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Datasheet for 000-001-C33**VlsE Control Protein****Overview**

Description:	VlsE Control Protein - 000-001-C33
Item No.:	000-001-C33
Size:	100 µg
Applications:	SDS-PAGE, WB, Biochemical Assay
Origin:	Borrelia burgdorferi
Expressed in:	E. coli

Product Details**Background:**

Variable Lipoprotein Surface-Exposed protein, or VlsE, is a lipoprotein on the surface of the Lyme Disease spirochete *Borrelia burgdorferi*, detectable during all its life stages. It can exist as many different isoforms. VlsE has variable regions (VRs) and invariable regions (IRs). Some IRs are anchored in the outer membrane of the bacteria and some are antigens exposed on the membrane surface. Replacement of the VR by *Borrelia* within days of being transferred to a mammalian host presents new surface antigens to the host immune system, and helps *Borrelia* avoid a strong reaction by host immune systems. The VlsE is apparently not modified as much in the tick or in the rodent vector, when compared to in the mammal host. Several putative envelope proteins of *B. burgdorferi* appear to be expressed only in the infected mammalian host. The VRs are antigenic, irregularly shaped loops on the bacterial surface which may help to hide both membrane-incorporated and surface portions of adjacent proteins from immune cells. These VR loops are coded by antigenic cassettes. The protein loops can therefore be switched in or out of the protein, or different type loops traded. In *B. burgdorferi* there seem to be at least fifteen different VlsE cassettes that can insert into any of the variable regions of VlsE, allowing it to appear as millions of different antigens. Similar, but smaller, systems also operate for OSP-A, OSP-B, OSP-C, and other proteins. Some current research involves determination of control of cassette activation. One IR region, C6, of the VlsE protein, consistently stimulates a strong immune response. Its presentation may be a decoy that misdirects the immune system from less protected sites by causing competition for binding antibodies. The bound antibodies are thus not available for binding important therapeutic proteins. This may help *Borrelia* to enter T-cells, leading to their destruction. Because IR6 is invariable and found in all life stages of *B. burgdorferi*, it has been used in an ELISA diagnostic test for early IgM of Lyme Disease. Lyme disease proteins are ideal for researchers interested in immunology, neurology, rheumatology, coinfections, autoimmune, and neurodegenerative diseases.

Synonyms:	Outer surface protein VlsE, <i>Borrelia burgdorferi</i> VlsE, vlsE protein, control protein
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Species of Origin:	Borrelia burgdorferi
Expressed in:	E. coli
Type:	Recombinant Protein

Target Details

Gene Name:	vlsE
Purity/Specificity:	VlsE is a fusion protein with an MBP tag and was expressed in E. coli. Analysis by SDS-PAGE resulted in a pattern consistent with purified VlsE and was estimated to be greater than 90% pure.
Relevant Links:	<ul style="list-style-type: none">• UniProtKB - Q5DVG3• NCBI - CAH61549.1• GeneID - 1194357

Application Details

Tested Applications:	SDS-PAGE, WB
Suggested Applications:	Biochemical Assay (Based on references)
Application Note:	VlsE is suitable as a control in immunological assays. Specific conditions for reactivity should be optimized by the end user. Expect a band at 78.7 kDa for VlsE-MBP, (36.3 kDa for VlsE and 42.4 kDa for MBP) in size corresponding to VlsE by Western blotting in the appropriate cell lysate or extract. Variable Lipoprotein Surface-Exposed protein was tested in SDS-page and western blot.
Assay Dilutions:	All assays should be optimized by the user. Recommended dilutions (if any) may be listed below.
ELISA:	User Optimized
WB:	User Optimized

Formulation

Physical State:	Liquid (sterile filtered)
Concentration:	1.0 mg/mL by BCA assay
Buffer:	0.02 M Potassium Phosphate, 0.15 M Sodium Chloride, pH 7.2
Preservative:	0.01% (w/v) Sodium Azide
Stabilizer:	None

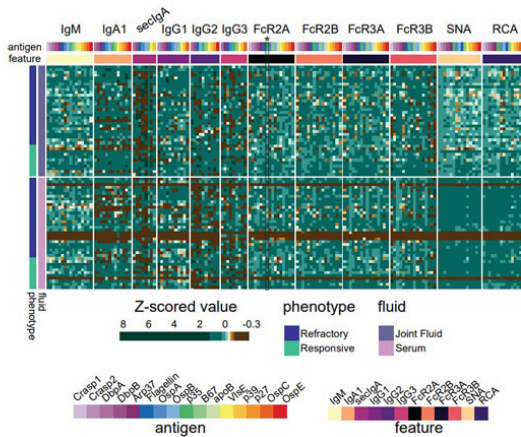
Shipping & Handling

Shipping Condition: Dry Ice

Storage Condition: Store vial at -20 °C prior to opening. Aliquot contents and freeze at -20 °C or below for extended storage. Avoid cycles of freezing and thawing. Centrifuge product if not completely clear after standing at room temperature. Dilute only prior to immediate use.

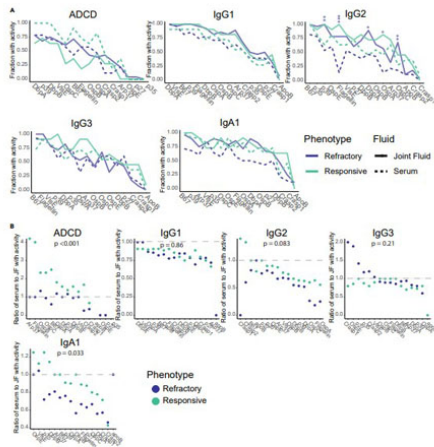
Expiration: Expiration date is six (6) months from date of receipt.

Images



Figure

Systems serology profiling with *Borrelia*-specific antigens reveals patient heterogeneity. The heatmap shows the Z-scored measurements for 12 features, across 16 antigens for both refractory and responsive patients, visualized with joint fluid measurements in the upper half of the heatmap and serum measurements in the lower half of the heatmap. Only antigens detected above background for at least 30% of samples were included for each measurement. Statistical significance was assessed using the Mann-Whitney nonparametric test, with p values then corrected for multiple hypothesis testing via Benjamini-Hochburg, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, else not significant. CRASP1 (p/n 000-001-C18), CRASP2 (p/n 000-001-C19), DbpA (p/n 000-001-B98), DbpB (p/n 000-001-C16), Arp37 (p/n 000-001-C09), flagellin (p/n 000-001-C14), OspA (p/n 000-001-C13), OspB (p/n 000-001-C15), OspC (p/n 000-001-C11), OspE (p/n 000-001-C10), p27 (p/n 000-001-C30), p35 (p/n 000-001-C12), p39 (p/n 000-001-C17), VlsE (p/n 000-001-C33). Fig 1. PMID: 38303696.

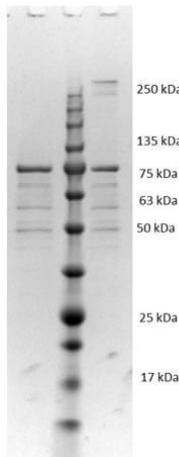


Figure

Antigen-specific IgG2, IgA1, and ADCD partitioning between compartments differs significantly across disease phenotypes. (A) Fraction of samples with non-zero measurements for ADCD, IgG1, IgG2, IgG3, and IgA1 for refractory (dark blue) and responsive (green) patients in the serum (dashed line) and joint fluid (solid line) for each antigen. Significant differences in distribution of non-zero measurements between fluids as assessed by a Fisher’s exact test are denoted as * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$ for refractory (dark blue) and responsive (green) samples after correction for multiple hypothesis testing via Benjamini-Hochburg. (B) Ratio of fraction of serum samples with non-zero measurements to fraction of joint fluid samples with non-zero measurements for ADCD, IgG1, IgG2, IgG3, and IgA1 for refractory (dark blue) and responsive (green) patients for each antigen. Significant differences in distributions of ratios between phenotypes are assessed by a Mann-Whitney nonparametric test, then corrected for multiple hypothesis testing via Benjamini-Hochburg. CRASP1, CRASP2, DbpA, DbpB, Arp37, flagellin, OspA, OspB, OspC, OspE, p27, p35, p39, VlsE: Rockland antigens. Fig 6. PMID: 38303696.

SDS-PAGE

SDS-Page of VlsE Control Protein. Lane 1: VlsE-MBP reduced. Lane 2: Opal Prestained Molecular Weight Marker (p/n MB-210-0500). Lane 3: VlsE-MBP non-reduced. 4-20% Gel, Coomassie Stained. Expect a band at ~78 kDa for VlsE-MBP, (~36 kDa for VlsE and ~42 kDa for MBP).



References

- Bowman KA. et al. Borrelia-specific antibody profiles and complement deposition in joint fluid distinguish antibiotic-refractory from -responsive Lyme arthritis. *iScience*. (2024)
- Haslund-Gourley BS. et al. Host glycosylation of immunoglobulins impairs the immune response to acute Lyme disease. *eBioMedicine*. (2024)
- Lone A et al. The Borrelia burgdorferi VlsE Lipoprotein Prevents Antibody Binding to an Arthritis-Related Surface Antigen. *Cell Rep*. (2020)

Disclaimer

This product is for research use only and is not intended for therapeutic or diagnostic applications. Please contact a technical service representative for more information. All products of animal origin manufactured by Rockland Immunochemicals are derived from starting materials of North American origin. Collection was performed in United States Department of Agriculture (USDA) inspected facilities and all materials have been inspected and certified to be free of disease and suitable for exportation. All properties listed are typical characteristics and are not specifications. All suggestions and data are offered in good faith but without guarantee as conditions and methods of use of our products are beyond our control. All claims must be made within 30 days following the date of delivery. The prospective user must determine the suitability of our materials before adopting them on a commercial scale. Suggested uses of our products are not recommendations to use our products in violation of any patent or as a license under any patent of Rockland Immunochemicals, Inc. If you require a commercial license to use this material and do not have one, then return this material, unopened to: Rockland Inc., P.O. BOX 5199, Limerick, Pennsylvania, USA.