

# **Neuromodulare non significa paralizzare: quando il nostro obiettivo è ridurre la ruga non produrre una paralisi**

**Fabrizio Vignoli**

Dalla sua introduzione come trattamento per lo strabismo, la tossina botulinica (BoNT) ha avuto un percorso fenomenale ed è ora raccomandata come trattamento di prima linea per la neuromodulazione dei muscoli mimici, nonostante i benefici clinici a breve termine e i rischi di effetti avversi.

Ad oggi sono presenti diverse formulazioni autorizzate dal ente regolatori dei farmaci italiano (AIFA) e per ognuna di queste formulazioni esiste una notevole variabilità di usi Label ed off-label.

Lo scopo della mia presentazione è quello di fare una review di cosa dovrebbe essere la tossina botulinica intesa come farmaco neuromodulatore delle iperspasticità della muscolatura del volto rispetto invece a come spesso viene utilizzata ovvero un farmaco paralizzante.

## **Neuromodular does not mean paralyzing: when our goal is to reduce wrinkles, do not produce paralysis**

Since its introduction as a treatment for strabismus, botulinum toxin (BoNT) has had a phenomenal journey and is now recommended as first-line treatment for focal dystonia, despite short-term clinical benefits and the risks of adverse effects.

To date, there are various formulations authorized by the Italian drug regulatory body (AIFA) and for each of these formulations there is considerable variability in label and off-label uses.

The purpose of my presentation is to review what botulinum toxin should be, intended as a neuromodulatory drug for hyperspasticity of the facial muscles, compared to how it is often used as a paralyzing drug.

1. Erbguth F. From poison to remedy: The chequered history of botulinum toxin. *J. Neural Transm.* 2008;115:559–565. doi: 10.1007/s00702-007-0728-2. [PubMed] [CrossRef] [Google Scholar]
2. Scott A.B., Magoon E.H., McNeer K., Stager D. Botulinum treatment of strabismus in children. *Trans. Am. Ophthalmol. Soc.* 1989;87:174. [PMC free article] [PubMed] [Google Scholar]
3. Scott A.B. Botulinum toxin injection into extraocular muscles as an alternative to strabismus surgery. *J. Pediatr. Ophthalmol. Strabismus.* 1980;17:21–25. doi: 10.3928/0191-3913-19800101-06. [PubMed] [CrossRef] [Google Scholar]
4. Lew M.F. Review of the FDA-approved uses of botulinum toxins, including data suggesting efficacy in pain reduction. *Clin. J. Pain.* 2002;18:S142–S146. doi: 10.1097/00002508-200211001-00005. [PubMed] [CrossRef] [Google Scholar]
5. Apostolidis A., Fowler C. The use of botulinum neurotoxin type A (BoNTA) in urology. *J. Neural Transm.* 2008;115:593–605. doi: 10.1007/s00702-007-0862-x. [PubMed] [CrossRef] [Google Scholar]
6. Soares A., Andriolo R.B., Atallah Á.N., da Silva E.M. Botulinum toxin for myofascial pain syndromes in adults. *Cochrane Database Syst. Rev.* 2012;4 doi: 10.1002/14651858.CD007533.pub2. [PubMed] [CrossRef] [Google Scholar]
7. Segura-Aguilar J., Tizabi Y. Botulinum Neurotoxin, an Example of Successful Translational Research. *Clin. Pharmacol. Transl. Med.* 2018;2:125. [PMC free article] [PubMed] [Google Scholar]
8. Dolly J., Aoki K. The structure and mode of action of different botulinum toxins. *Eur. J. Neurol.* 2006;13:1–9. doi: 10.1111/j.1468-1331.2006.01648.x. [PubMed] [CrossRef] [Google Scholar]
9. Lacy D.B., Tepp W., Cohen A.C., DasGupta B.R., Stevens R.C. Crystal structure of botulinum neurotoxin type A and implications for toxicity. *Nat. Struct. Biol.* 1998;5:898–902. doi: 10.1038/2338. [PubMed] [CrossRef] [Google Scholar]
10. Kumar R., Dhaliwal H.P., Kukreja R.V., Singh B.R. The botulinum toxin as a therapeutic agent: Molecular structure and mechanism of action in motor and sensory systems. *Semin. Neurol.* 2016;36:10–19. doi: 10.1055/s-0035-1571215. [PubMed]