# OnabotulinumtoxinA Treatment in Patients with Upper Limb and Lower Limb Spasticity from the ASPIRE Study

Ganesh Bavikatte,[1] Gerard E. Francisco,[2] Alberto Esquenazi,[3] Michael A. Dimyan,[4] Kenneth Ngo,[5] Marc Schwartz,[6] Aleks Zuzek,[7] Wolfgang H. Jost[8]

[1]*The Walton Centre, Liverpool, England, UK;* [2]*University of Texas McGovern Medical School and TIRR Memorial Hermann, Houston, Texas, USA;* [3]*MossRehab Gait and Motion Analysis Laboratory, Elkins Park, PA, USA;* [4]*University of Maryland, School of Medicine, Baltimore, MD, USA;* [5]*Brooks Rehabilitation Hospital, Jacksonville, FL, USA;* [6]*MS Biostatistics LLC, Clermont, FL, USA;* [7]*Allergan, an AbbVie company, Irvine, CA, USA;* [8]*Parkinson-Klinik Ortenau and University of Freiburg, Department of Neurology, Freiburg im Breisgau, Germany*

## CONCLUSIONS

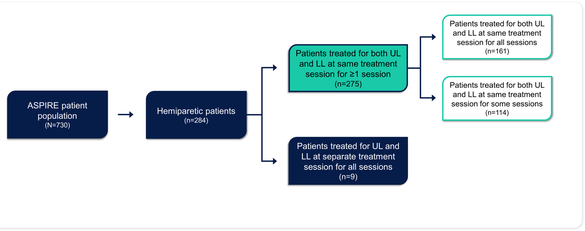
- ASPIRE provides valuable, real-world evidence on the use of onabotulinumtoxinA to treat patients with spastic hemiparesis
- OnabotulinumtoxinA was most frequently utilized to treat clenched fist (UL) and equinovarus foot (LL) in patients with spastic hemiparesis
- No new safety signals were identified, adding to the body of evidence on the safety of onabotulinumtoxinA for spasticity

## RESULTS

### Study Participants and Analysis Populations

- Of N=730 patients in ASPIRE, n=284 were defined as hemiparetic (**Figure 1**)
  - Of n=284 patients with spastic hemiparesis, n=275 patients received treatment to both the upper limb and lower limb at the same treatment session for ≥1 session during the 2-year study and are described hereafter

**Figure 1. Diagram of Participant Flow and Analysis Populations**

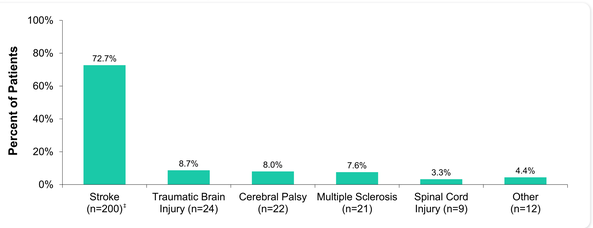



LL, lower limb; n, number of patients; UL, upper limb

### Baseline Demographics and Clinical Characteristics

- Hemiparetic patients (n=275) were on average 53.2 years of age (range: 20.2 - 88.5)
- Gender was nearly evenly distributed (female: n=134, 48.7%; male: n=141, 51.3%)
- Majority of patients were Caucasian (n=187, 68.0%)
- 108 patients (39.3%) were näive to botulinum toxins for spasticity
- Stroke was the most common etiology (n=200, 72.7%) (**Figure 2**)

**Figure 2. Etiology of Spasticity at Baseline in Hemiparetic Patients (n=275)†**




n, number of patients
†Etiologies were not mutually exclusive, as more than one response was allowed per patient
‡Stroke includes ischemic, hemorrhagic, and embolic

### Upper Limb Presentations Treated with OnabotulinumtoxinA

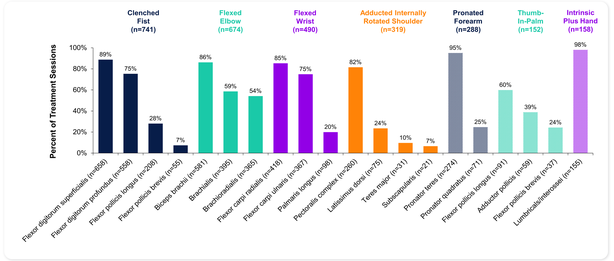
- Clenched fist was the most commonly treated upper limb spasticity presentation in hemiparetic patients (**Table 1**; **Figure 3**)
  - Data on onabotulinumtoxinA dosing, treatment side, injection localization methods, and muscles targeted for the upper limb presentations are shown below

**Table 1. OnabotulinumtoxinA Treatment Utilization for Upper Limb Spasticity Presentations in Hemiparetic Patients (n=275)†**

| | Clenched Fist | Flexed Elbow | Flexed Wrist | Adducted Shoulder | Pronated Forearm | Thumb-In-Palm | Intrinsic Plus Hand |
|---|---|---|---|---|---|---|---|
| Patients, n (%) | 219 (80) | 208 (76) | 159 (58) | 102 (37) | 102 (37) | 76 (28) | 60 (22) |
| Treatment sessions, n | 741 | 674 | 490 | 319 | 288 | 152 | 158 |
| Dose (U) | | | | | | | |
| Mean (SD) | 97 (60) | 109 (63) | 80 (62) | 78 (43) | 46 (26) | 32 (23) | 48 (24) |
| Mode | 100 | 100 | 100 | 50 | 50 | 20 | 40 |
| Min, Max | 10, 400 | 15, 500 | 20, 500 | 12, 250 | 10, 160 | 5, 200 | 5, 100 |
| Treatment side,‡ n (%) | | | | | | | |
| Right only | 327 (44) | 305 (45) | 230 (47) | 136 (43) | 108 (38) | 57 (38) | 51 (32) |
| Left only | 408 (55) | 354 (53) | 257 (52) | 179 (56) | 179 (62) | 94 (62) | 107 (68) |
| Both | 6 (1) | 15 (2) | 3 (1) | 4 (1) | 1 (0) | 1 (1) | 0 (0) |
| Localization method(s), ‡,§ n (%) | | | | | | | |
| Anatomical | 275 (37) | 224 (33) | 172 (35) | 125 (39) | 81 (28) | 34 (22) | 44 (28) |
| E-stim | 192 (26) | 117 (17) | 113 (23) | 34 (11) | 54 (19) | 30 (20) | 21 (13) |
| EMG | 430 (58) | 381 (57) | 276 (56) | 205 (64) | 179 (62) | 85 (56) | 98 (62) |
| Ultrasound | 181 (24) | 141 (21) | 111 (23) | 82 (26) | 65 (23) | 38 (25) | 42 (27) |

EMG, electromyography; E-stim, electrical stimulation; Max, maximum; Min, minimum; n, number of patients or treatment sessions; U, units of onabotulinumtoxinA
†Upper limb spasticity presentations are not mutually exclusive, and therefore, do not add up to 100%
‡Data represent the sum, per clinical presentation, across all treatment sessions during the 2-year study
§Injection localization methods were not mutually exclusive and may have been influenced by availability of equipment at the site; "Anatomical" localization refers to palpation

**Figure 3. Muscles Injected with OnabotulinumtoxinA for the Treatment of Upper Limb Spasticity in Hemiparetic Patients (n=275)†**




n, number of treatment sessions per clinical presentation or muscle injected
†Muscles injected with onabotulinumtoxinA are stratified by clinical presentation and are listed in order of number of patients treated: highest to lowest; Upper limb spasticity presentations, and muscles within each presentation, are not mutually exclusive and may sum to >100%; Data for "other" clinical presentations and "other" muscles not predefined within the case report form, including for nonspasticity indications, are not shown

### Lower Limb Presentations Treated with OnabotulinumtoxinA

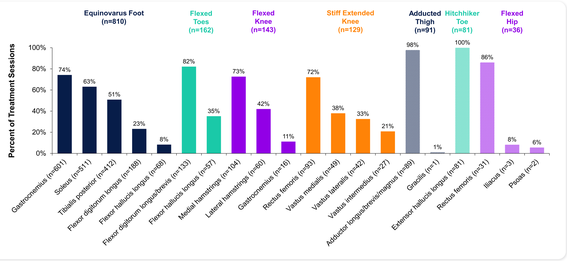
- Equinovarus foot was the most commonly treated lower limb spasticity presentation in hemiparetic patients (**Table 2**; **Figure 4**)
  - Data on onabotulinumtoxinA dosing, treatment side, injection localization methods, and muscles targeted for the lower limb presentations are shown below

**Table 2. OnabotulinumtoxinA Treatment Utilization for Lower Limb Spasticity Presentations in Hemiparetic Patients (n=275)†**

| | Equinovarus Foot | Flexed Toes | Flexed Knee | Stiff Extended Knee | Adducted Thigh | Hitchhiker Toe | Flexed Hip |
|---|---|---|---|---|---|---|---|
| Patients, n (%) | 238 (87) | 70 (25) | 55 (20) | 47 (17) | 37 (13) | 36 (13) | 17 (6) |
| Treatment sessions, n | 810 | 162 | 143 | 129 | 91 | 81 | 36 |
| Dose (U) | | | | | | | |
| Mean (SD) | 187 (115) | 58 (40) | 134 (73) | 111 (73) | 118 (68) | 38 (17) | 52 (62) |
| Mode | 100 | 50 | 100 | 60 | 100 | 50 | 20 |
| Min, Max | 15, 550 | 10, 200 | 12, 374 | 24, 350 | 20, 400 | 10, 100 | 15, 300 |
| Treatment side,‡ n (%) | | | | | | | |
| Right only | 362 (45) | 73 (45) | 49 (34) | 48 (37) | 30 (33) | 36 (44) | 12 (33) |
| Left only | 424 (52) | 89 (55) | 62 (43) | 67 (52) | 37 (41) | 45 (56) | 23 (64) |
| Both | 24 (3) | 0 (0) | 32 (22) | 14 (11) | 24 (26) | 0 (0) | 1 (3) |
| Localization method(s), ‡,§ n (%) | | | | | | | |
| Anatomical | 287 (35) | 75 (46) | 86 (60) | 35 (27) | 48 (53) | 30 (37) | 10 (28) |
| E-stim | 222 (27) | 69 (43) | 10 (7) | 29 (23) | 9 (10) | 16 (20) | 5 (14) |
| EMG | 440 (54) | 75 (46) | 83 (58) | 68 (53) | 43 (47) | 41 (51) | 25 (69) |
| Ultrasound | 184 (23) | 29 (18) | 11 (8) | 39 (30) | 9 (10) | 17 (21) | 3 (8) |

EMG, electromyography; E-stim, electrical stimulation; Max, maximum; Min, minimum; n, number of patients or treatment sessions; U, units of onabotulinumtoxinA
†Lower limb spasticity presentations are not mutually exclusive, and therefore, do not add up to 100%
‡Data represent the sum, per clinical presentation, across all treatment sessions during the 2-year study
§Injection localization methods were not mutually exclusive and may have been influenced by availability of equipment at the site; "Anatomical" localization refers to palpation

**Figure 4. Muscles Injected with OnabotulinumtoxinA for the Treatment of Lower Limb Spasticity in Hemiparetic Patients (n=275)†**




n, number of treatment sessions per clinical presentation or muscle injected
†Muscles injected with onabotulinumtoxinA are stratified by clinical presentation and are listed in order of number of patients treated: highest to lowest; Lower limb spasticity presentations, and muscles within each presentation, are not mutually exclusive and may sum to >100%; Data for "other" clinical presentations and "other" muscles not predefined within the case report form, including for nonspasticity indications, are not shown

### Summary of OnabotulinumtoxinA Treatment Utilization

- Hemiparetic patients had a mean (SD) of 4.6 (2.2) treatment sessions (range: 1.0 - 8.0 sessions) during the 2-year study
- Additional onabotulinumtoxinA utilization data, including total dosing, injection interval, number of injections, and number of muscles injected, are shown in **Table 3**

**Table 3. OnabotulinumtoxinA Utilization in Hemiparetic Patients (n=275)**

| | Total Treatment Sessions (n=976)† |
|---|---|
| Total upper limb + lower limb dose (U) | |
| Mean (SD) | 477 (190) |
| Median | 410 |
| Mode (Min, Max) | 400 (62, 1225) |
| Total upper limb dose (U) | |
| Mean (SD) | 257 (153) |
| Median | 235 |
| Mode (Min, Max) | 200 (10, 1100) |
| Total lower limb dose (U) | |
| Mean (SD) | 220 (128) |
| Median | 200 |
| Mode (Min, Max) | 200 (15, 750) |
| Dosing interval (weeks), n (%) | |
| <10 | 2 (0) |
| 10-15 | 392 (56) |
| >15 | 307 (44) |
| Number of injections, n (%) | |
| <5 | 9 (1) |
| 5-15 | 609 (62) |
| >15 | 358 (37) |
| Number of muscles injected, n (%) | |
| <2 | 0 (0) |
| 2-5 | 172 (18) |
| >5 | 804 (82) |

n, treatment sessions
†Data are reported for n=275 patients and n=976 treatment sessions, except for dosing interval where data for n=202 patients and n=701 treatment sessions are shown

### Safety

- Of the hemiparetic patients (n=275), 94 (34.2%) reported 293 adverse events (AEs)
  - 9 AEs in 9 patients (3.3%) were considered treatment-related (**Table 4**)
- Of n=275, 42 patients (15.3%) reported a total of 80 serious AEs (SAEs)
  - 3 SAEs in 2 patients (0.7%) were considered treatment-related (**Table 4**)

**Table 4. Treatment-Related Adverse Events and Treatment-Related Serious Adverse Events in Hemiparetic Patients (n=275)†**

| | Patients, n (%) | Events, n |
|---|---|---|
| Treatment-related AEs | | |
| Muscular weakness | 4 (1.5) | 4 |
| Asthenia | 1 (0.4) | 1 |
| Drug tolerance | 1 (0.4) | 1 |
| Dysphagia | 1 (0.4) | 1 |
| Grip strength | 1 (0.4) | 1 |
| Peripheral edema | 1 (0.4) | 1 |
| Treatment-related SAEs | | |
| Dysphagia | 1 (0.4) | 1 |
| Muscular weakness | 1 (0.4) | 1 |
| Slow speech | 1 (0.4) | 1 |

n, number of patients or adverse events

## INTRODUCTION

### Background

- Clinical presentations of spastic hemiparesis are common and likely require treatment to multiple muscles across both the upper and lower limbs during the same treatment session
- There is interest within the clinical community to better understand how to safely and effectively treat patients with combined upper limb and lower limb spasticity using onabotulinumtoxinA

### Objective

- Examine onabotulinumtoxinA utilization in patients with upper limb and lower limb spasticity from the Adult Spasticity International Registry (ASPIRE) study to gain real-world insights into the treatment of spastic hemiparesis

## METHODS

- ASPIRE is a 2-year international, multicenter, prospective, observational registry (NCT01930786)[1-4]
- ASPIRE included 74 treating clinicians across 54 international sites in North America, Europe, and Asia
- Adults with spasticity across multiple etiologies were treated with onabotulinumtoxinA during routine clinical practice, including patients that were näive or non-näive to botulinum toxins for spasticity
- OnabotulinumtoxinA was administered at the clinician's discretion without intervention from the study sponsor
- Financial support was not provided for any treatment or treatment-related costs

- Data collection:
  - Patient demographics and clinical characteristics were collected at baseline
  - OnabotulinumtoxinA utilization data were collected at each treatment session
  - Safety data were collected throughout the study

- Analysis population:
  - For this analysis, patients with spastic hemiparesis were defined as receiving ≥1 upper limb treatment and ≥1 lower limb treatment with onabotulinumtoxinA during the study
  - Hemiparetic patients that received treatment to both the upper limb and lower limb at the same treatment session for ≥1 session during the 2-year study are described in this presentation
  - Hemiparetic patients that received treatment to the upper limb and lower limb at separate treatment sessions are not described (n=9; refer to Results section)

## DISCLOSURES

***THANK YOU to all the patients and investigators who participated in this study!***
This study was sponsored by Allergan (prior to its acquisition by AbbVie). Writing and editorial assistance provided to the authors by Monica R.P. Elmore, PhD of AbbVie.
All authors met ICMJE authorship criteria. Neither honoraria nor payments were made for authorship. Financial arrangements of the authors with companies whose products may be related to the present report are listed, as declared by the authors.

G. Bavikatte, MD; served on a steering committee as a consultant for Allergan, an AbbVie company
G. E. Francisco, MD; consulted for, and received research grants from, Allergan, an AbbVie company, Merz, and Ipsen
A. Esquenazi, MD; consulted for Allergan, an AbbVie company, Ipsen, and Merz, and received research grants from Allergan, an AbbVie company, and Ipsen
M.A. Dimyan, MD; none reported
K. Ngo, MD; none reported
M. Schwartz, BS; statistical consultant for Allergan, an AbbVie company
A. Zuzek, PhD; full-time employee of AbbVie
Wolfgang H. Jost, MD, PhD; speaker and consultant for Allergan, an AbbVie company, Ipsen, and Merz

**References:**
1. Francisco et al. *J Rehab Med.* 2017;49(8):659-666
2. Francisco et al. *Toxicon.* 2020;X 7:100040
3. Francisco et al. *PM&R.* 2020;12:1120-1133
4. Esquenazi et al. *PM&R.* 2020;e-Pub ahead of print

**To obtain a PDF of this poster:**
- Scan the QR code
- Or visit www.allergancongressposters.com/324696

Charges may apply. No personal information is stored.

*Presented at Physiatry '21, the Association of Academic Physiatrists (AAP) Annual Meeting, February 9-13, 2021 (Virtual)*

ASPIRE Adult Spasticity International Registry

Allergan an AbbVie company