

**Staphylococcus aureus, Strain AIS 1000505**

**Catalog No. NR-46420**

**For research use only. Not for human use.**

**Contributor:**

Dr. Brandi Limbago, Deputy Chief, Clinical and Environmental Microbiology Branch, Centers for Disease Control and Prevention, Atlanta, Georgia, USA

**Manufacturer:**

BEI Resources

**Product Description:**

Bacteria Classification: *Staphylococcaceae*, *Staphylococcus*

Species: *Staphylococcus aureus*

Strain: AIS 1000505 (also referred to as VRSA-10)

NARSA Catalog Number: VRS10

Original Source: *Staphylococcus aureus* (*S. aureus*), strain AIS 1000505 was isolated in 2009 from a plantar foot wound of a 53-year-old female in Michigan, USA.<sup>1</sup>

Comments: *S. aureus*, strain AIS 1000505 is a vancomycin-resistant *S. aureus* (VRSA) strain.<sup>1</sup> *S. aureus*, strain AIS 1000505 was deposited as positive for *mec* and *vanA*; negative for *vanB*, PVL and arginine catabolic mobile element (ACME); pulsed-field type USA100; *spa* repeats TJMBMDMGMK; Ridom *spa* type t002.<sup>1-5</sup> *S. aureus*, strain AIS 1000505 is a USA100 isolate. USA100 isolates have the same MLST profile (ST 5), SCC*mec* (subtype II) and *spa* motif (MDMGMK) and are usually resistant to erythromycin and spectinomycin as well as being multiresistant to other commonly used therapeutic agents. USA100 is the most prevalent U.S health care-associated pulsed-field type and is endemic in many U.S. hospitals.<sup>5</sup> Unlike other VRSA strains which typically are co-isolated with only *Enterococcus faecalis*, a number of *Enterococcus* species were co-isolated along with *S. aureus*, strain AIS 1000505.<sup>1</sup> It is suspected that *Enterococcus gallinarum* was the donor of the *vanA* gene.<sup>6</sup> The complete genome sequence of *S. aureus*, strain AIS1000505 is available (GenBank: [AHBT00000000](http://AHBT00000000)).

*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 septicemia and endocarditis. *S. aureus* infections are difficult to treat due to resistance to numerous antibiotics. The development and dissemination of methicillin-resistant *S. aureus* (MRSA) strains has proven to be particularly difficult to contain and treat.<sup>7</sup> Vancomycin has been the preferred antibiotic of choice for the treatment of MRSA infections, however, there have now been MRSA strains isolated that are also resistant to vancomycin.<sup>7,8</sup> It is believed that this resistance results from either mutations that ultimately lead to a reduction of vancomycin at its site of action or from the acquisition of the

vancomycin resistance gene, *vanA*, from *Enterococcus faecalis*.<sup>7-9</sup> The *vanA* gene is carried by the Tn1546 transposon that resides on a plasmid in all VRSA strains.<sup>8</sup> For VRSA strains carrying both *mecA* and *vanA*,  $\beta$ -lactams and glycopeptides seem to have a synergistic effect against these strains, both *in vitro* and in an animal model.<sup>9,10</sup> Combination therapy, therefore, may be a more effective treatment option for VRSA infections than monotherapy with either antibiotic.<sup>9,10</sup>

**Material Provided:**

Each vial contains approximately 0.5 mL of bacterial culture in Brain Heart Infusion broth supplemented with 6  $\mu$ g/mL vancomycin and 10% glycerol.

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

**Packaging/Storage:**

NR-46420 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:**

Note: For stability purposes, it is recommended that the strain is subcultured in the presence of vancomycin.

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 AIS 1000505, NR-46420."

**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.

**BEI Resources**

[www.beiresources.org](http://www.beiresources.org)

E-mail: [contact@beiresources.org](mailto:contact@beiresources.org)

Tel: 800-359-7370

Fax: 703-365-2898

Washington, DC: U.S. Government Printing Office, 2009; see [www.cdc.gov/biosafety/publications/bmbl5/index.htm](http://www.cdc.gov/biosafety/publications/bmbl5/index.htm).

**Disclaimers:**

You are authorized to use this product for research use only. It is not intended for human use.

Use of this product is subject to the terms and conditions of the BEI Resources Material Transfer Agreement (MTA). The MTA is available on our Web site at [www.beiresources.org](http://www.beiresources.org).

While BEI Resources uses reasonable efforts to include accurate and up-to-date information on this product sheet, neither ATCC® nor the U.S. Government makes any warranties or representations as to its accuracy. Citations from scientific literature and patents are provided for informational purposes only. Neither ATCC® nor the U.S. Government warrants that such information has been confirmed to be accurate.

This product is sent with the condition that you are responsible for its safe storage, handling, use and disposal. ATCC® and the U.S. Government are not liable for any damages or injuries arising from receipt and/or use of this product. While reasonable effort is made to ensure authenticity and reliability of materials on deposit, the U.S. Government, ATCC®, their suppliers and contributors to BEI Resources are not liable for damages arising from the misidentification or misrepresentation of products.

**Use Restrictions:**

**This material is distributed for internal research, non-commercial purposes only.** This material, its product or its derivatives may not be distributed to third parties. Except as performed under a U.S. Government contract, individuals contemplating commercial use of the material, its products or its derivatives must contact the contributor to determine if a license is required. U.S. Government contractors may need a license before first commercial sale.

**References:**

1. Limbago, B. M., et al. "Report of the 13th Vancomycin-Resistant *Staphylococcus aureus* Isolate from the United States." *J. Clin. Microbiol.* 52 (2014): 998-1002. PubMed: 24371243.
2. Sievert, D. M., et al. "Vancomycin-Resistant *Staphylococcus aureus* in the United States, 2002-2006." *Clin. Infect. Dis.* 46 (2008): 668-674. PubMed: 18257700.
3. NARSA, VRS10
4. Kos, V. N., et al. "Comparative Genomics of Vancomycin-Resistant *Staphylococcus aureus* Strains and Their Positions within the Clade Most Commonly Associated with Methicillin-Resistant *S. aureus* Hospital-Acquired Infection in the United States." *MBio.* 3 (2012): e00112-1. PubMed: 22617140.
5. McDougal, L. K., et al. "Pulsed-Field Gel Electrophoresis Typing of Oxacillin-Resistant *Staphylococcus aureus*

- Isolates from the United States: Establishing a National Database." *J. Clin. Microbiol.* 41 (2003): 5113-5120. PubMed: 14605147.
6. Askari, E., et al. "VanA-Positive Vancomycin-Resistant *Staphylococcus aureus* Systematic Search and Review of Reported Cases." *Infect. Dis. Clin. Pract.* 21 (2013): 91-93.
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. Courvalin P. "Vancomycin-Resistance in Gram-Positive Cocci." *Clin. Infect. Dis.* 42 (2006): S25-34. PubMed: 16323116.
9. Severin, A., et al. "High Level Oxacillin and Vancomycin Resistance and Altered Cell Wall Composition in *Staphylococcus aureus* Carrying the Staphylococcal *mecA* and the Enterococcal *vanA* Gene Complex." *J. Biol. Chem.* 30 (2004): 3398-3407. PubMed: 14613936.
10. Fox, P. M., et al. "Successful Therapy of Experimental Endocarditis Caused by Vancomycin-Resistant *Staphylococcus aureus* with a Combination of Vancomycin and Beta-Lactam Antibiotics." *Antimicrob. Agents Chemother.* 50 (2006): 2951-2956. PubMed: 16940087.

ATCC® is a trademark of the American Type Culture Collection.

