

## **Group B Streptococcus: Prenatal Detection**

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### **Background**

In the past 2 decades, group B streptococcus (GBS) has emerged as a major cause of perinatal bacterial infections, including endometritis, amnionitis, urinary tract infections in parturient women and systemic as well as focal infections in infants.

Two distinct forms of invasive disease occur in neonates. Early-onset disease is often characterized by respiratory distress, apnea, shock, pneumonia, and occasionally meningitis. The early onset occurs from the first 24 hours of life up to 6 days. Late onset disease usually occurs at 3-4 weeks of age (range from 7 days - 3 months) and is frequently manifested as occult bacteremia or meningitis.

The CDC estimates 1 - 4 cases of neonatal GBS infections per 1,000 births (approximately 7,600 cases annually) with a mortality rate of 5-20%. The maternal carriage rate of GBS varies from 150 - 300 per 1,000 pregnancies. The carriage rate varies because of the different stages of pregnancy at the time of culture, the method of specimen collection, and the method of culture performed in the various studies. Infants who are born to women identified prenatally as GBS carriers have 29 times the risk of early-onset GBS disease than infants born to women whose prenatal cultures are negative.

### **Prevention of GBS infections**

Antenatal eradication of maternal colonization of GBS has not been successful in preventing GBS invasive disease. Studies have shown that re-colonization occurs, and that there is no significant difference in the carriage of the organism at delivery between treated and untreated women. Early invasive GBS disease is not preventable by oral neonatal treatment. Prevention of GBS colonization in women by vaccine is under investigation, but not available at this time.

Intrapartum chemoprophylaxis (i.e., the administration of antimicrobial agents after onset of labor or membrane rupture, but before delivery) is the most promising method to prevent both early onset disease and maternal illness due to GBS. Several studies have shown that intrapartum chemoprophylaxis decreases neonatal colonization and early onset disease when given to pregnant women colonized with GBS. Oral antimicrobial agents are ineffective in eliminating carriage or preventing neonatal disease, presumably because there is insufficient time for the antibiotic to be absorbed and to cross into the placenta.

The Centers for Disease Control, in their 1995 revised draft: "Guidelines for Prevention of Group B Streptococcal Disease, a Public Health Perspective", recommends any women who have had previous deliveries of infants with invasive GBS disease, and women identified with GBS bacteriuria be treated with intrapartum chemoprophylaxis. Otherwise, one of 2 strategies for the prevention of GBS disease are recommended. The first strategy consists of the collection of vaginal and rectal combination cultures at 35-37 weeks gestation to identify women with GBS colonization. These women are offered intrapartum chemoprophylaxis at the onset of labor. Since some pre-term deliveries will occur before culture results are available, it is recommended that intrapartum chemoprophylaxis be given to women who begin labor and/or membrane rupture before 37 completed weeks' gestation. In the second preventative strategy, where screening cultures are not done, intrapartum chemoprophylaxis will be given if one or more of the following conditions occur: membrane rupture lasting  $\geq$  18 hours, intrapartum temperature  $\geq$  38 deg. C, and/or gestation  $<$  37 weeks.

## **Detection of colonized pregnant women**

The gastrointestinal tract is the major human reservoir of GBS, with the genitourinary tract the most common site of secondary spread. Early onset disease occurs in newborns through transmission from mothers that carry GBS in their anorectum or genital tract (i.e. vertical transmission).

Colonization of GBS in pregnancy does not change with trimester. However, the duration of carriage is intermittent and unpredictable. Therefore, no screening method will correctly identify all women with intrapartum GBS. However, the later in the pregnancy that cultures are performed, the better the correlation with intrapartum presence of the organism. To minimize false negative prenatal culture results, cultures should be taken at 35-37 weeks gestation.

Optimal identification of GBS carriers is dependent not only on the timing of the culture but on the appropriate sites of collection. Culturing specimens from the anorectum and the vaginal introitus increases the likelihood of GBS isolation by 5% to 27% over vaginal culture alone. Cervical cultures are not recommended and a speculum should not be used. GBS bacteriuria is also an indication of heavy colonization in the parturient woman.

The laboratory performing the culture should use a broth selective for GBS. Selective broth, containing antibiotics to inhibit competing organisms, is essential because it can increase the yield of screening cultures by as much as 50%. The rapid direct antigen detection methods (similar to the ones used for group A strep. in throats), are discouraged because of poor sensitivity. These rapid methods detect only heavy colonization, and many infants with neonatal GBS disease are born to women who are lightly colonized.

## **Treatment**

For intrapartum hemoprophylaxis, intravenous (IV) penicillin G (5 million units initially and then 2.5 million units every 4 hours) should be administered until delivery. IV Ampicillin (2 grams initially and then 1 gram every 4 hours until delivery) is an acceptable alternative to penicillin G. Penicillin G is preferred since it has a narrow spectrum and therefore less likely to select for antibiotic resistant organisms. Clindamycin or erythromycin may be used for women allergic to penicillin, although the efficacy of these drugs for GBS disease prevention has not been measured in controlled trials. Women with clinical diagnosis of amnionitis who are receiving other treatment such as ampicillin or clindamycin do not need penicillin G added to the regimen.

**DLS Test Code:** 4590

**DLS Test Schedule:** Cultures set up Daily in microbiology

**Expected Turnaround Time:** 48 hours (for preliminary or final report)

**Specimen Requirements:** Single swab (or separate swabs) of the vaginal introitus and anorectum. If 2 swabs are sent, submit as one specimen. See collection instructions at the end of this bulletin for more information.)

## **DLS Outpatient List Prices:**

- Culture: \$24.90
- Identification: \$19.40

**Methodology:** Culture of swab(s) in selective broth for 18-24 hours. Subculture of broth to a blood agar plate for another 18-24 hour incubation. Colonies suspicious for GBS are identified by group specific antigen testing.

## References

1. AAP Committee on Infectious Diseases and Committee on Fetus Newborn, Guidelines for Prevention of Group B Streptococcal (GBS) infection by Chemoprophylaxis, Pediatrics, 1992; 90:775-778.
2. ACOG, Group B Streptococcal Infections in Pregnancy, ACOG Technical Bulletin, July 1992; No. 170.
3. Boyer, KM, Gotoff, SP, , Prevention of Early-Onset Neonatal Group B Streptococcal Disease with Selective Intrapartum Chemoprophylaxis, N. Engl. J. Med., 1986; 314:1665-1669.
4. Mandell, GI, Bennett, JE, Dolin, R, editors, Principles and Practices of Infectious Diseases 4th Ed., 1995; pp. 1835-1845.
5. Murray, P, et.al., editors, Manual of Clinical Microbiology 6th Ed., 1995; p. 301.
6. Persson, KM, Forsgren, A, Evaluation of Culture Methods for the Isolation of Group B Streptococci, Diagn. Microbiol. Infect. Dis., 1987; 6:175-177.
7. Philipson, EH, et.al., Enhanced Antenatal Detection of Group B Streptococcus Colonization, Obstetrics and Gynecology, 1995; 85:437-439.
8. Rouse, DJ, et.al., Strategies for the Prevention of Early-Onset Neonatal Group B Streptococcal Sepsis: A Decision Analysis, Obstet. & Gynecol., 1994; 83:483-494.
9. Schuchat, A, et.al., Prevention of Group B Streptococcal Disease: A Public Health Perspective, Centers for Disease Control, May 31.1996.
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## Collection of Clinical Specimens for Prenatal Group B Streptococcus Screening Cultures

1. Collect specimens at 35-37 weeks of pregnancy.
2. The optimal specimen is a combination swab of the vaginal introitus and anorectum.
  - A. Obtain a routine culture swab transport system (e.g. Culturette EZTM, CulturetteTM, or Star SwabTM). Contact the DLS Client Services at 589-5000 to obtain transport swabs.
  - B. A single swab (swab of the distal vagina first, then anorectum), or two swabs may be used. Note: Cervical specimens are not optimal for Group B streptococcus cultures. A speculum should not be used in culture collection. If other bacterial organisms are to be cultured, submit a separate endocervical swab specimen for routine culture, or a Thayer-Martin plate in CO2 for GC screen.
  - C. After collection, place the swab(s) in the transport medium.
    - a. Transport medium is not required if the Culturette EZTM, swab system is used. Place the Culturette EZTM swab(s) back into the swab sheath.
    - b. The transport media is a gel medium if a Star SwabTM is used. If the CulturetteTM swab is used, break the glass ampule and pump the ampule to release the liquid transport medium. Note: Dry swabs are unacceptable if a Star SwabTM or CulturetteTM swab(s) are submitted.
      - If two swabs are used, place both swabs in the same transport media (or same swab sheath if the Culturette EZTM is used). Both the vaginal and anorectum swabs are submitted as one specimen
  - D. Send swab(s) with properly filled-out requisition to the laboratory ASAP.
    - a. Test requested is "4590: Group B Streptococcus Prenatal Culture". Indicate request by checking off the appropriate test in the "Microbiology" section of the request form.
    - b. Indicate source in the "Specimen Source/Collection Method" section of the request form. Example: "Vaginal-Rectal Combination"
    - c. Indicate if a second copy of the culture report is to be sent to the anticipated birthing institution.

Call DLS Microbiology at (808) 589-5203 if you have any questions regarding specimen collection.