|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Studies | Study type | Tremor type | Intervention (Toxin type) | Comparison | Evaluation period (wks) | Adverse effects | Outcomes |
| Brin, M F2001 | R DB PC Parallel group | ET | OnaA | placebo | 6, 12, 16 | Hand weakness in 30%(13/43) of the low-dose group and in 70% (31/45) of the high-dose group | 1. tremor severity, tremor treatment response, motor tasks, and functional ability. 2. quality of life. 3. grip strength. |
| Jankovic J1996 | R DB PC | ET | OnaA | placebo | 16 | Mild (50%) to moderate (42%) weakness in extensor muscles at week 4 | 1. accelerometry. 2. UTRA. 3. force measurements. |
| Mittal, SO2017 | R DB PC Crossover | PD | IncoA | placebo | 4, 8 | Hand weakness (p = 3.2). Weakness was observed in 10 of 27 patients (37%) in the IncoA group and 6 of 27 (22%) in the placebo group | 1. UPDRS. 2. NIHCGC. 3. PDQL |
| Van Der Walt2012 | R DB PC | MS | BT | placebo | 6, 12 | More patients developed weakness after BT (n = 14 [42.2%]) than after placebo (n = 2 [6.1%]) | 1. CRST 2.quality of life 3. writing and motor tasks |
| Mittal, Shivam Om2018 | R DB PC customized | ET | IncoA | placebo | 4, 8 | The low incidence of hand weakness (~4% versus 50% or higher in previous ET studies) is notable and has practical value | 1. FTM scale. 2. NIHCGC. 3. PGI. 4. grip strength |
| Boonstra2020 | R DB PC | MS | IncoA | placebo | 6,12 |  | 1.tremor severity 2.Functional neuroplasticity:MRI |

Note: ET = essential tremor; MS = multiple sclerosis; PD = Parkinson’s disease; IncoA = incobotulinum toxin A; OnaA = onabotulinum toxin A; NIHCGC = National Institutes of Health Collaborative Genetic Criteria; PDQL = Parkinson’s Disease Quality of Life Questionnaire; PGIC = Patient Global Impression of Change; R DB PC = randomized, double-blind, placebo-controlled; UPDRS = Unified Parkinson’s Disease Rating Scale; BT = botulinum toxin; MRI：Functional MRI

TABLE 1: Double-blind studies evaluating the therapeutic effect of BoNT-A on tremor