

Staphylococcus aureus, Strain LIM 1

Catalog No. NR-45880

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Contributor:

Network on Antimicrobial Resistance in *Staphylococcus aureus* (NARSA), NIAID, NIH

Manufacturer:

BEI Resources

Product Description:

Bacteria Classification: *Staphylococcaceae*, *Staphylococcus*

Species: *Staphylococcus aureus*

Strain: LIM 1

NARSA Catalog Number: NRS35

Original Source: *Staphylococcus aureus* (*S. aureus*), strain LIM 1 was isolated in 1995 from the bloodstream of a 2-year-old female patient with leukemia in France.^{1,2}

Comments: *S. aureus*, strain LIM 1 is a methicillin-resistant *S. aureus* (MRSA) and a vancomycin-sensitive *S. aureus* (VSSA) strain.^{1,2} *S. aureus*, strain LIM 1 was deposited as positive for *mec* (subtype I); negative for *vanA*, *vanB*, *vanC1*, *vanC2*, *vanD*, and *vanE*; MLST sequencing type (ST) 572; eGenomic *spa* type 4, eGenomic *spa* repeats YHFGFMBQBLO; Ridom *spa* type t051.¹ Strain LIM 1 was the first MRSA isolate recovered from this patient. During the course of treatment, which included the use of glycopeptides, three additional MRSA strains, LIM 2 (NRS36), LIM 3 (NRS37) and LIM 4, were isolated and found to have a vancomycin-intermediate *S. aureus* (VISA) phenotype. Results from pulsed-field gel electrophoresis suggest that these three VISA strains were selected from LIM 1.² Note: Methicillin is no longer clinically used, however, the term methicillin-resistant *Staphylococcus aureus* (MRSA) continues to be used to describe *S. aureus* strains resistant to all penicillins.

S. aureus is a Gram-positive, cluster-forming coccus that normally inhabits human nasal passages, skin and mucus membranes. It is also a human pathogen and causes a variety of pus-forming infections as well as food-poisoning and toxic shock syndrome. In 1961, two years after the introduction of methicillin, a penicillinase-resistant penicillin, *S. aureus* developed methicillin-resistance due to acquisition of the *mecA* gene. Subsequently, MRSA infections have become widespread in both hospital and community settings.³ Vancomycin has been the preferred antibiotic of choice for the treatment of MRSA infections.⁴ However, there have now been MRSA strains isolated that also have reduced susceptibility or resistance to vancomycin.^{5,6} It is believed that this decreased sensitivity primarily arises through mutations affecting the production of peptidoglycans, resulting in a thickened cell wall and a reduction of vancomycin at its

site of action.⁷ While much rarer, resistance can also occur through the acquisition of the vancomycin resistance gene, *vanA*, from *Enterococcus faecalis*.^{5,7,8}

Material Provided:

Each vial contains approximately 0.5 mL of bacterial culture in Tryptic Soy broth supplemented with 10% glycerol.

Note: If homogeneity is required for your intended use, please purify prior to initiating work.

Packaging/Storage:

NR-45880 was packaged aseptically in cryovials. The product is provided frozen and should be stored at -60°C or colder immediately upon arrival. For long-term storage, the vapor phase of a liquid nitrogen freezer is recommended. Freeze-thaw cycles should be avoided.

Growth Conditions:

Media:

Brain Heart Infusion broth or Tryptic Soy broth or equivalent
Brain Heart Infusion agar or Tryptic Soy agar with 5% defibrinated sheep blood or equivalent

Incubation:

Temperature: 37°C

Atmosphere: Aerobic

Propagation:

1. Keep vial frozen until ready for use, then thaw.
2. Transfer the entire thawed aliquot into a single tube of broth.
3. Use several drops of the suspension to inoculate an agar slant and/or plate.
4. Incubate the tube, slant and/or plate at 37°C for 18 to 24 hours.

Citation:

Acknowledgment for publications should read "The following reagent was provided by the Network on Antimicrobial Resistance in *Staphylococcus aureus* (NARSA) for distribution by BEI Resources, NIAID, NIH: *Staphylococcus aureus*, Strain LIM 1, NR-45880."

Biosafety Level: 2

Appropriate safety procedures should always be used with this material. Laboratory safety is discussed in the following publication: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. Biosafety in Microbiological and Biomedical Laboratories. 5th ed. Washington, DC: U.S. Government Printing Office, 2009; see www.cdc.gov/biosafety/publications/bmbl5/index.htm.

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References:

1. NARSA, NRS35
2. Ploy, M. C., et al. "First Clinical Isolate of Vancomycin-Intermediate *Staphylococcus aureus* in a French Hospital." *Lancet* 351 (1998): 1212. PubMed: 9643727.
3. Deurenberg, R. H. and E. E. Stobberingh. "The Evolution of *Staphylococcus aureus*." *Infect. Genet. Evol.* 8 (2008): 747-763. PubMed: 18718557.
4. Hiramatsu K. "Vancomycin-Resistant *Staphylococcus aureus*: a New Model of Antibiotic Resistance." *Lancet Infect. Dis.* 1 (2001): 147-155. PubMed: 11871491.
5. Hiramatsu, K., et al. "Methicillin-Resistant *Staphylococcus aureus* Clinical Strain with Reduced Vancomycin Susceptibility." *J. Antimicrob. Chemother.* 40 (1997): 135-136. Pubmed: 9249217.
6. Hanaki, H., et al. "Activated Cell-Wall Synthesis is Associated with Vancomycin Resistance in Methicillin-Resistant *Staphylococcus aureus* Clinical Strains Mu3 and Mu50." *J. Antimicrob. Chemother.* 42 (1998): 199-209. Pubmed: 9738837.
7. Howden, B. P., et al. "Reduced Vancomycin Susceptibility in *Staphylococcus aureus*, Including Vancomycin-Intermediate and Heterogeneous Vancomycin-Intermediate Strains: Resistance Mechanisms, Laboratory Detection, and Clinical

Implications." *Clin Microbiol. Rev.* 23 (2010): 99-139. PubMed: 20065327.

8. Chang, S., et al. "Infection with Vancomycin-Resistant *Staphylococcus aureus* Containing the *vanA* Resistance Gene." *N. Engl. J. Med.* 3 (2003): 1342-1347. PubMed: 12672861.

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