

THERE ARE NO NORMAL VALUES IN MICROBIOLOGY!
AN IMPROPERLY COLLECTED SPECIMEN MEANS UNINTERPRETABLE RESULTS!

Emerging Pathogens – “*Streptococcus milleri*” Group

This is the first in a series of newsletters that will provide an overview of clinically important emerging pathogens. Isolation of “*S. milleri*” group bacteria is becoming increasingly prevalent from several deep-seated infections. CLS has been tracking the regional epidemiology of all “*S. milleri*” group infections for the past several years, and definitive speciation of isolates has provided some interesting insights into their role in causing suppurative infections.

What is the “*S. milleri*” Group?

Bacteria within the “*S. milleri*” group are aerobic Gram-positive cocci that are currently classified as part of the viridans streptococci. Based on recent genetic relatedness studies, the “*S. milleri*” group is currently divided into three separate species including *S. constellatus*, *S. anginosus* and *S. intermedius* ().

Phenotypic Traits of the “*S. milleri*” Group

Isolates may be alpha-, beta-, or gamma-haemolytic based on partial, complete, or no haemolysis when grown on blood-containing agar media. Isolates may possess a known Lancefield group antigen (A, C, F, or G) or may be non-groupable. “*S. milleri*” group isolates can be distinguished from other types of viridans streptococci by performing specific biochemical tests. However, because phenotypic identification methods do not allow accurate speciation of these organisms within the group itself, the CLS microbiology laboratory simply reports the presence of “*S. milleri*” group, rather than an individual species.

Clinical Infections Caused by “*S. milleri*” Group:

The association of the “*S. milleri*” group with the tendency to form abscesses has long been recognized but the pathogenesis of these important infections is not well understood. “*S. milleri*” group organisms are part of the normal oral and gastrointestinal flora. Species within this group therefore cause serious suppurative infections such as oral, maxillofacial and peritonsillar abscesses, brain abscess, pneumonia, lung abscess and empyema, and intra-abdominal abscesses including liver abscess. As part of the viridans group of streptococci, these organisms may also seed the endocardium or other endovascular sites resulting in endovascular infection and/or endocarditis. Significant morbidity and mortality are often associated with many such infections. Management of these types of life-threatening infections most often requires drainage of the abscess and a prolonged course of appropriate parenteral antibiotic therapy. Frequent relapses of infection may occur if this approach is not taken.

Speciation of the “*S. milleri*” group?

Recent studies in our laboratory and by others have shown that deoxyribonucleic acid (DNA) sequencing is the most definitive method for accurate speciation of organisms in the “*S. milleri*” group. Furthermore, it may be clinically and epidemiologically important to accurately speciate these organisms, especially from normally sterile body sites, since individual species have been shown to have a propensity for causing site-specific infection, and may have a high relapse rate. CLS recently completed a large DNA sequencing project of all “*S. milleri*” group isolates from invasive infections in the Calgary Health Region over a two-year period.

From a total of 115 stored “*S. milleri*” group isolates from invasive infections, 83 (72%) were studied by DNA sequencing. 27(33%) organisms came from blood cultures while 56(67%) were isolated from other sterile body site fluids and/or tissues. Overall, 36% were found by DNA sequencing to be *S. anginosus*, 20% were found to be *S. constellatus* and 44% were found to be *S. intermedius*. Blood culture isolates showed equal predominance between *S. anginosus* and *S. intermedius*, but *S. constellatus* was found less often. Abdominal isolates were mostly *S. anginosus* (73%) while chest isolates were mainly *S. intermedius* (76%). *S. constellatus* was found most commonly in brain abscess pus/tissue.

Our ability to study the pathogenesis of human “*S. milleri*” group infections has been limited prior to the availability of DNA sequencing. However, DNA sequencing of invasive isolates by the clinical microbiology laboratory allows for accurate speciation within this group, revealing a distinct predilection for different species to cause infection at certain body sites.

Antibiotic Susceptibility Profile:

Antibiotic susceptibility testing should be done on all “*S. milleri*” group isolates causing invasive infections. Although penicillin remains the treatment of choice, cephalosporins, clindamycin and vancomycin serve as alternative treatment choices. If the patient does not have a penicillin-allergy, intravenous high dose penicillin or its equivalent (i.e. 3rd generation cephalosporin) should be used for treatment. Vancomycin would be an appropriate alternative in patients with a Type-1 allergy to penicillin. Antibiotics that do not cross the blood-brain barrier (i.e. 1st or 2nd generation cephalosporins or clindamycin) should not be used to treat patients with brain abscess(es). Serial radiological imaging (i.e. CT Scan, Ultrasound or MRI) is essential during the course of therapy to determine the clinical response to treatment. A prolonged parenteral antibiotic course is required to resolve “*S. milleri*” group invasive infections and depending on the site of infection this may range from 6-8 weeks of continuous therapy or longer depending on clinical resolution of symptoms and microbiological cure.

**IF YOU HAVE ANY QUESTIONS OR COMMENTS ABOUT HOW THE LABORATORY WORKS,
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209-5281 (Dr. Church, Division Head, Microbiology)**

The Microbiology Newsletter is also available on the Internet and may be accessed at:
<http://www.crha-health.ab.ca/clin/cme/microbio.htm>