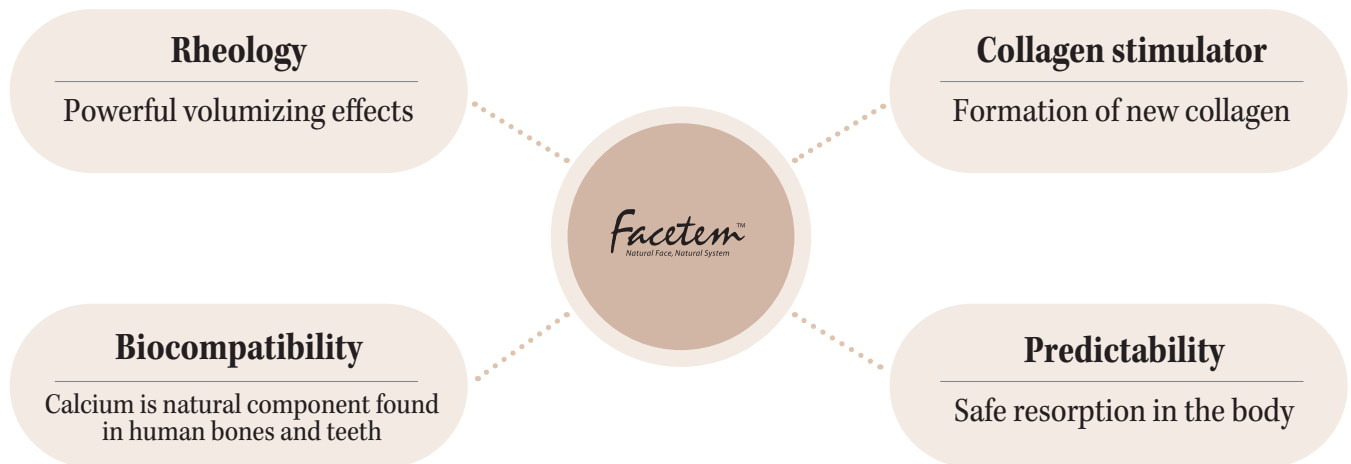


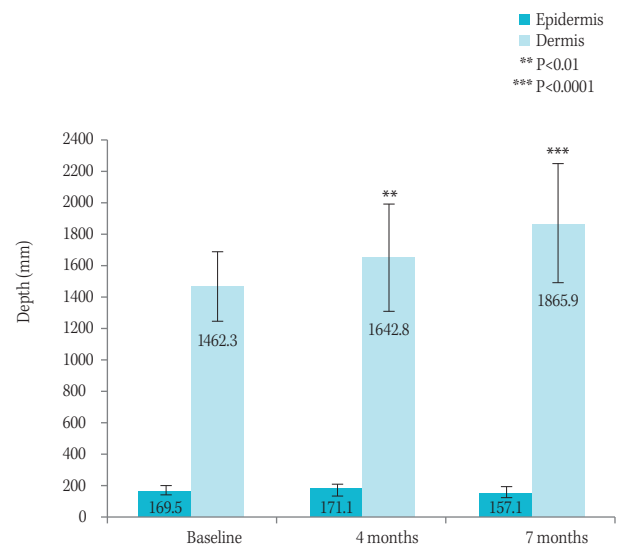
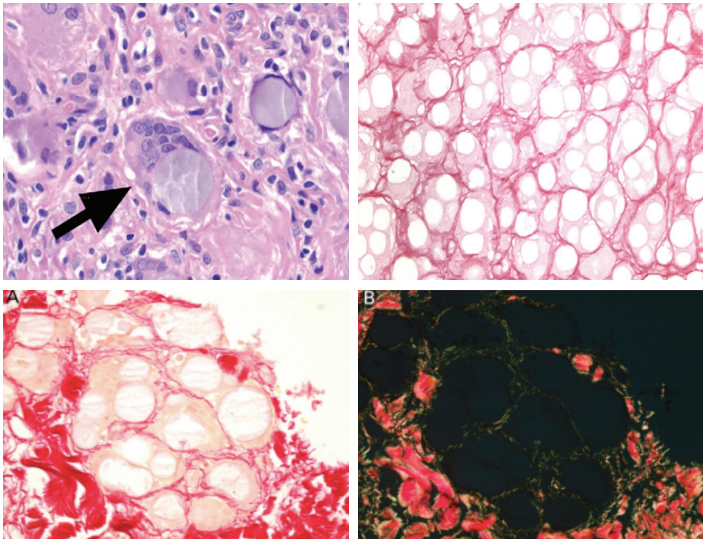


Facetem Double Effects: Volumizing & Collagenesis

Special Features of Facetem



Facetem stimulates skin improvement via new collagen formation



Increase of collagen type I & III

Enhancement of dermal thickness via collagen synthesis

Ref. Facial Plast Surg Clin N Am 2007;15:85-90
Ref. J Drugs Dermatol 2017;16(1):68-74



Facetem Double Effects: Volumizing & Collagenesis

Dilution Guideline for Collagen Stimulation

- It is recommended to conduct 2-3 treatments at 1-2 months intervals.
- The dilution ratio varies depending on the area of application, skin thickness, and degree of sagging.
- The dilution ratio is not proportional to the degree of stimulation of collagen formation.
- Depending on the dilution ratio, 1.5ml of CaHA filler can be injected into 100~300 cm².
- When using a cannula, it is recommended to apply 0.1 to 0.2 ml/site using 25 to 27 G.
- When using a needle, it is recommended to use 27 G or more and apply 0.1 ml / site.
- Diluted CaHA = 1:1, Hyperdiluted CaHA $\geq$ 1:2
- It is recommended to dilute the solution in a sterile environment right before the procedure.
- Use a syringe larger than the total volume of the solution and push the contents back and forth between syringes 20 times.
- Transfer the diluted CaHA solution into original syringe and proceed the injection.
- Inject the solution thinly and evenly targeting the deep dermal or subdermal layers.

Dilution ratio chart

	Facetem	2% lidocaine	N/S	Total volume	Lidocaine conc.
	cc	cc	cc	cc	%
1:1	0.8	0.4	0.4	1.6	0.5
	1.6	0.8	0.8	3.2	0.5
	2.4	1.2	1.2	4.8	0.5
1:2	0.8	0.6	1	2.4	0.5
	1.6	1.2	2	4.8	0.5
	2.4	1.8	3	7.2	0.5
1:3	0.8	0.8	1.6	3.2	0.5
	1.6	1.6	3.2	6.4	0.5
	2.4	2.4	4.8	9.6	0.5
1:4	0.8	0.8	2.4	4	0.4
	1.6	1.6	4.8	8	0.4
	2.4	2.4	7.2	12	0.4

Ref. Plast Reconstr Surg Glob Open 2019;7:e2160
Ref. Dermatol Surg 2018;44:S32-S41

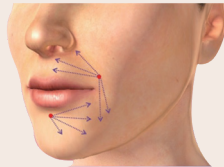


Facetem Double Effects: Volumizing & Collagenesis

Facetem Injection Guide

Injection : Perioral region

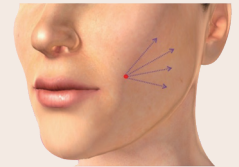
Dilute ratio	Total volume	
1 : 1	3.2cc	
Facetem	2% Lidocaine	N/S
1.6cc	0.8cc	0.8cc
Anesthesia	Size of cannula	
infraorbital, mental n. block	25~27G	



• insertion site
→ cannulation

Injection : Lateral cheek

Dilute ratio	Total volume	
1 : 1	3.2cc	
Facetem	2% Lidocaine	N/S
1.6cc	0.8cc	0.8cc
Anesthesia	Size of cannula	
insertion site only	23~25G	



• insertion site
→ cannulation

Injection : Cheek

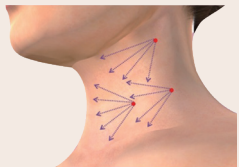
Dilute ratio	Total volume	
1 : 3	6.4cc	
Facetem	2% Lidocaine	N/S
1.6cc	1.6cc	3.2cc
Anesthesia	Size of cannula	
insertion site only	25~27G	



• insertion site
→ cannulation

Injection : Neck

Dilute ratio	Total volume	
1 : 3	6.4cc	
Facetem	2% Lidocaine	N/S
1.6cc	1.6cc	3.2cc
Anesthesia	Size of cannula	
transverse cervical n. block	25~27G	



• insertion site
→ cannulation

Adverse Events

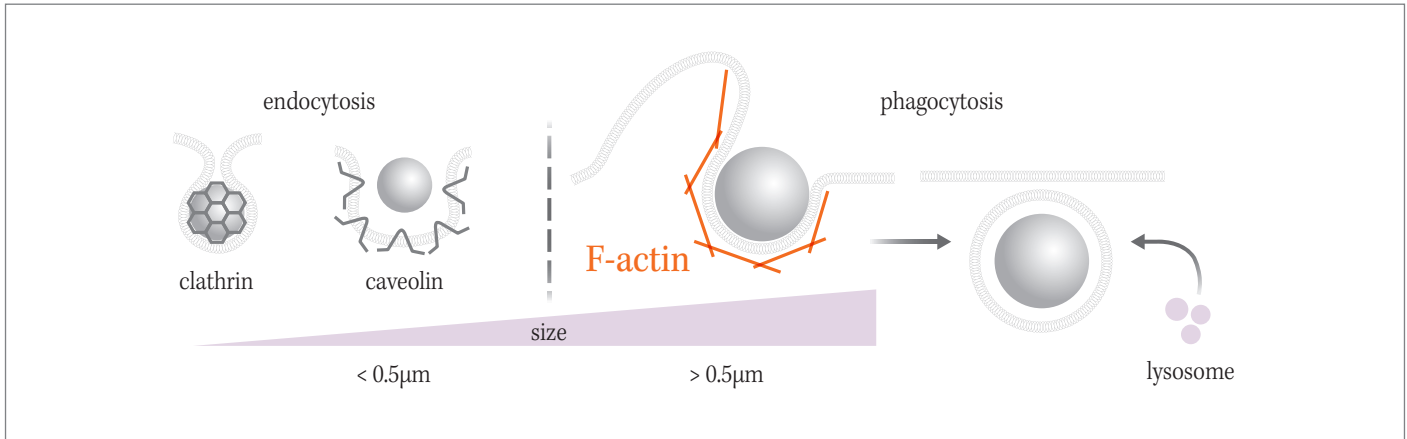
- Most mild adverse reactions disappear within 14 days.
 - Reaction in the injection site
 - Swelling
 - Pain
 - Nodule
 - Erythema
- CaHA filler is a safe material with the lowest probability of granuloma formation.

Prevention of Adverse Events

- **Contraindication:** Don't inject in the area around the eyes and into lips
- **Sterility:** Conduct the procedure in a sterile environment to avoid infection
- **Safe procedure:** Conform the injection layer and injection volume

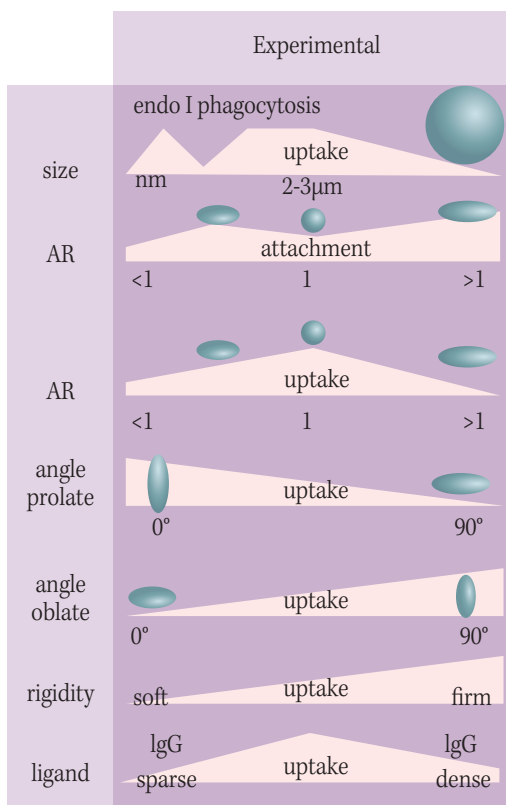
Particle Structure & Immune Response

When a foreign substance is injected into the body, the immune system response varies depending on the size of the substance.



- The particle will be removed through endocytosis (intracellular absorption), if its size is less than $0.5\mu\text{m}$.
- The particle will be decomposed through lysosome after phagocytosis, if its size is over $0.5\mu\text{m}$.

Comparison of phagocytosis efficiency according to particle size and shape

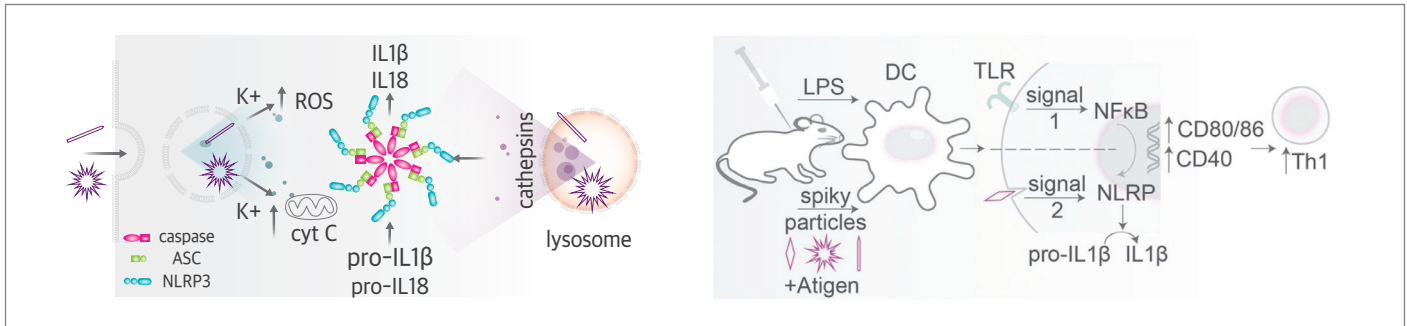


- The larger the particle size is, the more difficult it is to decompose.
- The closer the particle is to a spherical shape, the less likely it is to adhere to macrophages.
- The closer the particle is to a spherical shape, the easier it is to phagocytose.
(AR: aspect ratio, ratio of horizontal and vertical length)
- Phagocytosis is easier, if the particle is vertically long (with a narrow contact surface).
- The harder is the particle's surface, the easier phagocytosis occurs.

Ref. Maksim V Baranov, Manoj Kumar, Stefano Sacanna, Shashi Thutupalli, Geert van den Bogaart, Modulation of Immune Responses by Particle Size and Shape, Front Immunol. 2021 Feb 12;11:607945

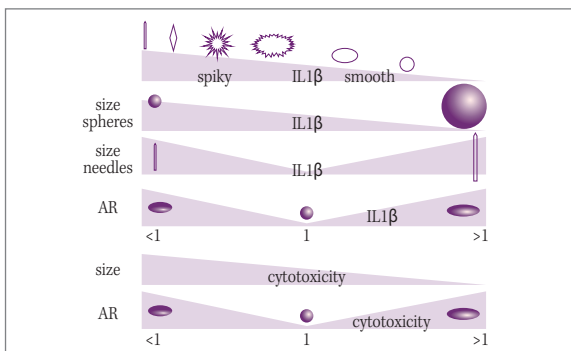
Particle Structure & Immune Response

Immune response depending on particle's shape



1. When particles with rough surfaces enter the dermis, they are absorbed into macrophages via phagocytosis
2. The rougher is the surface of particles, the stronger is inducement of cathepsin and K⁺ ions
3. K⁺ ions and cathepsin induce cell death and secretion of inflammatory cytokines IL-1 β
4. Inflammatory cytokines induce an inflammatory response and thereby generate nodule formation

Shape of particles that mitigate immune response



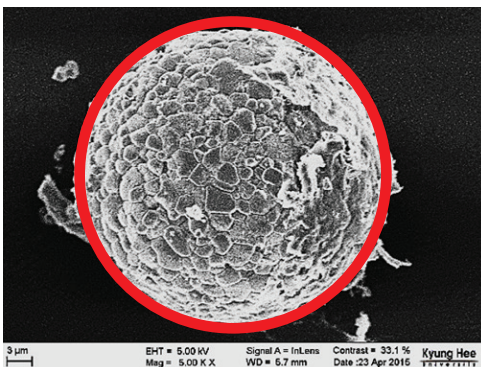
Generation of IL-1 β is minimized when :

- The particle's surface is smooth
- The particle's size is large
- The particle's shape is close to a sphere

Cytotoxicity is reduced when :

- The particle's size is large
- The particle's shape is close to a sphere

Facetem particles have structure that cause minimum immune response



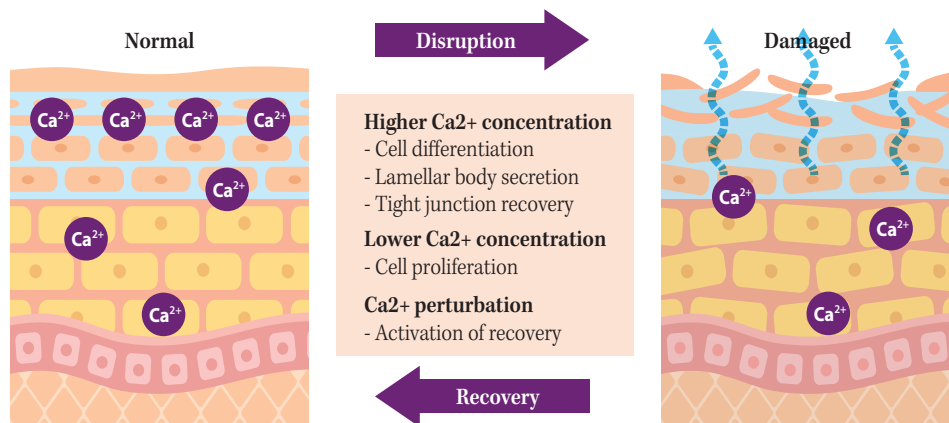
Lattice-pore structure

- Facetem is a uniform Hydroxyapatite Filler with an average particle size of 30 μ m.
- Facetem consists of lattice-pored homogeneous particles created through a patented technology.
- Facetem has a lattice-pore shape and size of 30 μ m, which minimizes immune responses and suppresses the secretion of inflammatory cytokine IL-1 β , thereby minimizing inflammatory reactions and nodule occurrence.

Correlation between Calcium Ions and Ceramide

Calcium ion (Ca²⁺) in the skin is known for its close relation to aging

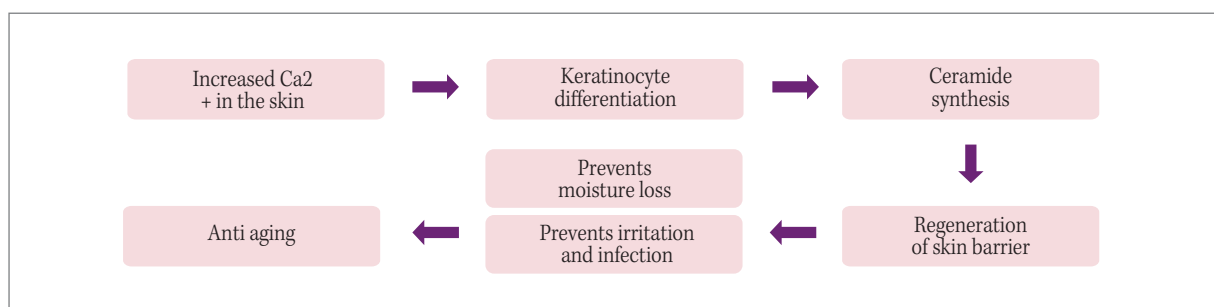
- Calcium ions play an important role in epidermis differentiation and homeostasis of the skin barrier. [1]
- In young people's skin, calcium ions are mainly present in the uppermost granular layer of the epidermis.
- With age-related changes, dermis structure damages and calcium ions near the skin surface dissolve and spread throughout the entire epidermis. [1,2]



- The activity of keratinocytes in the epidermis varies depending on the concentration of calcium ions.
- We can observe keratinocyte proliferation at low concentration of calcium ions. [3]
- There are several reactions at high concentrations of calcium ions: (1) non-proliferation of keratinocytes, (2) occurrence of cell differentiation, (3) recovery of tight junctions between cells.

Ceramide, a skin protection component, increases during keratinocyte differentiation at increased concentration of calcium ions.

- Ceramide is one of the components that forms skin epidermis and plays an important role in the skin barrier function.
- Decrease in ceramide level may cause skin problems such as dryness and irritation.
- Ceramide is produced during the differentiation of keratinocytes. [4,5,6]

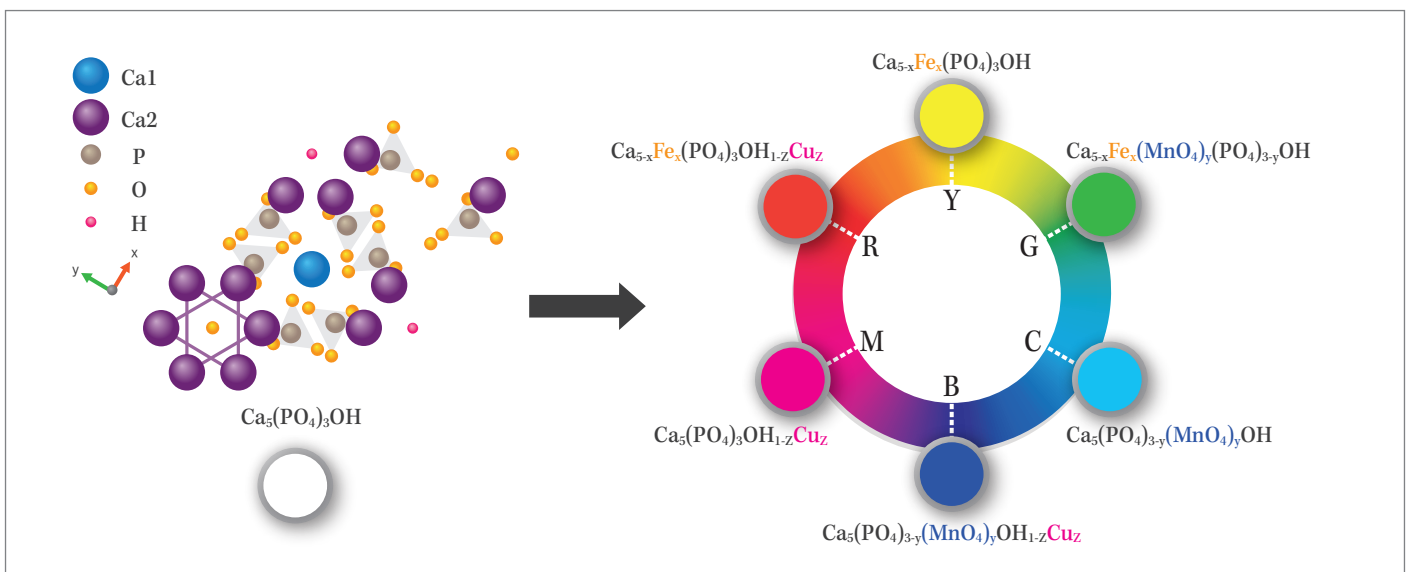


Ref. [1] Clinics in Dermatology 2019;37: 336-345 [2] The journal of Investigative Dermatology 2003;1557-1558 [3] APL Bioengineering 2021;5: 041509
[4] Cell 1980;19: 245-254 [5] The Journal of Investigative Dermatology 1985;84: 508-512 [6] Journal of Cellular Physiology 1988;134: 229-237

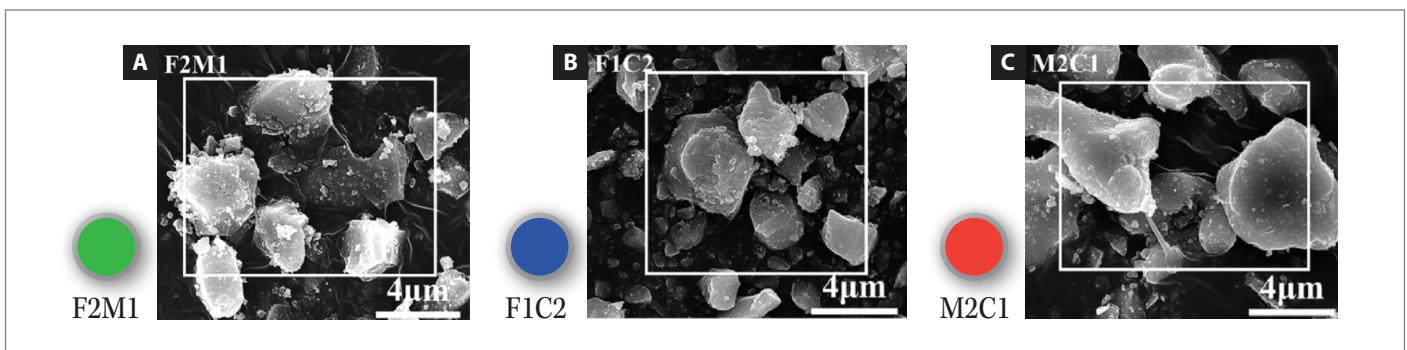
Calcium Hydroxyapatite: Colors and Purity

Hydroxyapatite's impurity and colors

- The original color of calcium particles in dermal filler is **white**
- However, various colors can appear if other materials, instead of calcium and phosphorus, were combined during the manufacturing process (sintering)
- Metal ions that can replace calcium and phosphorus: F(Fe), M(Mn), C(Cu),
- The presence of colors indicates that it is not a pure calcium particle, that can be identified as a foreign substance



Apatite impurity particles



- Colored particles do not have perfectly spherical shape.
- Malformed colored particles bear higher risk to cause inflammatory reaction compared to white filler particles.

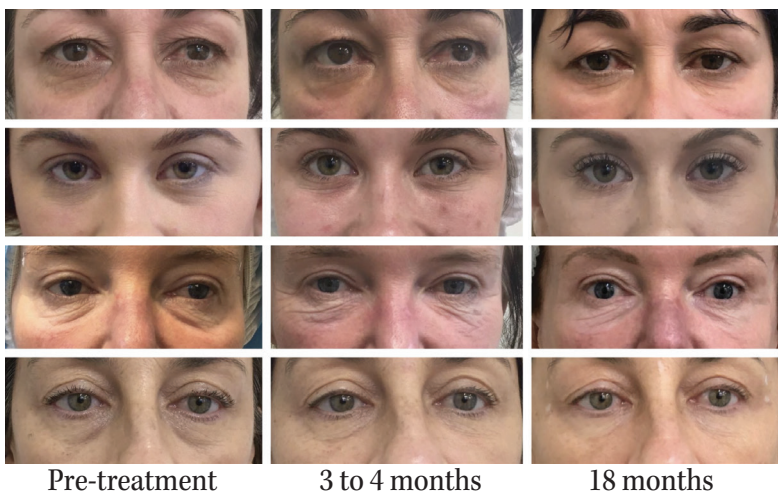
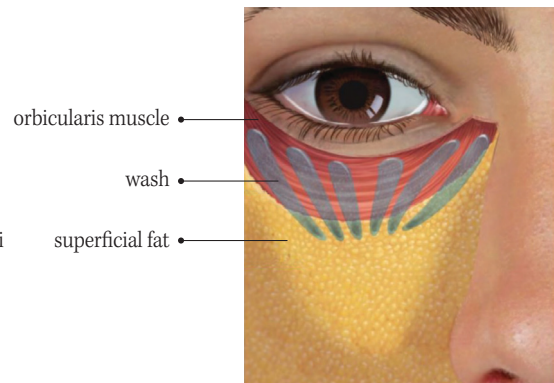
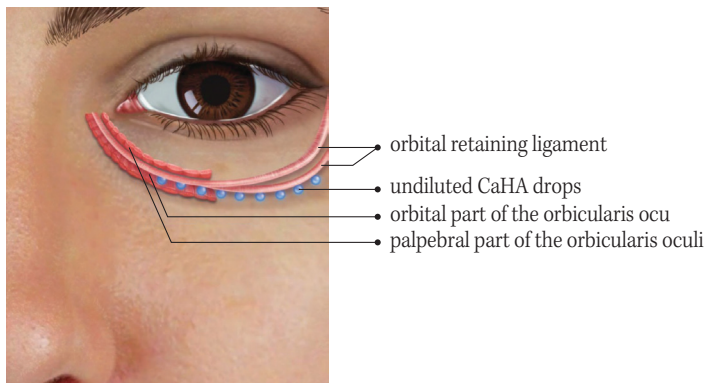
Ref. Tang, W., Xu, W., Zhong, M., & Zhang, Z, Slightly doped hydroxyapatite pigments of subtractive color with high near-infrared reflectance. Journal of Solid State Chemistry. 2023 jun, 322:123947



Calcium Hydroxyapatite : Colors and Purity

Whitening dark circles under eyes using calcium filler

- **Research purpose** Check the effect of applying calcium filler on dark circles to improve pigmentation
- **Research subject** Patients with pigmentation and dark spots around the eyes (total 12 patients)
- **Research method** Case study
- **Application method** 1st Lift : 25G cannula, CaHA 0.3~0.4ml/side, micro-bolus droplet along the bottom of the ligament base.
2nd CaHA wash : 27G cannula, CaHA : 1% lidocaine = 0.1:0.5, sub-q flushing in the lower eyelid area
- **Source** Corduff, Niamh MB BS, FRACS. An Alternative Periorbital Treatment Option Using Calcium Hydroxyapatite for Hyperpigmentation Associated with the Tear Trough Deformity. Plastic and Reconstructive Surgery - Global Open 8(2):p e2633, February 2020.



Pre-treatment

3 to 4 months

18 months

Effectiveness

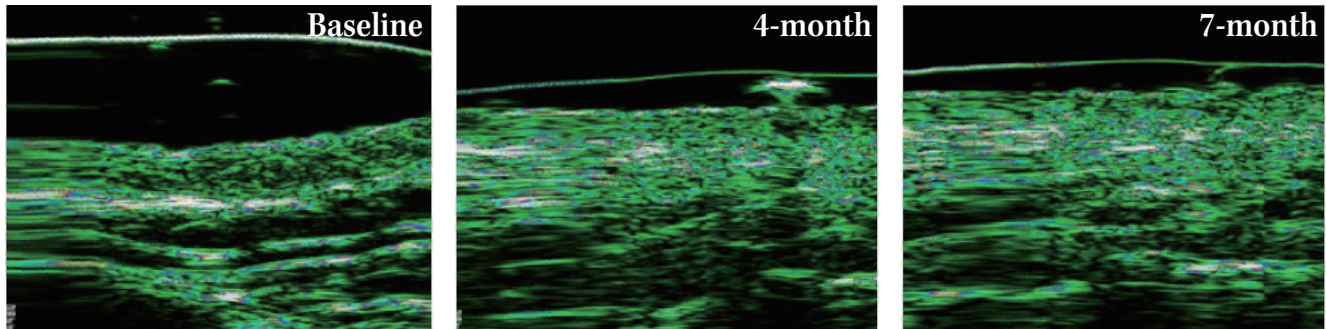
- Improvement of pigmentation, skin tone, thickness and color in 4-6 months.
- Increased satisfaction across all patients.
- Minor side effects: erythema, swelling, chest infection
- Nodules not identified

It is possible to improve sagging lower eyelids and pigmentation, and improve skin texture around the eyes using **neocollagenesis** of CaHA filler



Skin Rejuvenation Using Calcium Hydroxyapatite

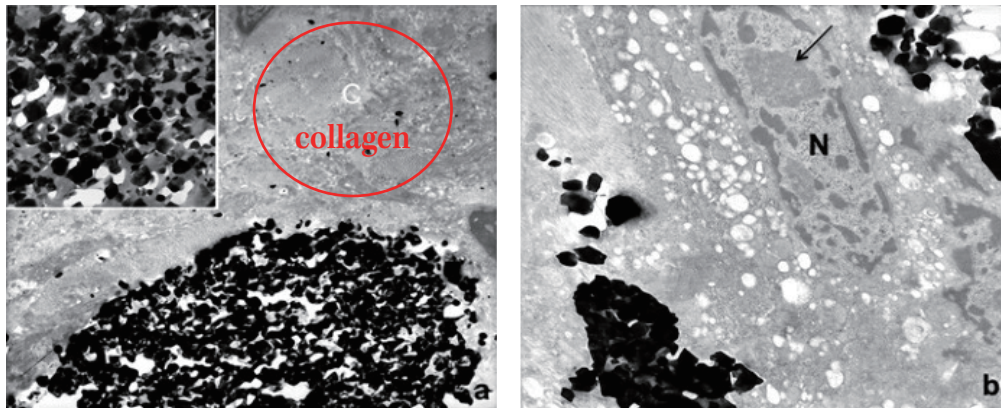
CaHA activates fibroblasts in the skin to produce collagen



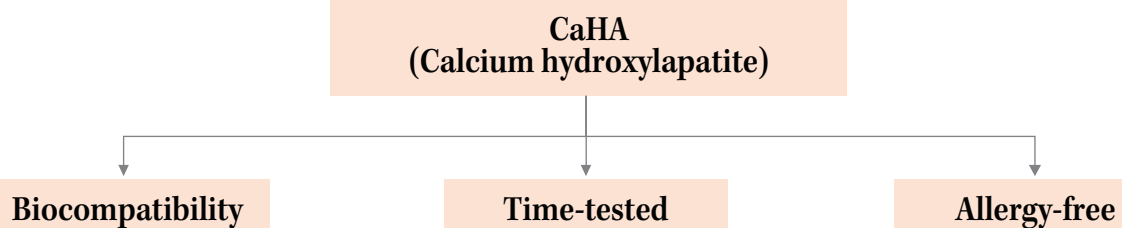
- Applying filler to the dermal layer activates fibroblasts (FB) and enhances the production of collagen.

**Calcium hydroxylapatite filler (CaHA filler)
has demonstrated both safety and long-term efficacy.**

- Examination of the skin after applying calcium filler demonstrated that collagen formation occurred without triggering phagocytic activity, thus avoiding immune system stimulation.



No phagocytosis → No inflammatory reaction → No side effects





Correlation between Calcium Ions and Ceramide

Guidelines for the successful rejuvenation of skin through a combined CaHA+HA treatment

• Why Hyaluronic Acid?

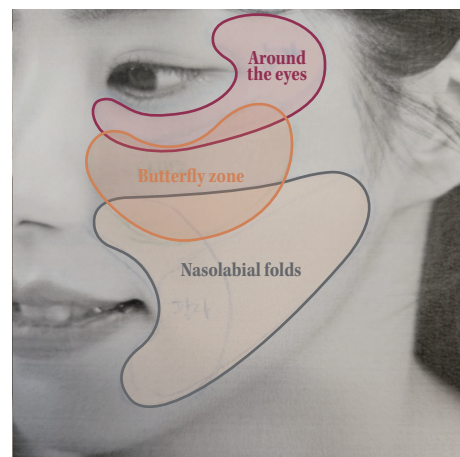
- The viscosity of hyaluronic acid (HA) provides optimal physical characteristics, ensuring uniform injection when using a syringe.
- Adding HA components facilitates skin hydration which naturally decreases with the aging process.
- HA is a component that formats the extracellular matrix (ECM)

• The dilution ratio of CaHA+HA varies depending on the application area, skin thickness, and degree of sagging.

- Dilution ration 1:5 is generally recommended for women or patients with thin skin
- Dilution ration 1:3 is recommended for men or patients with thick skin, large pores, and numerous acne scars

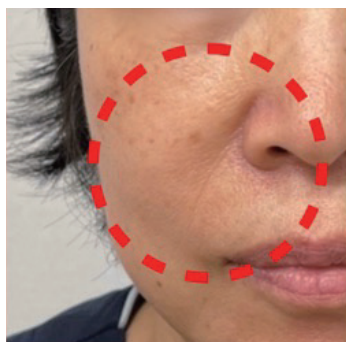
• General recommendations:

- It is advised to have 3-5 treatments at intervals of 3 weeks to 1 month.
- The substance shall be diluted directly by the physician or under supervision in a sterile environment right before the procedure.
- Use 2 syringes larger than the total volume of substance and dilute it over 60 times with reciprocating movements.
- Properly disinfect patient's entire face before the procedure.
- Adjust the depth of the needle according to the skin thickness.
- Inject evenly, punching subdermal layer several times.
- A particular facial area may be treated 2-3 times depending on the patient's specific concerns and doctor's judgment.

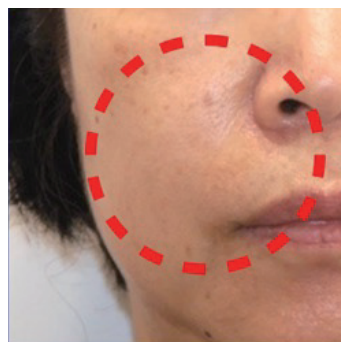


Dilution rate	Facetem	Non-crossed HA
1 : 3	0.3cc	1cc
	0.8cc	2.5cc
1 : 5	0.3cc	1.5cc
	0.8cc	4cc

Actual Case

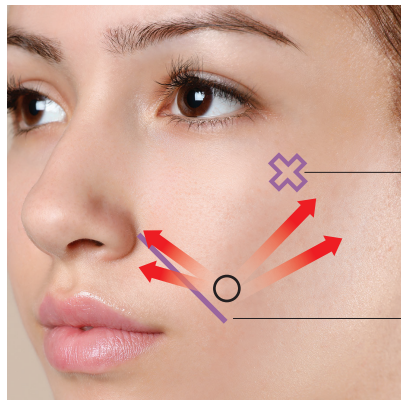


Before



After

Injection Protocol: Cheeks



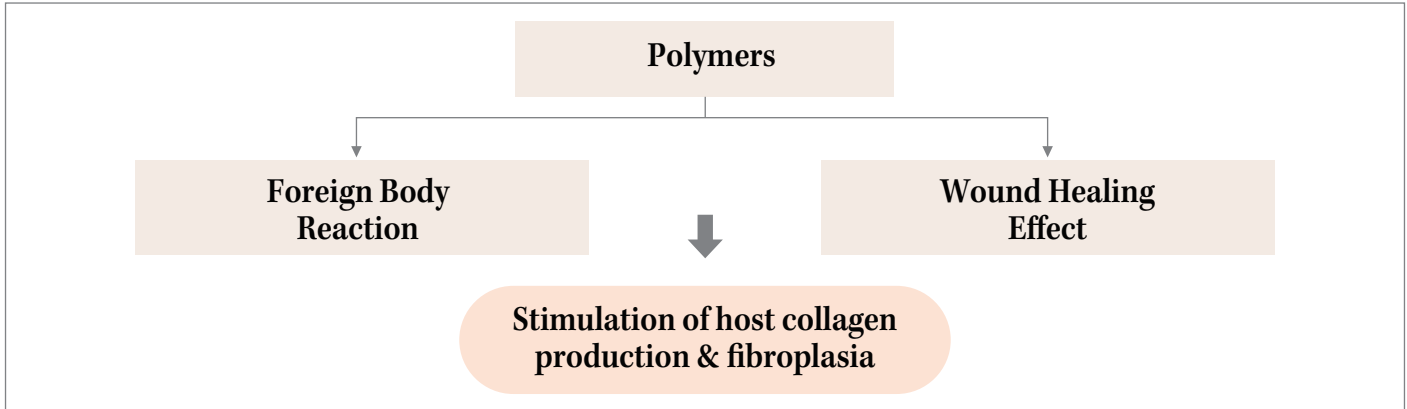
Zygoma

Nasolabial folds

Area	Cheeks
Entry point	The point where a vertical line down the lateral canthus meets a horizontal line lateral to the nasal alar base; or 0.5 to 1.0 cm outward from the 2/3rd point of the nasolabial extension line.
Anesthesia	Lidocaine cream + Local lidocaine point injection (if needed)
Dilution protocol	1:10 Facetem 0.8cc + distilled water 4cc + lidocaine (2%) 2cc + non-crosslinked HA 2cc (Considering potential loss of volume during hydration, you can add approximately 1cc more of distilled water)
Injection volume	Case by case
Injection tools	Puncture with a 23G needle and perform the treatment with a 23G cannula.
Injection layer	Layer 2 - Be careful not to damage the parotid gland during the procedure. - If the injection into buccal fat is too deep, it may cause swelling of the mucous membrane inside the mouth.
Injection guidelines	• Disinfect with alcohol, covering a wide area near the injection site. • Use a 23G needle for puncturing. • Use a fan-shaped/linear backward injection technique, gradually injecting the solution into the skin while pulling the cannula backwards • For beginners, it's advisable to mark the direction with a pen before proceeding. • Deeply pinch with the opposite hand, applying pressure slowly and evenly. • Gently tap or massage the injection site during the procedure. • Develop the habit of regularly checking the cannula, including its end and direction. • If the procedure time extends, particles may settle, so it's recommended that the assistant regularly mixes the solution.

Collagen Stimulation with Polymer

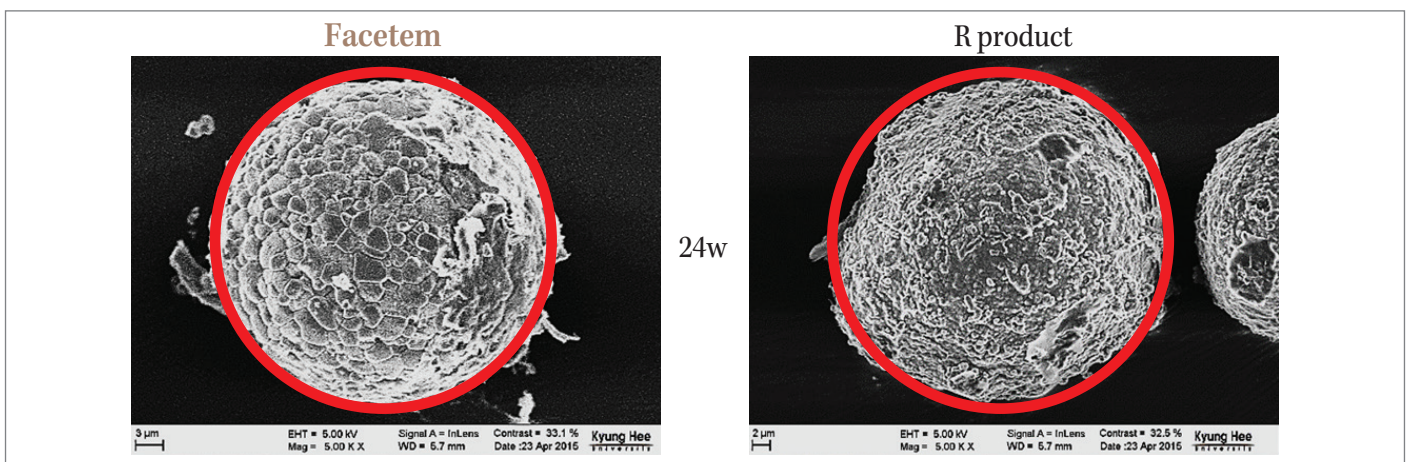
Polymer stimulates collagen formation through foreign body reactions and wound healing effects.



- The polymer activates macrophages in the skin, stimulates collagen production via fibroblasts, and enhances the dermal extracellular matrix (ECM).
- Polymers safely decompose and dissolve over time.
- Commonly used polymers consist of PLLA (Poly-L-Lactic Acid), PDLLA, PCL (Polycaprolacton), and CaHA (Calcium Hydroxylapatite).

Criteria for selecting the ideal polymer

- The risk of inflammation decreases if the polymer particles have a spherical form and homogeneous size and shape. (→ **Increased Nodule risk**)
→ Facetem consists of homogeneous particles with lattice-pored structure, achieved through a patented process.



※ Advantages of the lattice-pored particles

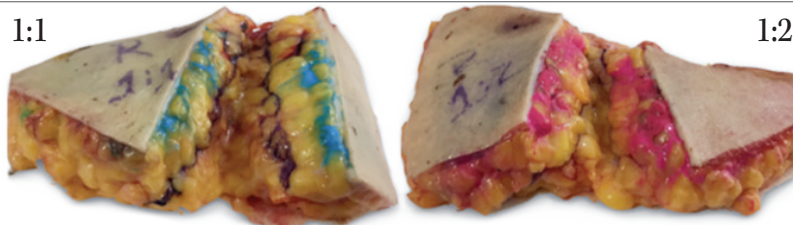
- Finely uniform particles
- Optimal decomposition and absorption
- Gradual decomposition rate.



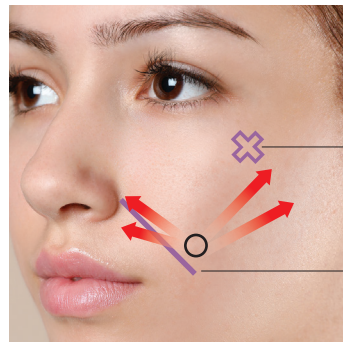
Collagen Stimulation with Polymer

Examples of Effective Treatment

- Perform the procedure using a cannula rather than a needle.
- If the dilution is 1:2 or more, the solution spreads to deeper tissue layers.



- Mix the substance at least **20 times** when diluting.
- The safest areas for application are the mid-lower face and nasolabial folds.
- The most suitable layer for the procedure is the reticular cutis, which is layer 2.
→ However, stimulating adipose-derived stem cells can still be anticipated when treating the deep fat layer corresponding to layer 4.
- Minimizing entry points and using techniques such as a fan-like application can enhance patient satisfaction.



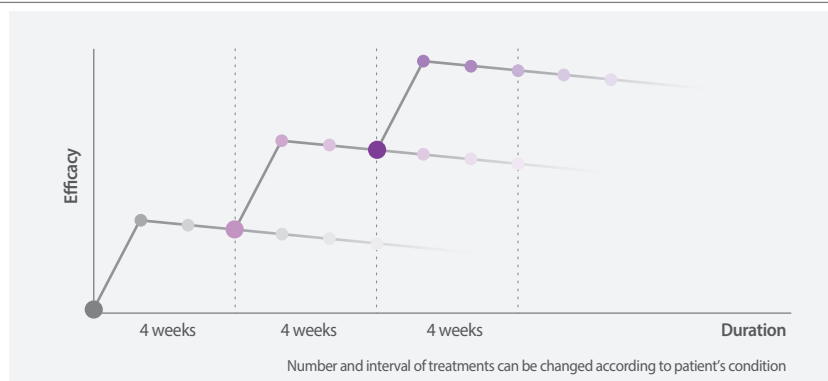
Zygoma

Nasolabial folds

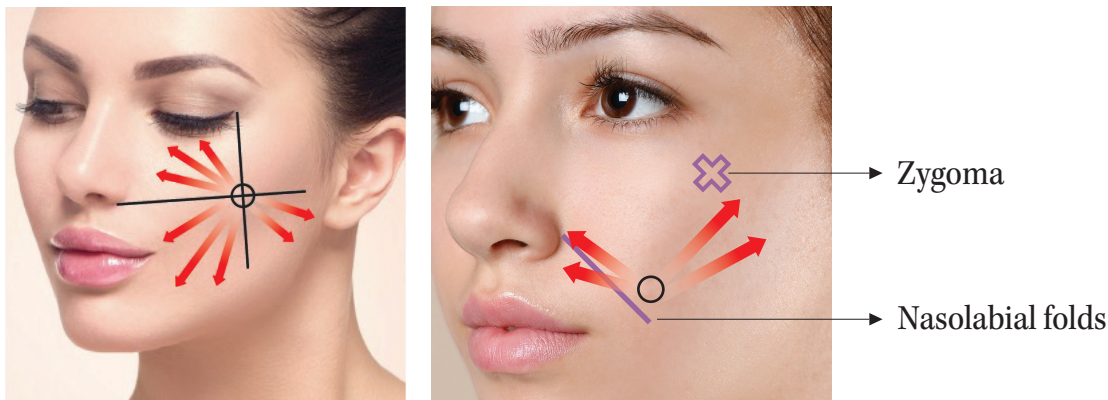
Facetem **0.8cc** : Distilled water **4cc** : Lidocaine (2%) **2cc** : Non-crosslinked HA **2cc** = Total **8.8cc** MIX

- It is advised to have **3 treatments** at intervals of **3-4 weeks**.

It is recommended to perform the treatment approximately **3 times** at **3-4 week** intervals after the 1st treatment. Additional 4th and 5th treatment sessions may be performed, if necessary.



Injection Protocol: Nasolabial folds



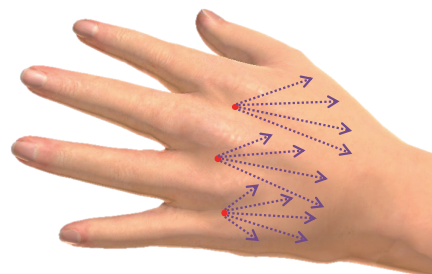
Area	Nasolabial folds, nasolabial extension lines
Entry point	The point where a vertical line down the lateral canthus meets a horizontal line lateral to the nasal alar base; or 0.5 to 1.0 cm outward from the 2/3rd point of the nasolabial extension line.
Anesthesia	Lidocaine cream + Local lidocaine point injection (if needed)
Dilution protocol	1:10 Facetem 0.8cc + distilled water 4cc + lidocaine (2%) 2cc + non-crosslinked HA 2cc (Considering potential loss of volume during hydration, you can add approximately 1cc more of distilled water)
Injection volume	Case by case
Injection tools	Puncture with a 23G needle and perform the treatment with a 23G cannula.
Injection layer	Layer 2, 4 (canine fossa)
Injection guidelines	• Disinfect with alcohol, covering a wide area near the injection site. • Use a 23G needle for puncturing. • Use a fan-shaped/linear backward injection technique, gradually injecting the solution into the skin while pulling the cannula backwards • For beginners, it's advisable to mark the direction with a pen before proceeding. • Deeply pinch with the opposite hand, applying pressure slowly and evenly. • Gently tap or massage the injection site during the procedure. • Develop the habit of regularly checking the cannula, including its end and direction. • If the procedure time extends, particles may settle, so it's recommended that the assistant regularly mixes the solution.



Injection Protocol: Hands

Injection : Hands

Dilute ratio	Total volume	
1 : 3	6.4cc	
Facetem	2% lidocaine	N/S
1.6cc	1.6cc	3.2cc
Anesthesia	Size of cannula	
insertion site only	23~25G	



● insertion site → cannulation

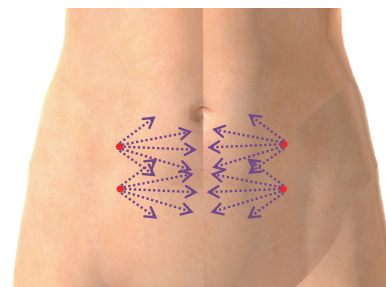
Area	Hands
Entry point	Three points between 2nd to 4th MCP joints
Anesthesia	Insertion site only
Dilution protocol	1:3 dilution Facetem 1.6cc + lidocaine (2%) 1.6cc + N/S 3.2cc
Injection volume	1.6cc
Injection tools	23~25G blunt cannula
Injection layer	Subcutaneous layer
Injection guidelines	Fanning /c retrograde linear threading



Facetem Injection Guide: Abdomen

Injection : Abdomen

Dilute ratio	Total volume	
1 : 3	9.6cc	
Facetem	2% lidocaine	N/S
2.4cc	2.4cc	4.8cc
Anesthesia	Size of cannula	
insertion site only	23~25G	



● insertion site → cannulation

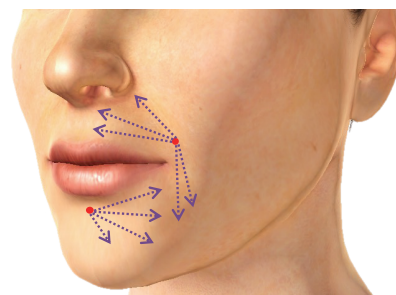
Area	Abdomen
Entry point	Select suitable entry points to cover the treatment area considering the length of the cannula; make 2-3 injection points per side
Anesthesia	Local injection on puncture site
Dilution protocol	1:3 dilution Facetem 2.4cc + lidocaine (2%) 2.4cc + N/S 4.8cc
Injection volume	2.4cc
Injection tools	25G blunt cannula
Injection layer	Subcutaneous layer
Injection guidelines	Fanning /c retrograde linear threading



Facetem Injection Guide: Perioral region

Injection : Perioral region

Dilute ratio	Total volume	
1 : 1	3.2cc	
Facetem	2% lidocaine	N/S
1.6cc	0.8cc	0.8cc
Anesthesia	Size of cannula	
infraorbital, mental n. block	25~27G	



● insertion site → cannulation

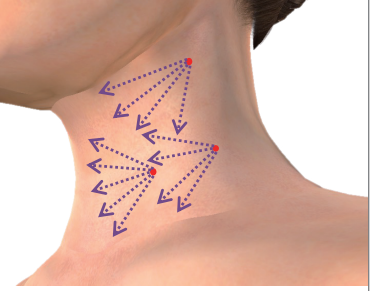
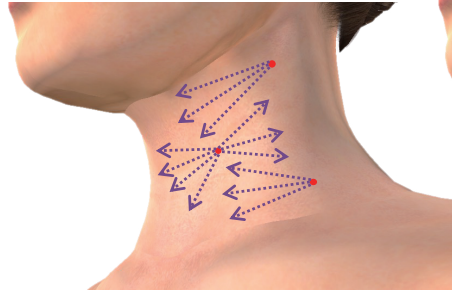
Area	Perioral region
Entry point	About 1cm superolateral from the corner of the mouth Around 1cm below the lower lip
Anesthesia	Infraorbital n. block & mental n. block
Dilution protocol	1:1 dilution Facetem 1.6cc + lidocaine (2%) 0.8cc + N/S 0.8cc
Injection volume	1.6cc
Injection tools	25~27G blunt cannula
Injection layer	Supraperiosteal layer
Injection guidelines	Fanning /c retrograde linear threading



Facetem Injection Guide: Neck

Injection : Neck

Dilute ratio	Total volume	
1 : 3	6.4cc	
Facetem	2% Lidocaine	N/S
1.6cc	1.6cc	3.2cc
Anesthesia	Size of cannula	
transverse cervical n. block	25~27G	



● insertion site

.....→ cannulation

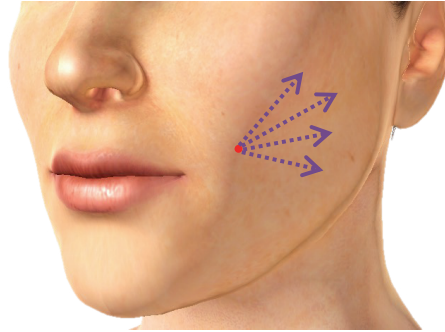
Area	Neck
Entry point	Select suitable entry points to cover the treatment area considering the length of the cannula; make 2-3 injection points per side ex) 2 points on the posterior border of the sternocleidomastoid muscle, etc.
Anesthesia	Transverse cervical n. block Local injection on puncture site
Dilution protocol	1:3 dilution Facetem 1.6cc + lidocaine (2%) 1.6cc + N/S 3.2cc
Injection volume	1.6cc
Injection tools	25G blunt cannula
Injection layer	Subcutaneous layer (pre-platysmal layer)
Injection guidelines	Fanning /c retrograde linear threading



Facetem Injection Guide: lateral cheek

Lateral cheek

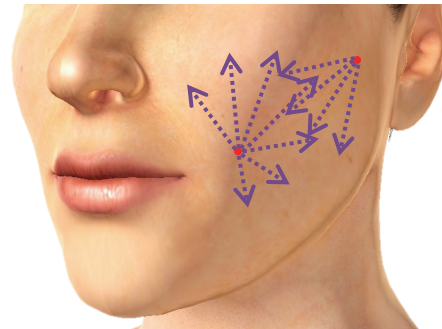
Dilute ratio	Total volume	
1 : 1	3.2cc	
Facetem	2% lidocaine	N/S
1.6cc	0.8cc	0.8cc
Anesthesia	Size of cannula	
insertion site only	23~25G	



● insertion site
→ cannulation

Cheek

Dilute ratio	Total volume	
1 : 3	6.4cc	
Facetem	2% lidocaine	N/S
1.6cc	1.6cc	3.2cc
Anesthesia	Size of cannula	
insertion site only	25~27G	



● insertion site
→ cannulation

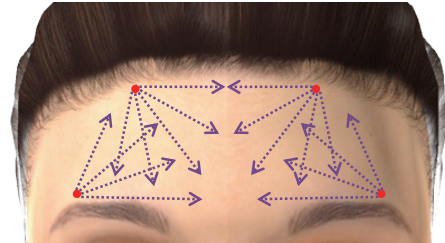
Area	Middle cheek
Entry point	About 1cm superolateral from the mouth corner
Anesthesia	Infraorbital n. block Local injection on puncture site
Dilution protocol	1:1 dilution Facetem 1.6cc + lidocaine (2%) 0.8cc + N/S 0.8cc
Injection volume	1.6cc
Injection tools	23G blunt cannula
Injection layer	Subcutaneous layer
Injection guidelines	Fanning /c retrograde linear threading



Facetem Injection Guide: Forehead

Injection : Forehead

Dilute ratio	Total volume	
1 : 1	4.8cc	
Facetem	2% Lidocaine	N/S
2.4cc	1.2cc	1.2cc
Anesthesia	Size of cannula	
superatrochlear, supraorbital n. block	23~25G	



● insertion site → cannulation

Area	Forehead
Entry point	Above the eyebrow on the lateral canthal line Near the hairline on the midpupil line Determine puncture site considering cannula's length
Anesthesia	Supratrochlear & supraorbital n. block Local injection on the puncture site (zygomaticotemporal n. block added depending on the scope of treatment)
Dilution protocol	1:1 dilution Facetem 1.6cc + lidocaine (2%) 0.8cc + N/S 0.8cc
Injection volume	1.6cc
Injection tools	23G blunt cannula
Injection layer	Supraperiosteal layer
Injection guidelines	Fanning /c retrograde linear threading