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ProductInformation

Lipoteichoic acid
from *Streptococcus pyogenes*

Product Number **L 3140**
Storage Temperature 2-8 °C

Product Description

CAS Number: 56411-57-5
Synonym: LTA

Among different groups of bacteria (e.g., Gram-positive, Gram-negative, spirochetes, mycobacteria, and mycoplasma) the cells have various types of cell envelopes that represent a departure from the normal simplicity of bacterial cell structure compared to animal cells. In general, the cell envelopes of bacteria are more complex than the cell membranes of animal cells.

The cell envelopes of Gram-positive bacteria are complex structures. Included among the components of the Gram-positive cell envelope are the cytoplasmic membrane, the cell wall, and the glycocalyx. The cytoplasmic membrane is a rather typical phospholipid bilayer "unit membrane" similar to that found in eukaryotic cells (except the bacterial membrane lacks sterols). Overlaying the cytoplasmic membrane is a relatively thick (i.e., compared to cytoplasmic membrane) structure consisting of a number of polymers called the cell wall. The major component of the cell wall is highly cross-linked peptidoglycan. While growing in natural habitats, Gram-positive bacteria also have a layer surrounding the cell wall called the glycocalyx. The glycocalyces of many bacteria are polysaccharides, some are proteins. Some pathogenic *Streptococcus* species contain a fibrillar protein layer, the M protein, in the glycocalyx.[1]

Among other non-peptidoglycan polymers found in the cell wall, many Gram-positive walls contain teichoic acid. Teichoic acid is a highly immunogenic polymer made from ribitol-phosphate and/or glycerol-phosphate. Often Gram-positive walls also contain lipoteichoic acid. Lipoteichoic acid is a teichoic acid attached to a lipid. Lipoteichoic acid is a linear polymer of phosphodiester-linked glycerol phosphate covalently bound to a lipid. The C2 position on the glycerol-phosphate is usually glycosylated and/or D-alanylated. Because of the negatively charged backbone of glycerol phosphate and the hydrophobic lipid, the molecule is amphipathic (i.e., it has both a polar and nonpolar end). The lipid portion is bound hydrophobically to the cell membrane, whereas the polyglycerol phosphate portion extends into the cell wall. LTA is not covalently bound to the peptidoglycan.[1]

The biological role of LTA when bound to the cell membrane and extending throughout the layers of the peptidoglycan is not understood. LTA can be found at the cell surface of some Gram-positive bacteria. When expressed on the cell exterior, LTA is thought to act as an adhesin. For example, LTA is secreted by *Streptococcus pyogenes*, where it acts as an adapter by binding to both the M protein and to receptors on host tissues. Attachment of bacteria to the host tissues allows colonization of those tissues. Under these circumstances one should consider the surface LTA as part of the glycocalyx along with the M protein.[1]

Precautions and Disclaimer

For Laboratory Use Only. Not for drug, household or other uses.

Preparation Instructions

Lipoteichoic acid is soluble in water (5mg/ml), yielding a clear, colorless to faintly hazy solution.

Storage/Stability
Aqueous solutions are stable for two days at 4 °C. or for two months when stored as single-use aliquots frozen at -20 °C.

References
1. The Physiology and Biochemistry of Prokaryotes, 2nd ed., White, D., Oxford University Press (New York, NY: 1999), p.16.

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