Informational

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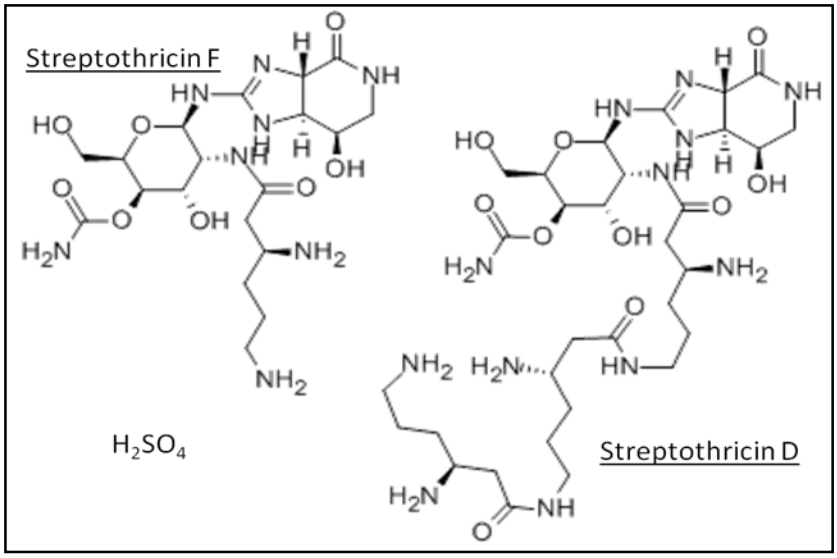
Nourseothricin Sulfate



Nourseothricin is an antimicrobial produced by the soil bacteria Streptomyces noursei and belongs to a subgroup of antibiotics that share a chemical structure called streptothricins (STs). Streptothricins are made up of a carbamoylated gulosamine molecule attached to an atypical amino acid (streptolidine) and a polymer of 1 to 7-lysine residues (ST-F through ST-A and ST-X)(Khoklov & Shutova, 1972). Naturally isolated nourseothricin is a mixture of ST-F and ST-D compounds.

Nourseothricin blocks protein biosynthesis, as do many aminoglycoside antibiotics like kanamycin, gentamicin, and hygromycin B. However, nourseothricin is structurally unrelated to this class of antibiotics and resistance to it is thought to act via a distinct mechanism (Cundliffe, 1989). Nourseothricin is broadly effective against many prokaryotic species and has also been used to inhibit growth in several eukaryotic systems including various yeast species, fungi, protozoa, insects, and plants (Hamano, Matsuura, Kitamura, Takagi, 2006).

Resistance to nourseothricin is conferred by the nat1 gene originally isolated from S.noursei. The gene encodes an enzyme that acetylates STs at the β-amino group(s) of the β -lysine moiety (Kobayashi, Horinouchi, Uozumi, Beppu, 1987; Krügel , Fiedler, Haupt, Sarfert, Simon 1988). The nat1 gene has been shown to function in several heterologous systems, making it a valuable selection tool for molecular genetics. Various cloning vectors designed for targeted gene deletion or as stable selectable plasmids have been developed and are widely available (Goldstein & McCusker, 1999; Taxis & Knopp, 2006; Hamano, Matsuura, Kitamura, Takagi, 2006). Recent research has identified another nourseothricin resistance gene, sttH, that appears to act through a distinct mechanism and that confers resistance specifically to yeast

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but not bacteria (Hamano, Matsurra, Kitamura, Takagi, 2006). The enzyme encoded by sttH converts STs to their acid forms by hydrolyzing the lactam ring of streptolidine.

Nourseothricin is effective at relatively low concentrations, with typical selection concentrations falling between 50-200µg/ml for most organisms. The *nat1* gene has not been shown to confer cross-resistance to a range of other antibiotics, so it can be used in combination with other dominant resistance marker genes (Haupt, Jona'k, Rychlik, Thrum, 1980). Nourseothricin is not used as a therapeutic antibiotic, and there is believed to be very little resistance among clinical bacterial isolates. Nourseothricin is an especially useful selection for yeast molecular biology. Unlike some auxotrophic markers, nourseothricin resistance has no effect on yeast growth rates and can be used in industrial or wild yeast that lack available nutritional markers for selection (Goldstein & McCusker, 1999).

References

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