
Effect of intralesional botulinum toxin type A injection on keloid and hypertrophic scar

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بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قَالُوا سُبْحَانَكَ لَا عِلْمَ لَنَا إِلَّا مَا عَلَّمْتَنَا
إِنَّكَ أَنْتَ الْعَلِيمُ الْحَكِيمُ

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List of Abbreviations

<i>ACh.</i>	Acetylcholine
B.C.	Before Christ
<i>BTX</i>	Botulinum neurotoxin
<i>BTX-A</i>	Botulinum toxin type A
<i>C. botulinum</i>	Clostridium botulinum
Ca^{2+}	Calcium
<i>Cl</i>	Chlorine
CO_2	Carbon dioxide
<i>DNA</i>	Deoxyribonucleic acid
<i>EGA</i>	Estimated gestational age
EGF	Epidermal growth factor
<i>ELISA</i>	Enzyme-linked immunosorbent assay
<i>FDA</i>	Food and Drug Administration
<i>H2O2</i>	Hydrogen peroxide
<i>HC</i>	Heavy chain
<i>HCC</i>	Carboxyl-terminal of the heavy chain of botulinum toxin
He-Ne	Helium-neon
<i>HN</i>	Amino terminal of the heavy chain of botulinum toxin
HPV	Human papilloma virus
ICAM-1	Intercellular adhesion molecule-1
Ig	Immunoglobulin
IGF-1	Insulin-like growth factor-1
IL	Interleukin
INF	Interferon
J	Joules
K^+	Potassium
<i>KCl</i>	Potassium chloride

<i>kDa.</i>	Kilo dalton
KTP	Potassium-titanyl-phosphate
LASER	Light amplification by stimulated emission of radiation
<i>LC</i>	Light chain
LP	Long-pulsed
MASER	Microwave amplification by stimulated emission of radiation.
<i>Mg/min.</i>	Milligrams per minute
MSH	Melanocyte stimulating hormone
<i>Na⁺</i>	Sodium
<i>NaCl</i>	Sodium chloride
Nd	Neodymium
<i>NMJ</i>	Neuromuscular junction
<i>NO</i>	Nitric oxide
<i>NOS</i>	Nitric oxide synthase
<i>NRC</i>	National Research Center
<i>O</i>	Singlet oxygen
<i>O₂⁻</i>	Superoxide anion radical
<i>OH⁻</i>	Hydroxyl radical
PDGF	Platelet derived growth factor
<i>pH.</i>	potential Hydrogen
PTH	Parathyroid hormone
<i>QOL</i>	Quality of life
QS	Quality-switched
RNA	Ribonucleic acid
ROS	Reactive oxygen species
<i>SNARE</i>	Soluble N-ethyl-maleimide-sensitive fusion protein attachment receptor
<i>SOD</i>	Superoxide dismutase
<i>TWI</i>	Tap water iontophoresis
TAC	Triamcinolone acetonide

TGF	Transforming growth factor
TNF	Tumour necrosis factor
TRT	Thermal relaxation time
VIP	Vasoactive intestinal polypeptide
Zn	Zinc
5-FU	5-Flurouracil

Introduction

A keloid is a benign cutaneous tumor produced by uncontrolled synthesis and deposition of dermal collagen in predisposed individuals. Keloids affect both sexes equally, although the incidence in young female patients has been reported to be higher than in young males, probably reflecting the greater frequency of earlobe piercing among women. There is a fifteen times higher frequency of occurrence in highly pigmented people. Persons of African descent are at increased risk of keloid occurrences (*Zhibo and Miaobo, 2009*).

A keloid is a type of scar, which depending on its maturity, is composed mainly of either type III (early) or type I (late) collagen. It is a result of an overgrowth of granulation tissue (collagen type III) at the site of a healed skin injury which is then slowly replaced by collagen type I (*Rapini et al., 2007*).

Keloids are firm, rubbery lesions or shiny, fibrous nodules, and can vary from pink to flesh-coloured or red to dark brown in colour. A keloid scar is benign, non-contagious, but sometimes accompanied by severe itching, pain and changes in texture. In severe cases, it can affect movement of skin. Keloids should not be confused with hypertrophic scars, which are raised scars that

do not grow beyond the boundaries of the original wound (*Ogawa, 2010*).

Histologically, keloids are fibrotic tumors characterized by a collection of atypical fibroblasts with excessive deposition of extracellular matrix components, especially collagen, fibronectin, elastin, and proteoglycans. Generally, keloids contain relatively acellular centers and thick, abundant collagen bundles that form nodules in the deep dermal portion of the lesion. There are four histologic features that are consistently found in keloid specimens that are deemed pathognomonic for their diagnosis, They are: 1) the presence of keloidal hyalinized collagen, 2) a tongue-like advancing edge underneath normal-appearing epidermis and papillary dermis, 3) horizontal cellular fibrous bands in the upper reticular dermis, and 4) prominent fascia-like fibrous bands (*Lee et al., 2004*).

Keloids are associated with small-fiber neuropathy and typically present with itching, pain, and usually causes major physical, psychological, and cosmetic problems. Treatment of the hypertrophic scar still is a dilemma due to the lack of effective and excellent methods and agents (*Uyesugi et al., 2010*).

Keloids present a therapeutic challenge that must be addressed, numerous treatments are currently available but they do not always yield excellent therapeutic results. Hence,

alternatives are needed. Recent basic and clinical research has shown that botulinum toxin type A (BTXA) has antihypertrophic scar properties but the molecular mechanism for this action is still unknown (*Xiao et al., 2010*).

Botulinum toxin injection has been used for a variety of indications in humans, including blepharospasm, hyperhidrosis and hyperfunctional facial lines (*Gassner and Sherries, 2002*).

the efficacy and safety of botulinum toxin type A in inhibiting and preventing the tensile force caused by shrinking of skin and muscle have been established by long-term follow-up studies (*Zhibo and Miaobo, 2009*).

Aim of work

The aim of work is to assess the efficacy and safety of intralesional injection of botulinum toxin types A (BTXA) in the treatment of keloids and hypertrophic scars.