Is there an Optimal Molecular Weight for Injectable Hyaluronic Acid Treatment?

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The Discovery of Hyaluronic Acid

In 1934, Karl Meyer and John Palmer reported in the *Journal of Biological Chemistry* the discovery of a unique, high-molecular-weight polysaccharide extracted from the vitreous humor of bovine eyes[1]. Although direct comparisons between modern formulations are still limited, differences among them may significantly impact clinical outcomes. Hyaluronic acid (HA), a naturally occurring substance with viscoelastic properties, plays several key roles in maintaining joint health[2]. These include distributing compressive forces, lubricating tissues, and regulating cellular functions[2].

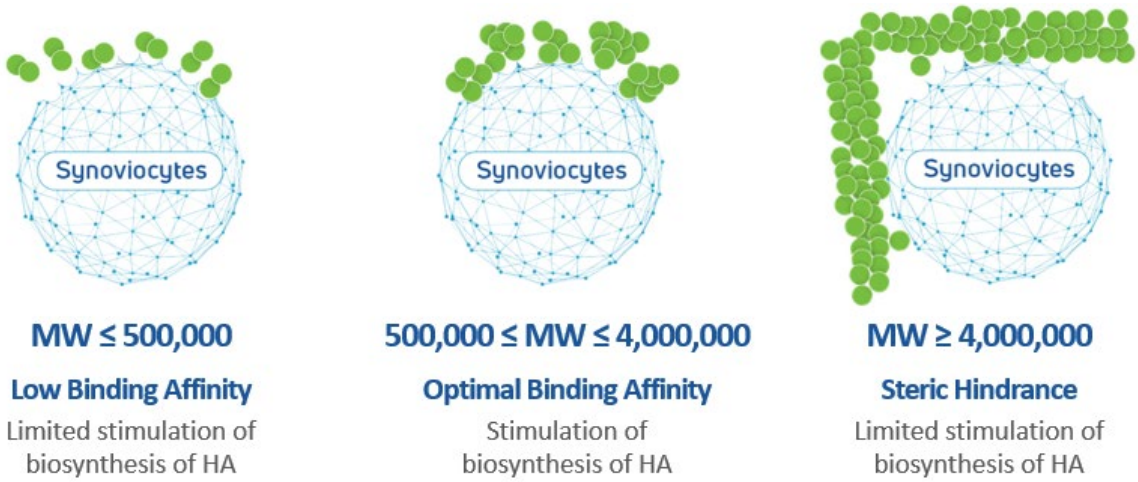
Evidence Supports Higher Molecular Weight Hyaluronic Acid Injectables.

In individuals with knee osteoarthritis (OA)—a chronic degenerative condition affecting both cartilage and bone—supplementation using synthetic HA formulations has been available for decades[2]. Variations in HA products, such as differences in composition, molecular weight, and biological activity, may influence the onset, duration, and safety of pain relief[2]. Understanding the physicochemical characteristics of HA is also important when considering its potential to slow or prevent further joint degeneration[2].

Evidence suggests that higher molecular weight formulations of Hyaluronic Acid perform significantly better than lower molecular formulations[3]. While all formulations seem to have some benefit, larger treatment effects have been reported with higher molecular weights[3]. Reviews suggest outcomes from prior meta-analyses are consistent with statistically significant improvements in pain, function and stiffness up to 26 weeks[3]. However, outcomes based on molecular weight (MW), demonstrate significantly improved pain outcomes for higher compared with lower MW HAs[3].

In Higher Molecular Weight Hyaluronic Acid Formulation, is there an Optimal Molecular Weight?

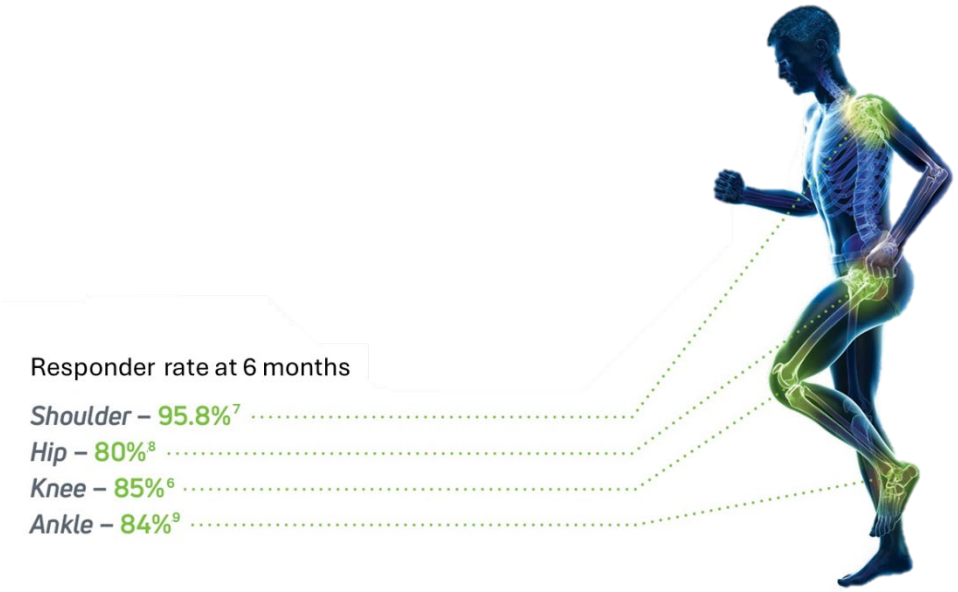
Preclinical studies suggest that the strong binding affinity of HA with optimal molecular weight stimulates endogenous HA production[4]. Steric hindrance describes how a molecule's physical structure can affect its ability to bind to cellular receptors. Optimal molecular weight has been defined at between 500 000 Da and 4M Da[4].



Case Study: Monovisc has biological rationale for optimal molecular weight.

Monovisc is a high molecular weight HA with a size of 3M Da, placing it in the optimal molecular weight range[4]. In addition, this agent has demonstrated a quick onset of effect at 2 weeks[5], with long lasting pain relief of up to 6 months, along with minimal adverse events[6].

In January, Health Canada has approved expanded indications for Monovisc in the shoulder, hip and the ankle based on additional clinical data.



Monovisc has been clinically proven to reduce OA pain and restore function in shoulder[7], hip[8], knee and ankle[9] with a responder rate of up to 96%[7] through 6 months (statistically significant at all time points, *p<0.0001*). It also demonstrated an excellent safety profile with no SAE reported[7,8,9].

References

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