



## Clinical trial results:

### A Randomized, Double-Blind, Placebo-Controlled Study of the Safety and Efficacy of Intranasal Midazolam (USL261) in the Outpatient Treatment of Subjects with Seizure Clusters

### ARTEMIS-1: Acute Rescue Therapy in Epilepsy with Midazolam Intranasal Spray-1

#### Summary

|                          |                |
|--------------------------|----------------|
| EudraCT number           | 2011-001318-32 |
| Trial protocol           | ES DE IT HU PL |
| Global end of trial date | 20 March 2017  |

#### Results information

|                                |                   |
|--------------------------------|-------------------|
| Result version number          | v1                |
| This version publication date  | 21 September 2019 |
| First version publication date | 21 September 2019 |

#### Trial information

##### Trial identification

|                       |          |
|-----------------------|----------|
| Sponsor protocol code | P261-401 |
|-----------------------|----------|

##### Additional study identifiers

|                                    |                       |
|------------------------------------|-----------------------|
| ISRCTN number                      | -                     |
| ClinicalTrials.gov id (NCT number) | NCT01390220           |
| WHO universal trial number (UTN)   | -                     |
| Other trial identifiers            | US IND number: 77,421 |

Notes:

#### Sponsors

|                              |  |
|------------------------------|--|
| Sponsor organisation name    | Proximagen, LLC  |
| Sponsor organisation address | 505 North Highway 169, Plymouth, MN, United States, 55441                  |
| Public contact               | David Sequeira, Proximagen, LLC, +1 952-658-7438, dsequeira@proximagen.com |
| Scientific contact           | David Sequeira, Proximagen, LLC, +1 952-658-7438, dsequeira@proximagen.com |

Notes:

#### Paediatric regulatory details

|  |    |
|--|----|
| Is trial part of an agreed paediatric investigation plan (PIP)       | No |
| Does article 45 of REGULATION (EC) No 1901/2006 apply to this trial? | No |
| Does article 46 of REGULATION (EC) No 1901/2006 apply to this trial? | No |

Notes:

## Results analysis stage

|  |               |
|--|---------------|
| Analysis stage                                       | Final         |
| Date of interim/final analysis                       | 17 April 2017 |
| Is this the analysis of the primary completion data? | No            |
| Global end of trial reached?                         | Yes           |
| Global end of trial date                             | 20 March 2017 |
| Was the trial ended prematurely?                     | Yes           |

Notes:

## General information about the trial

Main objective of the trial:

The primary efficacy objective of this study was to evaluate the efficacy of USL261 compared with that of intranasal (IN) placebo for the outpatient treatment of seizure clusters based on Treatment Success, which was defined as achieving both of the following:

- Termination of seizure(s) within 10 minutes after study drug administration, and
- No recurrence of seizure(s) beginning 10 minutes after study drug administration to 6 hours after study drug administration

Protection of trial subjects:

Before the initiation of the clinical trial, the protocol, consent form, and advertisements for the recruitment of participants were reviewed and approved by the institutional review board (IRB) of the participating study center, in accordance with current Good Clinical Practices (GCP) and all applicable regulatory requirements. All protocol amendments and changes to the informed consent form (ICF) occurring during the study were also approved by the IRB. This clinical trial was conducted in accordance with the ethical principles that have their origins in the Declaration of Helsinki, 1964, and with adherence to the principles of GCP, outlined by the International Council for Harmonisation's (ICH's) GCP Guidelines, effective 1997. If new safety information resulted in significant changes to the risk/benefit assessment, the consent form was to be reviewed and updated if necessary. All participants (including those already being treated) were to be informed, given a copy of the revised form, and asked to give their consent to continue in the study.

Background therapy: -

Evidence for comparator: -

|   |              |
|---|--------------|
| Actual start date of recruitment                          | 24 June 2011 |
| Long term follow-up planned                               | No           |
| Independent data monitoring committee (IDMC) involvement? | Yes          |

Notes:

## Population of trial subjects

### Subjects enrolled per country

|                                      |                    |
|--------------------------------------|--------------------|
| Country: Number of subjects enrolled | Poland: 14         |
| Country: Number of subjects enrolled | Spain: 12          |
| Country: Number of subjects enrolled | Germany: 13        |
| Country: Number of subjects enrolled | Hungary: 18        |
| Country: Number of subjects enrolled | Italy: 5           |
| Country: Number of subjects enrolled | New Zealand: 1     |
| Country: Number of subjects enrolled | Canada: 4          |
| Country: Number of subjects enrolled | United States: 118 |
| Country: Number of subjects enrolled | Ukraine: 70        |
| Country: Number of subjects enrolled | Israel: 18         |
| Country: Number of subjects enrolled | Australia: 19      |

|                                    |     |
|------------------------------------|-----|
| Worldwide total number of subjects | 292 |
| EEA total number of subjects       | 62  |

Notes:

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### Subjects enrolled per age group

---

|   |     |
|---|-----|
| In utero                                  | 0   |
| Preterm newborn - gestational age < 37 wk | 0   |
| Newborns (0-27 days)                      | 0   |
| Infants and toddlers (28 days-23 months)  | 0   |
| Children (2-11 years)                     | 0   |
| Adolescents (12-17 years)                 | 18  |
| Adults (18-64 years)                      | 272 |
| From 65 to 84 years                       | 2   |
| 85 years and over                         | 0   |

## Subject disposition

### Recruitment

Recruitment details:

This multicenter trial was conducted at 105 trial sites in the following 11 countries: United States of America (USA), Canada, Australia, Germany, Hungary, Israel, Italy, New Zealand, Poland, Spain, Ukraine.

### Pre-assignment

Screening details:

Participants underwent in-clinic administration of open-label USL261 5 mg followed by USL261 5 mg 10 minutes in absence of a seizure (Test Dose Phase [TDP]). Participants were then randomized to double-blind USL261 5 mg or Placebo to be administered by caregiver to treat a seizure cluster in Comparative Phase (CP) in the outpatient setting.

### Period 1

|                              |                |
|------------------------------|----------------|
| Period 1 title               | TDP            |
| Is this the baseline period? | Yes            |
| Allocation method            | Not applicable |
| Blinding used                | Not blinded    |

Blinding implementation details:

USL261 was not blinded for the Test Dose Phase

### Arms

|           |            |
|-----------|------------|
| Arm title | USL261 TDP |
|-----------|------------|

Arm description:

Participants received at least 1 open-label USL261 5 mg dose in TDP.

|  |                       |
|--|-----------------------|
| Arm type                               | Experimental          |
| Investigational medicinal product name | USL261                |
| Investigational medicinal product code | USL261                |
| Other name                             |                       |
| Pharmaceutical forms                   | Nasal spray, solution |
| Routes of administration               | Intranasal use        |

Dosage and administration details:

A dose of USL261 (5 mg midazolam [MDZ]) was delivered with a single actuation of the unit dose pump.

| Number of subjects in period 1     | USL261 TDP |
|------------------------------------|------------|
| Started                            | 292        |
| Completed                          | 201        |
| Not completed                      | 91         |
| Study/Site closure                 | 6          |
| Adverse Event                      | 17         |
| Caregiver no longer available      | 5          |
| Logistical                         | 6          |
| Consent withdrawn by participant   | 8          |
| Lost to follow-up                  | 2          |
| No treated seizure cluster episode | 37         |

|                    |   |
|--------------------|---|
| Protocol deviation | 8 |
| Noncompliance      | 2 |

## Period 2

|                              |                         |
|------------------------------|-------------------------|
| Period 2 title               | CP                      |
| Is this the baseline period? | No                      |
| Allocation method            | Randomised - controlled |
| Blinding used                | Double blind            |
| Roles blinded                | Subject, Investigator   |

Blinding implementation details:

USL261 was not blinded for the TDP or for the second dose provided to some participants during the CP; however, blinding was considered important for safety and efficacy assessments for the first dose of the CP. The drug name did not appear on the label, and neither the investigator/study center staff nor the participant/caregiver knew the identity of the randomized medication.

## Arms

|                              |           |
|------------------------------|-----------|
| Are arms mutually exclusive? | Yes       |
| <b>Arm title</b>             | USL261 CP |

Arm description:

Participants completing TDP who received USL261 5 mg as randomized dose to treat a seizure cluster episode in the CP.

|  |                       |
|--|-----------------------|
| Arm type                               | Experimental          |
| Investigational medicinal product name | USL261                |
| Investigational medicinal product code | USL261                |
| Other name                             |                       |
| Pharmaceutical forms                   | Nasal spray, solution |
| Routes of administration               | Intranasal use        |

Dosage and administration details:

A dose of USL261 (5 mg MDZ) was delivered with a single actuation of the unit dose pump.

|                  |            |
|------------------|------------|
| <b>Arm title</b> | Placebo CP |
|------------------|------------|

Arm description:

Participants completing TDP who received placebo as randomized dose to treat a seizure cluster episode in the CP.

|  |                       |
|--|-----------------------|
| Arm type                               | Placebo               |
| Investigational medicinal product name | Placebo               |
| Investigational medicinal product code |                       |
| Other name                             |                       |
| Pharmaceutical forms                   | Nasal spray, solution |
| Routes of administration               | Intranasal use        |

Dosage and administration details:

Matching placebo was administered.

| <b>Number of subjects in period 2</b> | USL261 CP | Placebo CP |
|---------------------------------------|-----------|------------|
| Started                               | 134       | 67         |
| Completed                             | 133       | 67         |
| Not completed                         | 1         | 0          |
| Consent withdrawn by participant      | 1         | -          |

## Baseline characteristics

### Reporting groups

|                       |            |
|-----------------------|------------|
| Reporting group title | USL261 TDP |
|-----------------------|------------|

Reporting group description:

Participants received at least 1 open-label USL261 5 mg dose in TDP.

| Reporting group values   | USL261 TDP   | Total |  |
|--|--------------|-------|--|
| Number of subjects   | 292          | 292   |  |
| Age categorical  |              |       |  |
| USL261 Test Dose: All participants receiving at least 1 dose of USL261 5 mg in TDP.                            |              |       |  |
| Units: Subjects  |              |       |  |
| In utero   | 0            | 0     |  |
| Preterm newborn infants (gestational age < 37 wks)   | 0            | 0     |  |
| Newborns (0-27 days)   | 0            | 0     |  |
| Infants and toddlers (28 days-23 months)   | 0            | 0     |  |
| Children (2-11 years)  | 0            | 0     |  |
| Adolescents (12-17 years)  | 18           | 18    |  |
| Adults (18-64 years)   | 272          | 272   |  |
| From 65-84 years   | 2            | 2     |  |
| 85 years and over  | 0            | 0     |  |
| Age continuous   |              |       |  |
| Units: years   |              |       |  |
| median   | 31.5         |       |  |
| full range (min-max)   | 12 to 65     | -     |  |
| Gender categorical   |              |       |  |
| Units: Subjects  |              |       |  |
| Female   | 146          | 146   |  |
| Male   | 146          | 146   |  |
| Ethnicity  |              |       |  |
| Units: Subjects  |              |       |  |
| Hispanic or Latino   | 22           | 22    |  |
| Not Hispanic or Latino   | 270          | 270   |  |
| Race   |              |       |  |
| Units: Subjects  |              |       |  |
| White  | 275          | 275   |  |
| Asian  | 2            | 2     |  |
| American Indian or Alaska Native   | 2            | 2     |  |
| Black or African American  | 7            | 7     |  |
| Native Hawaiian or Other Pacific Islander  | 1            | 1     |  |
| Other  | 5            | 5     |  |
| Body mass index (BMI)  |              |       |  |
| Measure Analysis Population Description: Height not measurable in some participants. Number analyzed (n) = 287 |              |       |  |
| Units: kg/m2   |              |       |  |
| median   | 24.69        |       |  |
| full range (min-max)   | 15.8 to 48.5 | -     |  |

|   |                        |   |  |
|---|------------------------|---|--|
| Number of seizure cluster episodes in 1 year before Visit 1 of the Study<br>Units: seizure cluster episodes<br>median<br>full range (min-max) | 15.0<br>3 to 999       | - |  |
| Number of years that participant has had seizure clusters prior to study  |                        |   |  |
| Measure Analysis Population Description: Unknown or data entered as indefinite (eg >3) for some participants. n = 283                         |                        |   |  |
| Units: Years<br>median<br>full range (min-max)  | 6.00<br>0.3 to 62.0    | - |  |
| Typical number of seizures in seizure cluster episode   |                        |   |  |
| Measure Analysis Population Description: Not reported for 1 participant. n = 291  |                        |   |  |
| Units: seizures<br>median<br>full range (min-max)   | 6.00<br>2.0 to 200.0   | - |  |
| Typical duration of seizure cluster episode   |                        |   |  |
| Measure Analysis Population Description: Non-numerical duration (eg "several" hours reported for some participants. n = 278                   |                        |   |  |
| Units: minutes<br>median<br>full range (min-max)  | 67.50<br>2.5 to 4320.0 | - |  |



## End points

### End points reporting groups

|   |            |
|---|------------|
| Reporting group title   | USL261 TDP |
| Reporting group description:<br>Participants received at least 1 open-label USL261 5 mg dose in TDP.  |            |
| Reporting group title   | USL261 CP  |
| Reporting group description:<br>Participants completing TDP who received USL261 5 mg as randomized dose to treat a seizure cluster episode in the CP. |            |
| Reporting group title   | Placebo CP |
| Reporting group description:<br>Participants completing TDP who received placebo as randomized dose to treat a seizure cluster episode in the CP.     |            |

### Primary: Participants Who Met the Criteria for Treatment Success After Administration of the Double-blind Dose in the CP

|   |   |
|---|---|
| End point title   | Participants Who Met the Criteria for Treatment Success After Administration of the Double-blind Dose in the CP |
| End point description:<br>Treatment Success is defined as achieving both of the following: 1) termination of seizure(s) within 10 minutes after double-blind study drug administration, and 2) no recurrence of seizure(s) beginning 10 minutes after study drug administration to 6 hours after study drug administration. Participants who received the open-label second dose within 6 hours of administration of the double-blind dose were analyzed as having had a seizure. |   |
| End point type  | Primary   |
| End point timeframe:<br>6 hours   |   |

| End point values            | USL261 CP       | Placebo CP      |  |  |
|-----------------------------|-----------------|-----------------|--|--|
| Subject group type          | Reporting group | Reporting group |  |  |
| Number of subjects analysed | 134             | 67              |  |  |
| Units: Participants         |                 |                 |  |  |
| number (not applicable)     | 72              | 23              |  |  |

### Statistical analyses

|                            |                        |
|----------------------------|------------------------|
| Statistical analysis title | Statistical Analysis 1 |
| Comparison groups          | USL261 CP v Placebo CP |

|   |                         |
|---|-------------------------|
| Number of subjects included in analysis | 201                     |
| Analysis specification                  | Pre-specified           |
| Analysis type                           | superiority             |
| P-value                                 | = 0.0109 <sup>[1]</sup> |
| Method                                  | Fisher exact            |

Notes:

[1] - 2-sided p-value from Fisher's exact test

### Secondary: Participants With Seizure(s) >10 Minutes to 4 Hours After Administration of the Double-blind Dose

|                 |   |
|-----------------|---|
| End point title | Participants With Seizure(s) >10 Minutes to 4 Hours After Administration of the Double-blind Dose |
|-----------------|---|

End point description:

Participants with recurrence of seizure(s) >10 minutes and up to 4 hours after administration of the double-blind dose in the CP. Participants who received the open-label second dose within 4 hours of administration of the double-blind dose were analyzed as having had a seizure.

|                |           |
|----------------|-----------|
| End point type | Secondary |
|----------------|-----------|

End point timeframe:

4 hours

| End point values            | USL261 CP       | Placebo CP      |  |  |
|-----------------------------|-----------------|-----------------|--|--|
| Subject group type          | Reporting group | Reporting group |  |  |
| Number of subjects analysed | 134             | 67              |  |  |
| Units: Participants         |                 |                 |  |  |
| number (not applicable)     | 51              | 40              |  |  |

### Statistical analyses

|   |                         |
|---|-------------------------|
| <b>Statistical analysis title</b>       | Statistical Analysis 1  |
| Comparison groups                       | USL261 CP v Placebo CP  |
| Number of subjects included in analysis | 201                     |
| Analysis specification                  | Pre-specified           |
| Analysis type                           | superiority             |
| P-value                                 | = 0.0043 <sup>[2]</sup> |
| Method                                  | Fisher exact            |

Notes:

[2] - 2-sided

### Secondary: Occurrence of Seizure With a Start Time >10 Minutes After Administration of the Double-blind Dose

|                 |   |
|-----------------|---|
| End point title | Occurrence of Seizure With a Start Time >10 Minutes After Administration of the Double-blind Dose |
|-----------------|---|

End point description:

Occurrence of next seizure with a start time >10 minutes and up to 24 hours after administration of the double-blind dose in the CP. Participants who did not have another seizure before the end of the 24-hour observation period were censored at the end of the observation period. Participants administered the open-label second dose who did not have a seizure were censored at the time of the administration.

|                      |           |
|----------------------|-----------|
| End point type       | Secondary |
| End point timeframe: |           |
| 24 hours             |           |

| End point values            | USL261 CP       | Placebo CP      |  |  |
|-----------------------------|-----------------|-----------------|--|--|
| Subject group type          | Reporting group | Reporting group |  |  |
| Number of subjects analysed | 134             | 67              |  |  |
| Units: Participants         |                 |                 |  |  |
| number (not applicable)     | 50              | 31              |  |  |

### Statistical analyses

| Statistical analysis title              | Statistical Analysis 1 |
|---|------------------------|
| Comparison groups                       | Placebo CP v USL261 CP |
| Number of subjects included in analysis | 201                    |
| Analysis specification                  | Pre-specified          |
| Analysis type                           | superiority            |
| P-value                                 | = 0.0124               |
| Method                                  | Logrank                |

### Secondary: Time to Next Seizure With a Start Time >10 Minutes After Administration of the Double-blind Dose

|   |  |
|---|--|
| End point title   | Time to Next Seizure With a Start Time >10 Minutes After Administration of the Double-blind Dose |
| End point description:  |  |
| <p>Time to next seizure with a start time &gt;10 minutes and up to 24 hours after administration of the double-blind dose in the CP. Participants who did not have another seizure before the end of the 24-hour observation period were censored at the end of the observation period. Participants administered the open-label second dose who did not have a seizure were censored at the time of the administration.</p> <p>99.99999=Not Available (NA)</p> <p>For USL261 CP: Required data are NA since median was not estimable as probability of no seizures through 24 hours was above 50%. Upper bound of 95% CI was not estimable.</p> <p>For Placebo CP: Required data are NA since upper bound of 95% CI was not estimable.</p> |  |
| End point type  | Secondary  |
| End point timeframe:  |  |
| 24 hours  |  |

| <b>End point values</b>          | USL261 CP                   | Placebo CP             |  |  |
|----------------------------------|-----------------------------|------------------------|--|--|
| Subject group type               | Reporting group             | Reporting group        |  |  |
| Number of subjects analysed      | 134                         | 67                     |  |  |
| Units: Hours                     |                             |                        |  |  |
| median (confidence interval 95%) | 99.99999 (17.9 to 99.99999) | 12.1 (2.2 to 99.99999) |  |  |

## Statistical analyses

| <b>Statistical analysis title</b>                            | Statistical Analysis 1 |
|--|------------------------|
| Statistical analysis description:<br>Kaplan-Meier estimates. |                        |
| Comparison groups  | USL261 CP v Placebo CP |
| Number of subjects included in analysis                      | 201                    |
| Analysis specification                                       | Pre-specified          |
| Analysis type  | superiority            |
| P-value  | = 0.0124               |
| Method   | Logrank                |

## Adverse events

### Adverse events information

Timeframe for reporting adverse events:

Treatment emergent adverse events (TEAEs) collected from administration of first open-label dose of USL261 5 mg in TDP until completion of the final study visit or 7 days after the last administration of study drug, whichever was later.

Adverse event reporting additional description:

Adverse events collected at each visit from participant and/or caregiver. TEAEs presented for TDP and CP separately. Due to the short systemic half-life of active (midazolam), TEAEs within 2 days after administration of first open-label USL261 5 mg dose presented for TDP, and within 2 days after administration of double-blind dose for CP.

|                 |            |
|-----------------|------------|
| Assessment type | Systematic |
|-----------------|------------|

### Dictionary used

|                 |        |
|-----------------|--------|
| Dictionary name | MedDRA |
|-----------------|--------|

|                    |      |
|--------------------|------|
| Dictionary version | 16.1 |
|--------------------|------|

### Reporting groups

|                       |            |
|-----------------------|------------|
| Reporting group title | USL261 TDP |
|-----------------------|------------|

Reporting group description:

Participants who received at least 1 open-label USL261 5 mg dose in TDP

|                       |                             |
|-----------------------|-----------------------------|
| Reporting group title | USL261 CP, USL261 5 mg Only |
|-----------------------|-----------------------------|

Reporting group description:

Participants completing TDP who received USL261 5 mg as randomized dose to treat a seizure cluster episode in the CP

|                       |                               |
|-----------------------|-------------------------------|
| Reporting group title | USL261 CP, USL261 5 mg + 5 mg |
|-----------------------|-------------------------------|

Reporting group description:

Participants completing TDP who received USL261 5 mg as randomized dose to treat a seizure cluster episode and received an open-label USL261 5 mg dose in the CP

|                       |                          |
|-----------------------|--------------------------|
| Reporting group title | Placebo CP, Placebo Only |
|-----------------------|--------------------------|

Reporting group description:

Participants completing TDP who received Placebo as randomized dose to treat a seizure cluster episode in the CP

|                       |                                   |
|-----------------------|-----------------------------------|
| Reporting group title | Placebo CP, Placebo + USL261 5 mg |
|-----------------------|-----------------------------------|

Reporting group description:

Participants completing TDP who received Placebo as randomized dose to treat a seizure cluster episode and received an open-label USL261 5 mg dose in the CP

| Serious adverse events                            | USL261 TDP      | USL261 CP, USL261 5 mg Only | USL261 CP, USL261 5 mg + 5 mg |
|---|-----------------|-----------------------------|-------------------------------|
| Total subjects affected by serious adverse events |                 |                             |                               |
| subjects affected / exposed                       | 2 / 292 (0.68%) | 0 / 91 (0.00%)              | 0 / 43 (0.00%)                |
| number of deaths (all causes)                     | 0               | 0                           | 0                             |
| number of deaths resulting from adverse events    | 0               | 0                           | 0                             |
| Nervous system disorders                          |                 |                             |                               |
| Sedation  |                 |                             |                               |
| subjects affected / exposed                       | 1 / 292 (0.34%) | 0 / 91 (0.00%)              | 0 / 43 (0.00%)                |
| occurrences causally related to treatment / all   | 1 / 1           | 0 / 0                       | 0 / 0                         |
| deaths causally related to treatment / all        | 0 / 0           | 0 / 0                       | 0 / 0                         |

|   |                 |                |                |
|---|-----------------|----------------|----------------|
| Seizure cluster                                 |                 |                |                |
| subjects affected / exposed                     | 0 / 292 (0.00%) | 0 / 91 (0.00%) | 0 / 43 (0.00%) |
| occurrences causally related to treatment / all | 0 / 0           | 0 / 0          | 0 / 0          |
| deaths causally related to treatment / all      | 0 / 0           | 0 / 0          | 0 / 0          |
| Somnolence                                      |                 |                |                |
| subjects affected / exposed                     | 1 / 292 (0.34%) | 0 / 91 (0.00%) | 0 / 43 (0.00%) |
| occurrences causally related to treatment / all | 1 / 1           | 0 / 0          | 0 / 0          |
| deaths causally related to treatment / all      | 0 / 0           | 0 / 0          | 0 / 0          |

| <b>Serious adverse events</b>                     | Placebo CP, Placebo Only | Placebo CP, Placebo + USL261 5 mg |  |
|---|--------------------------|-----------------------------------|--|
| Total subjects affected by serious adverse events |                          |                                   |  |
| subjects affected / exposed                       | 0 / 26 (0.00%)           | 1 / 41 (2.44%)                    |  |
| number of deaths (all causes)                     | 0                        | 0                                 |  |
| number of deaths resulting from adverse events    | 0                        | 0                                 |  |
| Nervous system disorders                          |                          |                                   |  |
| Sedation  |                          |                                   |  |
| subjects affected / exposed                       | 0 / 26 (0.00%)           | 0 / 41 (0.00%)                    |  |
| occurrences causally related to treatment / all   | 0 / 0                    | 0 / 0                             |  |
| deaths causally related to treatment / all        | 0 / 0                    | 0 / 0                             |  |
| Seizure cluster                                   |                          |                                   |  |
| subjects affected / exposed                       | 0 / 26 (0.00%)           | 1 / 41 (2.44%)                    |  |
| occurrences causally related to treatment / all   | 0 / 0                    | 0 / 1                             |  |
| deaths causally related to treatment / all        | 0 / 0                    | 0 / 0                             |  |
| Somnolence  |                          |                                   |  |
| subjects affected / exposed                       | 0 / 26 (0.00%)           | 0 / 41 (0.00%)                    |  |
| occurrences causally related to treatment / all   | 0 / 0                    | 0 / 0                             |  |
| deaths causally related to treatment / all        | 0 / 0                    | 0 / 0                             |  |

Frequency threshold for reporting non-serious adverse events: 5 %

| <b>Non-serious adverse events</b>                     | USL261 TDP        | USL261 CP, USL261 5 mg Only | USL261 CP, USL261 5 mg + 5 mg |
|---|-------------------|-----------------------------|-------------------------------|
| Total subjects affected by non-serious adverse events |                   |                             |                               |
| subjects affected / exposed                           | 78 / 292 (26.71%) | 17 / 91 (18.68%)            | 10 / 43 (23.26%)              |
| Nervous system disorders                              |                   |                             |                               |

|   |   |  |   |
|---|---|--|---|
| Headache<br>subjects affected / exposed<br>occurrences (all)  | 1 / 292 (0.34%)<br>1                                  | 6 / 91 (6.59%)<br>6                            | 1 / 43 (2.33%)<br>1                             |
| Somnolence<br>subjects affected / exposed<br>occurrences (all)  | 28 / 292 (9.59%)<br>30                                | 9 / 91 (9.89%)<br>9                            | 4 / 43 (9.30%)<br>4                             |
| General disorders and administration<br>site conditions<br>Product taste abnormal<br>subjects affected / exposed<br>occurrences (all)   | 17 / 292 (5.82%)<br>19                                | 4 / 91 (4.40%)<br>4                            | 0 / 43 (0.00%)<br>0                             |
| Eye disorders<br>Lacrimation increased<br>subjects affected / exposed<br>occurrences (all)  | 20 / 292 (6.85%)<br>26                                | 1 / 91 (1.10%)<br>1                            | 1 / 43 (2.33%)<br>1                             |
| Respiratory, thoracic and mediastinal<br>disorders<br>Nasal discomfort<br>subjects affected / exposed<br>occurrences (all)<br><br>Throat irritation<br>subjects affected / exposed<br>occurrences (all) | 47 / 292 (16.10%)<br>61<br><br>15 / 292 (5.14%)<br>15 | 5 / 91 (5.49%)<br>5<br><br>2 / 91 (2.20%)<br>2 | 7 / 43 (16.28%)<br>8<br><br>3 / 43 (6.98%)<br>3 |

| <b>Non-serious adverse events</b>  | Placebo CP, Placebo<br>Only                    | Placebo CP, Placebo<br>+ USL261 5 mg           |  |
|--|--|--|--|
| Total subjects affected by non-serious<br>adverse events<br>subjects affected / exposed  | 3 / 26 (11.54%)                                | 7 / 41 (17.07%)                                |  |
| Nervous system disorders<br>Headache<br>subjects affected / exposed<br>occurrences (all)<br><br>Somnolence<br>subjects affected / exposed<br>occurrences (all) | 0 / 26 (0.00%)<br>0<br><br>1 / 26 (3.85%)<br>1 | 0 / 41 (0.00%)<br>0<br><br>4 / 41 (9.76%)<br>4 |  |
| General disorders and administration<br>site conditions<br>Product taste abnormal<br>subjects affected / exposed<br>occurrences (all)                          | 0 / 26 (0.00%)<br>0                            | 0 / 41 (0.00%)<br>0                            |  |

|   |                |                |  |
|---|----------------|----------------|--|
| Eye disorders                                   |                |                |  |
| Lacrimation increased                           |                |                |  |
| subjects affected / exposed                     | 0 / 26 (0.00%) | 1 / 41 (2.44%) |  |
| occurrences (all)                               | 0              | 1              |  |
| Respiratory, thoracic and mediastinal disorders |                |                |  |
| Nasal discomfort                                |                |                |  |
| subjects affected / exposed                     | 2 / 26 (7.69%) | 3 / 41 (7.32%) |  |
| occurrences (all)                               | 2              | 3              |  |
| Throat irritation                               |                |                |  |
| subjects affected / exposed                     | 0 / 26 (0.00%) | 1 / 41 (2.44%) |  |
| occurrences (all)                               | 0              | 1              |  |



## More information

### Substantial protocol amendments (globally)

Were there any global substantial amendments to the protocol? Yes

| Date             | Amendment  |
|------------------|--|
| 19 December 2012 | Amendment 1: • To clarify the definition of recurrence of seizures; • To clarify efficacy versus safety objectives and to modify secondary and exploratory objectives; • To provide observation periods for the time to next seizure after study drug administration; • To clarify instructions for administering the second dose of study drug; • To clarify that medical history was to be taken at Visit 1 only; • To update the safety objectives and assessments to streamline the list of safety assessments; • To clarify inclusion and exclusion criteria; • To add test for phenobarbital in participants; • To clarify that the caregiver is to record the actual time of return to baseline activity; • To clarify requirement for training of the caregiver; • To remove the requirement to have a legally acceptable representative (LAR) co-sign the assent document with the participant; • Participant and caregiver satisfaction questionnaire, quality of life (QOL), and other health economic assessments at Visit 2 was moved from post-dose to before the administration of the first test dose; • To change the maximum amount of blood to be collected for PK analyses from 275 mL to 50 mL; • To update the permitted and prohibited medications and substances; • To include more information on the use of flumazenil in treating MDZ overdose per prescribing information of MDZ injection; • To clarify that adverse events (AEs) and serious adverse events (SAEs) were to be collected until 30 days after completing of the final study Visit; • To clarify statistical methodology; • To adjust time window for the occurrence of Visit 4 from 48 to 120 hours after study drug administration to 24 to 120 hours after study drug administration; • To add windows for completion of assessments at Visit 2 and change measurement of temperature to pre-dose only; • To allow extension of the Screening period; • To clarify instructions for repeating out-of-range vital signs.  |
| 20 October 2014  | Amendment 2: • To modify the trial to utilize a group sequential design with 3 interim analyses and a maximum of approximately 240 participants who have completed the CP; • To remove the requirement for emergency rescue treatment with assisted breathing or intubation within 24 hours after study drug administration; • To decrease the lower age (from 14 to 12 years of age) and remove the upper age restriction from Inclusion Criterion 3; • To modify the definition of intermittent use of benzodiazepines to clarify that benzodiazepines are allowed provided they are typically used $\leq 3$ days within a 7-day period; • To reduce the minimum observation time at the Test Dose Visit from 4 hours to 1 hour for all new test dosed participants after the originally planned 132 participants completed the CP; • To modify Exclusion Criterion 22 to clarify that a $\geq 40$ mmHg decrease from baseline in systolic blood pressure (SBP) and a $\geq 30$ mmHg decrease from baseline in diastolic blood pressure (DBP) during the observation period after administration of the USL261 test dose at Visit 2 were exclusionary; • To remove date and time of recognition of seizure cluster(s) eligible for treatment with study drug from the list of efficacy assessments; • To reduce the AE reporting time frame from 30 days after the last administration of study drug to 7 days after the last administration of study drug; • To clarify that participants who did not have sufficient available data to confirm whether they could be classified either as "Treatment Success" or as "Not a Treatment Success" were considered to have missing data; • To clarify that the PK profile after administration of any dose of USL261 would be evaluated, not just after 10 mg; • To update the statistical and PK analyses to provide additional detail on the planned analyses; • To clarify that participants who had not treated a seizure cluster meeting the study criteria within 6 months of randomization were to be discontinued from the study. |

|                  |   |
|------------------|---|
| 26 February 2015 | Amendment 3: • To update the definition of modified Intent-to-Treat (mITT) to maintain the wording in the original protocol (include only those participants who received at least 1 dose of study drug during the CP and who had any post-treatment efficacy assessments); • To update the statistical analysis of the primary efficacy endpoint to maintain the analyses in the original protocol and add chi-squared test as a sensitivity analysis.   |
| 20 May 2015      | Amendment 4: • To add the Brief Smell Identification Test (B-SIT) at US sites to assess the effects of USL261 on olfaction; • To update the procedures to be completed at Visits 1, 4, and on the monthly telephone follow-up calls between Visit 3 and Visit 4; • To update the introduction section to reflect current study status; • To clarify that the time between Visit 2 and Visit 3 may be extended, and that the extension must be approved by the Sponsor or Clinical Research Organization designee. |

Notes:

## Interruptions (globally)

Were there any global interruptions to the trial? Yes

| Date             | Interruption   | Restart date |
|------------------|--|--------------|
| 22 February 2017 | Due to business reasons, the study was stopped with a final sample size of 201 completed participants. Since the study was stopped prematurely, a conservative statistical approach was used for the final analysis. | -            |

Notes:

## Limitations and caveats

None reported