



# **Premium Hyaluronan** **From Europe**





## Your European Partner For Sodium Hyaluronate

Contipro is a Czech biotech company with tradition dating back to 1990. We produce **premium-quality hyaluronic acid** used by leading brands in more than 80 countries.

### Quality

Our hyaluronic acid and its derivatives meet the highest pharmaceutical and cosmetic standards.

### Cooperation

We work closely with customers on developing new solutions and optimizing existing products.

### Reliability

We ensure smooth and timely deliveries through stable processes and supply chain management.

### Safety Stock

We maintain safety stocks of our products to ensure continuous supply even in unexpected situations.

### R&D Support

With more than 100 in-house researchers, we provide expert guidance for the use of our raw materials in final formulations.

### Flexibility

We adapt our modern production and products to individual customer needs.

### Capacity

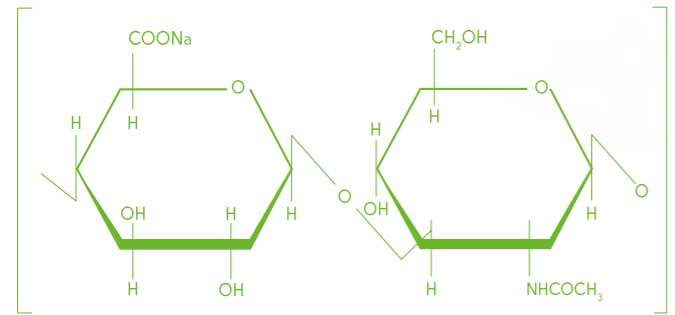
We hold a full year's supply of raw materials to meet growing global demand.

### GLP Testing

We offer our partners GLP in vitro testing and coordination of GLP in vivo studies.



# What is Sodium Hyaluronate



**Hyaluronic acid (HA)** is a biopolymer with multiple functions and unlimited application potential.

In the human body, HA naturally occurs in the form of sodium, potassium or calcium salts. Depending on its molecular weight, sodium hyaluronate (SH) provides a variety of biological effects, which are widely used in medicine, pharmaceuticals and cosmetics.

Our mission is to research and deeply understand all aspects of hyaluronic acid.

## Biological Properties

- Essential structural component of extracellular matrix
- Extremely hydrophilic - prevents cellular adhesion
- Prevents oxidative damage of tissues
- Regulates cell division, proliferation and cell death
- Modulates inflammation
- Provides lubrication
- Promotes healing

REGULATING TISSUES  
ON MOLECULAR LEVEL

SUPPORTING HEALTHY AND  
REGENERATING TISSUES



7 - 250 kDa

250 - 2 300 kDa

## Benefits of Hyaluronan

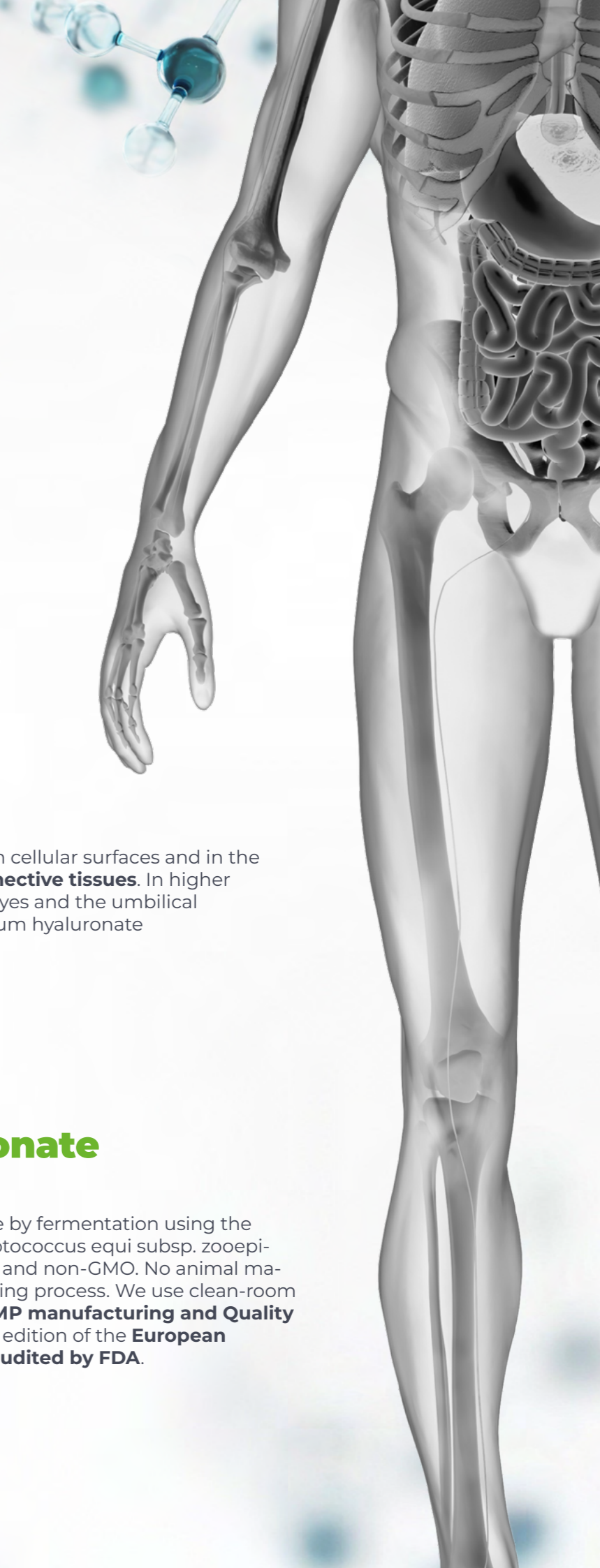
- Biocompatibility & biodegradability
- Does not induce an immune response
- Non-toxic fragments of the degraded chains
- Favourable mechanical properties

## Hyaluronan in our Body

Sodium hyaluronate occurs naturally in cellular surfaces and in the **basic extracellular matrix of the connective tissues**. In higher concentration, SH is located in joints, eyes and the umbilical cord. More than 50% of the body's sodium hyaluronate is located in the skin.

## Production of Sodium Hyaluronate

Contipro produces sodium hyaluronate by fermentation using the non-haemolytic, non-GMO strain *Streptococcus equi* subsp. *zooepidemicus*. This strain is non-haemolytic and non-GMO. No animal materials are used during the manufacturing process. We use clean-room production with strict adherence to **GMP manufacturing and Quality Control** testing according to the latest edition of the **European Pharmacopoeia (CEP)**. Contipro was **audited by FDA**.



# Hyaluronic Acid Applications

TARGET/APPLICATION    FORMULATIONS    RECOMMENDATION    MECHANISM    TARGET/APPLICATION    FORMULATIONS    RECOMMENDATION    MECHANISM

<b>ANTI—ADHESIVE DEVICES</b>	Abdominal, Pelvic (gynaecology), Postsurgery adhesions, Tendons, Thoracic, Spinal surgery, Surgery of paranasal sinus	Gels, Films, Textiles	SH Pharma SH Medical Hydrophobized SH Crosslinkable SH	A physical barrier that separates the surfaces of organs.
<b>OTHER RESORBABLE SURGICAL ADJUNCTS</b>	Various parts of the body, e.g., Abdomen, Pelvis	Hydrogels	SH Tyramine SH Formyl	Bioresorbable implantable materials with specific mechanical functions - barrier, tissue protection, volume filler, etc.; may be combined with targeted local delivery of small molecules or biologics.
<b>JOINT VISCOSUPPLEMENTATION</b>	Joints	IAT injections: Pre-filled sterile syringes Osteoarthritis/ post-surgical treatment	SH Pharma SH Medical SH Tyramine SH Formyl	Inhibition of the cartilage degradation. Stimulation of endogenous hyaluronic acid production. Restoration of the normal rheological conditions.
<b>TISSUE GRAFTS</b>	Large joints, Bones, Skin	Gel, Sponge	SH Tyramine	Scaffold for cell growth.
<b>OPHTHALMIC SURGERY</b>	Eyes (cataracts surgeries, vitreous humor supplementation)	Injections: Pre-filled syringes 0.5 – 1 ml	SH Pharma SH Medical	Protection of tissue against damage caused by surgical equipment.
<b>OPHTHALMOLOGY EYE DROPS (WITH API), MEDIUM FOR LENS</b>	Eyes (syndrom of dry eye, Inflammation of eye)	Drops, Solution (one-dose variant without preservatives/multi-dose variant with preservatives)	SH Pharma SH Medical HA P100 SH Lauroyl water soluble	Lubrication and moisturizing of the eye surface, stabilization of the tear film, reduction of water evaporation, promotion of corneal surface healing, and treatment of dry eye disease. Slows down the drug elimination from the eye surface.
<b>WOUND HEALING</b>	Burns, Ulcers, Surgical wounds, Decubitus	Dressings (nanofibrous, microfibrinous) Gels, Solutions, Sponges, Films	SH Pharma SH Medical SH Derivatives	Modulates the inflammation and cell growth. Maintains moist environment favorable for wound healing. Support of reepithelialization. Reduces scar formation. Synergistic effects with antiseptics and other polymers. Analgesic effects.
<b>MESOTHERAPY</b>	Epidermis, Dermis, Subcutaneous fat	Roller with micro-needles (1 ml), Prefilled syringes, Vials, Gels	SH Pharma SH Medical HA P100 SH Tyramine	Skin hydration, anti-wrinkle, improves skin viscoelasticity. Reduces skin roughness. Exhibits anti-aging effects.
<b>DERMAL FILLERS FOR AESTHETIC CORRECTION</b>	Dermis	Injections: Pre-filled syringes 0.5 – 1 ml	SH Pharma SH Medical SH Tyramine SH Formyl	Reduction of wrinkles, increased skin hydration, enhanced collagen production, and restoration of volume.
<b>SOFT TISSUE AUGMENTATION</b>	Muscles or other soft tissues	Injections: Pre-filled syringes	SH Pharma SH Medical SH Tyramine SH Formyl	Enhancing the function of sphincter muscles, vocal cords, and other structures by strengthening or enlarging them.

<b>DRUG DELIVERY SYSTEMS</b>	Local or systemic effect, depends on the application	Topical, Intravenous	Hydrophobized SH	Drug solubilization, bioavailability enhancement, controlled release of drugs, and drug targeting.
<b>FUNGAL INFECTIONS (MYCOSES)</b>	Skin	Local, Topical application	Hydrophobized SH	Drug delivery into deeper skin layers to treat fungal infections (mycoses).
<b>OTORHINOLARYNGOLOGY</b>	Nose, Throat, Ear	Nasal spray, Drops, Gels, Solutions, Mucoadhesive sheets	SH Pharma SH Medical HA P100 Hydrophobized SH	Moisturizing effect, enhancement of mucosal regeneration, and improvement of tympanoplasty for better regeneration of the tympanic membrane.
<b>PNEUMOLOGY</b>	Lungs	Microparticle aerodispersion	SH Pharma SH Medical	Cystic fibrosis (CF) and primary ciliary dyskinesia (PCD) treatment - mucus hydration, reduce airway inflammation, bronchoconstriction prevention, mucus clearance enhancement.
<b>STOMATOLOGY</b>	Oral cavity, Gingiva	Mouth rinse, Mucoadhesive sheets, Gels	SH Pharma SH Medical HA P100 Hydrophobized SH	Supports wound healing. Combinations with antiseptics disinfect wound. Protection of mucous membrane. Analgesic effects.
<b>UROLOGY - CYSTITIS</b>	Urinary bladder Interstitial cystitis, Chronical (bacterial) cystitis	Solutions or Gels via catheter	SH Pharma SH Medical	Glycosaminoglycan layer regeneration effect. Reduction of chronical inflammation.
<b>PROCTOLOGY</b>	Hemorrhoids	Suppositories	SH Pharma SH Medical	Moisturizing and lubricating effect, reduction of inflammation, enhancement of epithelial regeneration.
<b>GYNECOLOGY</b>	Mycosis/Candidiasis, Vaginal dryness	Vaginal ovules, Solutions, Gels, Solid forms (with applicator)	SH Pharma SH Medical	Moisturizing and lubricating effect, enhancement of mucosal regeneration.
<b>IN VITRO FERTILIZATION</b>	IVF, Sperm selection medium, Cryopreservation	Solutions, Gels	SH Pharma SH Medical	Optimal cell environment. Slowing down the movement of the sperm to allow the selection of the most mature viable spermatozoa.
<b>CELL/TISSUE BANKING, TISSUE ENGINEERING, TRANSPLANTIONS</b>	Cell and tissue banking, Tissue/organ transport, cryopreservation	Solution, Gels	SH Pharma SH Medical	Cell and tissue protection against desiccation, stress, oxidative stress; supports viability.

# Sodium Hyaluronate<sup>GMP</sup> Pharmaceutical Grade

TYPE I: Molecular weight **250—2300 kDa**

TYPE II: Molecular weight **7—250 kDa**

## Specification

Appearance	White to almost white powder, granules or fibrous aggregate
Identification - test A (Infrared spectrum)	Complies with the Ph. Eur. reference spectrum
Identification - test B (Sodium)	Pass
Appearance of solution - Appearance	Clear
Appearance of solution - Absorbance	≤ 0.010
pH	5.0–8.5
Intrinsic viscosity	> 0.65 m <sup>3</sup> /kg (Type I); < 0.65 m <sup>3</sup> /kg (Type II)
Nucleic acids	≤ 0.5
Protein	≤ 0.100 %
Chlorides	< 0.5 %
Iron	< 80.0 ppm
Loss on drying	< 10.0 %
Microbial contamination	< 100 CFU/g
Bacterial endotoxins	< 0.05 IU/mg
Sodium hyaluronate	95.0–105.0 %
Residual isopropanol	≤ 0.50 %
Molecular mass of disaccharide unit	401,3 Da. CAS number 9067–32–7
Certification and registration	GMP, CEP, US DMF, ASMF, KDMF, IDMF
Toxicology	Non-toxic substance (toxicological data available upon request)

## Stability & Storage

The stability and quality of sodium hyaluronate powder is guaranteed for 36 months when stored in originally sealed packaging at the temperature 2—8°C. Sodium hyaluronate is delivered in a polyethylene bag and three-layer aluminium foil. Packaging size upon the customer's request.

# Sodium Hyaluronate<sup>GMP</sup> Medical Grade

Molecular weight **250—2300 kDa**

## Specification

Appearance	White to almost white powder, granules or fibrous aggregate
Identification - test A (Infrared spectrum)	Complies with the Ph. Eur. reference spectrum
Identification - test B (Sodium)	Pass
Appearance of solution - Appearance	Clear
Appearance of solution - Absorbance	≤ 0.010
pH	5.0–8.5
Nucleic acids	≤ 0.5
Protein	≤ 0.100 %
Chlorides	≤ 0.5 %
Iron	≤ 80.0 ppm
Loss on drying	≤ 10.0 %
Microbial contamination	≤ 100 CFU/g
Bacterial endotoxins	< 0.50 IU/mg
Sodium hyaluronate	95.0–105.0 %
Residual isopropanol	≤ 0.50 %
Certification and registration	GMP, CEP, ASMF
Toxicology	Non-toxic substance (toxicological data available upon request)

## Stability & Storage

The stability and quality of sodium hyaluronate powder is guaranteed for 36 months when stored in originally sealed packaging at the temperature 2—8°C. Sodium hyaluronate is delivered in a polyethylene bag and three-layer aluminium foil. Packaging size upon the customer's request.

# Hyaluronic Acid <sup>GMP-like</sup> P100

Molecular weight **8—2300 kDa**

## Specification

Appearance	White to almost white powder, granules or fibrous aggregate
Identification - test A (Infrared spectrum)	Complies with the Ph. Eur. reference spectrum
Identification - test B (Sodium)	Pass
Appearance of solution - Appearance	Clear
Appearance of solution - Absorbance	≤ 0.010
pH	5.0–8.5
Intrinsic viscosity	Actual value
Nucleic acids	≤ 0.5
Protein	≤ 0.100 %
Chlorides	≤ 0.5 %
Iron	≤ 80.0 ppm
Loss on drying	≤ 10.0 %
Microbial contamination	≤ 100 CFU/g
Bacterial endotoxins	< 0.50 IU/mg
Sodium hyaluronate	95.0–105.0 %
Residual isopropanol	≤ 0.50 %
Toxicology	Non-toxic substance (toxicological data available upon request)

## Stability & Storage

The stability and quality of sodium hyaluronate powder is guaranteed for 24 months when stored in originally sealed packaging at the temperature 5—25°C. Sodium hyaluronate is delivered in a polyethylene bag and three-layer aluminium foil. Packaging size upon the customer's request.

# Hyaluronan Derivatives

With its strong R&D backing, Contipro develops innovative chemically modified hyaluronic acid with extended activity. These unique materials combine excellent biocompatibility with advanced functions such as hydration, antimicrobial action, film formation, and enhanced ophthalmic performance, offering broad applications and paving the way for **next-generation biomaterials**.

<b>SH TYRAMINE</b>	Crosslinkable under mild conditions (including in situ or crosslinking with living cells)
<b>SH CHLORAMIDE</b>	Antimicrobial, antibiofilm, antiprotease effect
<b>SH LAUROYL</b>	Hydrophobized – insoluble, increased stability and slower degradation than native HA
<b>SH OLEYL</b>	Hydrophobized HA - soluble, skin/mucosa penetration, micelle-forming, drug solubilization, anti-inflammatory
<b>SH LAUROYL WATER SOLUBLE</b>	Hydrophobized - soluble in vivo, more stable than native hyaluronan; excellent hydrating and cell protective properties
<b>SODIUM FORMYL HYALURONATE</b>	Crosslinkable, enables other chemical modifications including click chemistry



# Hyaluronan

## Forms

Innovative Materials for Medical and Pharmaceutical Applications

We are proud to introduce our novel forms of hyaluronan which are designed to meet specific medical needs and **enhance functionality across applications**, offering versatility in both production and performance.

## Nanofibers



Nanofibers can be produced from native hyaluronan, its derivatives or composite materials. Nanofibers are **produced via electrospinning** using our proprietary 4SPIN® technology. This allows the formation of nanofibers of different structures, voluminous and flat layers and even tubes of different surface area weights or oriented and aligned nanofibers. Applications of nanofiber materials could include wound dressings, drug delivery carriers and scaffolds for tissue engineering.

## Microfibers



Hyaluronan-based fibers are **continuous monofilaments**, these can be prepared from various biodegradable derivatives of hyaluronan with differing rates of water solubility, resorption time in a body and other biological and physical properties. Mechanical properties of fibers allow processing by textile technologies, like knitting and weaving. Hyaluronan microfibers are resorbable, implantable and also a sterilisable biomaterial.

## Hydrogels



Hydrogels are based on hyaluronan derivatives suitable for crosslinking. Hyaluronan derivatives are able to **form hydrogels by a non-cytotoxic reaction** allowing in situ gel formation, even in the presence of living cells. Crosslinking can be achieved by chemical, enzymatic, or photocatalytic reactions. Applications could include scaffolds, material for augmentation or for viscosupplementation.

## Polymeric Micelles



Prepared from hydrophobized (acylated) derivatives of hyaluronan, micelles **self-assemble in aqueous solutions** into core-shell structures, which enable non-covalent encapsulation of poorly water soluble drugs. Mainly because of its biodegradability, biocompatibility and safety, hyaluronan offers a number of advantages over synthetic polymers in both nonparenteral and parenteral administration routes.

## Staple Fibers



Staple Fibers are short fibers with a typical length of 3–5 mm produced from native hyaluronan, its derivatives and other biopolymers. They can be manufactured into **nonwoven textiles** and can be sterilised. Staple fibers are very flexible and can be used for wide range of implantable medical devices. Solubility in buffered saline can be modified from seconds to several weeks. Nonwoven textiles can be modified by number of active substances for a variety of uses e.g. antiseptics and haemostatic pads. Staple fibers can be loaded with growth factors or MRI contrast agents.

## Thin Films



Free-standing films prepared from native hyaluronan or its various derivatives. **Films insoluble in water** can be made from hydrophobized (acylated) hyaluronan or from covalently crosslinkable hyaluronan derivatives. The thin films could even carry active substances, dyes, and fluorescent nanoparticles inside the film. Applications could include wound dressings or surgical adjuncts.



# SH & Derivatives & Forms Specification

DERIVATES	SPECIFIC PROPERTIES	GENERAL PROPERTIES	STAGE OF DEVELOPMENT	FORMULATION	GENERAL PROPERTIES	MATERIALS	SPECIFIC PROPERTIES	
<b>SH PHARMA</b> <b>SH MEDICAL</b> <b>HA P100</b>	Biocompatible, biodegradable, safe, mucoadhesive, while antiadhesive to other tissues, cells and microorganisms; promotes regeneration, cell growth and migration; antiinflammatory/limited analgesic effect		Pharmacopoeial-grade substance, compliant with current pharmacopoeial standards	<b>HYDROGELS</b>	From viscous liquids to stable, shape retaining hydrogels	Crosslinkable SH derivatives	Depend on type of SH derivative and cross-linking method. Can be combined with cells or biologics (proteins, peptides, growth factors, exosomes, etc.)	
<b>SH TYRAMINE</b>	Crosslinkable under mild conditions (including in situ or crosslinking with living cells)	Biocompatible, biodegradable/resorbable, safe; tunable properties (Mw, DS); lubricating and hydrating, mucoadhesive, while antiadhesive to other tissues, cells and microorganisms, based on the processing method compatible with various APIs, cells, tissues etc.	Non-pharmacopoeial materials under development. Several have been evaluated through GLP-compliant in vitro and in vivo biocompatibility testing, and some have progressed to clinical studies confirming their safety and tolerability. Specific material selection is made according to the intended application.	<b>NANOFIBROUS TEXTILES</b>	Fine layers with high porosity and surface-to-volume ratio; contain low amounts of fiber forming polymers (PVA, PEO, ...)	Native Hyaluronan Hydrophobized SH Crosslinkable SH derivatives (HA Furanoyl) SH Chloramide	Water soluble (quickly) Water insoluble Water insoluble, retain porous structure In mixture with SH/HA, generates active chlorine	
<b>SH CHLORAMIDE</b>	Antimicrobial, antibiofilm, antiprotease effect			<b>NON-WOVEN TEXTILES</b>	Soft layers with medium porosity	Native Hyaluronan Hydrophobized SH  SH Chloramide	Water soluble In mixture with SH/HA, provides limited solubility In mixture with SH/HA, generates active chlorine	
<b>SH LAUROYL</b>	Hydrophobized - insoluble, increased stability and slower degradation than native HA			<b>FIBRES, THREADS AND WOVEN TEXTILES</b>	Dependent on the selected textile processing, highly variable	Native Hyaluronan Hydrophobized SH	Water soluble Water insoluble	
<b>SH OLEYL</b>	Hydrophobized HA - soluble, skin/mucosa penetration, micelle-forming, drug solubilization, anti-inflammatory			<b>FILMS</b>	Non-porous thin layers, good handling properties	Native Hyaluronan Hydrophobized SH Crosslinkable SH derivatives (SH Tyramine, SH Formyl) SH Chloramide	Water soluble Water insoluble, elastic Water insoluble  Water soluble, generates active chlorine	
<b>SH LAUROYL WATER SOLUBLE</b>	Hydrophobized - soluble in vivo, more stable than native hyaluronan; excellent hydrating and cell protective properties							
<b>SODIUM FORMYL HYALURONATE</b>	Crosslinkable, enables other chemical modifications including click chemistry							

Native Hyaluronan

Hyaluronan Derivatives

**Note 1:** Small molecules (API) can be incorporated into the above formulations, provided they remain stable under the relevant processing conditions and suitable solvents are available. Various incorporation strategies are possible.

**Note 2:** Other (bio)polymers can be incorporated into the above formulations, provided they remain stable under the relevant processing conditions and suitable solvents are available. Nanofibrous textiles are the most versatile in this respect.



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