Dr. Sotirios is the lead clinician for KT Training master classes in aesthetic medicine. KT Training provide hyperhidrosis as part of the advanced dermal fillers and botox courses. http://www.k-ttraining.com/courses-advanced-botox-dermal-fillers.php

NO SWEAT

>>> Dr Sotirios Foutsizoglou on botulinum toxin for treating hyperhidrosis <<<

Hyperhidrosis or excessive sweating is one of the few conditions that can truly be described as both a medical and cosmetic problem. Caused by hyperfunction of the eccrine sweat glands it is increasingly being treated by aesthetic practitioners because of the indication of botulinum toxin injections in its treatment.

>> *What is hyperhidrosis?*

Hyperhidrosis is the excessive production of sweat. It usually begins in either childhood or adolescence. Although any site on the body can be affected, the sites most commonly affected are the palms and soles (palmoplantar hyperhidrosis) and/or axillae (axillary hyperhidrosis) due to the relatively high concentration of sweat glands.

Axillary problems tend to start in late adolescence, while palmoplantar excessive sweating often begins earlier, average age 12-13 years. 1-2% of the global population have some form of hyperhidrosis, whereas severe cases can reach up to 0.1% of the population. The production and excretion of sweat are mediated by the sympathetic nervous system and regulated by a gland in our brain called hypothalamus.

Sweating plays an important role in the regulation of body temperature. Sweat glands produce an odourless liquid which, when decomposed by the action of bacteria, acquires a characteristic, unpleasant smell. Hyperhidrosis can either be generalised or localised to specific parts of the body as shown in table 1.

This condition may be idiopathic or secondary to other diseases, metabolic disorders, febrile illnesses, or medication use. Idiopathic or primary hyperhidrosis usually starts around puberty and peaks in adulthood. Studies show that there is a genetic component predisposing to the condition. Primary hyperhidrosis affects men and women equally. Primary hyperhidrosis is caused by an exaggerated response to increased body temperature (hot weather, exercise, fever) or emotion. Secondary hyperhidrosis may be due to a variety of medical conditions such as thyroid problems, hormone imbalance, diabetes, obesity and certain drugs, etc.

>> *INDICATIONS for treatment*

Hyperhidrosis is a distressing condition and sufferers have usually tried a variety of modalities including antiperspirants, deodorants, iontophoresis, antimuscarinic topical agents (e.g. Glycopyrrolate cream), oral medication such as oxybutynin or beta-blockers.

Those with severe hyperhidrosis may resort to surgical procedures such as endoscopic thoracic sympathectomy (ETS) to alleviate symptoms. Affected people are constantly aware of their condition and try to modify their lifestyle to accommodate this problem. This can be disabling in professional, academic and social life, causing embarrassments. Many routine tasks become impossible chores, which can have devastating emotional effects on one's individual life. Excessive sweating of the hands interferes with many routine activities, such as securely grasping objects. Some hyperhidrosis sufferers avoid situations where they will come into physical contact with others, such as greeting a person with a handshake.

I have come across people who have given up their studies as they could not write on a piece of paper

Dr Sotirios Foutsizoglou
Dr Sotirios Foutsizoglou is the medical director of the London Slimming and Cosmetic Centre and founder of SFMedica. He is a full member of the British Association of Cosmetic Doctors (BACD) and a member of the European College of Aesthetic Medicine (ECAM), Society of Cosmetic Physicians and Surgeons and International Academy of Advanced Facial Aesthetics (IAAFA). He works as a cosmetic surgeon and non-surgical aesthetic practitioner with expertise in the areas of cosmetic dermatology, medical Slimming and cosmetic injectables, among others. His work has been published in various Greek, UK and French magazines, journals and newspapers.

TABLE 1. CAUSES OF HYPERHIDROSIS

GENERALIZED	LOCALISED
• Fever • Metabolic abnormalities (e.g. hyperthyroidism, hypoglycemia, menopause) • Drugs {e.g. tricyclic antidepressants, Pilocarpine Hydrochloride (= systemic treatment for xerostomia), Levothyroxine etc } • Neoplastic disease (e.g. Hodgkins) • Neurological (e.g. autonomic dysregulation) • Alcoholism • Anxiety • Phobias (e.g. panic attacks, agoraphobia) • Cardiac Pathology (e.g. arrhythmias) • Tuberculosis	• Emotionally induced (palmoplantar sweating is controlled by the cerebral cortex and responds to emotional stimuli rather than to increase in temperature; palmoplantar, unlike axillary, sweating does not occur during sleep or sedation!) • Frey syndrome • Endocrinopathy • Glomus tumour (also known as glomangioma, or nonchromaffin paraganglioma) • Viral infections (e.g. Herpes Zoster) • Eccrine hamartomas

TABLE 3. MEDICAL VS SURGICAL TREATMENT FOR HYPEHIDROSIS

MEDICAL	SURGICAL
~Pharmacotherapy • Aluminium chloride based antiperspirants are usually tried as a first option. • Anticholinergic agents – They inhibit the binding of acetylcholine to the cholinergic receptor. Clinical effects usually occur within days. Better to be avoided as they may cause systemic side effects. • Neuromuscular blocking agents (i.e. Botox®) – The most popular ~ Iontophoresis (tap water vs anticholinergic iontophoresis) Tap water iontophoresis involves applying a low intensity electrical current to the hands and/or feet or axillae by means of an iontophoresis machine and water baths containing ordinary tap water. Exactly how tap water iontophoresis works remains unclear; however the treatment has been shown to be effective in a great number of people without any significant side effects making it a safe first line treatment option.[2] A variety of machines are available for use in NHS hospitals or at home.	~Sympahthectomy reserved as the final treatment option. Upper thoracic sympathectomy has been performed for many years as therapy for hyperhydrosis and several other diseases. There are various surgical approaches available. Prior to the advent of endoscopic transthoracic sympathectomy (ETS) which involves the use of an endoscope to identify the second through fourth ganglia, these approaches involved either painful back or neck incisions with possible risk of brachial plexus, or phrenic nerve injury, or Horner's syndrome. With the introduction of ETS the success rate for palmar and facial hyperhidrosis is in excess of 98%, with limited side effects or serious complications. The most common side effect is compensatory truncal sweating, in about 50% of patients. ~Finally surgical excision of the affected sweat glands or subcutaneous liposuction -removes eccrine glands along with adipose tissue- can also be used mainly for axillary hyperhidrosis. Least popular methods.

without soaking it with sweat or musicians who had to change career as using their musical instruments became 'mission impossible'.

Hiding embarrassing sweat spots under the armpits limits the sufferers' arm movements and pose. In severe cases, shirts must be changed several times during the day.

Hyperhidrosis can also affect the face, neck and scalp and it tends to affect men more than women occurring later on in life. The area most commonly affected in facial hyperhidrosis is the upper band of the forehead where studies suggest that the density of sweat glands is greater, followed by upper lip and cheek. The scalp may also be affected. These areas can also be effectively treated with botulinum toxin injections.

Botulinum toxin is a safe and effective treatment of excessive sweating for most people who think that their perspiration interferes with their quality of life.

>> *TREATMENT*

Hyperhidrosis is difficult to treat effectively. There are numerous options ranging from pharmacotherapy to surgical sympathectomy (see Table 3). BTX-A is a very effective treatment particularly for the axillary hyperhidrosis as will be discussed later.

>> *Contra-indications*

Patients suffering with myasthenia or amyotrophic lateral sclerosis, as well as patients taking certain antibiotics (e.g. aminoglycosides), and pregnant or breastfeeding women should not undertake treatments involving botulinum toxin injections.

>> *How does the BTX-A work in hyperhidrosis?*

Sweat glands are part of skin's adnexa (also known as skin appendages) along with hair, arrector pili muscle, sebaceous glands and nails. They can be divided into eccrine (or merocrine) and apocrine glands (see Table 2). Sweat glands are exocrine glands, found in the skin of all mammal species.

In humans an extensive system of eccrine and apocrine sweat glands constitutes the primary means of thermoregulation whereas in most animals - that usually have much fewer sweat glands than humans – additional thermoregulatory channels, such as panting, are required in order to achieve effective temperature regulation. Both apocrine and merocrine sweat glands contain specialised epithelial cells, called myoepithelial cells whose contractions squeeze the gland and discharge the accumulated secretions. The secretory activities of the gland cells and the contractions of myoepithelial cells are controlled by both the autonomic nervous system and by the circulating hormones.[3] Physical activity, emotional stress and internal or external high temperature will stimulate sweat glands.

Sequence: Autonomic nervous system activation -> contraction of myoepithelial cells -> discharge of sweat glands. Finally sweat contains mainly water as well as minerals (i.e. sodium, potassium, calcium, magnesium), trace elements, urea and lactate.

Botulinum toxin A injections can effectively treat

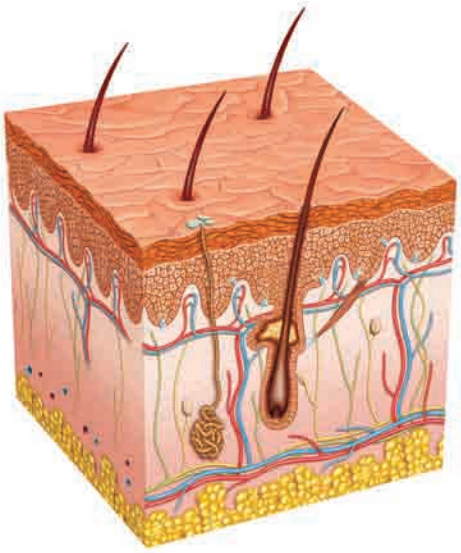


TABLE 2. DIFFERENCES BETWEEN THE TWO TYPES OF SWEAT GLANDS

ECCRINE SWEAT GLANDS	APOCRINE SWEAT GLANDS
~Coiled secretory structure in subcutaneous tissue with a single duct passing to the surface. ~Decreased or absent in skin grafts, leading to dryness.	~Found in the axilla and inguinal regions ~Secrete into hair follicles ~Become active at puberty

localised hyperhidrosis by blocking the smooth muscle activity of the sweat glands. The anhidrotic effect of BTX-A can last up to nine months. In addition, treatment with BTX-A showed marked improvement of unpleasant body odour by reducing the moist environment, which is favourable for bacterial overgrowth.

>> *Axillary hyperhidrosis*

Patients are advised to shave their armpit two to three days prior to the procedure.

On the day of the procedure the doctor identifies the worst affected area by performing an iodine test. An iodine solution followed by a starch solution will be applied under the armpit. The sweating areas take a blue colour which will guide the doctor's injection points. A tiny amount of muscle relaxing toxin is injected in a grid like pattern

Botulinum toxin injections for the treatment of Axillary Hyperhidrosis. A starch iodine test is used to outline the area of excessive sweating

over the affected area. The injections cause minimal discomfort as they are conducted on a superficial level with an extremely fine needle. However sensitive patients can benefit from a topical anaesthesia.

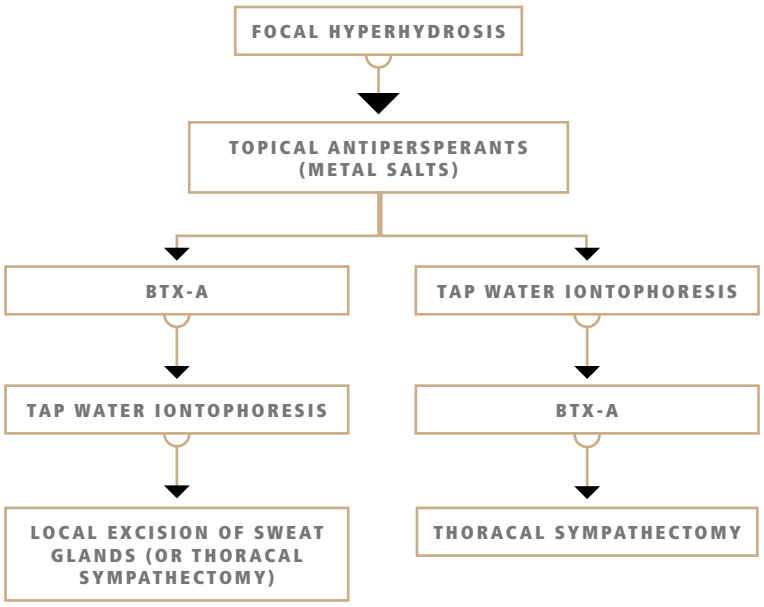
The effect starts being felt two days after the injections, the action of the treatment gradually increases and reaches peak efficacy after one month. The duration of action varies according to the patient, the toxin's concentration and the total injected dose. I personally use 50U of Botox® per armpit in a dilution of 4ml of bacteriostatic 0.9% sodium chloride for greater diffusion. However in severe cases up to 200 units of Botox® per axilla can be used. Results can last up to nine months.

Other areas that can be treated with BTX-A include

- Palmar hyperhidrosis
- Foot hyperhidrosis
- Facial hyperhidrosis
- Scalp and neck hyperhidrosis
- Frey's syndrome (= refractory localised hyperhidrosis occurring after parotid surgery)

Intradermal botulinum toxin treatment for Palmar Hyperhidrosis

>> A TREATMENT ALGORITHM FOR AXILLARY AND PALMOPLANTAR HYPERHIDROSIS IS PROPOSED BELOW <<



BOTOX® Hyperhidrosis Training <<for excessive underarm sweating.

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