GREATER NEW YORK DENTAL MEETING
95th ANNUAL SESSION

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Botox and Facial Fillers: A Clinical Workshop

Dr. Steven J. Clark
Dr. Steven J. Clark
M.D., D.M.D., F.A.C.S.

“BOTOX AND FACIAL FILLERS”

Clinical Lecture with Live Demonstration
Sunday, November 26th, 2017
through Wednesday, November 29th, 2017
Dr. Steven J. Clark

Bluewater Plastic Surgery & Cosmetic Center

Offices in Niceville and Santa Rosa Beach, Florida
Who Should Inject Botox for Aesthetic Purposes?

Physicians? Dentists?

• State Laws?
• Training?
On a Clinical Basis All Injectors Should Understand

• The Anatomy
  – Safe & Danger Zones
• The Drug Chemistry & Affect
• Proper Aseptic Injection Technique
• Possible Complications, Prevention & How to Treat Them if They Occur
Learning Objectives – Minimally Invasive Facial Rejuvenation

• What are the FDA approved neurotoxins for aesthetic treatment

• Describe the history and chemical action of Type A Botulinum Neurotoxin

• Review the aims of Botulinum Neurotoxin treatment
Learning Objectives – Minimally Invasive Facial Rejuvenation

- Examine the application of facial anatomy to the design of botulinum injection plans

- Facial Aging - An Appreciation of Changes Observed in the Aging Face – A New Paradigm

- Review the spectrum of currently available dermal filler products that are approved by the FDA
Minimally Invasive Facial Rejuvenation

Dr. Steven J. Clark
Who Are We Treating?

Total number of persons age 65 or older, by age group, 1900 to 2050, in millions

Note: Data for the years 2000 to 2050 are middle-series projections of the population.
Reference population: These data refer to the resident population.
Source: U.S. Census Bureau, Decennial Census Data and Population Projections.

> $10.3 billion spent on cosmetic procedures in 2008
Cosmetic Surgery Trends Over 10 Years: Surgical and Nonsurgical Cosmetic Procedures

Nonsurgical procedures accounted for 84% of the total in 2007.

Nonsurgical procedures have increased 747% since 1997.
Neuromodulator Injections in the US (2014)

- **Botulinum Toxin** (including Botox, Dysport, and Xeomin): 3,588,218
- **Hyaluronic Acid** (including Juvederm Ultra, Ultra Plus, Voluma, Perlane, Restylane, and Belotero): 1,696,621
- **Hair Removal** (laser or pulsed light): 828,480
- **Chemical Peel**: 484,053
- **Microdermabrasion**: 417,034

Source: American Society for Aesthetic Plastic Surgery

Botulinum Toxin has been the #1 treatment since 2000.
Top 5 Procedures: Surgical & Nonsurgical

**TOP 5 Surgical Procedures in 2015**

1. Liposuction 896,048
2. Breast Augmentation 805,886
3. Tummy Tuck 180,717
4. Eyelid Surgery 160,706
5. Breast Lift 148,967

**TOP 5 Nonsurgical Procedures in 2015**

1. Botulinum Toxin (including Botox, Dysport and Xeomin) 4,267,088
2. Hyaluronic Acid (including Juvederm Ultra, Ultra Plus, Voluma, Perlane, Restylane, Belotero) 2,148,828
3. Hair Removal (laser or pulsed light) 1,136,834
4. Chemical Peel 806,306
5. Microdermabrasion 557,690

Quick Facts

- Breast Lifts replaced Rhinoplasty as the 6th most popular surgical procedure in 2016.
- Botulinum Toxin has been the #1 nonsurgical procedure since 2000, and surpassed the 4-million-mark for number of procedures performed for the first time in 2016.
- Hyaluronic Acid became of an increasingly popular injectable this year, as the 2nd most popular nonsurgical procedure performed surpassing the 2-million-mark for number of procedures performed for the first time in 2016.

Source: American Society for Aesthetic Plastic Surgery

Please credit the American Society for Aesthetic Plastic Surgery when citing statistical data.
Contact: ASAPS Communications • 662.799.2368 • media@asaps.org • www.asaps.org • fax: 662.799.1098
The Science and Art of Botulinum Toxin in Aesthetic Medicine

Steven Clark, M.D., D.M.D.
History of Botulinum Neurotoxin Type A (BoNT-A)

- **19th century**: First outbreaks of botulism, the “sausage disease”
- **1895**: *Clostridium* bacterium identified
- **1940s**: BoNT-A purified (Schantz and colleagues)
- **1950s**: BoNT mechanism of action elucidated
- **1970s**: BoNT-A investigated as a treatment for strabismus (Dr. Alan Scott)
- **1979**: US Food and Drug Administration (FDA) granted limited approval to use BoNT-A for strabismus
History of Botulinum Neurotoxin Type A (BoNT-A)

- **1987**: Dr. Jean Carruthers notices effect on the glabella when treating patients with BoNT-A for blepharospasm
- **1989**: Botox® approved by FDA for the treatment of strabismus and blepharospasm (originally approved under the brand name Oculinum)
- **1992**: Dr. Jean Carruthers and Dr. Alastair Carruthers publish seminal paper on the use of BoNT-A for the aesthetic treatment of glabellar rhytides
- **2002**: Botox® Cosmetic approved by FDA for the treatment of glabellar rhytides
- **2009**: Dysport® approved by FDA for the treatment of glabellar rhytides
BoNT Structure

Polypeptide chain; inert before activation

Activated in process called nicking (or cleaving) to form a heavy chain linked by disulfide bonding to a light chain

7 different serotypes (A, B, C, D, E, F, G) are structurally similar but have functional and immunologic differences

All toxins naturally exist as complexes that dissociate under physiologic pH

BoNT-A: Structure & Function

Heavy chain (100 kD)
Light chain (50 kD)
BoNT-A inhibits calcium-dependent vesicle exocytosis
BoNT Complex

Type A 900-kD Complex

- Composition of complex
  - Neurotoxin protein (150 kD)
  - May contain hemagglutinin (HA) and nontoxic nonhemagglutinin proteins (NTNH)

- Complex sizes
  - 900 kD: type A
  - 700 kD: type B
  - 500 kD: types A, B, C1, D
  - 300 kD: types A, B, C1, D, E, F

HC: heavy chain
LC: zinc-dependent proteolytic light chain
S-S: disulfide bond
Zn: zinc
Acetylcholine Release Blocked: Muscle Relaxes

Blocking acetylcholine release means that muscle fibres can no longer contract
There are 3 FDA-approved products in the United States:

- BOTOX® Cosmetic (onabotulinumtoxinA)
- Dysport® (abobotulinumtoxinA)
- Xeomin® (incobotulinumtoxinA)
<table>
<thead>
<tr>
<th>Trade Name</th>
<th>Generic Name</th>
<th>Serotype</th>
<th>FDA Aesthetic Approval</th>
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</thead>
<tbody>
<tr>
<td>Botox®</td>
<td>OnabotulinumtoxinA</td>
<td>A</td>
<td>Moderate to severe glabellar lines</td>
</tr>
<tr>
<td>Dysport®</td>
<td>AbobotulinumtoxinA</td>
<td>A</td>
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</tr>
<tr>
<td>Xeomin®</td>
<td>IncobotulinumtoxinA</td>
<td>A</td>
<td>Moderate to severe glabellar line</td>
</tr>
<tr>
<td>Myobloc®</td>
<td>RimabotulinumtoxinB</td>
<td>B</td>
<td>Approved for medical but not cosmetic use</td>
</tr>
</tbody>
</table>
Medical Uses for BOTOX

1. Chronic migraine
2. Cervical Dystonia
3. Hyperhidrosis (excessive sweating)
   - Blocks signals the brain sends to sweat glands (8 mos)
4. Urinary incontinence- “overactive bladder"
   - Injecting the wall of the bladder lowers urge for urination from 6 times daily to once daily
Medical Uses for BOTOX

5. Bells Palsy

6. Eye muscle problems
   - Blepharospasm
   - Strabismas

7. Rectal/Anal Fissure
   - Lowers muscle spasm

8. MS and muscle spasticity and rigidity
BOTOX Therapy in Dentistry

BOTOX is used as an alternative treatment modality for such conditions as:

- Parafunctional clenching
- Extra capsular myogenic TMJ disorder
- Trismus and associated headaches

Muscles most often injected are masseter and temporalis

- Masseter: 20u – 100u / side
- Temporalis: 20u / side

30g needle
PRODUCT SIMILARITIES AND DIFFERENCES
How are They Similar?

- All Serotype A
- Toxin activating regent is the same
- Mechanism of action is the same
- Target is the same at presynaptic junction
- Onset and Duration
- Safety
How Are They Different?

- Botox® has 900-kDa complex
- Dysport® has 500- to 900-kDa complex
- Xeomin® has no complexing proteins
  - Manufacturing Process
  - Excipients
  - Proprietary Units
What Have We Gained From the Early Studies?

Key Points

• Botox Botulinum Toxin is safe for use in aesthetic medicine
• **Onset** - Occurs by 5 – 7 days (90%); it is potentiated to maximum affect at day 30
• **Duration** – Most patients have good improvement for 3 – 4 months
• **Safety Complications**
  – Well tolerated
  – Local complications – bruising
  – Blepharoptosis – 3.2% vs. 0.0%
Aims of BONT Treatment

• Relax hyperdynamic muscles
• Preserve normal facial expression
• Achieve ideal facial proportions
  • Brow shaping
Muscles of Expression Can Contribute to Facial Lines

- Corrugator supercilii (Glabella)
- Procerus (Glabella)
- Frontalis (Forehead)
- Orbicularis oculi (Crow’s feet)
- Nasalis (Bunny lines)
# Facial Anatomy Associated With Rhytids

<table>
<thead>
<tr>
<th>Muscle</th>
<th>Common Names</th>
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<tbody>
<tr>
<td>Frontalis</td>
<td>Forehead lines</td>
</tr>
<tr>
<td>Procerus/Corrugator</td>
<td>Frown lines</td>
</tr>
<tr>
<td>Orbicularis oculi</td>
<td>Crow’s feet</td>
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<tr>
<td>Orbicularis oris</td>
<td>Smoker’s lines</td>
</tr>
<tr>
<td>Depressor anguli oris</td>
<td>Marionette lines</td>
</tr>
<tr>
<td>Mentalis</td>
<td>Chin wrinkles/peau d’orange</td>
</tr>
<tr>
<td>Platysma</td>
<td>Vertical neck bands</td>
</tr>
</tbody>
</table>
The Glabellar Complex

Corrugators:
- Vertical glabellar lines

The Glabellar Complex (cont)

Corrugators:
- Vertical glabellar lines

Procerus:
- Horizontal glabellar lines

The Glabellar Complex (cont)

Corrugators:
- Vertical glabellar lines

Procerus:
- Horizontal glabellar lines

Depressor supercilii:
- Pulls down medial brow

Orbicularis oculi:
- Pulls down medial and lateral brow

Image © Paradigm Medical Communications, LLC. Adapted from de Maio M, Rzany B. *Botulinum Toxin in Aesthetic Medicine.* Berlin: Springer-Verlag; 2007.
Evaluate Dynamic Muscle Contraction and Static Lines
- Elicit contraction – “Frown”, “Get Mad” & “Concentrate”
- Starting Doses 20 – 25 Units Botox
- Anesthesia Ice or Topical
BoNTA to the Glabella: Clinical Considerations

- BoNTA Dose
  - Patient’s aesthetic preference
  - Muscle mass, action, and pattern
  - Gender
  - Pre-existing facial asymmetry (e.g., ptosis)
- • = 2.5 units Botox
- ☺ = 2.5–5 units Botox
- = 5 units Botox, insert needle in direction of arrow

- Corrugator m. margin
- Procerus m.
- Corrugator m. margin
BoNTA to the Forehead

*Frontalis* (elevates brows)

- 30-year-old woman (raising eyebrows)

Image courtesy of Hema Sundaram, MD
Treatment of the Forehead
BoNTA to the Forehead: Clinical Considerations

• BoNTA Dose and Injection Pattern
  – Patient’s Aesthetic Preference
  – Muscle Anatomy, Mass, Action
  – Gender
  – Look for Pre-Existing Brow/Facial Assymetry (or Brow Ptosis)
  – Pre-existing Compensated Eyelid Ptosis

• Key Points
  – Inject frontalis high/+ midline
  – Be conservative
  – Do not inject close to supraorbital rim
  – Include lateral frontalis
BoNTA to the Crow’s Feet

Orbicularis oculi
(closes eyes; lateral brow depressor)

- 45-year-old woman (smiling)
BoNTA: Crow’s Feet

- Caused by contraction of the orbicularis oculi coupled with static skin changes
- Occur in conjunction with smiling
- Care should be taken to stay outside the orbital rim
- If you inject too low on the cheek, you can cause a facial droop.
Treatment of Periorbital Wrinkles
“Crow’s Feet”

- Dose: 2 – 3 BU
- Injection depth: Superficial
- Location: At the orbital rim
- Warning: Avoid injecting below the orbital rim
- Needle direction: Angulated
The Ideal Brow
BoNTA for Brow Shaping

- **Frontalis** (elevates brows)
- **Lateral Orbicularis oculi** (lateral brow depressor)
- **Procerus, Corrugator supercilii, Medial Orbicularis oculi** (medial brow depressors)

- 1 – 5 BU
Treatment of the Upper Face

- Blue dots = 5 DU
- Red dots = 10 DU

Dilution = 1.5 mL
BoNTA for Bunny Lines

Nasalis
(wrinkles nose)

• 47-year-old woman
(wrinkling nose)

BoNTA for Bunny Lines (cont)

• 5 DU per injection point

• Range for total dose:
  – 5-10 BU
  – 10-30 DU

Image courtesy of Hema Sundaram, MD
Treatment of Bunny Lines

- 2.5 BU per point
- Injection depth: Superficial
- Location: Nasal dorsum
- Warning: Stay away from medial cheek
- Needle direction: Vertical
BoNTA to the Lower Face

- Commonly treated:
  - Depressor anguli oris (DAO)/oral commissure
  - Orbicularis ori/“smoker’s lines”
  - Mentalis/cobblestone chin
  - Platysmal bands
- Should be performed by experienced practitioners
- Treat conservatively and titrate dosage
- Do not treat if there is significant skin laxity
- Do not treat “professional mouths”
- Combination therapy with fillers is often appropriate
BoNTA to the DAO and Perioral Rhytides

**DAO**
1-8 BU / 2.5-15 DU per point

**Orbicularis oris**
1 BU / 2.5 DU per point

BE CONSERVATIVE!
Gummy Smile
Management of Gummy Smile with Botox

- Exaggerated upper lip retraction during smiling can result in a gummy smile with excessive gingival show.
- Gummy smile can be due to hyperactive upper lip elevator muscles or skeletal and dentoalveolar etiology.
- Muscles of facial expression responsible for upper lip elevation and lateral retraction upon smiling are the levator labi superioris alaeque nasi muscle (LLSAN), the levator labii superioris (LLS) and zygomaticus major and minor muscles.
- The gummy smile with deep nasolabial folds and contraction of the levator labi superioris alaeque nasi which engages with smiling to function as a medial lip elevator.
- Starting dose 2.5 units of Botox.
- Tell patient to smile hard; inject lateral to alar base just above naso labial fold.
Marionette Lines
BoNTA to the Depressor Anguli Oris (DAO)

- One injection point into the posterior aspect of DAO
- Second injection site may be added laterally to target platysma

**Depressor anguli oris (DAO)**
BoNTA to the Mentalis

- One injection point into the posterior aspect of the DAO
- Second injection site may be added laterally to target platysma
BoNTA to the Platysma

- 10-15 BU/20-40 DU per band
- BE CONSERVATIVE!

Image courtesy of Hema Sundaram, MD
BoNTA to the Platysma

- Series of intradermal injections into the contracted muscular band
- Number of injection points depends on length of the band
- Pinch band lengthwise when injecting
BoNTA to the Lower Face: Potential Adverse Events

- Ecchymosis/swelling
- Asymmetry: may be noticeable when smiling or talking
- Oral motor insufficiency
- Increased or decreased mandibular dental show on smiling
- Sagging/decreased support of lower face
- Dysphagia, dry mouth, neck weakness
### OnabotulinumtoxinA (Botox<sup>®</sup>) Starting Doses for Treatments

<table>
<thead>
<tr>
<th>Treatment Areas</th>
<th>Muscles Targeted</th>
<th>Total&lt;sup&gt;a&lt;/sup&gt; OBTX Dose (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frown lines</td>
<td>Glabellar complex</td>
<td>20</td>
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<tr>
<td>Horizontal forehead lines</td>
<td>Frontalis</td>
<td>15</td>
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<tr>
<td>Crow’s feet</td>
<td>Lateral orbicularis oculi</td>
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<tr>
<td>Lower eyelid wrinkles</td>
<td>Inferior preseptal orbicularis oculi</td>
<td>2.5</td>
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<td>Eyebrow lift</td>
<td>Superior lateral orbicularis oculi</td>
<td>5</td>
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<tr>
<td>Bunny lines</td>
<td>Nasalis</td>
<td>2.5</td>
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<tr>
<td>Lip lines (upper)</td>
<td>Orbicularis oris</td>
<td>3.75</td>
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<td>Gummy smile</td>
<td>Levator labii superioris alaeque nasi</td>
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<tr>
<td>Marionette lines</td>
<td>Depressor anguli oris</td>
<td>5</td>
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<tr>
<td>Chin</td>
<td>Mentalis</td>
<td>5</td>
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<tr>
<td>Neck bands</td>
<td>Platysma</td>
<td>15</td>
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<tr>
<td>Axillary hyperhidrosis</td>
<td>(Sweat glands)</td>
<td>45</td>
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Handling & Storage

• Arrives frozen on dry ice
• Store in refrigerator before and after reconstitution
• Check expiration date usually within 2 – 3 years
• Keep track of lot #, expiration date & particular vial used
• Manufacturer recommends using Botox within 24 hrs – ASPS Botox consensus panel recommends using Botox within 6 weeks after reconstitution and notes no loss of potency during this time
Reconstitute BOTOX® Cosmetic 100 Unit vial with "X" ml of diluent = "XX" units per ml
Reconstitute DYSPORT® 300 unit vial with "X" ml of diluent = "XX" units per ml

<table>
<thead>
<tr>
<th>Date</th>
<th>Toxin Brand</th>
<th>Lot #</th>
<th>Vial Expiration date</th>
<th>Volume Diluent Added</th>
<th>Concentration units / ml</th>
<th>Expiration date reconstituted product</th>
<th>Name of individual who performed reconstitution</th>
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Reconstitution
Equipment for Treatment

- **Botox Reconstitution**
  - Botox Cosmetic 100 unit vial
  - 5.0ml syringe
  - 0.9% preserved or nonpreserved sterile saline 10ml vial
  - 18 gauge 0.5 inch needle

- **Botox Treatment**
  - Make up marking pen/handheld mirror
  - Reconstituted Botox Cosmetic (100u/2-3-4ml)
  - 1ml Luer Lok tip syringe
  - 32 gauge 0.5 needle (TSK labs)
  - 2x2 guaze
  - Nonsterile gloves
  - Alcohol pads
  - Small ice pack
  - Bottle opener (removing metal cap on Botox)
  - Hemostat
Syringes and Needles
Common Reconstitution Volumes Used with 100 Unit Vial of Botox & Resulting Dose per 0.1ml

<table>
<thead>
<tr>
<th>Saline Volume Added to 100 Unit Vial of Botox (ml)</th>
<th>Each 1ml Syringe</th>
<th>Resulting Botulinum Dose Toxin per 0.1ml of Reconstituted Solution (units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0ml</td>
<td>100u</td>
<td>10 units</td>
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<td>2.0ml</td>
<td>50u</td>
<td>5 units</td>
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<td>3.0ml</td>
<td>33u</td>
<td>3.3 units</td>
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<tr>
<td>Neck bands</td>
<td>Platysma</td>
<td>15</td>
</tr>
<tr>
<td>Axillary hyperhidrosis</td>
<td>(Sweat glands)</td>
<td>45</td>
</tr>
</tbody>
</table>
Pre-Injection Evaluation - Check for:

- Allergy
- Pregnancy/Breastfeeding
- Bleeding Disorder, Blood Thinners, NSAIDS, Vitamin E
- Neuromuscular Disorder – Myastenia Gravis, ALS, etc.
- Do Not Inject in an Infected Site
How I Do It
Strategies for Avoiding Adverse Effects

Obtain consent and patient history

Check for

• Neuromuscular disorders
• Allergies
• Bleeding disorders

Assess

• Facial weakness
• Underlying ptosis

Ask if patient is pregnant or breastfeeding
patient history template female

Injectable Treatment Template

Date: __________________
Name: __________________

Injectable(s):
Injectable labels/lot #’s:
Total Units/Volume:
Anesthesia:
Photography:
Comments:

Treatment provider:

Patient History and Treatment (FEMALE)

Date: __________________
Name: __________________

Examination:

Medical History including prior cosmetic treatment / procedures: ______________________________________

_________________________________________________________________________________________

_________________________________________________________________________________________

Medications including ASA, NSAID, Herbs: _____________________________________________________

_________________________________________________________________________________________

Allergies, including LATEX: _________________________________________________________________

_________________________________________________________________________________________

Treatment Plan: __________________
How I Do It

TREATMENT:

• Quick photos - relaxed and animated
• With patient sitting up, mark with make-up pencil (white)
• Ice/Topical - for sensitive patients
• Bright light/Vein Translumination (especially lateral orbit)
• Injection
  • Needle/syringe - 32g/TB syringe/diabetic syringe
  • Based on area, consider: Anatomy, Muscle Shape, and Depth
How I Do It

POST OP INSTRUCTIONS:

• May see mild redness- 1 to 2 hours
• Bruising possible- rare
• Do not rub area
• Limit activity first few hours
• No caps/hats
• May apply ice gently
• Early results seen in 3 to 4 days
Avoiding, Diagnosing, and Managing Adverse Effects

Most Common Adverse Affects

• The most common adverse effects following aesthetic BoNTA treatment are mild, transient, and closely related to injection strategy

• Prevention remains the best strategy for managing adverse effects; despite the best care however, some adverse effects do occur

• Injection pain and bruising are the most common adverse effects following aesthetic use of BoNTA
Avoiding, Diagnosing, and Managing Adverse Effects

- **Injection pain and bruising** are the most common adverse effects following aesthetic use of BoNTA
  - Patient history - aspirin, NSAIDs, etc.
  - Translumination
  - Ice
  - Small needle (32g)
  - Topical/anesthetic
  - Preservative vs. nonpreservative Saline
- HA occurred with BoNTA and placebo
  - 0-30%
# Injection-Related Adverse Effects

<table>
<thead>
<tr>
<th>ADVERSE EFFECT</th>
<th>TYPICAL CAUSE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blepharoptosis</td>
<td>Migration of toxin through the orbital septum to the levator palpebrae superioris muscle (most experts agree)</td>
</tr>
<tr>
<td>Brow ptosis</td>
<td>Inappropriately low frontalis treatment or frank overtreatment of forehead</td>
</tr>
<tr>
<td>Unwanted lateral brow elevation</td>
<td>Forehead treatment too medial</td>
</tr>
<tr>
<td>Diplopia</td>
<td>Medial migration of toxin to the lateral rectus muscle</td>
</tr>
<tr>
<td>Ectropion</td>
<td>Disruption of orbicularis oculi function</td>
</tr>
<tr>
<td>Lip ptosis</td>
<td>Migration of toxin into the zygomaticus or overtreatment of the levator labii muscles</td>
</tr>
<tr>
<td>Lip Asymmetry</td>
<td>Many causes related to improper dosing, placement, or unintended migration</td>
</tr>
<tr>
<td>Oral incompetence</td>
<td>Inappropriate placement or overtreatment of the lip or chin</td>
</tr>
<tr>
<td>Dysphagia/Neck</td>
<td>Overtreatment of the platysmal bands or horizontal neck lines</td>
</tr>
</tbody>
</table>
Injection-Related Adverse Effects

• Brow Ptosis and Lateral Brow Elevation
  • Brow droop causes:
    • Pre-existing brow compensated ptosis
    • Frontalis injected- overtreatment or injected too low
      • This allows brow depressors (orbicularis oculi, corrugators, procerus, depressor) to act unopposed
Injection-Related Adverse Effects

• Lateral brow elevation (Mr. Spock) or cocked brow
  • Lateral/frontalis muscle unopposed compensatory contraction
Injection-Related Adverse Effects

- **Blepharoptosis (lid ptosis)**
  - Pre-existing ptosis masked by frontalis compensation
  - Diffusion to the levalor palpebre often during glabella injection

![Before and After Photos](image-url)
Injection-Related Adverse Effects

• Lid ptosis can be seen a few days post injection or as late as 2 weeks following injection
  • Unpleasant treatment outcome, but is transient and often resolves in 2 weeks
  • Management of lid ptosis- application of alpha adrenergic ophthalmic drops
    • Causes contraction of Mueller muscle (an adrenergically stimulated muscle) which in turn elevates lid slightly
    • This treatment is not a cure. Drops should be continued until ptosis has resolved

• Prevention- Injection technique
  • Glabella injection 1cm above the bony orbital rim
  • Don't cross midpupillary line
Facial Dermal Fillers
Focus on Fillers

**Replacement Fillers**
- Collagen
- Hyaluronic Acid (HA)

**Stimulatory Fillers**
- Poly-L-lactic acid (PLLA)
- Polymethylmethacrylate (PMMA)
- Calcium hydroxylapatite (CaHA)
# Current Compounds Used in Clinical Practice

<table>
<thead>
<tr>
<th>Temporary Biodegradable (&lt;1 Year)</th>
<th>Semipermanent Biodegradable (1 to 2 Years)</th>
<th>Permanent Nonbiodegradable (&gt;2 Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA compounds</td>
<td>Calcium hydroxyapatite</td>
<td>PMMA spheres/collagen</td>
</tr>
<tr>
<td>• Restylane</td>
<td>• Radiesse</td>
<td>• Bellafill (Artefill)</td>
</tr>
<tr>
<td>• Perlane</td>
<td>• PLLA spheres</td>
<td>• Autologous fibroblasts</td>
</tr>
<tr>
<td>• Prevelle-Silk/Hylaform</td>
<td>• Sculptra</td>
<td>• LaViv</td>
</tr>
<tr>
<td>• Juvéderm Ultra, Ultra XC, Ultra Plus, Ultra Plus XC</td>
<td>• HA compounds</td>
<td>• Autologous fat injection</td>
</tr>
<tr>
<td>• Belotero Balance</td>
<td>• Juvéderm Voluma XC</td>
<td></td>
</tr>
</tbody>
</table>
Aims of Soft Tissue Filler Treatment

- Improve wrinkle lines
- Correct volume loss
- Provide lift
- Achieve ideal facial proportions
- Stimulate new collagen to support tissues
Hyaluronan

- HA is abundant in the human dermis.
- Natural polysaccharide polymer that retains water and forms a matrix upon which collagen and elastic fibers develop.
- HA is hydrophilic and helps hydrate, lubricate, and stabilize connective tissue.
- As skin ages, cells lose the ability to produce HA.
HA as a Filler

- In order to be stable as a filler, it is complexed with HA fibers with cross-linked hydroxyl groups.
- The cross-linking confers longevity in the skin (6-12 months).
- As a filler, HA can be molded and has a soft look.
- Not permanent
  - Can be instantly dissolved with hyaluronidase
# Comparison of Commercially Available Hyaluronic Acid Products

<table>
<thead>
<tr>
<th></th>
<th>Restylane®</th>
<th>Perlane®</th>
<th>Juvéderm® Ultra/Ultra Plus</th>
<th>Prevelle® Silk</th>
<th>Hydrelle™</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>US distributor</strong></td>
<td>Medicis</td>
<td>Medicis</td>
<td>Allergan</td>
<td>Mentor</td>
<td>Coapt Systems</td>
</tr>
<tr>
<td><strong>Cross-linking agent</strong></td>
<td>1,4-butandiol diglycidyl ether (BDDE)</td>
<td>1,4-butandiol diglycidyl ether (BDDE)</td>
<td>1,4-butandiol diglycidyl ether (BDDE)</td>
<td>Divinyl sulfone (DVS)</td>
<td>Biscarbodiimide (BCDI)</td>
</tr>
<tr>
<td><strong>Total HA concentration (percent cross-linked HA)</strong></td>
<td>20 mg/mL&lt;sup&gt;[19]&lt;/sup&gt; (&lt;1%)&lt;sup&gt;[24]&lt;/sup&gt;</td>
<td>20 mg/mL&lt;sup&gt;[20]&lt;/sup&gt; (&lt;1%)&lt;sup&gt;[24]&lt;/sup&gt;</td>
<td>24 mg/mL&lt;sup&gt;[21,22]&lt;/sup&gt; (6%/8%)&lt;sup&gt;[24]&lt;/sup&gt; (12%)&lt;sup&gt;[24]&lt;/sup&gt;</td>
<td>5.5 mg/mL&lt;sup&gt;[17]&lt;/sup&gt;</td>
<td>28 mg/mL&lt;sup&gt;[23]&lt;/sup&gt; (N/A)</td>
</tr>
<tr>
<td><strong>Average particle size</strong></td>
<td>300 µm&lt;sup&gt;[17,25]&lt;/sup&gt;</td>
<td>750-1000 µm&lt;sup&gt;[20]&lt;/sup&gt;</td>
<td>Random sizes and shapes</td>
<td>350 µm&lt;sup&gt;[17]&lt;/sup&gt;</td>
<td>200 µm&lt;sup&gt;[24]&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Lidocaine</strong></td>
<td>Restylane®-L</td>
<td>Perlane®-L</td>
<td>Juvéderm® Ultra XC Juvéderm Ultra Plus XC</td>
<td>Yes</td>
<td>None</td>
</tr>
<tr>
<td>Trade Name</td>
<td>HA Concentration</td>
<td>Year of Approval</td>
<td>Indications</td>
<td>Injection Depth</td>
<td>Practical Uses</td>
</tr>
<tr>
<td>---------------------</td>
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<td>------------------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Restylane</td>
<td>20 mg/mL</td>
<td>2003</td>
<td>Correction of moderate-to-severe facial wrinkles and folds (eg, nasolabial folds) and lip augmentation</td>
<td>Mid-to-deep dermis</td>
<td>Glabella, infraorbital hollows, perioral rhytides, lips</td>
</tr>
<tr>
<td>Restylane-L</td>
<td>20 mg/mL</td>
<td>2012</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Restylane Silk</td>
<td>20 mg/mL</td>
<td>2014</td>
<td>Lip augmentation and correction of perioral rhytides</td>
<td>Dermal implantation</td>
<td>Glabella, infraorbital hollows, perioral rhytides, lips</td>
</tr>
<tr>
<td>Perlane</td>
<td>20 mg/mL</td>
<td>2007</td>
<td>Correction of moderate-to-severe facial wrinkles and folds (eg, nasolabial folds)</td>
<td>Deep dermis to superficial subcutis</td>
<td>Midface, chin</td>
</tr>
<tr>
<td>Perlane-L</td>
<td>20 mg/mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juvederm Ultra</td>
<td>24 mg/mL</td>
<td>2006</td>
<td>Correction of moderate-to-severe facial wrinkles and folds (eg, nasolabial folds)</td>
<td>Mid-to-deep dermis</td>
<td>Glabella, midface, perioral rhytides, lips, nasolabial folds, chin</td>
</tr>
<tr>
<td>Juvederm Ultra XC</td>
<td>24 mg/mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juvederm Ultra Plus</td>
<td>24 mg/mL</td>
<td>2008</td>
<td>Correction of moderate-to-severe facial wrinkles and folds (eg, nasolabial folds)</td>
<td>Mid-to-deep dermis</td>
<td>Glabella, midface, nasolabial folds, perioral rhytides, melolental folds, chin</td>
</tr>
<tr>
<td>Juvederm Ultra Plus XC</td>
<td>24 mg/mL</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Juvederm Voluma XC</td>
<td>20 mg/mL</td>
<td>2013</td>
<td>Cheek augmentation to correct age-related volume deficit in the midface</td>
<td>Deep (subcutaneous or supraperiosteal)</td>
<td>Midface, perioral rhytides, melolental folds, chin, jawline</td>
</tr>
<tr>
<td>Hydrelle</td>
<td>28 mg/mL</td>
<td>2006</td>
<td>Correction of moderate-to-severe facial wrinkles and folds (eg, nasolabial folds)</td>
<td>Mid-to-deep dermis</td>
<td>Midface, nasolabial folds, jawline</td>
</tr>
<tr>
<td>Prevelle Silk</td>
<td>5.5 mg/mL</td>
<td>2008</td>
<td>Correction of moderate-to-severe facial wrinkles and folds (eg, nasolabial folds)</td>
<td>Mid-to-deep dermis</td>
<td>Infraorbital hollows, perioral rhytides, lips, lateral perioral lines</td>
</tr>
<tr>
<td>Belotero Balance</td>
<td>22.5 mg/mL</td>
<td>2011</td>
<td>Correction of moderate-to-severe facial wrinkles and folds (eg, nasolabial folds)</td>
<td>Mid-to-deep dermis</td>
<td>Infraorbital hollows, perioral rhytides, lips, lateral perioral lines</td>
</tr>
</tbody>
</table>
Restylane

- 1st HA filler available in US (Medicis) 2003
- Has been shown to induce collagen formation
- Added Lidocaine in 2010
- Requires no skin testing, provides soft, natural results
- Non animal source- through bacterial fermentation
Juvederm
Ultra/ Ultra Plus - Allergan

• Non animal bacterial sourced HA - 2006
• Non sized particles – result in smooth gel
• Difference between Ultra and Ultra Plus – higher cross linking, higher viscosity
• Lidocaine added in 2009
Juvederm

- HA (Allergan)
  ✓ Non Animal
- Smooth Gel
  ✓ 3 Product Formulation
- Fine to Moderate Wrinkle Lines
- Mid Dermis
- Preferred Location
  ✓ Lip Augmentation
  ✓ Superficial Rhytids
  ✓ Naso Labial Line
Belotero Balance

- Non Animal – HA (MERZ)
- Cohesive polydensified matrix technology
- Low G’ prime & viscosity
  - High Cohesiveness
- Higher concentration of non-cross linked
- Softness, flow, tissue integration
- Suited for superficial dermis fill
- Good for tear trough lines and upper lip lines
- Minimizes Tyndall effect
FDA Recommends Approval of New Filler Exclusively for Cheek Augmentation – Juvederm Voluma XC (Allergan)

Juvederm Voluma XC is a viscous gel composed of cross-linked hyaluronic acid suspended in phosphate buffered saline with 0.3% Lidocaine

First dermal filler approved in the US specifically for deep (subcutaneous or supraperiosteal) injection used for cheek augmentation to correct age-related volume deficit in the mid face
DEFY GRAVITY.

A MORE YOUTHFUL PROFILE STARTS WITH THE APPLES OF YOUR CHEEKS

- Instantly adds volume lost to aging in the cheek area
- Creates contour and a subtle lift
- Natural-looking results last up to 2 years with optimal treatment

Juvederm VOLUMA® XC
The Youthful Face

- Natural rounding and projection of the cheek
- Malar fat pad in an elevated position
- Tear trough small
- Nasolabial folds are soft, less pronounced
WRINKLES AREN’T THE ONLY SIGN OF AGING

IS VOLUME LOSS IN THE CHEEKS MAKING YOU LOOK OLDER?

As you age, it’s not just about lines and wrinkles. Your cheeks also lose volume and the skin may sag.

YOUTHFUL CHEEK:
Round, like an apple

AGING CHEEK:
Flat and sunken

A MORE YOUTHFUL PROFILE STARTS WITH THE APPLES OF YOUR CHEEKS
HOW DO YOU SEE VOLUME LOSS?

LOOK AT YOURSELF FROM DIFFERENT ANGLES TO REVEAL CHEEK FLATTENING AND SAGGING SKIN

PROFILE VIEW: Do you have contour? Or is the cheek flat between the upper and lower half?

CHIN-DOWN VIEW: Do you notice sagging skin when you look down?

ASK HOW YOU CAN TEMPORARILY RESTORE VOLUME IN YOUR CHEEK AREA
**Voluma**

- **Hyaluronic Acid (MERZ)**
- **VY Cross Technology**
  - Mixes high + low MW HA
  - Enhanced crosslinking and tight binding
- **Voluma has a high HA concentration**
  - High G´ Prime Translating into good lift capacity and low cohesiveness with smooth gel consistency.
- **Supra Periosteal**
- **Improve Facial Volume Loss & Reshape Facial Contours**
  - Upper Face – Temporal
  - Mid Face – Malar
  - Lower Face – Jowl, Mandibula, Angle, Jawline
Available Non-HA Fillers

**Synthetic poly-L-lactic acid**
- Sculptra® Aesthetic
- 40-63 μm microspheres

**Synthetic calcium hydroxylapatite**
- Radiesse®
- 25-45 μm microspheres

**Synthetic polymethylmethacrylate**
- Artefill®
- 30-50 μm microspheres

**Synthetic silicone** – not approved for cosmetic use
STIMULATORY FILLERS

These fillers act primarily by causing a fibroplasia reaction which in turn stimulates native collagen formation. This induced fibroplasia is thought to increase the effectiveness and longevity of the treatment and it may benefit patients with thinning skin as well as volume loss.
RADIESSE Filler Stimulates New Collagen Production

A. 4 Weeks

B. 16 Weeks

C. 32 Weeks

D. 78 Weeks
Stimulatory Fillers-
CAHA, PLLA, PMMA

- Can fill deeper lines
- CAHA #1 choice for nasal labial line
- Can correct volume loss in cheek, mandibular line, temples
- Contraindicated for lips or hyperkinetic muscle regions
- Deeper injection level
- Fibroplasia reaction- stimulating native collagen, forming a scaffold
• Synthetic Calcium Hydroxylapatite (CaHA) microspheres [30%] suspended in a sodium carboxy-methylcellulose resorbable aqueous gel carrier [70%]
• Stimulates the body to produce new collagen
• No skin or allergy testing
• No special handling requirements
• 1.5cc Volume Advantage
• 0.8cc Moderate Fill
**Radiesse**

- Cal++ Hydroxyapatite (MERZ)
- Calcium in a Soluble Gel
- Used by OMFS for Past 20 Years
- Deep Dermis/Sub Q
- Naso Labial Fold
- Preferred Location:
  - ✓ Volume Replacement

---

**Preferred Location:**

- Naso Labial Fold
- Volume Replacement
Moderate          Severe

Just ONE RADIESSE Moderate Fill (0.8cc) syringe

Just ONE RADIESSE Volume Advantage (1.5cc) Syringe
Severe Folds with RADIESSE Filler

Treated with one RADIESSE® Volume Advantage (1.5 cc) syringe
Radiesse
(Calcium hydroxylapatite)

Juvederm
(Hyaluronic acid)

Restylane
(Hyaluronic acid)
Dermal Fillers

• Treatment is an in-office procedure

• **Product Selection** → Based on medical history, treatment area, degree of facial aging, severity of volume loss, patient’s desires

• **Pain Management** → Dependent on patient’s threshold, injection site, options: ice, topical anesthetic, nerve block

• **Injection** → Mid to deep dermal, subdermal serial puncture, linear threading fanning technique

• **After Care** → Ice can be applied for 24 hrs; avoid sun, extreme activity; make-up can be applied in 48 hrs
Dermal fillers correct wrinkles and augment facial contours by filling volume deficit in the dermis or subdermal tissues.
Facial Filler Equipment

- Desired Filler
- Gloves
- Alcohol preps
- 2 x 2 gauze
- Marking pen
- Q-tips
- Patient hand held mirror
- Small ice pack
- Local anesthetic
- Camera
Injectable Treatment Template

Date: __________________
Name: __________________

Injectable(s): __________________
Injectable labels/lot #s: __________________
Total Units/Volume: __________________
Anesthesia: __________________
Photography: __________________
Comments: __________________

Treatment provider: __________________

Patient History and Treatment (FEMALE)

Date: __________________
Name: __________________

Examination: __________________

Medical History including prior cosmetic treatment / procedures: __________________

Medications including ASA, NSAID, Herbs: __________________

Allergies, including LATEX: __________________

Treatment Plan: __________________
<table>
<thead>
<tr>
<th>Location for Treatment</th>
<th>Dermal Class Filler</th>
<th>Filler Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correction of Fine to Moderate Facial Wrinkles &amp; Folds</td>
<td>HA</td>
<td>Restylane Juvederm</td>
</tr>
<tr>
<td>Lip Augmentation</td>
<td>HA</td>
<td>Restylane Silk Juvederm</td>
</tr>
<tr>
<td>Fine Lip Lines</td>
<td>HA</td>
<td>Belotero Restylane</td>
</tr>
<tr>
<td>Fine Lip Lines</td>
<td>HA</td>
<td>Silk Juvederm Belotero</td>
</tr>
<tr>
<td>Tear Trough Lines Around Eyes</td>
<td>HA</td>
<td>Radiesse</td>
</tr>
<tr>
<td>Naso Labial Fold</td>
<td>Ca++ Hydroxyapatite</td>
<td>Restylane Juvederm</td>
</tr>
<tr>
<td>Marionette Lines</td>
<td>Ca++ Hydroxyapatite</td>
<td>Radiesse Radiesse</td>
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<tr>
<td>Location for Treatment</td>
<td>Dermal Class Filler</td>
<td>Filler Product</td>
</tr>
<tr>
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<tr>
<td>Cheek Temporal</td>
<td>HA</td>
<td>Voluma</td>
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<tr>
<td></td>
<td>Ca++ Hydroxyapatite</td>
<td>Radiesse</td>
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<tr>
<td>Longterm Volume Replacement</td>
<td>Sculptra</td>
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<tr>
<td></td>
<td>Polylactic Acid</td>
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</tr>
</tbody>
</table>
Facial Filler Complications

- Missed expectations
- Product-related complications
- Technique-related complications
Most Common HA Adverse Effects

- Erythema
- Edema
- Bruising
- Lumps
- Tyndall effect
A superficial bolus of HA filler imparts a bluish appearance to the underlying skin.

Why?
- Light scattering is inversely proportional to the fourth power of the light wavelength.
- Shorter wavelength of blue light is scattered most back to the observer’s eye.
Avoiding Filler Complications

- Obtain informed consent
- Understand your own abilities/limitations
- Explain the risks, possible complications, and limitations of the procedure/product
- Discuss any off-label uses with the patient
Avoiding Filler Complications (cont)

- Appropriate antisepsis
- Handwashing
- Prep skin: ETOH, chlorhexidine
- Avoid injecting large amounts of product
Avoiding Filler Complications (cont)

- Have a thorough knowledge of facial anatomy
- Avoid important neurovascular structures
- Inject small amounts