

***Salmonella enterica* subsp. *enterica*, Strain BL53977 (Serovar Typhi)**

**Catalog No. NR-51630**

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

**Contributor:**

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**Manufacturer:**

BEI Resources

**Product Description:**

Bacteria Classification: *Enterobacteriaceae*, *Salmonella*

Species: *Salmonella enterica*

Subspecies: *Salmonella enterica* subsp. *enterica*<sup>1,2</sup>

Serogroup: D (factor 9)

Serovar: Typhi

Strain: BL53977

Original Source: *Salmonella enterica* (*S. enterica*) subsp. *enterica*, strain BL53977 (serovar Typhi) was isolated in 2016 from human blood in Hyderabad, Sindh Province, Pakistan.<sup>3,4</sup>

Comments: *S. enterica* subsp. *enterica*, strain BL53977 (serovar Typhi) is an H58-lineage isolate deposited as resistant to carbapenem, cefixime, chloramphenicol, ciprofloxacin and sulfamethoxazole/trimethoprim, and susceptible to azithromycin, cefotaxime, ertapenem and meropenem.<sup>3,4</sup> The complete genome of the type strain Ty2 (serovar Typhi) has been sequenced (GenBank: [AE014613](https://www.ncbi.nlm.nih.gov/nuclseq/AF014613)).<sup>5</sup>

*S. enterica* are Gram-negative, rod-shaped, flagellated bacteria. The species is divided into six subspecies (I, II, IIIa, IIIb, IV, VI) where only subspecies I, subsp. *enterica*, is considered of clinical relevance. Salmonellosis (non-typhoidal), due to the greater than 1500 serovars of *S. enterica* subsp. *enterica*, is one of the most common food-borne diseases with an estimated two million cases that occur in the United States every year.<sup>6</sup> Pathogenicity results from a variety of virulence factors found in plasmids, prophages and five pathogenicity islands, which allow these organisms to colonize and infect host organisms.<sup>7</sup>

*S. enterica* subsp. *enterica* serovar Typhi (*S. Typhi*), the causative agent of typhoid fever, is a human-restricted, monophyletic serovar which is transmitted from human to human by the fecal-oral route, often via contaminated water. Multidrug-resistant (MDR) isolates prevalent in parts of Asia and Africa are often associated with the dominant H58 haplotype, harboring an IncHI1 plasmid with multiple resistance genes to first-line drugs, including *bla*<sub>TEM-1</sub> (ampicillin), *catA1* (chloramphenicol), *dfrA7*, *sul1*, *sul2* (sulfamethoxazole/trimethoprim) and *strAB* (streptomycin) resistance genes.<sup>4</sup> Recently, the emergence of a novel

*S. Typhi* clone with additional resistance to fluoroquinolones and third-generation cephalosporins has been reported in Sindh, Pakistan, and is classified as extensively drug-resistant (XDR).<sup>4,8</sup> This XDR *S. Typhi* clone encodes a chromosomally located resistance region and harbors an antibiotic resistance-associated IncY plasmid specific to XDR isolates in this phylogenetic branch, named p60006, which encodes additional elements, including the extended-spectrum beta-lactamase (*bla*<sub>CTX-M-15</sub>) and fluoroquinolone (*qnrS*) resistance genes. This p60006 plasmid exhibited high sequence identity to plasmids found in other enteric bacteria, particularly *Escherichia coli*, isolated from widely distributed geographic locations.<sup>4</sup>

**Material Provided:**

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

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

**Packaging/Storage:**

NR-51630 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:

Tryptic Soy broth or Nutrient broth or equivalent

Tryptic Soy agar with 5% defibrinated sheep blood or Nutrient agar 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: *Salmonella enterica* subsp. *enterica*, Strain BL53977 (Serovar Typhi), NR-51630."

**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/bmb15/index.htm](http://www.cdc.gov/biosafety/publications/bmb15/index.htm).

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**References:**

1. Judicial Commission of the International Committee on Systematics of Prokaryotes. "The Type Species of the Genus *Salmonella* Lignierres 1900 Is *Salmonella enterica* (ex Kauffmann and Edwards 1952) Le Minor and Popoff 1987, with the Type Strain LT2<sup>T</sup>, and Conservation of the Epithet *enterica* in *Salmonella enterica* over All Earlier Epithets that May Be Applied to This Species. Opinion 80." Int. J. Syst. Evol. Microbiol. 55 (2005): 519-520. PubMed: 15653929.
2. Tindall, B. J., et al. "Nomenclature and Taxonomy of the Genus *Salmonella*." Int. J. Syst. Evol. Microbiol. 55 (2005): 521-524. PubMed: 15653930.
3. Hasan, R., Personal Communication.
4. Klemm, E. J., et al. "Emergence of an Extensively Drug-Resistant *Salmonella enterica* Serovar Typhi Clone Harboring a Promiscuous Plasmid Encoding Resistance to Fluoroquinolones and Third-Generation Cephalosporins." MBio 9 (2018): e00105-18. PubMed: 29463654.
5. Deng, W., et al. "Comparative Genomics of *Salmonella enterica* serovar Typhi strains Ty2 and CT18." J. Bacteriol. 185 (2003): 2330-2337. PubMed: 12644504.
6. Altekruse, S. F., M. L. Cohen and D. L. Swerdlow.

"Emerging Foodborne Diseases." Emerg. Infect. Dis. 3 (1997): 285-293. PubMed: 9284372.

7. Lavigne, J. P. and A. B. Blanc-Potard. "Molecular Evolution of *Salmonella enterica* Serovar Typhimurium and Pathogenic *Escherichia coli*: From Pathogenesis to Therapeutics." Infect. Genet. Evol. 8 (2008): 217-226. PubMed: 18226587.
8. Chatham-Stephens, K., et al. "Emergence of Extensively Drug-Resistant *Salmonella* Typhi Infections Among Travelers to or from Pakistan - United States, 2016-2018." MMWR Morb. Mortal. Wkly. Rep. 68 (2019): 11-13. PubMed: 30629573.

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