Staphylococcus lugdunensis

A dangerous wolf in sheep's clothing…

Jay Hardy, CLS, SM (ASCP)

Jay Hardy is the founder and CEO of Hardy Diagnostics. He began his career in microbiology as a Medical Technologist in Santa Barbara, California.

In 1980, he began manufacturing culture media for the local hospitals. Today, Hardy Diagnostics is the third largest media manufacturer in the US.

To ensure rapid and reliable turn around time, Hardy maintains six distribution centers, and produces over 2,700 products used in clinical and industrial microbiology laboratories throughout the world.

During the last 20 years, *Staphylococcus lugdunensis* has emerged as an important pathogen implicated in both community-acquired and nosocomial infections.

First described in 1988, this seemingly harmless coagulase negative staph is increasingly the cause of significant invasive infections resembling that of its close cousin, *S. aureus.*

Clinical manifestations of infections with these organisms include:

- Abscesses
- Meningitis
- Skin and soft-tissue cellulitis
- Ventriculo-peritoneal shunt infection
- Spondylodiscitis (infection of the vertebra and discs)
- Prosthetic joint infection
- Catheter-related bacteremia
- Septic arthritis
- Osteomyelitis
- Endocarditis
- Peritonitis associated with peritoneal dialysis
- Toxic shock syndrome

Pathogenicity

Infections with the tube coagulase-negative *S. lugdunensis* tend to run a more severe course, which resemble that of *S. aureus* infections rather than that caused by other coagulase-negative staphylococci. In addition, these organisms are frequently misidentified as *S. aureus* because of the similare morphologic appearance with yellow pigmentation and complete hemolysis when cultured on blood agar.

The types of infections caused by *S. lugdunensis*, demonstrate the ability of this organism to form biofilm ("extracellular slime substance"), thus suggesting that this ability contributes to this organism's reputation for virulence.

Latex Agglutination Tests

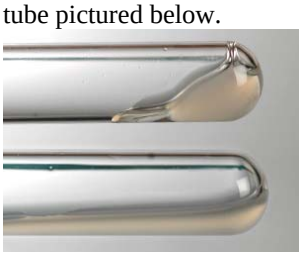
S. lugdunensis is tube coagulase negative, but can often be misidentified since it can produce positive results for clumping factor (bound coagulase), which is used in rapid slide agglutination tests. Positive results on such kits can be falsely suggestive of *S. aureus*.

It is recommended that when testing for *S. aureus*, an agglutination test kit, such as StaphTex, be used which tests for the clumping factor, free coagulase, and Protein A to avoid misidentification.

Coagulase Tests

S. lugdunensis produces a **bound coagulase** (clumping factor), which is why the slide coagulase test may be positive, however it does not produce **free coagulase**, and, unlike *S. aureus*, it will always be tube coagulase negative as in the bottom

tube pictured below.



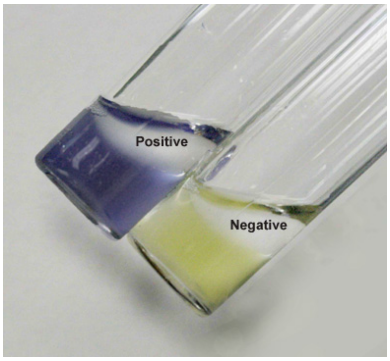
The slide coagulase must be performed with caution, since *S. aureus*, *S. lugdunensis*, and *S. schleiferi* subsp. *schleiferi* may produce positive results. Due to this ambiguity, it is recommended to use only the tube rather than the slide coagulase method.

Automated Identification Systems

Some automated identification systems are unable to identify *S. lugdunensis* due to insufficient discriminatory biochemical reactions (especially lacking in ornithine decarboxylase) or an inadequate database.

Manual Identification

S. lugdunensis can usually be successfully identified based on a positive catalase test, negative tube coagulase test, positive PYR test, and a positive ornithine decarboxylase test as pictured below.



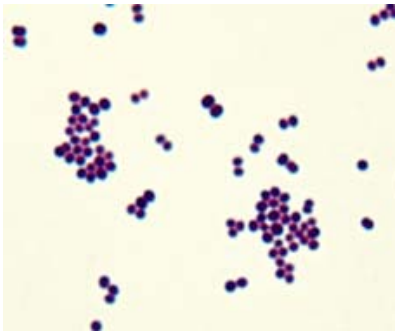
The Hardy Rapid Ornithine test (cat. no. K279) involves a sterile mineral oil overlay and can be read out in only two to four hours.

Antimicrobial Resistance

When first described, *S. lugdunensis* was thought to be universally susceptible to penicillins and cephalosporins. However resistance is increasing and some institutions report resistance to penicillin in about half of the isolates. It is important not only to identify *S. lugdunensis* in view of its clinical course, which is more aggressive than those of commonly isolated coagulase-negative staphylococci, but also to determine its susceptibility to oxacillin by detecting the mecA gene or its product, PBP2', since resistance has been reported. *S. lugdunensis* is usually susceptible to gentamicin, rifampin, vancomycin and erythromycin.

Microscopic Morphology

S. lugdunensis is a gram positive cocci that appears in clusters.



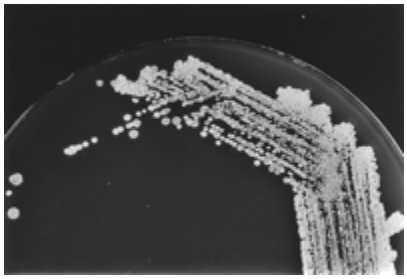
Gram stain at 1,000X

Scanning electron micrograph

Colonial Morphology

Colonies of *S. lugdunensis* are usually hemolytic, sticky, smooth, glossy, yellow, yellow-orange or cream, and about 2-4mm in diameter after 48 hours of incubation. Hemolysis may be weak or delayed. Most, but not all, are pigmented. They usually have a characteristic odor.

Occasionally, the colony size will vary within the same cell strain, falsely suggestive of a mixed culture (see below).



Habitat

S. lugdunensis is a common human skin commensal.

Armed with knowledge of this organism's characteristics and the proper identification tools the microbiologist can readily identify this dangerous "wolf in sheep's clothing."

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Santa Maria, CA