Name:	**Zymosan, Pre-activated**
Catalog Number:	**B400**
Sizes Available:	10 mL
Concentration:	1 x 10^9 zymosan particles/mL (10 mg/mL)
Form:	Frozen suspension
Buffer:	Normal Saline
Preservative:	None
Storage:	-70°C or below.
Source:	Yeast (saccharomyces cerevisiae).
CAS Number:	58856-93-2
Origin:	Manufactured in the USA.

General Description

Zymosan is prepared (Pillemer, L. and Ecker, E.E., (1941)) from actively growing yeast (*Saccharomyces cerevisiae*). After removal of cellular contents the isolated cell walls remain. This is zymosan and it is primarily composed of the highly cross-linked polysaccharides alpha-D-mannan, beta-D-glucan, and other minor polysaccharide polymers. Fresh zymosan, and especially zymosan stored as a dried powder, must be activated to develop its full complement-activating activity (Minta, J., 1983). This is done by refluxing zymosan in saline at 100°C for two hours. This process has been performed for customers on the zymosan offered by CompTech and it is sold as a pre-activated suspension in saline. The product has been shown to be stable for four years if kept frozen. It is stable at 4°C for several months if not contaminated by microbial growth.

Physical Characteristics & Structure

Under microscopic examination this product appears as small yeast particles with a distribution of sizes (average 3 µm) reflecting the growth and division by budding that occurs in an actively growing yeast culture (DiCarlo, F. and Fiore, J.V. (1958)).

Function

Zymosan is used as an activator of the alternative pathway of complement and as a target for phagocytosis by PMN, macrophages and other phagocytic cells. It can be used to consume complement and generate all of the complement activation products such as C3a, C5a, SC5b-9, iC3b, Ba, Bb, etc. Zymosan will activate all three pathways of complement. Most normal human serum contains natural antibodies to yeast resulting in classical pathway activation. Zymosan is primarily composed of a polymer of mannose resulting in activation of the lectin pathway via MBL and the alternative pathway of complement activates spontaneously and aggressively on pre-activated zymosan (Huber, A.R. and Weiss, S.J. (1989)).

Assays

Pre-activated zymosan is tested for its complement activating potential by incubating with normal human serum and subsequently measuring the remaining complement titer. Typically zymosan (0.5 mg in 50 µL) will consume >90% of the

complement activity in 1.0 ml of normal human serum during a 30 min incubation at 37^{o}C.

Applications

Zymosan is primarily used to activate complement (Huber, A.R. and Weiss, S.J., (1989)). This may be accomplished by activating all three pathways of complement or via the alternative pathway by using serum in which the classical and lectin pathways have been inhibited, such as with C2-dpl or C4-dpl or with the use of MgEGTA in NHS. The resulting particles have large amounts of covalently attached C3b, iC3b and C3d (as well as natural IgG from the NHS). The product of this procedure is referred to as "opsonized zymosan". This has been used as a target for phagocytic cells. Zymosan has also been used to prepare complement research reagents such as "zymosan-treated serum" which is partially depleted in C3, C5 and properdin by incubating 10 mg zymosan with 10 ml NHS for 60 min at 37 ^{o}C (Dodds, A.W. and Sim, R.B. (1997); Morgan, B.P. (2000)). A more selective removal of most, but not all, of the properdin in serum can be achieved by incubation for a limited time at low temperature. Zymosan can also be used to generate large amounts of C3a and C5a in NHS although due to the presence of carboxypeptidase N both anaphylatoxins are rapidly converted to the less active C3a desArg and C5a desArg forms (Dodds, A.W. and Sim, R.B. (1997)).

In vivo

Yeast and extracts of its major polysaccharides, mannan and beta-glucan have been used to elicit a variety of biological and immunological responses in animals (Sim R.B. 1993). These responses include direct phagocytosis via the beta-glucan receptor on monocytes and complement mediated binding to one or more of the complement receptors CR1, CR2, CR3 and CR4. Responses also include degranulation and transient leucopenia and neutropenia. Oxidative burst and release of histaminases have also been reported in response to zymosan and complement activation. Low concentrations of zymosan and polysaccharides extracted from it have been shown to elicit anti-tumor activities in immune cells (Miura, T. et al. (1999); Mariani, C.L. et al. (2007)).

References

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

Pillemer, L. and Ecker, E.E., J. Biol. Chem., 137, 139-142, (1941).

Dodds, A.W. and Sim, R.B. editors (1997). Complement A Practical Approach (ISBN 019963539) Oxford University Press, Oxford.

Sim R.B., editor (1993). Activators and Inhibitors of Complement (ISBN 0-7923-1819-6) Kluwer Academic Publishers.

DiCarlo, F. and Fiore, J.V., Science, 127, 756-757 (1958).

Minta, J., (1983) Methods in Enzymology, 93, 384.

Miura T, Ohno N, Miura NN, Adachi Y, Shimada S, Yadomae T., (1999) FEMS Immunol Med Microbiol. 24,131-9.

Mariani CL, Rajon D, Bova FJ, Streit WJ. (2007) J Neurooncol. 85, 231-40.

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