

Treatment With Hyaluronic Acid Fillers

Rebecca Kleinerman, MD; Patrick Emanuel, MD; Gary Goldenberg, MD

Hyaluronic acid (HA) fillers are a mainstay of cosmetic dermatology. The following article reviews the properties of these fillers as well as current and future uses for the HAs. We also discuss potential complications associated with their use.

John Keats, the celebrated Romantic poet, famously grappled with the subjects of youth and age, innocence and experience, and static and dynamic beauty in his 1819 poem, "Ode on a Grecian Urn."¹ Cosmetic dermatologists, too, regularly face these subjects as they consider the appropriate and ideal treatment of the aging face. Dynamic rhytides are approached with chemodeneration injectable therapies while static rhytides are treated with soft-tissue augmentation or volumization. With the development and approval of hyaluronic acid (HA) fillers in the United States over the past decade, patients may opt for a product that allows for a natural nonsurgical restoration of youthful facial contours. The HA fillers offer a smaller risk of the hypersensitivity reactions associated with the older bovine collagen fillers and a longer-lasting result.²⁻⁴ As with any innovation, essential criteria in the adoption of a cosmetic filler include facility of use, longevity of results, and minimization of adverse effects. The current HA fillers more than adequately fulfill these objectives, thus accounting for their popularity. We add a succinct review of the properties of HA fillers, several current

techniques and patterns of injection, and potential complications associated with HA filler use. We further point out some of the future directions for HA filler application.

PROPERTIES

Physiologically, HA is a glycosaminoglycan present in the dermis, alongside dermatan sulfate, heparin, heparan sulfate, keratan sulfate, and chondroitin 4- and chondroitin 6-sulfates.⁵ Hyaluronic acid and dermatan sulfate are the most abundant of the glycosaminoglycans. Structurally, HA is represented by a lengthy chain of repeating nonsulfated disaccharides (glucuronic acid, N-acetylglucosamine.) This is consistent across all species and tissues. While many of its functions are still not completely understood, it is known that HA binds to water and provides the dermis with volume, functioning in sodium and water homeostasis as well as protection against dermal compression.⁵ Similarly, injectable HA is hygroscopic and has been said to bind up to 6 L of water per gram.⁶ The injectable HAs most widely used at present are bacterially derived from *Streptococcus equi* cultures rather than from the avian combs of initial products. The bacterially derived HAs must be stabilized to prevent their prompt degradation, hence are called nonanimal stabilized HAs. There are various means of stabilization employed by the different nonanimal stabilized HAs and different stabilizing chemicals may be used, including butanediol diglycidyl ether, divinyl sulfone, and bis carbodiimide. Butanediol diglycidyl ether is most commonly employed.⁷ The stabilizer varies in many of the products on the market today, as does

Drs. Kleinerman, Emanuel, and Goldenberg are from the Departments of Dermatology and Pathology, Mount Sinai School of Medicine, New York, New York.

The authors report no conflict of interest in relation to this article.

Correspondence: Gary Goldenberg, MD, Department of Dermatology, Mount Sinai School of Medicine, 1425 Madison Ave L2-21, Box 1047, New York, NY 10029 (garygoldenbergm@gmail.com).

