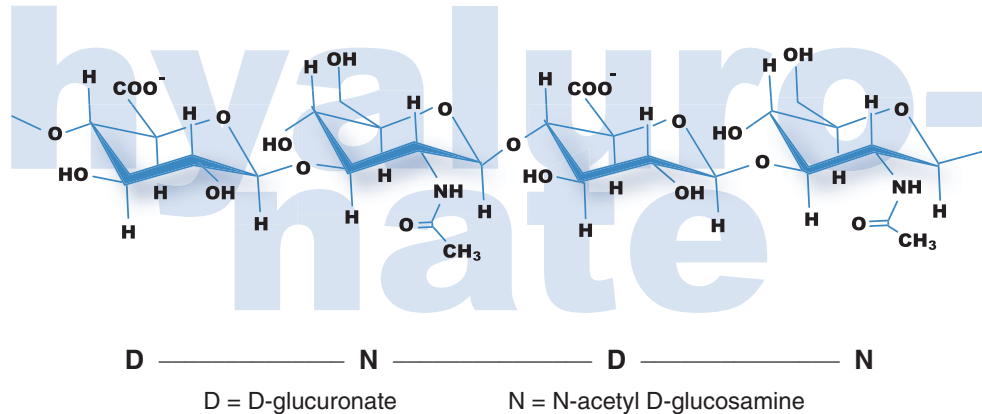


Hyaluronate

Sodium Hyaluronate Pharma Grade is a highly purified and well-characterized sodium hyaluronate developed for use in biomedical and pharmaceutical applications. Sodium Hyaluronate Pharma Grade is manufactured in Japan by NovaMatrix[®] strategic partner, Kikkoman Biochemifa Company (KBC). KBC produces our sodium hyaluronate by fermentation from *Streptococcus zooepidemicus*, using materials which are completely free of anything which is animal-derived.



Sodium hyaluronate is a linear copolymer composed of (β -1,4)-linked D-glucuronate and (β -1,3)-N-acetyl-D-glucosamine. Sodium hyaluronate is an abundant glycosaminoglycan found in the extracellular matrix of skin, joints, eyes, and most organs and tissues of all higher animals. It is the only non-sulfated glycosaminoglycan and forms highly viscous aqueous solutions.

The high viscosity is a direct result of the polymer expanded random coil structure, which is a consequence of strong hydrogen bonding. The coiled structure of hyaluronate can trap approximately 1000 times its weight in water. These characteristics give the molecule unique physicochemical properties as well as distinct biological functions and indicate it as an attractive building block for new biocompatible and biointeractive materials in drug delivery, tissue engineering and viscosupplementation.

Hyaluronic acid or hyaluronate is a natural component in mammalian organisms and will suffer from polymer chain enzymatic degradation by hyaluronidases. The half-life of hyaluronate in endothelial tissue is less than a day, and the natural turnover of the polymer in adults is approximately 7 grams per day. A mild to moderate covalent modification of hyaluronan will increase the *in vivo* stability and retention time from days to months or up to a year. The biomechanical properties of the polymer are also improved by covalent modification technologies. Current modifications are concentrated to the carboxyl group and hydroxyl group on the D and N monomer units respectively and polymer cross-linking technologies. The sodium hyaluronate products sold by NovaMatrix[®] are not cross-linked.

Quality

Sodium Hyaluronate Pharma Grade is a highly purified and well-characterized sodium hyaluronate developed for biomedical and pharmaceutical applications. Our Sodium Hyaluronate Pharma Grade is produced by NovaMatrix[®] strategic partner, KBC, in compliance with applicable Japanese law and GMP guidelines; ICH Q7; and ISO standards: ISO 9001:2008 and ISO 14001:2004.

Sodium Hyaluronate Pharma Grade meets the standards set forth in the current edition of the European Pharmacopoeia, and satisfies the requirements for use in tissue-engineered medical products as set forth in ASTM F2347. Sodium Hyaluronate Pharma Grade is described in a DMF submitted to the U.S. FDA.

HYALURONATE Product Range:

The ultrapure hyaluronate products (endotoxins ≤ 40 EU/gram) are marketed under the trade name Sodium Hyaluronate Pharma Grade. Products with different viscosity (molecular weight) ranges are available.

Ultrapure Sodium Hyaluronate

Product	Intrinsic viscosity [m ² /kg]	Appr. M _w [kDa]	Endotoxins [EU/g]
Sodium Hyaluronate Pharma Grade 80	1.2-2.0	620-1200	≤ 2.5
Sodium Hyaluronate Pharma Grade 150	2.1-2.8	1200-1900	≤ 40

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