



Botox: Wrinkles and Beyond

By John McCann, M.D.

Botulinum toxin A (Botox, Allergan Pharmaceuticals, Irvine, CA) is a purified protein derived from *Clostridium botulinum* toxin. This protein binds selectively to the presynaptic terminal of the neuromuscular junction, resulting in reversible denervation of muscle. It takes about three days for denervation to occur and about three months for recovery of the neuromuscular junction explaining the onset and duration of action of the toxin. Botox was initially approved by the FDA as an orphan drug in 1989 for treatment of strabismus, blepharospasm, hemifacial spasm and facial dystonias. In 2002, the FDA approved Botox for treat-

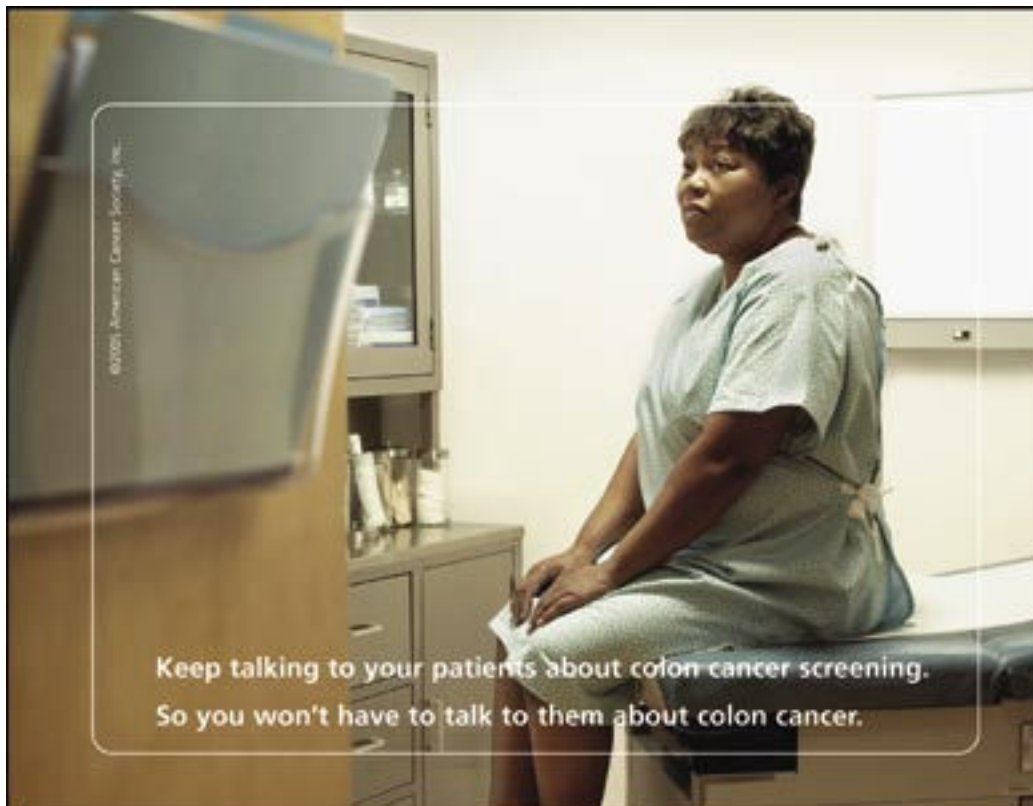
ment of some facial wrinkles. Botulinum toxin B (Myobloc, Solstice Neurosciences, Inc., South San Francisco, CA) was approved by the FDA for the treatment of cervical dystonias but has had much more limited clinical applications than botulinum toxin A.

WRINKLES

The bulk of Botox is used for the treatment of facial wrinkles. Wrinkles can be broadly divided into static and dynamic wrinkles. Dynamic wrinkles are wrinkles that are caused by movement of the mimetic muscles of the

face. Injection of Botox into the muscles responsible for frowning (procerus, corrugator and depressor supercillii) results in loss of the rhytids in the mid forehead associated with frowning for almost three months. Botox is also commonly used for the treatment of crows feet wrinkles, upper forehead wrinkles, chin wrinkles and cervical bands. Botox injections are effective, safe and require virtually no recovery; this explains why Botox has become a billion-dollar drug.

Many patients presenting for Botox injections have static wrinkles caused by droopy upper eyelids, bags in the lower



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*Source: <http://org.ncbi.nlm.gov/pubmed/147>

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eyelids, facial sagging or poor skin quality. By educating patients about those wrinkles that are not improved by Botox, it helps me grow the surgical side of my practice.

BLEPHAROSPASM/ HEMIFACIAL SPASM/ CERVICAL DYSTONIAS

I am the Medical Director of the Center for Facial Appearances in Salt Lake City, which is the largest user of Botox in Utah and the Intermountain West. The Center for Facial Appearances is also the largest center in the Western United States for the treatment of diseases of spasticity of facial muscles such as blepharospasm, hemifacial spasm and cervical dystonias. Blepharospasm is a neurological condition resulting in uncontrollable spasm of the eyelids. If untreated, blepharospasm can result in functional blindness, but with appropriate Botox treatment symptoms are reduced 80 percent in 90 percent of patients. Hemifacial spasm is a similar disorder that results in spasticity of one side of the face. Hemifacial spasm patients benefit as much or more than blepharospasm patients from Botox injections. Patients with painful cervical dystonias like torticollis and retrocollis also benefit substantially from Botox injections.

HEADACHES

Many chronic recurrent migraine or tension headaches that are resistant to standard therapy can be improved with Botox injections. The headaches that trigger between the eyes and over the forehead respond the best. I find that 80 percent of my patients will demonstrate an improvement in frequency and or severity of headaches with Botox injections. The injections must be repeated three or four times yearly to be effective. Botox is not yet approved by the FDA for the treatment of headaches yet many insurance companies in Utah including IHC, Blue Cross and Blue Shield will cover this treatment if the patient has proven resistant to several attempts at standard therapy.

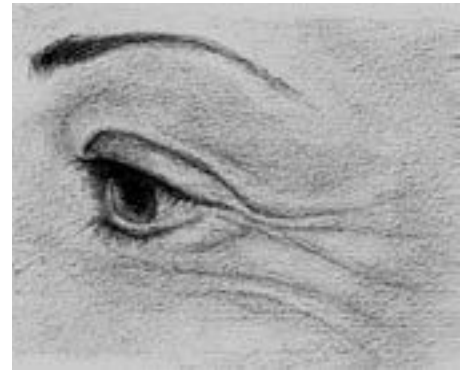
HYPERHIDROSIS

Axillary hyperhidrosis refers to a group of patients with excess sympathetic stimulation of the sweat glands resulting in profuse dripping of sweat from the axillary region. The sweat is typically resistant to all forms of deodorant and associated with a constant odor. The constant sweating soaks through, stains and rots clothing. It typically begins in adolescents and is a major source of social embarrassment for this group of patients. Sweating of the palms is a related problem. Prior to treating patients with Botox, they should be put on a course of maximum medical therapy with aluminum chloride hexahydrate lotion (Drysol). I have found that Botox injections once or twice yearly resolves the condition in the majority of patients. The FDA has approved Botox for the treatment of hyperhidrosis yet most insurance companies do not cover the treatment. The sweat ducts are located in the dermis of the skin so this sort of injection must be given much more superficially than injections for spastic conditions of the muscle.

SAFETY

Botox is purified from *Clostridium botulinum*, which is the organism that causes botulism. At doses much higher than used in clinical practice, the toxin can cause paralysis, respiratory failure and death. The typical measure used to determine the safety of a drug is the therapeutic index, which is the ratio of amount of drug required to cause toxicity to the amount required to treat. Using therapeutic index, Botox is actually a great deal safer than over the counter medications such as aspirin or ibuprofen. At the doses of Botox commonly used in clinical practice, systemic toxicity is almost unheard of.

When injecting Botox in the periocular area, regional complications such as droopy eyelid, double vision or inability to close the eyes may occur. In most



Before and after appearance of a patient receiving Botox for crow's feet wrinkles.

clinical situations, injection of Botox into the midface is avoided as it can cause difficulty with speech or drooling. Injection of Botox in the neck can cause weakness of muscles limiting extension or flexion of the neck. In each case the risk of complication is related to the area, depth and the dose of toxin injected. Regional complications can be avoided by selecting an experienced practitioner. The Center for Facial Appearances is one of the national training centers where physicians come to learn how to give Botox injections.

Botox has proven to be a very versatile therapeutic agent. It is safe enough that the FDA has approved it for a purely cosmetic indication. It has restored vision to patients with blepharospasm, and relieved pain in patients with cervical dystonia. I have found it useful for the treatment of migraine and tension headaches and a great benefit to patients with embarrassing hyperhidrosis. Indications for Botox have definitely expanded beyond wrinkles. ■