Clinical trial results:
A Study to Assess the Efficacy, Safety, Tolerability, and Pharmacokinetics of Multiple Doses of Nusinersen (ISIS 396443) Delivered Intrathecally to Patients with Infantile-Onset Spinal Muscular Atrophy

Summary

EudraCT number	2017-000621-12
Trial protocol	Outside EU/EEA
Global end of trial date	21 August 2017

Results information

Result version number	v1
This version publication date	03 March 2018
First version publication date	03 March 2018

Trial information

Trial identification

Sponsor protocol code	ISIS 396443-CS3A

Additional study identifiers

ISRCTN number	-
ClinicalTrials.gov id (NCT number)	NCT01839656
WHO universal trial number (UTN)	-

Notes:

Sponsors

Sponsor organisation name	Biogen
Sponsor organisation address	250 Binney Street, Cambridge, Massachusetts, United States, 02142
Public contact	Study Medical Director, Biogen, clinicaltrials@biogen.com
Scientific contact	Study Medical Director, Biogen, clinicaltrials@biogen.com

Notes:

Paediatric regulatory details

Is trial part of an agreed paediatric investigation plan (PIP)	Yes
EMA paediatric investigation plan number(s)	EMEA-001448-PIP01-13
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?	Yes

Notes:

Results analysis stage

Analysis stage	Final
Date of interim/final analysis	21 August 2017
Is this the analysis of the primary completion data?	Yes
Primary completion date	21 August 2017
Global end of trial reached?	Yes
Global end of trial date	21 August 2017
Was the trial ended prematurely?	Yes

Notes:

General information about the trial

Main objective of the trial:

The primary objective of this study was to examine the clinical efficacy of multiple doses of Nusinersen (ISIS 396443) when administered intrathecally to subjects with infantile-onset spinal muscular atrophy (SMA).

Protection of trial subjects:

Written informed consent was obtained from each subject’s parent or legal guardian prior to evaluations being performed for eligibility. Adequate time to review the information in the informed consent and ask questions concerning all portions of the conduct of the study was provided. Through the informed consent process, awareness of the purpose of the study, the procedures, the benefits and risks of the study, the discomforts and the precautions taken was made. Any side effects or other health issues occurring during the study were followed up by the study doctor. Subjects were able to stop taking part in the study at any time without giving any reason.

Background therapy: -

Evidence for comparator: -

Actual start date of recruitment	08 May 2013
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	United States: 18
Country: Number of subjects enrolled	Canada: 3
Worldwide total number of subjects	21
EEA total number of subjects	0

Notes:

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)	21
Children (2-11 years)	0
Adolescents (12-17 years)	0

Adults (18-64 years)	0
From 65 to 84 years	0
85 years and over	0

Subject disposition

Recruitment

Recruitment details: -

Pre-assignment

Screening details:

Of the 23 subjects screened, 2 were screening failures. A total of 21 subjects enrolled; 1 was withdrawn from the study prior to receiving the first dose of study treatment. Twenty subjects received at least 1 dose of study treatment and were included in the efficacy, safety, and PK analyses.

Period 1

Period 1 title	Overall Study (overall period)
Is this the baseline period?	Yes
Allocation method	Non-randomised - controlled
Blinding used	Not blinded

Arms

Are arms mutually exclusive?	Yes
Arm title	Nusinersen 6 mg

Arm description:

Subjects received nusinersen 6 mg injections as an intrathecal (IT) bolus through a lumbar puncture (LP) on Days 1, 15, and 85. Maintenance doses of 12 mg were given on Days 253, 379, 505, 631, 757, 883, 1009, 1135, and 1261.

Arm type	Experimental
Investigational medicinal product name	Nusinersen
Investigational medicinal product code	
Other name	ISIS 396443, Spinraza, BIIB058, IONIS SMN Rx, ISIS SMNRx
Pharmaceutical forms	Solution for injection
Routes of administration	Intrathecal use

Dosage and administration details:

Administered as specified in the treatment arm.

Arm title	Nusinersen 12 mg

Arm description:

Subjects received nusinersen 12 mg injections as an intrathecal (IT) bolus through a lumbar puncture (LP) on Days 1, 15, and 85. Maintenance doses of 12 mg were given on Days 253, 379, 505, 631, 757, 883, 1009, 1135, and 1261.

Arm type	Experimental
Investigational medicinal product name	Nusinersen
Investigational medicinal product code	
Other name	ISIS 396443, Spinraza, BIIB058, IONIS SMN Rx, ISIS SMNRx
Pharmaceutical forms	Solution for injection
Routes of administration	Intrathecal use

Dosage and administration details:

Administered as specified in the treatment arm.

Number of subjects in period 1[1]	Nusinersen 6 mg	Nusinersen 12 mg
Started	4	16
Completed Loading Dose Period	4	15
Completed	2	0
Not completed	2	16
Adverse event, serious fatal	1	4
Consent withdrawn by subject	1	1
Early study closure	-	11

Notes:

[1] - The number of subjects reported to be in the baseline period are not the same as the worldwide number enrolled in the trial. It is expected that these numbers will be the same.
Justification: Of the 21 subjects enrolled, 1 (in Cohort 1) was withdrawn from the study prior to receiving the first dose of study treatment.

Baseline characteristics

Reporting groups	
Reporting group title	Nusinersen 6 mg
Reporting group description:	
Subjects received nusinersen 6 mg injections as an intrathecal (IT) bolus through a lumbar puncture (LP) on Days 1, 15, and 85. Maintenance doses of 12 mg were given on Days 253, 379, 505, 631, 757, 883, 1009, 1135, and 1261.	
Reporting group title	Nusinersen 12 mg
Reporting group description:	
Subjects received nusinersen 12 mg injections as an intrathecal (IT) bolus through a lumbar puncture (LP) on Days 1, 15, and 85. Maintenance doses of 12 mg were given on Days 253, 379, 505, 631, 757, 883, 1009, 1135, and 1261.	

Reporting group values	Nusinersen 6 mg	Nusinersen 12 mg	Total
Number of subjects	4	16	20
Age categorical Units: Subjects			
In utero	0	0	0
Preterm newborn infants (gestational age < 37 wks)	0	0	0
Newborns (0-27 days)	0	0	0
Infants and toddlers (28 days-23 months)	4	16	20
Children (2-11 years)	0	0	0
Adolescents (12-17 years)	0	0	0
Adults (18-64 years)	0	0	0
From 65-84 years	0	0	0
85 years and over	0	0	0
Age continuous Units: days			
arithmetic mean	145	140	
standard deviation	± 67	± 60	-
Gender categorical Units: Subjects			
Female	1	7	8
Male	3	9	12
Ethnicity Units: Subjects			
Hispanic or Latino	0	1	1
Not Hispanic or Latino	4	15	19
Race Units: Subjects			
White	3	13	16
Black	0	1	1
Asian	0	1	1
American Indian or Alaskan Native	0	0	0
Native Hawaiian or Other Pacific Islander	0	0	0
Multiple Race	1	0	1
Other	0	1	1

Hammersmith Infant Neurological Examination (HINE) Head Control Motor Milestones at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
Unable to maintain head upright	3	13	16
Wobbles	1	2	3
All the time maintained upright	0	1	1
HINE Sitting Motor Milestones at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
Cannot sit	4	15	19
Sits with support at hips	0	1	1
Props	0	0	0
Stable sit	0	0	0
Pivots (rotates)	0	0	0
HINE Voluntary Grasp Motor Milestones at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
No grasp	0	3	3
Uses whole hand	4	13	17
Index finger and thumb but immature grasp	0	0	0
Pincer grasp	0	0	0
HINE Ability to Kick Motor Milestones at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
No kicking	1	5	6
Kick horizontally, legs do not lift	3	10	13
Upward (vertically)	0	1	1
Touches leg	0	0	0
Touches toes	0	0	0
HINE Rolling Motor Milestones at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
No rolling	4	15	19
Rolling to side	0	0	0
Prone to supine	0	1	1
Supine to prone	0	0	0
HINE Crawling Motor Milestones at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
Does not lift head	4	14	18
On elbow	0	1	1
On outstretched hand	0	1	1
Crawling flat on abdomen	0	0	0
Crawling on hands and knees	0	0	0
HINE Standing Motor Milestones at Baseline			

Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
Does not support weight	4	15	19
Supports weight	0	1	1
Stands with support	0	0	0
Stands unaided	0	0	0
HINE Walking Motor Milestones at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
No walking	4	15	19
Bouncing	0	1	1
Cruising (walks holding on)	0	0	0
Walking independently	0	0	0
Distribution of Total Scores of the CHOP INTEND Motor Function Scale at Baseline			
CHOP INTEND is the Children's Hospital of Philadelphia Infant Test for Neuromuscular Disease. Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: Subjects			
0 to 9	0	0	0
10 to 19	0	2	2
20 to 29	3	6	9
30 to 39	1	6	7
40 to 49	0	1	1
50 to 59	0	0	0
60 to 64	0	1	1
Mean CHOP INTEND Total Scores at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: units on a scale			
arithmetic mean	27	30	
standard deviation	± 5	± 12	-
Mean Compound Muscle Action Potential (CMAP) Amplitude of the Peroneal Nerve at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: millivolts (mV)			
arithmetic mean	0.673	0.518	
standard deviation	± 0.501	± 0.664	-
Mean CMAP Amplitude of the Ulnar Nerve at Baseline			
Baseline was defined as the last non-missing value prior to the first dose of nusinersen.			
Units: mV			
arithmetic mean	0.372	0.532	
standard deviation	± 0.177	± 0.878	-

End points

End points reporting groups

Reporting group title	Nusinersen 6 mg

Reporting group description:

Subjects received nusinersen 6 mg injections as an intrathecal (IT) bolus through a lumbar puncture (LP) on Days 1, 15, and 85. Maintenance doses of 12 mg were given on Days 253, 379, 505, 631, 757, 883, 1009, 1135, and 1261.

Reporting group title	Nusinersen 12 mg

Reporting group description:

Subjects received nusinersen 12 mg injections as an intrathecal (IT) bolus through a lumbar puncture (LP) on Days 1, 15, and 85. Maintenance doses of 12 mg were given on Days 253, 379, 505, 631, 757, 883, 1009, 1135, and 1261.

Primary: Percent of Subjects Who Achieved Improvement in Motor Milestones as Assessed by Section 2 of the HINE at the Last Visit

End point title	Percent of Subjects Who Achieved Improvement in Motor Milestones as Assessed by Section 2 of the HINE at the Last Visit[1]

End point description:

Section 2 of HINE consists of 8 independent milestone categories. Within each of these categories, subjects can progress from complete absence of a motor ability (the lowest level in each category) through multiple milestones (2 to 4 levels in each category) to the highest level within the category. Overall, there are a total of 26 milestones that can be achieved across the 8 categories. Improvement was defined as any of the following: 1. An increase from baseline of 2 milestones or more, or the achievement of pincer grasp in the voluntary grasp category 2. An increase from baseline of 2 milestones or more, or achievement of touching toes in the ability to kick category 3. An increase from baseline of 1 milestone or more in any of the remaining 6 categories: head control, rolling, sitting, crawling, standing, or walking.

End point type	Primary

End point timeframe:

Baseline, Day 1352 or Early Termination

Notes:

[1] - No statistical analyses have been specified for this primary end point. It is expected there is at least one statistical analysis for each primary end point.
Justification: Statistical analysis was not conducted for this endpoint because there was no comparator in this study.

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	4[2]	16[3]		
Units: percent of subjects				
number (not applicable)	25.0	68.8		

Notes:

[2] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

[3] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

Statistical analyses

No statistical analyses for this end point

Secondary: Event-free Survival at the End of Study

End point title	Event-free Survival at the End of Study

End point description:

Event-free survival was defined as the percent of subjects who were alive and did not require permanent ventilatory support (defined as tracheostomy or the need for ≥16 hours ventilation/day continuously for at least 2 weeks in the absence of an acute reversible illness) Event-free survival was estimated using Kaplan-Meier methodology.

End point type	Secondary

End point timeframe:

Up to Day 1638

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	4[4]	16[5]		
Units: percent of subjects				
number (not applicable)	25.0	62.5		

Notes:

[4] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

[5] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

Statistical analyses

No statistical analyses for this end point

Secondary: Percent of Subjects With Improved Motor Function at the Last Visit as Assessed by the CHOP-INTEND Motor Function Scale

End point title	Percent of Subjects With Improved Motor Function at the Last Visit as Assessed by the CHOP-INTEND Motor Function Scale

End point description:

The CHOP-INTEND test includes 16 items structured to move from easiest to hardest with the grading including gravity eliminated (lower scores) to antigravity movements (higher scores). All item scores range from 0 (worst) to 4 (best). Total scores range from 0 to 64, with higher scores indicating better movement functioning. Improvement was defined as an increase in total CHOP INTEND score ≥4 points from baseline as of the last study visit.

End point type	Secondary

End point timeframe:

Baseline, Day 1352 or Early Termination

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	4[6]	16[7]		
Units: percent of subjects				
number (not applicable)	25.0	62.5		

Notes:

[6] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

[7] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

Statistical analyses

No statistical analyses for this end point

Secondary: Improvement in Neuromuscular Electrophysiology at the Last Visit as Assessed by the Change From Baseline in CMAP Amplitude

End point title	Improvement in Neuromuscular Electrophysiology at the Last Visit as Assessed by the Change From Baseline in CMAP Amplitude

End point description:

CMAP is an electrophysiological technique that can be used to determine the approximate number of motor neurons in a muscle or group of muscles. A positive change from Baseline indicates that the number of motor neurons increased.

End point type	Secondary

End point timeframe:

Baseline, Day 1072

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	2[8]	8[9]		
Units: mV				
arithmetic mean (standard deviation)				
Peroneal nerve	1.88 (± 2.58)	2.81 (± 1.28)		
Ulnar nerve	0.776 (± 1.448)	0.685 (± 0.415)		

Notes:

[8] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

[9] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

Statistical analyses

No statistical analyses for this end point

Secondary: Number of Subjects Experiencing Adverse Events (AEs) and/or Serious Adverse Events (SAEs)

End point title	Number of Subjects Experiencing Adverse Events (AEs) and/or Serious Adverse Events (SAEs)

End point description:

AE: any unfavorable and unintended sign, symptom, or disease temporally associated with the study or use of investigational drug product, whether or not the AE is considered related to the investigational drug product. SAE: any AE that in the view of either the Investigator or Sponsor, meets any of the following criteria: results in death; is life threatening: that is, poses an immediate risk of death at the time of the event; requires in-patient hospitalization or prolongation of existing hospitalization; results in a persistent or significant incapacity or substantial disruption of the ability to conduct normal life functions; results in congenital anomaly or birth defect in the offspring of the subject (whether male or female); is an important medical event in the opinion of the Investigator or Sponsor.

End point type	Secondary

End point timeframe:

Up to Day 1352

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	4[10]	16[11]		
Units: Number of Subjects				
Any AE	4	16		
Any SAE	3	13		

Notes:

[10] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

[11] - Safety Population: All subjects who were registered and received at least 1 dose of nusinersen.

Statistical analyses

No statistical analyses for this end point

Secondary: Pharmacokinetic (PK) Parameters of Nusinersen in CSF: Maximum Observed Drug Concentration (Cmax)

End point title	Pharmacokinetic (PK) Parameters of Nusinersen in CSF: Maximum Observed Drug Concentration (Cmax)

End point description:

End point type	Secondary

End point timeframe:

Day 1

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	0[12]	0[13]		
Units: nanograms/milliliter (ng/ml)				
arithmetic mean (standard deviation)	()	()		

Notes:

[12] - Due to the limited CSF samples collected, no CSF PK parameters were calculated.

[13] - Due to the limited CSF samples collected, no CSF PK parameters were calculated.

Statistical analyses

No statistical analyses for this end point

Secondary: PK Parameters of Nusinersen in Plasma: Cmax

End point title	PK Parameters of Nusinersen in Plasma: Cmax

End point description:

End point type	Secondary

End point timeframe:

Day 1

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	4[14]	16[15]		
Units: ng/ml				
arithmetic mean (standard deviation)	396 (± 311)	829 (± 625)		

Notes:

[14] - PK Population: All subjects who were registered and had at least 1 evaluable postdose PK sample.

[15] - PK Population: All subjects who were registered and had at least 1 evaluable postdose PK sample.

Statistical analyses

No statistical analyses for this end point

Secondary: PK Parameters of Nusinersen in Plasma: Time to Reach Cmax (Tmax)

End point title	PK Parameters of Nusinersen in Plasma: Time to Reach Cmax (Tmax)

End point description:

End point type	Secondary

End point timeframe:

Day 1

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	4[16]	16[17]		
Units: hr				
arithmetic mean (standard deviation)	2.09 (± 1.35)	2.37 (± 1.25)		

Notes:

[16] - PK Population: All subjects who were registered and had at least 1 evaluable postdose PK sample.

[17] - PK Population: All subjects who were registered and had at least 1 evaluable postdose PK sample.

Statistical analyses

No statistical analyses for this end point

Secondary: PK Parameters of Nusinersen in Plasma: Area Under the Plasma Concentrations Time Curve From the Time of the IT Dose to Four Hours After Dosing (AUC0-4)

End point title	PK Parameters of Nusinersen in Plasma: Area Under the Plasma Concentrations Time Curve From the Time of the IT Dose to Four Hours After Dosing (AUC0-4)

End point description:

End point type	Secondary

End point timeframe:

Day 1

End point values	Nusinersen 6 mg	Nusinersen 12 mg		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	4[18]	16[19]		
Units: ng x hr/ml				
arithmetic mean (standard deviation)	894 (± 610)	2181 (± 1488)		

Notes:

[18] - PK Population: All subjects who were registered and had at least 1 evaluable postdose PK sample.

[19] - PK Population: All subjects who were registered and had at least 1 evaluable postdose PK sample.

Statistical analyses

No statistical analyses for this end point

Adverse events

Adverse events information	
Timeframe for reporting adverse events: Up to Day 1359	
Assessment type	Systematic
Dictionary used	
Dictionary name	MedDRA
Dictionary version	16.0
Reporting groups	
Reporting group title	Cohort 1
Reporting group description: -	
Reporting group title	Cohort 2
Reporting group description: -	

Serious adverse events	Cohort 1	Cohort 2	
Total subjects affected by serious adverse events			
subjects affected / exposed	3 / 4 (75.00%)	13 / 16 (81.25%)	
number of deaths (all causes)	1	4	
number of deaths resulting from adverse events	1	4	
Cardiac disorders			
Bradycardia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Cardiac arrest			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Cardio-respiratory arrest			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Cyanosis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	

Pneumopericardium			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Nervous system disorders			
Convulsion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Hypoxic-ischaemic encephalopathy			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 1	
Gastrointestinal disorders			
Vomiting			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory, thoracic and mediastinal disorders			
Acute respiratory failure			
subjects affected / exposed	2 / 4 (50.00%)	4 / 16 (25.00%)	
occurrences causally related to treatment / all	0 / 4	0 / 9	
deaths causally related to treatment / all	0 / 0	0 / 0	
Apnoea			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences causally related to treatment / all	0 / 0	0 / 2	
deaths causally related to treatment / all	0 / 0	0 / 0	
Asphyxia			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 1	0 / 0	
Aspiration			

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Atelectasis			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences causally related to treatment / all	0 / 0	0 / 3	
deaths causally related to treatment / all	0 / 0	0 / 0	
Bronchial secretion retention			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Chronic respiratory failure			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Hypoventilation			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Hypoxia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pneumomediastinum			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pneumonia aspiration			
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences causally related to treatment / all	0 / 0	0 / 3	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory distress			

subjects affected / exposed	2 / 4 (50.00%)	6 / 16 (37.50%)	
occurrences causally related to treatment / all	0 / 3	0 / 9	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory failure			
subjects affected / exposed	0 / 4 (0.00%)	5 / 16 (31.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 6	
deaths causally related to treatment / all	0 / 0	0 / 2	
Musculoskeletal and connective tissue disorders			
Synovitis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Infections and infestations			
Adenovirus infection			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Bronchiolitis			
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences causally related to treatment / all	0 / 0	0 / 4	
deaths causally related to treatment / all	0 / 0	0 / 0	
Corona virus infection			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 1	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Enterovirus infection			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Lower respiratory tract infection viral			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 1	

Metapneumovirus infection			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences causally related to treatment / all	0 / 0	0 / 2	
deaths causally related to treatment / all	0 / 0	0 / 0	
Parainfluenzae virus infection			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pneumonia			
subjects affected / exposed	0 / 4 (0.00%)	5 / 16 (31.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 8	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pneumonia adenoviral			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pneumonia bacterial			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 1	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pneumonia pseudomonas aeruginosa			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 1	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pneumonia viral			
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences causally related to treatment / all	0 / 0	0 / 4	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory syncytial virus bronchiolitis			
subjects affected / exposed	1 / 4 (25.00%)	3 / 16 (18.75%)	
occurrences causally related to treatment / all	0 / 1	0 / 3	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory tract infection			

subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory tract infection viral			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Rhinovirus infection			
subjects affected / exposed	0 / 4 (0.00%)	4 / 16 (25.00%)	
occurrences causally related to treatment / all	0 / 0	0 / 4	
deaths causally related to treatment / all	0 / 0	0 / 0	
Upper respiratory tract infection			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Viral infection			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences causally related to treatment / all	0 / 0	0 / 2	
deaths causally related to treatment / all	0 / 0	0 / 0	
Viral upper respiratory tract infection			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences causally related to treatment / all	0 / 0	0 / 2	
deaths causally related to treatment / all	0 / 0	0 / 0	
Metabolism and nutrition disorders			
Failure to thrive			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Hyponatraemia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	

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

Non-serious adverse events	Cohort 1	Cohort 2	
Total subjects affected by non-serious adverse events			
subjects affected / exposed	4 / 4 (100.00%)	16 / 16 (100.00%)	
Neoplasms benign, malignant and unspecified (incl cysts and polyps)			
Acrochordon			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Haemangioma			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Vascular disorders			
Capillary fragility			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Essential hypertension			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Hypertension			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Subgaleal haematoma			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
General disorders and administration site conditions			
Cyst			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Device leakage			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Device occlusion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	3	
Discomfort			

subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Infusion site extravasation			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Injection site bruising			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Non-cardiac chest pain			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Oedema			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Oedema peripheral			
subjects affected / exposed	2 / 4 (50.00%)	3 / 16 (18.75%)	
occurrences (all)	3	3	
Pain			
subjects affected / exposed	0 / 4 (0.00%)	4 / 16 (25.00%)	
occurrences (all)	0	4	
Pyrexia			
subjects affected / exposed	3 / 4 (75.00%)	14 / 16 (87.50%)	
occurrences (all)	6	46	
Vessel puncture site bruise			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Vessel puncture site haemorrhage			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Immune system disorders			
Drug hypersensitivity			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Hypersensitivity			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	

Seasonal allergy			
subjects affected / exposed	1 / 4 (25.00%)	3 / 16 (18.75%)	
occurrences (all)	1	3	
Respiratory, thoracic and mediastinal disorders			
Acute respiratory failure			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	2	0	
Apnoea			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Apnoeic attack			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Aspiration			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Atelectasis			
subjects affected / exposed	0 / 4 (0.00%)	5 / 16 (31.25%)	
occurrences (all)	0	8	
Bronchial secretion retention			
subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	1	3	
Choking			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Chronic respiratory failure			
subjects affected / exposed	2 / 4 (50.00%)	3 / 16 (18.75%)	
occurrences (all)	2	3	
Cough			
subjects affected / exposed	2 / 4 (50.00%)	5 / 16 (31.25%)	
occurrences (all)	2	11	
Dyspnoea			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Epistaxis			

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Hypoxia			
subjects affected / exposed	0 / 4 (0.00%)	4 / 16 (25.00%)	
occurrences (all)	0	7	
Increased bronchial secretion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Increased upper airway secretion			
subjects affected / exposed	0 / 4 (0.00%)	5 / 16 (31.25%)	
occurrences (all)	0	7	
Laryngeal granuloma			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Nasal congestion			
subjects affected / exposed	1 / 4 (25.00%)	6 / 16 (37.50%)	
occurrences (all)	3	8	
Nasal discharge discolouration			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Pneumonia aspiration			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Pneumothorax			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	3	
Pulmonary congestion			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Pulmonary oedema			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Respiratory arrest			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Respiratory distress			

subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences (all)	0	4	
Respiratory failure			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Restrictive pulmonary disease			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Rhinitis allergic			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Rhinorrhoea			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Rhonchi			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Sinus congestion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	2	
Sleep apnoea syndrome			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Tachypnoea			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Tracheal disorder			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Upper respiratory tract congestion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Use of accessory respiratory muscles			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Wheezing			

subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Psychiatric disorders			
Anxiety			
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences (all)	0	3	
Expressive language disorder			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Investigations			
Bacterial test positive			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Bone density decreased			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Breath sounds abnormal			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Heart rate decreased			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Heart rate increased			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	3	
Human rhinovirus test positive			
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences (all)	0	3	
Moraxella test positive			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Neutrophil count increased			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	3	
Neutrophil percentage increased			

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Oxygen saturation decreased			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	3	
Pseudomonas test positive			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	2	
Serratia test positive			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Staphylococcus test positive			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Streptococcus test positive			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Weight decreased			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	3	1	
White blood cell count increased			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Injury, poisoning and procedural complications			
Arthropod bite			
subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	3	4	
Contusion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Ear abrasion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	2	
Excoriation			

subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	1	3	
Feeding tube complication			
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences (all)	0	5	
Joint dislocation			
subjects affected / exposed	1 / 4 (25.00%)	3 / 16 (18.75%)	
occurrences (all)	2	3	
Laceration			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	3	
Lip injury			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Pneumothorax traumatic			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Post gastric surgery syndrome			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Procedural pain			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Procedural site reaction			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Soft tissue injury			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Sunburn			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Thermal burn			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Tooth injury			

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Urinary retention postoperative			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Congenital, familial and genetic disorders			
Clinodactyly			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Cryptorchism			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
High arched palate			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Hip dysplasia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Pectus carinatum			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Plagiocephaly			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Cardiac disorders			
Bradycardia			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Cardiomyopathy			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Tachycardia			
subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	1	3	
Ventricular tachycardia			

subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Nervous system disorders			
Cerebral infarction			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Cerebrospinal fluid leakage			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Convulsion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Drooling			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Headache			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Hyporeflexia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Lethargy			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Muscle contractions involuntary			
subjects affected / exposed	1 / 4 (25.00%)	3 / 16 (18.75%)	
occurrences (all)	1	3	
Nystagmus			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Speech disorder developmental			
subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	1	2	
Syncope			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	

Blood and lymphatic system disorders			
Anaemia			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Eosinophilia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Lymphadenopathy			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Neutropenia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Thrombocytosis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Ear and labyrinth disorders			
Cerumen impaction			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Middle ear effusion			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Eye disorders			
Astigmatism			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Conjunctivitis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Erythema of eyelid			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	2	
Eye irritation			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Eyelid ptosis			

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Ocular hyperaemia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Gastrointestinal disorders			
Abdominal distension			
subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	1	2	
Abdominal pain			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Chapped lips			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Constipation			
subjects affected / exposed	1 / 4 (25.00%)	8 / 16 (50.00%)	
occurrences (all)	1	9	
Diarrhoea			
subjects affected / exposed	2 / 4 (50.00%)	4 / 16 (25.00%)	
occurrences (all)	3	15	
Flatulence			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Frequent bowel movements			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Gastritis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Gastrointestinal hypomotility			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Gastrooesophageal reflux disease			
subjects affected / exposed	0 / 4 (0.00%)	6 / 16 (37.50%)	
occurrences (all)	0	6	

Haematemesis			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Salivary hypersecretion			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Stomatitis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Teething			
subjects affected / exposed	2 / 4 (50.00%)	2 / 16 (12.50%)	
occurrences (all)	2	2	
Tongue atrophy			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Tooth crowding			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Traumatic tooth displacement			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Vomiting			
subjects affected / exposed	2 / 4 (50.00%)	5 / 16 (31.25%)	
occurrences (all)	3	11	
Skin and subcutaneous tissue disorders			
Alopecia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	2	
Blister			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Dermatitis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	2	
Dermatitis contact			

subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Dermatitis diaper			
subjects affected / exposed	2 / 4 (50.00%)	3 / 16 (18.75%)	
occurrences (all)	3	3	
Ecchymosis			
subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	1	2	
Eczema			
subjects affected / exposed	1 / 4 (25.00%)	3 / 16 (18.75%)	
occurrences (all)	1	3	
Erythema			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Excessive granulation tissue			
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)	
occurrences (all)	0	3	
Heat rash			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Petechiae			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Pruritus			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Rash			
subjects affected / exposed	1 / 4 (25.00%)	5 / 16 (31.25%)	
occurrences (all)	3	8	
Rash follicular			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Rash papular			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Rosacea			

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Skin depigmentation			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Skin disorder			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Skin irritation			
subjects affected / exposed	1 / 4 (25.00%)	3 / 16 (18.75%)	
occurrences (all)	2	3	
Skin ulcer			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Subcutaneous emphysema			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Musculoskeletal and connective tissue disorders			
Arthritis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Deformity thorax			
subjects affected / exposed	1 / 4 (25.00%)	2 / 16 (12.50%)	
occurrences (all)	1	2	
Hand deformity			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Joint contracture			
subjects affected / exposed	3 / 4 (75.00%)	7 / 16 (43.75%)	
occurrences (all)	11	15	
Joint range of motion decreased			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Joint stiffness			

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Kyphoscoliosis			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Kyphosis			
subjects affected / exposed	2 / 4 (50.00%)	3 / 16 (18.75%)	
occurrences (all)	3	4	
Lordosis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Osteopenia			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Pain in extremity			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	3	
Rib deformity			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Scoliosis			
subjects affected / exposed	2 / 4 (50.00%)	6 / 16 (37.50%)	
occurrences (all)	3	8	
Spinal deformity			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Synovitis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Torticollis			
subjects affected / exposed	2 / 4 (50.00%)	2 / 16 (12.50%)	
occurrences (all)	2	2	
Trismus			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Infections and infestations			

Adenoviral upper respiratory infection				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Adenovirus infection				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	2		
Bacterial disease carrier				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Bacterial infection				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	2		
Bacterial tracheitis				
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)		
occurrences (all)	0	4		
Bronchiolitis				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Candida nappy rash				
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)		
occurrences (all)	1	0		
Ear infection				
subjects affected / exposed	0 / 4 (0.00%)	3 / 16 (18.75%)		
occurrences (all)	0	4		
Enterovirus infection				
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)		
occurrences (all)	0	2		
Erythema infectiosum				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Fungal skin infection				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Gastritis viral				

subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Gastroenteritis viral			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Gastroenteritis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Hand-foot-and-mouth disease			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Haemophilus infection			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Hordeolum			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Influenza			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Lower respiratory tract infection			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Moraxella infection			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Mucocutaneous candidiasis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Nasopharyngitis			
subjects affected / exposed	1 / 4 (25.00%)	7 / 16 (43.75%)	
occurrences (all)	1	14	
Oral candidiasis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Otitis media			

subjects affected / exposed	1 / 4 (25.00%)	6 / 16 (37.50%)		
occurrences (all)	1	8		
Parainfluenzae virus infection				
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)		
occurrences (all)	1	1		
Pharyngitis streptococcal				
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)		
occurrences (all)	1	0		
Pneumonia				
subjects affected / exposed	1 / 4 (25.00%)	5 / 16 (31.25%)		
occurrences (all)	2	10		
Pneumonia moraxella				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Pneumonia pseudomonas aeruginosa				
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)		
occurrences (all)	1	1		
Pneumonia streptococcal				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Pneumonia viral				
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)		
occurrences (all)	1	0		
Pseudomonas infection				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Respiratory syncytial virus bronchiolitis				
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)		
occurrences (all)	1	1		
Respiratory syncytial virus infection				
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)		
occurrences (all)	0	1		
Respiratory tract infection				
subjects affected / exposed	3 / 4 (75.00%)	4 / 16 (25.00%)		
occurrences (all)	18	11		

Respiratory tract infection bacterial subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	1 / 16 (6.25%) 1	
Rhinitis subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	3 / 16 (18.75%) 3	
Rhinovirus infection subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	4 / 16 (25.00%) 5	
Staphylococcal bacteraemia subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	1 / 16 (6.25%) 1	
Staphylococcal infection subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	1 / 16 (6.25%) 1	
Tracheitis subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	2 / 16 (12.50%) 4	
Upper respiratory tract infection subjects affected / exposed occurrences (all)	1 / 4 (25.00%) 2	10 / 16 (62.50%) 44	
Urinary tract infection subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	1 / 16 (6.25%) 1	
Viral infection subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	4 / 16 (25.00%) 5	
Viral rash subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	1 / 16 (6.25%) 1	
Viral upper respiratory tract infection subjects affected / exposed occurrences (all)	0 / 4 (0.00%) 0	2 / 16 (12.50%) 2	
Metabolism and nutrition disorders Dehydration			

subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Failure to thrive			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Hyperglycaemia			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Hyperkalaemia			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Hyponatraemia			
subjects affected / exposed	0 / 4 (0.00%)	2 / 16 (12.50%)	
occurrences (all)	0	2	
Hypophagia			
subjects affected / exposed	1 / 4 (25.00%)	1 / 16 (6.25%)	
occurrences (all)	1	1	
Malnutrition			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	1	0	
Metabolic alkalosis			
subjects affected / exposed	0 / 4 (0.00%)	1 / 16 (6.25%)	
occurrences (all)	0	1	
Weight gain poor			
subjects affected / exposed	1 / 4 (25.00%)	0 / 16 (0.00%)	
occurrences (all)	2	0	

More information

Substantial protocol amendments (globally)

Were there any global substantial amendments to the protocol? Yes

Date	Amendment
14 August 2013	14 August 2013 Changes to the protocol are summarized below: * Changed the dose from 9 mg to 12 mg ISIS 396443 (no participants were dosed at the 9-mg level) * Added additional participants to the study where Cohort 2 could enroll between 4 to approximately 16 participants * Added age at death and age at death or ≥16 hours ventilation/day for >2 weeks to the exploratory endpoints * Updated the clinical experience section for the ISIS 396443 CS2 and ISIS 396443 CS12 studies
18 January 2014	18 January 2014 Changes to the protocol are summarized below: * Added 1 additional "maintenance" dose of 12 mg equivalent ISIS 396443 on Study Day 253, approximately 6 months after the participants received their Study Day 85 dose (for all participants – both dose cohorts)
14 March 2014	14 March 2014 Changes to the protocol are summarized below: * Added permanent ventilation, defined as ≥16 hours ventilation/day continuously for >2 weeks in the absence of an acute reversible illness, to the combined efficacy endpoint
19 May 2014	19 May 2014 Changes to the protocol are summarized below: * Added 4 additional doses of 12 mg equivalent of ISIS 396443 given once every 4 months to extend the maintenance dosing (i.e., on Days 379, 505, 631, and 757) * Updated the rationale for loading and maintenance dose and regimen * Added study drug injection volume in participants >24 months of age * Updated information on preclinical experience
29 May 2015	29 May 2015 Changes to the protocol are summarized below: * Added 4 additional doses of 12 mg equivalent of ISIS 396443 given once every 4 months to extend maintenance dosing (i.e., on Days 883, 1009, 1135, and 1261) * Added the Hammersmith Functional Motor Scale-Expanded as an outcomes measure for all participants who maintain a CHOP-INTEND total score of ≥50 for 2 consecutive study visits * Added a ready-to-use vial configuration of the study treatment * Added language on the possibility to perform an interim analysis to support potential discussions with regulatory agencies
25 January 2016	25 January 2016 Changes to the study protocol are summarized below: * Added "Efficacy" and "Nusinersen" to the study title * Amended Study Objectives to reflect efficacy assessment as the primary study objective and safety and tolerability as secondary study objectives

Notes:

Interruptions (globally)

Were there any global interruptions to the trial? No

Limitations and caveats

Limitations of the trial such as small numbers of subjects analysed or technical problems leading to unreliable data.

Care should be used when interpreting the Cmax and AUC values due to the limited sampling.

Notes: