

***Francisella tularensis* subsp. *holarctica*, Strain LVSG**

Catalog No. NR-585

For research use only. Not for human use.

Contributor:

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Product Description:

Bacteria Classification: *Francisellaceae*, *Francisella*

Agent: *Francisella tularensis* subsp. *holarctica*

Biotype/Biovar: Type B

Strain: LVSG

Source: *F. tularensis* subsp. *holarctica* LVSG is a spontaneous colony-opacity (i.e. grey) variant isolated from the parent live vaccine strain (LVS).¹

Francisella tularensis (*F. tularensis*) is one of the most infectious bacterial pathogens known and is the causative agent of the febrile zoonotic disease tularemia. The environmental reservoir of the bacterium is unknown, although most human cases result from the bite of a blood-feeding arthropod vector.

F. tularensis subsp. *holarctica* is a small, non-motile, aerobic, pleomorphic, gram-negative coccobacillus which displays a moderate degree of human virulence. Very little is known about the virulence mechanisms of *F. tularensis*, but growth in macrophages is central to the bacterium's ability to cause disease.²

NR-585 has been confirmed as subsp. *holarctica* (Type B) by PCR amplification of a subspecies-specific sequence of ~ 1250 bp from extracted DNA.³

Material Provided:

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

Packaging/Storage:

NR-585 was packaged aseptically, in screw-capped plastic 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

Cystine Heart Agar with 5% defibrinated rabbit blood

Incubation:

Temperature: 37°C

Atmosphere: Aerobic with 5% CO₂

Propagation:

1. Keep vial frozen until ready for use; thaw slowly.
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 tubes and plate at 37°C for 24–48 hours.

Citation:

Acknowledgment for publications should read "The following reagent was obtained through the NIH Biodefense and Emerging Infections Research Resources Repository, NIAID, NIH: *Francisella tularensis* subsp. *holarctica*, Strain LVSG, NR-585."

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. 4th ed. Washington, DC: U.S. Government Printing Office, 1999. HHS Publication No. (CDC) 93-8395. This text is available online at www.cdc.gov/od/ohs/biosfty/bmb14/bmb14toc.htm. This publication indicates that vaccination for *Francisella tularensis* is available and should be considered for personnel working with infectious materials.

Disclaimers:

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References:

1. Eigelsbach, H. T. and C. M. Downs. "Prophylactic Effectiveness of Live and Killed Tularemia Vaccines. I. Production of Vaccine and Evaluation in the White Mouse and Guinea Pig." J. Immunol. 87 (1961): 415–425. PubMed: 13889609.
2. Larsson, P., et al. "The Complete Genome Sequence of *Francisella tularensis*, the Causative Agent of Tularemia." Nature Genet. 37 (2005): 153–159. PubMed: 15640799.
3. Petersen, J. M., et al. "Laboratory Analysis of Tularemia in Wild-Trapped, Commercially Traded Prairie Dogs, Texas, 2002." Emerg. Infect. Dis. 10 (2004): 419–425. PubMed: 15109407.
4. Hartley, G., et al. "Grey Variants of the Live Vaccine Strain of *Francisella tularensis* Lack Lipopolysaccharide O-Antigen, Show Reduced Ability to Survive in Macrophages and Do Not Induce Protective Immunity in Mice." Vaccine 24 (2006): 989–996. PubMed: 16257097.
5. Cowley, S. C., S. V. Myltseva, and F. E. Nano. "Phase Variation in *Francisella tularensis* Affecting Intracellular Growth, Lipopolysaccharide Antigenicity and Nitric Oxide Production." Mol. Microbiol. 20 (1996): 867–874. PubMed: 8793882.
6. Raynaud, C., et al. "Role of the *wbt* Locus of *Francisella tularensis* in Lipopolysaccharide O-Antigen Biogenesis and Pathogenicity." Infect. Immun. 75 (2007): 536–541. PubMed: 17030571.
7. McLendon, M. K., M. A. Apicella, and L.-A. H. Allen. "*Francisella tularensis*: Taxonomy, Genetics, and Immunopathogenesis of a Potential Agent of Biowarfare." Annu. Rev. Microbiol. 60 (2006): 167–185. PubMed: 16704343.
8. Farlow, J., et al. "*Francisella tularensis* in the United States." Emerg. Infect. Dis. 11 (2005): 1835–1841. PubMed: 16485467.
9. Petersen, J. M. and M. E. Schriefer. "Tularemia: Emergence/Re-emergence." Vet. Res. 36 (2005): 455–467. PubMed: 15845234.
10. Svensson, K., et al. "Evolution of Subspecies of *Francisella tularensis*." J. Bacteriol. 187 (2005): 3903–3908. PubMed: 15901721.
11. Johansson, A., et al. "Worldwide Genetic Relationships among *Francisella tularensis* Isolates Determined by Multiple-Locus Variable-Number Tandem Repeat Analysis." J. Bacteriol. 186 (2004): 5808–5818. PubMed: 15317786.
12. Titball, R. W., A. Johansson, and M. Forsman. "Will the Enigma of *Francisella tularensis* Virulence Soon Be Solved?" Trends Microbiol. 11 (2003): 118–123. PubMed: 12648943.
13. Broekhuijsen, M., et al. "Genome-Wide DNA Microarray Analysis of *Francisella tularensis* Strains Demonstrates Extensive Genetic Conservation within the Species but Identifies Regions That Are Unique to the Highly Virulent *F. tularensis* subsp. *tularensis*." J. Clin. Microbiol. 41 (2003): 2924–2931. PubMed: 12843022.
14. Ellis, J., P. C. Oyston, M. Green, and R. W. Titball. "Tularemia." Clin. Microbiol. Rev. 15 (2002): 631–646. PubMed: 12364373.

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