUa d`YDUHjYbh
 ID: D5 H9 BHIG-00002
 SEX: Female
 AGE: 60

CLIENT #: %& ()
 DOCTOR:
 8 cWc ffg'8 UHĹ-bW
 3755 Illinois Ave.
 St. Charles, IL 60174

Comprehensive Vaginosis Profile

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

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

Additional Gram Stain Findings:
 Many Gram positive cocci in pairs

BACTERIAL VAGINOSIS SCORE	
4	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 *Trichomonas vaginalis*, yeast, and bacterial cultures.
¹Nugent Scoring System. (Nugent et al. J. Clin. Micro. (1991)29:297-301)

TRICHOMONAS CULTURE			
	Normal	Abnormal	Expected
<i>Trichomonas vaginalis</i>	None		None

YEAST CULTURE
No yeast isolated

BACTERIOLOGY CULTURE		
Expected/Beneficial flora	Commensal (Imbalanced) flora	Dysbiotic flora
NG Lactobacillus spp.	2+ Gamma hemolytic strep 1+ Alpha hemolytic strep 1+ Staphylococcus not aureus	
NG = No Growth		

SPECIMEN DATA	
Comments:	
Date Collected:	4/1/2012
Date Received:	4/2/2012
Date Completed:	4/3/2012

v08.10

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). Commensal bacteria are those bacteria that are neither typically harmful nor beneficial to the patient. Some Commensal bacteria that present at a level of 1-2+, are reported as "imbalance" and susceptibility testing is not performed. When commensal 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.

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.

White Blood Cells (WBC)-Abnormal

The number of white blood cells (WBC's) in this sample is higher than expected. Greater than six white blood cells per field examined under 40-X magnification is indicative of an inflammatory state, possibly an infection [1]. The presence of white blood cells is usually consistent with trichomoniasis, desquamative vaginitis, cervicitis, hypersensitivity reactions, and can be seen in candidiasis [1-5]. If yeast or abnormal bacteria were not detected a cervical specimen should be tested for Chlamydia trachomatis, Neisseria gonorrhoeae, Herpes Simplex Virus (HSV), or human papillomavirus (HPV) [1]. White blood cells are not typically seen with bacterial vaginosis [2, 6]. White blood cells are a useful confirmatory test but any treatment should be based on bacteriological findings and not on the appearance of white blood cells alone [7]. Vaginal secretions high in polymorphonuclear leukocytes and immature squamous epithelial cells have been found in a rare but disabling condition called desquamative inflammatory vaginitis [1]. In this condition, squamous epithelial cells and gram-positive cocci are also present in vaginal secretions, follow-up cultures are negative for bacteria, viruses and yeast and there is a decrease in Lactobacillus [1].

1. Faro S. *Vaginitis Differential Diagnosis and Management*. New York: CRC Press, 2004.
2. Cleveland A. Vaginitis: Finding the cause prevents treatment failure. *Cleveland Clinic Journal of Medicine*, 67(9):39-46, 2000.
3. Zariffard MR, Harwani S, Novak RM, Graham PJ, Ji X, Spear GT. Trichomonas vaginalis infection activates cells through toll-like receptor 4. *Clin Immunol*, 111(1):103-107, 2004.
4. Murphy R. Desquamative inflammatory vaginitis. *Dermatol Ther*, 17(1):47-49, 2004.
5. Horowitz BJ, Mardh P. *Vaginitis and Vaginosis*. New York: Wiley-Liss, 1991.
6. Diaz F, Vasquez ME, Escobar S, Galeano A, Londono M, Pelaez M, Villas M, Montoya F.

Vaginitis due to *Gardnerella vaginalis* in a university medical service. *Acta Med Colomb*, 10(5):197-203, 1985.

7. Stricker T, Navratil F, Sennhauser FH. Vulvovaginitis in prepubertal girls. *Arch Dis Child*, 88(4):324-326, 2003.

Bacterial Vaginosis Score - Indeterminate

Gram stain shows altered vaginal flora (4-6). This may precede the development or follow the resolution of frank bacterial vaginosis. If indicated further testing may be necessary. Note: Gram stain scoring of vaginal smears for post menopausal women has not been standardized but clinical correlations have been reported.