BEHAVIORAL INVESTIGATION OF THE EFFECT OF TETANUS NEUROTOXIN ON SENSORY TRANSMISSION IN THE RAT FACIAL REGION

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Introduction: Tetanus neurotoxin (TeNT) employs axonal transport within peripheral cholinergic neurons and transcytosis to disrupt inhibitory transmission in the CNS, which induces muscular spasticity and autonomic instability. A similar clostridial toxin botulinum neurotoxin type A (BoNT/A), prevents pain transmission and is clinically used for chronic migraine. Although some in vivo studies reperted that chimeric combinations of TeNT and BoNT/A domains may produce analgesic effect at high doses, the in vivo effect of TeNT alone has not been examined so far. Thus, here we investigated the potential effect of TeNT on acute mechanical thresholds and acute inflammatory pain in the rat orofacial region innervated dominantly by the trigeminal sensory nerve.
Experimental procedure: Low local dose of TeNT (1 ng) was injected into the rat whisker pad or into the trigeminal ganglion via infraorbital foramen. Five days following the TeNT injections, mechanical sensitivity of the orofacial region was assessed by Von Frey filaments. Further, the effect of TeNT on nociceptive transmission was assessed in inflammatory pain evoked by 2.5% formalin injection into the whisker pad.
Results: TeNT injection into the whisker pad induced the local spastic paralyisis of whisker movement, while the intraganglionic injection did not alter the facial whisker movement. Low dose TeNT injected into the rat orofacial region or the trigeminal ganglion did not affect acute mechanical thresholds measured by Von Frey filaments. Duration of the nocifensive behavior evoked by formalin (facial rubbing and grooming) was not altered by either facial or intraganglionic TeNT.
Conclusion: Present results indicate that TeNT does not exert any analgesic or hyperalgesic effects in the sensory nociceptive system at doses which exert local spasticity. The data do not support significant effect of TeNT on sensory transmission within primary sensory neurons, or toxin transcytosis into central sensory regions. In conclusion, the data suggest lower affinity of TeNT for sensory neurons in comparison to BoNT/A.

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