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SUPPORTING INFECTIOUS DISEASE RESEARCH

Staphylococcus aureus, Strain 880 (BR-VRSA)

Catalog No. NR-49120

For research use only. Not for human use.

Contributor:

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Manufacturer:

BEI Resources

Product Description:

Bacteria Classification: Staphylococcaceae, Staphylococcus Species: Staphylococcus aureus

Strain: 880 (BR-VRSA)

<u>Note:</u> The strain designation on the vial label is incorrect. The correct strain designation is Strain 880 (BR-VRSA).

<u>Original Source</u>: *Staphylococcus aureus* (*S. aureus*), strain 880 (BR-VRSA) was isolated in 2012 in Brazil, from the blood of a 35-year-old male patient with recurrent skin and soft tissue infections (SSTI), which were treated with numerous antibiotics, including vancomycin and teicoplanin. The patient had a history of mycosis fungoides, cocaine addiction and diabetes mellitus.¹⁻³

Comments: S. aureus, strain 880 (BR-VRSA) (HMP ID 1625) methicillin-resistant S. aureus (MRSA), is а vancomycin-resistant S. aureus (VRSA) strain. S. aureus, strain 880 (BR-VRSA) was deposited as positive for mec (subtype IV) and the bsa operon (for bacteriocin production); negative for Panton-Valentine leukocidin (PVL) toxin genes and the arginine catabolic mobile element (ACME); resistant to vancomycin and gentamicin; MLST (ST) 8; spa repeats YGMBQBLO; Ridom spa type t292; pulsed-field type USA300-related. Strain 880 (BR-VRSA) contains a unique plasmid, pBRZ01, which encodes for the vancomycin-resistance gene, vanA, and gentamicin-resistance gene, aac(6')-aph(2"). Strain 880 (BR-VRSA) was co-isolated with vancomycin-sensitive strain S. aureus (VSSA), strain 917 (BR-VSSA) (HMP ID 2111) and vancomycin-resistant Enterococcus faecalis (VREF), strain 918 (HMP ID 2097).^{2,3} The sequence of the vanA cluster from strain 880 (BR-VRSA) is identical to the one isolated from the VREF strain, suggesting that the VREF strain is the source of the vanA gene. Based on SNP-analysis, strain 917 (BR-VSSA) or a strain closely resembling strain 917 (BR-VSSA) is believed to be the origin of strain 880 (BR-VRSA).³ S. aureus, strain 880 (BR-VRSA) is a reference genome for The Human Microbiome Project (HMP). HMP is an initiative to identify and characterize human microbial flora. The complete genome of S. aureus, strain 880 (BR-VRSA) was sequenced by the Genome Institute at Washington University (GenBank: JICL0000000).

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.⁴ 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.^{5,6} 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*.^{5,7}

Material Provided:

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

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

Packaging/Storage:

NR-49120 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:

<u>Note</u>: For stability purposes, it is recommended that strain 880 (BR-VRSA) be 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 1 day.

Citation:

Acknowledgment for publications should read "The following reagent was obtained through BEI Resources, NIAID, NIH: *Staphylococcus aureus*, Strain 880 (BR-VRSA), NR-49120."

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,

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Public Health Service, Centers for Disease Control and Prevention, and National Institutes of Health. <u>Biosafety in</u> <u>Microbiological and Biomedical Laboratories</u>. 5th ed. Washington, DC: U.S. Government Printing Office, 2009; see <u>www.cdc.gov/biosafety/publications/bmbl5/index.htm</u>.

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References:

- 1. <u>HMP ID 1625</u> [*Staphylococcus aureus*, strain 880 (BR-VRSA)]
- 2. Arias, C. A., Personal Communication.
- Rossi, F., et al. "Transferable Vancomycin Resistance in a Community-Associated MRSA Lineage." <u>N. Engl. J. Med.</u> 370 (2014): 1524-1531. PubMed: 24738669.
- Deurenberg, R. H. and E. E. Stobberingh. "The Evolution of *Staphylococcus aureus*." <u>Infect. Genet. Evol.</u> 8 (2008): 747-763. PubMed: 18718557.
- 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." <u>Clin. Microbiol. Rev.</u> 23 (2010): 99-139. PubMed: 20065327.

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- 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." <u>J. Biol.</u> <u>Chem.</u> 30 (2004): 3398-3407. PubMed: 14613936.

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