A clinical trial* to establish the efficacy and safety of risdiplam for babies with Type 1 SMA (FIREFISH)

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M-XX-00003978

*Referred to as a ‘study’ throughout this summary document. See the end of the document for the full title of the study.
Thank you to those who took part in this clinical study. You have helped researchers to answer important questions about the outlook for babies with spinal muscular atrophy (SMA) and about the study drug risdiplam.

This document provides a summary of the 12-month results of Parts 1 and 2 of the FIREFISH study. The study started in December 2016 and met its key endpoints in November 2019, when the last baby to take part had completed 12 months of treatment with risdiplam, the drug being investigated in this study. The study will continue up to 5 years after the last baby has enrolled in the study.

This document has been written for members of the public, as well as the patients and families participating in the study.

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The study is ‘open label’, which means that the researchers and the patient families all knew which treatment was being given. No one was given ‘placebo’ (a dummy drug with no active ingredient and which has no real physical effect on the individual). All the babies taking part in the trial were given risdiplam.

The study is described as a ‘pivotal’ trial, which means its aim was to demonstrate the efficacy and safety of risdiplam in order to support regulatory approval by health authorities to make the drug available to patients around the world.

This study was carried out in two parts:

Part 1 (dose-finding part) had three purposes: to define the optimal dose of the drug to give to babies, to identify any side effects and to assess whether the drug has a positive impact on SMA.

Part 2 (confirmatory part) was carried out to find out more detailed information about the effectiveness of the drug, any side effects and if the drug has a positive impact on babies with SMA. Part 2 used the dose identified in Part 1 of the study.
1. General information about the study

Why was this study carried out and what is SMA?

When this study began, there were no approved treatment options for people with SMA. SMA is a rare, inherited, neuromuscular disease, which destroys muscle-controlling nerve cells called motor neurons. It affects the central nervous system (brain and spinal cord), peripheral nervous system, and voluntary muscle movement (skeletal muscle). SMA causes progressive muscle weakness and loss of movement due to muscle wasting (atrophy).

SMA is caused by a change (mutation) in a specific motor neuron gene called **SMN1 (survival of motor neuron 1)**. **SMN1** produces a protein called **survival motor neuron (SMN)** that is critical to the function of the nerves that control the muscles. Without SMN, those nerve cells cannot properly function and eventually die, leading to debilitating and sometimes fatal muscle weakness. People with SMA have low levels of SMN and are dependent on a related gene called **SMN2** as a ‘back-up’. However, **SMN2** produces only approximately 10% of the working (‘functional’) SMN protein that the body needs. Without sufficient SMN protein, motor neurons degenerate and become non-functional. The more copies of the **SMN2** gene an individual has, the more SMN protein they can produce, which makes the symptoms of SMA less severe.

Individuals with SMA have difficulty performing the basic functions of life, including breathing and swallowing. SMA does not affect cognition (ability to understand), emotional development or learning ability. The severity of SMA varies among individuals and depends on a range of factors, including age of onset. There are **four primary types of SMA**, based on the age that symptoms begin and the highest physical milestone achieved. Some clinicians also refer to a Type 0 (also known as prenatal onset SMA). Type 0 is the most severe form of SMA and affects babies that are still in the womb.

**The four primary types of SMA**

<table>
<thead>
<tr>
<th>SMA classification</th>
<th>Age of onset</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type 1</td>
<td>Birth – 6 months</td>
<td>Babies with this form of SMA will never sit independently</td>
</tr>
<tr>
<td>Type 2</td>
<td>6 –18 months</td>
<td>Babies are typically able to sit but not to stand</td>
</tr>
<tr>
<td>Type 3</td>
<td>18 months onwards</td>
<td>Children can typically stand and walk. However, many children lose the ability to walk in early life</td>
</tr>
<tr>
<td>Type 4</td>
<td>18 years onwards</td>
<td>Develops post adolescence. Causes mild motor impairment</td>
</tr>
</tbody>
</table>
1. General information about the study (continued)

The impact of SMA on life expectancy varies according to the classification. Babies with the most severe types of SMA (Types 0 and 1) have a very short life expectancy: most would not live beyond two years without treatment. Individuals with Type 4 SMA usually have a normal life expectancy.

The goal of new treatments is to address the underlying cause of the disease, improve life expectancy, maintain vital motor functions, lessen the overall symptoms and enhance quality of life.

The FIREFISH study was carried out to understand the safety and efficacy of risdiplam in babies with Type 1 SMA, aged between 1 and 7 months at enrollment.

What is risdiplam and how does it work?

Risdiplam is the drug that is studied in FIREFISH. Risdiplam is a liquid taken once a day by mouth (orally) or, for babies with difficulty swallowing, by feeding tube.

Risdiplam is designed to target the SMN2 gene and help it to produce more functional SMN protein. The aim is to prevent motor neuron degeneration and preserve muscle function. Risdiplam is distributed throughout the body, raising the levels of SMN protein in various organs and not only the central nervous system (brain and spinal cord).

In individuals with SMA, the SMN2 gene cannot produce enough functional SMN protein because of the abnormal ‘splicing’ of the gene. Splicing is a process where some parts of the gene called introns are removed and others, called exons, are joined together. Risdiplam is designed to control this abnormal splicing of the SMN2 gene and to allow production of a functional SMN protein.
1. General information about the study (continued)

How was the study designed?

The study was designed in two parts:

- An exploratory dose-finding part (Part 1) and
- A confirmatory part (Part 2) to demonstrate the efficacy and safety of risdiplam at the dose selected in Part 1

The study is ‘open label’ which means that the researchers and the patient families all knew which treatment was being given. No one was given ‘placebo’ (a dummy drug with no active ingredient and which has no real physical effect on the individual). All the babies were given risdiplam.

In Part 1 of the study, the babies were divided into two groups or ‘cohorts’ and received risdiplam for at least 12 months:

- Babies in cohort A were given a low dose of risdiplam (4 babies in total)
- Babies in cohort B were given a higher dose of risdiplam (17 babies in total)

This allowed for comparison of safety and efficacy between the two doses, so the best dose could be used in Part 2 of the study.

Part 2 of the study was designed to assess the efficacy and safety of risdiplam in 41 babies at the dose selected from Part 1. Specifically, the study primary endpoint was to assess the ability of babies to sit unsupported for at least 5 seconds, after 12 months of treatment with risdiplam.

What were the aims of the study?

The FIREFISH study aims to answer a number of different questions about risdiplam, as shown in the below table.

In order to understand and evaluate the effects of risdiplam and help answer the different questions set by researchers, the study includes a number of outcome measures. The FIREFISH study includes a primary outcome measure (‘primary endpoint’) as well as secondary outcome measures (‘secondary endpoints’). A primary endpoint is a specific measure that aims to address the main research question. If met or verified at the end of a pre-specified study duration, that will define the success of the clinical trial. Secondary endpoints are there to provide additional information to evaluate the effects of the intervention under investigation in a clinical study, in this case treatment with risdiplam. A clinical study may have more than one secondary outcome measure. Lastly, exploratory endpoints, which were also included in the study, are generally evaluated less formally (from a statistical point of view) as primary and secondary endpoints.

As part of these endpoints, specific scales were used to measure movement ability in the babies taking part in the study. You can find a full description of the scales on page 21 of this document.
1. General information about the study (continued)

Summary of the primary and secondary endpoints for Parts 1 and 2

**Part 1 Primary and Secondary Endpoints**

<table>
<thead>
<tr>
<th>The main question researchers wanted to answer (known as the ‘primary endpoint’)</th>
<th>Additional questions the researchers wanted to answer (known as ‘secondary and exploratory endpoints’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the recommended dose of risdiplam for babies aged 1-7 months with Type 1 SMA, to take forward into Part 2 of the study?</td>
<td>What effects does risdiplam have on:</td>
</tr>
<tr>
<td>What changes in blood levels of SMN protein were seen after taking risdiplam?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>■ Proportion of babies sitting without support for 5 seconds (as assessed by the BSID-III*)</td>
</tr>
<tr>
<td></td>
<td>■ Proportion of babies who achieve a score of at least 40 points in the CHOP-INTEND*</td>
</tr>
<tr>
<td></td>
<td>■ Proportion of babies achieving motor milestones (as assessed by HINE-2*)</td>
</tr>
<tr>
<td></td>
<td>■ Time to death or permanent ventilation</td>
</tr>
<tr>
<td></td>
<td>■ Ability to swallow and feed orally</td>
</tr>
</tbody>
</table>

**Part 2 Primary and Secondary Endpoints**

<table>
<thead>
<tr>
<th>The main question researchers wanted to answer (known as the ‘primary endpoint’)</th>
<th>Additional questions the researchers wanted to answer (known as ‘secondary and exploratory endpoints’)</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is the proportion of babies sitting without support for 5 seconds at Month 12 (as assessed by the BSID-III*)?</td>
<td>What effects does risdiplam have on:</td>
</tr>
<tr>
<td></td>
<td>■ Achievement of motor milestones as measured by the HINE-2* at Month 12</td>
</tr>
<tr>
<td></td>
<td>■ Proportion of babies who achieve an increase of ≥ 4 points in the CHOP-INTEND* at Month 12</td>
</tr>
<tr>
<td></td>
<td>■ Proportion of babies alive and without permanent ventilation who achieve a score of ≥ 40 in the CHOP-INTEND* at Month 12</td>
</tr>
<tr>
<td></td>
<td>■ Ability to swallow and feed orally at Month 12</td>
</tr>
</tbody>
</table>

*Please see page 21 for a full description of the measurement scales used.*
In both parts of the trial, a key endpoint was to assess the safety of risdiplam.

The FIREFISH study is a global, multicentre trial, involving 31 locations across 12 countries. The following map shows the countries where the FIREFISH study has taken place. Babies enrolled in Part 2 were from a wider geographical area than babies in Part 1.

**Countries where the FIREFISH study has taken place**

The countries that have taken part in the FIREFISH study are Belgium, Brazil, China, Croatia, France, Italy, Japan, Poland, Russia, Switzerland, Turkey and the USA
2. Who took part in this study?

21 babies aged 3–7 months took part in Part 1 of the study and 41 babies aged 2–7 months took part in Part 2 of the study. All had Type 1 SMA. See the ‘baseline characteristics’ section for more information about the demographic and clinical data collected for each participant at the beginning of each part of the clinical trial.

Babies could take part (‘inclusion criteria’) in the study (Parts 1 and 2) if they:

- Had developed symptoms of Type 1 SMA between 1 and 3 months of age, with a confirmed genetic diagnosis of the disease (‘5q SMA’)
- Had two copies of the SMN2 gene
- Had recovered from any short-term illness at the time of the study screening process and were considered well-enough to take part

Babies could not take part (‘exclusion criteria’) in the study (Parts 1 and 2) if they:

- Had taken part in another clinical trial within the past 3 months
- Had previously received gene or cell therapy
- Needed medical support to breathe for more than 16 hours per day
- Had experienced any recent emergencies requiring an overnight stay in hospital or major illnesses from which they had not fully recovered

Babies that had taken part in Part 1 of the study could not take part in Part 2 of the study.

Full details of the inclusion/exclusion criteria can be found by following the link in chapter 7.

The baseline characteristics of the babies that took part

‘Baseline characteristics’ describe the demographic, clinical and other relevant information collected for each baby at the beginning of a clinical trial, before they were given risdiplam or placebo.

This information allows researchers to measure the potential effectiveness of risdiplam by benchmarking a set of reference values for any baby, to assess any improvements or worsening of symptoms over time.

The baseline characteristics for Part 1 and Part 2 of the study are shown in the following tables, respectively.
2. Who took part in this study? (continued)

<table>
<thead>
<tr>
<th>Part 1</th>
<th>Cohort A</th>
<th>Cohort B</th>
<th>All babies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n = 4</td>
<td>n = 17</td>
<td>n = 21</td>
</tr>
<tr>
<td></td>
<td>Low dose</td>
<td>Higher dose</td>
<td></td>
</tr>
<tr>
<td>Sex, number (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>4 (100)</td>
<td>11 (65)</td>
<td>15 (71)</td>
</tr>
<tr>
<td>Male</td>
<td>0 (0)</td>
<td>6 (35)</td>
<td>6 (29)</td>
</tr>
<tr>
<td>Average age in months (range)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>At first appearance of symptoms</td>
<td>2.7 (2.0–3.0)</td>
<td>1.5 (0.9–3.0)</td>
<td>2.0 (0.9–3.0)</td>
</tr>
<tr>
<td>At study enrollment</td>
<td>6.9 (6.7–6.9)</td>
<td>6.3 (3.3–6.9)</td>
<td>6.7 (3.3–6.9)</td>
</tr>
<tr>
<td>Motor function and milestones</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average CHOP-INTEND score (range)</td>
<td>23.5 (10.0–25.0)</td>
<td>24.0 (16.0–34.0)</td>
<td>24.0 (10.0–34.0)</td>
</tr>
<tr>
<td>Average HINE-2 score (range)</td>
<td>1.0 (0.0–3.0)</td>
<td>1.0 (0.0–2.0)</td>
<td>1.0 (0.0–3.0)</td>
</tr>
<tr>
<td>Number of babies sitting without support for 5 seconds (BSID III)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
3. What were the results of Part 1 of the study?

This summary provides an overview of the safety and efficacy results after the babies had received 12 months of treatment with risdiplam.

Risdiplam successfully raised levels of functional SMN protein in babies with Type 1 SMA, which was sustained throughout the whole 12-month period. All doses of risdiplam were well tolerated and no babies left the trial due to any side effects from the drug.

Based on the concentration of risdiplam in the blood, an increase in SMN protein and safety, the higher dose of risdiplam was chosen to be studied further in Part 2. The higher dose of risdiplam also had more promising effects on the motor function of the babies in the trial, as well as on swallowing and feeding, as detailed in the efficacy results section.

What were the safety results of Part 1 of the study?

All doses of risdiplam were well tolerated and no babies left the trial due to any side effects from the drug. Three deaths were reported: two babies died during the trial and one baby died 3.5 months after discontinuing treatment with risdiplam. The trial investigators did not consider these deaths to be related to treatment.

A total number of 202 ‘adverse events’ were reported during the study. These were considered to be events that are common in people with SMA, rather than side effects related to risdiplam.

A table of the safety summary is shown below. The percentage of babies who had each of the most common adverse events reported over the course of the 12 months is included in brackets.

**Side effects (n%)**

<table>
<thead>
<tr>
<th></th>
<th>Total n = 21</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of sides effects reported</td>
<td>202</td>
</tr>
<tr>
<td>Babies with at least one side effect</td>
<td>21 (100)</td>
</tr>
<tr>
<td>Babies with at least one serious side effect</td>
<td>9 (43)</td>
</tr>
<tr>
<td>Most common side effects, number of babies (%)</td>
<td></td>
</tr>
<tr>
<td>Pyrexia (fever)</td>
<td>11 (52)</td>
</tr>
<tr>
<td>Upper respiratory tract infection</td>
<td>19 (43)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>6 (29)</td>
</tr>
<tr>
<td>Vomiting</td>
<td>5 (24)</td>
</tr>
<tr>
<td>Cough</td>
<td>5 (24)</td>
</tr>
<tr>
<td>Discontinuation due to drug-related side effects</td>
<td>0</td>
</tr>
</tbody>
</table>

**Additional safety reports**

The most common serious sides effects were:
- pneumonia (3 babies)
- respiratory tract infection (2 babies)
- viral respiratory tract infection (2 babies)
- acute respiratory failure (2 babies)
- respiratory distress (2 babies)

Three deaths were reported:
- 2 babies died during the first 12 months of treatment
- 1 additional baby died after 12 months of treatment and 1 baby died 3.5 months after discontinuing treatment with risdiplam

Serious adverse events – ones that are considered life-threatening or need hospital care - were seen in 10 babies (48%), with a total of 24 serious adverse events. All babies that had serious adverse events continued taking risdiplam without interruption.
What were the exploratory efficacy results of Part 1 of the study?

The outlook for babies with Type 1 SMA who do not receive any treatment is death or permanent breathing support by the age of two. Without treatment, children with Type 1 SMA are never able to sit without support and are not expected to reach other major milestones, such as rolling over, crawling, standing or walking. These results show the effects of risdiplam on babies with Type 1 SMA after 12 months of treatment.

Event-free survival in babies

Event free in FIREFISH is defined as alive with no permanent ventilation (i.e. no tracheostomy or BiPAP (Bilevel Positive Airway Pressure) ≥16 hours per day continuously for >3 weeks or continuous intubation >3 weeks, in the absence of, or following the resolution of, an acute reversible event).

90.5% (19/21) were alive and event free

Babies sitting without support for at least 5 seconds

As assessed by the BSID-III scale

33% (7/21) of all the babies (low dose and high dose cohorts)

41% (7/17) treated with the high dose

Without treatment, children with Type 1 SMA are never able to sit without support
3. What were the results of Part 1 of the study? (continued)

Babies achieving key motor milestones

- 86% (18/21) of all the babies showed a ≥4-point improvement in CHOP-INTEND score compared with the score at the start of treatment.
- 75% (3/4) of those receiving the low dose showed an improvement.
- 88% (15/17) of those receiving the high dose showed an improvement.

*Without treatment, babies with Type 1 SMA show a steady decline in CHOP-INTEND scores over time.*

Improvements among those receiving the high dose of risdiplam, according to the HINE-2 scale:

- **Head control**:
  - 24% can wobble, 53% maintain upright all the time, 77% overall.

- **Rolling**: 12% can roll to side, 18% prone to supine, 12% supine to prone, 59% overall.

- **Sitting**: 12% sits with support at hips, 18% props, 35% stable sit, 65% overall.

- **Standing**: 6% can support weight, 6% overall.
3. What were the results of Part 1 of the study? (continued)

Babies swallowing and feeding ability

- 0 infants lost the ability to swallow
- 95% (18/19) were able to swallow and to feed by mouth or in combination with a feeding tube
- 79% (15/19) were able to feed exclusively by mouth
This summary provides an overview of the efficacy and safety results after the babies had received 12 months of treatment. The primary endpoint for this part of the study was to assess the efficacy of risdiplam measured as the proportion of babies sitting without support for at least 5 seconds after 12 months of treatment (according to the BSID-III scale). This primary endpoint was met. Risdiplam also led to significant improvement in mobility as assessed by other scales.

**What were the efficacy results of Part 2 of the study?**

As outlined previously, the outlook for babies with Type 1 SMA who do not receive any treatment is death or permanent breathing support by the age of two. Without treatment, children with Type 1 SMA are never able to sit without support and are not expected to reach other major milestones, such as rolling over, crawling, standing or walking.

See page 19 for the full results after 12 months of treatment with risdiplam.

**What were the safety results of Part 2 of the study?**

Risdiplam was well tolerated and no babies left the trial due to any side effects from the drug. Three babies sadly passed away as a result of their SMA during the first 12 months of treatment.

There were a total of 254 ‘adverse events’ reported during the study. The investigators did not consider the vast majority of these ‘adverse events’ to be side effects of risdiplam. Instead, they are events that are common in people with SMA.

A table of the safety summary is shown on page 19. The percentage of people who had each of the most common adverse events reported over the course of the 12 months is included in brackets.

**Serious adverse events** were seen in 24 babies. All babies that had serious adverse events still went on to continue taking risdiplam without interruption.
4. What were the results of Part 2 of the study? (continued)

Babies sitting without support for at least 5 seconds
As assessed by the BSID-III scale

29% (12/41) of all babies

Without treatment, children with Type 1 SMA are never able to sit without support

Babies achieving key motor milestones
According to the HINE-2 scale

78% (32/41) demonstrated significant gains in motor milestones, such as head control, rolling, sitting and standing

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Head control

- Wobbles: 32%
- Maintain upright all the time: 44%
- 76%

Sitting
- Sits with support at hips: 17%
- Props: 20%
- Stable sit: 15%
- Pivots: 10%
- 62%

Standing
- Supports weight: 17%
- Stands with support: 5%
- 22%

Walking
- Bouncing: 2%
4. What were the results of Part 2 of the study? (continued)

**Babies achieving key motor milestones (continued)**

- 90% (37/41) achieved an increase of ≥4 points in CHOP-INTEND total score
- 56% (23/41) achieved a CHOP-INTEND score ≥40 points

*Without treatment, babies with Type 1 SMA rarely reach a score of 40 points on the CHOP-INTEND scale*

**Babies swallowing and feeding ability**

- 95% (36/38) who survived maintained the ability to swallow
- 89% (34/38) were able to feed by mouth
- 74% (28/38) were able to feed exclusively orally

*In a natural history cohort, all babies with Type 1 SMA older than 12 months require feeding support*
4. What were the results of Part 2 of the study? (continued)

Event free survival in babies

- 93% (38/41) were alive
- 85% (35/41) were alive and had no need for permanent ventilation (event-free)
- 49% (20/41) did not require hospitalization during 12 months of treatment, compared to an average of 4–7 hospitalizations every year in untreated babies
4. What were the results of Part 2 of the study? (continued)

<table>
<thead>
<tr>
<th>Safety results after 12 months of treatment with risdiplam</th>
<th>Risdiplam n = 41</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients with at least 1 side effect, n (%)</td>
<td>41 (100)</td>
</tr>
<tr>
<td>Total number of side effects</td>
<td>254</td>
</tr>
<tr>
<td>Total number of deaths, n (%)</td>
<td>3 (7)</td>
</tr>
<tr>
<td>Total number of patients with at least one side effects, n (%)</td>
<td></td>
</tr>
<tr>
<td>Side effect with serious outcome</td>
<td>3 (7)</td>
</tr>
<tr>
<td>Serious side effect</td>
<td>24 (59)</td>
</tr>
<tr>
<td>Serious side effect leading to withdrawal from treatment</td>
<td>0</td>
</tr>
<tr>
<td>Treatment-related serious side effect</td>
<td>1 (2)</td>
</tr>
<tr>
<td>Side effect leading to withdrawal from treatment</td>
<td>0</td>
</tr>
<tr>
<td>Side effect leading to dose modification/interruption</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Treatment-related side effect</td>
<td>7 (17)</td>
</tr>
<tr>
<td>Related side effect leading to withdrawal from treatment</td>
<td>0</td>
</tr>
<tr>
<td>Related side effect leading to dose modification/interruption</td>
<td>0</td>
</tr>
<tr>
<td>Upper respiratory tract infection</td>
<td>19 (46)</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>16 (39)</td>
</tr>
<tr>
<td>Fever</td>
<td>16 (39)</td>
</tr>
<tr>
<td>Constipation</td>
<td>8 (20)</td>
</tr>
<tr>
<td>Nasopharyngitis (a cold)</td>
<td>5 (12)</td>
</tr>
<tr>
<td>Rhinitis (allergy)</td>
<td>5 (12)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>4 (10)</td>
</tr>
<tr>
<td>Skin rash</td>
<td>4 (10)</td>
</tr>
<tr>
<td>Most common serious side effects, n (%)</td>
<td></td>
</tr>
<tr>
<td>Pneumonia</td>
<td>13 (32)</td>
</tr>
<tr>
<td>Bronchiitis</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Respiratory failure</td>
<td>2 (5)</td>
</tr>
<tr>
<td>Hypotonia (poor muscle tone)</td>
<td>2 (5)</td>
</tr>
</tbody>
</table>

The rate of serious pneumonia in babies with Type 1 SMA (Parts 1 and 2 combined) decreased approximately 2-fold between the first and second 6-month periods.

No risdiplam-associated ophthalmologic findings were observed.
4. What were the results of Part 2 of the study? (continued)

Key difference between FIREFISH Part 1 and 2

**Summary**

- FIREFISH Part 2 (N=41) has a larger patient population than Part 1 (N=21)

- Babies in FIREFISH Part 2 were on average 1 month younger than patients in Part 1 (median age at enrollment: 5.3 months in Part 2 versus 6.7 months in Part 1)

- Babies enrolled in FIREFISH Part 2 are from a wider geographical area than babies in Part 1

- After 12 months of treatment with risdiplam, results from the main endpoints in FIREFISH Part 2 were similar to Part 1
So that the effect of different drugs on SMA can be assessed, standard ‘scales’ are used by researchers. Three of these scales were used in the FIREFISH study to understand how risdiplam affects babies’ abilities to move.

**The Bayley Scales of Infant and Toddler Development—Third Edition (BSID-III)**
The BSID-III scale uses a series of play tasks to assess the development of babies from 1 month to 3.5 years old. It is made up of five sections: thinking (cognitive), language (communication), movement (motor), social skills (emotion) and responding (adaptation). Only an adapted version of the movement section was used in FIREFISH, for babies with Type 1 SMA to better reflect their abilities and minor improvements that can make a big difference to babies’ and parents’ lives, such as sitting without support for 5 seconds or more.

**The Hammersmith Infant Neurological Examination, Section 2 (HINE-2)**
The HINE-2 scale assesses a baby’s ability to move its head, kick, roll on its side, walk, crawl, sit up and grasp objects — known as motor milestones. For each motor milestone, babies are scored from 0—4 based on their ability to perform the movements. Higher scores reflect better motor function. Severely affected babies aged 1 to 8 months with Type 1 SMA who don’t receive treatment are never expected to reach a major milestone such as rolling over, independent sitting, crawling, standing or walking.

**The Children’s Hospital of Philadelphia Infant Test of Neuromuscular Disorders (CHOP-INTEND) scale**
The CHOP-INTEND scale was specifically created to evaluate weak babies with neuromuscular disorders and assesses how a baby moves. The scale contains 16 items assessing: head, arm and leg movement; the ability to grasp an object; and the ability to roll around. CHOP-INTEND scores can range from 0 to 64. Higher scores reflect more movement. In babies with Type 1 SMA that don’t receive treatment, their CHOP-INTEND scores are rarely as high as 40 and no matter where they start, they go down over time.

5. What scales were used to measure movement in the study?
For a disease like SMA, where treatment options are limited, the study of possible new drugs and different modes of administration (such as risdiplam as the first oral treatment for SMA), is important to advance patient outcomes and care.

Babies who survived and took part in the study have experienced improvements in their symptoms and continue to take risdiplam.

Building on previous research, the study results from FIREFISH have given researchers and patients a fuller understanding of the effectiveness and safety of risdiplam in Type 1 SMA. The results have enabled the sponsoring company (Roche) to submit the drug for regulatory approval by health authorities around the world. Risdiplam received first approval for use in the US for the treatment of SMA in patients 2 months of age and older, in August 2020. Since then, it continues to be reviewed and approved by national and regional health authorities on a global scale.

No single study can tell us everything about the risks and benefits of a medicine. Always speak to your doctor before making any decisions about your treatment.
7. Where can I find more information?

You can find more information about this study on the websites listed below:

- https://clinicaltrials.gov/ct2/show/study/NCT02913482

If you or your child have took part in this study and have any questions about the results, please speak with your doctor or other medical staff at your study site.

If you have any further questions, please contact a representative at your local Roche office.

The full title of this study is: A Two Part Seamless, Open-label, Multicenter Study to Investigate the Safety, Tolerability, Pharmacokinetics, Pharmacodynamics and Efficacy of RO7034067 in Infants With Type 1 Spinal Muscular Atrophy.

The study is known as ‘FIREFISH’.

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**Address and telephone number for the sponsor of this trial:**

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