# Product Information Sheet for NR-56770

## *Francisella tularensis* subsp. *tularensis,* Strain SCHU S4 Δ*fupA*/Δ*clp*B

## Catalog No. NR-56770

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**For research use only. Not for use in humans.**

### Contributor:

National Institutes of Allergy and Infectious Diseases (NIAID), National Institutes of Health (NIH)

### Manufacturer:

BEI Resources

### Product Description:

Bacteria Classification: *Francisellaceae, Francisella*
Species: *Francisella tularensis* subsp. *tularensis*
Biotype/Biovar: Type A
Strain: SCHU S4 Δ*fupA*/Δ*clp*B
Original Source: *Francisella tularensis (F. tularensis)* subsp. *tularensis*, strain SCHU S4 Δ*fupA*/Δ*clp*B is a double-deletion mutant of genes *clp*B, encoding a heat shock gene, and *fup*A, encoding the major virulence factor iron utilization protein A (also referred to as FTT0918), from *F. tularensis* subsp. *tularensis*, strain SCHU S4.[1,2,3] Strain SCHU S4 is a clone of highly virulent strain SCHU, which was isolated in 1941 from a human case of tularemia in Ohio, USA.[4,5]
Comments: *F. tularensis* subsp. *tularensis*, strain SCHU S4 Δ*fupA*/Δ*clp*B was generated using a suicide plasmid-based allelic exchange method targeting the *clp*B and *fup*A genes.[1] Verification of the Δ*clp*B mutation by whole genome sequencing (WGS) analysis and demonstration of significant attenuation in culture confirms that NR-56770 conforms to the criteria listed for exclusion of *Francisella tularensis* subsp. *tularensis*, strain SCHU S4 Δ*clp*B from the requirements of 42 CFR part 73, i.e., the Select Agent guidelines, and is suitable for use in BSL2 laboratories. The complete genome of *F. tularensis* subsp. *tularensis*, strain SCHU S4 has been sequenced (GenBank: AJ749949.2).

*F. tularensis* subsp. *tularensis* is a small, non-motile, aerobic, pleomorphic, Gram-negative coccobacillus which displays the highest degree of human virulence among *F. tularensis* subspecies. The pathogenicity of *Francisella* is attributed to the Francisella Pathogenicity Island (FPI), a gene cluster encoding a type VI secretion system (T6SS) consisting of 17 proteins involved in the modulation of host-bacterial or bacterial-bacterial interactions.[6] Deletion of *clp*B, located in the FPI gene cluster, has demonstrated compromised intracellular replication, attenuated virulence and impaired handling of stress stimuli in mutant strains compared to wild-type strains.[6] FupA is a 58-kilodalton protein required for utilization of siderophore-bound iron and plays an important role iron metabolism of *F. tularensis,* strain SCHU S4.[3]

### Material Provided:

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

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

### Packaging/Storage:

NR-56770 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:
Mueller Hinton broth or Cystine Heart broth with 5% defibrinated rabbit blood or equivalent
Chocolate agar with IsoVitaleX™ Enrichment (BD BBL™ B11875) or Cystine Heart agar with 5% defibrinated rabbit 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 3 days.

### Citation:

Acknowledgment for publications should read "The following reagent was obtained through BEI Resources, NIAID, NIH: *Francisella tularensis* subsp. *tularensis,* Strain SCHU S4 Δ*fupA*/Δ*clp*B, NR-56770."

### 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 (BMBL). 6th ed. Washington, DC: U.S. Government Printing Office, 2020.

### Disclaimers:

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

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## References:

1. Conlan, J. W., et al. "Differential Ability of Novel Attenuated Targeted Deletion Mutants of *Francisella tularensis* Subspecies *tularensis* Strain SCHU S4 to Protect Mice Against Aerosol Challenge with Virulent Bacteria: Effects of Host Background and Route of Immunization." Vaccine 28 (2010): 1824-1831. PubMed: 20018266.
2. De Pascalis, R., et al. "Working Correlates of Protection Predict SchuS4-Derived-Vaccine Candidates with Improved Efficacy against an Intracellular Bacterium, *Francisella tularensis."* NPJ Vaccines 7 (2022): 95. PubMed: 35977964.
3. Lindgren, H., et al. "The 58-Kilodalton Major Virulence Factor of *Francisella tularensis* is Required for Efficient Utilization of Iron." Infect. Immun. 77 (2009): 4429-4436. PubMed: 19651867.
4. Hesselbrock, W. and L. Foshay. "The Morphology of Bacterium Tularense." J. Bacteriol. 49 (1945): 209-231. PubMed: 16560913.
5. Eigelsbach, H. T., W. Braun and R. D. Herring. "Studies on the Variation of Bacterium Tularense." J. Bacteriol. 61 (1951): 557-569. PubMed: 14832199.
6. Alam, A., et al. "ClpB Mutants of *Francisella tularensis* Subspecies *holarctica* and *tularensis* Are Defective for Type VI Secretion and Intracellular Replication." Sci. Rep. 8 (2018): 11324. PubMed: 30054549.

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