

**PrBOTOX®**

Botulinum toxin type A for injection Ph. Eur.

*Clostridium botulinum* type A neurotoxin complex (900kD)

**Sterile vacuum-dried concentrate powder for solution for injection**

**100 Allergan units per vial**

**Neuromuscular Paralytic Agent**

Manufactured by: Allergan, Inc.  
Irvine, CA 92715

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## BOTOX®

**Botulinum toxin type A for injection Ph. Eur**  
***Clostridium botulinum* type A neurotoxin complex (900kD)**

### PART I: HEALTH PROFESSIONAL INFORMATION

#### SUMMARY PRODUCT INFORMATION

Route of Administration	Dosage Form / Strength	Clinically Relevant Nonmedicinal Ingredients
<ul style="list-style-type: none"><li>• Intramuscular Use for All Indication except Hyperhidrosis</li><li>• Intradermal Use for Hyperhidrosis only</li></ul>	Sterile vacuum-dried concentrate; powder for solution for injection; 100 Allergan units per vial	Albumin (human) <i>For a complete listing see Dosage Forms, Composition and Packaging section.</i>

#### INDICATIONS AND CLINICAL USE

**BOTOX® (Botulinum toxin type A for injection)** is indicated:

- for the treatment of blepharospasm associated with dystonia, including benign essential blepharospasm or VII nerve disorders in patients 12 years of age or older,
- for the treatment of strabismus in patients 12 years of age or older. BOTOX® is ineffective in chronic paralytic strabismus except to reduce antagonist contracture in conjunction with surgical repair,
- to reduce the subjective symptoms and objective signs of cervical dystonia (spasmodic torticollis) in adults,
- in the management of focal spasticity, including the treatment of upper limb spasticity associated with stroke in adults,
- in the treatment of dynamic equinus foot deformity due to spasticity in pediatric cerebral palsy patients, two years of age or older, and
- for the treatment of hyperhidrosis of the axilla in patients 18 years of age or older.

#### **Geriatrics (> 65 years of age):**

Studies specifically designed to determine the dose in elderly patients have not been performed. Dosages for the elderly are as for other adults. Initial dosing should begin at the lowest recommended dose for the specific indication.

### **Pediatrics (< 18 years of age):**

The safety and effectiveness of BOTOX® in the treatment of blepharospasm or strabismus have not been investigated in children under 12 years of age.

The safety and effectiveness of BOTOX® in the treatment of cervical dystonia has not been investigated in children under 16 years of age.

The safety and effectiveness of BOTOX® in the management of focal spasticity, including the treatment of upper limb spasticity associated with stroke has not been investigated in children and adolescents under 18 years of age.

The safety and effectiveness of BOTOX® in the treatment of dynamic equinus foot deformity due to spasticity in pediatric cerebral palsy patients has not been investigated in children under two years of age.

### **CONTRAINDICATIONS**

BOTOX® is contraindicated in:

- patients who are hypersensitive to botulinum toxin type A or to any ingredient in the formulation or component of the container. For a complete listing, see the Dosage Forms, Composition and Packaging section of the product monograph.
- the presence of infection at the proposed injection site(s).

### **WARNINGS AND PRECAUTIONS**

#### **Serious Warnings and Precautions**

- The term “Allergan unit” upon which dosing is based, is a specific measurement of toxin activity that is unique to Allergan’s formulation of botulinum toxin type A. Therefore, the “Allergan units” used to describe BOTOX® activity are different from those used to describe that of other botulinum toxin preparations and the units representing BOTOX® activity are not interchangeable with other products.
- BOTOX® should only be given by physicians with the appropriate qualifications and experience in the treatment and the use of required equipment.
- Follow the recommended dosage and frequency of administration for BOTOX® (See **WARNINGS AND PRECAUTIONS, General and DOSAGE AND ADMINISTRATION**).

#### **General**

Use BOTOX® only as directed.

Do not use dosage recommendations and potency Units applied to other botulinum toxin products when using BOTOX®.

The safe and effective use of BOTOX® (Botulinum toxin type A for injection) depends upon proper storage of the product, selection of the correct dose, and proper reconstitution and administration techniques.

Physicians administering BOTOX® should be familiar with the relevant anatomy of the area involved and any alterations to the anatomy due to prior surgical procedures. An understanding of standard electromyographic techniques is also required for treatment of strabismus, and may be useful for the treatment of cervical dystonia, and focal spasticity associated with pediatric cerebral palsy and upper limb spasticity in adults.

Caution should be used when BOTOX® is used in the presence of inflammation at the proposed injection site(s) or when excessive weakness or atrophy is present in the target muscle.

Muscle weakness remote to the site of injection and other serious adverse effects (e.g. dysphagia, aspiration pneumonia) have been rarely reported in both pediatric and adult patients, in some cases associated with a fatal outcome.

Patients or caregivers should be advised to seek immediate medical care if swallowing, speech or respiratory disorders arise.

Patients with a history of underlying neurological disorders, dysphagia and/or aspiration should be treated with extreme caution. The botulinum toxin product should be used under specialist supervision in these patients and should only be used if the benefit of treatment is considered to outweigh the risk.

Injection specific dosage and administration recommendations should be followed. In treating adult patients, including when combining indications, the maximum cumulative dose should generally not exceed 360 Units, up to a maximum of 6 U/kg, in a 3 month interval. In treating pediatric patients, the maximum cumulative dose should generally not exceed 6 Units/kg, up to a maximum of 200 Units, in a 3 month interval.

One unit (U) of BOTOX® corresponds to the calculated median intraperitoneal lethal dose (LD<sub>50</sub>) in mice. The method utilized for performing the assay is specific to Allergan's product, BOTOX®. Due to specific details of this assay such as the vehicle, dilution scheme and laboratory protocols for the various mouse LD<sub>50</sub> assays, Units of biological activity of BOTOX® cannot be compared to nor converted into Units of any other botulinum toxin or any toxin assessed with any other specific assay method. Therefore, differences in species sensitivities to different botulinum neurotoxin serotypes precludes extrapolation of animal-dose activity relationships to human dose estimates. The specific activity of BOTOX® is approximately 20 units/nanogram of neurotoxin protein complex.

This product contains human serum albumin, a derivative of human blood. Based on effective donor screening and product manufacturing processes, it carries an extremely remote risk for

transmission of viral diseases. A theoretical risk for transmission of Creutzfeldt-Jakob disease (CJD) also is considered extremely remote. No cases of transmission of viral diseases or CJD have ever been identified for albumin.

*Dynamic equinus foot deformity due to spasticity in pediatric cerebral palsy* - BOTOX® is a treatment of spasticity that has only been studied in association with usual standard of care regimens, and is not intended as a replacement for these treatment modalities. BOTOX® is not likely to be effective in improving range of motion at a joint affected by a fixed contracture.

### **Carcinogenesis and Mutagenesis**

Studies in animals have not been performed to evaluate the carcinogenic potential of BOTOX®. BOTOX® was not mutagenic in *in vitro* and *in vivo* mutagenicity studies. (See TOXICOLOGY Section for more information.)

### **Cardiovascular**

There have been rare reports following administration of botulinum toxin of adverse events involving the cardiovascular system, including arrhythmia and myocardial infarction, some with fatal outcomes. Some of these patients had risk factors including preexisting cardiovascular disease. The exact relationship of these events to BOTOX®/BOTOX COSMETIC® is unknown.

### **Ear/Nose/Throat**

*Cervical Dystonia* - Dysphagia is a commonly reported adverse event following treatment of cervical dystonia patients with all types of botulinum toxins. Patients with cervical dystonia should be informed of the possibility of experiencing dysphagia which may be mild, but could be severe. Consequent to the dysphagia there is the potential for aspiration, dyspnea and occasionally the need for tube feeding. In rare cases, dysphagia followed by aspiration pneumonia and death has been reported.

Injections into the levator scapulae may be associated with an increased risk of upper respiratory infection and dysphagia.

Dysphagia has contributed to decreased food and water intake resulting in weight loss and dehydration. Patients with subclinical dysphagia may be at increased risk of experiencing more severe dysphagia following a BOTOX® injection.

Limiting the dose injected into both sternocleidomastoid muscles to less than 100 units may decrease the occurrence of dysphagia. Patients with smaller neck muscle mass, or patients who receive bilateral injections into the sternocleidomastoid muscle, have been reported to be at greater risk of dysphagia. Dysphagia is attributable to the localized diffusion of the toxin to the oesophageal musculature.

Patients or caregivers should be advised to seek immediate medical care if swallowing, speech or respiratory disorders arise.

## Immune

Formation of neutralizing antibodies to botulinum toxin type A may reduce the effectiveness of BOTOX® treatment by inactivating the biological activity of the toxin. The critical factors for neutralizing antibody formation have not been well characterized. The results from some studies suggest that BOTOX® injections at more frequent intervals or at higher doses may lead to greater incidence of antibody formation. When appropriate, the potential for antibody formation may be minimized by injecting with the lowest effective dose given at the longest feasible intervals between injections.

As with all biologic products, an anaphylactic reaction may occur. Necessary precautions should be taken and epinephrine should be available.

Serious and/or immediate hypersensitivity reactions such as anaphylaxis and serum sickness have been rarely reported, as well as other manifestations of hypersensitivity including urticaria, soft tissue edema, and dyspnea. Some of these reactions have been reported following the use of BOTOX® either alone or in conjunction with other products associated with similar reactions. One fatal case of anaphylaxis has been reported in which lidocaine was used as the diluent for BOTOX® and consequently the causal agent cannot be reliably determined. If such a reaction occurs, further injection should be discontinued and appropriate medical therapy immediately instituted.

## Neurologic

Extreme caution should be exercised when administering BOTOX® to individuals with peripheral motor neuropathic diseases (e.g. amyotrophic lateral sclerosis, or motor neuropathy) or neuromuscular junction disorders (e.g. myasthenia gravis or Lambert-Eaton syndrome). Patients with neuromuscular junction disorders may be at increased risk of clinically significant systemic effects including severe dysphagia and respiratory compromise from typical doses of BOTOX®. There have been rare cases of administration of botulinum toxin to patients with known or unrecognized neuromuscular junction disorders where the patients have shown extreme sensitivity to the systemic effects of typical clinical doses. In some of these cases, dysphagia has lasted several months and required placement of a gastric feeding tube. **When exposed to very high doses, patients with neurologic disorders, e.g. pediatric cerebral palsy or adult spasticity, may also be at increased risk of clinically significant systemic effects.**

New onset or recurrent seizures have been reported, typically in patients who are predisposed to experiencing these events. The reports in children were reports predominantly from cerebral palsy patients treated for spasticity. The exact relationship of these events to the botulinum toxin injection has not been established.

## **Ophthalmologic**

*Blepharospasm* - Reduced blinking following BOTOX® injection into the orbicularis oculi muscle can lead to corneal exposure, persistent epithelial defect, and corneal ulceration, especially in patients with VII nerve disorders. One case of corneal perforation in an aphakic eye requiring corneal grafting has occurred because of this effect. Careful testing of corneal sensation in eyes previously operated upon, avoidance of injection into the lower lid area to avoid ectropion, and vigorous treatment of any epithelial defect should be employed. This may require protective drops, ointment, therapeutic soft contact lenses, or closure of the eye by patching or other means.

Because of the anticholinergic activity of botulinum toxin, caution should be exercised when treating patients at risk for angle closure glaucoma, including patients with anatomically narrow angles. Acute angle closure glaucoma has been reported very rarely following periorbital injections of botulinum toxin.

*Strabismus* - BOTOX® is ineffective in chronic paralytic strabismus except to reduce antagonist contracture in conjunction with surgical repair. The efficacy of BOTOX® in deviations over 50 prism diopters, in restrictive strabismus, in Duane's syndrome with lateral rectus weakness, and in secondary strabismus caused by prior surgical over-recession of the antagonist is doubtful. In order to enhance efficacy, multiple injections over time may be required.

During the administration of BOTOX® for the treatment of strabismus, retrobulbar hemorrhages sufficient to compromise retinal circulation have occurred from needle penetrations into the orbit. It is recommended that appropriate instruments to decompress the orbit be accessible. Ocular (globe) penetrations by needles have also occurred. An ophthalmoscope to diagnose this condition should be available.

Inducing paralysis in one or more extraocular muscles may produce spatial disorientation, double vision, or past-pointing. Covering the affected eye may alleviate these symptoms.

## **Skin**

As is expected for any injection procedure, localized pain, inflammation, paresthesia, hypoaesthesia, tenderness, swelling/edema, erythema, localized infection, bleeding and/or bruising have been associated with the injection. Needle-related pain and/or anxiety have resulted in vasovagal responses, including transient symptomatic hypotension and syncope. Care should be taken when injecting near vulnerable anatomic structures.

*Primary hyperhidrosis of the axillae* - Medical history and physical examination, along with specific additional investigations as required, should be performed to exclude potential causes of secondary hyperhidrosis (e.g. hyperthyroidism or phaeochromocytoma). This will avoid symptomatic treatment of hyperhidrosis without the diagnosis and/or treatment of underlying disease.

## **Special Populations**

**Pregnant Women:** There are no adequate and well-controlled studies of BOTOX® administration in pregnant women. Studies in animals have shown reproductive toxicity. The potential risk for humans is unknown. BOTOX® should not be used during pregnancy unless clearly necessary. If this drug is used during pregnancy, or if the patient becomes pregnant while taking this drug, the patient should be apprised of the potential risks, including abortion or fetal malformations, which have been observed in rabbits.

**Nursing Women:** It is not known whether this drug is excreted in human milk. Because many drugs are excreted in human milk, caution should be exercised when BOTOX® is administered to a nursing woman.

**Pediatrics (2-18 years of age):** **There have been very rare spontaneous reports of death sometimes associated with aspiration pneumonia in children with severe cerebral palsy after treatment with botulinum toxin. A causal association to BOTOX® has not been established in these cases. Post-marketing reports of possible distant spread of toxin have been very rarely reported in pediatric patients with co-morbidities, predominantly with cerebral palsy, who received > 8 U/kg. Extreme caution should be exercised when treating pediatric patients who have significant neurologic debility, dysphagia, or have a recent history of aspiration pneumonia or lung disease.**

The safety and effectiveness of BOTOX® in the treatment of blepharospasm or strabismus have not been investigated in children under 12 years of age.

The safety and effectiveness of BOTOX® in the treatment of cervical dystonia has not been investigated in children under 16 years of age.

The safety and effectiveness of BOTOX® in the management of focal spasticity, including upper limb spasticity associated with stroke and primary hyperhidrosis of the axillae, has not been investigated in children and adolescents under 18 years of age.

The safety and effectiveness of BOTOX® in the treatment of dynamic equinus foot deformity due to spasticity in pediatric cerebral palsy patients has not been investigated in children under two years of age.

**Geriatrics (> 65 years of age):** Studies specifically designed to determine dose in elderly patients have not been performed. Dosages for the elderly are as for other adults. Initial dosing should begin at the lowest recommended dose for the specific indication.

## **Monitoring and Laboratory Tests**

There are no specific requirements for laboratory test monitoring when patients are treated with BOTOX®.

## ADVERSE REACTIONS

### Adverse Drug Reaction Overview

In general, adverse reactions occur within the first few days following injection and while generally transient may have duration of several months or, in rare cases, longer.

Local muscle weakness represents the expected pharmacological action of botulinum toxin in muscle tissue. However, weakness of adjacent muscles associated with local diffusion and/or injection technique has been reported. Muscle weakness remote to the site of injection and other serious adverse effects (e.g. dysphagia, aspiration pneumonia) have been rarely reported in both pediatric and adult patients, some associated with a fatal outcome.

As is expected for any injection procedure, localized pain, inflammation, paresthesia, hypoaesthesia, tenderness, swelling/oedema, erythema, localized infection, bleeding and/or bruising have been associated with the injection. Needle-related pain and/or anxiety have resulted in vasovagal responses, including transient symptomatic hypotension and syncope.

### Clinical Trial Adverse Drug Reactions

*Because clinical trials are conducted under very specific conditions the adverse reaction rates observed in the clinical trials may not reflect the rates observed in practice and should not be compared to the rates in the clinical trials of another drug. Adverse drug reaction information from clinical trials is useful for identifying drug-related adverse events and for approximating rates.*

For each indication the frequency of adverse reactions documented during clinical trials is given. The following lists events that occurred in  $\geq 1\%$  of subjects. The frequency is defined as follows: Very Common ( $\geq 1/10$ ); Common ( $\geq 1/100$ ,  $< 1/10$ ).

#### Blepharospasm

Safety data compiled from controlled clinical trials and open label studies involving 1732 patients treated with BOTOX®, the following adverse reactions were reported.

<b>Eye disorders</b>	
Very common	Eyelid ptosis.
Common	Punctate keratitis, lagophthalmos, dry eye, photophobia, eye irritation, lacrimation increase
<b>Skin and subcutaneous tissue disorder</b>	
Common	Ecchymosis

#### Strabismus

Safety data compiled from clinical trials involving approximately 2058 patients treated with BOTOX®, the following adverse reactions were reported.

<b>Eye disorders</b>	
Very common	Eyelid ptosis, eye movement disorder

### **Cervical dystonia**

Safety data compiled from placebo controlled, double-blind trial involving 231 patients treated with BOTOX®, the following adverse reactions were reported.

<b>Infections and infestations</b>	
Common:	Rhinitis, upper respiratory tract infection.
<b>Nervous system disorders</b>	
Common:	Dizziness, hypertonia, hypoesthesia, somnolence, headache
<b>Gastrointestinal disorders</b>	
Very common:	Dysphagia
Common:	Dry mouth, nausea
<b>Musculoskeletal and connective tissue disorders</b>	
Very common:	Muscular weakness
Common:	Musculoskeletal stiffness
<b>General disorders and administration site conditions</b>	
Very common:	Pain
Common:	Asthenia, malaise, influenza like illness

### **Pediatric cerebral palsy**

Safety data compiled from two double-blind, randomized, placebo controlled and an open-label extension studies involving approximately 304 patients treated with BOTOX®. The following adverse reactions were reported.

<b>Infections and infestations</b>	
Very common:	Viral infection, ear infection
<b>Nervous system disorders</b>	
Common:	Somnolence, gait disturbance, paraesthesia
<b>Skin and subcutaneous tissue disorders</b>	
Common:	Rash
<b>Musculoskeletal and connective tissue disorders</b>	
Common:	Myalgia, muscular weakness, pain in extremity
<b>Renal and urinary disorders</b>	
Common:	Urinary incontinence
<b>Injury, poisoning and procedural complications</b>	
Common:	Fall
<b>General disorders and administration site conditions</b>	
Common:	Malaise, injection site pain, asthenia

**Focal Spasticity, including the treatment of upper limb spasticity associated with stroke in adults**

Safety data compiled from double-blind and open label studies involving 339 patients treated with BOTOX®. The following adverse reactions were reported.

<b>Nervous system disorders</b>	
Common:	Hypertonia
<b>Skin and subcutaneous tissue disorders</b>	
Common:	Ecchymosis
<b>Musculoskeletal and connective tissue disorders</b>	
Common:	Muscular weakness, pain in extremity
<b>General disorders and administration site conditions</b>	
Common:	Injection site pain, pyrexia, influenza like illness

**Primary hyperhidrosis of the axillae**

Safety data compiled from double-blind and open-label studies involving 397 patients treated with BOTOX®. The following adverse reactions were reported.

<b>Nervous system disorders</b>	
Common:	Headache, paresthesia
<b>Vascular disorders</b>	
Common:	Hot flush
<b>Gastrointestinal disorders</b>	
Common:	Nausea
<b>Skin and subcutaneous tissue disorders</b>	
Common:	Hyperhidrosis, skin odor abnormal, pruritus, subcutaneous nodule, alopecia
<b>Musculoskeletal and connective tissue disorders</b>	
Common:	Pain in extremity
<b>General disorders and administration site conditions</b>	
Very common:	Injection site pain
Common:	Pain, injection site edema, injection site hemorrhage, injection site hypersensitivity, injection site irritation, asthenia

Note: increase in non-axillary sweating was reported in 4.5% of patients within one month after injection and showed no pattern with respect to anatomical sites affected. Resolution was seen in approximately 30% of the patients within four months.

**Less Common Clinical Trial Adverse Drug Reactions (<1%)**

For each indication the frequency of adverse reactions documented during clinical trials is given.

The frequency is defined as follows:

Uncommon ( $\geq 1/1,000$ ,  $< 1/100$ );

Rare ( $\geq 1/10,000$ ,  $< 1/1,000$ );

Very Rare ( $< 1/10,000$ ).

### Blepharospasm

<b>Nervous system disorders</b>	
Uncommon	Dizziness, facial palsy
<b>Eye disorders</b>	
Uncommon	Keratitis, ectropion, diplopia, entropion, vision blurred.
Rare	Eyelid oedema.
Very rare	Ulcerative keratitis, corneal epithelium defect, corneal perforation
<b>Skin and subcutaneous tissue disorder</b>	
Uncommon	Rash
<b>General disorders and administration site conditions</b>	
Uncommon	Fatigue

### Strabismus

<b>Eye disorders</b>	
Uncommon	Ocular retrobulbar hemorrhages, eye penetration, Holmes-Adie pupil
Rare	Vitreous hemorrhage

### Cervical dystonia

<b>Eye disorders</b>	
Uncommon	Diplopia, eyelid ptosis,
<b>General disorders and administration site conditions</b>	
Uncommon	Pyrexia

### Focal Spasticity, including the treatment of upper limb spasticity associated with stroke in adults

<b>Nervous system disorders</b>	
Uncommon:	Hypoaesthesia, headache, paraesthesia
<b>Vascular disorders</b>	
Uncommon:	Orthostatic hypotension
<b>Gastrointestinal disorders</b>	
Uncommon:	Nausea
<b>Skin and subcutaneous tissue disorders</b>	
Uncommon:	Dermatitis, pruritis, rash
<b>Musculoskeletal and connective tissue disorders</b>	
Uncommon:	Arthralgia, bursitis
<b>General disorders and administration site conditions</b>	
Uncommon:	Asthenia, pain, injection site hypersensitivity, malaise

## **Abnormal Hematologic and Clinical Chemistry Findings**

No specific trends in abnormal hematologic or clinical chemistry findings have been reported.

## **Post-Market Adverse Drug Reactions**

BOTOX® and BOTOX COSMETIC® contain the same active ingredient in the same formulation. Therefore, adverse events observed with the use of BOTOX COSMETIC® also have the potential to be associated with the use of BOTOX®.

Adverse events after treatment with botulinum toxin include rare spontaneous reports of death, sometimes associated with anaphylaxis, dysphagia, respiratory compromise, pneumonia, and/or other significant debility. There have also been rare reports of adverse events involving the cardiovascular system, including arrhythmia and myocardial infarction, some with fatal outcomes. Some of these patients had risk factors including pre-existing cardiovascular disease. New onset or recurrent seizures have also been reported, typically in patients who are predisposed to experiencing these events. The exact relationship of these events to the botulinum toxin injection has not been established.

The following other adverse events have been reported since the drug has been marketed: abdominal pain; diarrhea; vomiting; pyrexia; anorexia; vision blurred; visual disturbance, hypoacusis; tinnitus; vertigo; facial palsy, facial paresis; brachial plexopathy; radiculopathy; syncope; hypoaesthesia; malaise; myalgia; myasthenia gravis; paraesthesia; allergic reaction, skin rash (including erythema multiforme, urticaria and psoriasiforme eruption); pruritus; hyperhidrosis; alopecia, including madarosis.

Angle closure glaucoma has been reported very rarely following BOTOX® treatment for blepharospasm.

These reactions are reported voluntarily from a population of uncertain size. The exact relationship of these events to botulinum toxin is unknown.

## **DRUG INTERACTIONS**

### **Overview**

No specific interactions have been reported.

## Drug-Drug Interactions

<b>Proper name of drug</b>	<b>Ref</b>	<b>Effect</b>	<b>Clinical comment</b>
aminoglycoside antibiotics or spectinomycin, or other medicinal products that interfere with neuromuscular transmission (e.g. neuromuscular blocking agents, both depolarizing (succinylcholine) and non-depolarizing (tubocurarine derivatives), lincosamides, polymyxins, quinidine, magnesium sulfate, and anticholinesterases).	T	Theoretically, the effect of botulinum toxin type A may be potentiated	The effect of botulinum toxin may be potentiated by aminoglycoside antibiotics or spectinomycin, or other drugs that interfere with neuromuscular transmission (e.g. tubocurarine-type muscle relaxants). Caution should be exercised when BOTOX® is used with aminoglycosides (e.g. streptomycin, tobramycin, neomycin, gentamycin, netilmicin, kanamycin, amikacin), spectinomycin, polymyxins, tetracyclines, lincomycin or any other drugs that interfere with neuromuscular transmission.
Different botulinum neurotoxin serotypes	T	Unknown	The effect of administering different botulinum neurotoxin serotypes at the same time or within several months of each other is unknown. Excessive weakness may be exacerbated by administration of another botulinum toxin prior to the resolution of the effects of a previously administered botulinum toxin.

Legend: T = Theoretical

## Drug-Food Interactions

Interactions with food have not been established.

## Drug-Herb Interactions

Interactions with herbal products have not been established.

## Drug-Laboratory Interactions

Interactions with laboratory tests have not been established.

## **DOSAGE AND ADMINISTRATION**

### Dosing Considerations

- **Intramuscular Use for All Indications except Hyperhidrosis**
- **Intradermal Use for Hyperhidrosis only**
- BOTOX® (Botulinum toxin type A for injection) should only be given by physicians with the appropriate qualifications and experience in the treatment and the use of required equipment.

- The term “Allergan unit” upon which dosing is based, is a specific measurement of toxin activity that is unique to Allergan’s formulation of botulinum toxin type A. Therefore, the “Allergan units” used to describe BOTOX® activity are different from those used to describe that of other botulinum toxin preparations and the units representing BOTOX® activity are not interchangeable with other products.
- The use of one vial for more than one patient is not recommended because the product and diluent do not contain a preservative.
- Follow the recommended dosage and frequency of administration for each indication.
- Generally, optimum dose levels and the number of injection sites per muscle have not been established for all indications. Treatment should be initiated at the lowest effective dose. This dose can be gradually increased in subsequent treatments to the maximum recommended dose, if needed.
- Injection intervals of BOTOX® should be according the specific indication. In treating adult patients, when combining indications, the maximum cumulative dose should generally not exceed 6 Units/kg, up to a maximum of 360 Units, in a 3 month interval. In treating pediatric patients, the maximum cumulative dose should generally not exceed 6 Units/kg, up to a maximum of 200 Units, in a 3 month interval.

### **Recommended Dose and Dosage Adjustment**

#### **Blepharospasm:**

For blepharospasm, diluted BOTOX® (see Dilution Table, below) is injected using a sterile, 27 - 30 gauge needle with or without electromyographic guidance. The initial recommended dose is 1.25 U to 2.5 U (0.05 mL to 0.1 mL volume at each site) injected into the medial and lateral pre-tarsal orbicularis oculi of the upper lid and into the lateral pre-tarsal orbicularis oculi of the lower lid.

In general, the initial effect of the injections is seen within three days and reaches a peak at one to two weeks post-treatment. Treatment effects last approximately three months, following which the procedure can be repeated indefinitely.

At repeat treatment sessions, the dose may be increased up to two-fold if the response from the initial treatment is considered insufficient (i.e., defined as an effect that lasts no longer than two months). However there appears to be little benefit obtainable from injecting more than 5.0 U per site. Some tolerance may be found when BOTOX® is used in treating blepharospasm if treatments are given more frequently than every three months, and it is rare to have the effect be permanent.

The cumulative dose of BOTOX® for treatment of blepharospasm in a two month period should not exceed 200 U.

Avoiding injection near the levator palpebrae superioris may reduce the complication of ptosis. Avoiding medial lower lid injections, and thereby reducing diffusion into the inferior oblique, may reduce the complication of diplopia.

**Strabismus:**

BOTOX® is intended for injection into extraocular muscles utilizing the electrical activity recorded from the tip of the injection needle as a guide to placement within the target muscle. Injection without surgical exposure or electromyographic guidance should not be attempted. Physicians should be familiar with electromyographic techniques.

To prepare the eye for BOTOX® injection, it is recommended that several drops of a local anesthetic and an ocular decongestant be given several minutes prior to injection.

*Note:* The recommended volume of BOTOX® injected for treatment of strabismus is 0.05 mL to 0.15 mL per muscle.

The initial listed doses of the diluted BOTOX® (see Dilution Table below) typically create paralysis of injected muscles beginning one to two days after injection and increasing in intensity during the first week. The paralysis lasts for 2-6 weeks and gradually resolves over a similar time period. Overcorrections lasting over six months have been rare.

About one-half of patients will require subsequent doses because of inadequate paralytic response of the muscle to the initial dose, or because of mechanical factors such as large deviations or restrictions, or because of the lack of binocular motor fusion to stabilize the alignment.

- I. Initial doses in units (abbreviated as U). Use the lower listed doses for treatment of small deviations. Use the larger doses only for large deviations.
  - A. For vertical muscles, and for horizontal strabismus of less than 20 prism diopters: 1.25 U to 2.5 U in any one muscle.
  - B. For horizontal strabismus of 20 prism diopters to 50 prism diopters: 2.5 U to 5.0 U in any one muscle.
  - C. For persistent VI nerve palsy of one month or longer duration: 1.25 U to 2.5 U in the medial rectus muscle.
- II. Subsequent doses for residual or recurrent strabismus.
  - A. It is recommended that patients be reexamined 7-14 days after each injection to assess the effect of that dose.
  - B. Patients experiencing adequate paralysis of the target muscle that require subsequent injections should receive a dose comparable to the initial dose.

- C. Subsequent doses for patients experiencing incomplete paralysis of the target muscle may be increased up to two-fold compared to the previously administered dose.
- D. Subsequent injections should not be administered until the effects of the previous dose have dissipated as evidenced by substantial function in the injected and adjacent muscles.
- E. The maximum recommended dose as a single injection for any one muscle is 25 U.
- F. The recommended volume of BOTOX® injected for treatment of strabismus is 0.05mL to 0.15 mL per muscle.

**Cervical dystonia (spasmodic torticollis):**

Several dosing regimens have been used in clinical trials for treatment of cervical dystonia with BOTOX®. Dosing must be tailored to the individual patient based on the patient's head and neck position, localization of pain and muscle hypertrophy, patient's bodyweight, and patient response.<sup>6</sup> In initial controlled clinical trials to establish safety and efficacy for cervical dystonia, doses of diluted BOTOX® ranged from 140 U to 280 U. However, in clinical practice, a range of 200 U to 360 U have been used effectively.

A 25, 27 or 30 gauge needle may be used for superficial muscles, and a 22 gauge needle may be used for deeper musculature. For cervical dystonia, localization of the involved muscles with electromyographic guidance may be useful.

Multiple injection sites allow BOTOX® to have more uniform contact with the innervation areas of the dystonic muscle, and are especially useful in larger muscles. The optimal number of injection sites is dependent upon the size of the muscle to be chemically denervated.

Clinical improvement generally occurs within the first two weeks after injection. The maximum clinical benefit generally occurs approximately six weeks post-injection. Repeat doses should be administered when the clinical effect of a previous injection diminishes, but not more frequently than every two months. The interval between injections reported in the clinical trials showed substantial variation (from 2 to 32 weeks), with a typical duration of approximately 12 to 16 weeks, depending on patient's individual symptoms and responses.

Table 3 is intended to give dosing guidelines for injection of BOTOX® in the treatment of cervical dystonia.

<b>Table 3: Dosage Guide for Cervical dystonia</b>		
<b>Classification</b>	<b>Muscle Groupings</b>	<b>Total Dosage; Number of Sites</b>
Type I Head rotated toward side of shoulder elevations	Sternocleidomastoid	50-100 U; at least 2 sites
	Levator scapulae	50 U; 1-2 sites
	Scalene	25-50 U; 1-2 sites
	Splenius capitis	25-75 U; 1-3 sites
	Trapezius	25-100 U; 1-8 sites

<b>Table 3: Dosage Guide for Cervical dystonia</b>		
<b>Classification</b>	<b>Muscle Groupings</b>	<b>Total Dosage; Number of Sites</b>
Type II Head rotation only	Sternocleidomastoid	25-100 U; at least 2 sites if >25 U given
Type III Head tilted toward side of shoulder elevation	Sternocleidomastoid Levator scapulae Scalene Trapezius	25-100 U; at posterior border; at least 2 sites if >25 U given 25-100 U; at least 2 sites 25-75 U; at least 2 sites 25-100 U; 1-8 sites
Type IV Bilateral posterior cervical muscle spasm with elevation of the face	Splenius capitis and cervicis	50-200 U; 2-8 sites, treat bilaterally

This information is provided as guidance for the initial injection. The extent of muscle hypertrophy and the muscle groups involved in the dystonic posture may change with time necessitating alterations in the dose of toxin and muscles to be injected. The exact dosage and sites injected must be individualized for each patient.

**Focal Spasticity:**

The exact dosage and number of injection sites should be tailored to the individual based on the size, number and location of muscles involved, the severity of spasticity, presence of local muscle weakness, and the patient response to previous treatment. In clinical trials, the doses did not exceed 360 U divided among selected muscles (typically in the flexor muscles of the elbow, wrist and fingers) at any treatment session. Clinical improvement in muscle tone generally occurs within two weeks following treatment with the peak effect seen four to six weeks following treatment. In clinical studies, patients were reinjected at 12 to 16 week intervals. The degree of muscle spasticity at the time of reinjection may necessitate alterations in the dose of **BOTOX®** and muscles to be injected.

Table 4 is intended to give dosing guidelines for injection of **BOTOX®** in the treatment of upper limb spasticity associated with stroke.

<b>Table 4: Dosing guidelines in upper limb spasticity associated with stroke</b>	
<b>Muscle</b>	<b>Total Dosage; Number of Sites</b>
Biceps brachii	100 - 200 U; up to 4 sites
Flexor digitorum profundus	15 - 50 U; 1-2 sites
Flexor digitorum sublimis	15 - 50 U; 1-2 sites
Flexor carpi radialis	15 - 60 U; 1-2 sites
Flexor carpi ulnaris	10 - 50 U; 1-2 sites
Adductor Pollicis	20 U; 1-2 sites
Flexor Pollicis Longus	20 U; 1-2 sites

In controlled and open non-controlled clinical trials doses usually between 200 and 240 units, and up to 360 units divided among selected muscles have been used at a given treatment session.

In controlled clinical trials patients were followed for 12 weeks after single treatment. Improvement in muscle tone occurred within two weeks with the peak effect generally seen within four to six weeks. In an open, non-controlled continuation study, most of the patients were re-injected after an interval of 12 to 16 weeks, when the effect on muscle tone had diminished.

These patients received up to four injections with a maximal cumulative dose of 960 units over 54 weeks. If it is deemed appropriate by the treating physician, repeat doses may be administered, when the effect of a previous injection has diminished. Re-injections should not occur before 12 weeks. The degree and pattern of muscle spasticity at the time of reinjection may necessitate alterations in the dose of BOTOX® and muscles to be injected. The lowest effective dose should be used.

A 25, 27 or 30 gauge needle may be used for superficial muscles, and a 22-gauge needle may be used for deeper musculature. For focal spasticity, localization of the involved muscles with electromyographic guidance or nerve stimulation techniques may be useful.

Multiple injection sites allow **BOTOX®** to have more uniform contact with the innervation areas of the muscle and are especially useful in larger muscles.

**Dynamic equinus foot deformity due to spasticity in pediatric cerebral palsy patients, two years of age or older:**

For the treatment of equinus foot deformity due to spasticity in pediatric cerebral palsy, diluted BOTOX® is injected using a sterile 23 - 26 gauge needle. In clinical trials, the total dose of 4 U/kg was administered by injecting BOTOX® into each of two sites in the medial and lateral heads of the gastrocnemius muscle of the affected lower limb(s). In diplegia, the initial recommended total dose is 6 units/kg body weight divided between the affected limbs.

Clinical improvement generally occurs within the first two weeks after injection. Repeat doses should be administered when the clinical effect of a previous injection diminishes but not more frequently than every two months. The average duration of the therapeutic effect reported in an open-label clinical trial of 207 patients was 3.1 to 3.6 months. In this study, although the dose was 4 U/kg, the number of Units injected did not exceed 200 U.

**Hyperhidrosis of the axilla:**

BOTOX® is reconstituted with 0.9% non-preserved sterile saline (100 U/4.0 mL). Using a 30 gauge needle, 50 U of BOTOX® (2.0 mL) is injected intradermally, evenly distributed in multiple sites approximately 1-2 cm apart within the hyperhidrotic area of the axilla. The hyperhidrotic area may be defined using standard staining techniques, for example Minor's iodine-starch test.

**Lack of Response:**

There are several potential explanations for a lack or diminished response to an individual treatment with BOTOX®. These may include inadequate dose selection, selection of inappropriate muscles for injection, muscles inaccessible to injection, underlying structural abnormalities such as muscle contractures or bone disorders, change in pattern of muscle involvement, patient perception of benefit compared with initial results, inappropriate storage or reconstitution, as well as neutralizing antibodies to botulinum toxin. A neutralizing antibody is defined as an antibody that inactivates the biological activity of the toxin. However, there have been patients who continued to respond to therapy and demonstrated presence of neutralizing antibodies; the proportion of patients which lose their response to botulinum toxin therapy and have demonstrable levels of neutralizing antibodies is small.

The critical factors for neutralizing antibody production are the frequency and dose of injection. Some cervical dystonia patients acquired immunity to botulinum toxin when injected at two to three week intervals with doses exceeding 300 units in a 30 day period. Some tolerance may be observed when BOTOX® is used in treating blepharospasm if treatments are given more frequently than every three months. To reduce the potential for neutralizing antibody formation, it is recommended that injection intervals should be no more frequent than two months. In general, the dose should not exceed 360 U in any two month period. For the treatment of blepharospasm, the cumulative dose of BOTOX® in a two month period should not exceed 200U.

A suggested course of action when patients do not respond to BOTOX® injections is:

- 1) wait the usual treatment interval;
- 2) consider reasons for lack of response listed above;
- 3) more than one treatment course should be considered before classification of a patient as a non-responder;
- 4) test patient serum for neutralizing antibody presence.

### **Missed Dose**

Missed doses may be administered as soon as is practical.

### **Administration**

An injection of BOTOX® is prepared by drawing into a sterile 1.0 mL tuberculin syringe an amount of the properly diluted toxin (see Dilution Table, below) slightly greater than the intended dose. Air bubbles in the syringe barrel are expelled and the syringe may be attached to the electromyographic injection needle, preferably a 1.5 inch, 27 gauge needle. Injection volume in excess of the intended dose is expelled through the needle into an appropriate waste container to assure patency of the needle and to confirm that there is no syringe-needle leakage. A new sterile needle and syringe should be used to enter the vial on each occasion for dilution or removal of BOTOX®.

### **Reconstitution:**

#### **Parenteral Products:**

To reconstitute vacuum-dried BOTOX®, use sterile normal saline without a preservative; 0.9% Sodium Chloride Injection is the only recommended diluent. Draw up the proper amount of diluent in the appropriate size syringe. Since BOTOX® is denatured by bubbling or similar violent agitation, inject the diluent into the vial gently. Discard the vial if a vacuum does not pull the diluent into the vial. Record the date and time of reconstitution on the space on the label. BOTOX® should be administered within twenty-four hours after reconstitution. During this time period, reconstituted BOTOX® should be stored in a refrigerator (2° to 8° C). Reconstituted BOTOX® should be clear, colorless and free of particulate matter. Parenteral drug products should be inspected visually for particulate matter and discoloration prior to administration and whenever the solution and the container permit.

<b>Table 5: Dilution</b>	
<b>Quantity of Diluent Added (0.9% Sodium Chloride Injection)</b>	<b>Resulting dose Units per 0.1 mL</b>
	<b>100 U Vial</b>
1.0 mL	10.0 U
2.0 mL	5.0 U
4.0 mL	2.5 U
8.0 mL	1.25 U

*Note:* These dilutions are calculated for an injection volume of 0.1 mL. A decrease or increase in the BOTOX® dose is also possible by administering a smaller or larger injection volume (i.e., 0.05 mL (50% decrease in dose) to 0.15 mL (50% increase in dose)).

## **OVERDOSAGE**

In the event of overdose or injection error, additional information may be obtained by contacting Allergan, Inc. at (800) 433-8871.

Overdose of BOTOX® is a relative term and depends upon dose, site of injection, and underlying tissue properties. Signs and symptoms of overdose are not apparent immediately post-injection. Should accidental injection or oral ingestion occur, or overdose be suspected, the person should be medically monitored for up to several weeks for progressive signs or symptoms of muscular weakness distant from the site of injection that may include ptosis, diplopia, swallowing and speech disorders, generalized weakness or respiratory failure. These patients should be considered for further medical evaluation and appropriate medical therapy immediately instituted, which may include hospitalization.

## **ACTION AND CLINICAL PHARMACOLOGY**

### **Mechanism of Action**

BOTOX® (Botulinum toxin type A for injection) is a sterile, vacuum-dried form of purified botulinum neurotoxin type A complex, produced from a culture of the Hall strain of *Clostridium botulinum* grown in a medium containing N-Z amine, glucose and yeast extract. It is purified to a crystalline complex consisting of the neurotoxin, a non-toxic protein and four major hemagglutinin proteins.

BOTOX® blocks neuromuscular conduction by binding to receptor sites on motor nerve terminals, entering the nerve terminals, and inhibiting the release of acetylcholine. When injected intramuscularly at therapeutic doses, BOTOX® produces partial chemical denervation of the muscle resulting in localized muscle paralysis. When chemically denervated, the muscle may atrophy, axonal sprouting may occur, and extrajunctional acetylcholine receptors may

develop. There is evidence that reinnervation of the muscle may occur, thus reversing muscle weakness produced by localized injection of BOTOX®.

One Allergan unit of BOTOX® corresponds to the calculated median intraperitoneal lethal dose (LD50) in mice, performed in a mouse potency assay. This assay method is specific to Allergan's product, BOTOX®. Due to specific method details such as the vehicle, dilution scheme and laboratory protocols for the various mouse LD50 assays, units of biological activity of BOTOX® can not be compared to or converted into units of any other botulinum toxin activity. The specific activity of BOTOX® is approximately 20 units/nanogram of neurotoxin protein complex .

### **Pharmacodynamics**

When injected into neck muscles, BOTOX® reduces both objective signs and subjective symptoms of cervical dystonia (spasmodic torticollis). These improvements include reduced angle of head turning, reduced shoulder elevation, decreased size and strength of hypertrophic muscles, and decreased pain. Based on the results of well-controlled studies, 40-58% of patients with cervical dystonia would be expected to have a significant improvement in their symptoms.

The paralytic effect on muscles injected with BOTOX® reduces the excessive, abnormal contractions of blepharospasm associated with dystonia.

When used for the treatment of strabismus, it has been postulated that the administration of BOTOX® affects muscle pairs by inducing an atrophic lengthening of the injected muscle and a corresponding shortening of the antagonist muscle.

Following injection of BOTOX® some distant muscles have shown increased electrophysiologic neuromuscular jitter. This effect is not associated with other types of electrophysiologic abnormalities, or with clinical signs of weakness or symptoms regarding either safety or efficacy.

In the treatment of pediatric cerebral palsy patients with dynamic equinus foot deformity due to spasticity, BOTOX® injections into the gastrocnemius produce an improvement in ankle position (reduction in equinus) and an improvement in gait pattern due to increased heel-to-floor contact.

In the treatment of hyperhidrosis of the axilla (N=320), BOTOX®-treated patients demonstrated a responder rate based on gravimetric assessment of 95% at week 1 and 82% at week 16. The mean percentage reduction in sweat production in the BOTOX®-treated patients ranged from 83% at week 1 to 69% at week 16. Treatment response has been reported to persist for 4 to 7 months (average of 5.2 months) in patients (N=12) treated with 50 U per axilla. Repeat injections should be administered when effects from previous injections subside.

When used for the treatment of focal spasticity BOTOX® injected into upper limb muscles reduces the objective signs and subjective symptoms of spasticity. Improvements include reduction of muscle tone, increase in range of motion, and in some patients reduction of spasticity-related disability.

## **Pharmacokinetics**

It is believed that little systemic distribution of therapeutic doses of BOTOX® occurs. BOTOX® is not expected to be presented in the peripheral blood at measurable levels following IM or intradermal injection at the recommended doses. The recommended quantities of neurotoxin administered at each treatment session are not expected to result in systemic, overt distant clinical effects, i.e. muscle weakness, in patients without other neuromuscular dysfunction. However, clinical studies using single fiber electromyographic techniques have shown subtle electrophysiologic findings consistent with neuromuscular inhibition (i.e. “jitter”) in muscles distant to the injection site, but these were unaccompanied by any clinical signs or symptoms of neuromuscular inhibition from the effects of botulinum toxin.

## **STORAGE AND STABILITY**

- Store the vacuum-dried product either in a refrigerator at 2° - 8°C, or in a freezer at or below -5° C.
- Administer BOTOX® within 24 hours after the vial is removed from the freezer and reconstituted.
- During these 24 hours, reconstituted BOTOX® should be stored in a refrigerator (2° to 8° C).
- Reconstituted BOTOX® should be clear, colorless and free of particulate matter.
- Do not freeze reconstituted BOTOX®.
- At the time of use, product acceptability should be confirmed relative to the expiration date indicated on the product vial and outer box.

## **SPECIAL HANDLING INSTRUCTIONS**

All vials, including expired vials, or equipment used with the drug should be disposed of carefully as is done with all medical waste.

## **DOSAGE FORMS, COMPOSITION AND PACKAGING**

BOTOX® is available in 100 unit (U) sterile vials of *Clostridium botulinum* toxin type A in a vacuum-dried form without a preservative. One Allergan unit (U) corresponds to the calculated median lethal dose (LD<sub>50</sub>) in mice using reconstituted BOTOX® and injected intraperitoneally.

The quantities of the ingredients in each vial are listed below:

<b>INGREDIENTS</b>	<b>100 Allergan U Vial</b>
<i>Clostridium botulinum</i> toxin type A neurotoxin complex (900kD)	100 U
Human Serum Albumin	0.5 mg
Sodium Chloride	0.9 mg

## PART II: SCIENTIFIC INFORMATION

### PHARMACEUTICAL INFORMATION

#### Drug Substance

Proper name: Botulinum toxin type A for injection

Molecular formula and molecular mass: The amino acid composition of the neurotoxin complex (based on the average of three independent assays) is as follows:

Asx<sub>1442</sub>Thr<sub>485</sub>Ser<sub>531</sub>Glx<sub>719</sub>Pro<sub>237</sub>Gly<sub>395</sub>Ala<sub>341</sub>Val<sub>390</sub>Cys<sub>103</sub>Met<sub>84</sub>Ile<sub>644</sub>Leu<sub>718</sub>Tyr<sub>499</sub>Phe<sub>356</sub>Lys<sub>486</sub>His<sub>47</sub>Arg<sub>241</sub>Trp<sub>115</sub> where Asx represents a mixture of Asn and Asp, and Glx represents a mixture of Gln and Glu.

900kD

Structural formula: The Purified Neurotoxin Complex is a 900 kD complex composed of a 150 kD neurotoxin, a 130 kD non-toxic, non-hemagglutinating protein, and various hemagglutinins ranging between 14 and 48 kD. The 150 kD neurotoxin is produced as a single-chain polypeptide. The polypeptide is activated by the proteolytic enzymes of *C. botulinum* during fermentation in a process known as nicking, which converts the single-chain polypeptide into a di-chain polypeptide comprised of a 97 kD heavy chain linked by a disulfide bond to a 53 kD light chain. The complete amino acid sequence of the neurotoxin was derived from a cloned DNA sequence. The neurotoxin, before nicking, consists of 1296 amino acids (1295 after the Met at the N-terminus is cleaved). Ten amino acid residues, from Leu<sub>438</sub> - Lys<sub>447</sub>, are removed during nicking.

One Allergan unit (U) of BOTOX® corresponds to the calculated median intraperitoneal lethal dose (LD<sub>50</sub>) in mice. The method utilized for performing the assay is specific to Allergan's product, BOTOX®. Due to specific details of this assay such as the vehicle, dilution scheme and laboratory protocols for the various mouse LD<sub>50</sub> assays, Units of biological activity of BOTOX® cannot be compared to nor converted into Units of any other botulinum toxin or any toxin assessed with any other specific assay method. Therefore, differences in species sensitivities to different botulinum neurotoxin serotypes precludes extrapolation of animal-dose activity relationships to human dose estimates. The specific activity of BOTOX® is approximately 20 units/nanogram of neurotoxin protein complex.

### CLINICAL TRIALS

#### Blepharospasm

The paralytic effect on muscles injected with BOTOX® reduces the excessive, abnormal contractions of blepharospasm associated with dystonia.

In one study, injection of botulinum toxin was evaluated in 27 patients with essential blepharospasm. Twenty-six (26) of the patients had previously undergone drug treatment

utilizing bztropine mesylate, clonazepam and/or baclofen without adequate clinical results. Three of these patients then underwent muscle stripping surgery, again without an adequate outcome. One patient of the 27 was previously untreated. Twenty-five (25) of the 27 patients reported improvement within 48 hours following injection of botulinum toxin. Blepharospasm in one of the other patients was later controlled with a higher dosage of botulinum toxin. The remaining patient reported only mild improvement but remained functionally impaired.

In a double-blind, placebo-controlled study, 12 patients with blepharospasm were evaluated; 8 patients received botulinum toxin and 4 received placebo. All patients who received botulinum toxin improved compared to none in the placebo group. Among the botulinum toxin-treated patients, the mean dystonia score improved by 72%, the self-assessment score rating improved by 61%, and a videotape evaluation rating improved by 39%. The mean duration of treatment effects was 12.5 weeks.

In an open trial, 1684 patients with blepharospasm showed clinical improvement after treatment with BOTOX® lasting an average of 12.5 weeks prior to the need for re-treatment.

### **Strabismus**

When used for the treatment of strabismus, it has been postulated that the administration of BOTOX® affects muscle pairs by inducing an atrophic lengthening of the injected muscle and a corresponding shortening of the antagonist muscle.

In an open trial, 677 patients with strabismus were treated with one or more injections of BOTOX®. Fifty-five percent (55%) of these patients were improved to an alignment of 10 prism diopters or less when evaluated six months or more following injection. These results are consistent with results from additional open label trials which were conducted for this indication.

### **Cervical dystonia (spasmodic torticollis)**

When injected into neck muscles, BOTOX® (Botulinum Toxin Type A For Injection) reduces both objective signs and subjective symptoms of cervical dystonia (spasmodic torticollis). These improvements include reduced angle of head turning, reduced shoulder elevation, decreased size and strength of hypertrophic muscles, and decreased pain. Based on the results of well-controlled studies, 40-58% of patients with cervical dystonia would be expected to have a significant improvement in their symptoms.

In a double-blind, vehicle-controlled parallel study, 51 patients with idiopathic cervical dystonia (spasmodic torticollis) were evaluated. Patients treated with BOTOX® experienced an average of 8 to 12 degrees decrease in head rotation at rest, corresponding to a mean decrease of 13% to 20%, respectively. There was also a significant decrease in strength and size of the contralateral sternocleidomastoid and trapezii (i.e., muscles involved in head rotation). Vehicle-treated patients showed a mean decrease of only 0 to 4 degrees (0% to 6%) of head rotation at rest, and had no change in muscle strength or size. The difference in head rotation between treatment groups was statistically significant. Among BOTOX® treated patients, improvement was reported by 42%, 58% and 57% of the patients at 2, 6 and 12 weeks after injection, respectively. Improvement was reported by 8%, 8% and 17% of vehicle-treated subjects at the same time points, respectively.

In a double-blind, vehicle-controlled crossover study, there was a significant decrease in the size of the sternocleidomastoid muscle contralateral to head turning following BOTOX® compared to placebo injection. By crossover analysis, 41% of patients reported a positive global assessment of response after BOTOX® injection (which includes measures of head rotation, head tilt, anterocollis, retrocollis, duration of sustained movements, shoulder elevation and tremor duration and severity), compared to 14% after vehicle injection.

Two additional double-blind, vehicle-controlled crossover studies evaluated the efficacy of BOTOX® in patients with cervical dystonia. There was a significant decrease in discomfort in the patients treated with BOTOX® in one study. In the other study, patients treated with BOTOX® had a mean decrease in head rotation of 18% (crossover analysis) and 30% (parallel analysis) compared with a mean decrease in head rotation of 3% (crossover) and 16% (parallel) in patients treated with placebo. In both of these studies, the global assessment of cervical dystonia showed trends of improvement for patients treated with BOTOX® relative to those treated with vehicle.

#### **Focal Spasticity, including the treatment of upper limb spasticity associated with stroke in adults**

The efficacy of BOTOX® used for the treatment of upper limb spasticity associated with stroke was evaluated in double-blind and open label studies in 387 unique patients who received 531 treatment exposures.

In a three month, double-blind, placebo controlled study, 126 patients with upper limb spasticity post-stroke were treated with 200 U to 240 U of BOTOX® into the wrist, finger, and thumb flexor muscles. A clinically significant greater reduction in muscle tone was observed in BOTOX® treated patients compared to placebo as measured on the Ashworth scale 1 to 12 weeks post-treatment. The Physician Global Assessment showed parallel statistically significant improvements. Furthermore, patients treated with BOTOX® had significant improvement for a pre-determined, targeted disability item associated with upper limb spasticity at 4 to 12 weeks post-treatment.

In three- and four-month, double-blind, placebo-controlled, dose-ranging studies involving a total of 130 patients with upper limb spasticity post-stroke, patients were treated with a total dose of up to 300 U or 360 U of BOTOX®. Improvements in wrist, elbow and finger flexor muscle tone were reported at the highest dose in each study at various timepoints. The Physician Global Assessment also showed significant benefit at doses ranging from 75 to 360 units at various timepoints.

#### **Dynamic equinus foot deformity due to spasticity in pediatric cerebral palsy patients, two years of age or older**

In a three-month, double-blind, placebo-controlled, parallel study, 145 ambulatory children with cerebral palsy, 2 to 16 years of age, were evaluated. Patients exhibited muscle spasticity of the lower extremity(ies) associated with an equinovalgus foot position during gait. A significantly greater number of patients treated with BOTOX® vs. placebo demonstrated improvement based on a physician's rating of dynamic gait which was composed of assessments of gait pattern, ankle position, hindfoot position during foot strike, knee position during gait, degree of crouch

and speed of gait. Improvement was reported by 53%, 50%, 60% and 54% of BOTOX®-treated patients vs. 25%, 27%, 25% and 32% of placebo-treated patients at Weeks 2, 4, 8 and 12, respectively. Of the individual assessments which were included in the physician's rating of dynamic gait, a significantly greater number of BOTOX®-treated vs. placebo-treated subjects had improvements in gait pattern (Weeks 2, 8, and 12) and ankle position (Weeks 2, 4, 8 and 12).

Electromyography confirmed that BOTOX® produces a partial denervation of the gastrocnemius muscle. No significant changes in electromyography were seen in the placebo-treated patients.

In a long-term, open-label study, 207 patients were evaluated for up to three years. The percent of patients who showed an improvement based on the physician's rating of dynamic gait ranged from 41% to 67% over the three-year period. Of the individual assessments which were included in the physician's rating of dynamic gait, significant improvements in gait pattern were seen at every visit over the three-year period.

### **Primary Hyperhidrosis of the Axillae**

When injected intradermally, BOTOX® produces temporary chemical denervation of the sweat gland resulting in local reduction in sweating. The efficacy and safety of BOTOX® for the treatment of primary axillary hyperhidrosis were evaluated in a randomized, multi-center, double-blind, placebo-controlled study.

In the study, 320 adults with bilateral axillary primary hyperhidrosis were randomized to receive either 50 Units of BOTOX® (n=242) or placebo (n=78). Treatment responders were defined as subjects showing at least a 50% reduction from baseline in axillary sweating measured by gravimetric measurement at 4 weeks. At week 4 post-injection, the percentages of responders were 91% (219/242) in the BOTOX® group and 36% (28/78) in the placebo group,  $p < 0.001$ . The difference in percentage of responders between BOTOX® and placebo was 55% (95% CI = 43.3, 65.9).

### **DETAILED PHARMACOLOGY**

BOTOX® (Botulinum toxin type A for injection) blocks neuromuscular transmission by binding to acceptor sites on motor nerve terminals, entering the nerve terminals, and inhibiting the release of acetylcholine. This inhibition occurs as the neurotoxin cleaves SNAP-25, a protein integral to the successful docking and release of acetylcholine from vesicles situated within nerve endings. When injected intramuscularly at therapeutic doses, BOTOX® produces partial chemical denervation of the muscle resulting in localized reduction in muscle activity and possible muscle atrophy. When chemically denervated, axonal sprouting may occur, and extrajunctional acetylcholine receptors may develop. There is evidence that reinnervation of the muscle may occur, thus reversing muscle denervation produced by localized injection of BOTOX®.

## TOXICOLOGY

### *Mutagenicity Studies:*

BOTOX® (Botulinum toxin type A for injection) was not mutagenic in the *in vitro* Ames microbial mutagen test with or without metabolic activation at a maximum concentration of 42.9 U/plate using tester strains of *Salmonella typhimurium* and *Escherichia coli*. No increases in the average mutant frequencies were seen in *in vitro* evaluations of BOTOX® at dosages as high as 43.0 U/plate (approximately 100,000 times the maximum anticipated clinical dose, based upon 360 U/60 kg person) with and without metabolic S9 activation in AS52/XPRT mammalian cells. No chromosomal aberrations were produced in *in vitro* evaluations of BOTOX® in Chinese hamster ovary cells at dosages as high as 43.0 U/kg with and without metabolic activation. No clastogenic effects were observed in *in vivo* micronucleus evaluations of BOTOX® in mice at doses as high as six to seven times the maximum anticipated human dose.

### *Fertility and Reproductive Toxicity:*

A fertility and reproductive toxicity study with BOTOX® was evaluated in rats. No effects on reproduction were observed following intramuscular injection of BOTOX® at dosages of 4 U/kg (approximately 2/3 of the maximum recommended human dose) in male rats and at dosages of 8 U/kg in female rats. Higher dosages (8 and 16 U/kg) were associated with dose-dependent reductions in fertility in male rats, and the cohabitation period was slightly increased at dosages of 16 U/kg. Altered estrous cycling (prolonged diestrus) and interrelated reductions in fertility occurred in the female rats dosed with 16 U/kg.

### *Teratogenic Effects:*

The teratogenic effects of BOTOX® were evaluated in mice, rats and rabbits. No teratogenic effects were observed when presumed pregnant mice were injected intramuscularly with doses of 4 U/kg (approximately 2/3 of the maximum recommended human dose) and 8 U/kg on days 5 and 13 of gestation; however, dosages of 16 U/kg induced a slightly lower fetal body weight. No teratogenic effects were observed in rats when injected intramuscularly with doses of 16 U/kg on days 6 and 13 of gestation, and 2 U/kg/day on days 6 through 15 of gestation. In rabbits, daily injections at dosages of 0.5 U/kg/day (days 6 through 18 of gestation) and 4 and 6 U/kg (days 6 and 13 of gestation) caused death and abortions among surviving animals. External malformations were observed in the fetus in one 0.125 U/kg/day and one 2 U/kg dosage. The rabbit appears to be a more sensitive species to BOTOX®.

### *Reproductive and Developmental Effects:*

The reproductive and developmental effects of BOTOX® were evaluated in rats at dose levels of 4, 8 and 16 U/kg. Muscle atrophy at the injected site, reduced body weight gains and reduced absolute feed consumption were observed following intramuscular injection of BOTOX® at dosages of 4 U/kg and higher on days 5 and 13 of presumed gestation, and day 7 of lactation. No effects on maternal reproductive performance were observed at the highest dose tested, 16 U/kg (approximately three times the maximum recommended human dose). No adverse effects on development of the pups was observed at 4 U/kg; however, higher dosages were associated with reduced pup body weight and/or pup viability at birth.

*Animal Toxicology Studies:*

There were no observable toxic effects in rats that received a single intravenous or intramuscular injection of 5 U/kg of BOTOX®, and in monkeys that received 8 U/kg intramuscularly.

In a one year study where monkeys received seven intramuscular injections (once every two months), there were no observable toxic effects at a BOTOX® dosage level of 4 U/kg (approximately 2/3 of the maximum recommended human dose). Three out of six female monkeys in the 16 U/kg group were sacrificed in extremis. This probably was a treatment-related effect of high doses of BOTOX®. Local muscle atrophy and degeneration at the injection site (expected pharmacological effects) were observed in all BOTOX® treated monkeys. There was evidence of systemic toxicity in animals treated with 8 U/kg and 16 U/kg. No antibodies were detected in the sera of animals during the study.

In a 20 week study where juvenile monkeys received a series of three im injection sessions (each session divided into four sites, distributed bilaterally into the heads of the gastrocnemius muscles, and given at 8 week intervals), the NOEL was at a BOTOX® dosage level of 8 U/kg. Local pharmacologic effects were observed in all BOTOX®-treated animals and included decreases in size and weights of the injected site (gastrocnemius muscles) and microscopic observations of muscle fiber atrophy with occasional involvement of the underlying soleus muscle. Systemic effects included a slight transient decrease in body weight gains in animals receiving 12 U/kg.

*Antigenicity:*

Antigenicity studies in rats and guinea pigs showed no effects. In an indirect hemagglutination assay, mice were immunized once per week for two weeks. Both the placebo (human serum albumin) and BOTOX® were antigenic when Complete Freund's Adjuvant (CFA) was used. No antigenicity was detected without the adjuvant.

*Ocular or dermal irritation:*

No ocular or dermal irritation was observed in rabbits at concentrations of BOTOX® up to 200 U/mL.

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**PART III: CONSUMER INFORMATION**  
**BOTOX®**  
**(Botulinum toxin type A for injection)**

This leaflet is part III of a three-part "Product Monograph" published when **BOTOX®** was approved for sale in Canada and is designed specifically for Consumers. This leaflet is a summary and will not tell you everything about **BOTOX®**. Contact your doctor or pharmacist if you have any questions about the drug.

**ABOUT THIS MEDICATION**

What it is used for:

**BOTOX®** works by temporarily weakening overactive muscles which may cause crossed eyes or squint (strabismus), eyelid tics (blepharospasm), unnatural ankle position and walking gait (juvenile cerebral palsy and focal spasticity), muscle contractions in the neck and twisting of the head (cervical dystonia); or muscle contractions in the limbs (focal spasticity). **BOTOX®** can also block signals to the sweat glands thus reducing excessive sweating (hyperhidrosis).

When it should not be used:

It should not be used if:

- you are allergic or sensitive to any of the ingredients
- you have an infection in the muscles where it would normally be injected.
- you have any muscle disorders in other parts of your body, including myasthenia gravis, Eaton Lambert Syndrome or amyotrophic lateral sclerosis.

What the medicinal ingredient is:

Botulinum toxin type A for injection is a sterile, form of purified botulinum neurotoxin type A complex

What the important nonmedicinal ingredients are:

Albumin (human) and sodium chloride.

**WARNINGS AND PRECAUTIONS**

**BEFORE** you receive **BOTOX®** talk to your doctor or pharmacist if:

- you have myasthenia gravis or Eaton Lambert Syndrome, amyotrophic lateral sclerosis or another muscle disorder.
- you are allergic or sensitive to **BOTOX®**.
- you have an infection at a proposed injection site.
- you are scheduled to have surgery using a general anaesthetic
- you are taking or are likely to take antibiotics, especially aminoglycoside antibiotics
- you are pregnant or become pregnant while taking this drug. Repeated doses of **BOTOX®** given to rabbits during pregnancy have caused abortion or fetal malformations.
- you are nursing. It is not known whether this drug is excreted in human milk, but many drugs are excreted in human milk.

**BOTOX®** is for:

- Intramuscular Use for All Indications except Hyperhidrosis

- Intradermal Use for Hyperhidrosis only

**BOTOX®** should only be given by physician with the appropriate qualifications and experience in the treatment and the use of required equipment.

Seek immediate medical care if swallowing, speech or respiratory problems arise.

Tell your doctor if you experience any difficulties in swallowing food while on **BOTOX®**, as it could be related to the dosage. Difficulty in swallowing food, ranging from very mild to severe, can persist for 2-3 weeks after injection, or longer.

Tell your doctor if you are taking other medicines, including any you have bought at your pharmacy, supermarket or health food shop.

**INTERACTIONS WITH THIS MEDICATION**

The effect of **BOTOX®** may be increased by aminoglycoside antibiotics (e.g. streptomycin, tobramycin, neomycin, gentamicin, netilmicin, kanamycin, amikacin), spectinomycin, polymyxins, tetracyclines, lincomycin or any other drugs that interfere with neuromuscular transmission.

**SIDE EFFECTS AND WHAT TO DO ABOUT THEM**

**General**

Pain, tenderness and/or bruising at the site of injection. Malaise (generally feeling unwell), lasting up to six weeks after injection with **BOTOX®**. Weakness and rarely, changes in the way the heart beats, chest pain, skin rash and allergic reaction (symptoms: shortness of breath, wheezing or difficulty breathing; swelling of the face, lips, tongue or other parts of the body; rash, itching or hives on the skin); anaphylaxis; cardiovascular events; seizures; dysphagia; and respiratory compromise.

The following events have been reported rarely (<0.1%) since **BOTOX®** has been marketed: skin rash, itching, allergic reaction, and facial paralysis. There have also been rare reports of adverse events involving the cardiovascular system, including arrhythmia and myocardial infarction, some with fatal outcomes. Some of these patients had risk factors, including cardiovascular disease.

**Blepharospasm**

Drooping of the eyelids, irritation or tearing, dry eye, not being able to close the eye, and sensitivity to light. Less commonly, inward or outward turning of the eye, inflammation of the eye, double vision, and swelling of the eyelid skin lasting several days.

**Strabismus**

Drooping of the eyelids, vertical turning of the eye, double vision, bleeding beneath the eye lids and at the front of the eye. Less commonly, bleeding behind the eye ball, piercing of the sclera (the tough skin covering part of the eye bulb), dilation of the pupil, loss of awareness of space and past pointing (the inability to place a

finger on another part of the body accurately, headache, inability to focus, dizziness, discomfort/irritation of the eye, increased pressure in the eye.

**Spasticity due to Juvenile Cerebral Palsy:**

Falling, leg pain, weakness of the leg and generalised weakness. Less commonly, leg cramps, fever and knee or ankle pain.

**Cervical Dystonia**

Soreness or bruising where the injection was given, difficulty in swallowing, weakness of the neck, and less commonly, general weakness, malaise and nausea. Side effects, if they occur, tend to appear in the first week after injection, and last about two weeks.

However, in rare instances, patients may have difficulty in swallowing that could persist for longer than two weeks **after injection** and may develop into a more serious condition. Make sure you tell your doctor if you experience any difficulty in swallowing.

**Primary hyperhidrosis**

Increase in sweating in other areas of the body, headaches and pain at the injection site.

**Focal spasticity**

Most side effects that have been reported in patients being treated for focal spasticity were mild to moderate and got better without needing medical attention. Side effects reported include: pain in the affected limb, changes in ease of movement of the muscle, increased sensitivity to touch or pain and headache. Less common side effects include: fever, flu syndrome, weakness or a loss of energy, joint pain, skin problems, nausea, 'pins & needles', itching and lack of coordination.

*This is not a complete list of side effects. For any unexpected effects while taking BOTOX®, contact your doctor or pharmacist.*

**REPORTING SUSPECTED SIDE EFFECTS**

To monitor drug safety, Health Canada collects information on serious and unexpected effects of drugs. If you suspect you have had a serious or unexpected reaction to this drug you may notify Health Canada by:

toll-free telephone: 866-234-2345

toll-free fax 866-678-6789

By email: [cadmp@hc-sc.gc.ca](mailto:cadmp@hc-sc.gc.ca)

By regular mail:

National AR Centre

Marketed Health Products Safety and Effectiveness  
Information Division

Marketed Health Products Directorate

Tunney's Pasture, AL 0701C

Ottawa ON K1A 0K9

***NOTE: Before contacting Health Canada, you should contact your physician or pharmacist.***

**MORE INFORMATION**

This document plus the full product monograph, prepared for health professionals can be found by contacting the sponsor, Allergan at: 1-877-255-3746

The HPFB (BGTD and TPD) website address is to be included in this section. The sponsor also has the option of including their company website address.

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