

# Recombinant *Borrelia burgdorferi* sensu stricto (B31) DbpB Protein, MBP-tagged

**Cat. No.** BOR-029    **Lot. No.** (See product label)

## SPECIFICATION

### Product Overview

*Borrelia burgdorferi* DbpB recombinant protein, fused to an MBP-tag and produced from *E. coli* (>90% purity).

### Tag

MBP

### Background

Decorin Binding Protein B (DbpB) is encoded by the spirochete *B. burgdorferi*, which is carried by Ixodes ticks. Strain B31 is the type strain (ATCC 35210) for this organism and was derived by limited dilutional cloning from the original Lyme-disease tick isolate obtained by A. Barbour (Johnson, et al., 1984). It should be noted that other microbial DbpA's, such as *E. coli* (ATP-dependent RNA helicase DbpA), are significantly different to *Borrelia* DbpA. *B. burgdorferi* sensu stricto has a linear plasmid (lp54) which carries a two-gene operon encoding two surface lipoproteins, DbpA and DbpB, both of which bind decorin (Guo, et al., 1995).

DbpA and DbpB are surface-exposed outer membrane lipoproteins that mediate the attachment of *Borrelia* to decorin, a major component of the host extracellular matrix, enabling bacteria to colonize mammalian tissues (Roberts, et al., 1998). Both can mediate interaction with the glycosaminoglycans (GAGs) heparin and dermatan sulfate (Guo, et al., 1998), but only DbpB binds chondroitin sulfate (Fischer, et al., 2003). The expression of decorin-binding protein (Dbp) A and/or DbpB is sufficient to convert a high-passage nonadherent *B. burgdorferi* strain into one that efficiently binds HEK293 epithelial cells.

The spirochete travels from the tick mid-gut during tick feeding, to the tick salivary glands and into the mammal host, and it is believed that this migration is facilitated by

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changes in expression of different *B. burgdorferi* genes. It is thought that expression of the various proteins associated with the spirochete may be regulated by the changes in tick life cycle, changes in conditions during tick feeding (such as temperature, pH, and nutrients) and/or in coordination with the course of infection of the mammal host. While not expressed in the unfed tick, DbpA (and possibly DbpB) are quickly upregulated, either during feeding or after entry, into the host. The location of DbpA and DbpB in the outer membrane of *B. burgdorferi* allows exposure of these proteins to the host immune system. DbpA has also been used to show high levels of genetic diversity in *B. afzelii*-infected rodent hosts, by qPCR (Coipan, et al., 2018). NMR and a crystal structure of a DbpA monomer (resolution of 1.60 Å) confirmed three lysines co-localize with decorin to a common basic patch near the C terminus of the protein (Wang & Feng, 2015; Fortune, et al., 2014). Knockout strains confirmed that the lysine residues are required for binding and infection in mice (Fortune, et al., 2014). Strain-specific variations of *Borrelia* surface proteins also affect tissue tropism (Lin, et al., 2014) as well as differences in GAG binding affinities which is correlated with differences in GAG-binding pocket location and epitope number (Morgan & Wang, 2015).

|                    |                                                                                         |
|--------------------|-----------------------------------------------------------------------------------------|
| <b>Purity</b>      | >90% by SDS-PAGE                                                                        |
| <b>Formulation</b> | 0.02 M Potassium Phosphate, 0.15 M Sodium Chloride, pH 7.2 and 0.01% (w/v) Sodium Azide |
| <b>Stability</b>   | At +4 centigrade: Not determined.<br>At -80 centigrade: Not determined.                 |
| <b>Freezing</b>    | Can be frozen, but avoid multiple freeze/thaw cycles.                                   |
| <b>Storage</b>     | Short Term Storage: +2 centigrade to +8 centigrade<br>Long Term Storage: -80 centigrade |

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|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Concentration</b>    | 1.0 mg/mL by UV absorbance at 280 nm                                                                                                                                                                                                             |
| <b>Notes</b>            | This product is intended for research and manufacturing uses only. It is not a diagnostic device. The user assumes all responsibility for care, custody and control of the material, including its disposal, in accordance with all regulations. |
| <b>Type</b>             | Recombinant                                                                                                                                                                                                                                      |
| <b>ClassID 1</b>        | Infectious Disease                                                                                                                                                                                                                               |
| <b>GENE INFORMATION</b> |                                                                                                                                                                                                                                                  |
| <b>Synonyms</b>         | Borrelia burgdorferi sensu stricto (B31) DbpB                                                                                                                                                                                                    |

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