Consensus Recommendations on the Aesthetic Usage of Botulinum Toxin Type A in Asians

Bong Kyun Ahn, MD,* Youn Sung Kim, MD,† Hong Jig Kim, MD,‡ Nark Kyung Rho, MD,§ and Hei Sung Kim, MD¶

BACKGROUND The use of botulinum toxin has rapidly expanded into various aesthetic applications. Any guideline representing a consensus for aesthetic treatments using botulinum toxin type A (BTA) in Asians has not been published.

OBJECTIVES To provide consensus recommendations on common aesthetic problems which are treated by neurotoxin in Asians.

METHODS A panel of experienced Korean dermatologists was convened to develop a clinical consensus on common aesthetic problems involving the face, neck, and calves in Asians, based on their own extensive experience.

RESULTS The consensus recommendations address general questions regarding treatment and provide specific guidelines on each common aesthetic indication. The recommended final concentration of BTA was 50 U/mL after reconstitution with physiologic saline. For horizontal forehead lines, the members recommended nine injections in two rows into the frontalis with 1 U/point. For glabellar lines, the members recommended three injection points (a total of 8 U) at the lateral part of the orbicularis oculi. For infraorbital wrinkles, one to two points per side in the superficial subcutaneous space approximately 1 cm below the lash line were recommended (1–2 U/side). For nasal flare, one injection point in the middle of each ala nasi was recommended (a total of 2 U). For depressed nasal tip, a single injection deep within the columella was recommended, with a dose of 3 U. For benign masseter hypertrophy, the members recommended a six-point injection to the masseter (three points per side for a total of 50–60 U). For the treatment of calf hypertrophy, the members recommended a total dose of 100 to 120 U (50–60 U/side), divided between six injection points (approximately 8–10 U/point).

CONCLUSION This guideline provides a framework for physicians who wish to perform safe and efficacious injections of BTA in Asians.

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Injection with botulinum toxin type A (BTA) is one of the most widely performed noninvasive cosmetic procedures in the world. The first medical use of BTA was reported in 1980, and the first cosmetic use of BTA—as a safe and effective treatment for glabellar lines—was described in a seminal paper published in 1992. The Food and Drug Administration granted approval for the treatment of facial wrinkles on April 12, 2002. Consensus recommendations for onabotulinumtoxinA (Botox, Allergan, Inc., Irvine, CA) from the United States and for abobotulinumtoxinA (Dysport, Ipsen Ltd, Slough, UK) from Europe.

*MYD Aesthetic Laser and Cosmetic Surgery Center, Seoul, Korea; †Kimbelle Catholic Skin Clinic, Daejeon, Korea; ‡OhKim's Skin and Laser Clinic, Seoul, Korea; §Leaders Aesthetic Laser and Cosmetic Surgery Center, Seoul, Korea; ¶Incheon St. Mary's Hospital, Incheon, Korea

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began to arise in 2004, and revised or updated consensus recommendations have recently been published to help physicians treat Caucasians. In Asian countries, the use of BTA in cosmetic procedures started when the commercial preparation of BTA became available, roughly 1999. With ethnic differences in skin texture, facial muscle anatomy, pharmacologic reactions, and notions of beauty, it is difficult to apply consensus recommendations based on Caucasians directly to Asians. Because there are no published regional guidelines on BTA injection for cosmetic purposes in Asians, we believe that our general guidelines will be beneficial in treating Asians.

Considerations Regarding BTA Formulations
Commercial preparations of BTA products that are available in Korea are Botox, Botulax (Hugel Inc., Chuncheon, Korea), BTX-A (Hugh Source, Hong Kong, China), Dysport, Neuronox (Medytox Inc., Seoul, Korea), and Xeomin (Merz Pharma GmbH & Co. KGaA, Frankfurt/Main, Germany) (in alphabetical order). Of these, only Dysport is abobotulinumtoxinA. It has different bacterial strains of origin, different methods of purification and stabilization, different chemical and biological properties, and different units (Speywood units) of potency. This product has mainly been used for facial aesthetics in Europe, whereas onabotulinumtoxinA products have most commonly been used in the United States. The dose equivalency of the products (Botox: product) are Botulax, 1:1; BTX-A, 1:1; Dysport, 1:2–1:4; Neuronox, 1:1; and Xeomin, 1:1.11–13 Botox and Neuronox are the most frequently used products in Korea, and as mentioned, their potencies are thought to be almost identical.13 The Korean Academy of Corrective Dermatology (KACD) consensus recommendation is described with Botox and Neuronox as standard BTA products.

Methods of Consensus Development
KACD consists of 17 dermatologists who have extensive experience in the cosmetic usages of botulinum toxin in Asians. Members have administered botulinum toxin for an average of 9.4 years (range 7–13 years) to a variety of patients: Koreans (55%), Chinese (30%), Japanese (10%), and others (5%). Board members convened to develop consensus recommendations on various cosmetic indications of the face, neck, and calves based on their own experience (Table 1). A strong consensus was defined as approval from at least 90% of the board members.

Consensus Recommendations
Reconstitution
In a questionnaire-based study conducted by a Korean BTA company (Medy-Tox, Inc.) in 2009, 500 Korean physicians (300 dermatologists, 200 plastic surgeons) each diluted a vial of BTA (100 U) with 2.5 mL of saline (49%) followed by 2.0 mL (21%) and 3.0 mL (14%) for horizontal forehead and glabellar wrinkles and benign masseter hypertrophy. We recommend reconstituting a vial of BTA (100 U) in preservative-free 0.9% saline (2.0 mL). Recommended indications are arranged in cephalocaudal order.

Horizontal Forehead Lines
Horizontal forehead lines are one of the most common indications for BTA injection in Asians. The primary muscle of the horizontal forehead lines is the frontalis muscle (Figure 1). Draw an imaginary horizontal line 2 cm above the orbital rim and inject at five regularly spaced points. Then, 1 to 1.5 cm above the first line, draw an imaginary line and inject at four points in the same manner (Figure 2). Inject 1 to 1.5 U at each point. (Higher doses may be needed for men.) The total recommended dose range is 6 to 13.5 U. Intradermal and oblique injection is recommended for Asians.

Ethnic Considerations
Several articles report ethnic differences in the contractility and shape of the frontalis muscle. With regard to forehead contractility, Tzou and colleagues showed that
Europeans have larger facial movements in the frontal region than Asians. Tsukahara and colleagues\textsuperscript{15} found significantly higher wrinkle scores in Caucasians than in Japanese. In terms of shape, Koreans were shown to have wider foreheads than white North Americans.\textsuperscript{16} Ethnic differences in the frontalis may influence the method of BTA treatment,\textsuperscript{17} which is summarized in Table 2.

### Safety Concerns
All injections should be 1 to 2 cm above the orbital rim to minimize the risk of brow ptosis. In cases in which the external portion of the frontalis muscle is not treated sufficiently, excessive elevation of the external third of the eyebrow can be seen (the “Samurai face”).

### Injectiion Target, Points, Dose, and Technique

The primary muscles of the glabellar complex are the

<table>
<thead>
<tr>
<th>Target Muscle</th>
<th>Injection Level</th>
<th>Injection Points, n</th>
<th>Injection Dose, U</th>
<th>Total Dose, U</th>
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<tr>
<td>Horizontal forehead lines</td>
<td>Frontalis Intradermal</td>
<td>6-9</td>
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<td>Corrugator Procercus Intramuscular</td>
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<td>4</td>
<td>8</td>
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<tr>
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<td>5</td>
<td>4</td>
<td>12</td>
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<tr>
<td>Brow lifting</td>
<td>Brow depressors Procercus Intramuscular</td>
<td>4-5</td>
<td>1</td>
<td>6-10</td>
</tr>
<tr>
<td></td>
<td>Corrugator Depressor supercilii Intramuscular</td>
<td>2</td>
<td>2</td>
<td>4-4 (optional)</td>
</tr>
<tr>
<td></td>
<td>Orbicularis oculi</td>
<td>6 (3/side)</td>
<td>3</td>
<td>14 (7/side)</td>
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<tr>
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<td>Orbicularis oculi</td>
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<td>1-2</td>
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<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Bunny lines</td>
<td>Nasalis Intradermal, subcutaneous</td>
<td>3</td>
<td>2</td>
<td>6</td>
</tr>
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<td>Nasal flare</td>
<td>Dilator naris Intramuscular</td>
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<td>1</td>
<td>2 (1/side)</td>
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<tr>
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<td>0.8-1.2</td>
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<td>Gummy smile</td>
<td>Upper lip elevators</td>
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<td>2-3</td>
<td>4-6</td>
</tr>
<tr>
<td>Marionette lines</td>
<td>Levator labii superioris Intradermal, subcutaneous</td>
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<td>3-5</td>
<td>6-10</td>
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<tr>
<td>Cobblestone chin (mild)</td>
<td>Alaeque nasi Intradermal, subcutaneous</td>
<td>1</td>
<td>5</td>
<td>5</td>
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<tr>
<td>Cobblestone chin (severe)</td>
<td>Levator labii superioris Intradermal, subcutaneous</td>
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<td>5</td>
<td>10</td>
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<td>Masseter Intramuscular</td>
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<td>48-60</td>
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<tr>
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<td>24-32</td>
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<tr>
<td>Calf contouring</td>
<td>Gastrocnemius Intramuscular</td>
<td>12 (6/band)</td>
<td>8-10</td>
<td>100-120</td>
</tr>
</tbody>
</table>

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Glabellar lines
The glabella is the most common site for BTA injection in Asians.
corrugator supercilii, the procerus, and the depressor supercilii (Figure 1). A three-point injection is recommended for glabellar lines. Draw an imaginary line between the origin of the medial brow and the contralateral inner canthus and inject 4 U of BTA at the point where these lines intersect (Figure 3). Two units of BTA are injected at the intersection of the vertical line above the inner canthus and the brow line. In patients with large corrugator muscles, five injection points can be used (Figure 4). The procerus is a superficial muscle and should not be injected too deeply. In contrast, the corrugator supercilii muscles
lie deep relative to the frontalis muscle and should be injected deeply (closer to the periosteum).

**Ethnic Considerations**  The results of a study with Chinese cadavers suggested that a large number of Asians have “short, square type” corrugator muscles. In contrast, Caucasians often have long, transversely developed corrugators. These ethnic differences may explain the more-conservative approach needed in Asians when treating...
glabellar wrinkles with BTA (Table 2) (8-U injection in Asians vs 20- to 30-U injection in Caucasians).20

Safety Concerns Upper eyelid ptosis can be the most serious complication. A three-point injection can cause medial brow elevation.

Brow Lifting Brow lifting is not a popular procedure in Asia but is at times performed in conjunction with other upper facial BTA treatments.

Injection Target, Points, Dose, and Technique The target muscles for brow lifting are the brow depressors, which include the procerus, the corrugators, the depressor supercilii, and parts of the orbicularis oculi (Figure 1). A four-point injection (2 points per side) is recommended (Figure 5). A single injection should be made into the pars orbicularis at the tail of each eyebrow. The recommended dose is 1 U per injection point. Two additional injections should be made into the corrugators; 2 U per injection point is recommended. The total dose range for brow lifting is 6 to 10 U. If injection into the median portion does not provide sufficient brow lifting, an optional 2- to 4-U injection into the procerus can be performed. We recommend an intramuscular injection for the eyebrow tail (superficial) and corrugators (deep and perpendicular).

Ethnic Considerations Previous recommendations have rarely mentioned “brow lifting,” with the exception of one article from Europe, in which the authors emphasized lifting only the lateral portion of the brow (Table 2).8 This difference stems from the disparity in perception of a desirable and beautiful brow shape between Asians and Caucasians. In an article involving digital modification of photographs, the ideal brow peak was located above the lateral canthus in a white model, whereas it was more medial in a young Asian model.21 Asian women do not favor an abruptly arched brow with a lateral peak because it is felt to appear aggressive. The KACD recommendation includes suppression of corrugators to achieve a favorable Asian brow shape.

Safety Concerns This treatment is usually effective and safe. Eyelid and brow ptosis occur rarely.

Crow’s Feet BTA injection for crow’s feet is one of the most popular cosmetic procedures in Asia.
The primary muscle in crow’s feet is the external part of the orbicularis oculi (Figure 1). For the treatment of crow’s feet, injection to the canthal region (three points per side) is recommended (Figure 6). The first injection is usually made approximately 1.5 cm lateral to the outer canthus (dose 3 U), with the other two injection points (2 U each)
approximately 1 cm above and below the primary injection point. An intradermal injection is preferred, which minimizes the risk of bruising while retaining effectiveness.

**Ethnic Considerations** In general, the degree of periorbital wrinkling is higher in Caucasians than Asians when one smiles fully. By comparing two studies from Europe and Japan that present fundamental data on facial muscle fibers, we could surmise that the muscle fiber size of orbicularis oculi is smaller in Asians than in Europeans. Skin thickness is another important factor determining the degree of periorbital wrinkling, with Asians shown to have thicker facial skin (and a thicker epidermis) than Caucasians. Although insufficient, these data help explain the ethnic difference in recommendation (Table 2) (7 U/side, intradermal injection in Asians vs 10–15 U/side, intramuscular injection in Caucasians).

**Safety Concerns** The most frequent adverse event is mild periorbital hematoma. Deep injection or injection into the inferior region of the zygomaticus major should be avoided because it may cause unwanted effects such as drooping mouth corners.

**Infraorbital Wrinkles**
Intraorbital wrinkles are commonly treated using BTA in Asia.

**Injection Target, Points, Dose, and Technique** The primary muscle of the infraorbital wrinkle is inferior horizontal fibers of the orbicularis oculi (Figure 1). BTA (0.5 U) should be injected into the superficial subcutaneous space approximately 1 cm below the lash line (Figure 7). One to two points per side is recommended, with a total dose of 1 to 2 U. Oblique and intradermal injection is recommended.

**Ethnic Considerations** There are significant racial differences in perceptions of a groove that is caused by contraction and hypertrophy of the pretarsal orbicularis oculi (the “jelly roll”). For Caucasians, the ‘jelly roll’ is thought to make them look dull, and many opt for rounder eyes, particularly when smiling. Thus, many have the desire to remove the “jelly roll.” Carruthers and colleagues introduced a
method to treat the “jelly roll” using BTA injection. For Asians, this structure is thought to make women look younger and cute and is thus referred to as the “charming roll.” Many Asian patients wish to increase the size of this roll through filler injection. These differences in the perception of beauty explain the ethnic difference in recommendations (Table 2) (injection of BTA 1 cm below the ciliary line in Asians vs 1–2 mm below the ciliary line in Caucasians).

Safety Concerns  The lower orbital fat pad may bulge because of the reduction of infraorbital muscle tone after BTA injection. Patients should also be warned of the possibility of infraorbital puffiness before treatment.

Bunny Lines  BTA injection for bunny lines is not uncommon in Asia.

Injection Target, Points, Dose, and Technique  Bunny lines result from contraction of the transverse portion of the nasalis (Figure 1). A three-point injection is recommended for treatment (1 point in the middle and 1 on each side) (Figure 8). The recommended total dose is 6 U (2 U per injection point). The injections should be performed superficially.

Ethnic Considerations  The total dose in the KACD recommendation is slightly higher than those of Western recommendations.

Safety Concerns  Upper lip ptosis can occur when the levator labii superioris alaeque nasi is blocked.

Nasal Flare and Depressed Nasal Tip  Nasal flare and depressed nasal tip are frequent indications for BTA in Asian patients.

Injection Target, Points, Dose, and Technique  The contraction of the inferior portion of the nasal muscle called the dilator naris causes nasal flare. The nasal septum depressor muscle is involved in ptosis of the nasal tip. One injection at the middle of each ala nasi is sufficient for nasal flare (Figure 9). The recommended dose is 1 U per injection point. Perpendicular intramuscular injection is recommended. One deep intramuscular injection at the
base of the columella is recommended for elevation of the nasal tip (Figure 10). The recommended dose is 3 U. If necessary, additional injections (2 U) can be made into each side of the nasal muscle nasi.

**Ethnic Considerations**  Because many Asians prefer a “Caucasian nose,” rhinoplasty is one of the most popular and frequently performed procedures in Asia. Asians typically have lower nasal bridges, bulbous and poorly projected tips, a small septum, and wide nostrils. Because nasal flare and depressed nasal tip make the nose look flatter and wider, the demand for such correction is higher in Asians than Caucasians.

**Safety Concerns**  Injections to the ala nasi must be performed with care because there is a risk of lowering...
of the corners of the mouth, causing lip ptosis and lengthening the philtrum. Impairments of labial function, such as speech impairments and difficulties in eating and drinking with a straw, can occur.

### Perioral Wrinkles

BTA or filler treatment for perioral wrinkles is less frequently performed in Asia than in Western countries.

#### Injection Target, Points, Dose, and Technique

The target muscle for perioral wrinkles is the orbicularis oris (Figure 1). Four symmetrical injections on the upper lip are recommended for perioral wrinkles (Figure 11). The injection points should be at the vermilion border, with the lateral points at least 1 cm away from the mouth corners. The recommended total dose for the perioral area is approximately 0.8 to 1.2 U. The injections should be intradermal and as superficial as possible.

#### Ethnic Considerations

Morphologically, a high percentage of Asians have protruding lips, which is rare in Caucasians. This protruding oral structure is thought to make Asians more sensitive to complications of BTA treatment. The ethnic difference in recommendation is shown in Table 2 (1-U injection in Asians vs 5 U in Caucasians).

#### Safety Concerns

Difficulty in pursing the lips can occur with excessive doses or deep injection of BTA in the perioral area. Speech impairments and difficulties eating and drinking with a straw can also occur.

### Gummy Smile

Many Asians consider People with a “gummy smile” to be unsightly. The procedure requires skill, and only highly experienced practitioners should perform it.

#### Injection Target, Points, Dose, and Technique

A “gummy smile” can be corrected by injecting BTA to the upper lip elevators, such as the levator labii superioris alaeque nasi, levator labii superioris, and zygomaticus minor (Figure 1). Injection of 2 to 3 U of BTA is performed at the nasofacial groove, which is usually approximately 1 cm lateral to the nasal ala (Figure 12). Injection should be perpendicularly, intramuscular and deep (just above the periosteum).
Ethnic Considerations  The dose of BTA and injection points recommended by KACD are similar to those in Western recommendations.

Safety Concerns  Potential risks associated with treatment of “gummy smile” are upper lip ptosis, excessive lengthening of the philtrum, and drooping of the mouth corners.

Marionette Lines  The use of BTA alone in treating marionette lines is regarded as difficult and risky. It is therefore not commonly performed in Asia.

Injection Target, Points, Dose, and Technique  Extensive contraction of the depressor anguli oris and some fibers of the platysma can pull
the corners of the mouth downward (Figure 1). A two-point injection into the depressor anguli oris (1 point per side) is recommended, with a total dose of 6 to 10 U (3–5 U per point) (Figure 13). The injection should be intramuscular and perpendicular.

**Ethnic Considerations**  The dose of BTA and injection points recommended by KACD are similar to those in Western recommendations.

**Safety Concerns**   Drooling and speech impairment can occur when the levator anguli oris is affected.

**Dimpled Chin**  BTA is the most effective treatment for this problem and is commonly performed in Asians. For best results, BTA is often combined with filler augmentation.

**Injection Target, Points, Dose, and Technique**  Dimpled chin is present in people who have a form of mentalis muscle with significant numbers of fibers inserting into the dermis. A midline injection (5 U) is often sufficient to soften a dimpled chin (Figure 14), but for severe cases, a two-point injection close to the center (5 U per point) may be considered (Figure 15). The injection points should be closer to the mandible than the lower lip to avoid diffusion of BTA to the orbicularis oris. Because the mentalis is a deep muscle, the injection should be perpendicular to the skin and should be deep and intramuscular.

**Ethnic Considerations**  The dose and injection points of the KACD recommendation are similar to those in Western recommendations.

**Safety Concerns**  Drooling, speech impairment, mouth asymmetry, and lower lip ptosis can occur.

**Benign Masseter Hypertrophy**  This indication has a high demand in Asia, and good results can be achieved with repeated injections of BTA.

**Injection Target, Points, Dose, and Technique**  The target muscle is the masseter (Figure 1). A six-point injection into the masseter (3 points per side) is recommended (Figure 16). Physicians should ask patients to clench their teeth to set the boundary of the safe zone. The safe zone is a rectangular area defined by linking the lower border of the mandible,
the tragus–mouth corner line, and the anterior and posterior borders of the masseter. Injection into this zone is highly effective and safe. The first injection is administered into the thickest (middle) portion of the masseter muscle 1.5 cm from the border of the mandibular angle. Two other points are located anterior and posterior to the center. Together, the three points form a triangle. A total dose of 50 to 60 U is recommended (8–10 U per point).

**Ethnic Considerations**  Asians, including Koreans, tend to have more-developed mandibles than Westerners. Data show that the distance between the gonions is 12 to 20 mm longer in Korean woman
than in Caucasians. In addition, benign hypertrophy of the masseter muscle is common in Asians and contributes to an undesirable quadrangular and wide lower face. There is high demand for a slim mandible in Asians, and the use of BTA to improve a square jaw appearance is common.

Safety Concerns  The risk of significant adverse events is virtually nil, but crunching power has been reported to be reduced for 2 to 4 weeks after injection. There have been a number of complaints of sunken cheeks in slim patients with prominent zygomas. Disappearance of facial dimples and protrusion of muscles with crunching motion occur occasionally.

Platysmal Bands
BTA injection is less frequently performed in Asians than Caucasians for the platysmal bands.

Injection Target, Points, Dose, and Technique  The platysma is a thin, broad muscle that originates from the border of the lower jaw and extends to the clavicular region (Figure 1). The location of the platysma muscle can be verified by asking the patient to grimace and tighten the muscle. Once the platysmal bands become apparent, the physician can pinch the bands of muscle with the nondominant hand and inject BTA directly into the muscle band at points approximately 1 to 1.5 cm apart (2 U per site) (Figure 17). Three to four injections are usually made per band, with a total dose of 24 to 32 U. Injections should be performed superficially and intramuscularly on the band.

Ethnic Considerations  The doses of BTA and injection points recommended by KACD are similar to those in Western recommendations.

Safety Concerns  Dysphagia, dysphonia, and neck weakness are serious potential adverse events.

Calf Hypertrophy
Calf hypertrophy is a much-favored indication for BTA treatment in Asian women.

Injection Target, Points, Dose, and Technique  The Achilles tendon connects the calf muscles, which have three heads arising from the two major muscle masses, to the foot. Three injections per portion...
(6 points for each side of the leg) are recommended to reduce the sizes of the medial and lateral portions of the calf muscles (Figure 18). A total dose of 100 to 120 U (50–60 U per side) is recommended, divided between six-injection points (approximately 8–10 U per point). Injections should be intramuscular and perpendicular.

**Ethnic Considerations** In general, Asian women have shorter legs and thicker calves than Caucasians.
BTA treatment has been popular in Asia, with its ability to make the legs look long and slim. The mechanism of BTA treatment for calf hypertrophy is identical to that of benign masseter hypertrophy.

Safety Concerns  Calf muscle impairments such as gait disturbance and fatigue after walking or running are the most common concerns after treatment, but they rarely occur.

Summary

The KACD consensus recommendations have addressed questions regarding treatment with BTA in general and specific common indications on the face, neck, and calf in Asians. For each indication, the anatomy of the target muscles was briefly reviewed, and the recommended injection points, dose, and injection techniques were provided (Table 1). This paper also reviewed the complications that may follow BTA injection in Asians to ensure maximal treatment safety. Most importantly, the KACD paper has made extensive reviews on ethnic differences, such as the anatomy of facial muscles and ideas of beauty. Indications for which there are major discrepancies between the KACD consensus recommendations and the latest western recommendations are summarized in Table 2. The KACD consensus recommendations will help ensure treatment safety and efficacy with BTA in Asians and can be further adapted in clinical practice to meet individual needs.

References


Address correspondence and reprint requests to: Hei Sung Kim, MD, Department of Dermatology, Incheon St. Mary’s Hospital, Catholic University of Korea, Dongsuro, Bupyeong-gu, 150-713, Incheon, Korea, or e-mails: hazelkimhoho@gmail.com; hazelkimhoho@catholic.ac.kr