



Hyaluronan (Low Molecular Weight)

Certificate of Analysis

Catalog Number: GLR001

Lot Number: 1254988

Specifications and Use

- Source** ♦ Produced by microbial fermentation of *Streptococcus pyogenes*.
- Molecular Mass Range** ♦ 15 - 40 kDa. This lot has a mass of 16.9 kDa.
- Endotoxin Level** ♦ < 0.01 EU per mg
- Bioburden** ♦ < 10 CFU per g
- Moisture Content** ♦ 3.8%
- Protein Content** ♦ 0.1%
- Alcohol Content** ♦ Methanol: < 0.11%
♦ Ethanol: < 0.1%
♦ Isopropanol: 0.1%
- pH (1% solution)** ♦ 7.50
- Formulation** ♦ White odorless powder
- Reconstitution** ♦ Hyaluronan can be reconstituted in aqueous solutions.
- Storage** ♦ Hyaluronan is hygroscopic. Store opened vials in a desiccated chamber at $\leq -15^{\circ}$ C.

Shelley Falvey
Quality & Regulatory Affairs

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R&D Systems, Inc.

1-800-343-7475

Hyaluronan

Hyaluronan (HA), also known as hyaluronic acid or sodium hyaluronate, is a naturally occurring linear polymer of the repeating disaccharide structure: D-glucuronic acid-beta-1, 3-N-acetylglucosamine-beta-1,4 (1 - 3). It is a glycosaminoglycan (GAG) that is ubiquitously present in the extracellular matrix of all vertebrates and is also present in the capsule of some strains of *Streptococci*. Unlike other GAGs such as chondroitin sulfate, dermatan sulfate, and heparin sulfate, HA lacks sulfate groups. Except for the covalent binding with the heavy chain of inter-alpha-trypsin inhibitor (2), HA is not covalently associated with other proteins. Mammalian HA is synthesized by one of three distinct HA synthases (HAS1, 2, and 3), which are plasma membrane proteins with multiple transmembrane domains (1 - 4). As UDP-sugar substrates are added, the growing HA polymer continuously translocates across the membrane to the extracellular surface. The three HA synthases differ in their rates of synthesis and produce HA polymers with different chain lengths. Whereas HAS-2 produces high molecular weight (HMW) HA with an average mass of greater than 2000 kDa, HAS-1 and HAS-3 produce HA with a size distribution of 200 - 2000 kDa (4). HA is important for the maintenance of a highly hydrated extracellular matrix in tissues, which is involved in cell adhesion and supports cell migration. HA also exhibits diverse biological functions by interacting with a large number of hyaluronan-binding proteins and cell surface receptors (CD44, LYVE-1) (5). HA biological functions differ depending on the size of HA (3 - 7). Whereas HMW HA (> 500 kDa) is anti-angiogenic, anti-inflammatory, and immunosuppressive, low molecular weight (LMW) HA (10 - 500 kDa) is highly angiogenic and pro-inflammatory. HA oligomers are anti-apoptotic and upregulate heat shock protein expression. HA turns over rapidly in mammals, via the concerted actions of a family of at least 5 hyaluronidases (8).

References

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3. Stern, R. (2004) *Eur. J. Cell Biol.* **83**:317.
4. Itano, N. and K. Kimata (2002) *IUBMB Life* **54**:195.
5. Day, A.J. <http://www.glycoforum.gr.jp/science/hyaluronan/HA16/HA16E.html>.
6. Powell, J.D. and M.R. Horton (2005) *Immunol. Res.* **32**:207.
7. Csoka, A.B. *et al.* (2001) *Matrix Biol.* **20**:499.
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