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JRS Products: PROSOLV® EASYtab® Nutra CM

Sodium Hyaluronate – Direct Compression

Aim of Study

Most hyaluronic acid supplements for oral intake on the market are available in form of soft capsules and contain between 50 and 100 mg of hyaluronic acid per dose. The aim of the current study was to develop high dosed hyaluronic acid tablets by direct compression, which is an easier and more cost-efficient process compared to capsule manufacturing. A formulation composed of the ready-to-use excipient composite **PROSOLV® EASYtab** and the active ingredient was targeted leading to a simple formulation with only two ingredients.

Hyaluronic Acid

Hyaluronic acid is a substance which is naturally present in the human body. It is a mucopolysaccharide comprised of alternating D-glucuronic acid and N-acetyl glucosamine, which is found in high concentrations in skin, joints and eye fluids. Due to its exceptionally high water-binding capacity, hyaluronic acid functions as a skin moisturizer and keeps the skin elastic.
Furthermore, hyaluronic acid supports the joint lubrication, which makes it helpful regarding the prevention and treatment of osteoarthritis. Although the human body is able to synthesize hyaluronic acid, this ability decreases with increasing age leading to lack of hyaluronic acid. In order to ensure a sufficient supply of hyaluronic acid, the intake of hyaluronic acid in the form of tablets or capsules can be useful. The recommended daily allowance of hyaluronic acid is about 200 mg.[1]

Used Excipient

PROSOLV® EASYtab Nutra CM is an all-in-one excipient for nutraceutical applications which covers all necessary functionalities for successful tableting. It is composed of four ingredients: microcrystalline cellulose as a binder, colloidal silicon dioxide as a glidant, croscarmellose as a disintegrant and magnesium stearate as a lubricant. Due to the special co-processing of **PROSOLV® EASYtab Nutra CM**, a homogeneous distribution of the single ingredients within the final particles can be ensured without the risk of segregation during blending and tableting. Synergistic effects in terms of functional properties lead to an excellent compactibility resulting in a high mechanical robustness of the tablets combined with a fast disintegration. Furthermore, **PROSOLV® EASYtab Nutra CM** provides a high robustness against over-mixing, as the containing lubricant is fixed in the co-processed composite structure. As ready-to-use excipient, **PROSOLV® EASYtab Nutra CM** requires only one blending step with the active before the mixture can be compacted into tablets, which makes the tableting process additionally convenient and cost-efficient.
Additional grades of **PROSOLV® EASYtab Nutra** with varying disintegrants and lubricants are available in order to fulfill the regulatory requirements in various countries[2]. All grades are equivalent in terms of powder and tableting characterics.

Formulation

For the manufacturing of the tablets, sodium hyaluronate in the form of white powder with fine particle size was used (Figure 1).

	Active content [mg]	mg/tablet	Contribution [%]
Sodium Hyaluronate	200	200	40
PROSOLV® EASYtab Nutra CM		300	60
Total		500.0	100.0

Procedure

Blending

The ingredients were blended to homogeneity for 15 minutes and immediately used for direct compression of tablets.

Equipment

Tablet Press	Korsch EK 0, Oblong, 7.3 x 18.3 punches, with breakline
Free Fall Mixer	Brunitec Suisse, Brunimat Type Porta
Hardness Tester	Erweka TBH 425 TD
Friability Tester	Pharma Test PTF
Disintegration Tester	SOTAX DT2

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Tablet Characteristics

Tablet Weight	500 mg
Tablet Dimensions	7.3 x 18.3 x 6.53 mm
Compaction Force	4.3 kN
Crushing Strength	98 N
Friability	0.0 %
Disintegration Time	> 2 h

Nutra CM tablets, which do not show friability, in combination with a smooth tablet surface is the ideal basis to apply an enteric coating to protect the hyaluronic acid against gastric juices.

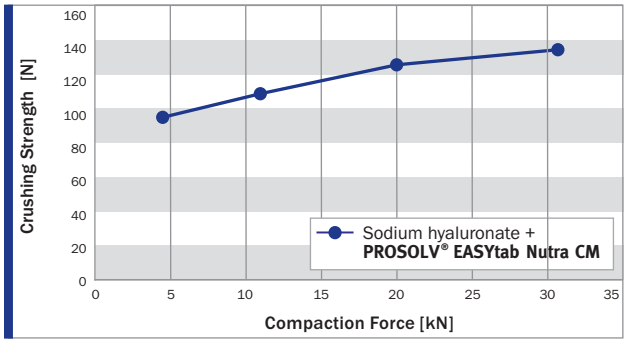

Chart 1 Tablet Hardness of Hyaluronic Acid Tablets as a Function of Compaction Force.

Fig. 1 Pure Sodium Hyaluronate Powder and Hyaluronic Acid Tablets Composed of **PROSOLV® EASYtab Nutra CM** and 40 % Sodium Hyaluronate.

Conclusion

It was shown that **PROSOLV® EASYtab Nutra CM** was ideally suited for the production of high dosed hyaluronic acid tablets manufactured by direct compression. Due to the excellent compaction properties of **PROSOLV® EASYtab Nutra CM** it was possible to increase the dosage by 100 % compared to marketed hyaluronic acid tablets (100 mg, HWS OTC Service GmbH) at the same tablet dimensions and with the same tablet hardness. The long disintegration time can be attributed to the high water binding-capacity of hyaluronic acid, which is decisive for the beneficial effects of hyaluronic acid. After contact with water, hyaluronic acid tablets typically form a gel-like film leading to an increased disintegration time. Furthermore, the outstanding mechanical robustness of **PROSOLV® EASYtab**

References

[1] Tashiro, T. et al. (2012) Oral Administration of Polymer Hyaluronic Acid Alleviates Symptoms of Knee Osteoarthritis. The ScientificWorld Journal. Volume 2012, Article 167928.

[2] Brochure: **PROSOLV® EASYtab**. JRS PHARMA GmbH & Co.KG.

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