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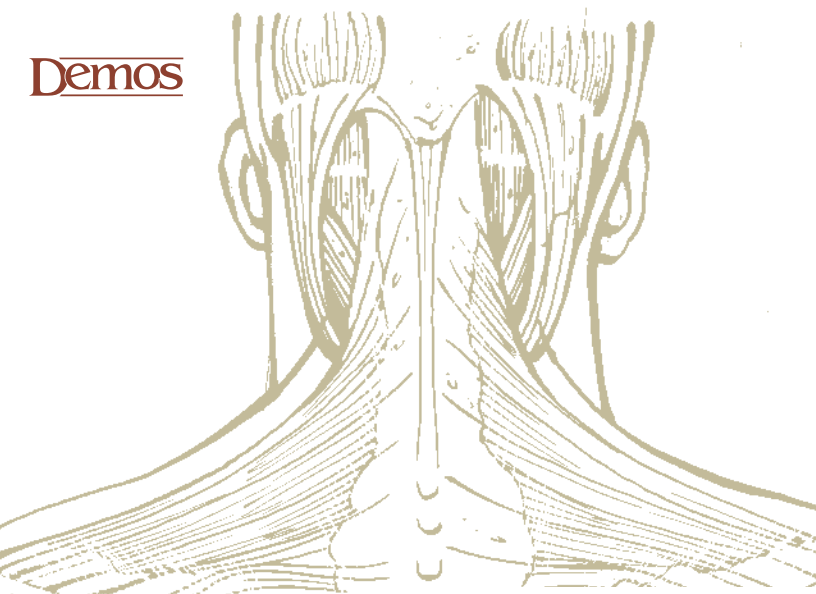
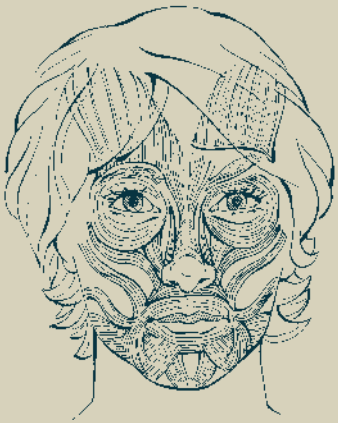


IB R. ODDERSON

BOTULINUM TOXIN

INJECTION GUIDE

SPASTICITY
DYSTONIA
MIGRAINE
HYPERHIDROSIS
DROOLING
PAIN
RATING SCALES
CODING/BILLING



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BOTULINUM TOXIN
INJECTION GUIDE

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To
Ingrid, Erik, and Eva

George H. Kraft, MD, has been a mentor and a good friend since the beginning of my residency program at the University of Washington, Seattle. He is a breath of fresh air, always optimistic, inspiring, and fun to be around. He is truly an academic statesman, has advised me well, and opened many doors for me. *Thank you, George.*

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Contents

Preface

In any field of medicine, the quality of care is proportional to the knowledge of the physician. For the clinician the real challenge is to stay abreast of new developments in clinical treatments and drug therapies. New indications for drug therapies are continually emerging. The first indication for treatment with botulinum toxin was approved by the US Food and Drug Administration (FDA) in 1989. Currently, there are six FDA-approved indications (hemifacial spasm, 1989; blepharospasm, 1989; strabismus, 1989; cervical dystonia, 2000; glabellar lines, 2002; and hyperhidrosis, 2004). In addition, there has been a wide-spread growth of applications beyond the FDA-approved indications for botulinum toxin. The toxin is used to treat numerous conditions across many specialties. Therefore, most of the current uses and about half of the applications in this manual are off-label, and thus should be applied with caution.

This handbook is designed to be a practical introductory and reference guide for the busy clinician and newcomers to the field of neurotoxin applications. To facilitate easy clinical use of this handbook the dosing range tables and related illustrations appear are on facing pages. For some conditions, however, the anatomic illustrations required multiple pages of display (migraine, cervical dystonia-torticollis, adducted/internally rotated shoulder, writer's cramp, flexed hip, equinovarus foot, and valgus foot). In these cases, the dosing tables for the illustrations are repeated on the facing pages.

The information contained in this book is no substitute for appropriate clinical training, knowledge of the anatomy, familiarization with

the literature, and understanding of the risks and benefits associated with botulinum neurotoxin applications. Because treatments with botulinum toxins are individualized for the severity of the treated condition, the size of the individual, and potential adverse events, the doses listed must be modified accordingly. The listed doses are for adults only unless specifically noted. Botulinum toxin is a very powerful medication and must be used with great caution.

Unfortunately, many of the applications, and even some of the FDA-approved indications, may not be covered by third-party payers. Thus, the codes listed are no guarantee of future coverage and reimbursement, but they should help with the process. Preapproval of a third-party payer is recommended for all procedures, with the exception of Medicare, which does not preauthorize.

Treatment with botulinum toxin can be very effective for managing a variety of conditions. The benefits are often impressive, and with better clinical skills in administering botulinum toxin, practitioners will be able to improve treatment outcomes and the quality of life for patients with conditions amenable to botulinum toxin injections.

Ib R. Odderson, MD, PhD

Introduction

- Muscle Overactivity
- Botulinum Toxin
- Properties of Botulinum Toxin Preparations
- Comparison of Type A and Type B Units
- FDA-Approved Indications
- Botulinum Toxin Dosing
- Frequency of Injection
- BTX-A Contacts
- BTX-B Contacts
- BTX Resources
- Safety Information
- BTX-A Dilutions
- BTX-B Dilutions
- Guidance Technique for Injection
- Techniques to Minimize Injection Pain
- Dilutions

Muscle Overactivity[1]	
Spasticity	*Velocity dependent* increased muscle contraction with stretching. The resistance to movement is increased with increased velocity of motion. Also, the EMG activity is increased with joint movement and muscle stretching. See the Ashworth Scale on page 158.
Spastic dystonia	Active muscle contraction at rest without joint or limb movement.[2] The EMG shows continued muscle activity at rest. Also, stretch-sensitive and increased EMG activity with muscle stretching.
Spastic cocontraction	Cocontraction of the antagonist muscle with voluntary muscle contraction of the agonist, and without stretching of the antagonist. Also, stretch-sensitive and increased EMG activity with muscle stretching.
Dystonia	Involuntary muscle contractions frequently causing twisting and repetitive movements or abnormal postures.[3] The muscle activity is often increased with voluntary movements or when opposing the dystonia. The muscle activity may involve both the agonist and antagonist (cocontraction). The EMG may show rhythmic or sustained muscle activity that is increased in the antagonist with attempted contraction of the agonist. *Focal dystonia* includes: • Blepharospasm • Oromandibular dystonia • Torticollis • Cervical dystonia • Writer's cramp • Spasmodic dysphonia

See the TWSTRS scale for cervical dystonia on page 152–153.

References

1. Gracies JM. Pathophysiology of spastic paresis. II: emergence of muscle overactivity. *Muscle Nerve* 2005;31:552–71.
2. Denny-Brown D. *The Cerebral Control of Movement*. Liverpool: Liverpool University Press, 1966;124–43, 171–84.
3. Rowland LP. *Merritt's Textbook of Neurology*, 8th ed. Philadelphia: Lea & Febiger, 1989.

Botulinum Toxin

Botulinum toxins are produced by the bacterium *Clostridium botulinum*. It is a gram-positive and spore-forming obligate anaerobic bacteria found in the soil.

Seven serotypes exist (types A, B, C1, D, E, F and G), and two are commercially available for clinical use in the United States, namely type A (Botox, Allergan, Inc.) and type B (Myobloc, Solstice Neurosciences, Inc.). At this writing, another type A (Dysport, Ipsen Ltd., U.K.) is not available in the United States.

Mechanism of action. Botulinum toxin inhibits the release of neurotransmitters such as acetylcholine by entering the presynaptic neurons and cleaving proteins responsible for docking and fusion of the synaptic vesicles to the presynaptic membrane. Type B acts on the outside of the synaptic vesicle, cleaving the vesicle-associated membrane protein (VAMP, synaptobrevin), whereas type A acts on the inner surface of the postsynaptic membrane (synaptosomal-associated protein of 25kd, SNAP-25). In addition to inhibiting acetylcholine release, botulinum toxin also appears to inhibit the release of other neurotransmitters such as noradrenaline, dopamine, gamma-aminobutyrate, glycine, peptide methionine-enkephalin, as well as the pain nociceptor substance P.[1,2]

In the muscle, botulinum toxin inhibits the release of acetylcholine at the neuromuscular junction of the muscle fibers (extrafusal fibers) and at the muscle spindles (intrafusal fibers). The reduced activation of the muscle spindles may contribute to muscle relaxation. In the periphery, botulinum toxin may reduce the release of pain nociceptors.

Mouse unit. Biologic activity is measured in *mouse units* (median lethal dose LD_{50}). One unit (U) is the median lethal intraperitoneal dose for female Swiss Webster mice weighing 18 to 20 g.

References

1. MacKenzie I, Burnstockk G, Dolly JO. The effects of purified botulinum toxin type A on cholinergic, adrenergic and non-adrenergic atropine-resistant autonomic neuromuscular transmission. *Neuroscience* 1982;7:997–1006.
2. Ishikawa H, Mitsui Y, Yoshitomi T, et al. Presynaptic effects of botulinum toxin type A on the neuronally evoked response of albino and pigmented rabbit iris sphincter and dilator muscles. *Jpn J Ohpthalmol* 2000;44:106–09.

Properties of Botulinum Toxin Preparations[1,2]		
	BTX-A (Botox)	BTX-B (Myobloc)
Vials	100 U	2,500 U, 5,000 U, 10,000 U
Albumin	0.5 mg	0.05%
Toxin	5 ng	25 ng, 50 ng, 100 ng
pH	7.3 after constitution	5.6
Storage	24 months refrigerated (Note expiration date)	30 months refrigeration 9 months room temp[3] (Note expiration date)
Vials	Single use	Single use
Use within 4 hours of dilution – no preservatives		

References

1. Mayer NH, Simpson DM, eds. Spasticity: etiology, evaluation, management, and the role of botulinum toxin. *We Move*, Sept 2002.
2. Package insert for Botox and Myobloc.
3. Royal MA. Botulinum toxins in pain management. *Phys Med Rehabil Clin N Am* 14(2003):805–820.

Comparison of Type A and Type B Units
Units of biologic activity of botulinum toxins type A and B cannot be compared to or converted into units of any other botulinum toxin.

FDA-Approved Indications	
BTX-A (Botox)	BTX-B (Myobloc)
Hemifacial spasm, 1989	
Blepharospasm, 1989	
Strabismus, 1989	
Cervical dystonia, 2000	Cervical dystonia, 2000
Glabellar lines, 2002	
Hyperhidrosis, 2004	

Botulinum Toxin Dosing
The dose should be influenced by the patient's size, muscle hypertrophy, degree of activation by EMG, types of movement, weakness, risk of side effects, potential loss of function, total dose, diagnosis and responses to prior injections.

Frequency of Injection
Generally, the duration of benefit last for 3-6 months. The likelihood of antibody formation appears related to the dose and frequency of injections. Therefore, extending the time between injections and using the lowest dose for symptom management may be desirable. However, the recurrence of symptoms and insurance coverage may be the ultimate determining factors.

BTX-A Contacts	
Allergan for practitioners	1-800-433-8871
Botox information line	1-800-44-Botox http://www.allergan.com/ http://www.botox.com/

BTX-B Contacts	
Solstice Neurosciences	1-888-461-2255
Myobloc information	http://www.solsticeneuro.com/

BTX Resources	
The Neurotoxin Institute	http://www.neurotoxininstitute.com/ Independent source of information related to the basic science and the clinical applications of neurotoxin therapies Free CME material
We Move	http://www.wemove.org/ Worldwide Education and Awareness for Movement Disorders
MDVU Movement Disorder Virtual University	http://www.mdvu.org/ Movement Disorder Virtual University dosing guidelines

Safety Information	
The listed dose suggestions have been obtained from the literature and the Internet web sites for Allergan, Solstice Neuroscience, MDVU and We Move. Some of the dose recommendations have been made by consensus panels of clinical experts, such as those published by We Move and MDVU. Other doses have been obtained from the literature, while, some of the listed doses have only been found in case studies. Consequently, the injector should err on the side of safety when starting injections in a particular patient. The listed doses do not guarantee the absence of any untoward effects, because inherent adverse events are associated with all drugs and their administration. The starting dose should be individualized according to the patient's size, weight, weakness, degree of spasticity, potential for functional losses, and degree of dysfunction. The treating physician is encouraged to review the literature for specific dosing.	
Contraindications	Botulinum toxin treatment is contraindicated in the presence of infection at the injection site(s) and in individuals with known hypersensitivity to any ingredient in the formulation.
Warnings	Serious and/or immediate hypersensitivity reactions have been rarely reported. These reactions include anaphylaxis, urticaria, soft-tissue edema, and dyspnea. If such a reaction occurs, further injection should be discontinued and appropriate medical therapy immediately instituted. Patients with peripheral motor neuropathic diseases (e.g., amyotrophic lateral sclerosis or motor neuropathy) or neuromuscular junctional disorders (e.g., myasthenia gravis or Lambert-Eaton syndrome) should only receive treatment with caution. Patients with neuromuscular disorders may be at increased risk of clinically significant systemic effects, including severe dysphagia and respiratory compromise from typical botulinum toxin doses. Treatment of botulinum toxin–naïve patients should be initiated at lower doses. Caution should be given to injection of nursing women and only to pregnant women if clearly needed.
Adverse events	There have been rare reports of adverse events involving the cardiovascular system, including arrhythmia and myocardial infarction, some with fatal outcomes.

Reference

Package insert for Botox and Myobloc.

BTX-B Safety Information	
Botulinum toxin type B Myobloc	The initial dose of Myobloc for patients *with* a prior history of tolerating botulinum toxin injections is 2,500 to 5,000 U divided among affected muscles. Patients *without* a prior history of tolerating botulinum toxin injections should receive a lower initial dose.[1]

Reference

1. Myobloc product information.

Safety Information Update

At the time of this writing the U.S. Food & Drug Administration (FDA) has issued an early communication about an ongoing safety review of botulinum toxins type A and B. The FDA has received reports of systemic adverse reactions including respiratory compromise and death following the use of botulinum toxins types A and B for both FDA-approved and unapproved uses. The reactions reported are suggestive of botulism, which occurs when botulinum toxin spreads in the body beyond the site where it was injected. The most serious cases had outcomes that included hospitalization and death, and occurred mostly in children treated for cerebral palsy-associated limb spasticity. Use of botulinum toxins for treatment of limb spasticity (severe arm and leg muscle spasms) in children or adults is not an approved use in the United States.

The pediatric botulism cases occurred in patients less than 16 years old, with reported symptoms ranging from dysphagia to respiratory insufficiency requiring gastric feeding tubes and ventilatory support. Serious outcomes included hospitalization and death. The most commonly reported use of botulinum toxin among these cases was treatment of limb muscle spasticity associated with cerebral palsy. For Botox, doses ranged from 6.25 to 32 Units/kilogram (U/kg) in these cases. For Myobloc, reported doses were from 388 to 625 U/kg.

FDA is aware of the body of literature describing the use of botulinum toxins to treat limb spasticity in children and adults. The safety, efficacy and dosage of botulinum toxins have not been established for the treatment of limb spasticity of cerebral palsy or for use in any condition in children less than 12 years of age.

The reports of adult botulism cases described symptoms including patients experiencing difficulty holding up their heads, dysphagia and ptosis. Some reports described systemic effects that occurred distant from the site of injection and included weakness and numbness of the lower extremities. Among the adult cases that were serious, including hospitalization, none required intubation or ventilatory support. No deaths were reported. The doses for Botox ranged from 100 to 700 Units and for Myobloc from 10,000 to 20,000 U.

Safety Information *(continued)*

Until such time that FDA has completed its review, healthcare professionals who use medicinal botulinum toxins should:

- Understand that potency determinations expressed in "Units" or "U" are different among the botulinum toxin products; clinical doses expressed in units are not comparable from one botulinum product to the next
- Be alert to the potential for systemic effects following administration of botulinum toxins such as: dysphagia, dysphonia, weakness, dyspnea or respiratory distress
- Understand that these effects have been reported as early as one day and as late as several weeks after treatment
- Provide patients and caregivers with the information they need to be able to identify the signs and symptoms of systemic effects after receiving an injection of a botulinum toxin
- Tell patients they should receive immediate medical attention if they have worsening or unexpected difficulty swallowing or talking, trouble breathing, or muscle weakness

From: FDA, Early Communication, February 8, 2008.
http://www.fda.gov/cder/drug/early_comm/botulinium_toxins.htm

BTX-A Dilutions

100 U

1 cc

100 U/syringe
10 U/0.1 cc

100 U

2 cc

50 U/syringe
5 U/0.1 cc

100 U

4 cc

100 U/syringe
25 U/1 cc

Dilution with preservative-free saline.

BTX-B Dilutions

2,500 U/0.5 cc

0.5 cc

2,500 U/ 0.5 cc
500 U/0.1 cc

5,000 U/1 cc

1 cc

5,000 U/1 cc
500 U/0.1 cc

10,000 U/2 cc

1 cc

5,000 U/1 cc
500 U/0.1 cc

Myobloc may be diluted with normal saline.

Guidance Technique for Injection of Botulinum Toxin	
Electrical stimulation	• Particularly useful for dynamic muscle overactivity, where the EMG activity is only present when reflexes are elicited. This may be the case for an upgoing hallux or toe curling seen only during stance or gait. In such cases, the EMG activity may be too difficult to elicit at rest. Electrical stimulation may be the only way to localize the muscles. • Also useful to target smaller muscle groups in the forearm, while avoiding weakening of nearby useful muscles. Not useful with strongly contracting muscle groups in which the electrical stimulation may not have any effect on limb movement. • Can be used to localize motor points (area of small motor nerve endings in the muscle and often close to the motor endplate zone).[1] This requires full muscle relaxation. The needle is directed to the part of the muscle where a contraction can be elicited with stimulation of only 1 mAmp or less.
Needle EMG	• First palpate for the overactive muscle during range of motion of the involved joint. • Then, after needle insertion, target the area of the most EMG activity and place the needle so that the motor unit produces a crisp sound. This assures placement closest to the most active motor units. Placement of the needle at the midbelly of the muscle vs. close to the motor endplate (neuromuscular junction) or motor point has not clearly shown any functional benefits.[1,2] The majority of motor endplates will be found within the greatest bulk of the muscle.[3] • Passive stretch of the involved muscle will elicit increased EMG activity, which can be used to guide the injection as well. Again, inject into the area with the most EMG activity elicited and with the crispest sound. • Needle EMG can also be used to identify motor endplates. However, this requires the patient to be able to relax the muscles completely. The characteristic features of the endplate are: a low-voltage increase in the baseline of about 10 to 40 mV, irregularly firing monophasic spike discharges, and deep pain described by the patient.[1]

Guidance Technique for Injection of Botulinum Toxin (Continued)	
Audio-only EMG	Audio only and no EMG display. This may cause the injector to mistake the sound of muscle denervation potentials for muscle motor units. Recommend the user first becomes familiar with the combined audio and visual display of EMG activity (denervation potentials and motor unit activity), before using audio-only EMG. Also, Medicare may not cover the monitoring unless both visual and auditory components are procured.

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1. Childers MD. The importance of electromyographic guidance and electrical stimulation for injection of botulinum toxin. *Phys Med Rehabil Clin N Am* 2003;14:781–92.
2. Satila H, Iisalo T, Pietikainen T, et al. Botulinum toxin treatment of spastic equinus in cerebral palsy. *Am J Phys Med Rehabil* 2005;84:355–65.
3. Childers MK. Targeting the neuromuscular junction in skeletal muscles. *Am J Phys Med Rehabil* 2004;83(Suppl);S38–S44.

Techniques to Minimize Injection Pain	
Topical	Spray with an evaporant such as ethyl chloride or Flouri-Methane. Topical anesthetic such as lidocaine/prilocaine in the form of a gel or transdermal patch.
Oral Medications	Premedication with opioids or anxiolytics.
Dilution with preservative[1]	Botulinum toxin type B: further dilution with preserved saline.
Dilution with anesthetic[2]	With a pH of 5.6, the Myobloc preparation may cause local injection discomfort. Therefore, recommendations have been made to dilute the BTX preparation with preserved saline, lidocaine, or bupivacaine to provide a local anesthetic effect.
Nerve blocks	See pages 116–118.

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1. van Laborde, S, Dover JS, Moore M, et al. Reduction in injection pain with botulinum toxin type B further diluted using saline with preservative: a double-blind, randomized controlled trial. *J Am Acad Dermatol* 2003;489(6):875–77.
2. Royal MA. The use of botulinum toxin in the management of myofascial pain and other conditions associated with painful muscle spasm. In: Brin MF, Jankovic J, Hallet M, eds. *Scientific and Therapeutic Aspects of Botulinum Toxin*. Philadelphia: Lippincott Williams & Wilkins, 2002.

Dilutions		
BTX-A (Botox)	BTX-B (Myobloc)*	
100 U/1 cc = 100 U/cc 100 U/2 cc = 50 U/cc 100 U/4 cc = 25 U/cc	Undiluted = 250 U/0.05 cc	
	2,500 U + 1 cc NS = 83 U/0.05 cc	5,000 U + 1 cc NS = 125 U/0.05 cc
	2,500 U + 2 cc NS = 50 U/0.05 cc	5,000 U + 2 cc NS = 83 U/0.05 cc

*Each vial has an overfill amount beyond what is noted on the label. Therefore, do not perform dilutions in the vial. Pull out the desired volume in a syringe and add the desired additional volume of saline.

BOTULINUM TOXIN
INJECTION GUIDE

CHAPTER 1

Head and Neck

- Migraine
- Facial Hemispasms
- Blepharospasms
- Drooling/Sialorrhea
- Lingal Dystonia
- Oromandibular Dystonia
- Cervical Dysontia

Migraine 1/3 Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Procerus	2.5–5.0/site	50–100† (125–500)*	1
Corrugator, medial	2.5–4.0/site	Limited data	1
Frontalis	2.5/site (4–6/side)	500–750 500–1,250[4,8]	8–12
Temporalis (each muscle)	2.5–5/site (4/side)	Limited data for specific muscles See data for regions below reference 3	4
Occipitalis	5–10/side		1
Splenius capitis	5–15/side		1–2
Masseter	5–15/side		1–2
Levator scapulae	10–25/side[6,7]		
Trapezius	5–15/side	625–1,000/side[4,5,8]	1–3
Semispinalis	5–10/side	Limited data for specific muscles	1
Sternocleidomastoid	10–20/side		2
Total dose	100–200	2,500–5,000	
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii.	
Needle	30 G, 0.5 in		

Facial injections are done bilaterally to avoid asymmetric expressions.

* Data for facial hemispasms.

† Author recommendation.

3. Inadequate data for specific muscles. Dose ranges for areas[3,4]:
   Lateral neck muscles 625 U/side
   Cervical paraspinals 500–650 U/side
   Occipital 500–625/side
   Temporal 250/side

6,7. Doses used for trigger points/tender points.[5,6]

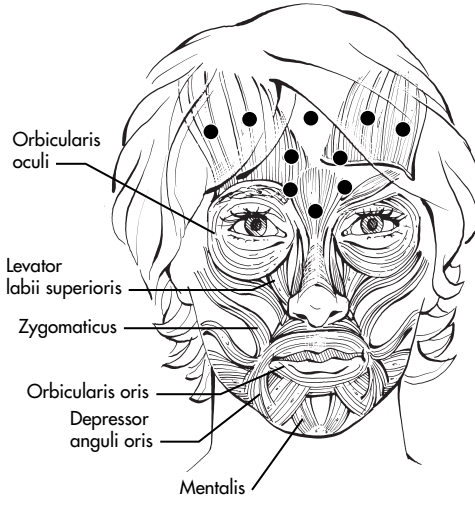
Injection Technique (see page 5)

References (see page 4).
Safety information (see pages xx–xxii).

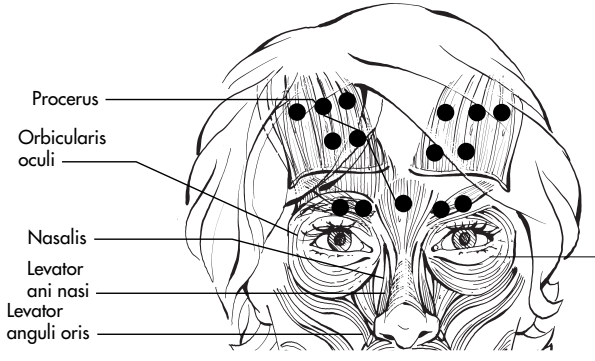
Muscles possibly involved

Procerus
Corrugator
Frontalis
Temporalis
Occipitalis
Splenius capitis
Masseter
Levator scapulae
Trapezius
Sternocleidomastoid
Cervical paraspinal muscles

Migraine 1/3



Author's technique



Blumenfeld technique

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2. MDVU. MD Virtual University, We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
3. Fadeyi MO, Adams QM. Use of botulinum toxin type b for migraine and tension headaches. *Am J Health-Syst Pharm* 2002;59:1860–62.
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8. Mathew MT, Frishberg M, Gawel M, et al. Botox CDH study group. *Headache* 2005;45:293–307.

Injection Precautions	
Bruising	Avoid injecting into visible superficial blood vessels. For facial injections, place the patient in upright or semiupright position to minimize bleeding and bruising. Apply pressure and cold packs after the injection. Angle needle ~45 degrees.
Depth of injection	Intramuscular. Intradermal and periosteal injections are less effective.
Symmetrical injections	For facial injections, to avoid asymmetric expression. Consider preinjection photos.
Ptosis	Avoid injections into the brow areas. Inject approximately 2 cm above the brows. Avoid injections above the levator palpebra (see page 12–13).
Intravascular injections	Can be minimized by applying vacuum to the syringe before the injection, avoiding visible superficial vessels and intraperiosteal injections.
Injection Techniques	
Follow-the-pain	This approach for injections allows a more individualized approach depending on the patient's localization of pain and tender/trigger points. The dosing may vary from side to side except for the facial area.
Fixed-site injections	Fixed, symmetrical injections are used to infiltrate the target region. This approach may not include areas with pain such as the scalp. On the other hand, this approach may also include injections of areas with no pain or trigger/tender points such as the frontalis muscle. Conceivably, the cosmetic benefits may influence the patient's decision to have future treatments regardless of the effects on pain relief.
Combination approach	Here the fixed-site approach is used for certain areas, while the follow-the-pain approach is used for other areas.

Modified after Blumenfeld et al.

Migraine 2/3 Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Procerus	2.5–5.0/site	50–100† (125–500)*	1
Corrugator, medial	2.5–4.0/site	Limited data	1
Frontalis	2.5/site (4–6/side)	500–750 500–1,250[4,8]	8–12
Temporalis (each muscle)	2.5–5/site (4/side)	Limited data for specific muscles See data for regions below reference 3	4
Occipitalis	5–10/side		1
Splenius capitis	5–15/side		1–2
Masseter	5–15/side		1–2
Levator scapulae	10–25/side[6,7]		
Trapezius	5–15/side	625–1,000/side[4,5,8]	1–3
Semispinalis	5–10/side	Limited data for specific muscles	1
Sternocleidomastoid	10–20/side		2
Total dose	100–200	2,500–5,000	
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
Needle	30 G, 0.5 in		

Facial injections are done bilaterally to avoid asymmetric expressions.

* Data for facial hemispasms.

† Author recommendation.

3. Inadequate data for specific muscles. Dose ranges for areas[4,5]:
   Lateral neck muscles 625 U/side
   Cervical paraspinals 500–650 U/side
   Occipital 500–625/side
   Temporal 250/side

6,7. Doses used for trigger points/tender points.[6,7]

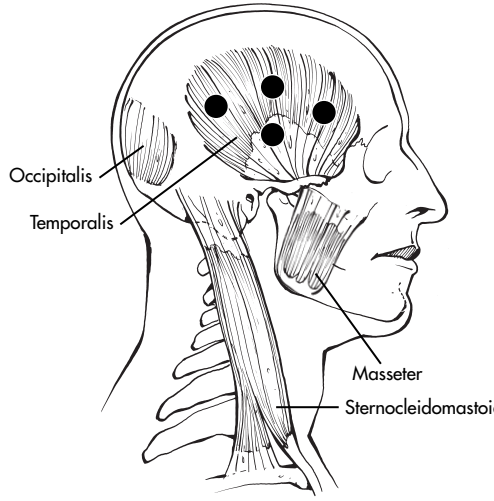
Injection Technique (see page 5)

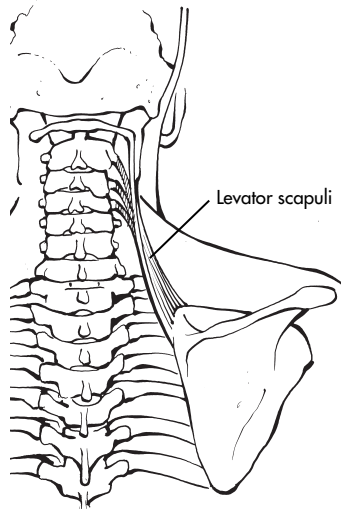
References (see page 4).
Safety information (see pages xx–xxii).

Muscles possibly involved

Procerus
Corrugator
Frontalis
Temporalis
Occipitalis
Masseter
Levator scapulae
Sternocleidomastoid
Splenius capitis
Trapezius
Cervical paraspinal muscles

Migraine 2/3





Migraine 3/3 Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Procerus	2.5–5.0/site	50–100† (125–500)*	1
Corrugator, medial	2.5–4.0/site	Limited data	1
Frontalis	2.5/site (4–6/side)	500–750 500–1,250[4,8]	8–12
Temporalis (each muscle)	2.5–5/site (4/side)	Limited data for specific muscles See data for regions below reference 3	4
Occipitalis	5–10/side		1
Splenius capitis	5–15/side		1–2
Masseter	5–15/side		1–2
Levator scapulae	10–25/side[6,7]		
Trapezius	5–15/side	625–1,000/side[4,5,8]	1–3
Semispinalis	5–10/side	Limited data for specific muscles	1
Sternocleidomastoid	10–20/side		1–3
Total dose	100–200	2,500–5,000	
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
Needle	30 G, 0.5 in		

Facial injections are done bilaterally to avoid asymmetric expressions.

* Data for facial hemispasms

† Author recommendation.

3. Inadequate data for specific muscles. Dose ranges for areas[4,5]:
   Lateral neck muscles 625 U/side
   Cervical paraspinals 500–650 U/side
   Occipital 500–625/side
   Temporal 250/side

6,7. Doses used for trigger points/tender points.[6,7]

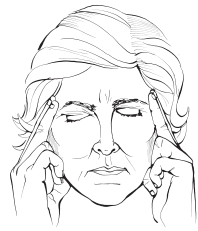
Injection Technique (see page 5)

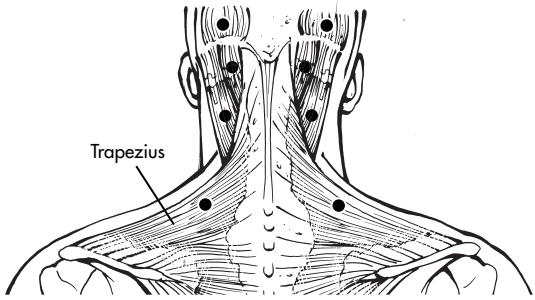
References (see page 4).
Safety information (see pages xx–xxii).

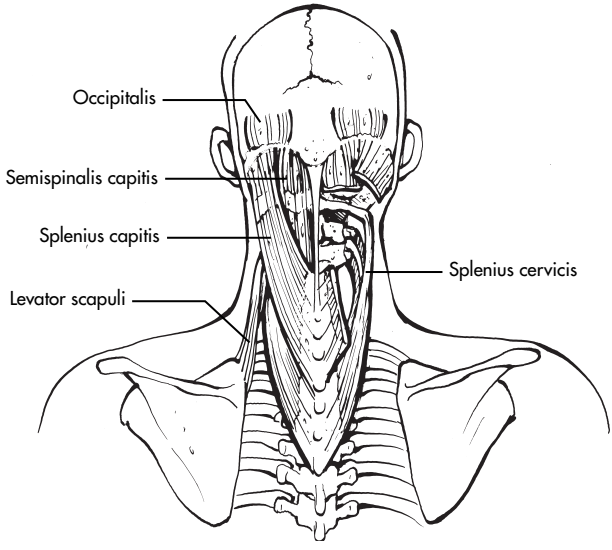
Muscles possibly involved

Procerus
Corrugator
Frontalis
Temporalis
Occipitalis
Masseter
Sternocleidomastoid
Levator scapulae
Splenius capitis
Trapezius
Cervical paraspinal muscles

Migraine 3/3







Facial Hemispasms Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Procerus	2.5–5 (2.5–7)*	125–500	1
Orbicularis oculi	5 (1–2.5)*	250–1,000	3–5/side
Nasalis		125–250	1/side
Levator labii superioris	2 (1.75–5)	125–250	1/side
Levator anguli oris		125–250	1/side
Zygomaticus major	2 (1.75–12.5)	125–500	1–2/side
Orbicularis oris	2 (1.75–7.5)	75–250	1–4
Risorius	2.5 (1–5)*	125–250	1/side
Depressor anguli oris	2 (2.5–6)	125–250	1/side
Depressor labii inferioris		125–250	1/side
Mentalis		125–250	1/side
Corrugator	5 (3–7.75)*	125–750	1/side
Platysma	10 (5.0–20)	500–2,500	2–4/side
Total dose		750–5,000	
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
Needle	30 G, 0.5 in		

*Dose value from blepharospasm chart.[1]

Injection Precautions See additional information under migraine page 5	
Bruising	Avoid injecting into visible superficial blood vessels. For facial injections, place the patient in upright or semiupright position to minimize bleeding and bruising. May apply pressure and cold packs after the injection. Angle needle ~45 degrees to minimize bleeding.
Ptosis	Avoid injections above the levator palpebra, which elevates the eyelid (see page 12–13).

References

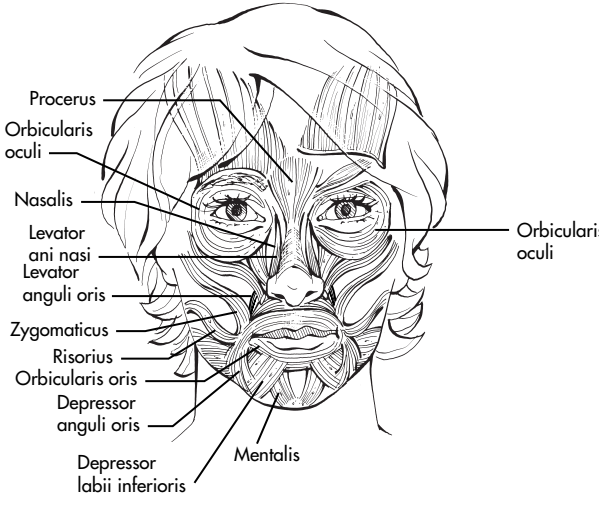
1. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Dystonia with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.

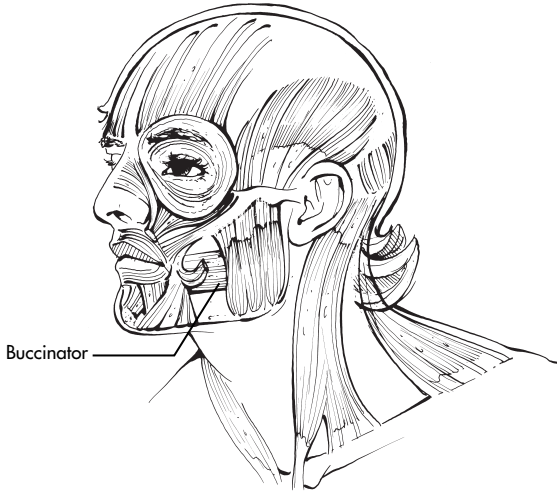
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Procerus
Orbicularis oculi
Nasalis
Levator ani nasi
Levator anguli oris
Zygomaticus major
Orbicularis oris
Buccinator
Risorius
Depressor anguli oris
Depressor labii inferioris
Mentalis

Facial Hemispasms





Blepharospasms Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Orbicularis oculi Pretarsal fibers	5 1–2.5/site	250–1,000	2–5
Procerus	2.5–5 2.5–7/site	250–500	1/side
Frontalis	10 2.5–7.5/site	500–750† 500–1,250*	2/side
Corrugator	5 3–7.5/site	250–750	1/side
Total dose	12.5–15	750–2,500 U/side	
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
Needle	30 G, 0.5 in		

*Dose from migraine chart.[1]
† Author recommendation.

Injection Technique	
See additional information under migraine page 5.	• Injection sites will vary according the muscle activity. • Injections of the orbicularis oculare are done medial and lateral to the levator palpebrae to avoid ptosis. • Avoiding injecting the central part of the lower lid helps prevent entropion and sagging of the lower lid.[3] • Injections too deeply into the medial lower eyelid may cause diffusion into the inferior oblique muscle with a potential for diplopia.[4]

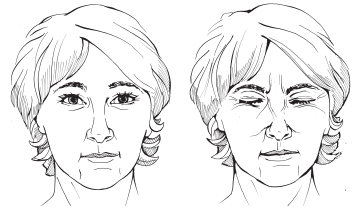
References

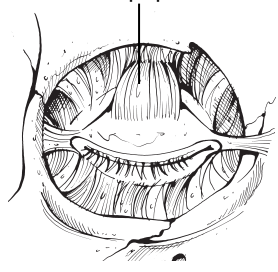
1. MDVU. MD Virtual University. Adult Dosing Guidelines. Management of Dystonia with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. MDVU. MD Virtual University. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.
3. Bhidayasiri R, Cardoso F, Truong DD. Botulinum toxin in blepharospasm and oromandibular dystonia: comparing different botulinum toxin preparations. *Eur J Neurol* 2006;13(Suppl 1):21–29.
4. Campos EC, Bolzani R, Schiavi C, et al. Effect of injection sites of botulinum toxin for blepharospasm treatment: statistical analysis. *Neuro-ophthalmol* 1999;22:17–23.

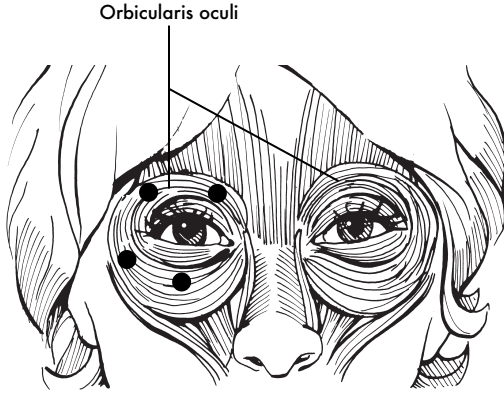
Muscles possibly involved

Orbicularis oculi
Procerus
Frontalis
Corrugator

Blepharospasms







Drooling/Sialorrhea Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per gland
Parotid glands	15–40/gland	500–1,000/ gland* 1,000/gland	2
Submandibular glands +/– ultrasound guidance	10–15/gland	250/gland	1
Dilution	100 U/1–2 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
Needle	30 G, 0.5 in		

Injection Technique	
Parotid	Posterior to the palpated masseter muscle and anterior to the external ear[2]
Submandibular	Anterior and medial to the genu of the mandible[2]

* Author recommendation.

References

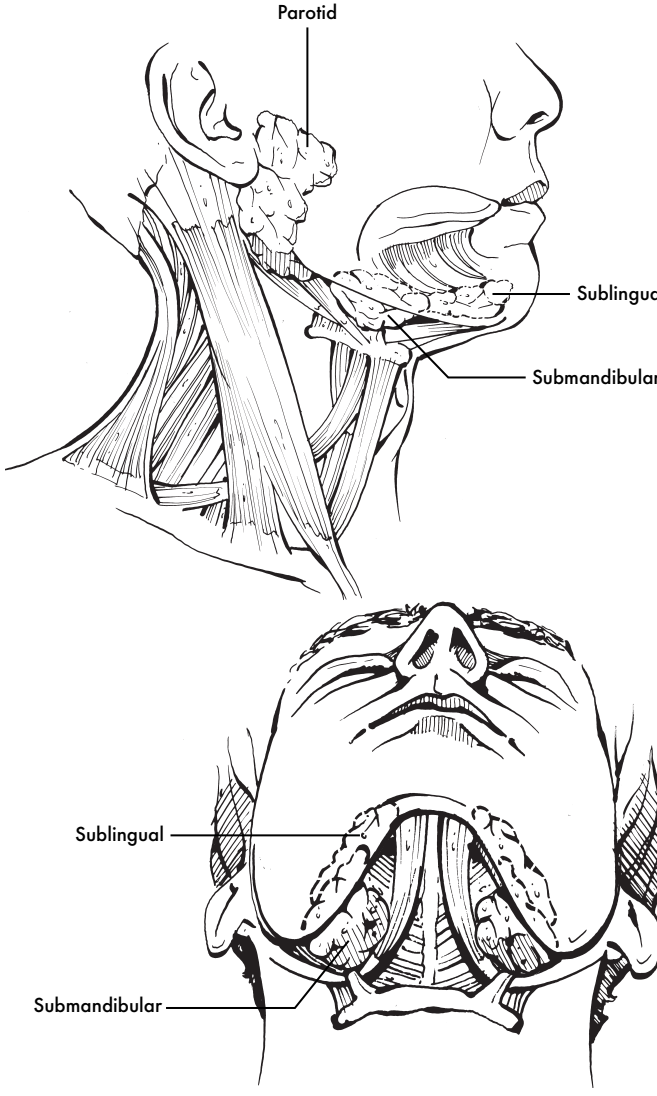
1. Porta M, Gamba M, Bertacchi G, Vaj P. Treatment of sialorrhea with ultrasound guided botulinum toxin type A injection in patients with neurological disorders. *J Neurol Neurosurg Psychiatry* 2001;70:538–40.
2. Ondo WG, Hunter C, Moore W. A double-blind placebo-controlled trial of botulinum toxin B for sialorrhea in Parkinson's disease. *Neurology* 2004;62:37–40.

See drooling scales pages 155–157.

Glands possibly involved

Parotid glands
Submandibular glands
Sublingual glands

Drooling/Sialorrhea



Lingual Dystonia Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units	Injection sites per muscle
Genioglossus muscle	10–30[1,2]	500–1,000[4]	1–2/side
Hypoglossus	10–30	Limited data*	1
Total dose	10–30		
Dilution	100 U/1–2 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
EMG needle	27–25 G, 1 in		

*Inadequate data for dose recommendations.

Injection Technique	
Intraoral	*Genioglossus*. 15–20 U/side injected at two sites at the base of the tongue, using 27G, 1 in needle.[3] *Intrinsic muscles*. 15–20 U/side in two locations, middle lateral side of tongue, using 30 G, 1/2 in needle.[3]
Submandibular approach	*Genioglossus*. 5–15 U/side injected at two sites bilaterally through a percutaneous submandibular approach,[1] using a 27–25 G EMG needle.

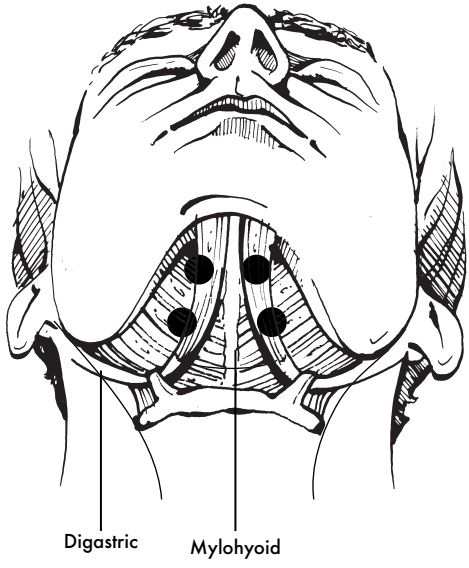
Other	
Adverse events	Dysphagia, dysarthria
Tongue protrusion	Due to the action of the posterior fibers of the genioglossus[5]
Tongue retraction	Due to the action of the anterior fibers[5]

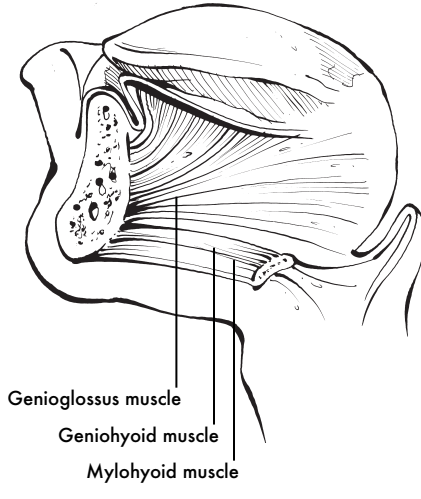
References

1. Charles PD, Davis T, Shannon KM, Hook MA, Warner JS. Tongue protrusion dystonia: treatment with botulinum toxin. 1997;90:522–25.
2. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Dystonia with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
3. Clark TG. The management of oromandibular motor disorders and facial spasms with injections of botulinum toxin. *Phys Med Rehabil Clin N Am* 2003;14:727–48.
4. MDVU. MD Virtual University. BTX-B Adult Dosing Guidelines Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.
5. Bhidayasiri R, Cardoso F, Truong DD. Botulinum toxin in blepharospasm and oromandibular dystonia: comparing different botulinum toxin preparations. *Eur J Neurol* 2006;13(Suppl 1):21–29.

Muscle possibly involved
Genioglossus muscle

Lingual Dystonia





Oromandibular Dystonia Dosing Ranges			
	Botox (BTX-A) units[2]	Myobloc (BTX-B) units[3]	Injection sites
Masseter	40/side (25–100)	1,000–3,000	2/side
Temporalis	40/side (20–60)	500–1500† 1,000–3,000	2–4/side
Orbicularis oris	15–20*[4]/side	250–500	2–4/side
Anterior digastric, geniohyoid, mylohyoid	10 (10–200)	250–750	1/side
Medial pterygoid	15 (15–50)	1,000–3,000	1/side
Lateral pterygoid	40 (20–100)	1,000–3,000	1/side
Total dose		1,250–5,000 U per side	
Dilution	100 U/1–2 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
Needle	30 G, 0.5 in to 27 G, 37 mm		

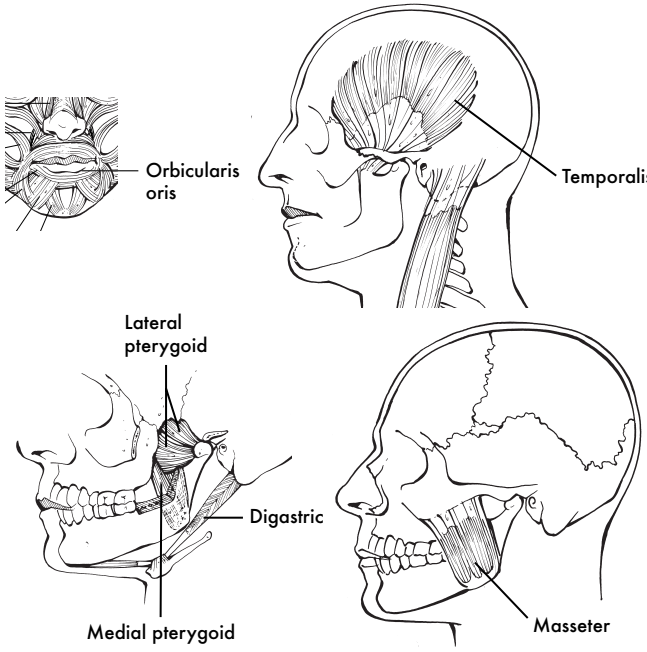
*Inject below the lower lip in four locations. Only inject in the upper lip if this approach does not work fully.[4]
† Author recommendation. May lower dose with bilateral multiple masticatory muscle injections.

Injection Technique	
Median pterygoid	Can be approached either intraorally or from below.[1] *From below*: The needle is inserted 0.5 to 1 cm anterior to the angle of the mandible along the interior aspect of the mandible and angled perpendicular to the mandible until it can be verified by EMG with the patient clenching his teeth. *Oral approach*: Posterior to the lower molars. The facial artery lies anteriorly. A bite bloc placed laterally can be helpful to prevent trauma to the fingers.
Lateral pterygoid	Laterally, the entry point is approximately 35 mm from the external auditory canal and 10 mm from the inferior margin of the zygomatic arch.[1] The EMG needle is angled upward about 15 degrees to reach the inferior head of the lateral pterygoid.

Other	
Mouth opening	Lateral pterygoid is the major contributor.
Mouth closure	Masseter, medial pterygoid, temporalis.
Adverse events	Potential for hypernasal speech due to palatal muscle weakness, especially with the lateral pterygoid muscle injection.[4]

Muscles possibly involved

Masseter
Temporalis
Orbicularis oris
Medial pterygoid
Lateral pterygoid
Digastric
Geniohyoid
Mylohyoid



See previous illustrations for the anterior digastric, geniohyoid, and mylohyoid muscles.

References

1. Bhidayasiri R, Cardoso F, Truong DD. Botulinum toxin in blepharospasm and oromandibular dystonia: comparing different botulinum toxin preparations. *Eur J Neurol* 2006;13(Suppl 1):21–29.
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4. Clark GT. The management of oromandibular motor disorders and facial spasms with injections of botulinum toxin. *Phys Med Rehabil Clin N Am* 2003;14:727–48.

Cervical Dystonia – Torticollis 1/2 Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Splenius capitis	75 (50–150)	1,000–5,000	2–4
Splenius cervicis	30 (20–60)	Limited data	2
Inferior oblique longus capitis	30[4]	Limited data	
Sternocleidomastoid – contralateral	50 (15–75)	1,000–3,000	1–4
Levator scapula	50 (25–100)	1,000–4,000	1–3
Cervical dystonia		5,000–10,000	
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Injection Technique	
Splenius capitis	Posterior approach: One finger breadth lateral to the C5 spinous process.
Splenius cervicis	Posterior approach: One–two finger breadths lateral to the T1 spinous process.
Inferior oblique longus capitis	*Lateral approach*: Approximately two–three finger breadths below the tip of mastoid process at the top level of the C2 spinous process. Beware of the location of the vertebral artery and the superficial occipital nerve.[5] The greater occipital n. lies posterior over the inferior oblique capitis. *Posterior approach*: Less than one finger breadth lateral to the C2 spinous process. Be aware of the intervertebral space of C1-C2 anterior to the inferior oblique longus capitis.

Neck injections pose a significant risk for dysphagia.

References

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2. Clinical experience helps you determine the lowest effective dose. BTX 0104. Irvine CA: Allergan Inc., 2002.
3. MDVU. MD Virtual University. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.
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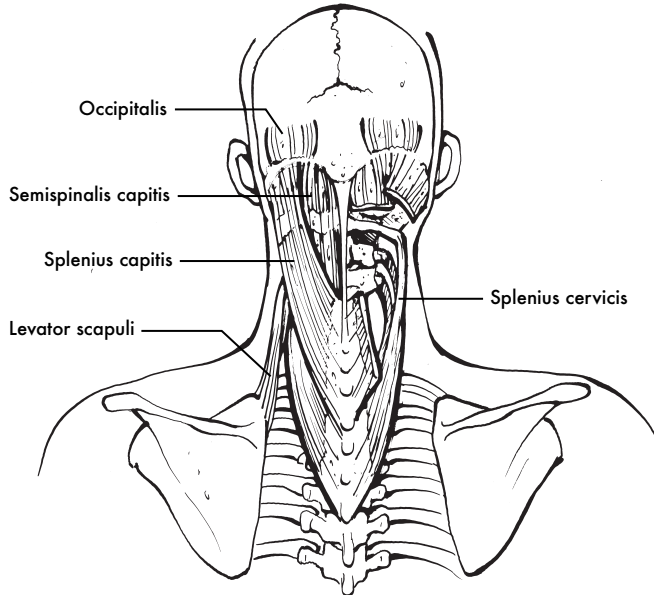
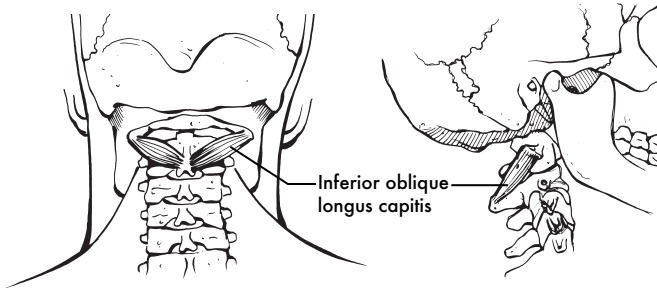
Muscles possibly involved

Ipsilateral splenius capitis
Splenius cervicis
Inferior oblique longus capitis
Levator scapulae
Contralateral sternocleidomastoid

Cervical Dystonia – Torticollis 1/2





Cervical Dystonia—Torticollis 2/2 Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Splenius capitis (ipsilateral)	75 (50–150)	1,000–5,000	2–4
Splenius cervicis	30 (20–60)	Limited data	2
Inferior oblique longus capitis	30[4]	Limited data	
Sternocleidomastoid (contralateral)	50 (15–75)	1,000–3,000	1–4
Levator scapula	50 (25–100)	1,000–4,000	1–3
Cervical dystonia		5,000–10,000	
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Injection Technique	
Sternocleidomastoid (contralateral)	The midbelly of the muscle is vertically below the angle of the jaw.
Levator scapula	*Lateral approach:* is at the level of the thyroid cartilage and one finger breadth, anterior to the trapezius and posterior to the vertical line of the styloid process. *Posterior approach:* is approximately three finger breadths lateral to the C6 sponours process.

Neck injections pose a significant risk for dysphagia.

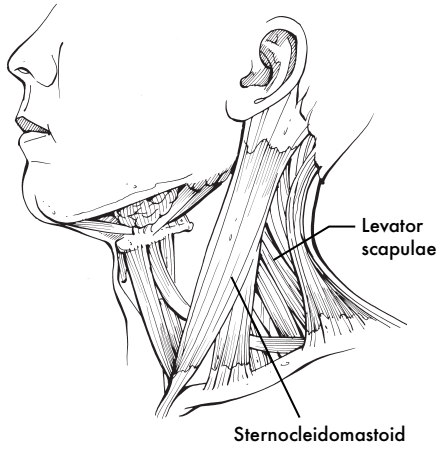
References

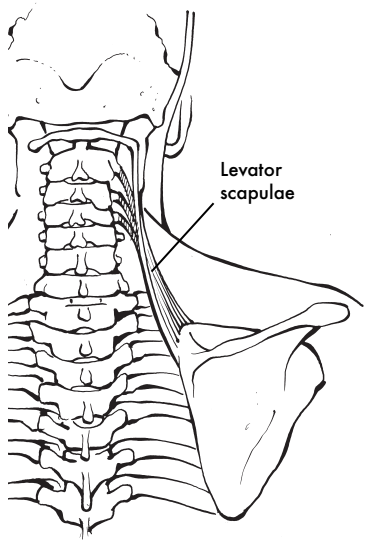
1. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Dystonia with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. Clinical experience helps you determine the lowest effective dose. BTX 0104. Irvine CA: Allergan Inc., 2002.
3. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.
4. Walker FO. Botulinum toxin therapy for cervical dystonia. *Phys Med Rehabil Clin N Am* 2003;14:749–66.

Muscles possibly involved

Ipsilateral splenius capitis
Splenius cervicis
Inferior oblique longus capitis
Levator scapulae
Contralateral sternocleidomastoid

Cervical Dystonia – Torticollis 2/2





Cervical Dystonia—Retrocollis Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Splenius capitis – bilateral	75 50–150/side	1,000–5,000	2–4
Semispinalis capitis	75 50–150	1,000–5,000	1–4
Longissimus	75 50–150	1,000–5,000	1–4
Dilution	100 U/2–4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

For retrocollis, inject bilaterally to avoid tilting of the head.
Author recommends lower doses with bilateral injections.

Injection Technique	
Splenius capitis – bilateral	*Posterior approach*: One finger breadth lateral to the C5 spinous process.
Semispinalis capitis	One finger breadth lateral to the C3 spinous process.
Longissimus	Two finger breadths lateral to the C7 spinous process.

Neck injections pose a significant risk for dysphagia.

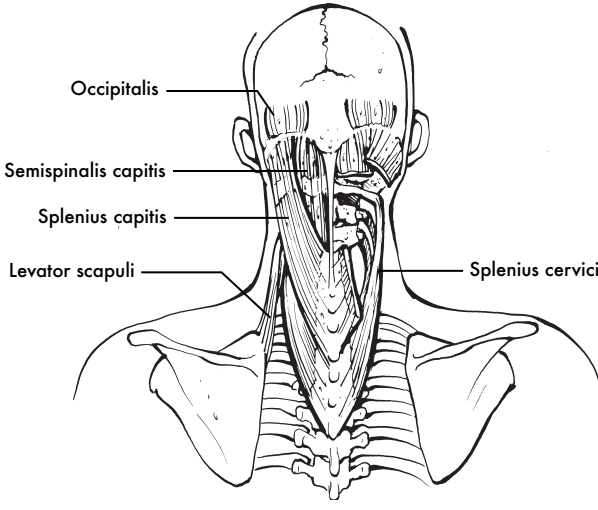
References

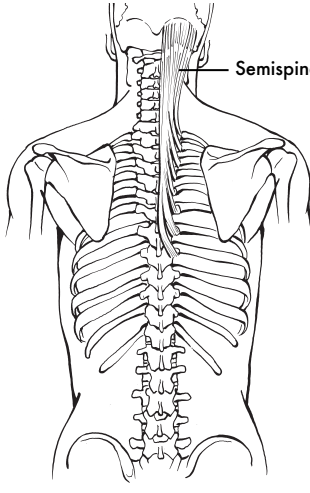
1. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Dystonia with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. Clinical experience helps you determine the lowest effective dose. BTX 0104. Irvine CA: Allergan Inc., 2002.
3. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

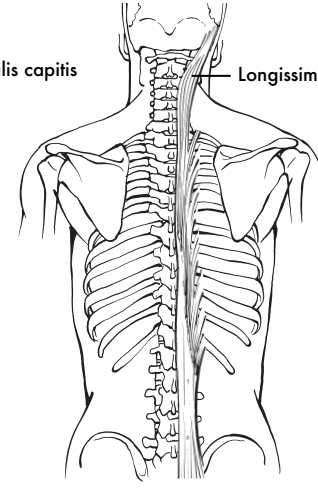
Muscles possibly involved

Splenius capitis
Semispinalis capitis
Longissimus

Cervical Dystonia—Retrocollis







Cervical Dystonia—Laterocollis Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Splenius capitis	75 50–150	1,000–5,000	2–4
Scalene complex – ipsilateral	35 15–50	1,000–3,000	**1–3**
Levator scapulae	50 25–100	1,000–4,000	1–3
Longissimus	75 50–150	1,000–5,000	1–4
Dilution	100 U/2 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Injection Technique	
Splenius capitis	Posterior approach: One finger bredth lateral to the C5 spinous process.
Scalene complex – ipsilateral	The injector should be familiar with the anatomy, because the phrenic nerve lies on anterolateral surface of the anterior scalene muscle. *Lateral approach:* approximately two finger breadths above the clavicle. The anterior scalene is immediately posterior to the clavicular head of the sternocleidomastoid muscle. Approach the needle slowly and withdraw if any radiation of pain. The posterior scalene is immediately anterior to the anterior border of the trapezius. Ultrasound or fluoroscopy guidance is helpful.
Levator scapulae	*Lateral approach:* Midpoint from the clavicle to the mastoid process and immediately anterior the trapezius. *Posterior approach:* is approximately three finger breadths lateral to the C7 spinous process.
Longissimus	Two finger breadths lateral to the C7 spinous process.

Neck injections pose a significant risk for dysphagia.

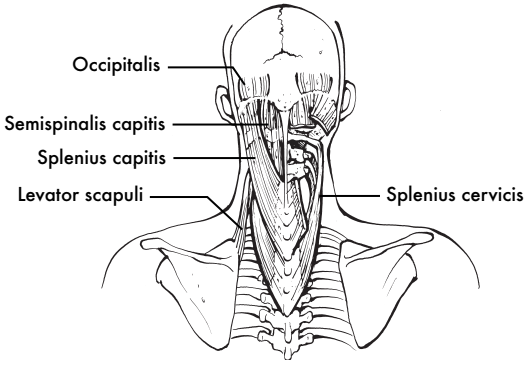
References

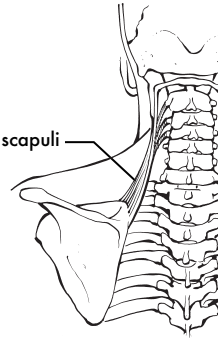
1. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Dystonia with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. Clinical experience helps you determine the lowest effective dose. BTX 0104. Irvine CA: Allergan Inc., 2002.
3. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

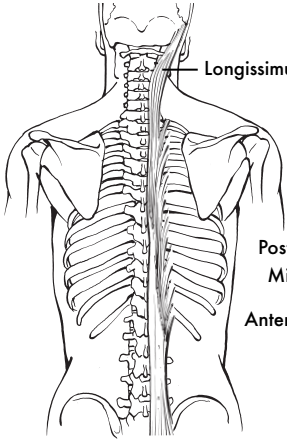
Muscles possibly involved

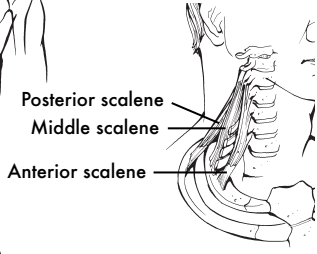
Splenius capitis
Scalene complex
Levator scapulae
Longissimus

Cervical Dystonia—Laterocollis









Cervical Dystonia—Anterocollis Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Sternocleido-mastoid (bilateral)	50 15–75	1,000–3,000	1–2
Dilution	100 U/2 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

The dose should be reduced by 50% if both SCM muscles are injected.

Injection Technique	
Sternocleidomastoid	The midbelly of the muscle is vertically below the angle of the jaw.

Neck injections pose a significant risk for dysphagia.

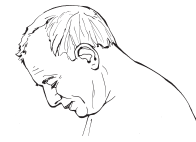
References

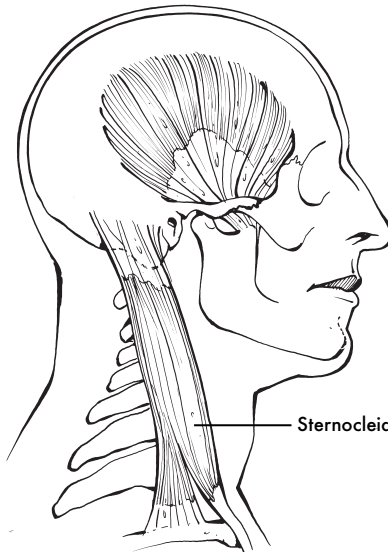
1. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Dystonia with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. Clinical experience helps you determine the lowest effective dose. BTX 0104. Irvine CA: Allergan Inc., 2002.
3. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

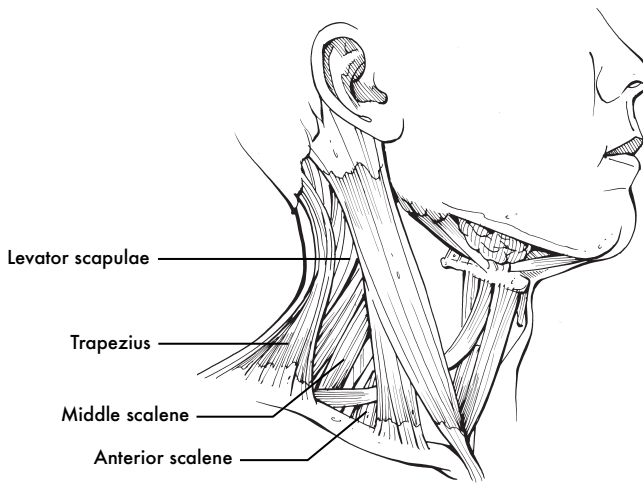
Muscles possibly involved

Bilateral
sternocleidomastoid

Cervical Dystonia—Anterocollis







CHAPTER 2

Spasticity/Dystonia: Upper Extremities

- Adducted/Internally Rotated Shoulder
- Flexed Elbow
- Pronated Forearm
- Flexed Wrist
- Extended Wrist
- Clenched Fist
- Thumb-in-Palm
- Adducted Thumb
- Intrinsic Plus Hand
- Extended Digits
- Writer's Cramp
- Safety Information Update
- Pediatric Dosing for Upper Extremities

Adducted/Internally Rotated Shoulder 1/2 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Pectoralis complex	100 (50–200)	2,500–5,000	2–6
Latissimus dorsi	100 (50–200)	2,500–5,000	2–6
Teres major	50 (25–100)	1,000–3,000	1–4
Subscapularis	75 (50–100)	1,000–3,000	1–2
Total dose		5,000–15,000	
Dilution	100 U/4 cc Dispensed in 1 cc syringes	Dilutions, see page xxvii	
EMG needle	25–27 G, 37–50 mm		

Pediatric dosing see page 61.

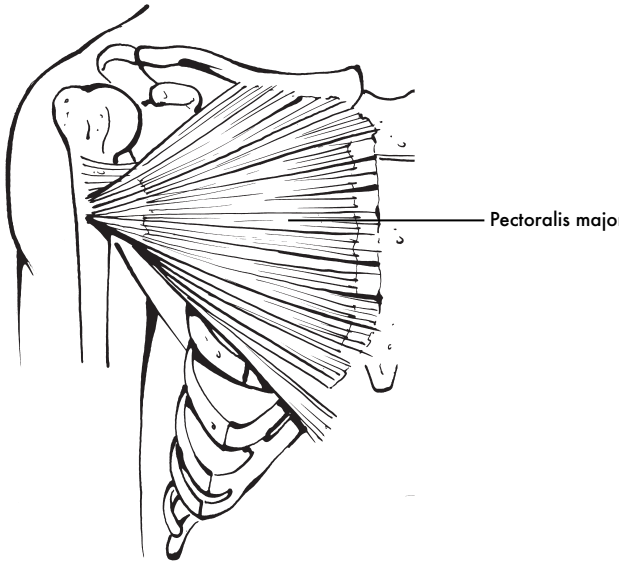
Injection Technique	
Pectoralis major	Palpate the anterior axillary fold between thumb and fingers and inject the muscle. Use caution with needle depth when injecting over the chest wall. Inject over the ribs to reduce the potential for pneumothorax.
Latissimus dorsi	Palpate the posterior axillary fold between thumb and fingers and inject the muscle. Potential for pneumothorax exists.
Teres major	Palpate the muscle at the top of the posterior axillary fold and direct the needle towards the acromion.
Subscapularis	*Medial approach*: Place patient prone or sitting with hand on back and close to the shoulder blade to wing the scapula. Inject laterally toward and under the scapula. *Lateral (axillary) approach*[3]: Inject between the posterior axillary fold and the brachial pulse. Direct the needle posteriorly towards the subscapular fossa's lateral edge. Potential for pneumothorax exists.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 mL	2,500 U	

Muscles possibly involved

Pectoralis major
Teres major
Latissimus dorsi
Subscapularis

Adducted/Internally Rotated Shoulder 1/2



References

1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.
3. Chiodo A, Goodmurphy C, haig A. Cadaveric study of methods for subscapularis muscle needle insertion. *Am J Phy Med Rehabil* 2005;84:662–665.

Adducted/Internally Rotated Shoulder 2/2 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Pectoralis complex	100 (50–200)	2,500–5,000	2–6
Latissimus dorsi	100 (50–200)	2,500–5,000	2–6
Teres major	50 (25–100)	1,000–3,000	1–4
Subscapularis	75 (50–100)	1,000–3,000	1–2
Total dose		5,000–15,000	
Dilution	100 U/4 cc Dispensed in 1 cc syringes	Dilutions see page xxvii	
EMG needle	27 G, 37 mm		

Pediatric dosing see page 61.

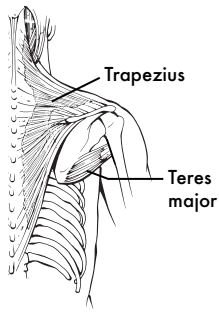
Injection Technique	
Pectoralis major	Palpate the anterior axillary fold between thumb and fingers and inject the muscle. Use caution with needle depth when injecting over the chest wall. Inject over the ribs to reduce the potential for pneumothorax.
Latissimus dorsi	Palpate the posterior axillary fold between thumb and fingers and inject the muscle. Potential for pneumothorax exists.
Teres major	Palpate the muscle at the top of the posterior axillary fold and direct the needle towards the acromion.
Subscapularis	*Medial approach*: Place patient prone or sitting with hand on back and close to the shoulder blade to wing the scapula. Inject laterally toward and under the scapula. *Lateral (axillary) approach*[3]: Inject between the posterior axillary fold and the brachial pulse. Direct the needle posteriorly towards the subscapular fossa's lateral edge. Potential for pneumothorax exists.

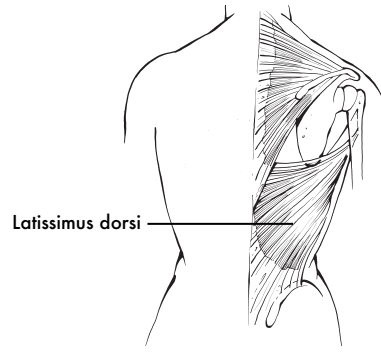
Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 mL	2,500 U	

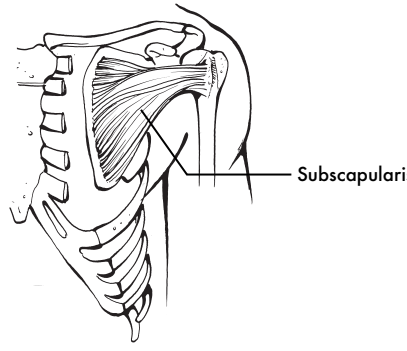
Muscles possibly involved

Pectoralis major
Teres major
Latissimus dorsi
Subscapularis

Adducted/Internally Rotated Shoulder 2/2







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1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.
3. Chiodo A, Goodmurphy C, haig A. Cadaveric study of methods for subscapularis muscle needle insertion. *Am J Phy Med Rehabil* 2005;84:662–665.

Flexed Elbow Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Brachioradialis	60 25–100	1,000–3,000	1–4
Biceps	80 75–200	2,500–5,000	2–4
Brachialis	50 40–150	1,000–3,000	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	25–27 G, 37 mm		

Pediatric dosing see page 61.

Injection Technique	
Brachioradialis	The midbelly of the muscle is at the level of the insertion of the biceps tendon.
Biceps	Since the biceps supinates the forearm neurolysis may increase forearm pronation.
Brachialis	A lateral approach will avoid the biceps muscle and the median and ulnar nerves and vessels. At the level of four finger breadths above the lateral epicondyle.

Guidelines[1,3]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

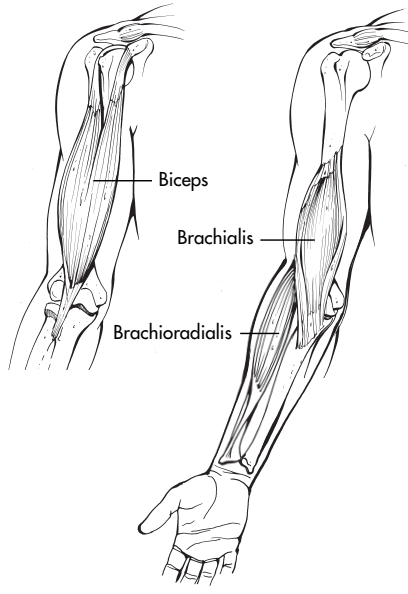
References

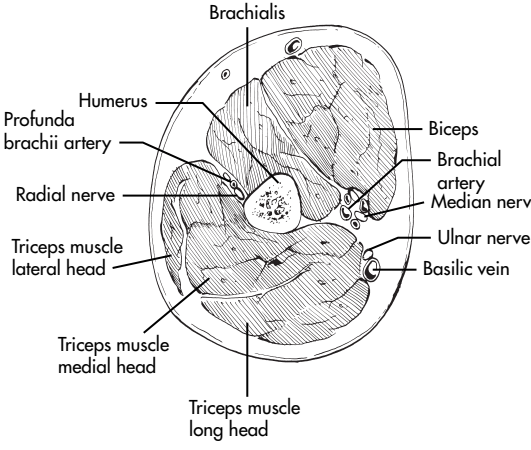
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Brachioradialis
Biceps
Brachialis

Flexed Elbow





Pronated Forearm Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Pronator quadratus	25 10–50	1,000–2,500	1–2
Pronator teres	40–50 25–75	1,000–2,500	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Pediatric dosing see page 61.

Injection Technique	
Pronator teres	Midbelly of the muscle is three finger breadths distal to the biceps tendon and one finger breadth medially.
Pronator quadratus	Dorsal approach between the radius and the ulnar at one-quarter the distance from the ulnar styloid process to the insertion of the biceps tendon.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

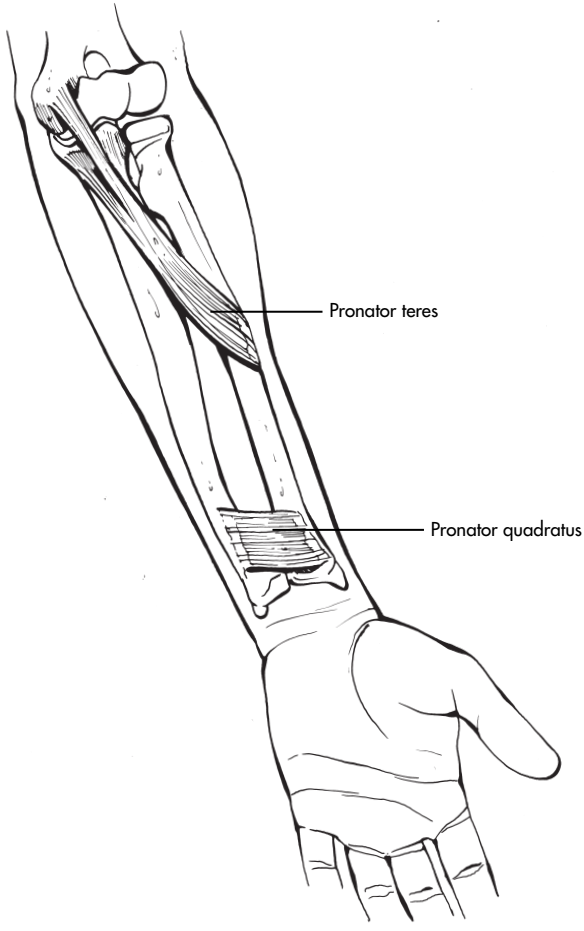
References

1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Pronator teres
Pronator quadratus

Pronated Forearm



Flexed Wrist Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Flexor carpi radialis	50 25–100	1,000–3,000	1–2
Flexor carpi ulnaris	40 20–100	1,000–3,000	1–2
Flexor digitorum profundus	20 20–50*	1,000–3,000*	1–2
Palmaris longus	40 20–100^	1,000–3,000^	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Pediatric dosing see page 61.
*Values used for clenched fist/fingers.[1,2]
^Values used for flexor carpi ulnaris.

Injection Technique	
Flexor carpi radialis	Midbelly of the muscle at four finger breadths below the elbow crease. Insert one finger breadth medial to the distal part of the biceps tendon.
Flexor carpi ulnaris	Midbelly of the muscle at one-third the distance from the medial epicondyle to the wrist.
Flexor digitorum profundus	Midbelly of the muscle at the midpoint of the biceps tendon and the ulnar styloid process.
Palmaris longus	Midbelly of the muscle at four finger breadths below the biceps tendon and one finger breadth medial to a line between the midwrist and the biceps tendon.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

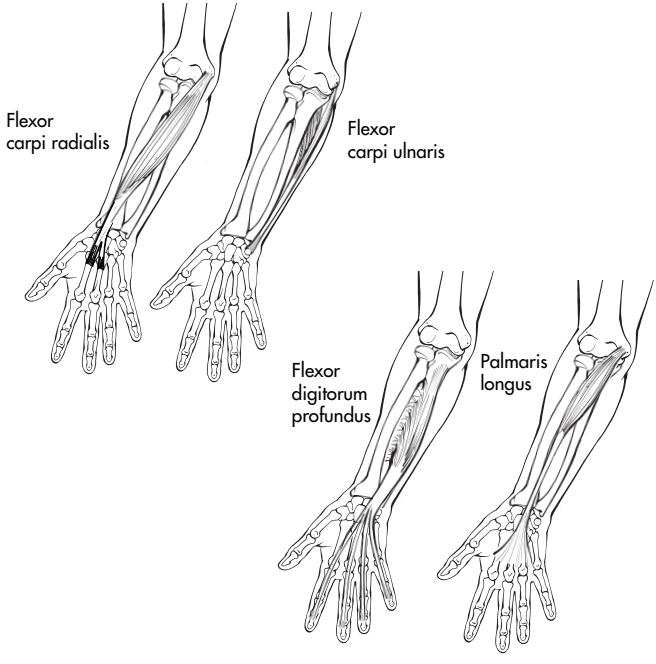
References

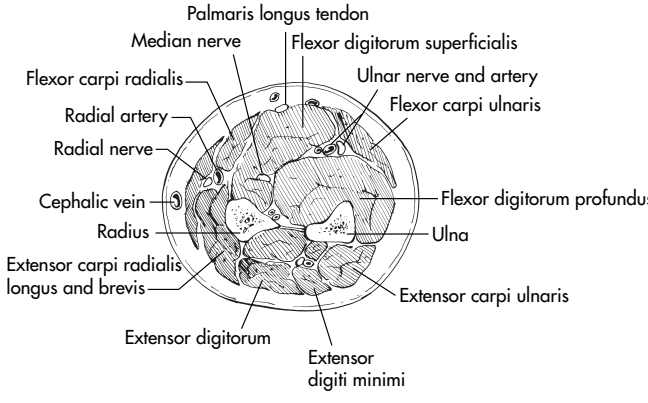
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Flexor carpi radialis
Flexor carpi ulnaris
Flexor digitorum profundus
Palmaris longus

Flexed Wrist





Extended Wrist Dosing Ranges			
	Botox (BTX-A) units[1*]	Myobloc (BTX-B) units[2*]	Injection sites per muscle
Extensor carpi radialis (longus and brevis)	40 20–100	1,000–3000	1–2
Extensor carpi ulnaris	40 20–100	1,000–3,000	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

*Values for flexor carpi ulnaris under flexed wrist.[2]

Injection Technique	
Extensor carpi radialis longus	Midbelly of the muscle located at one-third of the distance from the lateral epicondyle to the radial styloid process and over the radius.
Extensor carpi radialis brevis	Midbelly of the muscle located at one-fourth of the distance from the lateral epicondyle to the radial styloid process and over the radius.
Extensor carpi ulnaris	Midbelly of the muscle located at half the distance from the lateral epicondyle to the wrist and over the ulna.

Guidelines[1,3]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

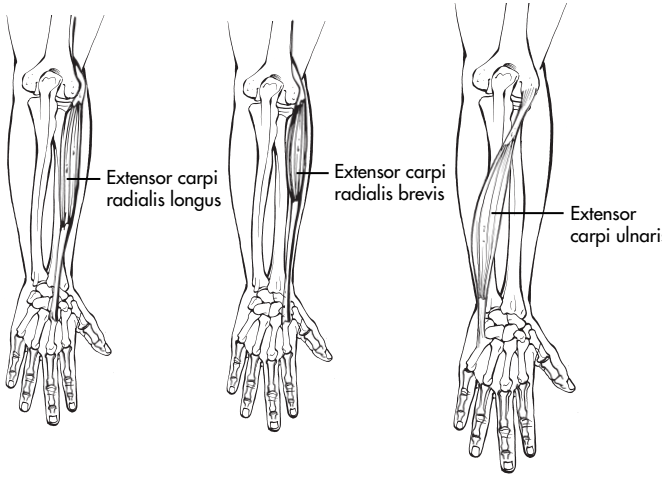
References

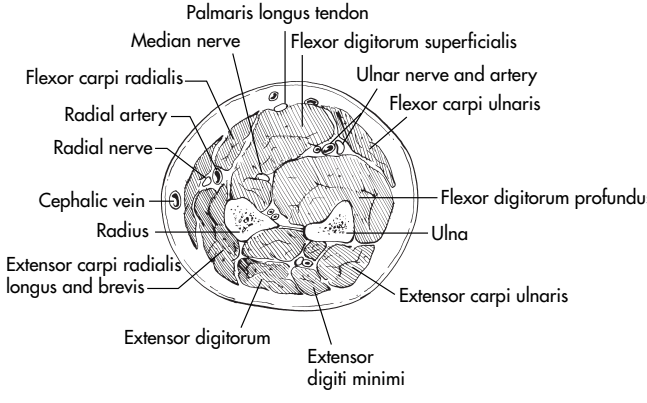
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Extensor carpi radialis longus
Extensor carpi radialis brevis
Extensor carpi ulnaris

Extended Wrist





Clenched Fist Dosing Ranges			
	Botox (BTX-A) units[1]*	Myobloc (BTX-B) units[2]*	Injection sites per muscle
Flexor digitorum superficialis (per fascicle)	20 20–50	1,000–3,000	1
Flexor digitorum profundus (per fascicle)	20 20–50	1,000–3,000	1
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Pediatric dosing see page 61.

Injection Technique	
Flexor digitorum superficialis	Midbelly of the muscle at the midpoint from the biceps tendon to the wrist and mainly over the proximal and middle ulna and interosseus membrane. The median and ulnar nerves lies between the FDS and FDP.
Flexor digitorum profundus	Midbelly of the muscle at the midpoint from the biceps tendon to the wrist and mainly over the ulna and interosseus membrane. A medial approach just above the ulna and below the flexor carpi ulnaris will minimize exposure to the ulnar nerve.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

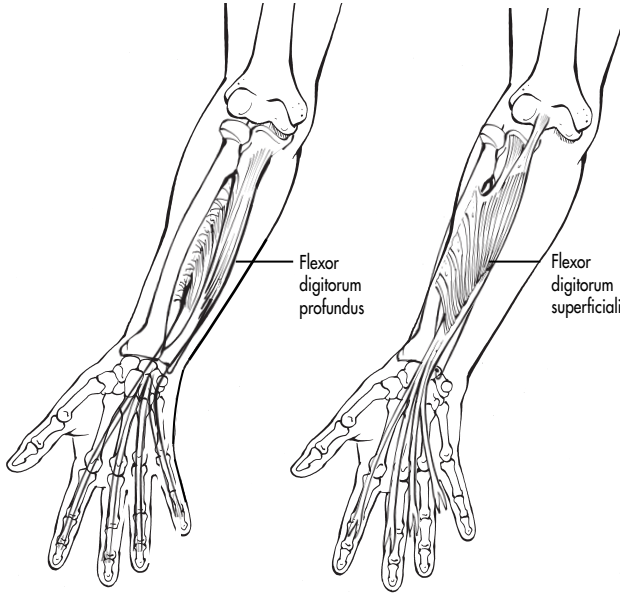
References

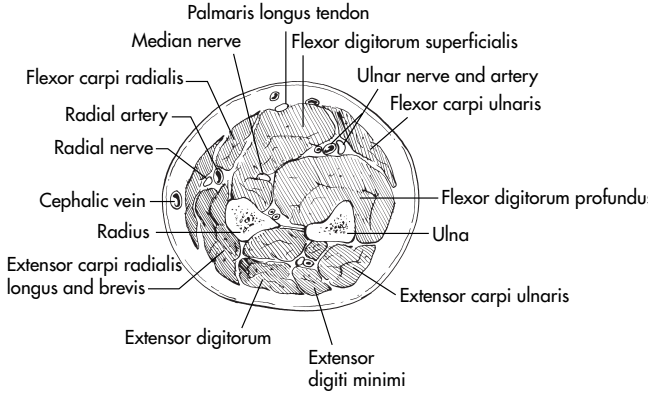
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Flexor digitorum superficialis
Flexor digitorum profundus

Clenched Fist





Thumb-in-Palm Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Flexor pollicis longus	20 10–50	1,000–2,500	1–2
Flexor pollicis brevis/ opponens	10 5–30	500–1,500	1
Adductor pollicis	10 5–30	500–2,500	1
First dorsal interosseus	2.5†	250–500*	1
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Pediatric dosing see page 61.
*Dose from the task-specific dystonia chart.[2]
*Dose from intrinsic plus hand.[1]

Injection Technique	
Flexor pollicis longus	Midbelly at one-third of the distance from the wrist to the biceps tendon over the radius.
Flexor pollicis brevis/opponens	Midbelly at the midpoint and medial border of the first metacarpal bone.
Adductor pollicis	Midbelly over the middle of the second metacarpal bone.
First dorsal interosseus	Midbelly at the midpoint of radial border of the second metacarpal bone.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

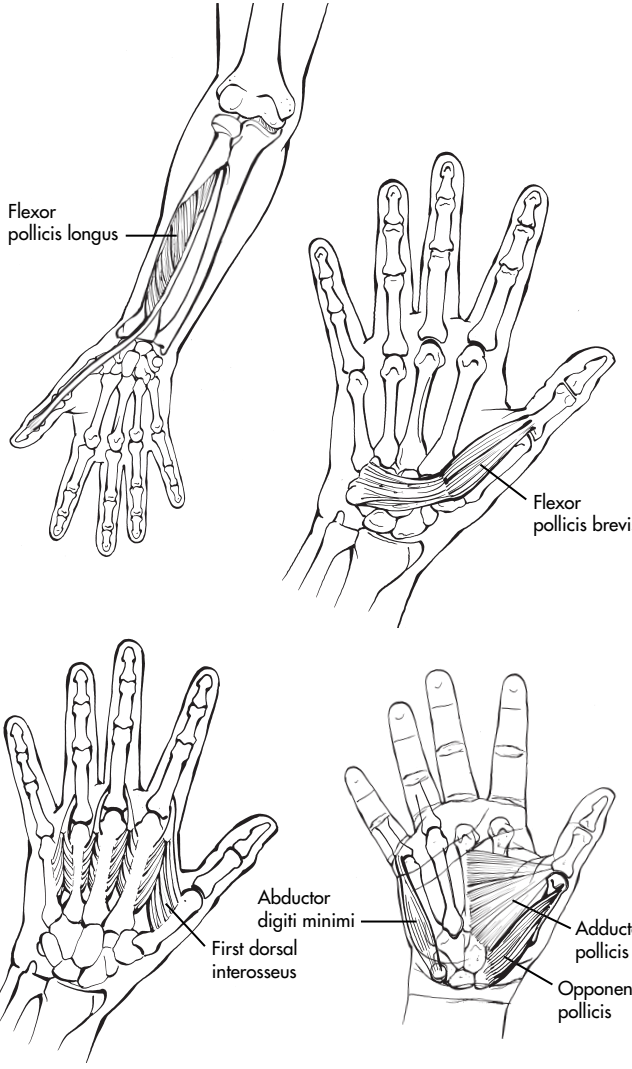
References

1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Flexor pollicis longus
Flexor pollicis brevis
Adductor pollicis
First dorsal interosseus
Opponens pollicis

Thumb-in-Palm



Adducted Thumb Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Adductor pollicis	10 5–30*	500–2,500*	1
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

*Dose for thumb-in-palm.[3]

Injection Technique	
Adductor pollicis	Midbelly over the middle of the second metacarpal bone.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

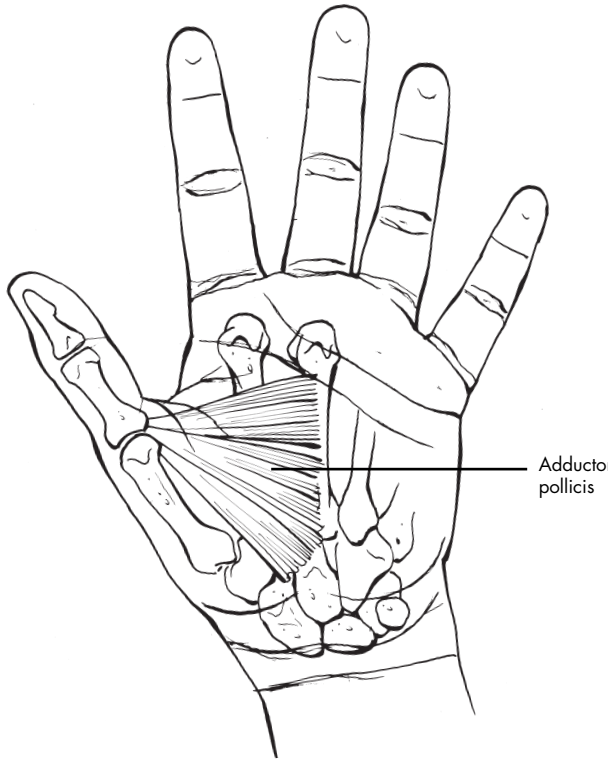
References

1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Adductor pollicis

Adducted Thumb



Intrinsic Plus Hand Dosing Ranges			
	Botox (BTX-A) Units	Myobloc (BTX-B) units[3]	Injection sites per muscle
Lumbricals/ interossei	10 (5–15)/ lumbrical[1]	1,500 – 4,500/ hand	1
Dorsal interosseus	2.5/muscle 7.5–25/m. group[2]*	250–500/ hand*	1–4
Lumbricals	2.5/ muscle 7.5–20/m. group[2]*		1
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Pediatric dosing see page 61.
*For task-specific dystonia.

Injection Technique	
Dorsal interossei/ Lumbricals	Midbelly of muscles at the midpoint of the metacarpals.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

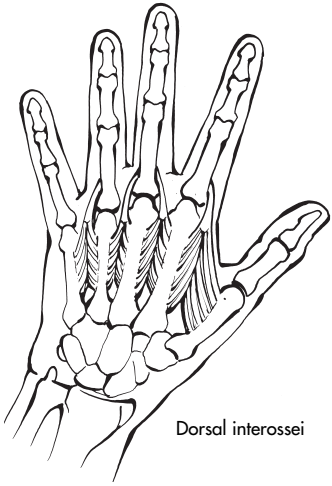
References

1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
3. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

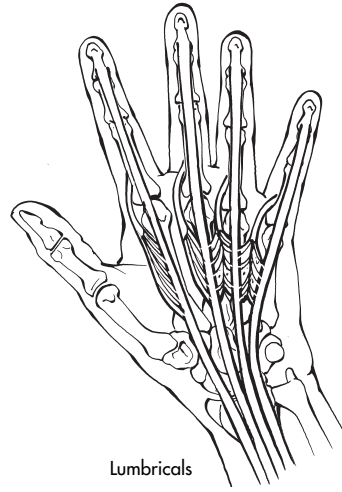
Muscles possibly involved

Dorsal interossei
Lumbrical

Intrinsic Plus Hand



Dorsal interossei



Lumbricals

Extended Digits Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Extensor indicis proprius	20 10–50*	1,000–2,500*	1
Extensor digitorum communis	20 20–50†	1,000–3,000†	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

*Dose from flexor pollicis longus in thumb-in-palm section.[3]
† Dose from flexor digitorum superficialis in clenched fist section.[3]

Injection Technique	
Extensor digitorum communis	Midbelly of the muscle at the midpoint of the lateral epicondyle and the wrist over the radius.
Extensor indicis proprius	Midbelly one finger breadth of the muscle on the radial side of the ulna one finger breadth above the ulnar styloid process.

Guidelines[2,3]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

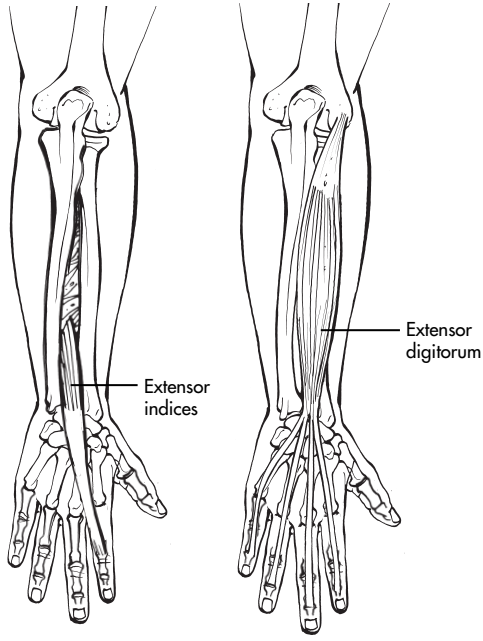
References

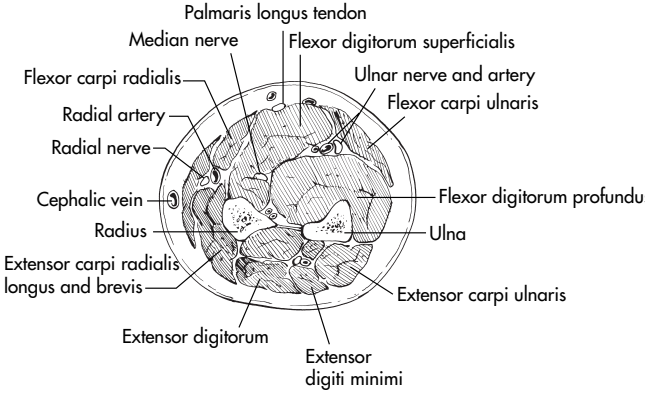
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.
3. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.

Muscles possibly involved

Extensor indicis proprius
Extensor digitorum communis

Extended Digits



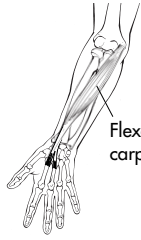


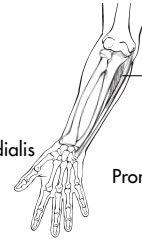
Writer's Cramp 1/3 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Flexor digitorum profundus	15 (15–40)	250–1,500	1–3
Flexor carpi radialis	15 (15–50)	500–2,500	1–2
Flexor digitorum superficialis	15 (15–40)	250–1,500	1–3
Flexor carpi ulnaris	15 (15–50)	500–2,500	1–2
Pronator teres	10 (10–35)	500–1,500	1–2
Pronator quadratus	10 (10–35)	500–1,500	1
Flexor pollicis longus	10 (5–25)	1,000–2,500	1
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

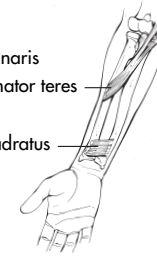
Injection Technique	
Flexor digitorum profundus	Midbelly of the muscle at the midpoint of the biceps tendon and the ulnar styloid process.
Flexor carpi radialis	Midbelly of the muscle at four finger breadths below the elbow crease. Insert one finger breadth medial to the distal part of the biceps tendon.
Flexor digitorum superficialis	Midbelly of the muscle at the midpoint from the biceps tendon to the wrist and mainly over the proximal and middle ulna and interosseus membrane. The median and ulnar nerves lie between the FDS and FDP.
Flexor carpi ulnaris	Midbelly of the muscle at one-third the distance from the medial epicondyle to the wrist.
Pronator teres	Midbelly of the muscle is three finger breadths distal to the biceps tendon and one finger breadth medially.
Pronator quadratus	Dorsal approach between the radius and ulnar at one-quarter the distance from the ulnar styloid process to the insertion of the biceps tendon.
Flexor pollicis longus	Midbelly at one-third of the distance from the wrist to the biceps tendon over the radius.

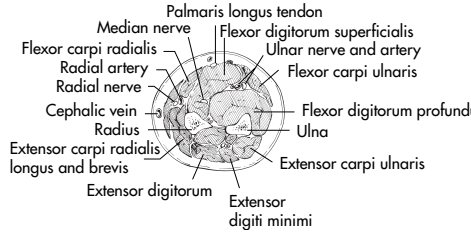
Muscles possibly involved Writer's Cramp 1/3

Flexor digitorum profundus	Extensor digitorum	
Flexor carpi radialis	Extensor carpi ulnaris	
Flexor digitorum superficialis	Extensor pollicis longus	
Flexor carpi ulnaris	Extensor pollicis brevis	
Pronator teres	Extensor indicis	
Pronator quadratus	Adductor pollicis	Opponens pollicis
Flexor pollicis longus	Abductor digiti minimi	Dorsal interosseus









Guidelines[1,2]			
Dystonia	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	300	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–0.6 ml	2,500	

References, see page 57.

Writer's Cramp 2/3 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Extensor digitorum	15 (10–30)	500–1,500†	1–2
Extensor carpi ulnaris	10 (10–40)	500–1,500	1–2
Extensor carpi radialis	10 (10–40)	500–1,500	1–2
Extensor pollicis longus	7.5 (15–15)	500–1,000*	1
Extensor pollicis brevis*	2.5 (2.5–25)*	250–500‡	1
Extensor indicis proprius	2.5 (2.5–25)	500–1,000	1
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

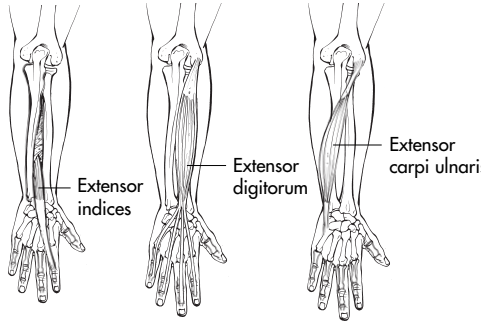
*Value used as for extensor indicis.
†Value used as for extensor indicis.[2]
‡Value used for dorsal interosseus.[2]

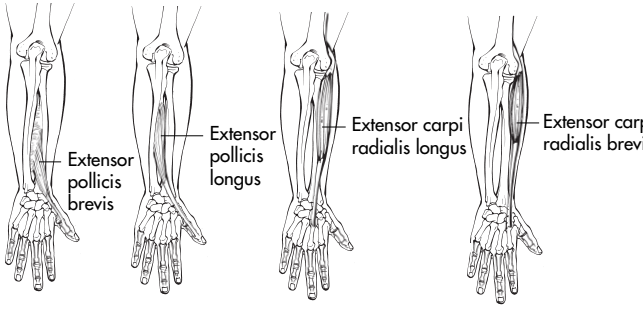
Injection Technique	
Extensor digitorum communis	Midbelly of the muscle at the midpoint of the lateral epicondyle and the wrist over the radius.
Extensor carpi ulnaris	Midbelly of the muscle located at half the distance from the lateral epicondyle to the ulnar styloid process and over the ulna.
Extensor carpi radialis	Midbelly of the muscle located at one-third of the distance from the lateral epicondyle to the radial styloid process and over the radius.
Extensor pollicis longus	Midbelly of the muscle at one-third to one-half the distance from the wrist to the lateral epicondyle and over the interosseus membrane.
Extensor pollicis brevis	Midbelly of the muscle three finger breadths above the ulnar styloid process and on the ulnar side of the radius.
Extensor indicis proprius	Midbelly of the muscle on the radial side of the ulna one finger breadth above the ulnar styloid process.

Guidelines*			
Dystonia	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	300	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–0.6 ml	2,500 U	

Muscles possibly involved Writer's Cramp 2/3

Flexor digitorum profundus	Extensor digitorum	
Flexor carpi radialis	Extensor carpi ulnaris	
Flexor digitorum superficialis	Extensor pollicis longus	
Flexor carpi ulnaris	Extensor pollicis brevis	
Pronator teres	Extensor indicis	
Pronator quadratus	Adductor pollicis	Opponens pollicis
Flexor pollicis longus	Abductor digiti minimi	Dorsal interosseus





References

1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Writer's Cramp 3/3 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Adductor pollicis	5 (5–25)	500–1,500	1
Abductor digiti minimi	5 (2.5–25)	125–250	1
Opponens pollicis	5 (5–35)	125–250	1
Dorsal interosseus	2.5/ muscle 7.5–25/ muscle group	250–500	1
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	27 G, 37 mm		

Injection Technique	
Adductor pollicis	Midbelly over the middle of the second metacarpal bone.
Abductor digiti minimi	Midbelly at the midpoint of the fifth metacarpal bone on the palmar side.
Opponens pollicis	Midbelly of the muscle over the midpoint of the first metacarpal bone.
Dorsal interosseus	Midbelly of muscles at the midpoint of the metacarpals.

Guidelines*			
Dystonia	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	300	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–0.6 ml	2,500 U	

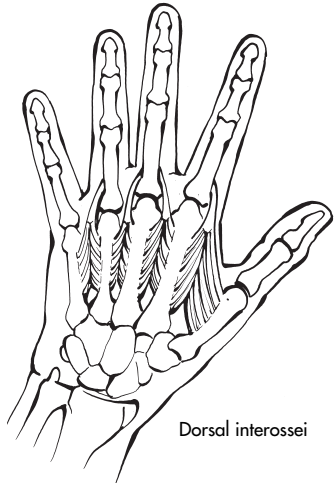
References

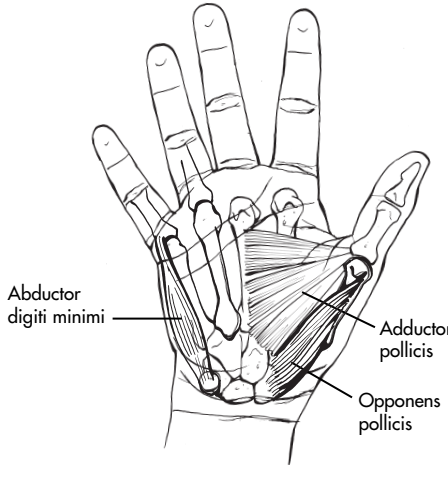
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved Writer's Cramp 3/3

Flexor digitorum profundus
Flexor carpi radialis
Flexor digitorum superficialis
Flexor carpi ulnaris
Pronator teres
Pronator quadratus
Flexor pollicis longus
Extensor digitorum
Extensor carpi ulnaris
Extensor pollicis longus
Extensor pollicis brevis
Extensor indicis
Adductor pollicis
Abductor digiti minimi

Opponens pollicis
Dorsal interosseus





Safety Information Update

At the time of this writing the U.S. Food & Drug Administration (FDA) has issued an early communication about an ongoing safety review of botulinum toxins type A and B. The FDA has received reports of systemic adverse reactions including respiratory compromise and death following the use of botulinum toxins types A and B for both FDA-approved and unapproved uses. The reactions reported are suggestive of botulism, which occurs when botulinum toxin spreads in the body beyond the site where it was injected. The most serious cases had outcomes that included hospitalization and death, and occurred mostly in children treated for cerebral palsy-associated limb spasticity. Use of botulinum toxins for treatment of limb spasticity (severe arm and leg muscle spasms) in children or adults is not an approved use in the United States.

The pediatric botulism cases occurred in patients less than 16 years old, with reported symptoms ranging from dysphagia to respiratory insufficiency requiring gastric feeding tubes and ventilatory support. Serious outcomes included hospitalization and death. The most commonly reported use of botulinum toxin among these cases was treatment of limb muscle spasticity associated with cerebral palsy. For Botox, doses ranged from 6.25 to 32 Units/kilogram (U/kg) in these cases. For Myobloc, reported doses were from 388 to 625 U/kg.

The safety, efficacy and dosage of botulinum toxins have not been established for the treatment of limb spasticity of cerebral palsy or for use in any condition in children less than 12 years of age.

Until such time that FDA has completed its review, healthcare professionals who use medicinal botulinum toxins should:

- Understand that potency determinations expressed in "Units" or "U" are different among the botulinum toxin products; clinical doses expressed in units are not comparable from one botulinum product to the next.
- Be alert to the potential for systemic effects following administration of botulinum toxins such as: dysphagia, dysphonia, weakness, dyspnea or respiratory distress.
- Understand that these effects have been reported as early as one day and as late as several weeks after treatment.
- Provide patients and caregivers with the information they need to be able to identify the signs and symptoms of systemic effects after receiving an injection of a botulinum toxin.
- Tell patients they should receive immediate medical attention if they have worsening or unexpected difficulty swallowing or talking, trouble breathing, or muscle weakness.

From: FDA, Early Communication, February 8, 2008.
http://www.fda.gov/cder/drug/early_comm/botulinium_toxins.htm

Pediatric Dosing for Upper Extremities

Adducted/Internally Rotated Shoulder		
	Botox (BTX-A) U/kg	Injection sites per muscle
Pectoralis complex	2	2–3
Latissimus dorsi	2	2
Teres major	2	1–2
Subscapularis	1–2	1–2
Flexed Elbow		
Brachioradialis	1–2	1
Biceps	2	2–4
Brachialis	2	1–4
Pronated Forearm		
Pronator quadratus	0.5–1	1
Pronator teres	1–2	1
Flexed Wrist		
Flexor carpi radialis	1–2	1
Flexor carpi ulnaris	1–2	1–2
Clenched Fist		
Flexor digitorum profundus	1–2	1–2
Flexor digitorum superficialis	1–2	1–2
Thumb-in-palm		
Flexor pollicis longus	0.5–1	1
Adductor pollicis	0.5–1	1
Flexor pollicis brevis/ opponens	0.5–1	1
Intrinsic Plus Hand		
Lumbricals/interossei	0.5–1	1

See safety information update on the previous page and pediatric dosing on the next page.

Reference

1. MDVU. MD Virtual University. We Move. BTX-A Pediatric Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.

Pediatric Dosing
Botox (BTX-A)[1]
Total maximum body dose per visit: lesser of 16 U/kg or 400 U. Adult dosing should be substituted for children heavier than 60kg.
Maximum dose per large muscle/visit: 6 U/kg
Maximum dose per small muscle/visit: 1–2 U/kg
Maximum dose per injection site: 50 U
Maximum volume per site: 1.0 mL, except in select situations
Dilution: 1–5 mL per vial. More dilute solutions may be more effective in larger muscles.

CHAPTER 3

Spasticity/Dystonia: Lower Extremities

- Flexed Hip
- Adducted Thigh
- Flexed Knee
- Extended (Stiff) Knee
- Equinovarus Foot
- Valgus Foot
- Striatal Toe
- Flexed Toes
- Safety Information Update
- Pediatric Dosing for Lower Extremities

Flexed Hip 1/2 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Iliopsoas with or without ultrasound/ fluoroscopy guidance	100 50–200	3,000–7,500	2–3
Psoas with ultrasound/ fluoroscopy guidance	100 50–200	3,000–7,500	1–2
Rectus femoris	100 75–200	2,500–5,000	1–4
Adductor longus, brevis, maximus*	200/leg 75–300*	5,000–10,000*	2-6
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	25 G, 50 mm to 22 G, 75 mm		

Pediatric dosing see page 89.
*Dose as per adducted thighs.[1]

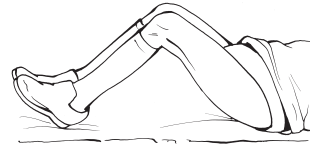
Injection Technique	
Psoas	With ultrasound or fluoroscopic guidance lateral to the transverse spinous process of L4 or L5[2].
Iliopsoas	Below the inguinal ligament between the femoral artery and the anterior superior iliac spine.
Rectus femoris	The midbelly of the muscle is located at the midpoint between the anterior superior iliac spine and the patella.
Adductor longus, brevis, maximus	Medial approach to the midbelly of the muscle located one-third of the distance from the pubic bone to the knee.

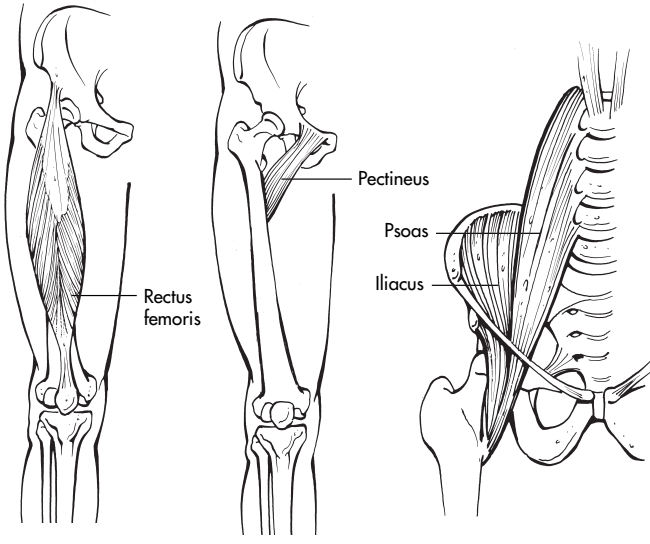
Guidelines[1,3]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

Muscles possibly involved

Iliopsoas
Rectus femoris
Adductor longus
Adductor brevis
Gluteus maximus

Flexed Hip 1/2





References

1. MDVU. MD Virtual University. We Move. BTX-A. Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005. Accessed 1.13.07.
2. Childers MK. *The use of botulinum toxin type a in pain management*, 2nd ed. Academic Information Systems, 2002:133.
3. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Flexed Hip 2/2 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Iliopsoas with or without ultrasound/ fluoroscopy guidance	100 50–200	3,000–7,500	2–3
Psoas with ultrasound/ fluoroscopy guidance	100 50–200	3,000–7,500	1–2
Rectus femoris	100 75–200	2,500–5,000	1–4
Adductor longus, brevis, maximus*	200/leg 75–300*	5,000–10,000*	2–6
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG needle	25 G, 50 mm		

Pediatric dosing see page 89.
*Dose as per adducted thighs.[1]

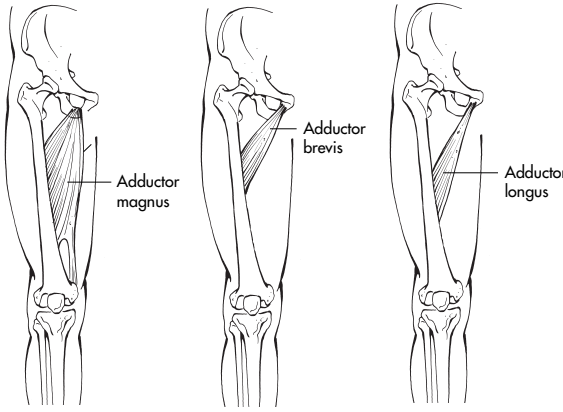
Injection Technique	
Psoas	With ultrasound or fluoroscopic guidance lateral to the transverse spinous process of L4 or L5[2].
Iliopsoas	Below the inguinal ligament between the femoral artery and the anterior superior iliac spine.
Rectus femoris	The midbelly of the muscle is located at the midpoint between the anterior superior iliac spine and the patella.
Adductor longus, brevis, maximus	Medial approach to the midbelly of the muscle located one-third of the distance from the pubic bone to the knee.

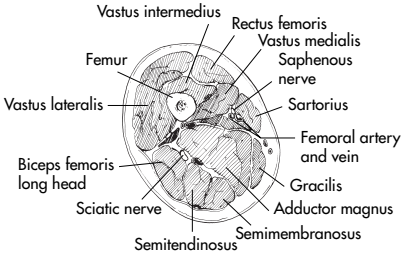
Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

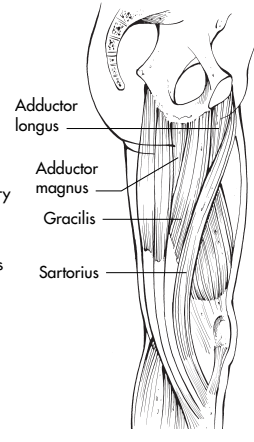
Muscles possibly involved

Iliopsoas
Rectus femoris
Adductor longus
Adductor brevis
Adductor magnus

Flexed Hip 2/2







References

1. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Adducted Thigh Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Adductor longus/ brevis/magnus	200/leg 75–300	5,000–10,000	2–6/leg
Iliopsoas	100 50–200*	3,000–7,500	2–3
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG Needle	25 G, 50 mm		

Pediatric dosing see page 89.
*Dose for flexed hip.[1]

Injection Technique	
Adductor longus/brevis/ magnus	Medial approach to the midbelly of the muscle located one-third of the distance from the pubic bone to the knee.
Iliopsoas	Below the inguinal ligament between the femoral artery and the anterior superior iliac spine.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

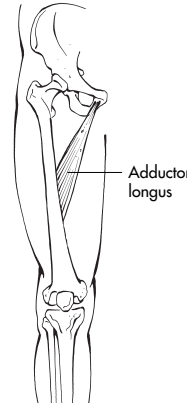
References

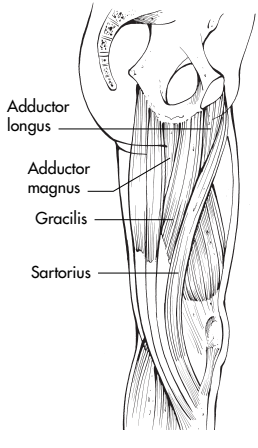
1. MDVU. MD Virtual University. We Move. Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

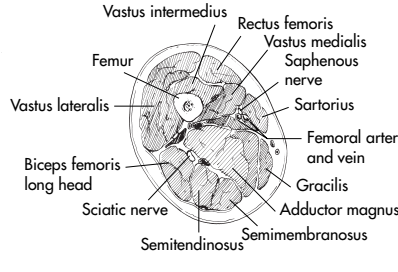
Muscles possibly involved

Adductor magnus
Adductor longus
Adductor brevis

Adducted Thigh







Flexed Knee Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Medial hamstrings	100 50–200	2,500–7,500	2–4
Gastrocnemius (as knee flexor)	125 50–150	3,000–7,500	2–4
Lateral hamstrings	100 75–200	2,500–7,500	2–4
Dilution	100 U/4 cc	Dilutions, see page xxvii	
EMG Needle	25 G, 50 mm		

Pediatric dosing see page 89.

Injection Technique	
Medial hamstrings	The midbelly of the muscle is located midway between the ischial tuberosity and the medial condyle of the tibia.
Gastrocnemius (as knee flexor)	The midbelly of the muscle is one-quarter the distance from the popliteal fossa to the heel.
Lateral hamstrings	The midbelly of the muscle is located midway between the lateral part of the ischial tuberosity and the fibular head.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

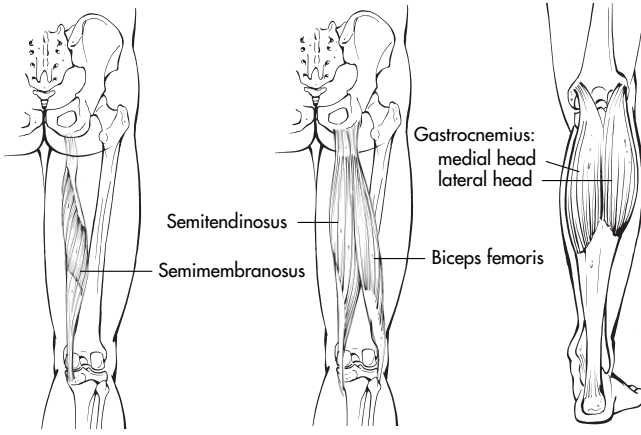
References

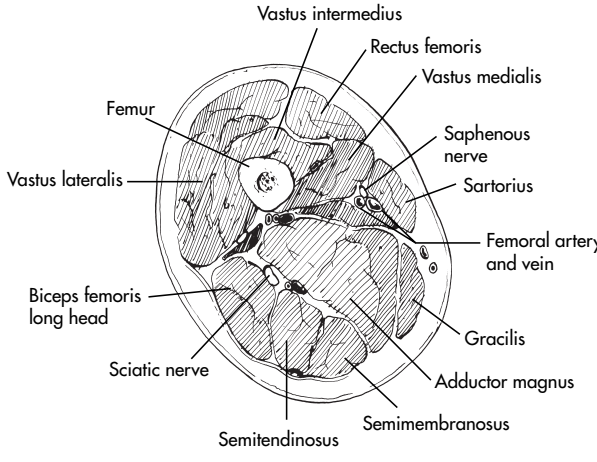
1. MDVU. MD Virtual University. We Move. BTX-A. Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Medial hamstring
Lateral hamstring
Gastrocnemius

Flexed Knee





Extended (Stiff) Knee Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Quadriceps mechanism	100 50–300	5,000–7,500	2–6
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	25 G, 50 mm		

Pediatric dosing see page 89.

Injection Technique	
Vastus intermedius	The midbelly of the muscle is midway between the anterior superior iliac spine and the patella. Vastus intermedius is often overlooked and can be a major contributor to knee extension.
Rectus femoris	The midbelly of the muscle is located at the midpoint between the anterior superior iliac spine and the patella. In patients with hip flexion weakness the dose may be adjusted as the rectus femoris is also a hip flexor.
Vastus medialis	The midbelly of the muscle is located midway between the pubic symphysis and the medial part of the knee joint.
Vastus lateralis	The midbelly of the muscle is located midway between the greater trochanter and the patella.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

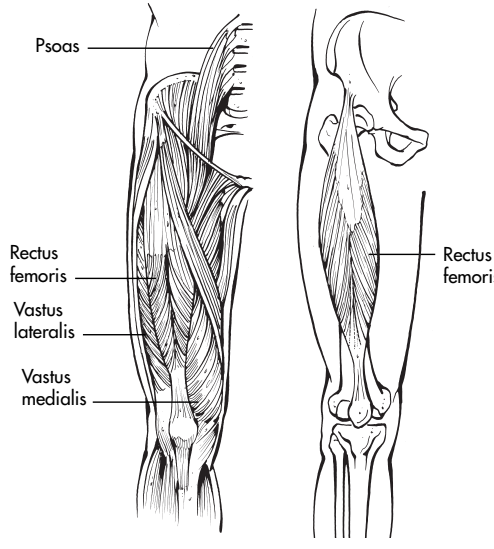
References

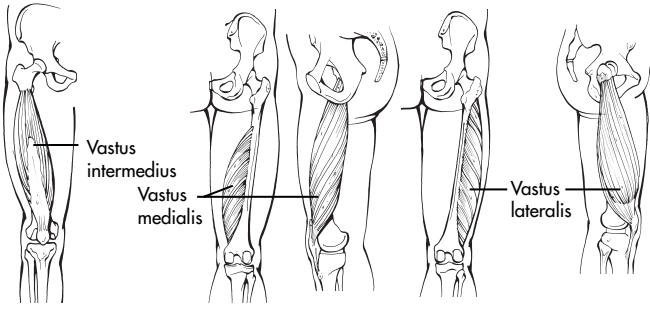
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0, Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Vastus intermedius
Rectus femoris
Vastus medialis
Vastus lateralis

Extended (Stiff) Knee





Equinovarus Foot 1/3 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Soleus	100 50–200	2,500–5,000	1–3
Gastrocnemius	100 50–250	3,000–7,500	2–4
Flexor digitorum longus	75 50–100	2,500–5,000	1–2
Tibialis posterior	75 50–150	3,000–7,500	1–3
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	25 G, 50 mm		
Guidance	EMG		

Pediatric dosing see page 89.

Injection Technique	
Soleus	Medial or lateral approach is midway to two-thirds the distance from the heel to the popliteal fossa. Can also be approached through the gastrocnemius.
Gastrocnemius	The midbelly of the muscle is located one-quarter the distance from the popliteal fossa to the heel.
Flexor digitorum longus	The midbelly of the muscle is located one-third to one-half of the distance from the heel to the popliteal fossa immediately posterior to the tibia.
Tibialis posterior	Medial approach midway between the heel and the popliteal fossa. It lies posterior to the interosseus membrane. The medial approach will avoid the nerves and vessels near the interosseus membrane.

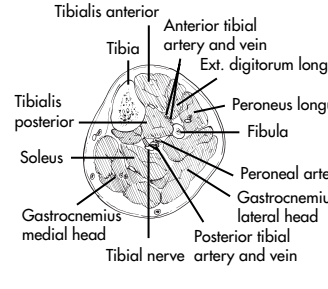
References

1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Soleus
Gastrocnemius
Flexor digitorum longus
Tibialis posterior
Tibialis anterior
Flexor digitorum brevis
Flexor hallucis longus

Equinovarus Foot 1/3



Equinovarus Foot 2/3 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Tibialis anterior	50 50–150	2,500–5,000	1–3
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	25 G, 50 mm		
Guidance	EMG/E–stim/U/S/fluoro		

Pediatric dosing see page 89.

Injection Technique	
Tibialis anterior	The midbelly of the muscle is located at one-third the distance from the patella to the ankle over the interosseus membrane and the fibula.

Guidelines[1,3]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

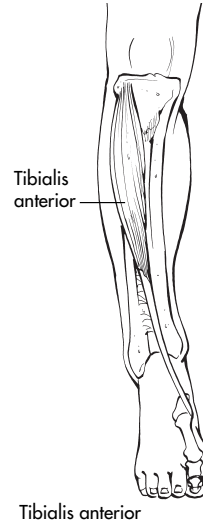
References

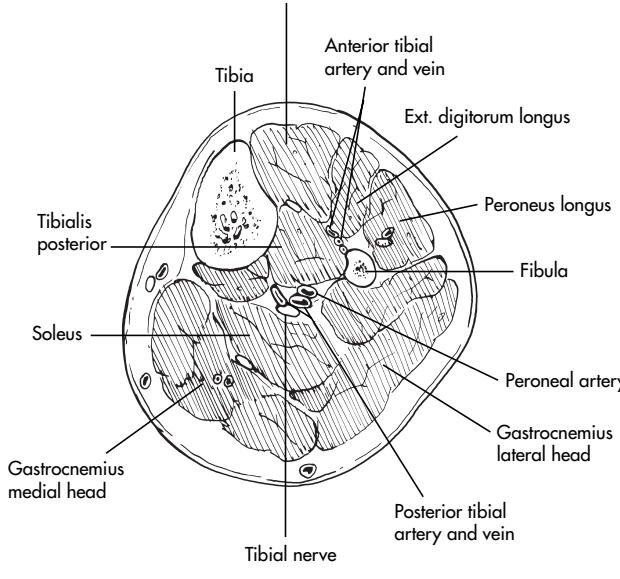
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0, Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Soleus
Gastrocnemius
Flexor digitorum longus
Tibialis posterior
Tibialis anterior
Flexor digitorum brevis
Flexor hallucis longus

Equinovarus Foot 2/3





Equinovarus Foot 3/3 Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Flexor digitorum brevis	25 20–40	2,500–5,000	1–2
Flexor hallucis longus	50 25–75	1,500–3,500	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	25 G, 50 mm		
Guidance	EMG/E–stim/U/S/fluoro		

Pediatric dosing see page 89.

Injection Technique	
Flexor digitorum brevis	Midbelly of the muscle is located in the center of the sole. Shown in the equinovarus foot picture, but with no influence on ankle motion.
Flexor hallucis longus	Approach is lateral to the Achilles tendon at one-third the distance from the heel to the popliteal fossa and over the fibula.

Guidelines[1,2]			
Spasticity	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

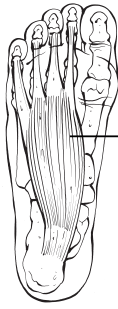
References

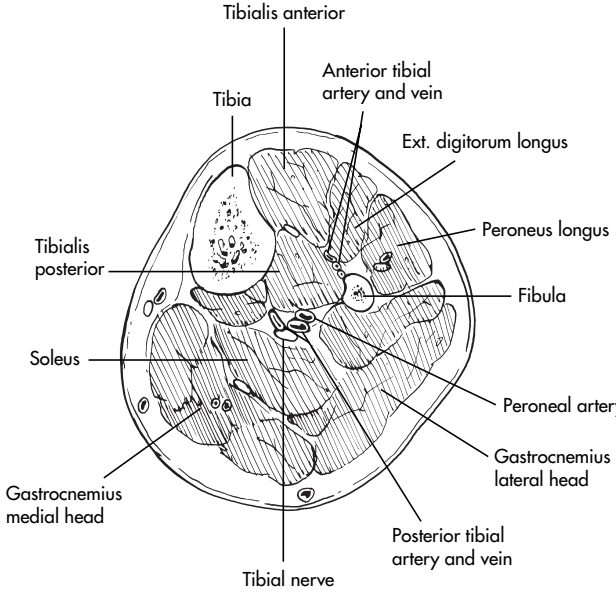
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Soleus
Gastrocnemius
Flexor digitorum longus
Tibialis posterior
Tibialis anterior
Peroneus longus
Flexor digitorum brevis
Flexor hallucis longus

Equinovarus Foot 3/3





Valgus Foot 1/2 Dosing Ranges			
	Botox (BTX-A) units*[1,2]	Myobloc (BTX-B) units*[3]	Injection sites per muscle
Peroneus longus	50 35–85	2,500–5,000	1–2
Peroneus brevis	40 40–70	2,500–5,000	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	25 G, 50 mm		
Guidance	EMG/E–stim/U/S		

*Dose from lower limb dystonia.

Injection Technique	
Peroneus longus	The midbelly is located at the upper one-third of the lateral fibula.
Peroneus brevis	The midbelly is located at the lower one-third of the lateral fibula.

Guidelines[1,3]			
	BTX-A	BTX–B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose 1–2
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

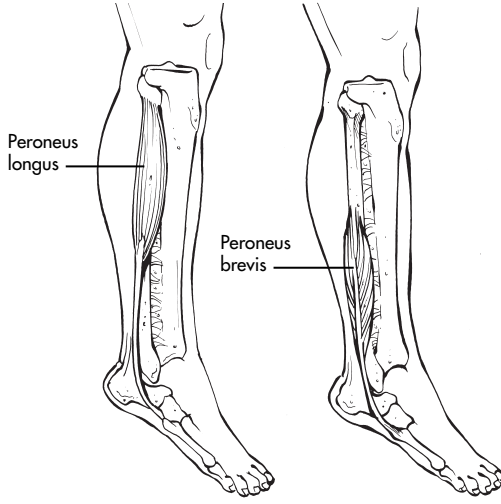
References

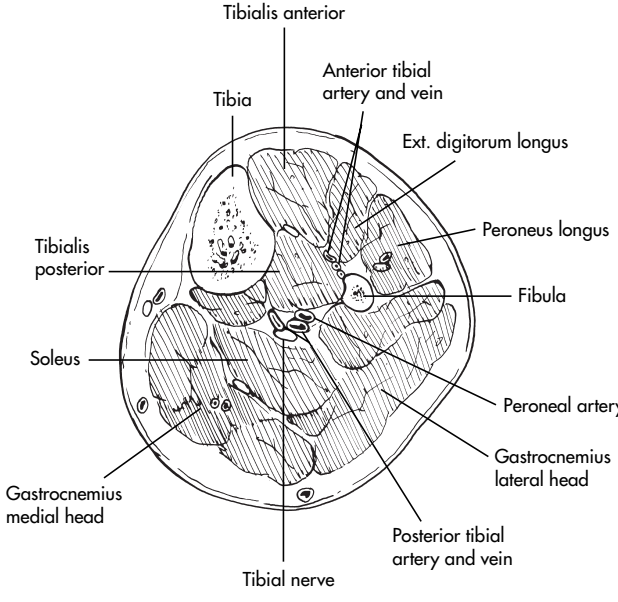
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 2.0. Revised August 2005.3.
3. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Peroneus longus
Peroneus brevis
Gastrocnemius
Soleus

Valgus Foot 1/2





Valgus Foot 2/2 Dosing Ranges			
	Botox (BTX-A) units*[1]	Myobloc (BTX-B) units*[2]	Injection sites per muscle
Gastrocnemius	100 50–200	3,000–7,500	2–4
Soleus	100 50–200	2,500–5,000	1–3
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	25 G, 50 mm		

*Dose from equinovarus foot.[2,3]

Injection Technique	
Gastrocnemius	The midbelly of the muscle is located one-quarter the distance from the popliteal fossa to the heel.
Soleus	Medial or lateral approach is midway to two-thirds the distance from the heel to the popliteal fossa. Can also be approached through the gastrocnemius.
Flexor digitorum longus	Medial approach 1/3 the distance from the heel to the popliteal fossa.

Guidelines[1,3]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

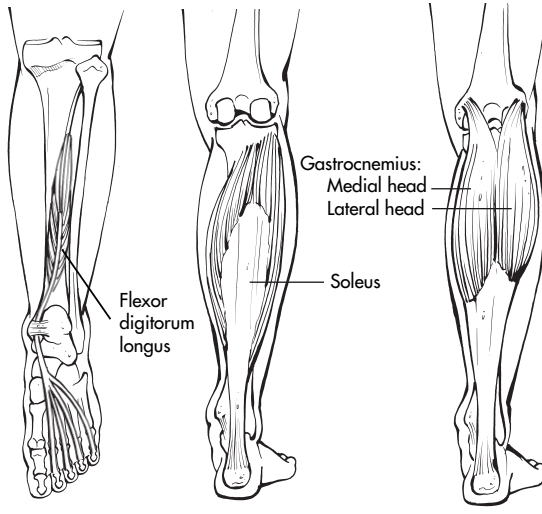
References

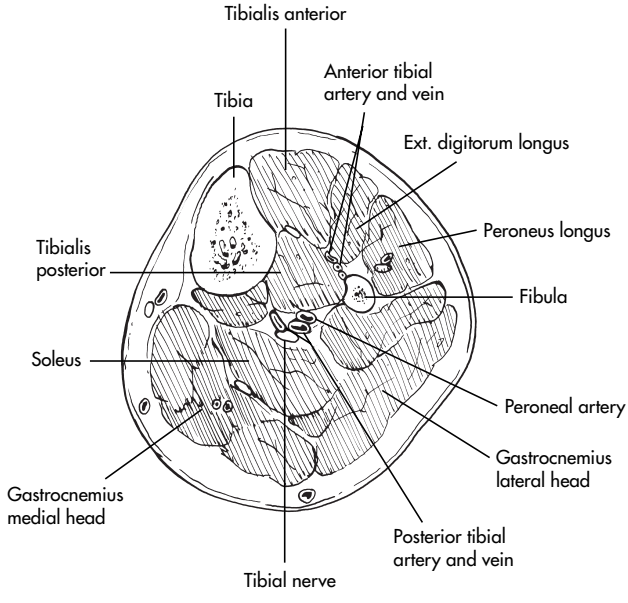
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Peroneus longus
Peroneus brevis
Gastrocnemius
Soleus

Valgus Foot 2/2





Striatal Toe Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]	Injection sites per muscle
Extensor hallucis longus	50 20–100	2,000–4,000	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	27 G, 37 mm/25 G, 50 mm		
Guidance	EMG/E–stim/U/S		

Pediatric dosing see page 89.

Injection Technique	
Extensor hallucis longus	Anterior approach is at one-third the distance from the ankle to the patella over the interosseus membrane.

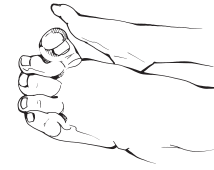
Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

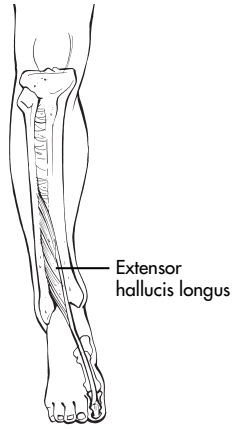
References

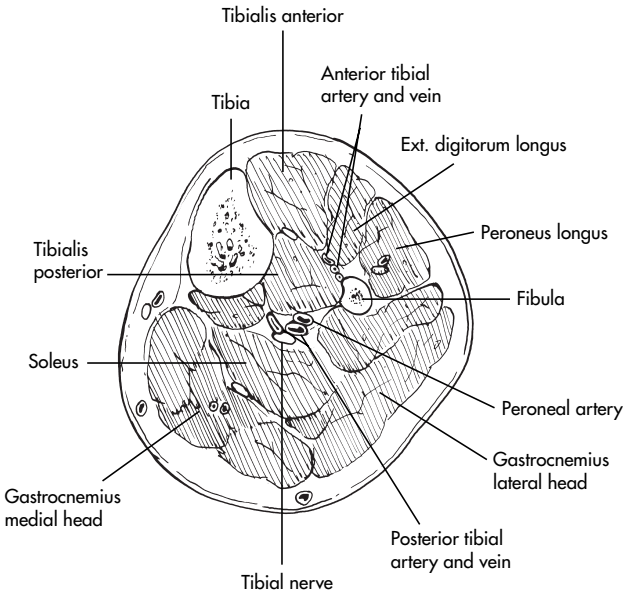
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0, Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscle possibly involved
Extensor hallucis longus

Striatal Toe (Hitchhiker's Great Toe)







Flexed Toes Dosing Ranges			
	Botox (BTX-A) units*[1]	Myobloc (BTX-B) units*[2]	Injection sites per muscle
Flexor digitorum brevis	25 20–40	1,000–2,500† 2,500–5,000	1
Flexor digitorum longus	75 50–100	2,500–5,000	1–3
Flexor hallucis longus	50 25–75	1,500–3,500	1–2
Dilution	100 U/4 cc	Dilutions, see page xxvii	
Needle	25 G, 50 mm		
Guidance	EMG/E–stim/U/S		

*Values from equinovarus foot.
† Author's recommendation.

Injection Technique	
Flexor digitorum brevis	Midbelly of the muscle is located at the center of the sole.
Flexor digitorum longus	The midbelly of the muscle is located one-third to one-half of the distance from the heel to the popliteal fossa immediately posterior to the tibia.
Flexor hallucis longus	Approach is lateral to the Achilles tendon at one-third the distance from the heel to the popiteal fossa and over the fibula.

Guidelines[1,2]			
	BTX-A	BTX-B	Starting Dose
Total maximum body dose/visit:	400–600	10,000–15,000	<50% of max. dose
Maximum dose or volume/injection site	0.5–1.0 ml	2,500 U	

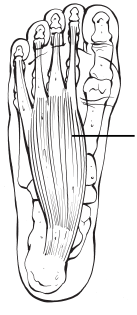
References

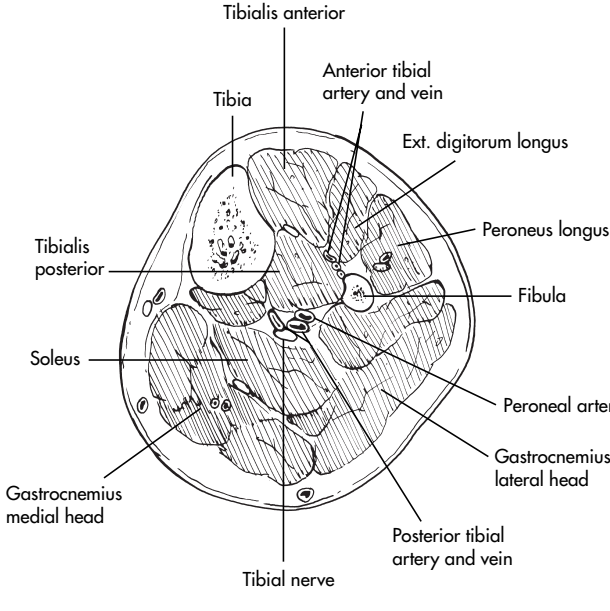
1. MDVU. MD Virtual University. We Move. BTX-A Adult Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.
2. MDVU. MD Virtual University. We Move. BTX-B Adult Dosing Guidelines. Edition 1.0. Botulinum Toxin Type B (Myobloc). At http://www.mdvu.org/library/dosingtables/btxb_adg.html. Updated 1.28.05. Accessed 11.30.06.

Muscles possibly involved

Flexor digitorum brevis
Flexor digitorum longus
Flexor hallucis longus

Flexed Toes





Safety Information Update

At the time of this writing the U.S. Food & Drug Administration (FDA) has issued an early communication about an ongoing safety review of botulinum toxins type A and B. The FDA has received reports of systemic adverse reactions including respiratory compromise and death following the use of botulinum toxins types A and B for both FDA-approved and unapproved uses. The reactions reported are suggestive of botulism, which occurs when botulinum toxin spreads in the body beyond the site where it was injected. The most serious cases had outcomes that included hospitalization and death, and occurred mostly in children treated for cerebral palsy-associated limb spasticity. Use of botulinum toxins for treatment of limb spasticity (severe arm and leg muscle spasms) in children or adults is not an approved use in the United States.

The pediatric botulism cases occurred in patients less than 16 years old, with reported symptoms ranging from dysphagia to respiratory insufficiency requiring gastric feeding tubes and ventilatory support. Serious outcomes included hospitalization and death. The most commonly reported use of botulinum toxin among these cases was treatment of limb muscle spasticity associated with cerebral palsy. For Botox, doses ranged from 6.25 to 32 Units/kilogram (U/kg) in these cases. For Myobloc, reported doses were from 388 to 625 U/kg.

The safety, efficacy and dosage of botulinum toxins have not been established for the treatment of limb spasticity of cerebral palsy or for use in any condition in children less than 12 years of age.

Until such time that FDA has completed its review, healthcare professionals who use medicinal botulinum toxins should:

- Understand that potency determinations expressed in "Units" or "U" are different among the botulinum toxin products; clinical doses expressed in units are not comparable from one botulinum product to the next.
- Be alert to the potential for systemic effects following administration of botulinum toxins such as: dysphagia, dysphonia, weakness, dyspnea or respiratory distress.
- Understand that these effects have been reported as early as one day and as late as several weeks after treatment.
- Provide patients and caregivers with the information they need to be able to identify the signs and symptoms of systemic effects after receiving an injection of a botulinum toxin.
- Tell patients they should receive immediate medical attention if they have worsening or unexpected difficulty swallowing or talking, trouble breathing, or muscle weakness.

From: FDA, *Early Communication*, February 8, 2008.
http://www.fda.gov/cder/drug/early_comm/botulinium_toxins.htm

Pediatric Dosing for Lower Extremities

Flexed Hip		
Iliacus	1–2	1
Rectus femoris	3–5	2–3
Adducted Thigh		
Adductor Longus/Brevis/Magnus	3–6	1–3
Flexed Knee		
Medial hamstrings	3–8	3–4
Gastrocnemius	3–6	2–4
Lateral hamstrings	2–6	1–2
Extended Knee		
Quadriceps mechanism	3–6	2–4
Equinovarus Foot		
Gastrocnemius	3–6	1–4
Soleus	2–3	1–2
Tibialis posterior	1–2	1
Tibialis anterior	1–3	1
Flexor digitorum longus/brevis	1–2	1
Flexor hallucis longus	1–2	1
Striatal Toe		
Extensor hallucis longus	1–2	1

See safety information update on the previous page and pediatric dosing on the next page.

Reference

1. MDVU. MD Virtual University. We Move. BTX-A Pediatric Dosing Guidelines. Management of Spasticity with Botulinum Toxin Type A (Botox). Edition 3.0. Revised August 2005.

Pediatric Dosing
Botox (BTX-A)[1]
Total maximum body dose per visit: lesser of 16 U/kg or 400 U. Adult dosing should be substituted for children heavier than 60kg.
Maximum dose per large muscle/visit: 6 U/kg.
Maximum dose per small muscle/visit: 1–2 U/kg
Maximum dose per injection site: 50 U
Maximum volume per site: 1.0 mL, except in select situations
Dilution: 1–5 mL per vial. More dilute solutions may be more effective in larger muscles.

CHAPTER 4

Pain Syndromes

- Cervicothoracic/Myofascial Pain
- Lumbosacral/Myofascial Pain
- Thoracic Outlet Syndrome
- Piriformis Syndrome
- Neuropathic Cutaneous Pain
- Lateral Epicondylitis

Cervicothoracic/Myofascial Pain Dosing Ranges			
	Botox (BTX-A) units	Myobloc (BTX-B) units	Injection sites per muscle
Trigger points	20–25/trigger point[1,2]	Insufficient data	1–4
Total dose	100[1]–257[3*]	5,000[4]–9,000[3,5*]	
Dilution	100 U/1–4 cc	Dilutions, see page xxvii	
Needle +/– EMG	30 G–0.5 in/25–27 G EMG needle		

*Mean dose

Injection Technique	
Trigger/Tender Points	Intramuscular injection. If injections are too deep over the thoracic cage, a potential for pneumothorax exists.

References

1. Freund BJ, Schwartz M. Treatment of cervical-associated headache with botulinum toxin A: a pilot study. *Headache* 2000;40(3):231–36.
2. Graboski CL, Gray DS, Burnham RS. Botulinum toxin a versus bupivacaine trigger point injections for the treatment of myofascial pain syndrome: a randomized double blind crossover study. *Pain* 2005;118:170–75.
3. Lang AL. A preliminary comparison of the efficacy and tolerability of botulinum toxin serotypes a and b in the treatment of myofascial pain syndrome: a retrospective, open-label chart review. *Clin Ther* 2003;25:2268–78.
4. Nalamachu S. Treatment with botulinum toxin type B (Myobloc) injections in three patients with myofascial pain. Poster presented at: American Academy of Pain Medicine 18th Annual Meeting; 2.26–3.3, 2002. San Francisco, CA.
5. Argoff CE. A focused review on the use of botulinum toxins for neuropathic pain. *Clin J Pain* 2002;18:S177–S181.

Muscles possibly involved

Tender points
Trigger points

Cervicothoracic/
Myofascial Pain

Lumbosacral/Myofascial Pain Dosing Ranges		
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[2]
Paravertebral lumbosacral muscles in areas of pain	40/site	1,250/site
Total dose	200	10,000
Dilution	100 U/1–4 cc	Dilutions, see page xxvii
Needle (+/– EMG)	30 G/0.5 in or 25–27 G/37–50 mm	

Injection Technique	
Trigger/Tender Points	Intramuscular injection

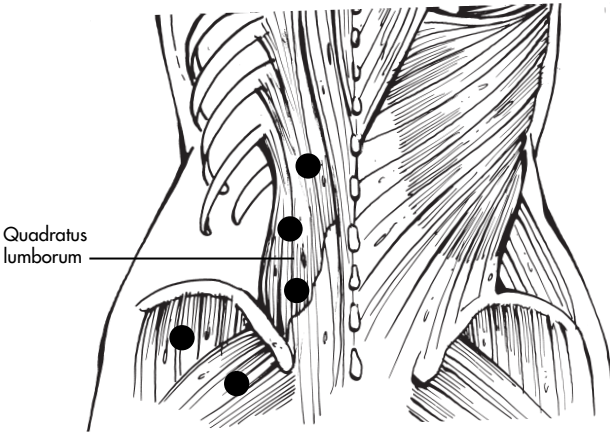
References

1. Foster L, Clapp L, Erickson M, Jabbari B. Botulinum toxin A and chronic low back pain. A randomized, double-blind study. *Neurology* 2001;56:1290–93.
2. Opida CL, Open-label study of Myobloc (botulinum toxin type B) in the treatment of patients with chronic low back pain. Poster presented at: International Conference 2002 Basic and Therapeutic Aspects of botulinum and tetanus toxins; June 8–11, 2002; Hannover, Germany.

Muscles possibly involved

Tender points
Trigger points

Lumbosacral/Myofascial Pain



Thoracic Outlet Syndrome Dosing Ranges			
	Botox (BTX-A) units[1]*	Myobloc (BTX-B) units†	Injection sites per muscle
Anterior scalene	12	(1,000–3,000 used with laterocollis)	1
Middle scalene	12		1
Trapezius–ipsilateral	76	(625–1,000/ side with migraine)	
Dilution	100 U/1 cc	Dilutions, see page xxvii	
EMG needle +/– U/S guidances	27 G, 37 mm		

†Inadequate data for dose recommendation.
*Data available from one study only.[1]
Higher doses are used for treatment of laterocollis page 26.
Neck injections pose a significant risk for dysphagia.

Injection Technique	
Scalene muscles	The injector should be familiar with the anatomy, because the phrenic nerve lies on the anterolateral surface of the anterior scalene muscle. *Lateral approach:* approximately two finger breadths above the clavicle. The anterior scalene is immediately posterior to the clavicular head of the sternocleidomastoid muscle. Insert the needle slowly and withdraw if there is any radiation of pain. The posterior scalene is immediately anterior to the anterior border of the trapezius. Ultrasound or fluoroscopy guidance is helpful.
Trapezius	Intramuscular injection. If injections are too deep over the thoracic cage, a potential for pneumothorax exists.

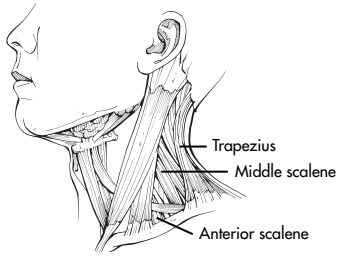
Reference

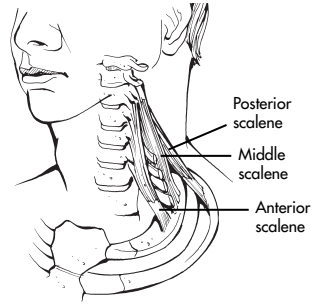
1. Jordan SE, Ahn SS, Freischlag JA, et al. Selective botulinum chemo denervation of the scalene muscles for treatment of neurogenic thoracic outlet syndrome. *Ann Vasc Surg* 2000;14:365–69.

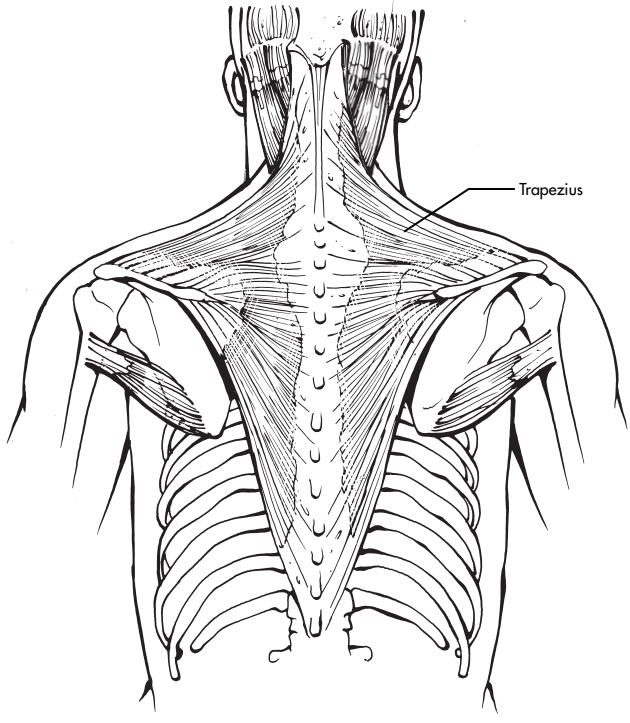
Muscles possibly involved

Anterior scalene
Middle scalene
Trapezius-ipsilateral

Thoracic Outlet Syndrome







Piriformis Syndrome Dosing Ranges			
	Botox (BTX-A) units[1,2]	Myobloc (BTX-B) units[3]	Injection sites per muscle
Piriformis muscle	100–200	2,500–5,000* 5,000	1
Dilution	100 U/1 cc	Dilutions, see page xxvii	
EMG needle	22 G, 75 mm		

*Author's recommendation.

Injection Technique	
Piriformis muscle	*Fishman technique*[3] injects at one-third the distance from the greater trochanter to the point of maximum tenderness in the buttock. The needle is directed toward the navel, with the patient lying on their side. The motor point is injected with this technique and not the nerve–muscle junction.[4] External rotation of the leg will activate the piriformis muscle. Ultrasound or fluoroscopic guidance will enhance the localization.

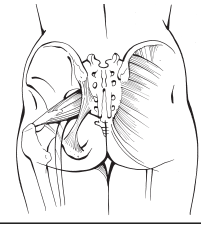
References

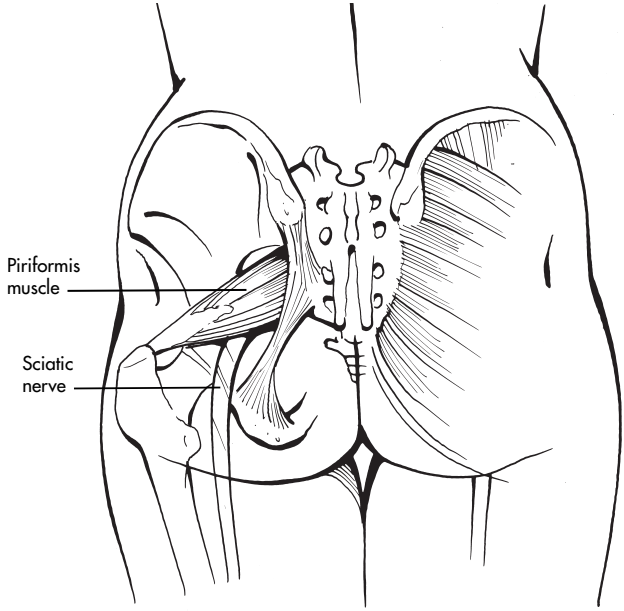
1. Childers MK, Wilson DJ, Gnatz SM, et al. Botulinum toxin type a use in piriformis syndrome. A pilot study. *Am J Phys Med Rehabil* 2002;81:751–59.
2. Fishman LM, Anderson C, Rosner B. Botox and physical therapy in the treatment of piriformis syndrome. *Am J Phys Med Rehabil* 2002;81:936–42.
3. Fishman LM, Dombi GW, Michaelsen C, et al.
4. Lang AM. Botulinum toxin type b in piriformis syndrome. *Am J Phys Med Rehabil* 2004;83:198–202.

Muscle possibly involved

Piriformis muscle

Piriformis Syndrome





Neuropathic Cutaneous Pain Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[3]	Injection sites
Subcutaneous injections per site	2.5–5.0* 5.0	62.5 U	2–3 cm apart
Total dose	100–200	5,000–10,000	
Dilution	100 U/2–4 cc NS Dispensed in 1 cc syringes.	Dilutions, see page xxvii	
Needle	30 G, 0.5 in		

*Author's recommendation.

Injection Technique	
Subcutaneous injections	Angle needle at ~45 degrees to skin surface, and with bevel upward to avoid backflow.

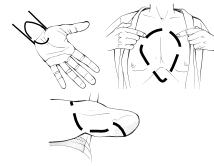
References

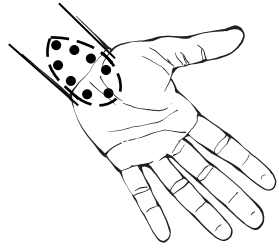
1. Freund B, Schwartz M. Subcutaneous BTX-A in the treatment of neuropathic pain: a pilot study. Presented at the 38th Interagency Botulism Research Coordinating Committee Meeting, October, 17–19, 2001.
2. Easton MD, Wittekindt C, Liu WC, et al. Botulinum toxin A for neuropathic pain after neck dissection: a dose-finding study.

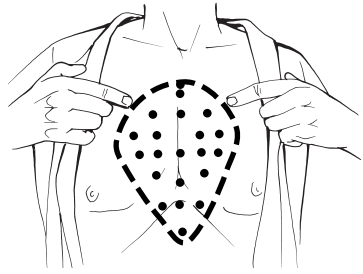
Muscles possibly involved

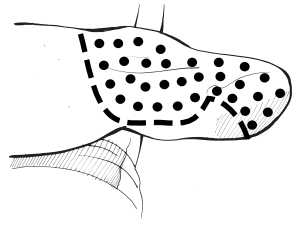
Intradermal/subcutaneous injections to affected areas

Neuropathic Cutaneous Pain









Lateral Epicondylitis Dosing Ranges		
	Botox (BTX-A) units[1]	Injection sites per muscle
Lateral epicondyle	50*	1
Dilution	100 U/4 cc	
Needle	27 G, 37 mm	

*Wong et al. used 60 U of Dysport (BTX-A).

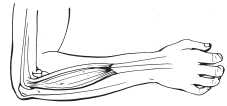
Injection Technique	
Injection site	*Intramuscular injection* is 5 cm distal to the area of maximal tenderness at the lateral epicondyle, in line with the middle of the wrist. Needle is inserted deep to the forearm fascia.[1] *Intramuscular/subcutaneous* injection is 1 cm distal to the lateral epicondyle, and aimed toward the tender spot.[2]
Adverse effects	May be associated with digital paresis and weakness of finger extensors or unable to fully extend one or more digits.

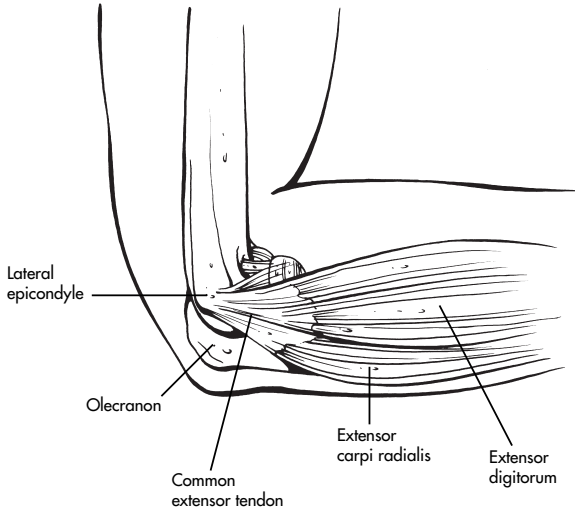
References

1. Hayton MJ, Santini AJA, Hughes PJ, et al. Botulinum toxin injection in the treatment of tennis elbow. *J Bone Joint Surg* 2005:67–A:503–07.
2. Wong SM, Hui ACF, Tong P-Y, et al. Treatment of lateral epicondylitis with botulinum toxin. A randomized, double blind, placebo–controlled trial. *Ann Intern Med* 2005;143:793–98. (Dysport, Beaufour Ipsen International)

Muscle possibly involved
Lateral epicondyle area

Lateral Epicondylitis





CHAPTER 5

Hyperhidrosis

- Forehead/Scalp
- Axillae
- Palms
- Residual Limb
- Feet
- Nerve Blocks–Hands
- Nerve Blocks–Feet

Forehead/Scalp Dosing Ranges			
	Botox (BTX-A) units[1]	Myobloc (BTX-B) units[1]	Injection sites
Forehead/Scalp	1.25–2.5 U/site*	37.5* U/site	2 cm apart/ 10 sites
Dilution	100 U/4 cc NS Dispensed in four 1 cc syringes. = 2.5 U/0.1 cc = 1.25 U/0.05 cc	Undiluted: = 250 U/0.05 cc Diluted: 2,500 U +2 cc NS = 50 U/0.05 cc Dispensed in 1 cc syringes. See dilutions page xxvii	
Needle	30 G, 0.5 in		

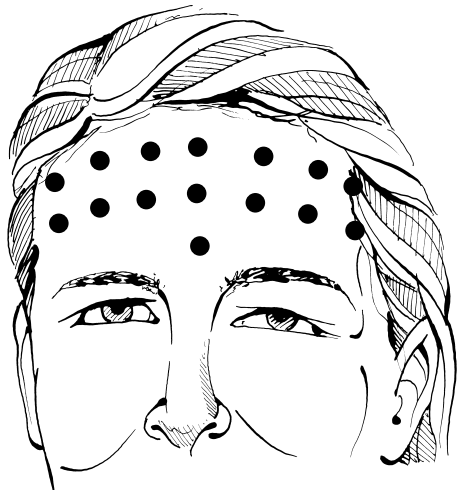
*Start with lowest dose, author's approach.

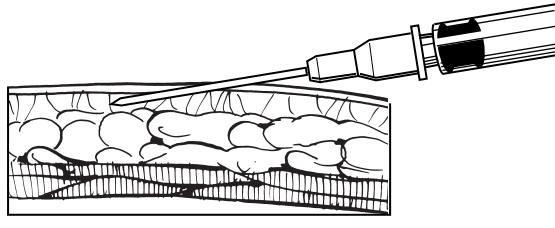
Injection Technique	
Intradermal injections	Mark the area in a grid-type pattern with 1 to 2 cm distance between sites. Stay ~2.5 cm above the brows. Intradermal injection (1–2 mm depth). Angle needle at ~45 degrees to skin surface, and with bevel upward to avoid backflow. Do not inject on ink marks to avoid permanent spots. After injection, clean with alcohol. Reclining position afterward may minimize extravasation to brows.
Potential complications	Sensory deficits in injected area. Inability to frown. Drooping brows or eyelids if injection sites are too close to brows.

Areas possibly involved

Intradermal injections to affected areas

Forehead/Scalp





Axillae Dosing Ranges			
	Botox (BTX-A) units	Myobloc (BTX-B) units	Injection sites
Axillae	50/axillae 5 U/site	2,500/axillae 250 U/site	2 cm apart/10 sites
Dilution	100 U/2 cc nonpreserved saline Dispensed in 1 cc syringes. = 2.5 U/0.1 cc	Undiluted: = 250 U/0.05 cc Diluted: 5,000 U +1 cc NS = 250 U/0.1 cc Dispensed in 1 cc syringes.	
Needle	30 G, 0.5 in		

Injection Technique	
Intradermal injections	Mark the hair-covered area in a grid-type pattern with 2 cm distance between sites. Spray with coolant (ethyl chloride, Fluori-Methane) before each injection. Intradermal injection 1 to 2 mm depth. Do not inject on ink marks to avoid permanent spots. Angle needle at ~45 degrees to skin surface, and with bevel upward to avoid backflow. After injection, cover with 4 × 4 gauze pad and tape in place to avoid spotting.

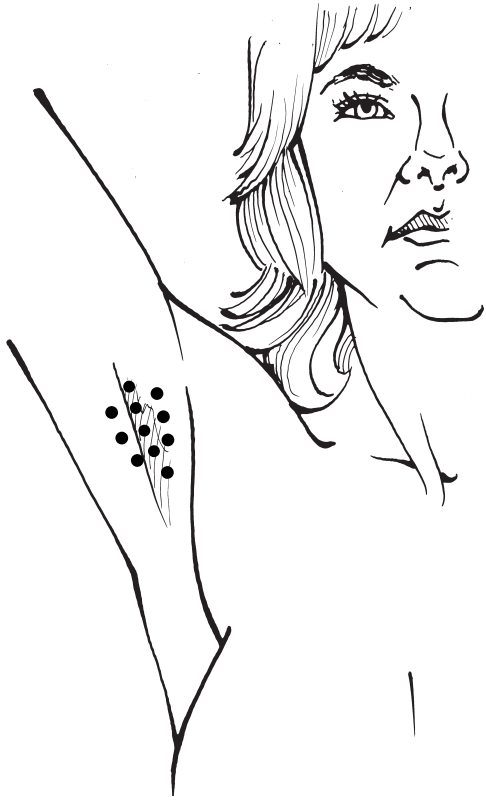
References

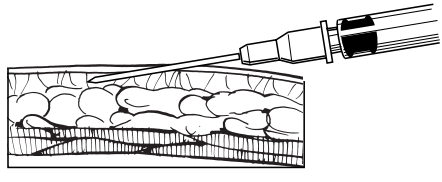
1. Bauman et al. Pilot study of the safety and efficacy of Myobloc (botulinum toxin type B) for treatment of axillary hyperhidrosis. *Int J Dermatol* 2005;44:418–24.
2. Dressler D, Saberi A, Benecke F, Reiner. Botulinum toxin type B for treatment of axillary hyperhidrosis. *J Neurology* 2002;249;1729–32.
3. Odderson IR. Long-term quantitative benefits of botulinum toxin type A in the treatment of axillary hyperhidrosis. *Dermatol Surg* 2002;28:480–83.

Areas possibly involved

Intradermal injections
to affected areas

Axillae





Palms Dosing Ranges			
	Botox (BTX-A) units	Myobloc (BTX-B) units	Injection sites
Palms	100 U/palm 25 U/site	5,000 U/hand[1] 75*–125[1] U/site	2 cm apart
Dilution	100 U/4 cc saline Dispensed in four 1 cc syringes. =2.5 U/0.1 cc	Undiluted: =250 U/0.05 cc Diluted: 5,000 U +1 cc NS =125 U/0.05 cc Dispensed in 1 cc syringes.	
Needle	30 G, 0.5 in		

*Author's recommendation.

Injection Technique	
Intradermal injections	Mark the area in a grid-type pattern with 2 cm distance between sites. Median and ulnar nerve blocks–see page 116. Spray with coolant (ethyl chloride, Fluori-Methane). Intradermal injection 1 to 2 mm depth. Angle needle at ~45 degrees before each injection into skin surface, and with bevel upward to avoid backflow. Do not inject on ink marks to avoid permanent spots. After injection, clean with alcohol and cover with 4 × 4 gauze pad and tape. Keep palms down as much as possible for 1 to 2 hours to minimize penetration to hand intrinsic muscles.
Potential complications	Sensory deficits in injected area. Intrinsic hand muscle weakness.

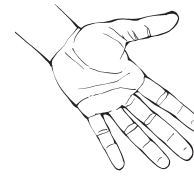
Reference

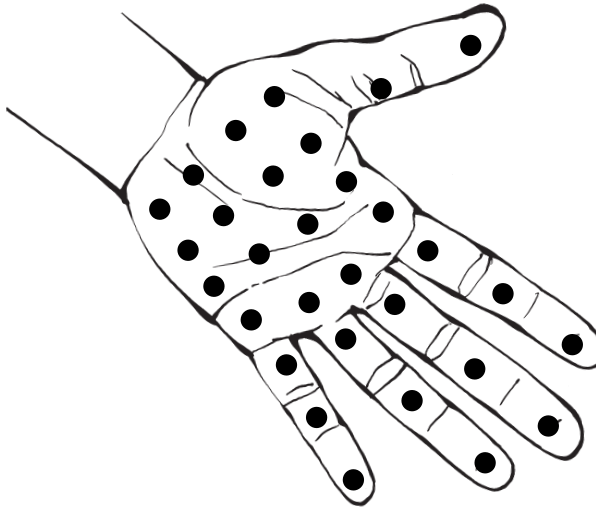
1. Bauman et al. Double-blind, randomized, placebo-controlled pilot study of the safety and efficacy of Myobloc (botulinum toxin type B) for the treatment of palmar hyperhidrosis. *Dermatol Surg* 2005;31:1158.

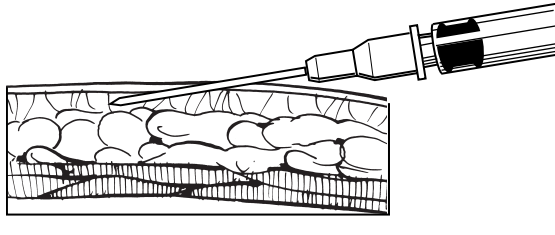
Areas possibly involved

Intradermal injections
to affected areas

Palms







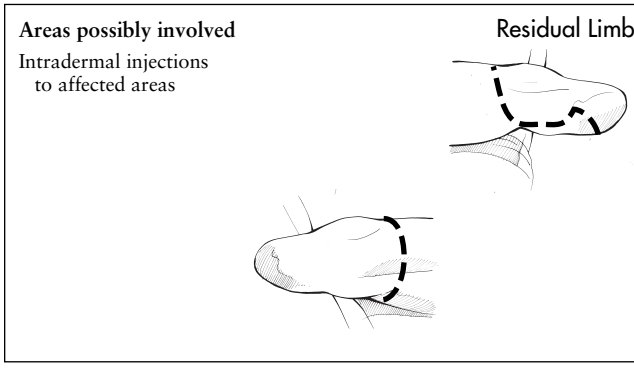
Residual Limb Dosing Ranges			
	Botox (BTX-A) units*	Myobloc (BTX-B) units*	Injection sites
Residual limb	100 U/hand-sized area 2.5 U/site	5,000 U/hand-sized area 125 U/site	2 cm apart
Dilution	100 U/4 cc saline Dispensed in four 1 cc syringes. =2.5 U/0.1 cc	Undiluted: =250 U/0.05 cc Diluted: 5,000 U + 1 cc NS =125 U/0.05 cc Dispensed in 1 cc syringes.	
Needle	30 G, 0.5 in		

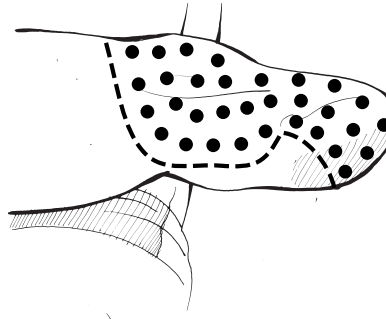
* Author's approach.

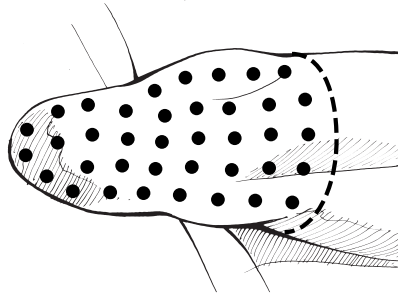
Injection Technique	
Intradermal injection	Mark the area in a grid-type pattern with 2 cm distance between sites. Spray with coolant (ethyl chloride, Fluori-Methane) before each injection. Intradermal injection 1 to 2 mm depth. Do not inject on ink marks to avoid permanent spots. Angle needle at ~45 degrees to skin surface, and with bevel upward to avoid backflow. After injection, clean with alcohol and cover with 4 × 4 gauze pad and tape.
Potential complications	Sensory deficits in injected area.

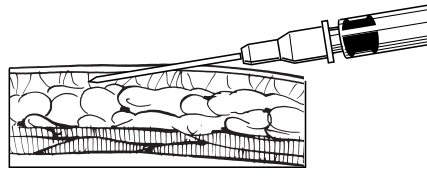
Areas possibly involved

Intradermal injections
to affected areas









Feet Dosing Ranges			
	Botox (BTX-A) units*	Myobloc (BTX-B) units*	Injection sites
Feet	100 U/foot 2.5 U/site	5,000 U/hand 125 U/site	2 cm apart
Dilution	100 U/4 cc saline Dispensed in four 1 cc syringes. = 2.5 U/0.1 cc	Undiluted: = 250 U/0.05 cc Diluted: 5,000 U + 1 cc NS = 125 U/0.05 cc Dispensed in 1 cc syringes.	
Needle	30 G, 0.5 in		

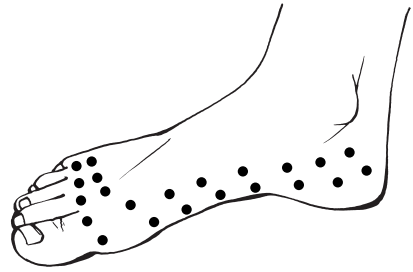
* Author's approach.

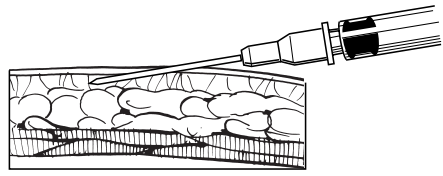
Injection Technique	
Intradermal injections	Mark the area in a grid-type pattern with 2 cm distance between sites. Spray with coolant (ethyl chloride, Fluori-Methane) before each injection. Intradermal injection 1 to 2 mm depth. Angle needle at ~45 degrees to skin surface and with bevel upward to avoid backflow. After injection, clean with alcohol and cover with 4 × 4 gauze pad and tape. Keep soles down as much as possible for 1 to 2 hours to minimize penetration to foot intrinsic muscles.
Potential complications	Sensory deficits in injected area. Muscle weakness.

Areas possibly involved

Intradermal injections
to affected areas

Feet





Nerve Blocks – Hands Dosing Ranges		
	0.5%	2%
Lidocaine	2–5 cc[1]	0.5 cc[2]
Onset[1]	5–15 min	
Duration[1]	60 min	
Needle[1]	30 G, 0.5 in	

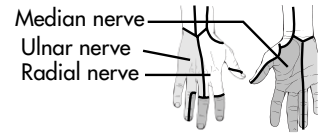
Injection Technique	
Median nerve	Under the palmaris tendon; insert the needle between the palmaris tendon and the flexor carpi radialis tendon. Insert the needle slowly and, if any paresthesia occurs, withdraw somewhat. Advance less than 1 cm.
Ulnar nerve	Under the flexor carpi ulnaris tendon; insert the needle just proximal to the wrist from the medial side under the flexor carpi ulnaris tendon and directed toward the radius. Advance 1 to 1.5 cm. The needle can also be placed on the volar side between the ulnar artery and the flexor carpi ulnaris tendon.
Radial nerve	Subcutaneous infiltration along the extensor pollicis longus tendon and across to the extensor pollicis brevis tendon at the anatomic snuff-box.[2]

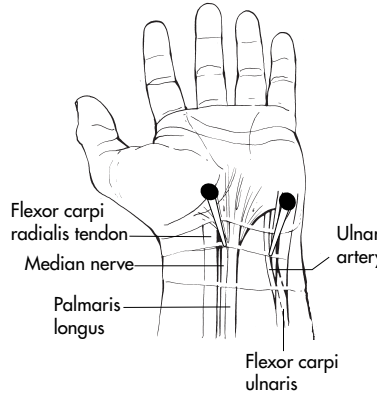
References

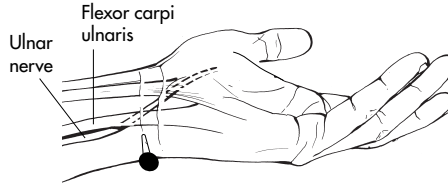
1. Scott DB, Cousins MJ. Clinical pharmacology of local anesthetic agents. In: Cousins MJ, Bridenbauch PO eds. *Neural blockade in clinical anesthesia and management of pain*. Philadelphia: JB Lippincott, 1980.
2. Berry FR, Bridenbaugh L. The upper extremity: somatic blockade. pp 296–319 In: Cousins MJ, Bridenbauch PO eds. *Neural blockade in clinical anesthesia and management of pain*. Philadelphia: JB Lippincott, 1980.

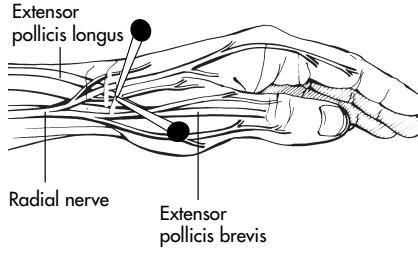
Areas possibly involved

Lateral epicondyle area









Modified from Berry FR, Bridenbaugh L. The upper extremity: somatic blockade. In: Cousins MJ, Bridenbauch PO eds. *Neural blockade in clinical anesthesia and management of pain*. Philadelphia: JB Lippincott, 1980.

Nerve Blocks – Feet Dosing Ranges		
	0.5%	2%
Lidocaine	3–5 cc[1]	0.5 cc
Onset[1]	5–15 min	
Duration[1]	60 min	
Needle[1]	30 G, 0.5 in	

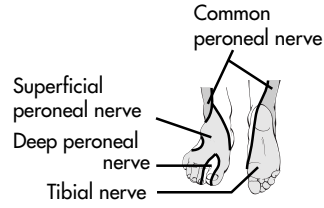
Injection Technique	
Posterior tibial nerve	Inject at the level of the medial malleolus, between the posterior tibial artery and the Achilles tendon.
Sural nerve	Inject at the level of the lateral malleolus, at the midpoint of the Achilles tendon and the posterior part of the lateral malleolus, subcutaneously.
Superficial peroneal nerve	Inject at the level immediately above the lateral malleolus, and one finger breadth lateral to the tendon of the tibialis anterior, subcutaneously.
Deep peroneal nerve	Inject at the level immediately above the malleoli. Needle placement is between the tendons of the extensor hallucis longus and the tibialis anterior.
Saphenous nerve	Inject at the level immediately above and just anterior to the medial malleolus, subcutaneously.

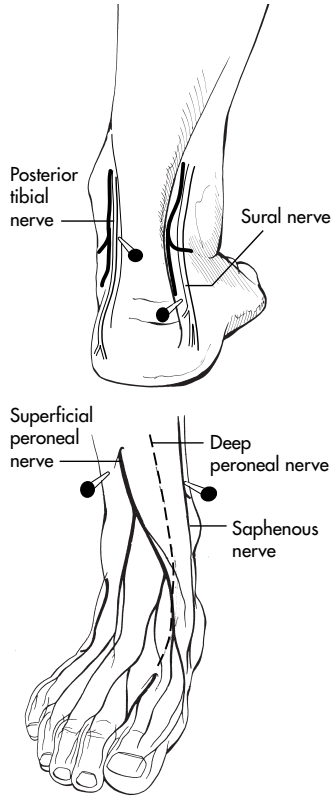
Reference

1. Bridenbauch PO. The lower extremity: Somatic blockade. In: Cousins MJ, Bridenbauch PO eds. Neural blockade in clinical anesthesia and management of pain. Philadelphia: JB Lippincott, 1980.

Areas possibly involved

Intradermal injections to affected areas





Modified with permission from Bridenbauch PO. The lower extremity: Somatic blockade. In: Cousins MJ, Bridenbauch PO eds. *Neural blockade in clinical anesthesia and management of pain*. Philadelphia: JB Lippincott, 1980.

CHAPTER 6

Billing and Reimbursement

- CPT Codes
- Guidance Codes
- Modifiers
- HCPCS Codes
- Insurance Coverage of Drugs and Procedures
- Web Sites for Local Coverage Determination (LCD) by Medicare
- Resources for Coding and Billiing
- ICD-9-CM Codes
- BTX-A and BTX-B Interchangeablity
- Secondary ICD-9-CM Codes

Codes and Modifiers

CPT Codes* for Botulinum Toxin Injections	
64612	Chemodenervation of muscle(s); muscle(s) innervated by facial nerve (e.g., for blepharospasm, hemifacial spasm).
64612-50	Bilateral injections.
64613	Chemodenervation of muscle(s); neck muscles (e.g., for spasmodic dystonia).
64613-50	Bilateral injections.
64614	Chemodenervation of muscle(s); extremity(s) and/or trunk muscle(s) (e.g., for dystonia, cerebral palsy, multiple sclerosis).
64614-50	Bilateral injections.
64650	Chemodenervation of eccrine glands; *both* axillae.
64653	Chemodenervation of eccrine glands; other area(s) (e.g., scalp, face, neck).
64999	Unlisted procedure, nervous system. Chemodenervation hands/palms. Chemodenervation feet.

*Current Procedural Terminology (CPT). The AMA definition may vary from payer definition.

Guidance Codes Used in Addition to Injection Service(s)	
95873	Electrical stimulation for guidance in conjunction with chemodenervation (listed separately in addition to code for primary procedure e.g., 64612, 64613 or 64614).
95874	Needle electromyography for guidance in conjunction with chemodenervation (listed separately in addition to code for primary procedure).
76942	Ultrasonic guidance for needle placement (e.g., biopsy, aspiration, injection, localization device).
77002	Fluoroscopic guidance for needle placement (e.g., biopsy, aspiration, injection, localization device).
77012	CT guidance for needle placement (e.g., biopsy, aspiration, injection, localization device).

Modifiers	
25	Used with the *level of service code,* provided to identify procedure as a separately identifiable service on the same day as the injection. Used with the E/M visit code for level of service.
50	Indicates bilateral service for extremity (64614), facial nerve (64612), and neck muscle (64613) injections.
51	Multiple procedures. Additional procedures are identified by adding modifier 51 (modifier 59 more commonly used).
53	Discontinued procedure. This modifier is added to the code for the procedure that was started.
59	Distinct procedural service. Distinct or independent procedure performed with other procedure, such as *different site* or organ system,* (i.e., right arm and right leg). Use if no more descriptive modifier is available.
Examples	
Mod. 25	Clinic visit and injection with EMG guidance: 99213 × 25 + 64614 + 95874
Mod. 50 59	Both legs injected with EMG guidance: 64614 × (50) + 95874 × 2 One arm and one leg injected with EMG guidance: 64614 + 64614×(59) + 95874 × 2 Bilateral neck injection: 64613 + 64613 × (59) + 95874 × 2 or 64613 × (50) + 95874 × 2
	Use modifiers when injecting more than one site. Use modifiers for only one injection site.

***Injection site billing.** An injection site may be defined as contiguous or functional. A *contiguous* injection site is a single contiguous body part, such as a single limb, single eyelid, side of face, side of neck, etc. A *functional* injection site is a functional muscle group (i.e., elbow flexors or elbow extensors) regardless of the number of injections made into each group or number of muscles that compose it. Be sure to check for the proper definition in your area of coverage.

Modifiers commonly used for contiguous sites (59), and for functional muscle groups (51).

Reference

http://www.noridianmedicare.com

HCPCS Codes*	
J0585	Botulinum toxin type A, **per unit**
J0587	Botulinum toxin type B, **per 100 units**

*The Healthcare Common Procedure Coding System (HCPCS) is used primarily to identify products, supplies, and services not included in the CPT-4 codes. Such coding is necessary for Medicare, Medicaid, and other health insurance programs for insurance claims.

Documentation in the patient's record should include:

- Support for the medical necessity of the injections.
- A covered diagnosis.
- Statement that traditional methods of treatments have been tried and proven unsuccessful.
- Type of botulinum toxin, dosage, and frequency of the injection.
- A complete description of the site(s) of injections.
- Support for the medical necessity of EMG/electrical stimulation procedures.
- Support of the clinical effectiveness of the injections.
- Additional documentation is suggested for quality of life, expected outcome, and duration of benefits.

Insurance Coverage of Drugs and Procedures

- **Medicare part B** covers some outpatient procedures and administered drugs. Botulinum toxin is only covered for certain associated procedures, as indicated in the tables listed below. However, for up-to-date coverage see the local coverage determination (LCD, *http://www.medicare.gov/* and compare health plans and Medigap policies in your area). Medicare part B currently pays 80% of the average sales price of the drug and the patient is responsible for the remaining 20% of the coinsurance costs. Medicare does not provide preauthorization of services.
- **Other insurance** such as Medicaid, Worker's Compensation, managed care, and commercial payers may require precertification for certain allowed procedures. However, many insurers do not necessarily cover all FDA-approved indications nor do they cover all scientifically documented applications of botulinum toxin. If the reasons for the denial are unclear, it may be worthwhile to write an appeals letter inquiring about the specifics of the denial. If further appeals fail to obtain authorization, the next step can be to contact the medical director for the insurance program or appeal to an insurance ombudsman if one exists.
- With most insurance coverage, monthly premiums and an out-of-pocket expense (deductible) are charged each year; these must be paid before the insurance begins to cover the procedure and administered drug.
- **The physician** may have different options for obtaining and billing the botulinum toxin depending on the specifics of the insurance plans. In many cases, the physician can purchase and bill for the drug.
- **For Medicare** patients, the physician can purchase the drug and be reimbursed 80% of the cost by Medicare and collect the remaining 20% coinsurance from the patient. Another option is the Competitive Acquisition Program (CAP), in which the physician is not responsible for billing of the drug. A CAP contractor will purchase the drug, and bill Medicare and the patient for the drug. There are certain requirements for handling of the drug by the physician.
- **A similar system** exists for some managed care organizations, in which the drug is shipped to the physician by a specialty pharmacy provider (SPP) and billed through the managed care plan.
- **The drug manufacturers** can also assist the physicians with the purchase and billing of the drug.

Reference

Botox reimbursement handbook by Allergan, Inc. SIMC05479.
http://www.medicare.gov/

Web Sites for Local Coverage Determination (LCD) by Medicare	
Empire Medical Services	http://www.empiremedicare.com/provprtbny.htm
Noridian Medicare	http://www.noridianmedicare.com/
TrailBlazer Health Enterprises	http://www.trailblazerhealth.com/

Resources for Coding and Billing	
Botox	Ph: 1-800-44-Botox http://www.allergan.com
Botox Reimbursement Solutions	Ph: 1-800-44-Botox (option 4) www.BotoxReimbursementSolutions.com
Botox information line	1-800-44-Botox
Myobloc	1-888-461-2255 http://www.myobloc.com/
Myobloc Reimbursement	http://www.myobloc-reimbursement.com/
Medicare	http://www.medicare.gov/ http://www.medicare.gov/Coverage/Home.asp

ICD-9-CM Codes* that Support Medical Necessity for BTX Injections		
BTX-A (see interchangeability page 128)		
Head	333.81	Blepharospasm.
	333.82	Orofacial dyskinesia.
	341.1	Schilder's disease.
	341.8	Other demyelinating diseases of central nervous system.
	341.9	Demyelinating disease of central nervous system, unspecified.
	343.8	Other specified infantile cerebral palsy.
	343.9	Infantile cerebral palsy, unspecified.
	350.8	Other specified trigeminal nerve disorders.
	351.8	Other facial nerve disorders.
	527.7	Disturbance of salivary secretion.
	705.21	Primary focal hyperhidrosis.
	705.22	Secondary focal hyperhidrosis.
	728.85	Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130..
Neck	333.6	Genetic torsion dystonia.
	333.79	Other acquired torsion dystonia.
	333.83	Spasmodic torticollis.
	343.8	Other specified infantile cerebral palsy.
	343.9	Infantile cerebral palsy unspecified.
	478.75	Laryngeal spasm.
	705.21	Primary focal hyperhidrosis.
	705.22	Secondary focal hyperhidrosis.
	728.85	Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130.
Body & Limbs	333.6	Genetic torsion dystonia.
	333.79	Other acquired torsion dystonia.
	333.89	Other fragments of torsion dystonia.
	333.84	Organic writer's cramp.
	334.1	Hereditary spastic paraplegia.
	341.8	Other demyelinating diseases of the central nervous system.
	341.9	Demyelinating disease of the central nervous system, unspecified.
	343.0	Congenital diplegia.
	343.1	Congenital hemiplegia.
	343.2	Congenital quadriplegia.
	343.3	Congenital monoplegia.
	343.4	Infantile hemiplegia.
	343.8	Other specified infantile cerebral palsy.
	343.9	Infantile cerebral palsy unspecified.
	705.21	Primary focal hyperhidrosis.

ICD-9-CM Codes* that Support Medical Necessity for BTX Injections *(Continued)*		
	705.22	Secondary focal hyperhidrosis
	728.85	Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130.
Bladder	596.54	Neurogenic bladder nos.
	596.55	Detrusor sphincter dyssynergia.
Pain	**None for Medicare**	***No specific pain codes for Medicare***
		Other payees may consider these codes
	307.81	Tension headaches.
	346.0	Migraine.
	346.0	Classical migraine.
	346.1	Common migraine.
	346.11	Migraine, common.
	346.9	Migraine, unspecified.
	353.0	Thoracic outlet syndrome.
	355.0	Piriformis syndrome.
	723.8	Other syndromes affecting cervical region.
	723.85	Cervicobrachial syndrome.
	723.9	Unspecified muscle disorder, symptoms referred to neck.
	729.5	Pain, limb.
	728.85	Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130.
BTX-B (see interchangeability below)		
Neck	333.6	Genetic torsion dystonia.
	333.79	Other required torsion dystonia.
	333.83	Spasmatic torticollis.
	333.89	Other fragments of torsion dystonia.

*International Classification of Diseases (ICD)

BTX-A and BTX-B Interchangeability
Providers such as Medicare may require the use of botulinum toxins in accordance with the approved indications unless failure to improve with the use of other toxins (two treatments in a row with adequate dose), patient intolerance, or hypersensitivity to the other form of the toxin.

Reference

http://www.noridianmedicare.com/p-medb/coverage/final_policies.html
(Active Policies-LCD ID: L19897.)

Secondary ICD-9-CM Codes that May be Required for 728.85 by Medicare in Certain States	
Primary Diagnosis	
728.85	Spasm of muscle.
Secondary Diagnosis Required for 728.85	
340	Multiple sclerosis.
342.11	Spastic hemiplegia and hemiparesis affecting dominant side.
342.12	Spastic hemiplegia and hemiparesis affecting nondominant side.
344.1	Paraplegia.
344.2	Diplegia of upper limbs.
344.5	Unspecified monoplegia.
430	Subarachnoid hemorrhage.
431	Intracerebral hemorrhage.
432.0	Nontraumatic extradural hemorrhage.
432.1	Subdural hemorrhage.
433.01	Occlusion and stenosis of basilar artery with cerebral infarction.
433.11	Occlusion and stenosis of carotid artery with cerebral infarction.
433.21	Occlusion and stenosis of vertebral artery with cerebral infarction.
433.31	Occlusion and stenosis of multiple and bilateral precerebral arteries with cerebral infarction.
433.81	Occlusion and stenosis of other specified precerebral artery with cerebral infarction.
433.91	Occlusion and stenosis of unspecified precerebral artery with cerebral infarction.
434.01	Cerebral thrombosis with cerebral infarction.
434.11	Cerebral embolism with cerebral infarction.
434.91	Cerebral artery occlusion unspecified with cerebral infarction.
438.21	Hemiplegia affecting dominant side.
438.22	Hemiplegia affecting nondominant side.
438.31	Monoplegia of upper limb affecting dominant side.
438.32	Monoplegia of upper limb affecting nondominant side.
438.41	Monoplegia of lower limb affecting dominant side.
438.42	Monoplegia of lower limb affecting nondominant side.
438.51	Other paralytic syndrome affecting dominant side.
438.52	Other paralytic syndrome affecting nondominant side.
438.53	Other paralytic syndrome bilateral.
952.00	C1-C4 level spinal cord injury unspecified.
952.01	C1-C4 level with complete lesion of spinal cord.
952.02	C1-C4 level with anterior cord syndrome.
952.03	C1-C4 level with central cord syndrome.
952.04	C1-C4 level with other specified spinal cord injury.

Secondary ICD-9-CM Codes that May be Required for 728.85 by Medicare in Certain States *(Continued)*	
952.05	C5-C7 level spinal cord injury unspecified.
952.06	C5-C7 level with complete lesion of spinal cord.
952.07	C5-C7 level with anterior cord syndrome.
952.08	C5-C7 level with central cord syndrome.
952.09	C5-C7 level with other specified spinal cord injury.
952.10	T1-T6 level spinal cord injury unspecified.
952.11	T1-T6 level with complete lesion of spinal cord.
952.12	T1-T6 level with anterior cord syndrome.
952.13	T1-T6 level with central cord syndrome.
952.14	T1-T6 level with other specified spinal cord injury.
952.15	T7-T12 level spinal cord injury unspecified.
952.16	T7-T12 level with complete lesion of spinal cord.
952.17	T7-T12 level with anterior cord syndrome.
952.18	T7-T12 level with central cord syndrome.
952.19	T7-T12 level with other specified spinal cord injury.
997.01	Central nervous system complication.
997.02	Iatrogenic cerebrovascular infarction or hemorrhage.

CHAPTER 7

Billing Codes for Specific Conditions

- Migraine
- Blepharospasm/Facial Hemispasms
- Drooling/Sialorrhea
- Lingual Dystonia
- Oromandibular Dystonia
- Cervical Dystonia
- Spasticity and Other Dystonias
- Pain
- Thoracic Outlet Syndrome
- Hyperhidrosis
- Nerve Blocks
- Financial Waiver
- Charges for Botulinum Toxin Procedures
- Body Areas and Related ICD-9-CM Codes

Migraine		
ICD-9	307.81 346.0 346.1 346.11 346.90	Tension headache Migraine, classical Migraine, common Common intractable migraine Migraine, unspecified Migraine may not be covered by Medicare and some commercial payers.
CPT	64612 64613 64614	Chemodenervation of muscle(s); muscle(s) innervated by facial nerve (e.g., for blepharospasm, hemifacial spasm) Chemodenervation of muscle(s); neck muscles (e.g., for spasmodic torticollis) Chemodenervation of muscle(s); extremity(s), and/or trunk muscle(s) (e.g., for dystonia, cerebral palsy, multiple sclerosis), per day
HCPCS		Units used / Units discarded
	J0585	BTX-A (Botox) _____ _____
	J0587	BTX-B (Myobloc) _____ _____
Guidance codes	95873 95874	Electrical stimulation for guidance in conjunction with chemodenervation Needle electromyography for guidance in conjunction with chemodenervation
Modifiers	25	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Blepharospasm/Facial Hemispasms		
ICD-9	333.81 333.85 350.8 351.8 728.85	Blepharospasm Subacute dyskinesia due to drugs Other specified trigeminal nerve disorders (masticatory muscles) Other facial nerve disorders Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130.
CPT	64612	Chemodenervation of muscle(s); muscle(s) innervated by fascial nerve (e.g., for blepharospasm)
HCPCS	 J0585 J0587	Units used / Units discarded BTX-A (Botox) _____ _____ BTX-B (Myobloc) _____ _____
Guidance codes	95873 95874	Electrical stimulation for guidance in conjunction with chemodenervation Needle electromyography for guidance in conjunction with chemodenervation
Modifiers	25 50 51 59	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day) Bilateral (side of face, side of neck) Multiple procedures Distinct procedural service. The procedure was distinct/separate from other services performed on the same day (e.g., if two areas were injected – R arm and R leg)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Drooling/Sialorrhea		
ICD-9	527.7	Disturbance of salivary secretion
CPT	64999 64612	Unlisted procedure, nevous systems Chemodenervation of muscle(s); muscle(s) innervated by the facial nerve
HCPCS	 J0585 J0587	Units used / Units discarded BTX-A (Botox) _____ _____ BTX-B (Myobloc) _____ _____
Guidance codes	76942	Ultrasound guidance for needle placement
Modifiers	25 50 51 59	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day) Bilateral Multiple procedures Distinct procedural service. The procedure was distinct/separate from other services performed on the same day (e.g., if two areas were injected – R arm and R leg)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Lingual Dystonia		
ICD-9	333.82 333.85 341.8 343.9 728.85	Orofacial dyskinesia Subacute dyskinesia due to drugs Other demyelinating diseases of central nervous system Infantile cerebral palsy, unspecified Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130.
CPT	64999	Unlisted procedure, nervous system
HCPCS		Units used / Units discarded
	J0585	BTX-A (Botox) _____ _____
	J0587	BTX-B (Myobloc) _____ _____
Guidance codes	95873 95874 76942	Electrical stimulation for guidance in conjunction with chemodenervation Needle electromyography for guidance in conjunction with chemodenervation Ultrasound guidance for needle placement
Modifiers	25	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Oromandibular Dystonia		
ICD-9	333.82	Orofacial dyskinesia
	333.85	Subacute dyskinesia due to drugs
	341.8	Other demyelinating diseases of the central nervous system
	341.9	Demyelinating disease of the central nervous system, unspecified
	343.8	Other specified infantile cerebral palsy
	343.9	Infantile cerebral palsy, unspecified
	350.8	Other specified trigeminal nerve disorders
	728.85	Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130.
CPT	64999	Unlisted procedure, nervous system
HCPCS		Units used / Units discarded
	J0585	BTX-A (Botox) _____ _____
	J0587	BTX-B (Myobloc) _____ _____
Guidance codes	95873	Electrical stimulation for guidance in conjunction with chemodenervation
	95874	Needle electromyography for guidance in conjunction with chemodenervation
Modifiers	25	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day)
	50	Bilateral
	51	Multiple procedures
	59	Distinct procedural service. The procedure was distinct/separate from other services performed on the same day (e.g., if two areas were injected, neck and arm)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Cervical Dystonia		
ICD-9	333.6	Genetic torsion dystonia
	333.72	Acute dystonia due to drugs
	333.79	Other acquired torsion dystonia
	343.8	Other specified infantile cerebral palsy
	333.83	Spasmodic torticollis – Medicare dx
	333.85	Subacute dyskinesia due to drugs
	333.89	Other fragments of torsion dystonia
	343.9	Infantile cerebral palsy unspecified
	723.5	Torticollis unspecified
	728.85	Spasm of muscle – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130.
CPT	64613	Chemodenervation of cervical spinal muscle(s) (e.g., for spasmodic torticollis)
	64614	Chemodenervation of muscle(s); extremity(s) and/or trunk muscle(s) (e.g., for dystonia, cerebral palsy, multiple sclerosis), per day
HCPCS		Units used / Units discarded
	J0585	BTX-A (Botox) _____ _____
	J0587	BTX-B (Myobloc) _____ _____
Guidance codes	95873	Electrical stimulation for guidance in conjunction with chemodenervation
	95874	Needle electromyography for guidance in conjunction with chemodenervation
	76942	Ultrasound guidance for needle placement
Modifiers	25	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service
		Bilateral
	50	Multiple procedures
	51	Distinct procedural service. The
	59	procedure was distinct/separate from other services performed on the same day (e.g., if two areas were injected, neck and arm)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Spasticity and Other Dystonias		
ICD-9 Head	333.81	Blepharospasm
	333.82	Orofacial dyskinesia
	333.85	Subacute dyskinesia due to drugs
	341.1	Schilder disease
	341.8	Other demyelinating diseases of the central nervous system
	341.9	Demyelinating disease of the central nervous system, unspecified
	343.8	Other specified infantile cerebral palsy
	343.9	Infantile cerebral palsy, unspecified
	350.8	Other specified trigeminal nerve disorders
	351.8	Other facial nerve disorders
	728.85	Spasm of muscle – *Medicare may also require secondary diagnosis* for Medicare (i.e., 728.85 + 340) see pages 129–130.
ICD-9 Neck	333.6	Genetic torsion dystonia
	333.72	Acute dystonia due to drugs
	333.79	Other acquired torsion dystonia
	343.8	Other specified infantile cerebral palsy
	333.83	Spasmodic torticollis
	333.85	Subacute dyskinesia due to drugs
	343.9	Infantile cerebral palsy unspecified
ICD-9 Body & Limbs	333.6	Genetic torsion dystonia
	333.72	Acute dystonia due to drugs
	333.79	Other acquired torsion dystonia
	333.84	Organic writer's cramp
	333.85	Subacute dyskinesia due to drugs
	333.89	Other fragments of torsion dystonia
	334.1	Hereditary spastic paraplegia
	341.8	Other demyelinating diseases of central nervous system
	341.9	Demyelinating disease of central nervous system, unspecified
	343.0	Congenital diplegia
	343.1	Congenital hemiplegia
	343.2	Congenital hemiplegia
	343.3	Congenital monoplegia
	343.4	Infantile hemiplegia
	343.8	Other specified infantile cerebral palsy
	343.9	Infantile cerebral palsy unspecified

Spasticity and Other Dystonias *(Continued)*		
CPT	64612	Chemodenervation of muscle(s); muscle(s) innervated by facial nerve (e.g., for blepharospasm, hemifacial spasm)
	64613	Chemodenervation of muscle(s); cervical spinal muscles (e.g., for spasmodic torticollis)
	64614	Chemodenervation of muscle(s); extremity(s) and/or trunk muscle(s) (e.g., for dystonia, cerebral palsy, multiple sclerosis), per day
HCPCS		Units used / Units discarded
	J0585	BTX-A (Botox) _____ _____
	J0587	BTX-B (Myobloc) _____ _____
Guidance codes	95873	Electrical stimulation for guidance in conjunction with chemodenervation
	95874	Needle electromyography for guidance in conjunction with chemodenervation
	76942	Ultrasound guidance for needle placement
	77002	Fluoroscopic guidance for needle placement, CT guidance for needle placement
Modifiers	25	Significant, separately identifiable evaluation and management service by the same physician on the same day of procedure or other service
	50	Bilateral procedures
	51	Multiple procedures
	59	Distinct procedural service. The procedure was distinct/separate from other services performed on the same day. (e.g., if two areas injected: arm and leg)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Pain		
ICD-9		*No specific pain codes for Medicare.*
	333.6	Genetic torsion dystonia
	333.72	Acute dystonia due to drugs
	333.79	Other acquired torsion dystonia
	307.81	Tension Headache
	333.83	Spasmodic torticollis
	333.84	Organic writer's cramp
	333.85	Subacute dyskinesia due to drugs
	337.20	RSD, unspecified
	346.0	Migraine, classic
	346.10	Migraine, common
	346.11	Chronic daily headaches
	346.90	Migraine, unspecified
	350.8	Other specified trigeminal nerve disorders
	351.9	Facial nerve disorder, unspecified
	353.0	Thoracic outlet syndrome
	354.4	Causalgia, arm
	355.71	Causalgia, leg
	723.3	Cervicobrachial syndrome
	723.1	Cervicalgia
	723.8	Other syndromes affecting cervical region
	723.9	Unspecified musculoskeletal disorder and symptoms referable to neck
	724.2	Lumbago, low back pain, low back syndrome
	724.3	Sciatica (piriformis syndrome)
	729.1	Myalgia and myositis, unspecified
	729.5	Pain, limb
	728.85	Spasm of muscle (primary diagnosis) – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130
CPT	64612	Chemodenervation of muscle(s); muscle(s) innervated by facial nerve (e.g., for blepharospasm, hemifacial spasm)
	64613	Chemodenervation of muscle(s); neck muscles (e.g., for spasmodic torticollis)
	64614	Chemodenervation of muscle(s); extremity(s) and/or trunk muscle(s) (e.g., for dystonia, cerebral palsy, multiple sclerosis), per day
	64999	Unlisted procedure, nervous system

Migraine and pain may not be covered by Medicare and some commercial payers.

Pain *(Continued)*			
HCPCS		Units used	Units discarded
	J0585	BTX-A (Botox) _____	_____
	J0587	BTX-B (Myobloc) _____	_____
Guidance codes	95873	Electrical stimulation for guidance in conjunction with chemodenervation	
	95874	Needle electromyography for guidance in conjunction with chemodenervation	
	64999	Ultrasound guidance for needle placement	
Modifiers	25	Significant, separately identifiable evaluation and management (e.g., consult and procedure on the same day)	
	50	Bilateral	
	51	Multiple procedures	
	53	Discontinued procedure for procedure that was started	
	59	Distinct procedural service. The procedure was distinct/separate from other services performed on the same day (e.g., if two areas injected: face and arm)	

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Thoracic Outlet Syndrome		
ICD-9	333.79	Other acquired torsion dystonia
	353.0	Brachial plexus lesion/thoracic outlet syndrome
	723.3	Cervicobrachial syndrome
	723.8	Other syndromes affecting cervical region
	723.9	Unspecified musculoskeletal disorders and symptoms referable to neck
	728.85	Spasm of muscle (primary diagnosis) – *Medicare may also require secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130
CPT	64613	Chemodenervation of muscle(s); cervical spinal muscles (e.g., for spasmodic torticollis)
	64999	Unlisted procedure, nervous system
HCPCS		Units used / Units discarded
	J0585	BTX-A (Botox) _____ _____
	J0587	BTX-B (Myobloc) _____ _____
Guidance codes	95873	Electrical stimulation for guidance in conjunction with chemodenervation
	95874	Needle electromyography for guidance in conjunction with chemodenervation
	76942	Ultrasound guidance for needle placement
Modifiers	25	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day)
	50	Bilateral procedures
	51	Multiple procedures
	59	Distinct procedural service. The procedure was distinct/separate from other services performed on the same day (e.g., if two areas injected: arm and leg)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Hyperhidrosis		
ICD-9	705.21 705.22	Primary focal hyperhidrosis Secondary focal hyperhidrosis
CPT	64650 64653 64999	Chemodenervation of eccrine glands; both axillae Chemodenervation of eccrine glands; other area(s) (e.g., scalp, face, neck), per day Unlisted procedure, nervous system • Palms • Feet • Other _____
HCPCS	 J0585 J0587	 Units used / Units discarded BTX-A (Botox) _____ _____ BTX-B (Myobloc) _____ _____
Guidance codes		Not applicable
Modifiers	25 50 59	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day) Bilateral procedures – not applicable for axillae Distinct procedural service. The procedure was distinct/separate from other services performed on the same day (e.g., if two areas injected (scalp and palms)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Nerve Blocks		
ICD-9	705.21 705.22	Primary focal hyperhidrosis Secondary focal hyperhidrosis
CPT	64450 64999	Injection anesthetic agent, other peripheral nerve or branch Unlisted procedure, nervous system
Modifiers	25 50 51 59	Significant, separately identifiable evaluation and management service by the same physician on the same day of a procedure or other service (e.g., consult and procedure on the same day) Bilateral Multiple procedures Distinct procedural service. The procedure was distinct/separate from other services performed on the same day (e.g., if two areas were injected, neck and arm)

Modified from Botox reimbursement handbook by Allergan, Inc. SIMC05479.

ICD-9, *International Classification of Diseases*, 9th edition; CPT, Current Procedural Terminology; HCPCS (J-codes), Health Care Procedure Coding.

Example of Financial Waiver

Medicare Advanced Beneficiary Notice used by providers, physicians, practitioners, and suppliers for all situations in which Medicare payment is expected to be denied.

Patient's Name: Medicare # (HCN):

Advance Beneficiary Notice (ABN)

NOTE: You need to make a choice about receiving these laboratory tests. We expect that Medicare will not pay for the laboratory test(s) that are described below. Medicare does not pay for all of your health care costs. Medicare only pays for covered items and services when Medicare rules are met. The fact that Medicare may not pay for a particular item or service does not mean that you should not receive it. There may be a good reason your doctor recommended it. Right now, In your case, Medicare probably will not pay for the laboratory test(s) Indicated below for the following reasons:

Medicare does not pay for these tests for your condition	Medicare does not pay for these tests as often as this (denied as too frequent)	Medicare does not pay for experimental or research use tests

The purpose of this form is to help you make an Informed choice about whether or not you want to receive these laboratory tests, knowing that you might have to pay for them yourself. Before you make a decision about your options, you should read this entire notice carefully.

- Ask us the explain, If you don't understand why Medicare probably won't pay.
- Ask us how much these laboratory tests will cost you (Estimated Cost: $ _____). In case you have to pay for them yourself or through other insurance.

PLEASE CHOOSE ONE OPTION. CHECK ONE BOX. SIGN & DATE YOUR CHOICE.

☐ **Option 1. YES. I want to receive these laboratory tests.**
I understand that Medicare will not decide whether to pay unless I receive these laboratory tests. Please submit my claim to Medicare. I understand that you may bill me for laboratory tests and that I may have to pay the bill while Medicare is making its decision. If Medicare does pay, you will refund to me any payments I made to you that are due to me. If Medicare denies payment, I agree to be personally and fully responsible for payment. That is, I will pay personally, either out of pocket or through any other Insurance that I have. I understand I can appeal Medicare's decision.

☐ **Option 2. NO. I have decided not to receive these laboratory tests.**
I will not receive these laboratory tests. I understand that you will not be able to submit a claim to Medicare and that I will not be able to appeal your opinion that Medicare won't pay. I will notify my doctor who ordered these laboratory tests that I did not receive them.

Date **Signature of patient or person acting on patient's behalf**

NOTE: Your health information will be kept confidential. Any information that we collect about you on this form will be kept confidential in our offices. If a claim is submitted to Medicare, your health information on this form may be shared with Medicare. Your health information which Medicare sees will be kept confidential by Medicare.

CMB Approval No. 0938-0566 Form No. CMS-R-131-L (June 2002)

Reference

http://www.cms.hhs.gov/BNI/

Charges for Botulinum Toxin Procedures

New Patient			
X	CPT	Level	Mod
	99201	Level 1	25
	99202	Level 2	25
	99203	Level 3	25
	99204	Level 4	25
	99205	Level 5	25
Established Patient			
	CPT	Level	Mod
	99211	Level 1	25
	99212	Level 2	25
	99213	Level 3	25
	99214	Level 4	25
	99215	Level 5	25
Consult Patient			
	CPT	Level	Mod
	99241	Level 1	25
	99242	Level 2	25
	99243	Level 3	25
	99244	Level 4	25
	99245	Level 5	25

Botulinum Toxin Injection			
X	CPT	Mod	Chemodenervation
	64612		**Facial nerve muscles**
	64612	50	-+- Bilat
	64612	59	-+- Distinct procedure
	64613		**Neck muscles**
	64613	50	-+- Bilat
	64613	59	-+- Distinct procedure
	64614		**Extremity/trunk m's**
	64614	50	-+- Bilat
	64614	59	-+- Distinct procedure
	+95873		**E. stim guidance**
	+95873	× 2	-+- Bilat
	+95873	× 3	-+- Distinct procedure
	+95874		**EMG guidance**
	+95874	× 2	-+- Bilat
	+95874	× 3	-+- Distinct procedure
	64650		Eccrine glands axillae bilat
	64653		Other areas – scalp, face, neck
	64999		Extremities – hand, foot
	64999	50	Extremities – hands
	64999	50	Extremities – feet
	64999/ 64612		Sialorrhea, masticatory muscles, lingual muscles
	64999	50	-+- Bilat
	76942		**Ultrasonic guidance**
		53	**Discontinued procedure**

Body Areas and Related ICD-9-CM Codes that May be Covered by Medicare in Certain States		
BTX-A (see interchangeability page 128)		
Head	333.81	Blepharospasm
	333.82	Orofacial dyskinesia
	341.1	Schilder's disease
	341.8	Other demyelinating diseases of central nervous system
	341.9	Demyelinating disease of central nervous system, unspecified
	343.8	Other specified infantile cerebral palsy
	343.9	Infantile cerebral palsy, unspecified
	350.8	Other specified trigeminal nerve disorders
	351.8	Other facial nerve disorders
	527.7	Disturbance of salivary secretion
	705.21	Primary focal hyperhidrosis
	705.22	Secondary focal hyperhidrosis
	728.85	Spasm of muscle – *must be used with secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130
Neck	333.83	Spasmodic torticollis
	343.8	Other specified infantile cerebral palsy
	343.9	Infantile cerebral palsy unspecified
	478.75	Laryngeal spasm
	705.21	Primary focal hyperhidrosis
	705.22	Secondary focal hyperhidrosis
	728.85	Spasm of muscle – *must be used with secondary diagnosis* (i.e., 728.85 + 340) see pages 129–130
Body & Limbs	333.6	Idiopathic torsion dystonia
	333.7	Symptomatic torsion dystonia
	333.89	Other fragments of torsion dystonia

Body Areas and Related ICD-9-CM Codes that May be Covered by Medicare in Certain States *(Continued)*		
	333.84	Organic writer's cramp
	334.1	Hereditary spastic paraplegia
	341.8	Other demyelinating diseases of central nervous system
	341.9	Demyelinating disease of central nervous system, unspecified
	343.0	Congenital diplegia
	343.1	Congenital hemiplegia
	343.2	Congenital hemiplegia
	343.3	Congenital monoplegia
	343.4	Infantile hemiplegia
	343.8	Other specified infantile cerebral palsy
	343.9	Infantile cerebral palsy unspecified
	705.21	Primary focal hyperhidrosis
	705.22	Secondary focal hyperhidrosis
	728.85	Spasm of muscle – *must be used with secondary diagnosis* (i.e., 728.85 + 340) see list below
Bladder	596.54	Neurogenic bladder nos
	596.55	Detrusor sphincter dyssynergia
Pain	**None for Medicare**	***No specific pain codes for Medicare.***
		Other payees may consider these codes
	729.5	Pain, limb
	723.85	Cervicobrachial syndrome
	723.9	Unspecified muscle disorder, symptoms referred to neck
	355.0	Piriformis syndrome
	353.0	Thoracic outlet syndrome
	307.81	Tension headaches
	346.11	Migraine, common
	346.0	Migraine
	346.0	Classical migraine
	346.1	Common migraine
	346.9	Migraine, unspecified
	723.8	Other syndrome affecting cervical region
	728.85	Spasm of muscle – *must be used with secondary diagnosis* for Medicare
BTX-B (see interchangeability page 128)		
Neck	333.6	Idiopathic torsion dystonia
	333.7	Symptomatic torsion dystonia
	333.83	Spasmodic torticollis
	333.89	Other fragments of torsion dystonia

CHAPTER 8

Scales

- Cervical Dystonia – TWSTRS Scale
- Hyperhidrosis Disease Severity Scale (HDSS)
- Drooling/Sialorrhea Scales
- Spasticity Scales

Cervical Dystonia – TWSTRS Scale

I. Cervical Dystonia Severity Scale (Maximum = 35)

A. Maximal Excursion Rate maximum amplitude of excursion, asking patient not to oppose the abnormal movement; examiner may use distracting or agaravating maneuvers. When degree of deviation is between scores, choose the higher of the two.							Score
1. Torticollis (Rotation) (Turn: right or left)	0	1	2	3	4		
0 = None (0°); 1 = Slight (<1/4 range, 1°–22°); 2 = Mild (1/4–1/2 range, 23°–45°); 3 = Moderate (1/2–3/4 range, 46°–67°); 4 = Severe (>3/4 range, 68°–90°)							
2. Laterocollis (Tilt: right or left, exclude shoulder elevation)	0	1	2	3			
0 = None (0°); 1 = Mild (1°–15°); 2 = Moderate (16°–35°); 3 = Severe (>35°)							
3. Anterocollis/Retrocollis (a or b) **a. Anterocollis**	0	1	2	3			
a. 0 = None; 1 = Mild downward deviation of chin; 2 = Moderate downward deviation (approximates 1/2 possible range); 3 = Severe (chin approximates chest)							
b. Retrocollis	0	1	2	3			
b. 0 = None; 1 = Mild backward deviation of vertex with upward deviation of chin; 2 = Moderate backward deviation (approximates 1/2 possible range); 3 = Severe (approximates full range)							
4. Lateral shift (Right or left)	0	1					
0 = Absent; 1 = Present							
5. Sagittal shift (Forward or backward)	0	1					
0 = Absent; 1 = Present							
B. Duration Factor (Weighted × 2)	0	1 (× 2)	2 (× 2)	3 (× 2)	4 (× 2)	5 (× 2)	
0 = None; 1 = Occasional deviation (<25% of the time, most often submaximal); 2 = Occasional deviation (<25% of the time, often maximal) *or* intermittent deviation (25%–50% of the time, most often submaximal); 3 = Intermittent deviation (25%–50% of the time, often maximal) *or* frequent deviation (50%–75% of the time, most often submaximal); 4 = Frequent deviation (50%–75% of the time, often maximal) *or* constant deviation (>75% of the time, most often submaximal); 5 = Constant deviation (>75% of the time, often maximal)							
C. Effect of Sensory Tricks	0	1	2				
0 = Complete relief by 1 or more tricks; 1 = Partial or only limited relief by tricks; 2 = Little or no benefit from tricks							
D. Shoulder Elevation/ Anterior Displacement	0	1	2	3			
0 = Absent; 1 = (<1/3 possible range), intermittent, or constant; 2 = Moderate (1/3–2/3 possible range) and constant (>75% of the time) *or* severe (>2/3 possible range) and intermittent; 3 = Severe and constant							
E. Range of Motion (Without aid of sensory tricks.) (If limitation occurs in more than one plane of motion, use individual score that is highest.)	0	1	2	3	4		
0 = Able to move to extreme opposite position; 1 = Able to move head well past midline but not to extreme opposite position; 2 = Able to move head barely past midline; 3 = Able to move head toward but not past midline; 4 = Barely able to move head beyond abnormal posture							
F. Time (Up to 60 seconds) for which patient is able to maintain head within 10° of neutral position without using sensory tricks (mean of 2 attempts)	0	1	2	3	4		
0 = >60 seconds; 1 = 46–60 seconds; 2 = 31–45 seconds; 3 = 16–30 seconds; 4 = < 15 seconds							

*Adapted from: Consky ES, Lang AE. Clinical assessments of patients with cervical dystonia. In: Jankovic J, Hallett M, eds. *Therapy with Botulinum Toxin*. New York, NY: Marcel Dekker, Inc.; 1994:211–237.

Subtotal Severity

II. Disability Scale (Maximum = 30)

							Score
A. Work (Occupation or housework/ home management)	0	1	2	3	4	5	
0 = No difficulty; 1 = Normal work expectations with satisfactory performance at usual level of occupation but some interference by cervical dystonia; 2 = Most activities unlimited, selected activities very diffcult and hampered but still possible with satisfactory performance; 3 = Working at lower than usual occupation level; most activities hampered, all possible but with less than satisfactoy performance in some activities; 4 = Unable to engage in voluntary or gainful employment, still able to perform some domestic responsibilities saatisfactorily; 5 = Marginal or no ability to perform responsibilities							
B. Activities of Daily Living (eg, feeding, dressing, or hyfiene including washing, shaving, makeup, etc)	0	1	2	3	4	5	
0 = No difficulty with any activity; 1 = Activities unlimited but some interference by cervical dystonia; 2 = Most activities unlimited, selected activities very diffcult and hampered but still possible using simple tricks; 3 = Most activities hampered or laborious but still possible, may use exterme tricks; 4 = All activities impaired, some impossible or require assistance; 5 = Dependent on others in most self-care tasks							
C. Driving	0	1	2	3	4	5	
0 = No difficulty (or has never driven a car); 1 = Unlimited ability to drive but bothered by cervical dystonia; 2 = Unlimited ability to drive but requires tricks (including touching or holding face, holding head against headrest) to control cervical dystonia; 3 = Can drive only short distances; 4 = Usually cannot drive because of cervical dystonia; 5 = Unable to drive and cannot ride in a car for long stretches as a passenger because of cervical dystonia							
D. Reading	0	1	2	3	4	5	
0 = No difficulty; 1 = Unlimited ability to read in normal seated position but bothered by cervical dystonia; 2 = Unlimited ability to read in normal seated position but requires use of tricks to control cervical dystonia; 3 = Unlimited ability to read but requires extensive mesures to control cervical dystonia *or* is able to read only in nonseated position (eg, lying down); 4 = Limited ability to read because of cervical dystonia despite tricks; 5 = Unable to read more than a few sentences because of cervical dystonia							
E. Watching Television	0	1	2	3	4	5	
0 = No difficulty; 1 = Unlimited ability to watch television in normal seated position but bothered by cervical dystonia; 2 = Unlimited ability to watch television in normal seated position but requires use of tricks to control cervical dystonia; 3 = Unlimited ability to watch television but requires extensive mesures to control cervical dystonia *or* is able to view only in nonseated position (eg, lying down); 4 = Limited ability to watch television because of cervical dystonia; 5 = Unable to watch television more than a few minutes because of cervical dystonia							
F. Activities Outside the Home (eg, shopping, walking, movies, dining, and other recreational activities)	0	1	2	3	4	5	
0 = No difficulty; 1 = Unlimited activities but bothered by cervical dystonia; 2 = Unlimited activities but requires simple tricks to accomplish; 3 = Accomplishes activities only when accompanied by others because of cervical dystonia; 4 = Limited activities outside the home, certain activities impossible or given up because of cervical dystonia; 5 = Rarely if ever engages in activities outside the home							
						Subtotal Disability	

III. Pain Scale (Maximum = 20)

A. Severity of Pain	Best ____			Worst ____		Usual ____	
Rate the severity of neck pain due to cervical dystonia during the last week on a scale of **0–10**, where a score of 0 represents no pain and 10 represents the most excruciating pain imaginable. Score calculated as: (worst + best + [2 × usual])/4							
B. Duration of Pain	0	1	2	3	4	5	
0 = None; 1 = Present <10% of the time; 2 = Present 10%–25% of the time; 3 = Present 26%–50% of the time; 4 = Present 51%–75% of the time; 5 = Present >75% of the time							
C. Disability Due to Pain	0	1	2	3	4	5	
0 = No limitation or interference from pain; 1 = Pain is quite bothersome but not a source of disability; 2 = Pain definitely interferes with some tasks but is not a major contributor to disability; 3 = Pain accounts for some (less than half) but not all of disability; 4 = Pain is a major source of difficulty with activities; separate from this, head pulling is also a source of some (less than half) of disability; 5 = Pain is the major source of disability, without it most impaired activities could be perfomed quite satisfactorily despite the head pulling							

*Adapted from: Consky ES, Lang AE. Clinical assessments of patients with cervical dystonia. In: Jankovic J, Hallett M, eds. *Therapy with Botulinum Toxin*. New York, NY: Marcel Dekker, Inc.; 1994:211–237.

Subtotal Pain	
Subtotal Severity from previous page	
Total TWSTRS Score	

Reference

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Hyperhidrosis Scale

Hyperhidrosis Disease Severity Scale (HDSS)		
X	Score	
	1	My (underarm) sweating is never noticeable and never interferes with my daily activities.
	2	My (underarm) sweating is tolerable but sometimes interferes with my daily activities.
	3	My (underarm) sweating is barely tolerable and frequently interferes with my daily activities.
	4	My (underarm) sweating is intolerable and always interferes with my daily activities.

Reference

http://www.botoxseveresweating.com/info_physicians/info_physicians.aspx.

Drooling/Sialorrhea Scales

Drooling Impact Score (DIS)[1]					
Over the last week		Very much 4	A Lot 3	A Little 2	Not at all 1
1	How has your drooling been?				
2	How embarrassed or self-conscious have you been because of your drooling?				
3	Has your drooling interfered with your speech?				
4	Has your drooling influenced the clothes and make-up that you wear?				
5	Has your drooling affected the chin of your lower face?				
6	Has your drooling affected social or leisure activities?				
7	Has you drooling curtailed working or going out?				
8	Has your drooling interfered with socializing with your spouse or friends?				
9	Has your drooling been complicated by coughing or choking?				
10	Has your drooling caused your living area to be smelly and messy?				

References

1. Verma A, Steele J. Botulinum toxin improves sialorrhea and quality of living in bulbar amyotrophic lateral sclerosis. *Muscle Nerve* 2006;34:235–37.
2. Findlay AY, Khan GK. Dermatology life quality index – a simple practical measure for routine clinical use. *Clin Exp Dermatol* 1994;19:210–16.

Drooling/Sialorrhea Scales

Questionnaire-based Scoring System for Drooling Severity and Frequency			
Drooling severity	**1**	Dry	Never drools
	2	Mild	Only lips wet
	3	Moderate	Wet on lips and chin
	4	Severe	Drools to extent that clothing becomes damp
	5	Profuse	Clothing, hands, tray, and objects become wet
Drooling frequency	**1**	Never drools	
	2	Occasionally drools	
	3	Frequently drools	
	4	Constantly drools	

Scales for children and patients with poor communication.

Reference

Heine RG, Catto-Smith AG, Reddihough DS. Effect of antireflux medication on salivary drooling in children with cerebral palsy. *Dev Med Child Neurol* 1996;38:1030–36.

Drooling/Sialorrhea Scales

Drooling Rating Scale						
Completed by patient or caregiver						
	Score	Sitting	Standing	In bed	Talking	Eating & drinking
Excessive dryness of the mouth	**0**					
No excessive saliva	**0**					
Excess of saliva in mouth without drooling	**1**					
Mild to moderate drooling, needs occasional wiping	**2**					
Continuous drooling, wet clothes or constant use of handkerchief or tissue	**3**					

Reference

Marks L, Turner K, O'Sullivan J, Deighton B, Lees A. Drooling in Parkinson's disease: a novel speech and language therapy intervention. *Int J Lang Comm Dis* 2001;36(Suppl):282–87.

Spasticity Scales

The Ashworth Scale			
Score	Ashworth Scale[1] (1964)	Score	Modified Ashworth Scale[2] Bohannon & Smith (1987)
0	No increase in tone	**0**	No increase in muscle tone
1	Slight increase in tone giving a catch when the limb was moved in flexion or extension	**1**	Slight increase in muscle tone, manifested by *a catch* and release *or* by *minimal resistance at the end* of the range of motion when the affected part(s) is moved in flexion or extension
		1+	Slight increase in muscle tone, manifested by a catch, followed by minimal resistance throughout the remainder (less than half) of the ROM (range-of-movement)
2	More marked increase in tone but limb easily flexed	**2**	More marked increase in muscle tone through most of the ROM, but affected part(s) easily moved
3	Considerable increase in tone; passive movement difficult	**3**	Considerable increase in muscle tone passive, movement difficult
4	Limb rigid in flexion or extension	**4**	Affected part(s) rigid in flexion or extension

References

1. Ashworth B. Preliminary trial of carisoprodol in multiple sclerosis. *Practitioner* 1964;192:540.
2. Bohannon RW, Smith MB. Interrater reliability of a modified Ashworth scale of muscle spasticity. *Physical Ther* 1987;2:206–07.

Spasticity scales

During passive range-of-motion, muscle reaction (x) and angle of muscle reaction (y) are measured at various velocities.

The Tardieu Scale	
Muscle Reaction (X)	
0	No resistance throughout the ROM
1	Slight resistance through the ROM with no clear catch at a precise angle
2	Clear catch at precise angle, followed by release
3	Fatigable clonus <10 with maintaining pressure occurring at precise angle
4	Unfatigable clonus >10 when maintaining pressure occurring at a precise angle
Angle of Muscle Reaction (Y)	
Measured relative to the position of minimal stretch of the muscle (corresponding to angle 0) for all joints except hip, where it is relative to the resting anatomic position	
Velocity of Stretch	
V1	As slow as possible to minimize stretch reflex Used to measure passive ROM
V2	Speed of limb falling under gravity Used to rate spasticity
V3	As fast as possible – faster than V2 Used to rate spasticity

Adapted from Tardieu by Held and Pierrot-Deseilligly and translated by Gracies et al.[1–4] The Tardieu Scale differentiates spasticity from contracture in contrast to the Ashworth Scale.[5] To evaluate the treatment of spasticity, it is probably better to compare the maximal ROM at a very low-velocity passive stretch before and after treatment and the joint angle of the catch at a fast-velocity passive stretch before and after treatment.[7]

It may be difficult to distinguish between V2 and V3 and more appropriate to use a single generic fast velocity and be aware that this velocity will be dependent on the amount of tone and resistance in the muscle of each individual.[6]

References

1. Tardieu G, Shentoub S, Delarue R. A la recherché d'une technique de measure del la spasticite. *Rev Neurol* 1954;91:143–44.
2. Tardieu G, Rondont O, Mensch J, et al. Responses electromyographiques a l'etirement musculaire chez l'homme normal. *Rev Neurol* 1957;97:60–61.
3. Held J, Pierrot-Deseilligny E. *Reeducation motrice des affections neurologique*. J B Baillere, 1969:31–42.
4. Gracies J-M, Marosszeky J, Renton R, Sadaman J, et al. Short-term effects of dynamic Lycra splints on upper limb in hemiplegia patients. *Arch Phys Med Rehabil* 2000;81:1547–55.
5. Patric E, Ada L. The Tardieu Scale differentiates contracture form spasticity whereas the Ashworth Scale is confounded by it. *Clin Rehab* 2006;20:173–82.
6. Mackey AH, Walt SE, Lobb G, Stott NS. Intraobserver reliability of the modified Tardiwu scale in the upper limb of children with hemiplegia. *Dev Med Child Neurol* 2004;46:267–72.
7. Scholtes VAB, Beelen A, Lankhorst G. Clinical assessment of spasticity in children with cerebral palsy: a critical review of available instruments. *Dev Med Child Neurol* 2006;48:64–73.

Spasticity Scales

Spasm Frequency Score	
0	No Spams
1	Mild spasms induced by stimulation
2	Infrequent full spasms < once/hour
3	Spasms occurring > once/hour
4	Spasms occurring > 10 times/hour

Reference

Middle B, Kuipers-Upmeijer H, Bouma J, et al. Effect of intrathecal baclofen delivered by an implanted programmable pump on health related quality of life in patients with severe spasticity. *J Neurol Neurosurg Psychiatry* 1997;63:204–09.

Spasm Frequency Score	
0	No spasms
1	One or fewer spasms per day
2	Between 1 and 5 spasms per day
3	Five to < 10 spasms per day
4	Ten or more spasms per day, or continuous contractions

Reference

Snow BJ, Tsui JKC, Bhatt MH, et al. Treatment of spasticity with botulinum toxin: a double-blind study. *Ann Neurol* 1990;28:512–15.

Spasticity Scales

Degree of Adductor Tone	
0	No increase
1	Increased tone, hips easily abducted to 45 degrees by one person
2	Hips abducted to 45 degrees by one person with mild effort
3	Hips abducted to 45 degrees by one person with major effort
4	Two people required to abduct the hips to 45 degrees

Hygiene Score	
0	Independent with cleaning and catheterization
1	One person is able to clean and catheterize with ease
2	One person is able to clean and catheterize with effort
3	One person is able to clean and catheterize only with major difficulty
4	Two people required, but together they can clean and catheterize easily
5	Two people clean and catheterize with difficulty

Reference

Snow BJ, Tsui JKC, Bhatt MH, et al. Treatment of spasticity with botulinum toxin: a double-blind study. *Ann Neurol* 1990;28:512–15.

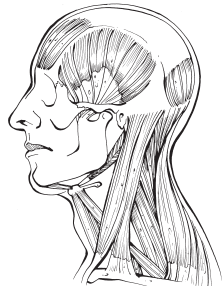
CHAPTER 9

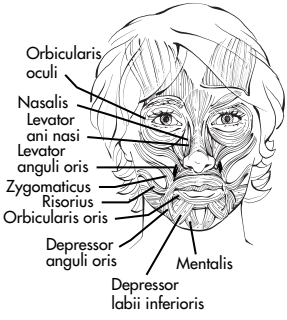
Clinical Data Forms

- Neurotoxin Clinic Evaluation and Treatment for Migraine
- Neurotoxin Clinic Evaluation and Treatment for Facial Spasms
- Neurotoxin Clinic Evaluation and Treatment for Cervical Dystonia
- Neurotoxin Clinic Evaluation and Treatment for Spasticity (Upper Extremities)
- Neurotoxin Clinic Evaluation and Treatment for Spasticity (Lower Extremities)

Neurotoxin Clinic Evaluation and Treatment for Migraine

Patient name:		**INR:**	**Date:**
Date:		**Pregnant:**	No Yes
Last injection:		**Birth control:**	Yes No

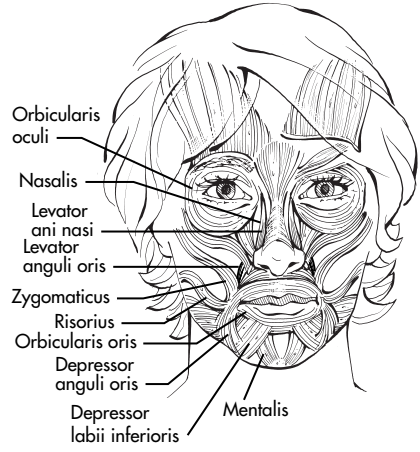




Guidance	
Estim	
EMG	
Units used	
BTX-A units	
BTX-B units	
Dilution	
BTX-A	
BTX-B	
Needle	
30G, 1/2 in	
27G, 37 mm	
25G, 50 mm	
Discarded	

Neurotoxin Clinic Evaluation and Treatment for Facial Spasms

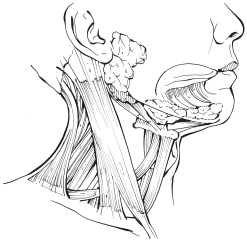
Patient name:		**Pregnant:**	Yes No
Date:		**Birth control:**	No Yes
Diagnosis:		**INR:**	
Last injection:		**INR – date:**	

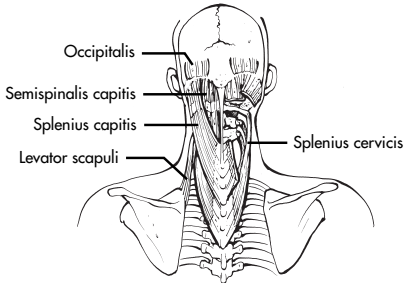


Guidance	
Estim	
EMG	
Units used	
BTX-A units	
BTX-B units	
Dilution	
BTX-A	
BTX-B	
Needle	
30G, 1/2 in	
27G, 37 mm	
25G, 50 mm	
Discarded	

Neurotoxin Clinic Evaluation and Treatment for Cervical Dystonia

Patient name:		**Pregnant:**	Yes No
Date:		**Birth Control:**	No Yes
Diagnosis:		**INR:**	
Last injection:		**INR – date:**	





Cervical ROM		
	Rest	**ROM**
Flexion		-
Extension		-
Rotation L		-
Rotation R		-

Guidance	
Estim	
EMG	
Units used	
BTX-A units	
BTX-B units	
Dilution	
BTX-A	
BTX-B	
Needle	
30G, 1/2 in	
27G, 37 mm	
25G, 50 mm	
22G, 75 mm	
Discarded	

Neurotoxin Clinic Evaluation and Treatment for Spasticity (Upper Extremities)

Patient name:		**Pregnant:**	Yes No
Date:		**Birth control:**	No Yes
Diagnosis:		**INR:**	
Last injection:		**INR – date:**	

	Motor		Ashworth	
	R	**L**	**R**	**L**
Shoulder				
Elbow/Flex Elbow/Ext				
Wrist/Flex Wrist/Ext				
Grasp				
Thumb MCP PIP DIP				

ROM		
Joint	**Rest**	**ROM**
Shoulder		-
Elbow		-
Wrist		-
Thumb MCP PIP DIP		- -

Guidance	
Estim	
EMG	
Units used	
BTX-A units	
BTX-B units	
Dilution	
BTX-A	
BTX-B	
Needle	
30G, 1/2 in	
27G, 37 mm	
25G, 50 mm	
22G, 75 mm	

Modified Ashworth Scale	
0	No increase in muscle tone
1	A *catch or minimal resistance at the end* of ROM
1+	A *catch* **and** minimal resistance (< ½ of ROM)
2	Affected part(s) easily moved
3	Passive movement difficult
4	Rigid

Spasm Frequency Score	
0	No spasms
1	Mild spasm induced by stimulation
2	Infrequent full spasm < once/hour
3	Spasm occurring > once/hour
4	Spasm occurring > 10 times/hour

Neurotoxin Clinic Evaluation and Treatment for Spasticity (Lower Extremities)

Patient name:		**Pregnant:**	Yes No
Date:		**Birth control:**	No Yes
Diagnosis:		**INR:**	
Last injection:		**INR – date:**	

	Motor		Ashworth	
	R	**L**	**R**	**L**
Hip Abduction Adduction Flexion				
Knee Flex Ext				
Ankle Dorsiflex Plantar flex				

ROM		
Joint	**Rest**	**ROM**
Hip		-
Knee		-
Ankle		-
Hallux Toes		- -

Guidance	
Estim	
EMG	
Units used	
BTX-A units	
BTX-B units	
Dilution	
BTX-A	
BTX-B	
Needle	
30G, 1/2 in	
27G, 37 mm	
25G, 50 mm	
22G, 75 mm	

Modified Ashworth Scale	
0	No increase in muscle tone
1	A *catch* **or** *minimal resistance at the end of* ROM
1+	A *catch* **and** minimal resistance (< ½ of ROM)
2	Affected part(s) easily moved
3	Passive movement difficult
4	Rigid

Spasm Frequency Score	
0	No spasms
1	Mild spasm induced by stimulation
2	Infrequent full spasm < once/hour
3	Spasm occurring > once/hour
4	Spasm occurring > 10 times/hour

Index

Note: **Boldface** numbers indicate illustrations; *t* indicates a table.

مؤسسه خدمات فرهنگی پویان

افزایش روز به روز کتابهای علمی از جمله علوم پزشکی باعث شده تا محققان و دانشجویان از کتابهای الکترونیکی استفاده نمایند.

مؤسسه خدمات فرهنگی پویان با هدف دسترسی آسان، سریع و کم هزینه متخصصان، رزیدنتها و علاقه مندان به کتابهای مرجع پزشکی و با توجه به حضور موفق در کنگره ها اقدام به تبدیل آنها به کتاب الکترونیکی نموده است که از قابلیتهایی همچون وضوح بسیار بالای عکس و متن(300 DPI)و امکان جستجوی کلمه در کل متن و چاپ و انتقال عکس ها و متون به محیطهایی مانند : Word, Photoshop, Power point و غیره برخوردار می باشد.

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ضمناً این مؤسسه آمادگی هر گونه همکاری در زمینهٔ یاد شده را با مراکز پزشکی و در خواست کنندگان شخصی را دارد.

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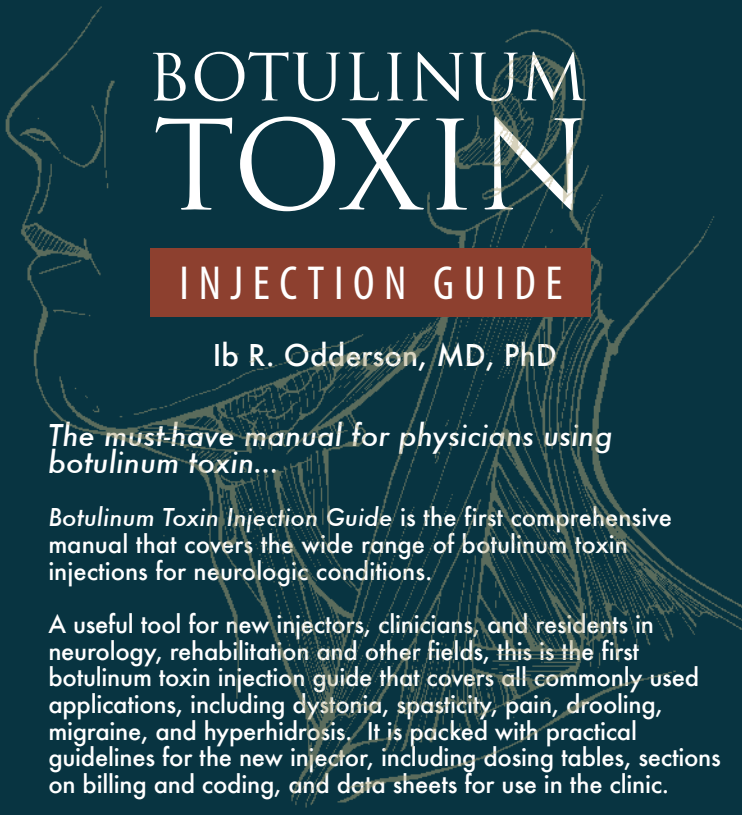

BOTULINUM TOXIN

INJECTION GUIDE

Ib R. Odderson, MD, PhD

The must-have manual for physicians using botulinum toxin...

Botulinum Toxin Injection Guide is the first comprehensive manual that covers the wide range of botulinum toxin injections for neurologic conditions.

A useful tool for new injectors, clinicians, and residents in neurology, rehabilitation and other fields, this is the first botulinum toxin injection guide that covers all commonly used applications, including dystonia, spasticity, pain, drooling, migraine, and hyperhidrosis. It is packed with practical guidelines for the new injector, including dosing tables, sections on billing and coding, and data sheets for use in the clinic.

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- Dosing guidelines for both botulinum toxin type A and type B
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- Billing and coding guidelines, essential for use in the clinic
- References for further reading
- And much more!

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