Volumizing characteristics of dermal fillers

Hema Sundaram, MD,[a] Bob Voigts, MS,[b] Kenneth

Beer, MD,[c] Melissa Meland, BS[b]

Merz Aesthetics

Background: Two types of soft tissue filler that are in common use are those formulated primarily with calcium hydroxylapatite (CaHA) and those with cross-linked hyaluronic acid (cross-linked HA).

Key words:
Calcium hydroxylapatite, complex viscosity, dermal fillers, elasticity, G prime, hyaluronic acid, Perlane, Juvéderm Ultra, Juvéderm Ultra Plus, Juvéderm Voluma, Radiesse, Restylane, Restylane SubQ

Objective: The viscosity and elasticity data obtained, when taken in the context of clinical considerations, provides physicians with a scientific rationale for determining which soft tissue fillers are most appropriate for volume replacement.

Materials: Six cross-linked HA soft tissue fillers were obtained as follows: Restylane® and Perlane® from Medicis (Scottsdale, AZ); Restylane SubQ® from Q-Med (Uppsala, Sweden); and Juvéderm Ultra®, Juvéderm Ultra Plus®, and Juvéderm Voluma® from Allergan (Pringy, France). Radiesse®, a soft tissue filler consisting of CaHA microspheres in a carrier gel containing carboxymethyl cellulose, was obtained from BioForm Medical, Inc (San Mateo, CA).

Methods: The η^* and G' of each filler gel were quantified via deformation oscillation measurements that were conducted with a Thermo Haake RS600 Rheometer, (Newington, NH) using a plate and plate geometry with a 1.2 mm gap. All measurements were performed with a 35 mm titanium sensor (PP35-Ti) at 30º C. Oscillation measurements were carried out at 5 pascal tau (τ) over a frequency range of 0.1 Hz to 10 Hz (interpolated at 0.7 Hz). Researchers chose the 0.7 Hz frequency because it elicited the most reproducible results and was considered physiologically relevant for stresses that are common to the skin.

Complex Viscosity Characteristics of Dermal Fillers

G' Prime Modulus Characteristics of Dermal Fillers
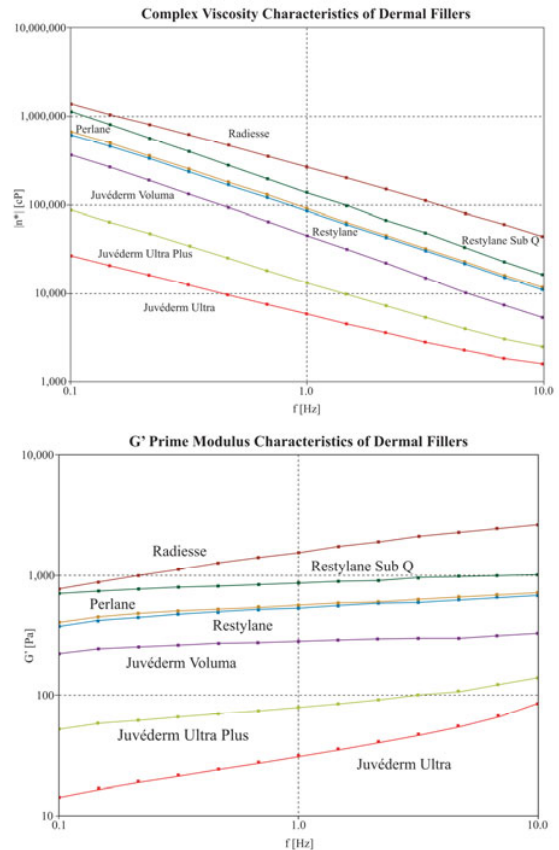
Results: The additional rheological measurements in this study support the concept that soft tissue fillers that are currently used commonly can be divided into three groups.

Conclusion: Rheological evaluation enables the clinician to objectively classify soft tissue fillers, to select specific filler products based on scientific principles, and to reliably predict how these products will perform – lifting, supporting and sculpting – after they are appropriately injected.

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