

TSHA-102 Rett Syndrome Program Update

May 2025



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Legal disclosure

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Agenda

Rett Syndrome Overview and Natural History Data Analysis

FDA Alignment on Key Elements of Pivotal Part B Trial

TSHA-102 Clinical Data from Part A of REVEAL Phase 1/2 Trials

Developmental Milestones

R-MBA

CGI-I

Safety Data

Key investment highlights

TSHA-102: potential one-time treatment designed to address the root cause of Rett syndrome

High Unmet Need and Significant Market Opportunity	<ul style="list-style-type: none">No approved therapies address genetic root cause of disease15,000-20,000 patients (U.S., EU+U.K.); 1 of 10,000 female births worldwide¹
Longitudinal Rett Syndrome Natural History Data	<ul style="list-style-type: none">Established patients ≥6 years of age are in developmental plateau, with a ~0% likelihood of gaining or regaining a developmental milestone²
Written FDA Alignment on Key Elements of Pivotal Trial Design ³	<ul style="list-style-type: none">Single-arm, open-label trial with patients serving as their own control (intend N=15)Broad enrollment focused on females ≥6 years of age who have reached developmental plateauPrimary endpoint: developmental milestone gain or regain<ul style="list-style-type: none">During advanced discussions with FDA, aligned on responder definition: gain/regain of ≥ one defined developmental milestone
TSHA-102 Part A Clinical Data ⁴	<ul style="list-style-type: none">100% of pediatric, adolescent and adult patients gained/regained ≥ one developmental milestone as assessed by multiple independent central raters through video evidenceDose-dependent response seen across key measures six months post-treatment, with the separation between dose cohorts increasing over timeNo treatment-related SAEs or DLTs following low and high dose of TSHA-102

Next Steps:

Expect to submit pivotal trial protocol and SAP as an amendment to the IND application in Q2 2025
Pivotal trial initiation activities expected in Q3 2025

Rett Syndrome Overview and Natural History Data Analysis



International
Rett Syndrome
Foundation
www.rettsyndrome.org

Natural History Data accessed from the International Rett Syndrome Foundation (IRSF). We thank IRSF and the governance committee for their partnership.

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There are no approved disease-modifying treatments that address the genetic root cause of Rett syndrome

High Unmet Medical Need



Current standard of care focused on symptom management¹



Patients typically require 24/7 care and lifelong assistance²



High caregiver burden with significant impact on quality of life and activities of daily living²

Significant Market Opportunity

- Estimated **15,000 and 20,000 patients in major global markets (U.S., EU+U.K.)**³
- **1 of every 10,000 female births worldwide**³
- Commercial launch and uptake of DAYBUE highlights market demand⁴

Rett syndrome caregiver research indicates improved function or achievement of developmental milestones would significantly improve quality of life



Communication

Gained or improved communication of basic needs—through eye gaze, gestures, or words—would enable self-advocacy and strengthen social connections

- Ex: follow a command without a gesture, pointed for something they wanted, use word(s) with meaning, identify body parts (pointed with eyes or fingers)



Fine Motor Function

Gained or improved hand function would restore a sense of control and purpose, and enable play and social engagement

- Ex: finger feed, use fork or spoon to eat without assistance, reached for a toy, drank from a cup held without assistance



Gross Motor Function

Gained or improved gross motor function would foster independence and reduce the physical burden of caregiving

- Ex: walked independently or with support, stood while holding on, sat without support, climbed up stairs without help

“If she can actually tell me what she wants, or make a choice between two things, even if it’s just looking at something purposefully...because now I don’t know what’s going on.”
– Caregiver of 20-year-old

“Feeding herself, entertaining herself...being able to flip pages or purposefully hold a book, change the channel on a remote...would be a game changer for us.”
– Caregiver of 8-year-old

“If we got a safe and secure sitting position from her, that would be a win. We would be able to have her sitting and not have to be right next to her. We could have her at the dining table with us.”
– Caregiver of 5-year-old

Longitudinal natural history data informed key elements of TSHA-102 pivotal trial design

Natural History Study (NHS) Dataset¹

- N = ~1100 females with confirmed Rett syndrome diagnosis; up to 14 years follow-up
- Captures longitudinal data on the functional gain, loss and regain of **developmental milestones** across core domains of Rett syndrome:



Communication

Ex: Pointed for something they wanted | Used word(s) with meaning



Fine Motor Function

Ex: Finger feed | Drank from a cup held without assistance



Gross Motor Function

Ex: Sat without support | Walked with support

- These functional skills and activities of daily living are highly important to caregivers

Developed Age- and Time-Based Models of Developmental Milestone NHS Data¹

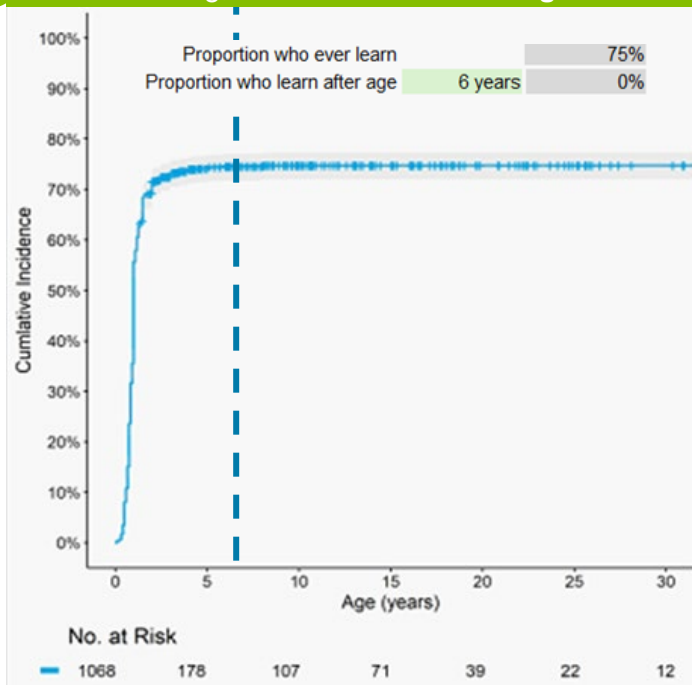
- Cumulative incidence models demonstrated **distinct age- and time-based trends in developmental milestone acquisition** that:
 - ✓ Strengthened understanding of longitudinal disease progression in Rett syndrome
 - ✓ Contextualized and substantiated disease-modifying potential of TSHA-102
 - ✓ Informed our discussions with the U.S. FDA on proposed pivotal trial design for TSHA-102

NHS cumulative incidence models showed that the likelihood of gaining/regaining 28 defined developmental milestones is **predictable in the age ≥ 6 population**¹



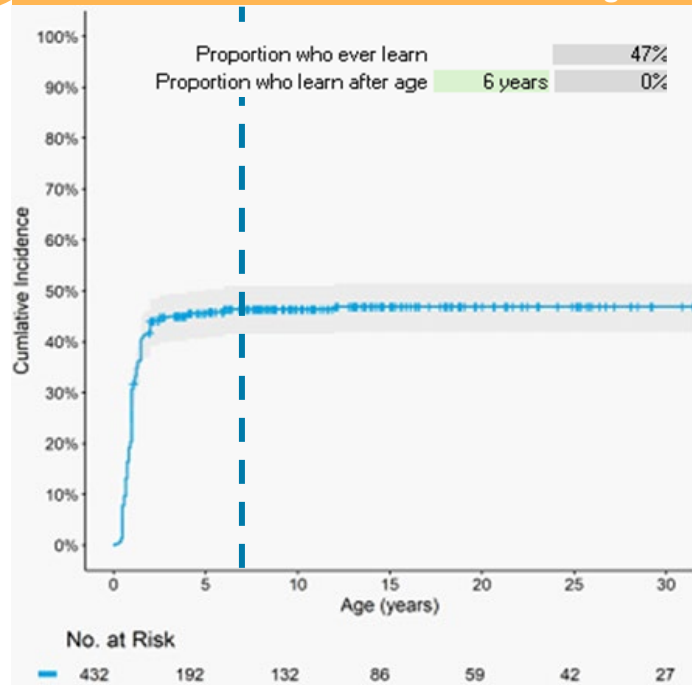
Communication Milestones

Ex: of patients who learn to use word(s) with meaning, ~0% ever learn after age 6



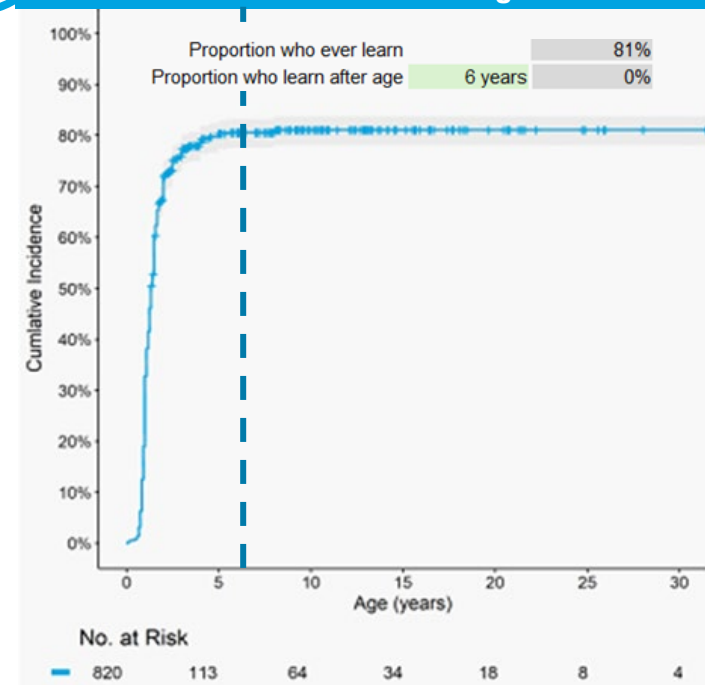
Fine Motor Milestones

Ex: of patients who learn to drink from a cup held without assistance, ~0% ever learn after age 6



Gross Motor Milestones

Ex: of patients who learn to walk with support, ~0% ever learn after age 6



We leveraged these findings to establish the “**Developmental Plateau Population**”

¹Accessed from International Rett Syndrome Foundation (IRSF). ClinicalTrials.gov: [NCT02738281](https://clinicaltrials.gov/ct2/show/study/NCT02738281); a prospective cohort of individuals with a pathologic mutation in the MECP2 gene, commonly associated with RTT. Incidence models of NHS data conducted by third-party statistical partners.

Identified 28 developmental milestones from the NHS dataset that would reflect:

meaningful functional gains to caregivers, with a ~0% likelihood of being achieved after ≥ 6 years if untreated¹



Communication

- Pointed for something they wanted
- Waved “Bye-Bye”
- Followed a command with a gesture
- Identified body parts (pointed with eyes or fingers)
- Followed a command without a gesture
- Used word(s) with meaning
- Spoke in phrases (2 words or more) with meaning



Fine Motor

- Reached for toy
- Holds bottle unpropped
- Used raking grasp to retrieve an object
- Used pincer grasp (refined or modified)
- Transferred an object from one hand to another
- Finger fed
- Drank from a cup held without assistance
- Used a fork or spoon to eat with assistance
- Used a fork or spoon to eat without assistance

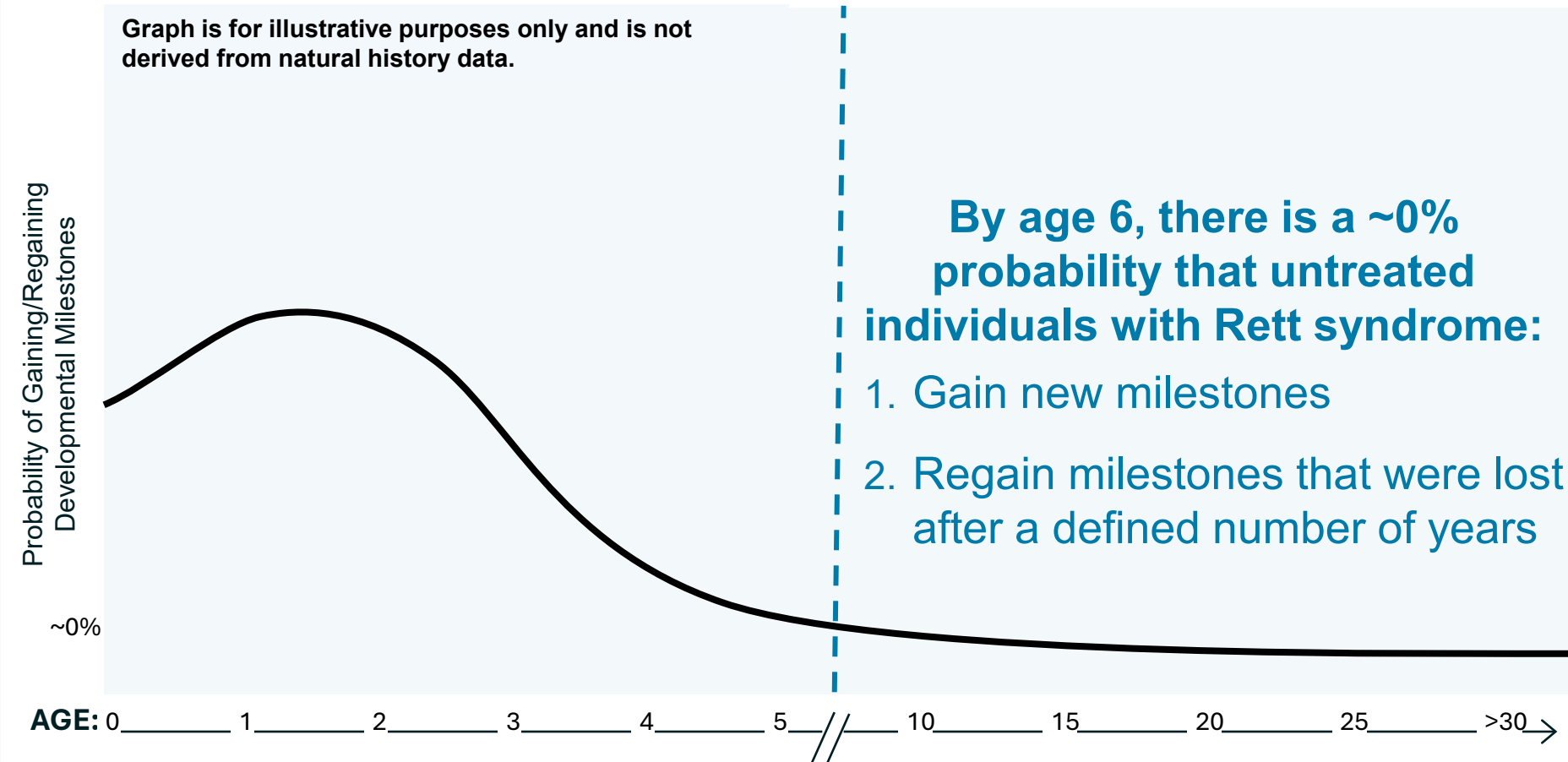


Gross Motor

- Come to sitting
- Sat without support
- Stood while holding on
- Pulled to standing
- Stood independently
- Walked with support
- Walked independently
- Climbed up stairs with help
- Climbed down stairs with help
- Climbed up stairs without help
- Climbed down stairs without help
- Ran 10 feet without falling

Rett syndrome NHS data analysis demonstrated that after 6 years of age, there is ~0% likelihood of gaining or regaining developmental milestones¹

Graph is for illustrative purposes only and is not derived from natural history data.



By age 6, there is a ~0% probability that untreated individuals with Rett syndrome:

1. Gain new milestones
2. Regain milestones that were lost after a defined number of years

The gain of new skills or restoration of previously lost skills presents an **objective, data-driven way** to assess the efficacy of TSHA-102 in a broad Rett syndrome population

Pre-Developmental Plateau Population (age 0-6 years):
demonstrate ongoing development

Developmental Plateau Population (age ≥6 years):
gain or regain of developmental milestones is unexpected

Pivotal Part B Trial Design for TSHA-102: data-driven assessment of functional gains in a broad Rett syndrome population

Obtained written alignment from the FDA on key elements of pivotal Part B REVEAL trial design

NHS models provide **data-driven, objective approach** to assessing functional gains in a single arm trial

Study Overview

- **Study Design:** Single-arm, open-label trial, using patient as own control
- **Dose:** Intend 1×10^{15} total vg (high dose)
- **Sample Size:** Intend 15 females with Rett syndrome age ≥ 6 years (developmental plateau population)¹
- **Primary Endpoint:** Developmental milestone gain or regain
 - During advanced discussions with FDA, aligned on the definition of a responder: gain/regain of \geq one defined developmental milestone¹
 - Video-based determination of milestone gain/regain will be performed by independent, blinded central raters
- 12-month primary analysis; intend 6-month interim analysis¹
- Safety of TSHA-102 will be evaluated in females with Rett syndrome 2-6 years of age with efficacy extrapolated from developmental plateau population

Company Believes REVEAL Part A Data Continues to Support Advancement to Pivotal Trial



Responder rate = 100% (N = 10) across all patients treated with TSHA-102 post-treatment²

Next Steps

- In written correspondence, the FDA advised Company to submit pivotal trial protocol and SAP as an amendment to the IND application; expected in Q2 2025

Primary endpoint: milestone gain is an objective, clinically meaningful and inherently individualized assessment of function in the developmental plateau population

~0% probability of milestone gain/regain after age 6 in the untreated population¹

Supported by cumulative incidence models from longitudinal NHS developmental milestone data

Fine motor, gross motor, and communication developmental milestones captured as binary (yes/no) measures





















Gain or regain of \geq one of 28 defined developmental milestones post-TSHA-102

- ✓ Represent meaningful functional improvement based on caregiver research²
- ✓ Directly reflects activities of daily living
- ✓ Inherently individualized to show improvements in a heterogeneous disease
- ✓ FDA-endorsed primary endpoint

TSHA-102 Clinical Data from Part A of REVEAL Phase 1/2 Trials

100% of patients (n=10) gained/regained ≥ one defined developmental milestone post-TSHA-102

with a ~0% likelihood of being achieved without treatment based on NHS data¹

	Cohort 1: Low Dose 5.7x10 ¹⁴ total vg				Cohort 2: High Dose 1x10 ¹⁵ total vg					
	 LD:P1	 LD:P2	 LD:P3	 LD:P4	 HD:P1	 HD:P2	 HD:P3	 HD:P4	 HD:P5	 HD:P6
AGE AT DOSING (years):	20	21	6	7	15	21	16	8	6	7
POST-TREATMENT FOLLOW UP:	18 mos.	18 mos.	12 mos.	12 mos.	9 mos.	9 mos.	6 mos.	6 mos.	6 mos.	3 mos.
	Developmental Milestone Gained Post-TSHA-102				Developmental Milestone Gained Post-TSHA-102					
										

Developmental milestone gains and regains were assessed by multiple independent central raters, who evaluated functional skills through video evidence at baseline and post-treatment, applying predefined binary criteria.

Patients gained/regained developmental milestones across the core functional domains of Rett syndrome post-TSHA-102

22 developmental milestones were achieved across 10 patients treated with TSHA-102



Communication

- ✓ Spoke in phrases (2 words or more) with meaning
- ✓ Used word(s) with meaning
- ✓ Followed a command without a gesture
- ✓ Followed a command with a gesture
- ✓ Pointed for something they wanted
- ✓ Identified body parts

Enable **expression of needs**, preferences, emotions, and foster **social connections**



Fine Motor

- ✓ Holds bottle unpropped
- ✓ Finger fed
- ✓ Reached for a toy
- ✓ Transferred an object from one hand to another

Reflect self-care skills and purposeful hand use that **enable independence**



Gross Motor

- ✓ Walked with support
- ✓ Stood while holding on
- ✓ Pulled to standing
- ✓ Sat without support

Enhance mobility and independence, and **reduce the physical burden of caregiving**

REVEAL caregiver testimonials post-TSHA-102 highlight the impact of functional **developmental milestone gains** on quality of life

“All of our days are better. Her improvements are much beyond anything we had expected or hoped for.”

“She’s **gained multiple words** – ‘no,’ ‘yeah,’ ‘mom,’ ‘dad’ – makes consistent sounds with meaning – and even **says some phrases** – ‘ok, bye’ and ‘no more.’”

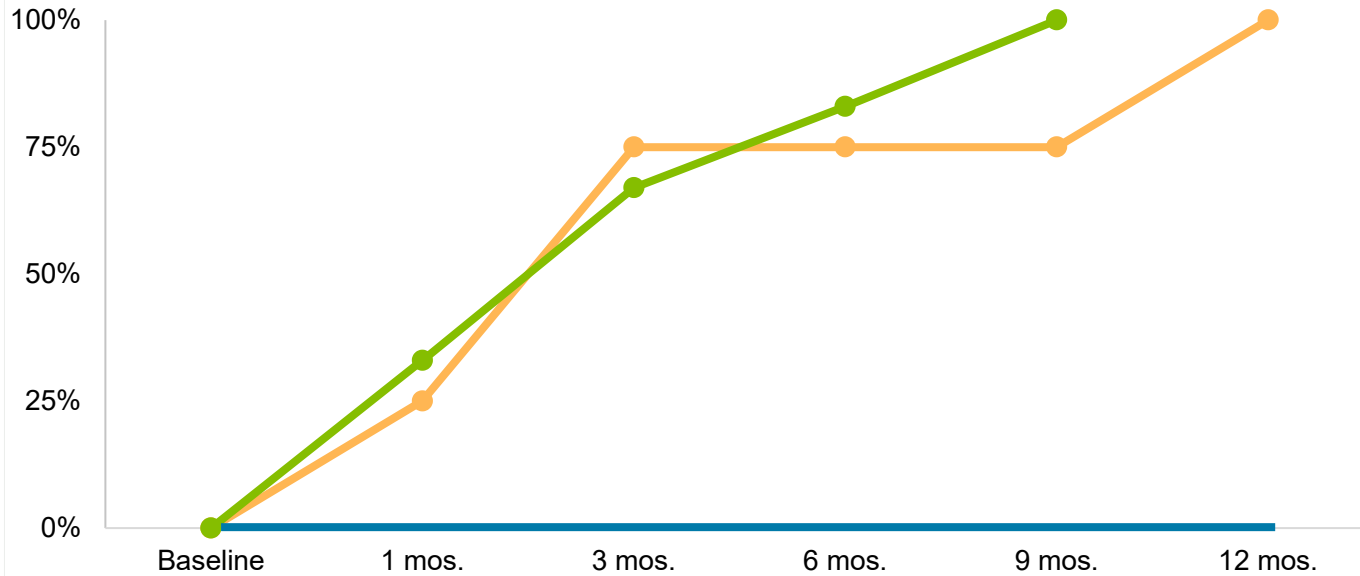
“She’s a lot easier to care for. She can **point a lot more deliberately to make choices and show us what she wants**, and she will keep gesturing until we get it for her. And she pushes away what she doesn’t want.”

“**[Standing while holding on]** has been a godsend when it comes to toileting while out in the community because now, I can have her stand and hang on to my arm to toilet or wipe her... and the consistency of keeping her hand down [without constant stereotypes] allows us to practice more with a walker, which has been huge.”

“Her hands are more relaxed, and she tries to grab everything with a **raking grasp**. She can **follow directions** in a snap, like if we say, ‘let’s go,’ she gets up, heads to the door. She’s babbling now, which she didn’t do before, and is definitely trying to tell us something.”

High dose TSHA-102 achieved 100% responder result at a 25% faster rate compared to low dose TSHA-102

Responder Rate: Time to Response



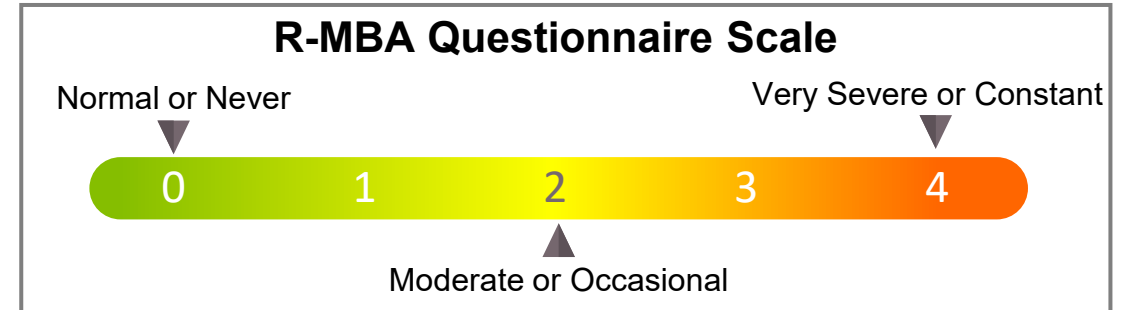
Low Dose TSHA-102	25%	75%	75%	75%	100%
High Dose TSHA-102	33%	67%	83%	100%	

- **Accelerated functional benefit seen with high dose TSHA-102**
- Early clinical response may increase the likelihood of reversing the disease trajectory and may be predictive of long-term clinical outcomes in Rett syndrome
- Consistent pattern of early gains that are sustained, with new achievements continuing to emerge over time following TSHA-102

Natural History (Developmental Plateau Population)¹ = ~0%

Overview of Revised Motor Behavior Assessment (R-MBA)

- Clinician-reported assessment that measures the onset of disease regression, growth, motor and communication skills, and disease behaviors for individuals with Rett syndrome¹
- **Associated with developmental milestone acquisition and function impacting quality of life**
- Measures the severity or frequency of a diverse set of symptoms to capture phenotypic variability
- Assessed in Rett syndrome natural history study²



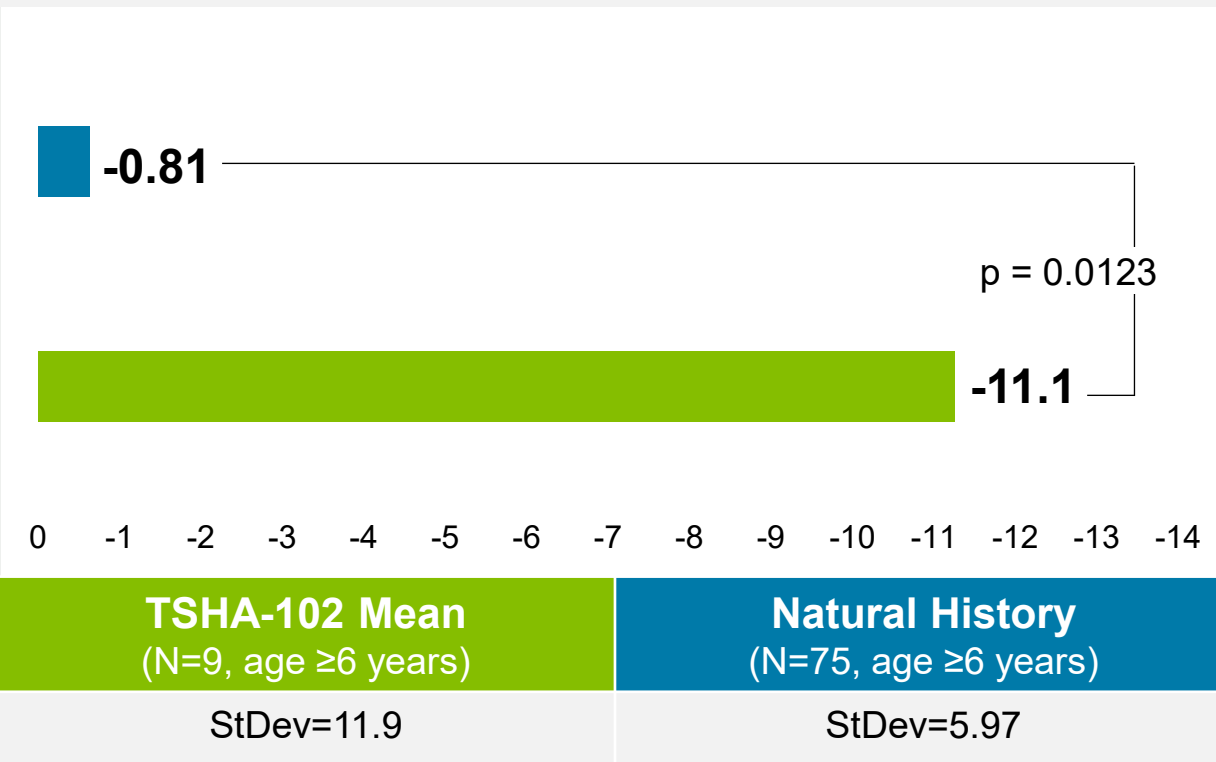
24-item questionnaire across five domains:

1. Motor Dysfunction
2. Functional Skills
3. Social Skills
4. Aberrant Behavior
5. Respiratory Behavior

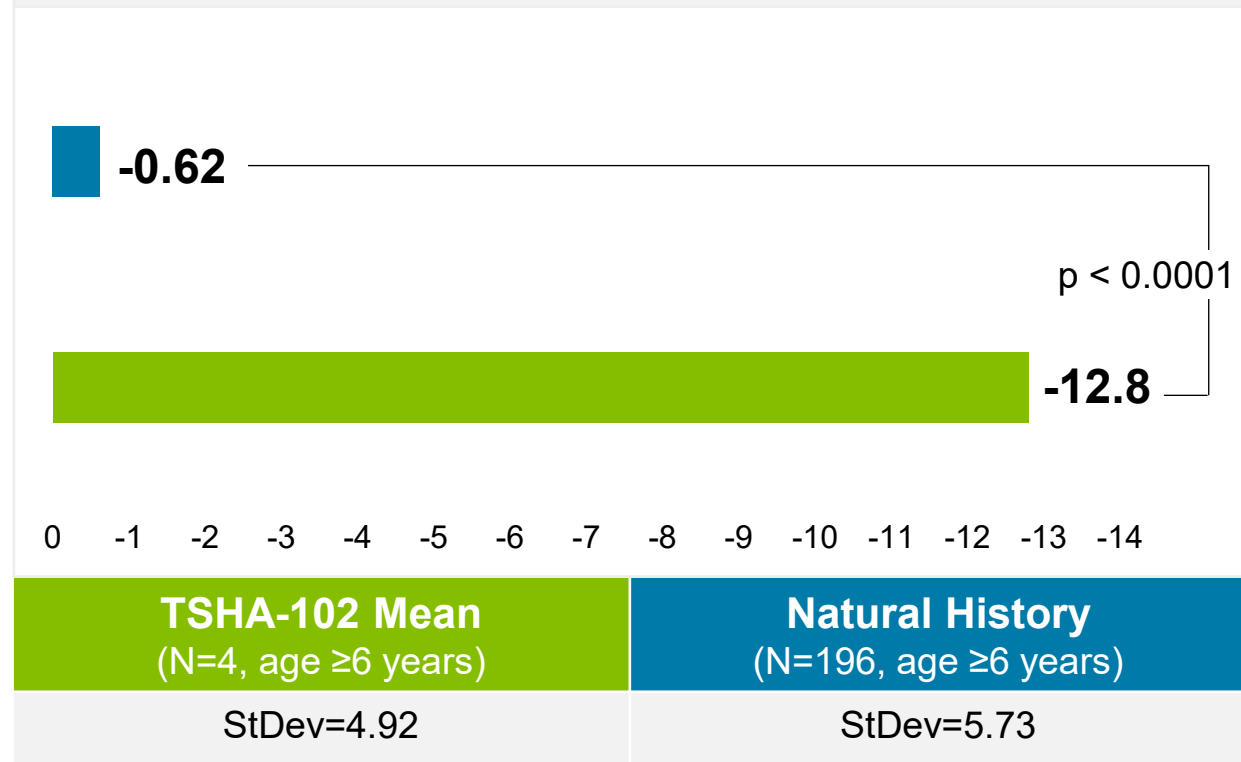
TSHA-102 demonstrated a statistically significant mean R-MBA score improvement compared to natural history at both 6 and 12 months

Lower score = improvement; R-MBA assessed in Rett syndrome NHS at ~6 months and ~12 months¹

R-MBA Score Mean Change From Baseline: 6 Months



R-MBA Score Mean Change From Baseline: 12 Months



Overview of Clinical Global Impression-Improvement (CGI-I) rating with Rett syndrome-specific anchors¹

CGI-I: Clinician-rated scale assessing improvement from baseline

- Designed as a global clinical assessment
- Factors considered to determine change included duration, onset, durability of change and the context of sign/symptom change across the Rett syndrome specific domains of the CGI

Score	CGI-I
1	Very much improved
2	Much improved
3	Minimally improved
4	No change
5	Minimally worse
6	Much worse
7	Very much worse

TSHA-102 demonstrated early global improvement, with dose-dependent effects deepening over time in CGI-I

Average CGI-I score of **1.0** (*very much improved*) in high dose cohort vs. average CGI-I score of **2.8** in low dose cohort at ≥ 9 months post-TSHA-102

Low Dose: Average CGI-I Score	3.0 (N=4)	2.3 (N=4)	3.0 (N=2)	3.3 (N=4)	2.0 (N=2)
	2.7 (N=6)	2.0 (N=5)	1.0 (N=2)		
Time Post TSHA-102:	3 months	6 months	9 months	12 months	18 months

Consistent dose response observed across key measures at 6 months post-TSHA-102, with the separation between dose cohorts increasing over time

Endpoint		Low Dose Cohort	High Dose Cohort	Dose-Dependent Response?
Developmental Milestones	Responder Rate (%)	100% by 12 months	100% by 9 months	✓
	Responder Rate at 6 Months (%)	75%	83%	
R-MBA ¹	Patients with R-MBA Improvement (%) at latest visit	100%	100%	✓
	Mean Score Improvement at 6 Months	-9.8	-12.2	
	Mean Score Improvement at ≥9 Months	-11.5	-18.0	
CGI-I	Patients with CGI-I Improvement (%) at latest visit	75%	100%	✓
	Mean CGI-I Score at 6 Months	2.3	2.0	
	Mean CGI-I Score at ≥9 Months	2.8	1.0	
CGI-S	Patients with CGI-S Improvement (%) at latest visit	25%	33%	✓

TSHA-102 was generally well tolerated at the low and high dose with no treatment-related SAEs or DLTs

Number of Events Across 12 Pediatric, Adolescent and Adult Patients Dosed in Part A of REVEAL Phase 1/2 Trials

	Low Dose 5.7x10 ¹⁴ vg (N=4)		High Dose 1x10 ¹⁵ vg (N=8)		Total (N=12)	
	N	E	N	E	N	E
TEAE Related to TSHA-102:	4	[10]	5	[14]	9	[24]
Serious TEAE Unrelated to TSHA-102:	2	[7]	4	[6]	6	[13]
Serious TEAE Related to TSHA-102:	0	0	0	0	0	0

- All TEAEs related to TSHA-102 were mild-moderate in severity, with the most common being elevated liver enzymes* (N=4, 33%), pyrexia (N=3, 25%), lethargy (N=2, 17%), and elevated levels of NfL in CSF (clinically insignificant) (N=2, 17%)
- Expected transaminase elevations observed
 - Majority experience mild elevations <2x ULN
 - Acute excursions (>5x ULN) less common, clinically asymptomatic and steroid treatment-responsive
- Seizures have generally been well controlled following TSHA-102

*Includes the following: hepatic enzyme increased, hypertransaminasemia, transaminases increased-and liver function test increased

Thank you

May 2025



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