## Usefulness of botulinum toxin A in complex regional pain syndrome

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**Purpose of study:** To demonstrate the effect of botulinum neurotoxin A (BoNT/A) in secondary dystonia due to complex regional pain syndrome (CRPS). The CRPS is determined by the criteria of the IASP and includes sensory, vasomotor and sudomotor /edema symptoms. However, not rarely, motor dysfunction like dystonia and a restricted range of motion are found additionally, which are not part of the IASP criteria. These movement disorders are generally difficult to manage and add considerably to the disease burden. There is evidence that intrathecal baclofen might be efficient in secondary dystonia, which, however, requires an invasive procedure. We present a mix of cases, where repetitive injections with BoNT/A could lower muscle tone, improve the range of motion and reduce the dosage of analgesics.

**Methods used:** The case reports of six patients who developed movement disorders in the course of CRPS are presented (1 facial dyskinesia, 3 dystonia of the upper limb and 2 with dystonia of the lower limb). Four were CRPS type I (without obvious nerve lesion). Patients were repetitively treated with injections of BoNT/A. The dosage depended on the muscles involved, and the number of injections differed enormously.

**Summary of results:** Injection of BoNT/A reduced muscle tone and relieved pain in 5/6 patients, lowering the dosage of analgesic drugs. It was, however, not possible to restore motor function completely.

**Conclusions:** BoNT/A might be partially effective in secondary dystonia in CRPS and represents a non-invasive alternative that should be tested before intrathecal baclofen is considered.

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## An early botulinum toxin A treatment in subacute stroke patients may prevent a disabling finger flexor stiffness six months later: A randomized controlled trial

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**Purpose of study**: The study asked whether an early BTX-A injection in subacute stroke patients might prevent a disabling finger flexor stiffness six months later.

**Methods used:** Eighteen stroke rehabilitation in-patients, interval 4-6 weeks, non-functional arm, Fugl-Meyer arm score (FM, 0-66) $< 20$, beginning elevated finger flexor tone, were allocated to group A or B in a randomized, controlled, single-blinded trial. In A-patients 150 U BTX-A (Xeomin®) injected into the deep and superficial finger (100 U) and wrist flexors (50 U), no injection in B-patients. Comprehensive rehabilitation in both groups. Main measures were, as the primary variable, the Modified Ashworth Score (MAS, 0-5) of the finger flexors; as the secondary variables, the whole arm muscle tone with REPAS, its motor control with FM and a disability scale, blindly assessed at T0 (beginning), T1 (4 weeks) and T6 (6 months).

**Summary of results**: Homogeneous groups at T0. Significantly less finger flexor stiffness in the BTX-A group at T1 and T6, the mean (SD) MAS scores in group A (B) were: 1.7±0.5, (1.6±0.5) at T0; 0.4±0.5 (1.9±0.7) at T1; and 1.4±0.7 (2.4±0.9) at T6. Among the secondary, the disability score, namely, the items pain and passive nail-trimming, was less in group A at T1 and T6.

**Conclusions**: The results indicate a protective effect of early BTX-A injection on finger flexor stiffness six months later, presumably attributable to reduced contracture development. Effect size calculation suggests the inclusion of at least 17 patients per group, excluding drop-outs, in a warranted placebo-controlled trial.

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## Electroneurographic pilot study with healthy volunteers to determine the efficacy, safety and duration of action of TrapoX, a potency-optimised botulinum toxin type A-based mutant

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**Purpose of study:** This dose-ranging, electroneurographic pilot study investigated the dose equivalence (efficacy), diffusion characteristics (spread), safety and duration of action of TrapoX, a potency-optimized botulinum toxin (BoNT/A)-based mutant, versus incobotulinumtoxinA, in four healthy volunteers.

**Methods used:** Single injection of different doses (10 U, 3 U, 1 U) of botulinum neurotoxin A mutant (TrapoX) into the extensor digitorum brevis (EDB) of the healthy male authors of this study. Measurement of latency and amplitude of compound muscle action potential (CMAP) in the target muscle (EDB), abductor hallucis and abductor digiti minimi over a period of 18 month. Comparison of dose-response-curve data versus data from Wohlfarth et. al. 2007 that employed onabotulinumtoxinA and incobotulinumtoxinA.

**Summary of results:** TrapoX displayed a 3-fold higher potency in the mouse phrenic nerve hemidiaphragm assay than incobotulinumtoxinA. The onset of reduction in CMAP amplitude in the target muscle (EDB) occurred within one day after injection of TrapoX and reached its maximum around day seven. The CMAP amplitude decrease was dose-dependent with effects persisting more than 12 months in the case of the 10 U TrapoX dose. The 10 U and 3 U TrapoX doses displayed higher reductions in CMAP amplitude than the 32 U and 16 U doses of incobotulinumtoxinA,