Name:	**Complement Factor P (Properdin)**
Catalog Number:	**A139C**
Sizes Available:	100 µg
Concentration:	1.0 mg/mL (see Certificate of Analysis for actual concentration)
Form:	Frozen liquid
Extinction Coeff.	$A_{280\ nm}$ = 1.78 at 1.0 mg/mL
Molecular weight:	53,000 Da (single chain)
Activity:	>70% versus normal human serum standard
Purity:	>90% by SDS-PAGE
Buffer:	10 mM Sodium phosphate, 145 mM NaCl, pH 7.3
Preservative:	None, 0.22 µm filtered.
Storage:	-70°C or below. Avoid repeated freeze/thaw.
Source:	Normal human serum (shown by certified tests to be negative for HBsAg, HTLV-I/II, STS, and for antibodies to HCV, HIV-1 and HIV-II).
Origin:	Manufactured in the USA.

General Description

Complement factor P (properdin) is purified from normal human serum. Factor P is a 53,000 dalton cationic protein that circulates in blood in the form of dimers, trimers and tetramers. It binds rapidly to C3b on surfaces where complement has begun to activate. Properdin binds most avidly to C3b,Bb the alternative pathway C3/C5 convertase, but also binds to C3b < C3b,B < C3b,Bb. Its primary function is to stabilize the C3b,Bb complex allowing increased alternative pathway activation (Pangburn, M.K., (1988); Nolan, K.F. and Reid, K.B.M. (1993)). Properdin enhances formation of the alternative pathway C3 convertase by increasing binding of factor B to P,C3b complexes. Thus, properdin is an accelerator (positive regulator) of complement activation. Properdin has recently been proposed to be able to also initiate activation of the alternative pathway by binding to the target surface and initiating C3/C5 convertase formation (Kemper C. and Hourcade D.E. (2008)).

Physical Characteristics & Structure

The basic subunit of this protein is a 53,000 dalton single chain molecule which is composed of six thrombospondin-like repeat (TSR) domains. These basic units are linked at the ends (C-terminal to N-terminal) to form circular dimers, trimers, tetramers and perhaps higher forms in blood (Pangburn, M.K. (1989)). Electron microscopic images (Smith, C.A. et al. (1984)) have clearly demonstrated these structures. Higher oligomers of properdin are formed upon freeze thaw and perhaps during complement activation and were originally called “activated” properdin due to their enhanced ability to bind and activate complement. Properdin has a rare post-translational modification in that its tryptophan residues are highly mannosylated (Hartmann, S. and Hofsteenge, J. (2000)). There is also a single N-linked glycosylation site near the C-terminal. These contribute to a carbohydrate content estimated at 10%. Properdin is highly positively charged at neutral pH and has a pI greater than 9.5. It is one of the most positively charged proteins in blood (Morley, B.J. and Walport, M.J. (2000)).

EC Number: EC 3.4.21.45

Function

Properdin binds most avidly to C3b,Bb the alternative pathway C3/C5 convertase, but also binds to C3b < C3b,B < C3b,Bb. Its primary function is to stabilize the C3b,Bb complex allowing increased alternative pathway activation. Properdin enhances formation of the alternative pathway C3 convertase by increasing binding of factor B to P,C3b complexes. Thus, properdin is an accelerator (positive regulator) of complement activation.

Assays

Assays depend on the ability of properdin to bind to clusters of C3b or to accelerate the activation of the alternative pathway. ELISA assays for protein may be performed by coating plates with excess C3b (CompTech Cat# A114), binding properdin and detection with goat anti-Properdin (CompTech Cat# A239). Functional assays are best performed using P-depleted serum (CompTech Cat# A339) and then measuring the accelerated lysis of rabbit erythrocytes (CompTech Cat# B300) in the presence of properdin (CompTech Cat# A139) and MgEGTA (CompTech Cat# B106). Lysis does occur slowly in the absence of properdin so these assays must be timed assays to compare the rates of lysis with and without properdin. Assays for "activated" properdin consist of incubating properdin in NHS for extended periods of time (30 to 60 min) and measuring the residual C3 activity using C3-depleted serum (CompTech Cat# 313) and rabbit erythrocytes.

In vivo

Blood contains approximately 5 µg/mL properdin (Pangburn, M.K. (1989)). Properdin does not appear to be synthesized in the liver where most complement proteins are synthesized. It is primarily made by monocytes, T-cells and neutrophils. In neutrophils it is stored in granules that release the properdin in response to C5a, FMLP, IL8 and TNF-alpha.

Regulation See ***In vivo*** above.

Genetics

The gene for properdin is X-linked and resides on the short arm of the X chromosome between Xp11.3-Xp11.23. The gene is 6 kb is size with 10 exons. Accession numbers: Human (X70872, X70872.1, X57748, M83652, S49355), Mouse (X12905), Guinea pig (S81116).

Deficiencies

Deficiencies are rare and can be the result of a total lack of properdin protein in blood or the presence of immunochemically detectable, but functionally inactive properdin.

Diseases

Deficiency of properdin results in recurrent fulminant meningococcal infections. Neisserial infections typically occur in young males, progress rapidly and can be fatal.

Reoccurrences are rare probably due to the generation of protective antibodies during the first incident.

Precautions/Toxicity/Hazards

This protein is purified from human serum, therefore precautions appropriate for handling any blood-derived product must be used even though the source was shown by certified tests to be negative for HBsAg, HTLV-I/II, STS, and for antibodies to HCV, HIV-1 and HIV-II.

Hazard Code: B WGK Germany 3

MSDS available upon request.

References

Hartmann, S. and Hofsteenge, J. (2000) Properdin, the positive regulator of complement, is highly C-mannosylated. J. Biol. Chem. 275:28569-74.

Kemper C. and Hourcade D.E. (2008) Properdin: New roles in pattern recognition and target clearance. Mol. Immunol. 45, 4048-4056.

Law, S.K.A. and Reid, K.B.M. (1995) Complement 2nd Edition (ISBN 0199633568) Oxford University Press, Oxford.

Morley, B.J. and Walport, M.J. (2000) The Complement Facts Book (ISBN 0127333606) Academic Press, London.

Morgan, B.P. ed. (2000) Complement Methods and Protocols. Humana Press.

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Pangburn, M.K. (1989) Analysis of the natural polymeric forms of human properdin and their functions in complement activation. J.Immunol. 142:202-207.

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Smith, C.A., Pangburn, M.K., Vogel, C.W. and Muller-Eberhard, H.J. (1984) J. Biol. Chem. 259:4582-4588.