

vAug.11.09 **Botulinum Toxin and Fillers AAO Course 2009**

**Part 1 : Botulinum Toxin**

**Part 2: Fillers**

**Part 3: Skills Transfer Lab Manual \_- BRING THIS TO THE LAB!!!**

Jemshed A. Khan, M.D.<sup>1</sup>  
Michael S. McCracken, M.D.<sup>2</sup>

INSTRUCTORS 2009

Gary Borodic, Dawn Buckingham, Cat Burkat, Christopher DeBacker, Kathleen Duerkson, Craig Geist, Yanni Glavas, Morris Hartstein, Ronald Kristen, Dale Meyer, Asa Morton, Janet Neigel, Rona Silkiss, Charles Slonim, Julie Woodward.



<sup>1</sup>Khan Eyelid and Facial Plastic Surgery, Leawood, KS  
[www.kcface.com](http://www.kcface.com)

<sup>2</sup>McCracken Eye and Face Institute, Parker, CO

“Portions of this handout are reprinted from COLOR ATLAS OF COSMETIC OCULOFACIAL SURGERY, Botox, Chapter 13, Chen, Khan, and McCord: 2004 Elsevier Inc, with permission from Elsevier.”

Proprietary interest: M.S. McCracken, None; J.A. Khan, None;

The pdf file for this handout has better image resolution and maybe downloaded from:

kcface.com ... “physician handouts” or at this link

[http://kcface.com/tiny\\_mce\\_uploads/AAO\\_2009\\_Botox\\_Fillers\\_TEMP\\_Handout.pdf](http://kcface.com/tiny_mce_uploads/AAO_2009_Botox_Fillers_TEMP_Handout.pdf)

# **Cosmetic Facial Botulinum Neurotoxin Application**

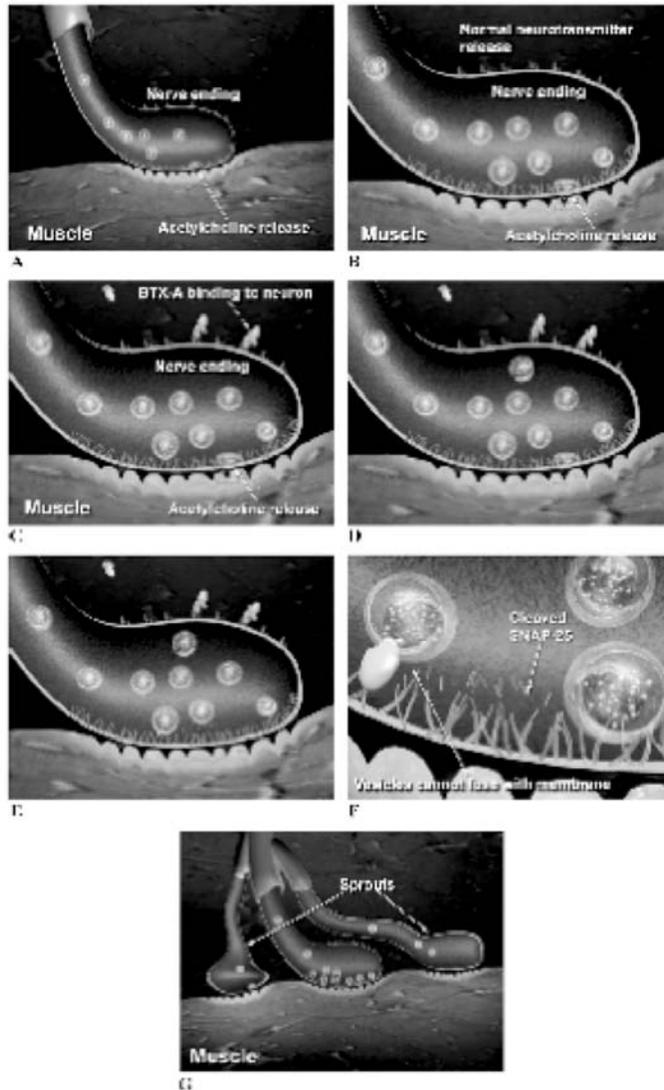
Jemshed A. Khan, M.D.

## ***1. Introduction and History***

One of the safest, simplest, and most satisfying methods of elective cosmetic reduction of facial rhytids is by the injection of Botulinum neurotoxin Type A. Botulinum neurotoxin is currently injected into selected SMAS-type facial muscles to temporarily reduce associated static and dynamic wrinkles. Botulinum neurotoxin A relaxes muscles by preventing the presynaptic release of the neurotransmitter acetylcholine at the peripheral cholinergic motor neuron endplate. Acetylcholine is stored in vesicles residing in the motor nerve ending. Docking is a necessary step prior to release of Ach into the neuromuscular junction. BoNT-A prevents the docking and exocytosis of these acetylcholine vesicles to the nerve endplate. In order for BoNT-A to exert this effect, it must first be absorbed into the nerve ending by a process termed receptor-mediated endocytosis. After BoNT-A is internalized within a cytoplasmic vesicle, the light chain is released into the cytoplasm. The light chain cleaves a protein known as SNAP-25A which must be functional in order for Acetylcholine vesicles to dock prior to release into the neuromuscular junction.

Several distinct immunological BoNT serotypes exist (A,B,C1,D,E,F,G) which vary from approximately 300 – 900 kD size. All BoNT serotypes target one or more specific intracellular proteins necessary for synaptic release of neurotransmitter. Proteins targeted by different serotypes include SNAP-25, syntaxin, and VAMP/synaptobrevin. Over time, the nerve ending may sprout additional axons which establish new motor endplates. This results in a gradual return of motor function. Skin testing for allergy to BoNT-A is not necessary, although neutralizing antibodies may occur in patients who receive high doses repeatedly. Antibodies are probably related to cumulative exposure, production batch, and protein concentration which may vary significantly between serotypes and manufacturers (see comparison table). The number of units of BoNT necessary to produce a desired effect varies dramatically from strain to strain and between manufacturers. BOTOX® was FDA approved for cosmetic injection in the glabella in April of 2002. In April of 2009, the FDA approved Dysport™, another formulation of BoNT A, for cosmetic injection into the glabella. Dysport™ injections usually require approximately 2.5 times as many units as BOTOX® injections. All doses given in this discussion relate specifically to BOTOX® brand BoNT A and not to any other neurotoxin products.

Fig 13-01a: Normal skeletal muscle contraction results when there is presynaptic release of the neurotransmitter acetylcholine at the peripheral cholinergic motor neuron endplate or nerve ending. The acetylcholine molecules diffuse across the synapse in order to stimulate skeletal muscle contraction. Fig 13-01b: Acetylcholine is stored in vesicles residing in the motor nerve ending. Docking of acetylcholine containing vesicles with the nerve membrane is a necessary step prior to release of Ach into the neuromuscular junction. Docking is mediated by a number of molecules including SNAP-



25A (blue). Fig 13-01c: Following BoNT-A injection, molecules of BoNT-A (yellow and gold colored molecules) diffuse through the tissues and bind to the surface of the nerve ending via specific surface receptors (red and blue structures). Fig 13-01d: After BoNT-A molecules bind to nerve endings, they are absorbed into the nerve ending through a process termed “receptor-mediated endocytosis.” BoNT-A is internalized into cytoplasmic vesicles.

Fig 13-01e and f: After BoNT-A is internalized within a cytoplasmic vesicle, the light chain of the molecule (yellow) is released into the cytoplasm. The light chain cleaves a protein known as SNAP-25A (blue) which must be functional in order for Acetylcholine vesicles to dock prior to release into the neuromuscular junction. Fig 13-01g: The muscle inactivity produced by a BoNT-A injections is temporary because peripheral nerve ending sprouts eventually develop and re-nerve the skeletal muscle. Figures 13-01 a-g courtesy of Allergan, Inc.

## Comparison of Neurotoxin Preparations: Relative Potency, Protein Load and Stability

Manufacturer Note: all products FDA approved	Relative Potency  BOTOX®: XX	Units/vial ng protein/100u Storage Durability	Relative protein load in clinical use
BOTOX® Allergan Inc Batch 79-11 BTX-A Nov. 1979 – Dec. 1997	1:1	100 u 25.0 ng -5 deg C 24 months	25.0 ng
BOTOX® Allergan Inc USA Batch BCB 2024 BTX-A	1:1	100 u 4.8 ng -5 deg C 24 months	4.8 ng
MYOBLOC® Elan Pharm. USA BTX-B	1:50-100	2500/5,000/10,000 1ng 2 - 8 deg C 24 months	50 - 100 ng
DYSPOURT™ Ipsen Ltd., UK BTX-A <a href="http://nts.med.uchile.cl/NS/viewabs.html">http://nts.med.uchile.cl/NS/viewabs.html</a>	1:2.5 variable and not well defined	300 u 1.0ng 2 - 8 deg C 12 months	4.0 ng

## 2. Anatomy

Running text: The facial mimetic muscles are specialized for several functions including facial signaling and communication. Most of the muscles of facial expression are part of a continuous interconnected layer of muscle and connective tissue known as the superficial musculoaponeurotic system (SMAS layer). While these muscles are specialized for facial expression, there is also a decline with age in the accuracy with which these muscles convey facial expression. Hence, the age-related development of standing glabellar furrows may create a mistaken expression of disapproval. It is often the goal of BOTOX® injection to reduce the facial “miscues” through selective pharmacologic denervation of the offending muscles. The common target muscles are summarized in the table.

Table 013-01 Target muscles for Botulinum neurotoxin injection.

Muscle	Action	Clinical effect and Wrinkle(s) Produced
Orbicularis oculi (orbital portion)	Forced eyelid closure, lateral eyebrow depression	Crows'-feet, eyebrow depression
Corrugator supercillii	Depresses and adducts medial ½ Eyebrows	Glabeller frown Lines
Procerus	Depresses medial eyebrow	Horizontal nasal bridge lines
Depressor supercillii	Depresses head of eyebrow	Depresses the head of the eyebrow
Frontalis (occipitofrontalis)	Furrows forehead Elevates eyebrows	Horizontal forehead lines
Orbicularis Oris	Purses and puckers lips	Vertical Lip lines
Depressors of Mouth: Depressor labii inferioris Depressor anguli oris	Depresses lateral angle of mouth	Ptosis of lateral commissure
Platysma	Maintains smooth neck skin, depresses lower jaw and lower lip	Vertical neck bands

Figure 13-02 Muscles of facial expression Figure 13-03 Facial zones and underlying muscle groups. Whitewashed areas respond predictably and well. Caution is used in greyed out areas because of unwanted effects such as adynamic and incompetent oral sphincter. Blacked out areas will produce severe unwanted effects such as drooping cheek and mouth.

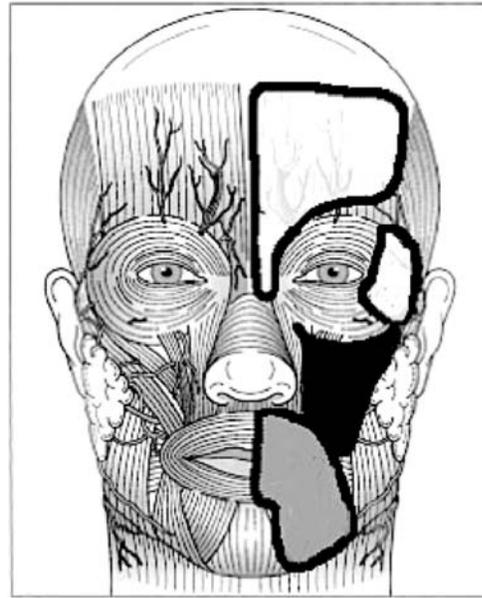


Figure 13.2 Muscles of facial expression.

### 3. Clinical indications and patient selection

Running text: BoNT-A injection works well and reliably in the crows-feet, glabella, and forehead. With experience, the eyebrows may be repositioned through treatment of the adjacent orbicularis oculi, procerus, corrugator supercilii, and depressor supercilii. BoNT-A may also be used with caution and experience to reduce the perioral rhytids and to improve the lateral angle of the mouth. However, the risk of perioral treatment resides in the possibility of inducing a neurolytic incompetence of the oral sphincter which may result in temporary drooling or inability to whistle. BoNT-A is not helpful in the treatment of the nasiolabial and marionette lines because such treatment results in facial ptosis. Dose is often individualized and may be related to muscle mass such that relatively smaller doses are sometimes used in females and Asians.

Table 13-02: General Guidelines for Typical BoNT A (BOTOX®) Cosmetic Doses

Site	Dose per site	Number of injections /side	Total dose per side	Spacing of ipsilateral injection	Recommended initial dose per side/#injection sites per side/distance between injections
Forehead	2.5 – 5 u	2 - 5	10 – 15 u	1 – 3 cm	2.5u/ 2/ 3cm
Glabella	5 – 10 u	1 - 2	10 – 20 u	1 – 2 cm	5u/ 2/ 1+cm
Crow's-feet	3 – 10 u	1 - 5	10 – 15 u	1 - 2.5 cm	5u/ 2/ 1+cm
Upper lip	1 – 1.5 u	1 - 2	1 – 2 u	1.5 cm	1u/ 1/ na
Lower lip	1 – 1.5 u	1 - 2	1 – 2 u	1.5 cm	1u/ 1/ na
Lateral Commisure	5 – 10 u	1 – 2	5 – 10 u	1-1.5 cm	5u/ 1/ na
Platysma	5 u	variable	15 – 50+	1 – 3 cm	5u/ variable/ 1.5+cm

## 4. Preparation

Running Text: BoNT-A (BOTOX) is an extremely labile lyophilized albumin and neurotoxin cryoprecipitate that must be reconstituted without agitation in order to prevent inactivation of effect. Preservative-free saline is used for reconstitution in order to prevent any possible loss of effect from the preservative inactivating the NT. When constituting BOTOX®, we use 2.2 ml of saline as diluent because approximately 0.1 ml remains in the vial through capillary attraction to the glass surface. The reconstituted drug should be used within 4 hours according to manufacturer's recommendation. A fine 27- or 30-gauge needle is used for administration (Tuberculin/insulin 1 cc syringe: 30 g with 0.5 inch needle, e.g., 1 ml insulin syringe Becton Dickson # 309311). Significant recondite volume of drug may be wasted in the hub of a detachable 27- or 30-gauge needle: the author prefers the economy of an insulin syringe with permanently attached needle.

The saline diluent should be dripped into the vial slowly so as to avoid creating a streaming jet of fluid that may agitate and inactivate the labile toxin. Vacuum sealed vial + 2.2 ml non-preserved saline = approx. 5u/0.1 ml

### Bullet Point

- ✓ Store in freezer prior to use
- ✓ (optional step) Break seal and remove stopper
- ✓ Drip in non preserved saline slowly, 2.2 ml
- ✓ 2.2 ml non-preserved saline = approx. 5u/0.1 ml
- ✓ Roll gently to mix – do not shake or stir
- ✓ Withdraw in a 0.5 or 1.0 mL via insulin syringe without dulling tip
- ✓ Refrigerate unused portion and use within four hours

Saline Diluent	Concentration per 0.1 mL (BOTOX®)	Concentration per 1.0 mL
1.0 mL	10u /0.1 mL	100u/ 1.0 mL
2.0 mL	5u /0.1 mL	50u/ 1.0 mL
2.5 mL	4u /0.1 mL	40u/ 1.0 mL
4.0 mL	2.5u/0.1 mL	25u/ 1.0 mL
10 mL	1.0u/0.1 mL	10u/ 1.0 mL

## 5. Injection Techniques: General principles.

The purpose of injection is deliver an appropriate intramuscular or perimuscular drug dose while minimizing the risks of bruising and pain. Because of the thinness of the overlying skin, ecchymosis is easily visible when it arises from the orbicularis oculi muscle. Therefore it is better to inject subcutaneously over the orbicularis oculi muscle and thereby avoid direct intramuscular injection and visible ecchymosis. Ecchymosis may also result from transection of fine subcutaneous vessels, therefore it is important to look for and avoid such vessels when injecting in the crow's-feet area. Superficial injection may be delivered by perpendicular or

tangential placement of subdermal BoNT-A to relax the frontalis muscle. Application of pressure immediately and directly to the injection site will minimize bruising. In the areas of thicker dermis overlying the orbicularis oris, mouth depressors, and corrugator supercilii muscles, one may attempt intramuscular injection since the thick overlying tissue will obscure ecchymosis.

Gently pinching the skin overlying the procerus, corrugator, and frontalis muscles may help reduce discomfort and ensure superficial placement of drug. One may also reduce discomfort with topical anesthesia techniques including ice, EMLA, Betacaine LA, etc.

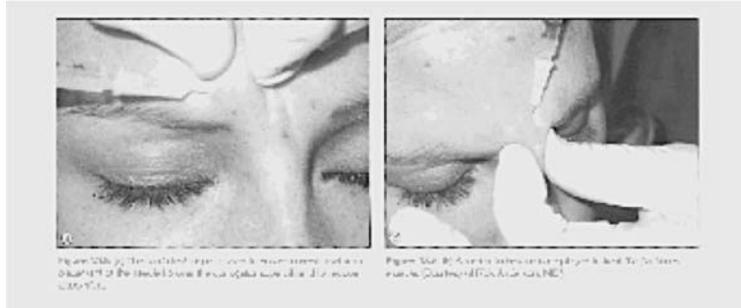


Figure 13-05a. The pinch technique is used to ensure correct anatomic placement of the needle tip over the corrugator supercilii and to reduce discomfort. Figure 13-05b. A similar technique is employed to treat the procerus muscle. Figures a and b courtesy of Rick Anderson, MD.

## 6. Injection Techniques: Crows'-feet injection.

Crow's-feet injection is one of the simplest and most satisfying applications of BoNT-A. The radiating dermal crow's-feet lines result from the concentric constriction of the underlying orbital and preseptal orbicularis oculi muscle. The orbicularis oculi injections of BoNT-A may result in diminution of both active and static crow's-feet rhytids, may prophylactically delay the onset and progression of such wrinkles, and improves final outcome following ablative periocular resurfacing. The thin periocular skin is prone to visible bruising, therefore injection should be delivered in the subdermal plane while avoiding actual intramuscular injection. The loose periocular subdermal plane in the area of crow's-feet rhytids should visibly balloon up when the injection is delivered at the proper depth. Following injection, the patient may apply pressure with facial tissues for 1 – 2 minutes over the injection sites to minimize bruising.

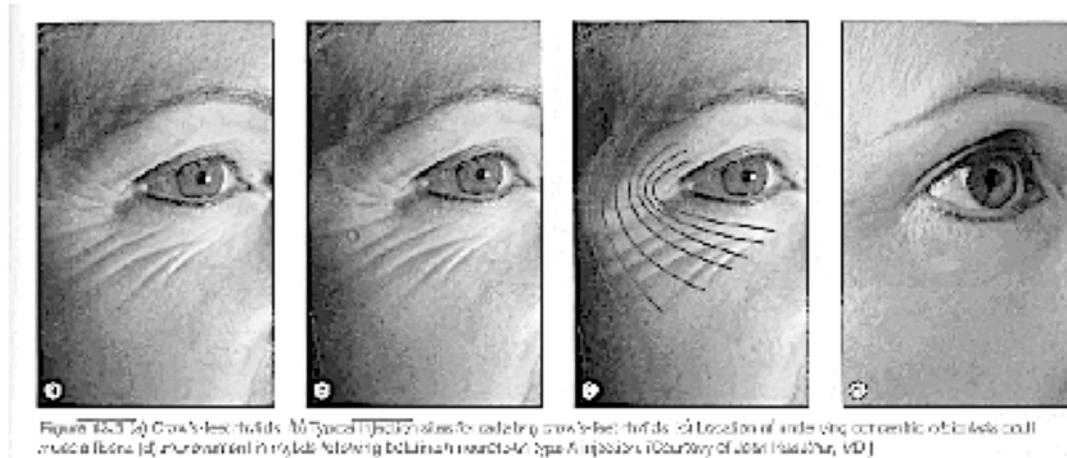


Fig 13-06a Crow's-feet rhytids. Fig 13-06b Typical injection sites for radiating crow's-feet rhytids. Fig 13-06c Location of underlying concentric orbicularis oculi muscle fibers. Fig 13-06d Improvement in rhytids following BoNT-A injection. Images a-d courtesy of Joan Kaestner MD

---

### Bullet Points

- ✓ Consciously avoid visible vessels
  - ✓ Insulin syringe with integrated 30 g needle
  - ✓ Injection sites 1-2 cm lateral to lateral canthal angle
  - ✓ 10-15u total dose (BOTOX) per side divided into 2-5 injections per side
  - ✓ Injections 1 - 5 cm apart
  - ✓ Apply pressure after each injection.
-

## **7. Corrugator and Procerus Rhytid Treatment**

Cosmetic injection of BOTOX® for Glabellar rhytids was approved by the FDA in April, 2002. To reduce pain and avoid blunting the needle tip during injection, care should be taken to respectively avoid injecting too shallow or too deep: stay deep enough to be subdermal, but not so deep as to engage the periosteum. Pain may also be reduced by palpating the supraorbital notch and thereby avoiding the vertical course of the supraorbital nerve. Stay 0.5 cm superior to the eyebrow to reduce the risk of eyelid ptosis.

The procerus muscle may be injected in the midline or by pinching the nasal bridge and entering the procerus tangentially. The drug is deposited in the midline. Generally, a single procerus injection is place over the upper nasal bridge either at or up to 7 mm higher than the level of the medial canthal tendon.

---

### Bullet Points:

- ✓ Perpendicular or tangential injections
  - ✓ Insulin syringe with integrated 30 g needle
  - ✓ Avoid supraorbital neurovascular bundles
  - ✓ Avoid dulling the needle against the periosteum
  - ✓ Inject at subdermal or intramuscular depth
  - ✓ Deeper depth is more painful
  - ✓ Injection sites placed at least 0.5 cm superior to the upper eyebrow border
  - ✓ Injection sites placed at least 0.5 cm medial and lateral to the path of the supraorbital nerve
  - ✓ Two injections of 5u each delivered to each corrugator muscle and 5u in to the procerus
  - ✓ Apply pressure after each injection.
- 

---

### Bullet points:

- ✓ Procerus muscle is midline structure
  - ✓ Procerus action creates horizontal furrows
  - ✓ Emotional signal created by procerus action is aggression
  - ✓ Inject 5 u in to the midline procerus
-

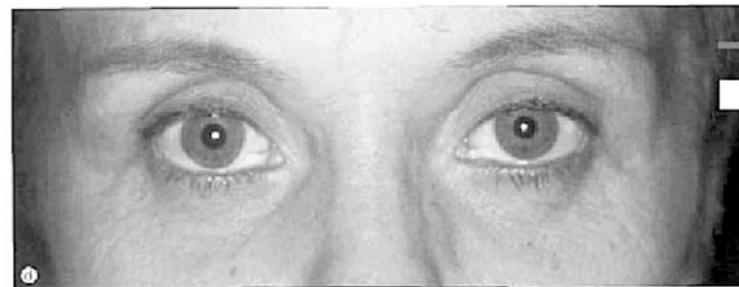
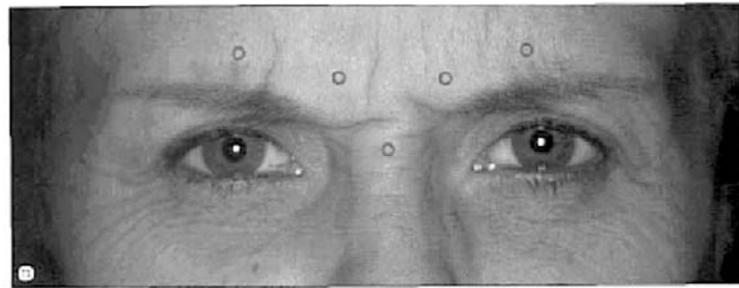
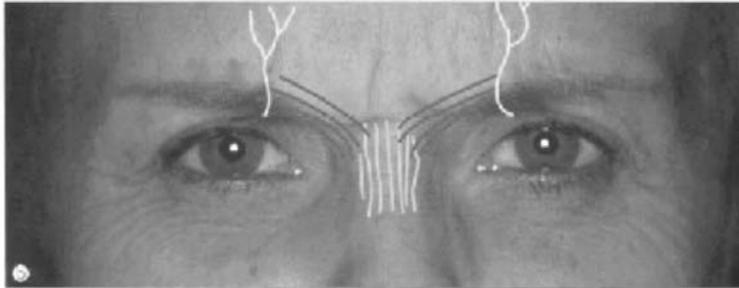


Figure 13-07a Glabellar and horizontal procerus wrinkles. Figure 13-07b The corrugator muscles are represented by red lines. The procerus muscle location is depicted by green lines. Note the course of the supraorbital nerve (yellow) located 2.5 cm lateral to the midline and often also located by palpating the supraorbital notch. The inferior portion of the nerve should be avoided because of pain or ecchymosis due to injection of the nerve or laceration of the accompanying blood vessels. Figure 13-07c Typical injection sites. Five injection sites of five units each are typically used. Note that the lateral site is never placed directly superior to the supraorbital notch. Figure 13-07d Improvement in rhytids following BoNT-A (BOTOX®) injection. Note the smoother appearance to the glabellar area. Images courtesy of Joan Kaestner MD.

## Frontalis treatment

Frontalis injection is useful in treated horizontal forehead wrinkles. Injection sites are at least 1.0 - 2.0 cm above the eyebrows to avoid a ptotic or adynamic and expressionless eyebrow. Injection should be delivered across the medial and lateral frontalis to avoid segmental eyebrow elevation (see complications section of this chapter). A series of 2 injections per ipsilateral forehead is usually a good starting point, and may be increased to 10 sites total depending upon patient response.

Prior to injection, one should search for any underlying eyelid ptosis with compensatory eyebrow elevation. Forehead injection and the resulting eyebrow depression may worsen an underlying eyelid ptosis such patients.

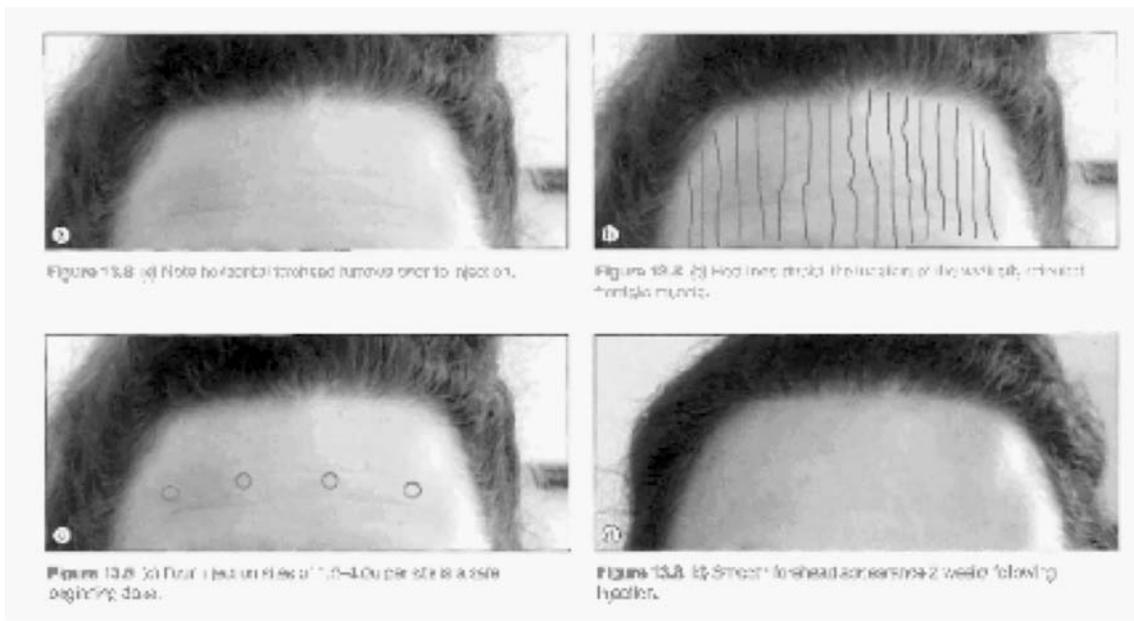


Figure 13-08a: Note horizontal forehead furrows prior to injection. Figure 13-08b Red lines depict the frontalis muscle location. Figure 13-08c Four injection sites of 1.5 to 4.0 units per site is a safe beginning dose. Figure 13-08d Smooth forehead appearance two weeks following injection.

### Bullet points

- ✓ Frontalis is a paired muscle
- ✓ Connected to the occipitalis muscle
- ✓ Frontalis action raises the eyebrows and furrows the forehead
- ✓ Emotional signal created by frontalis action is surprise
- ✓ Usual injection dose is 1.5 – 4.0u BOTOX® per site
- ✓ Usually 4 – 10 injections sites per patient depending upon size of forehead
- ✓ Use proper technique to avoid brow ptosis
- ✓ Use proper technique to avoid adynamic eyebrows

## 9. Advanced Techniques: Perioral

The perioral area responds less predictably than other treatment areas because of the dynamic muscle actions associated with eating, drinking, speaking and smiling may be impaired. Therefore, a cautious approach to this area is warranted.



Figure 13-9a Typical treatment sites for vertical lip lines. Minute doses, i.e., 1-1.5 units (BOTOX) per site are delivered. The dose and number of injection sites may be gradually increased if the response is inadequate. Only fifty percent of patients are satisfied with perioral Botox because of drooling, difficulty puckering and whistling, impaired enunciation, and drooling.



Figure 13-9b Patient with vertical lip lines demonstrating ability to pucker prior to injection. (Courtesy of Rick Anderson, MD.)



Figure 13-9c Same patient following BoNT-A injection demonstrates inability to pucker despite voluntary effort. (Courtesy of Rick Anderson, MD.)

Figure 13-09a Typical treatment sites for vertical lip lines. Minute doses, i.e., 1-1.5 units (BOTOX) per site are delivered. The dose and number of injection sites may be gradually increased if the response is inadequate. Only fifty percent of patients are satisfied with perioral Botox because of drooling, difficulty puckering and whistling, impaired enunciation, and drooling.

Figure 13-09b Patient with vertical lip lines demonstrating ability to pucker prior to injection.

Figure 13-09c (lower left) Same patient following BoNT-A injection demonstrates inability to pucker despite voluntary effort. Figures b and c courtesy of Rick Anderson, MD.



Figure 13-10 (a) Preoperative appearance of patient with depressed lateral oral commissures. Note the slight downward angulation of the lateral oral commissures prior to injection.

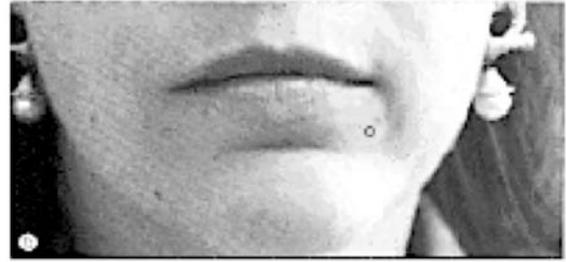


Figure 13-10 (b) Injection sites for treatment of depressed lateral oral commissures. Generally 5-10 units per site is delivered.

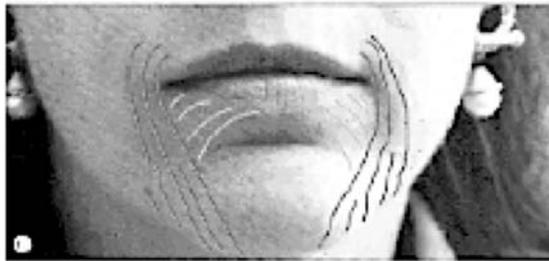


Figure 13-10 (c) Overlay of perioral muscles. Red lines represent depressor anguli oris. Green lines represent depressor labii inferioris. Both muscles may be targeted for Botox treatment.



Figure 13-10 (d) Note subtle improvement in wrinkles and slight elevation of the lateral oral commissures 2 weeks following injection.

Figure 13-10a Preoperative appearance of patient with depressed lateral oral commissures. Note the slight downward angulation of the lateral oral commissures prior to injection.

Figure 13-10b Injection sites for treatment of depressed lateral oral commissures. Generally, 5-10 units per site is delivered. Injection is inferior to lateral commissure, closer to the jawline than the commissure and 2/3 of distance to chin border.

Figure 13-10c Overlay of perioral muscles. Red lines represent depressor anguli oris. Green lines represent depressor labii inferioris. Both muscles may be targeted for BoNT-A treatment.

Figure 13-10d Note subtle improvement in wrinkles and slight elevation of the lateral oral commissures two weeks following injection

---

Bullet points:

- ✓ Only 50% of patients are happy with perioral injections
-

## 10. Complications

Complications may be minimized with appropriate refinement and adjustment of injection sites and doses on subsequent visits. For example, the patient pictured below received supplemental injections to the lateral frontalis muscle to correct the excess temporal eyebrow elevation.



Figure 13-11 Patient complained of temporal eyebrow tenting following forehead Botulinum neurotoxin type A (BoNT-A) injections. Placement of additional doses of 5u in to each lateral frontalis muscle corrected the eyebrow contour deformity.



Figure 13-12 Temporary lid upper eyelid ptosis following BoNT-A treatment of forehead and glabella.

Figure 13-11a Patient complained of temporal eyebrow tenting following forehead Botulinum type A injections. Placement of additional doses of 5u in to each lateral frontalis muscle corrected the eyebrow contour deformity.

Figure 13-11b Temporary eyelid ptosis following BoNT-A treatment of forehead and glabella.

---

### Bullet points:

- ✓ Complications may be reduced with appropriate dosing
  - ✓ Complications may be reduced with appropriate anatomic technique
  - ✓ Ptosis will resolve spontaneously
  - ✓ Eyelid ptosis may be treated with Iopidine drops or Naphcon-A
  - ✓ Perioral complications include drooling, inability to whistle
  - ✓ Diplopia, dry eyes, exposure keratitis, and lagophthalmos are unusual with cosmetic injections
-

## 11. Documentation of Treatment:

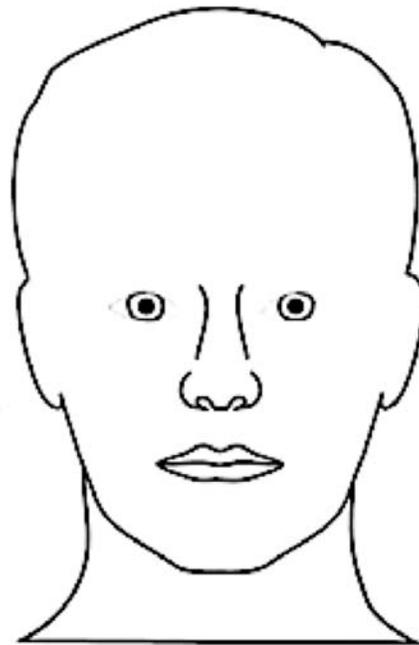
Anatomic documentation of treatment sites creates a historical record upon which further treatment modifications may be individualized. For example, if a patient has inadequate lateral forehead wrinkle reduction, one may refer to the previous treatment diagram and use this as a basis for adding new lateral treatment sites.

### BOTOX Treatment Record

Patient name:

Dx: BEB / Hemifacial spasm / Cosmetic / \_\_\_\_\_

Date
Pt comments:
CC: Spasms returning Cosmetic
U Given      Discard      Share
Notes:
Lot number:
RTC
Signed:



## 12. Informed consent:

While Botulinum toxin A appears to be a safe and effective drug, the very long term consequences of neurotoxin injection are unknown. Therefore, informed consent is important despite the relative simplicity of the procedure. Informed consent discussion should include both the known side effects as well as discussion of unknown risks related to the use of human albumin in Botulinum toxin A. Some malpractice insurance carriers, e.g., OMIC, require that you use their specified Botulinum toxin consent form.

### LIFETIME CONSENT FOR ADMINISTRATION OF BOTOX®

1. I, \_\_\_\_\_ ( first name, last name), request that Dr. \_\_\_\_\_, or whomever he designates, administer botulinum toxin to me for either medical or cosmetic purposes. Botulinum toxin is not FDA approved for headache treatment, tarsorrhaphy, or muscle twitching. Photos of me may be taken and used for educational, scientific, or marketing purposes.

2. If BOTOX® is given for medical purposes, such as involuntary muscle spasm, tarsorrhaphy, blepharospasm, hemifacial spasm, muscle twitch or tick, etc, I understand that there are other treatments for this condition, including, but not limited to, medical therapy including the administration of oral medicines, muscle stripping or other operations, removal of motor nerves, or procedures to release pressure on involved nerves.

3. I acknowledge that I understand that Botox A includes human albumin. Albumin is a protein, similar to the white of a chicken egg, that is derived from human blood products. While it is not believed that there has been any transmission of diseases from Botox A, I understand that this is very unlikely but possible. I accept the risk of the possibility of acquiring an infection, including viral or other types of infections from Botox administration and accept the risk of unknown future complications from Botox use. I understand that botulinum B can also be used for my condition and does not contain albumin.

4. Botulinum toxin usually works well in 95% of patients. There is a 5% chance that it will not have an adequate effect. It is not always possible to predict the effect, and it may work too well or not well enough. Some of the side effects may include flu symptoms, headache, temporary droopiness of one or both eyelids or double vision. Permanent muscle weakness is very unlikely.

5. By signing this document, I agree that it includes all botulinum toxin injections already provided by my doctor or whomever he designates, as well as all future Botox treatments.

6. I understand that the effects of botulinum toxin use with pregnancy or breast-feeding are not known and that I should not take botulinum if the possibility of pregnancy or nursing exists.

7. In summary, the risks, consequences, benefits, and alternatives of treatment, including no treatment, have been explained to me.

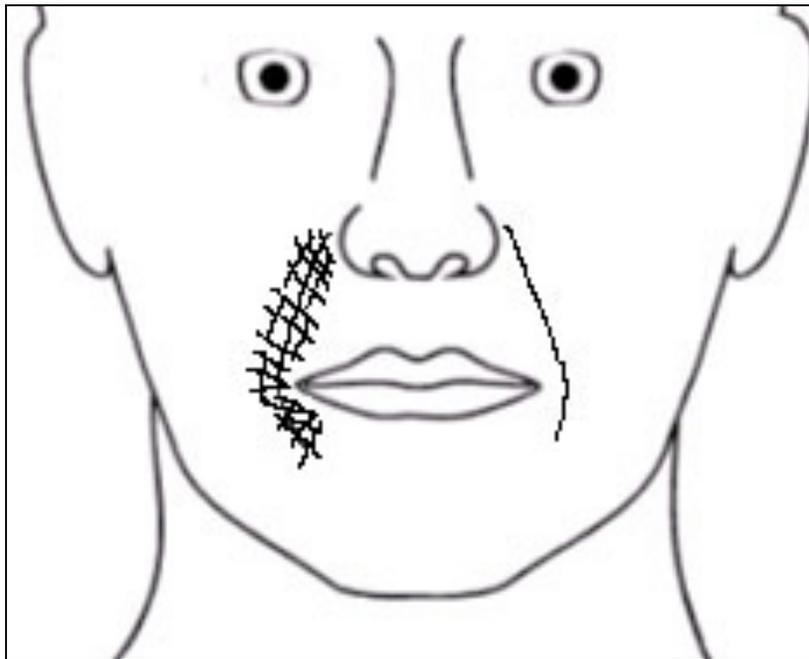
Signed (Patient) \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

Witnessed By \_\_\_\_\_ Date \_\_\_\_/\_\_\_\_/\_\_\_\_

**Part 2 (11pp): Human Facial Filler Materials: An overview of filler treatment of human facial features with an emphasis on Stabilized Hyaluronic Acid**

Jemshed A. Khan, M.D.<sup>1</sup>  
Michael S. McCracken, M.D.<sup>2</sup>

<sup>1</sup>Khan Eyelid and Facial Plastic Surgery, Leawood, KS  
<sup>2</sup>McCracken Eye and Face Institute, Parker, CO



Proprietary interest: M.S. McCracken, None; J.A. Khan, None

## **Table 1: Human Facial Fillers:**

---

### **Autologous Fillers:**

Autologen - collagen fibers prepared from the patient's tissue. 75% persistence at 1 year

\*\*\*Isolagen - cultured autologous fibroblasts

### **Cadaveric or Human-source Fillers:**

Alloderm - freeze-dried acellular human cadaveric dermis. Results often last 6-12 months

Cosmoplast - derived from highly purified human collagen

Cymetra - micronized, injectable form of Alloderm. Results for as long as 22 months.

Dermalogen - collagen matrix derived from cadaveric dermis. Persistence of correction as much as 50% at 1 year

### **Hyaluronic Acid Fillers:**

Captique - NASHA

Hylaform gel - derived from rooster combs

Juvederm (Allergan) – NASHA, monophasic, Ultra and Ultra Plus

Restylane, Perlane – NASHA. Restylane correction was 82% @ 3mo., 33% @ 1 yr

\*\*\*Puragen – NASHA

Prevelle Silk – NASHA WITH LOCAL ANESTHETIC

Eleveess – NASHA WITH LOCAL ANESTHETIC

### **Other Fillers:**

#### **Evolence – Porcine collagen. FDA approved 6/08.**

Artefill - PMMA microspheres suspended in bovine collagen. 65% of patients report results after 2 years

\*\*\*Endoplast-50 - solubilized elastin peptides with bovine collagen. As long as 12 months

Radiesse –calcium hydroxyapatite particles. 1-2 years effect; FDA approved for 6 mos

\*\*\*Reviderm intra - 40- to 60-µm dextran beads suspended in NASHA. 274 patients reported permanent results.

\*\*\*New-fill - nonanimal derived polylactic acid

Sculptra - Poly-L-lactic acid; FDA approved for treatment of lipoatrophy in HIV pts

\*\*\*Silicone (Silikon 1000) - a family of artificial silica-containing polymers. Illegal to use in USA.

UltraSoft – (e-PTFE): a specially prepared form of Teflon for incisional subdermal implantation. Permanent effect.

### **Products not requiring FDA approval:**

Autologous collagen: Months to years

Autologous fat: Months to years

---

\*\*\*Products are not FDA approved. FDA approval may not be specific for facial cosmetic use (e.g., Radiesse) For a more complete discussion of filler materials see: [www.eMedicine.com](http://www.eMedicine.com) - Dermal Fillers : Article by Roberta D Sengelmann, <http://www.emedicine.com/derm/topic515.htm>

## ***1. Introduction: Volumizers and Stimulators***

---

Fillers (see Table 1) are generally classified as either *volumizers* or *stimulators* based upon the mechanism of action. Volumizers are relatively inert substances that add bulk or volume, e.g., silicone, collagen, NASHA. Stimulators have a biologic activity that creates additional volume through either a foreign body reaction (e.g., poly-L-lactic acid, dextran) or collagen stimulation (e.g., polymethylmethacrylate, calcium hydroxylapatite). Recently, Restylane has been shown to both volumize and stimulate collagen production.<sup>1</sup>

Fillers vary considerably in the duration of effect. Permanent fillers seem to be associated with higher rates of late onset infection, granuloma, and induration. Furthermore, a permanent filler may yield unnatural results over time as it stays stationary while the face changes with aging. Bovine collagen (Zyderm I and II and Zyplast, Allergan) had been popular in the past, but lost favor because of the high rate of allergic reactions (3%), short duration of effect (three months or less), and theoretical risks of disease transmission from an animal source. Allergan also offers Cosmoderm and Cosmoplast, composed of human collagen derived from a cell line from a newborn's foreskin. Unlike the bovine collagen products, Cosmoderm and Cosmoplast do not require allergy testing. These products all contain lidocaine to reduce discomfort during injection, so rhytids require slight overfilling. Patient satisfaction is high with fillers, as patients show immediate results.

**Table: Patient Satisfaction on a 1 (Low) to 10 (High) Scale.**

---

Botox injection	8.9
Upper blepharoplasty	8.9
Restylane	8.1
Glycolic peel	6.9
Microdermabrasion	6.6
Collagen injection	6.6

---

## ***2. Filler Selection***

---

The most popular injectable filler is non-animal, **stabilized hyaluronic acid (NASHA)**. NASHA provides 6 – 12 months of tissue fill, is longer lasting than collagen, has a favorable side effect profile, does not risk disease transmission from an animal or human source, and avoids the theoretical risks of long lasting solid particles. Restylane is the most popular FDA-approved, non-animal derived hyaluronic acid injectable filler. It is produced from *Streptococci* by bacterial fermentation and undergoes cross-linking to increase its resistance to enzymatic degradation. The FDA approved **Restylane** in December 2003 for use in mid to deep dermal implantation for the correction of rhytids,

and it approved Perlane in May 2007. Both products have been available in Europe since 1996. Restylane is distributed in 1.0 cc and 0.4 cc syringes, and Perlane is distributed in 1.0 cc syringes. Neither product contains any local anesthetic. Although this necessitates topical and / or local anesthesia, it also eliminates the need for overcorrection. One mL of Restylane contains 100,000 gel particles, and one mL of Perlane contains 10,000 particles. Medicis has one other hyaluronic acid product that is not yet FDA approved: Restylane Fine Lines or Restylane Touch (500,000 gel particles/mL) for superficial rhytids. Restylane<sup>2</sup> and Perlane<sup>3</sup> have each been shown to provide longer lasting nasolabial fold correction with lower injection volumes than Zyplast. **Juvederm® Ultra and Juvederm® Ultra Plus** (Allergan) NASHA were approved by the FDA in mid 2006. These products are hyaluronic acid in a monophasic gel rather than particle-suspension formulation. **Prevelle Silk** (Mentor) is combined NASHA and lidocaine product that does not require anesthetic gel, lasts about 3 months, and may be a good choice for patients with poor pain tolerance or new patients. **Hylaform** (Allergan) is an FDA-approved hyaluronic that lasts only as long as Zyplast. It is derived from rooster combs, and therefore has a theoretical risk of disease transmission.

Other choices in injectable fillers include long-lasting filler / stimulator **Radiesse** (Bioform Medical, San Mateo, CA), permanent-filler / stimulator **Artefill** (Artes Medical, San Diego, CA), and long-lasting stimulator **Sculptra** (Dermik Laboratories, Berwyn, PA). Radiesse is composed of calcium hydroxylapatite (30% by volume) in glycerin and carboxymethylcellulose. It was FDA approved as a dermal filler in 12/06. Artefill is a suspension of non-resorbable polymethylmethacrylate microspheres (20% by volume) in 3.5% denatured bovine collagen that received FDA approval in 10/06. Sculptra is poly-L-lactic acid that must be constituted with sterile water at least 2 hours before injection and then used within 72 hours. Sculptra is FDA approved for treating HIV associated lipoatrophy. Poly-L-lactic acid fillers have been associated with granuloma formation.<sup>4</sup> Several versions of injectable human cadaver tissue have been used as well (Dermologen, Cymetra, and Fascian). Cadaver-derived products carry a theoretical risk of disease transmission. Injecting different fillers into different layers of the skin may allow one to combine the strengths of various fillers. However, the causative filler for any arising complication will be difficult to identify.

### ***3. Medical Legal Risks and the FDA***

---

Physicians must consider the possible legal implications of using fillers for off label applications. Although there are many other fillers not yet FDA approved but available in other nations, it is important to note that it is illegal for a physician to import a non-approved drug from another country. However, it is permissible for physicians to use an FDA-approved drug “off-label” for any condition within the doctor-patient relationship.

### ***4. Marketing***

---

Marketing for fillers can be inexpensive or complex. A simple, inexpensive starting point is to have in-office visibility for filler services, photo albums and visuals, employee education and training, and pricing information all clearly apparent to one’s existing patient population. (Table 2).

**Table 2: Source of 286 Filler Patients in Nine ASOPRS Practices**

---

<u>Percentage</u>	<u>Source</u>
45%	Existing Botox patients
18%	Existing non-Botox patients
14%	Word of mouth
13%	New Patients for other reasons
10%	Other sources (internet, ads, news, physician/OD referral)

---

## **5. Injection Basics**

---

Unless medically contraindicated, aspirin, NSAIDS, and other blood thinning agents should be discontinued prior to injection. History, physical examination, and patient counseling must be performed and informed consent obtained prior to injection. It is imperative to remove any makeup from any injection site. Depending upon the area, the physician may choose topical or local anesthesia, or both in combination. After removal of any topical anesthetic, a thorough cleaning with antiseptic (e.g., alcohol, Betadine, etc.) must be performed before injection. Ice may also be used for anesthetic effect: An ice cube is placed over the intended needle entry and treatment site for five to ten seconds prior to injection. The label from the syringe should be removed and placed in the patient's chart for traceability.

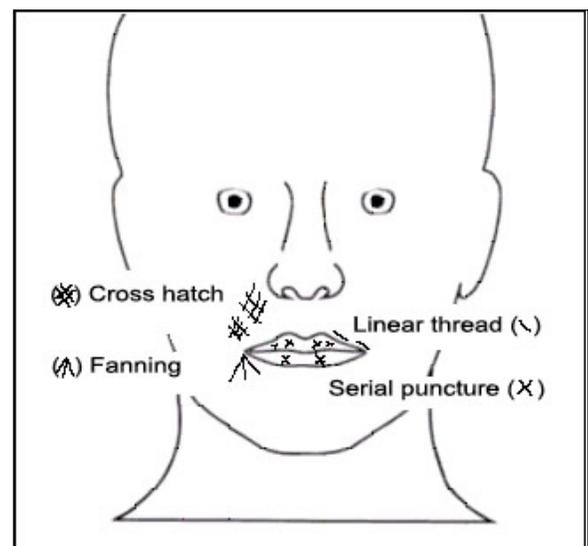
Proper injection depth and technique are filler-specific and highly dependent upon particle size and longevity. Permanent and long-lasting fillers and stimulators are usually injected beneath the dermis (intradermal injection is likely produce nodules and other complications). Permanent fillers are less forgiving with regards to delivery technique and are generally laid down as "threads" to avoid lumps or clumping.

A much more forgiving filler that is less likely to result in complications is hyaluronic acid. For most applications, Restylane and other mid sized hyaluronic acid particles should be injected at the mid dermal level. Smaller particles should be injected into the superficial dermis, and larger particles into the deep dermis or superficial subcutis.

## **6. The Five Basic Filler Injection techniques:**

---

**Push-ahead technique (PA).** The needle tip is advanced while depressing the plunger to dissect ahead of the tip, and moving blood vessels out of the way. Once mastered, this is an especially useful method for the vermillion border, and may reduce



bruising in other facial areas. Can be incorporated into the LT technique with experience.

**Linear Threading technique (LT):** The needle tip is continually advanced. During withdrawal, the plunger is depressed in order to deposit filler whenever the needle tip is at the desired depth and location. In the lip mucosa the tip is advanced submucosally and the filler will hydrodissect and spread across the submucosal plane.

**Serial Puncture technique:** The injection technique most commonly used by new injectors. Multiple pinprick aliquots of filler are deposited at the appropriate depth, allowing precise placement. Usually an adjunct technique to complete or “touch-up” areas already filled using other techniques. This technique requires multiple needle sticks.

**Cross-hatching technique:** Parallel rows of deposits are placed using PA or LT, and then a perpendicular second set of rows are placed, sometimes at the same depth, thus creating a grid pattern. This is a workhorse technique for the nasolabial folds.

**Fanning technique:** Through a single entry site, multiple radial linear deposits are placed. This is useful for the angulation and depression below the outer angles of the lips. (Ref: Skin Therapy)

## ***7. Injection sites***

---

**Nasolabial folds:** The approved site for Restylane/Perlane injection is the nasolabial folds. Most patients will tolerate nasolabial fold injections with topical anesthesia, but many require an infraorbital nerve block. This is usually accomplished by the injection of 0.5 cc of lidocaine 2% with or without epinephrine into the area of each infraorbital nerve via the mucosa of the superior gingival sulcus in the plane of the third tooth. We recommend beginning with a fanning technique to treat the superior portion of the nasolabial folds, up to the nasal ala. The needle is inserted into the mid dermal plane of the nasolabial fold and advanced toward the nose to deposit threads in several radial lines originating from the insertion point. The superior fan component is in the area of the folds, and the subsequent threads fan inferomedially. Linear threading is then used along the inferior portion of the nasolabial fold, taking care to leave a smooth transition between the superior fan and the inferior section of linear threading. Supplemental correction by cross hatching across the fold may then be performed. Excessive injection lateral to the fold may accentuate it. Massage may be performed to smooth out any irregularities. Although we have used up to 3 cc of Restylane in the nasolabial folds, a typical patient will require about 1-2 cc of Restylane/Perlane for nasolabial fold correction.

**Lips:** Although some patients may tolerate lip enhancement under topical anesthesia, most will require mental and infraorbital nerve blocks<sup>5</sup>. These may be accomplished by the injection of lidocaine 2% with epinephrine 1:200,000 into the mucosa of the gingival sulcus, in the plane of the third tooth from the midline. Each of these four sites should

receive an injection of 0.5 – 1.0 cc. Lidocaine 2% without epinephrine may be used to decrease the duration of the block. The administration of a block will distort the lips slightly, so it is necessary to note any asymmetry between sides before the block is administered. It is also crucial to observe the vertical height of the upper lip in comparison to the lower lip. In general, the ideal lower lip is slightly larger and fuller than the upper lip. During injection, it is essential to monitor the amount injected in each side and palpate the lips during the injection to assure symmetry. To define the lip border, linear threading may be performed along the vermillion border. This injection is in the virtual plane between the vermillion and the orbicularis. Excessive volume placement into the upper vermillion border may give an unnatural, duckbill-like appearance. Injection into the wet dry junction and between the junction and vermillion will increase the volume of the upper and lower lips. This is done with a series of linear threads (usually about six for the upper lip or four to five for the lower lip). The push-ahead technique is particularly useful in the lips to decrease bruising and swelling. Adequate volume restoration in the lips will produce improvement in “smoker’s lines”, the radial lines in the skin perpendicular to the lips. Caution should be used in directly filling smoker’s lines with Restylane, as overfilling and lumpiness may result. Filler materials with smaller particle size are better suited for smoker’s lines. We find that many patients are not amenable to the appearance produced by filling the philtral columns from the nose to the upper lip. During injection, any palpable lumps should be massaged. However, excessive massaging of the lips will increase post injection swelling. The typical patient will require 1 cc or less of Restylane to fill the lips. One can only fill lips to a given volume, since beyond a certain point the lips will no longer fill smoothly with filler, and further injection will only create a lumpy distended appearance. We recommend antiviral prophylaxis for lip injections in patients with a history of oral herpes simplex virus. Active herpetic infection at the site is a contraindication to injection.

**Melolabial folds:** The melolabial folds, or marionette lines, are often treated at the time of nasolabial fold injection. If a block is used for the nasolabial fold injection, it will not provide adequate anesthesia to the melolabial folds. These folds should be treated with topical anesthesia. We recommend a fanning technique beginning at the oral commissure and extending inferiorly along the folds. Full correction of this area is difficult to obtain, and it is easy to overfill and leave lumps. In the average patient, roughly 0.5 cc of Restylane is used to treat this area.<sup>5</sup> Perlane may be used for deep folds.

**Glabella:** The glabella is injected under topical anesthesia. Mid dermal linear threading is our preferred technique. The glabella is an injection site that should be reserved for experienced injectors. Filler injection into the glabella has been associated with localized necrosis and with blindness due to retrograde arterial injection and subsequent central retinal artery occlusion. Extreme caution must be exercised to ensure that the injection is placed within the dermis. It is important to aspirate before injecting to confirm that the needle is not in a vessel. Continuing to move the needle during injection and avoiding excessive pressure on the plunger of the syringe will help to avoid prolonged or forceful retrograde intra-arterial injection. The glabellar lines are usually best filled by linear threading of approximately 0.3 cc of Restylane.<sup>5</sup> Botulinum toxin injection has been shown to increase the duration of effect of Restylane in the glabella.<sup>6</sup>

**The tear trough:** With aging, the orbital septum weakens and allows prolapse of the lower lid fat pads. Descent of suborbicularis oculi fat (SOOF) and orbicularis muscle also occur over time, exposing the orbital rim. Lower lid fat prolapse and midface descent combine to produce a double bubble appearance. This is also referred to as the nasojugal fold, or tear trough. Tear trough injections are gaining popularity as an alternative to lower lid blepharoplasty in young patients. Restylane can usually be injected into the tear trough with topical anesthesia supplemented by ice. Some patients may require an infraorbital nerve block. We recommend the injection of Restylane in the suborbicularis plane, using the push-ahead technique. Because the eyelid skin is extremely thin, great care must be taken to inject deep beneath the orbicularis muscle with each pass to avoid superficial beading or a blue tint to the skin. To avoid injury to the eye, care should be taken to assure that the needle is attached tightly to the syringe, and the needle should be pointed away from the globe. A typical patient will require a total of about 0.5 cc of Restylane for tear trough correction.

**Restylane brow augmentation:** With aging, soft tissue atrophy and bone resorption in the brow contribute to brow ptosis. Surgical brow lifts alone are two dimensional and do not address this component of brow descent. Carruthers and Carruthers describe a technique for elevating the brow by injection of Restylane.<sup>7</sup> They recommend use of the push ahead technique to inject Restylane into the subdermal space, from the tail of the brow to the supraorbital notch. With this method, 0.2 cc are injected via the push-ahead technique from the tail of the brow in the medial direction, deep to the eyebrow. This is followed by the injection of 0.1 to 0.2 cc in push-ahead fashion medial to the first injection. Care must be taken to avoid injecting the supraorbital artery.

## ***8. Endpoints for Clinical Injection of Filler***

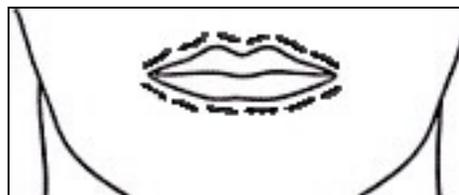
---

Clinical endpoints for treatment vary by product. Some require overfill and others such as NASHA require a neutral fill – see Table below. Visible tissue **blanching** indicates that the capillary perfusion has been interrupted and one should stop injecting in that area immediately. Mere grayish pallor is unlikely to create problems, but one should be wary of areas that turn a “chalky” white color. Areas of blanching during injection should “pink up” promptly with gentle massage and rubbing.

### **Table: NASHA Injection Endpoint**

---

Full Correction  
 Desired Contour  
 Volume injected  
 Slight overcorrection  
 Beading  
 Lumpiness  
 Extrusion




---

Endpoints are listed from most to least useful.

## **9. Routine Aftercare**

---

Patients are advised to avoid manipulating the filled area. Ice can be used to decrease postoperative discomfort and swelling. Those with a history of oral herpes simplex virus are placed on antiviral prophylaxis postoperatively. Patients should be instructed to call for excessive swelling, redness, pain or itching, signs of necrosis, or persistent bumps.

## **10. Complications**

---

In 1999, the protein content of Restylane and Perlane was reduced six-fold, and the strain of bacteria used for fermentation was changed. Since then, the incidence of complications has decreased. One study found a complication rate of 0.6% in 2000 after injection of these products.<sup>8</sup> **Bruising** is a common complication that may be lessened by discontinuing medications with anticoagulant properties, pre-treating with ice, practicing careful technique, injecting slowly, and applying ice or pressure to areas that begin to bruise during injection. Bruises may be covered with concealer. Pain after injection may last for several days, and is associated with movement of the perioral muscles. Usually it responds to acetaminophen. Swelling is a common side effect, but may be severe in cases of lip injections.<sup>9</sup> If severe lip edema occurs, it should be treated with an oral prednisone taper and oral antiviral prophylaxis.

**Telangiectasias** may result from the injection of any product into patients with existing Telangiectasias. **Bluish discoloration** of the skin (Tindall effect) is an optical effect due to superficial injection of hyaluronic acid. Persistent redness in all treated areas may be a reaction to the hyaluronic acid, and can be treated with concealers. Local steroid injection or excision may be options if redness persists. Superficial injection of an opaque filler such as collagen may be used to mask the Tindall effect.

**Nodularity** or beading is most commonly due to improper injection. It may be treated by massage of the product, incision and drainage with an 18-gauge needle, or enzymatic degradation by hyaluronidase.<sup>10</sup> Erythematous or fluctuant nodules in the early post treatment course could be due to **bacterial infection** by gram-positive skin flora, and should be treated accordingly. Artecoll nodules respond to steroid injection. Kenalog 3mg/ml solution may be injected into Sculptra, Radiesse, or Artefill nodules.

**Late onset erythema** (2 weeks after injection) accompanied by tender bumps may be the result of mycobacterial infection. Narins et al recommend empirical treatment with clarithromycin 500 mg PO BID for two weeks, followed by intralesional triamcinolone 2.5 mg/mL at 3-4 week intervals. Incision and drainage is recommended for lesions that do not respond to the above regimen.<sup>11</sup> Herpetic outbreaks of the lips necessitate therapeutic dose oral antiviral therapy.

**Superficial necrosis** (most commonly seen in the glabella) is thought to be due to compression (after overfilling or bleeding), vascular obstruction due to intravascular filler injection, or direct vascular injury.<sup>12</sup> Initially, painless blanching is noted, followed by blackening of the skin over several days. An ulcer covered by an eschar then develops<sup>13</sup>.

Narins et al recommend treatment protocols for necrosis due to intradermal bleeding (a slow, painless process) and due to arterial occlusion (immediate blanching with severe pain). In the case of intradermal bleeding, they recommend cessation of the injection and holding pressure against the area until the bleeding stops. Injection should be postponed until the tissue is soft. For darkening of mucosal skin, they recommend drainage of the hematoma. Ice may also be used in either case. In the event of necrosis due to arterial occlusion, immediate cessation of injection generally leads to resolution of the occlusion. If necessary, massage can be employed, and will usually lead to rebound hyperemia. Warm compresses and the application of 2% nitroglycerin paste may be a useful adjunct.<sup>10</sup> Hyaluronidase injection to dissolve hyaluronic acid and low molecular weight heparin may be used as a last resort.

**Central retinal arterial occlusion** or ophthalmic artery occlusion have been reported after glabellar injection of Zyderm II,<sup>14,15</sup> autologous fat,<sup>16,17</sup> and polymethylmethacrylate spheres.<sup>18</sup> Recently, retinal branch artery occlusion was reported after injection of Restylane into the glabella and cheek.<sup>19</sup> Once retinal vascular occlusion has occurred, immediate treatment should be initiated to attempt to dislodge the embolus distally in an attempt to restore some perfusion. Visual loss may become permanent as quickly as 90 minutes after occlusion of the central retinal artery. We recommend ocular massage with intraocular pressure lowering agents, followed by paracentesis. The prognosis for recovery of vision after retinal arterial occlusion is poor. Further discussion of fillers and their complications may be found in the useful review by Carruthers (19).

## ***11. Filler Summary***

---

In our opinion, NASHA are currently the most flexible, most useful, and lowest-risk of the available FDA-approved filler materials. This discussion is not a complete guide to injecting, but rather an introduction to hyaluronic acid and various techniques. There are many other body sites where fillers may be injected, but we have included those sites that ophthalmologists are most likely to treat.

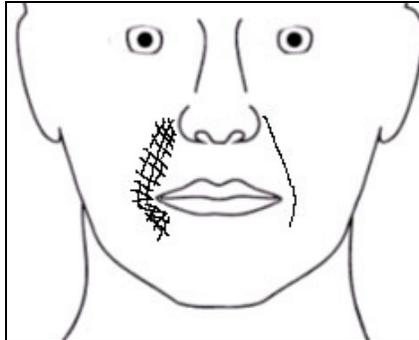
## REFERENCES

---

1. Wang F, Garza LA, Kang S: In vivo stimulation of de novo collagen production caused by cross-linked hyaluronic acid dermal filler injections in photodamaged human skin. *Arch Dermatol* 2007, 143(2):155-63.
2. Narins RS, Brandt FB, Leyden J, et al: A randomized, double-blind, multicenter comparison of the efficacy and tolerability of Restylane versus Zyplast for the correction of nasolabial folds. *Dermatol Surg* 2003;29:588-95.
3. Lindqvist C, Tveten S, Bondevik BE, Fagrell D: A randomized, evaluator-blind, multicenter comparison of the efficacy and tolerability of Perlane versus Zyplast in the correction of nasolabial folds. *Plast Reconstr Surg* 2005;115:282-89.
4. Beljaards RC, de Roos, K, Bruins FG: NewFill for skin augmentation: A new filler or failure? *Dermatol Surg* 2005;31:772-76.
5. McCracken MS, Khan JA, Wulc AE: Hyaluronic acid gel (Restylane) filler for facial rhytids: lessons learned from American Society of Ophthalmic Plastic and Reconstructive Surgery member treatment of 286 patients. *Ophthal Plast Reconstr Surg* 2006;22(3):188-91.
6. Carruthers J, Carruthers A: A prospective, randomized, parallel group study analyzing the effect of BTX-A (Botox) and nonanimal sourced hyaluronic acid (NASHA, Restylane) in combination compared with NASHA (Restylane) alone in severe glabellar rhytides in adult female subjects: treatment of severe glabellar rhytides with a hyaluronic acid derivative compared with the derivative and BTX-A. *Dermatol Surg* 2003;29:802-9.
7. Carruthers JDA, Carruthers A: Facial Sculpting and tissue augmentation. *Dermatol Surg* 2005;31:1604-12.
8. Friedman PM, Mafong EA, Kauvar AN, Geronemus RG. Safety data of injectable nonanimal stabilized hyaluronic acid gel for soft tissue augmentation. *J Dermatol Surg* 2002;28:491-94.
9. Leonhardt JM, Lawrence N, Rarins RS: Angioedema acute hypersensitivity reaction to injectable hyaluronic acid. *Dermatol Surg* 2005;31:577-579.
10. Soprarkar CN, Patrinely JR, Tschien J: Erasing Restylane. *Ophthal Plast Reconstr Surg* 2004;20(4):317-18.
11. Narins RS, Jewell M, Rubin M et al: Clinical conference: management of rare events following dermal fillers – focal necrosis and angry red bumps. *Dermatol Surg* 2006;32:426-434.
12. Schanz S, Schippert W, Ulmer A et al: Arterial embolization caused by injection of hyaluronic acid (Restylane). *Br J Dermatol* 2002;146:928-9.
13. Glaich AS, Cohen JL, Goldberg LH: Injection necrosis of the glabella: protocol for prevention and treatment after use of dermal fillers. *Dermatol Surg* 2006;32:276-81.
14. Hanke CW, Higley HR, Jolivet DM et al: Abscess formation and local necrosis after treatment with Zyderm or Zyplast collagen implant. *J Am Acad Dermatol* 1991;25:319-26.
15. Hanke CW. Adverse reactions to bovine collagen. In: Klein A, editor. *Augmentation in clinical practice: procedures and techniques*. New York: Marcel Dekker; 1998. 237-63.
16. Dreizen NG, Framm L: Sudden unilateral visual loss after autologous fat injection into the glabellar area. *Am J Ophthalmol* 1989;24:615-16.
17. Moon SY, Chang GY: A complication of cosmetic surgery. *N Engl J Med* 2004;350:1549.
18. Silva MT, Curi AL: Blindness and total ophthalmoplegia after aesthetic polymethylmethacrylate injection: case report. *Arq Neuropsiquiatr* 2004;62:873-74.
19. Peter S, Mennel S: Retinal branch artery occlusion following injection of hyaluronic acid (Restylane). *Clin Experiment Ophthalmol* 2006;34(4):363-4.
20. Carruthers JE: Review of Long-Lasting Derma Fillers. *Aesthetic Buyers Guide* (Suppl) 2006; 2 (1):1-26.

Part 3 (12 pp) : Botulinum Toxin and Fillers AAO Skills Transfer  
Laboratory

Senior Instructor: Jemshed A. Khan, M.D.<sup>1</sup>



<sup>1</sup>Khan Eyelid and Facial Plastic Surgery, Overland Park, KS  
[www.kface.com](http://www.kface.com)

INSTRUCTORS 2009

Gary Borodic, Dawn Buckingham, Cat Burkat, Christopher DeBacker, Kathleen Duerkson, Craig Geist, Yanni Glavas, Morris Hartstein, Ronald Kristen, Dale Meyer, Asa Morton, Janet Neigel, Rona Silkiss, Charles Slonim, Julie Woodward.

**General comments**

1. Welcome to the lab.
2. Introduction of instructors.
3. Please use precautions against any needle or sharps injuries. Treat the cadavers with professional respect and dignity.
4. You are here to learn techniques for Botulinum A injection and NASHA filler injections. Even after this course, it will be well worthwhile to perform supervised live injections. These can often be arranged through the local product representative.
5. Feel free to wander and observe others and ask questions, but do not miss your chance for supervised instruction. Expect instructors to differ in techniques.

For the downloadable color version pdf of this handout or downloadable video, see  
<http://web.mac.com/aeionic/iWeb/Site/Welcome.html>

Some of the material in this handout has been reprinted with permission from Color Atlas of Cosmetic Oculofacial Surgery, Chen WD, Khan KA, McCord C, 2004, Elsevier Press.

Skills Transfer Course outline: **Botulinum Toxin 20 minutes: NASHA 40 minutes**

See one site:

Do one site.

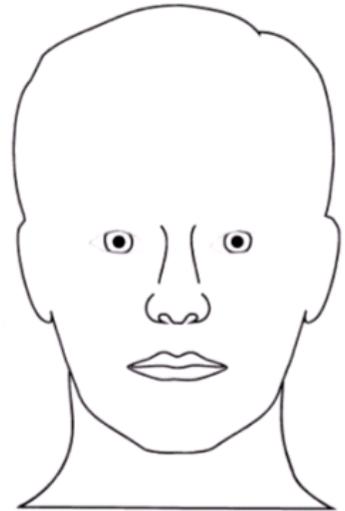
Instructor first.

Continue through all four sites

Refer back to Lecture notes for complete discussion

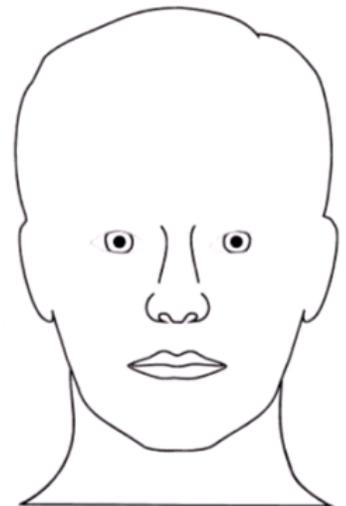
1. Botulinum toxin preparation

- a. Supplies: drug vial, 30g 0.5” syringe, alcohol wipe, needles, ice
- b. Vial refrigeration and dose (100u)
- c. Break vacuum and add saline 2.1 mL
- d. Withdraw appropriate dose
  - i. Glabella 25u (0.5 mL)
  - ii. Crow’s feet 15u/side (0.6 mL)
  - iii. Forehead 15u (your turn to calculate)
  - iv. Labial angle depressors 10u (capiche?)



2. Injection Technique

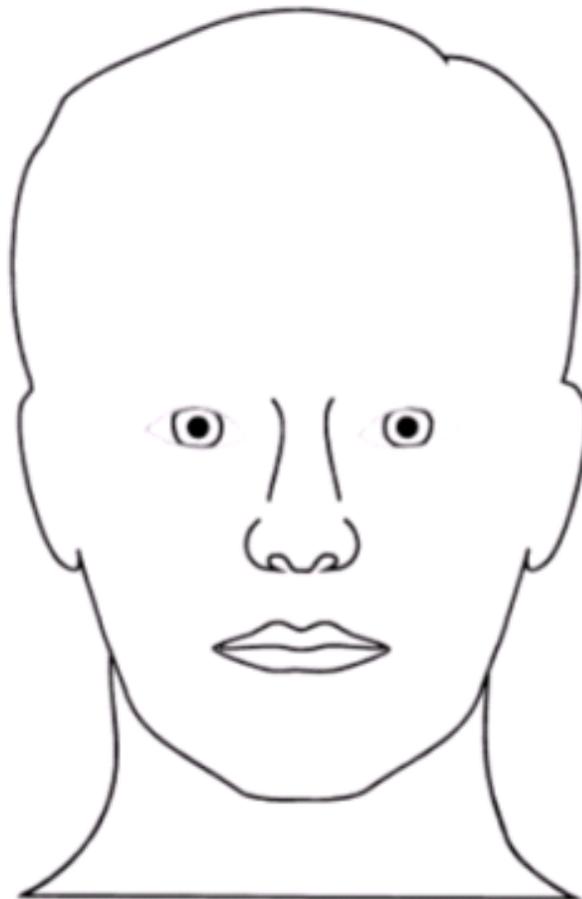
- a. Consider topical anesthetic gel
- b. Alcohol skin wipe
- c. Holding the needle to view metered markings
- d. Steady hand technique
- e. Counter-traction
- f. Effect of needle entry angle
- g. Injection depth
  - i. Subdermal: Crow’s-feet and forehead
  - ii. Intramuscular or deep: Labial depressors and glabella



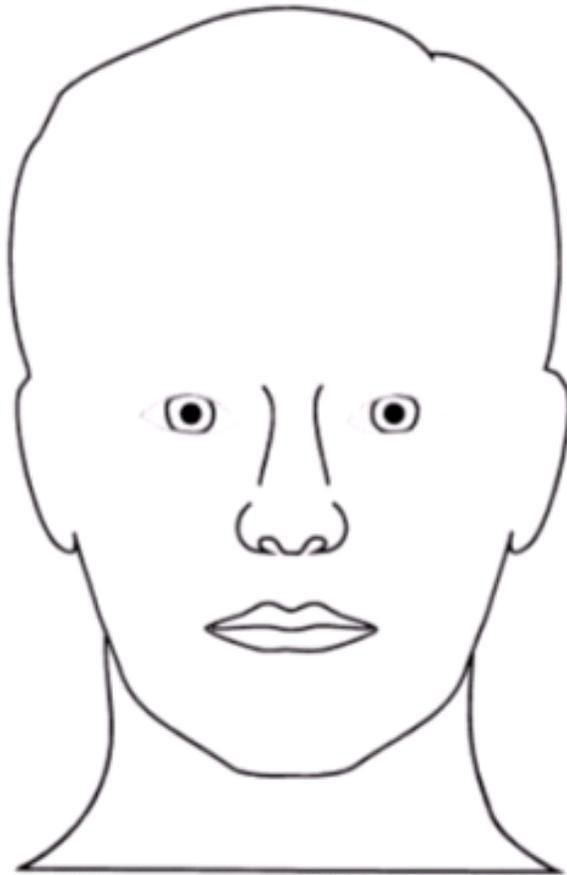
3. Site specifics:

- a. Glabella – 3 to 5 sites. 5u per site
  - i. Palpate supraorbital notch to avoid nerves & vessels
  - ii. Needle entry at 45 degrees (reduces bleeding)
  - iii. Inject superior to upper brow border
  - iv. Inject deep medial to notch into each rhytid #1, #2 (corrugator)
  - v. Inject deep Lateral to #1 and #2 (corrugator)
  - vi. Inject the midline procerus at intercanthal height or superior

- b. Crow's-feet 3 sites per side. 3-4 units per site.
  - i. Nearly tangential needle entry 25 degrees
  - ii. Barely subdermal injection
  - iii. At lateral orbital rim or mid-rhytid
  - iv. About 1-1.5 cm apart
  - v. Immediate pressure
- c. Forehead: 3 – 7 sites. Total dose usually 15 – 20u
  - i. Dose and sites vary with forehead anatomy and size
  - ii. Steep needle entry
  - iii. Inject subdermal
  - iv. Try not to dull the needle against periosteum
  - v. Stay mid forehead or higher
  - vi. Learn to touch up the “Spock” eyebrow with 5u
- d. Labial depressors: 5u each side
  - i. Locate lateral oral commissure
  - ii. Steep needle entry
  - iii. 2/3 way down to chin
  - iv. Subdermal injection 5u

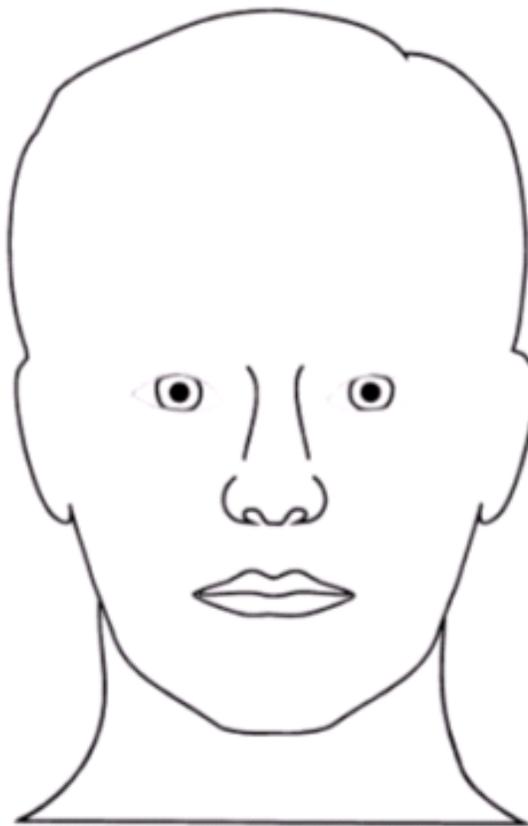


4. Aftercare:
  - a. Immediate pressure
  - b. Possibly ice
  - c. Document injection sites
5. Finer points/advanced techniques: Ask your instructor

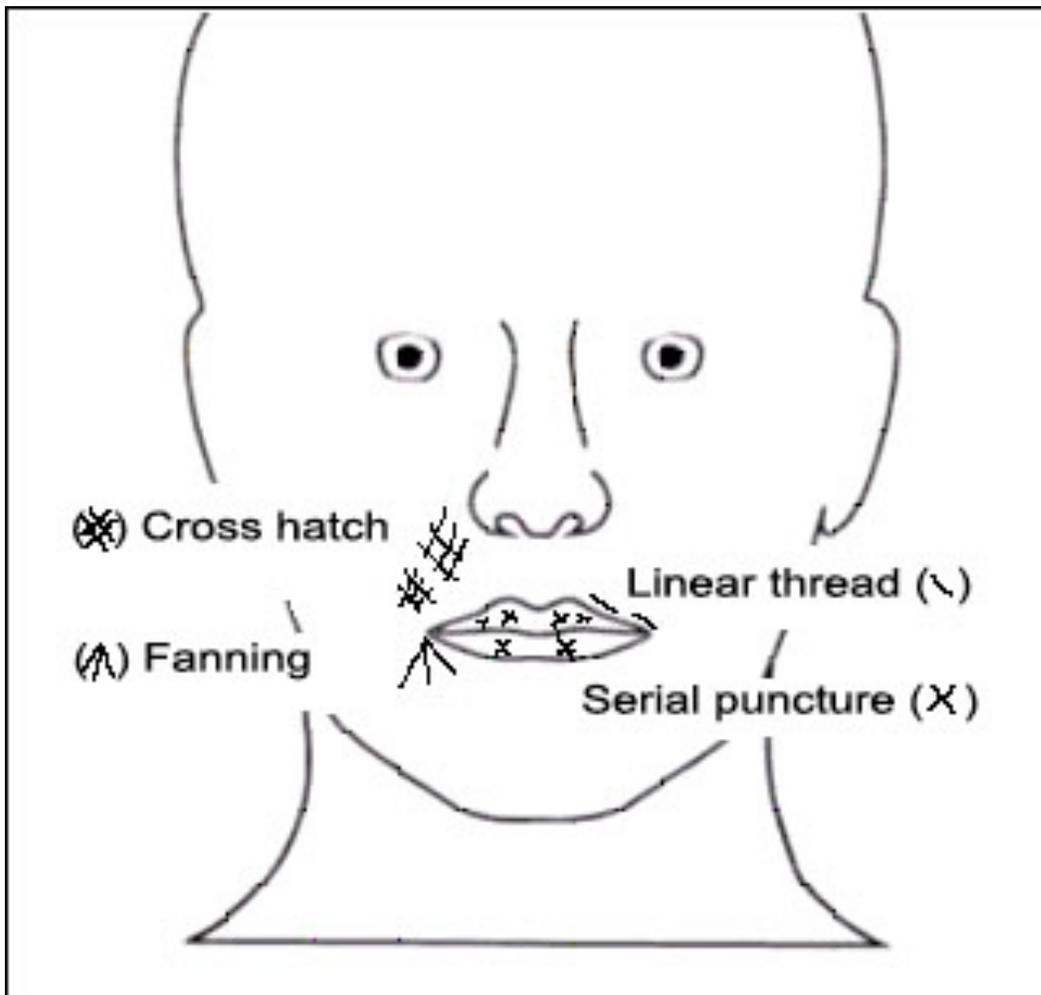


NASHA: 40 minutes

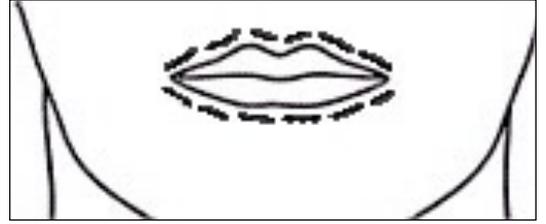
1. Identify and discuss plan for treatment sites:
  - a. Nasolabial folds
  - b. Melolabial folds (marionette lines)
  - c. Vermillion
  - d. Lip volume
  - e. Glabella
2. Discuss volumes and techniques for each site
3. Perform block of mental and infraorbital nerves
  - a. 3 mL syringe, 1 inch 27g.-30g needle
  - b. lidocaine 2% with epinephrine 1:200,000
  - c. balloon the mucosa of the gingival sulcus
  - d. In the plane of the third tooth from the midline
  - e. corresponds to the infraorbital nerve superiorly and the mental nerve inferiorly
  - f. 0.5 – 1.0 ml total at each site
  - g. 0.3 – 0.5 mL submucosal, then advance needle in direction of neurovascular bundle



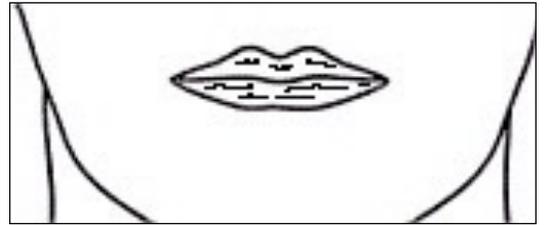
4. Product packaging and assembly
  - a. Read package insert
  - b. Correct needle hub attachment without product leakage
5. Practice technique on open cheek area-but conserve product!
  - a. Practice depth-instructor demonstration first!
    - i. Traction and countertraction if possible (See photos)
    - ii. Too deep
    - iii. Too shallow
    - iv. Just Right – Superficial to Mid-dermis for NASHA
  - b. Practice fill-techniques-instructor demonstration first!
    - i. Serial puncture
    - ii. Push ahead
    - iii. Linear threading
    - iv. Cross hatching
    - v. Fanning



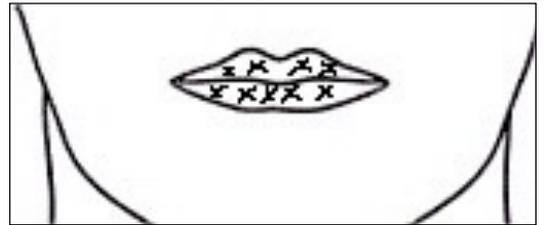
6. Treat Vermillion (See figures)
  - a. Correct plane
  - b. Push ahead
  - c. six injections for upper lip
  - d. four to five injections for lower lip



7. Augment lip volume
  - a. Push ahead submucosal method vs Depot volume augmentation method
  - b. Outer angle augmentation
  - c. Check for palpable nodules
  - d. Submucosal method to augment lip volume: Inject tangentially, superficially, just submucosal with push ahead linear technique.

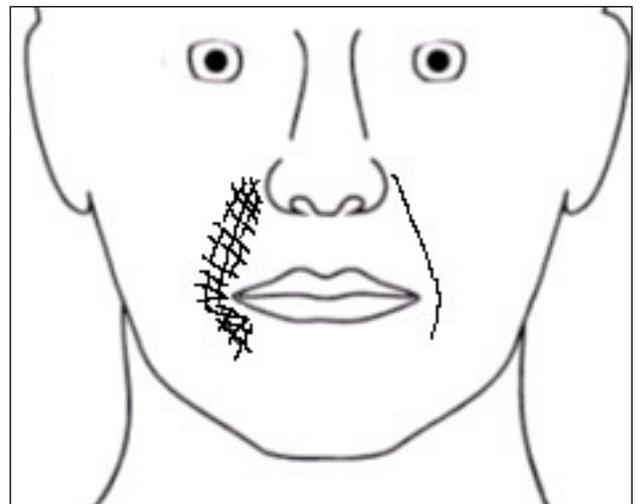


- e. Depot method: Enter cutaneously 3 mm away from vermilion border, advance vertically until needle tip tents labial mucosa, then inject depot.

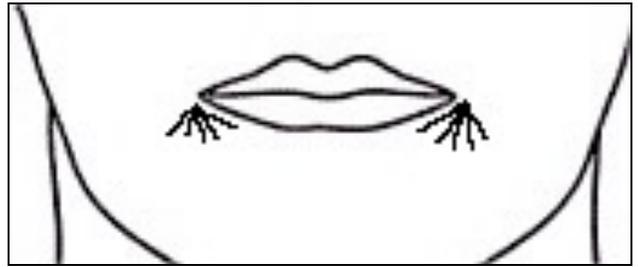


8. Glabella
  - a. Push ahead or linear threading
  - b. Avoid high pressure injection-necrosis

9. Nasolabial folds (See figures)
  - a. Multiple techniques
  - b. Larger volumes



10. Melolabial folds (marionette lines)
- a. Difficult to fill
  - b. Fanning technique
  - c. Correct jowling along chin border



11. Create deliberate lip nodule
- a. Compress it out

12. Optional if time
- a. mental crease
  - b. jowling
  - c. Enhance malar cheek bones
  - d. Tear trough area

13. Document treatment

BOTOX Treatment Record

Patient name: \_\_\_\_\_ Dx: BEB / Hemifacial spasm / Cosmetic / \_\_\_\_\_

Date \_\_\_\_\_  
Pt comments: \_\_\_\_\_

CC: Spasms returning  
Cosmetic

U Given    Discard    Share  
Notes: \_\_\_\_\_

RTC  
Signed: \_\_\_\_\_

A simple line drawing of a human face from the front, used for marking treatment areas. It shows the eyes, nose, mouth, and jawline.



Note traction and countertraction to keep skin taught during needle entry

Parallel linear thread depositions



A second set of perpendicular linear depositions create cross-hatching

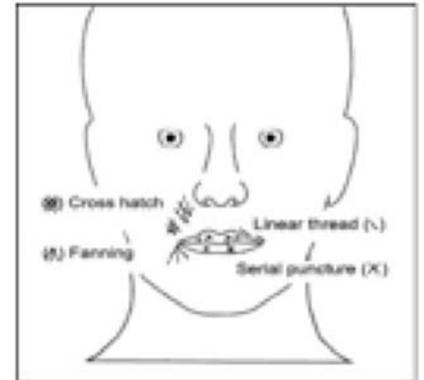
Rolling to smooth product dispersion and reduce nodules



## Lips and Vermillion



Injection of product along vermilion border



Continuing along the vermilion with second injection site

Completion of upper lip vermilion augmentation with six injections



Same process for lower lip vermilion

**Before**



**After**



Before and immediately after (with make up and concealer) vermillion border enhancement, lip volume augmentation, and nasolabial fold treatment. Approx 2-3 mL NASHA.

14. Advanced Techniques: Tear trough area
  - a. Difficult area to treat
  - b. Treat deep to orbicularis
  - c. Avoid intravascular injection and risk of blindness
    - i. angular vessels
    - ii. infraorbital vessels
  - d. Multiple minute injections
  - e. Single bolus and massage

Peter S, Mennel S: Retinal branch artery occlusion following injection of hyaluronic acid (Restylane). *Clin Experiment Ophthalmol* 2006;34(4)363-4.

The pdf file for this handout has better image resolution and maybe downloaded from: [kcfac.com](http://kcfac.com) ... "physician handouts" or at this link [http://kcfac.com/tiny\\_mce\\_uploads/AAO\\_2009\\_Botox\\_Fillers\\_TEMP\\_Handout.pdf](http://kcfac.com/tiny_mce_uploads/AAO_2009_Botox_Fillers_TEMP_Handout.pdf)

## Supplies and suppliers

Botulinum needle and syringe: 1.0 ml insulin syringe with integral 30g ½ inch needle (BD# 30931) <http://www.bd.com/products/>

Radiesse 27g 1 ¼ needle (B-D #305136)  
<http://www.bd.com/products/>

BOTOX®: Allergan Inc, <http://www.botox.com/site/>

Radiesse: <http://www.radiesse.com/>

Juvederm, Allergan Inc., <http://www.juvedermcomingsoon.com/>

Restylane is supplied with a 30g needle.

Perlane is supplied with a 27g needle:  
<http://www.restylaneusa.com/>

JJuvederm Ultra comes with a 30-gauge needle

Juvederm Ultra Plus comes with a 27-gauge needle as it is a thicker product

Prevelle Silk: <http://www.mentorcorp.com/global/facial-aesthetics/physician/prevelle.htm>

Photocaine anesthetic gel:  
<http://www.universitypharmacy.com/photocaine.htm>