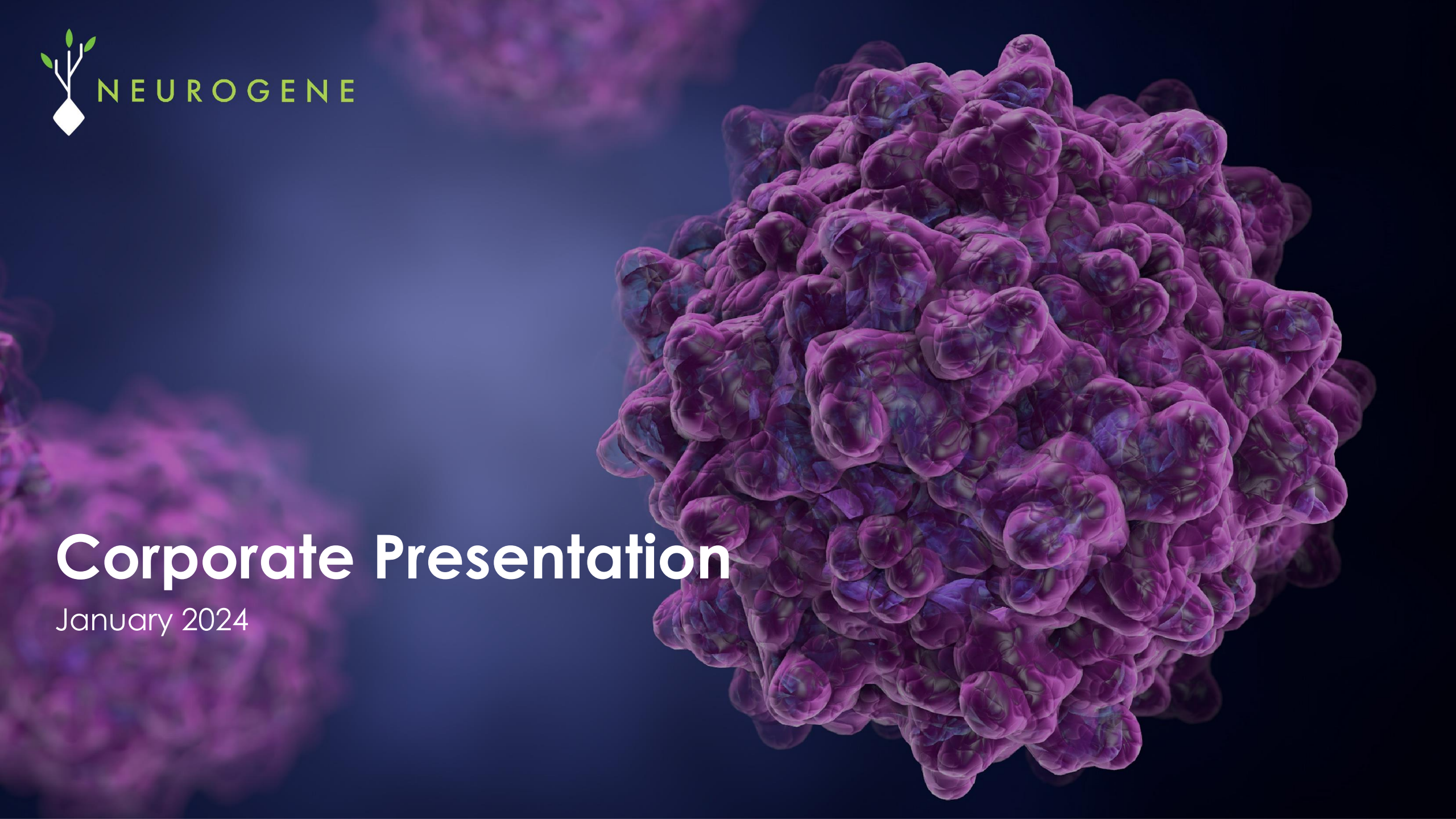
NEUROGENE



Corporate Presentation

January 2024

Disclaimer

Forward Looking Statements

This communication contains forward-looking statements (including within the meaning of Section 21E of the Securities Exchange Act of 1934, as amended, and Section 27A of the Securities Act of 1933, as amended. These statements may discuss goals, intentions and expectations as to future plans, trends, events, results of operations or financial condition, or otherwise, based on current expectations and beliefs of the management of Neurogene, as well as assumptions made by, and information currently available to, management of Neurogene. Forward-looking statements generally include statements that are predictive in nature and depend upon or refer to future events or conditions, and include words such as "may," "will," "should," "would," "expect," "anticipate," "plan," "likely," "believe," "estimate," "project," "intend," and other similar expressions or the negative or plural of these words, or other similar expressions that are predictions or indicate future events or prospects, although not all forward-looking statements contain these words. Statements that are not historical facts are forward-looking statements. Forward-looking statements in this communication include, but are not limited to, statements regarding the expected expansion and enrollment of, and timing of data from, Neurogene's Phase 1/2 clinical trials; statements regarding the potential of, and expectations regarding, Neurogene's programs, including its EXACT technology, NGN-101, NGN-401 and its research stage opportunities; statements regarding market opportunities for Neurogene's product candidates; the expected dosing of additional patients in Neurogene's Phase 1/2 clinical trial of NGN-401; statements regarding the potential expansion of Neurogene's Phase 1/2 clinical trial in Rett syndrome into the United Kingdom and/or the expansion of Cohort 1 to include additional patients; statements regarding future interactions with U.S. or foreign regulatory authorities; and statements regarding Neurogene's cash runway. Forward-looking statements are based on current beliefs and assumptions that are subject to risks and uncertainties and are not guarantees of future performance. Actual results could differ materially from those contained in any forward-looking statement as a result of various factors, including, without limitation: Neurogene's limited operating history; the significant net losses incurred since inception of Neurogene; the ability to raise additional capital to finance operations; the ability to advance product candidates through non-clinical and clinical development; the ability to obtain regulatory approval for, and ultimately commercialize, Neurogene's product candidates; the outcome of non-clinical testing and early clinical trials for Neurogene's product candidates, including the ability of those trials to satisfy relevant governmental or regulatory requirements; Neurogene's limited experience in designing clinical trials and lack of experience in conducting clinical trials; the ability to identify and pivot to other programs, product candidates, or indications that may be more profitable or successful than Neurogene's current product candidates; expectations regarding the market and potential for Neurogene's current product candidates; the substantial competition Neurogene faces in discovering, developing, or commercializing products; expectations regarding the potential tolerability, safety or efficacy for Neurogene's current product candidates; the ability to attract, hire, and retain skilled executive officers and employees; the ability of Neurogene to protect its intellectual property and proprietary technologies; reliance on third parties, contract manufacturers, and contract research organizations; the ability to attract, hire, and retain skilled executive officers and employees; the ability of Neurogene to protect its intellectual property and proprietary technologies; risks related to Neurogene's ability to correctly estimate its respective operating expenses, including its projected cash runway, and any unexpected costs, charges or expenses resulting from the merger with Neoleukin Therapeutics, Inc. 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Neurogene is a Differentiated Clinical-Stage Company Utilizing EXACT Technology to Treat Complex Neurological Diseases

- Novel EXACT technology designed to overcome key limitations of conventional gene therapy
- Pipeline addresses attractive market opportunities, including Rett syndrome
- Internal manufacturing provides financial and strategic pipeline flexibility
- 2H:26 cash runway enables operations beyond clinical inflection points

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Funding for Key Near Term Milestones Obtained in Reverse Merger and Concurrent Private Financing Completed in 2023

Merger and concurrent financing secures funding to position Neurogene to deliver on anticipated near term milestones:

Rett syndrome (NGN-401)

- Expand ongoing Phase 1/2 clinical trial in 1H:24 to enroll a larger cohort of patients
- Interim Phase 1/2 clinical data 4Q:24
- Additional Phase 1/2 clinical data from expansion and higher dose cohorts in 2H:25

CLN5 Batten disease (NGN-101)

- Interim Phase 1/2 clinical data in 2H:24
- Engage in FDA discussions regarding a streamlined registrational pathway in 2H:24

Early-stage discovery

- Advance one early-stage program into the clinic (2025)

Transaction Highlights

- **Merger closed on December 18, 2023**
- Post-merger company trades on Nasdaq as Neurogene Inc. with ticker **"NGNE"**
- Simultaneously closed on **~$95M concurrent private placement**
- 16,887,060 shares of common stock outstanding at closing*
- Cash balance of approximately **$200M at closing**
- Expected cash runway to fund operations into 2H:26

*After the closing of merger, private placement, and 1-for-4 reverse stock split. This number includes 4,063,364 Neurogene Pre-Funded Warrants.

Neurogene Clinical Stage Pipeline

Product Candidate	Indication	IND* Enabling	Phase I/2	Pivotal	Near-Term Expected Milestones
NGN-401	Rett Syndrome				Interim Data 4Q:24, Additional Data 2H:25
NGN-101	CLN5 Batten Disease				Interim Data 2H:24

*IND = investigational new drug.

Multiple discovery stage assets in development with plans to advance one program into the clinic in 2025

NEUROGENE

EXACT Developed to Solve the Limitations of Conventional Gene Therapy in Complex Neurological Disorders

Today's Gene Therapy is Limited By:	Neurogene's Solutions:
Variable Gene Expression	✓ **Novel, modular EXACT gene regulation technology and other regulatory elements** designed to optimize transgene expression to maximize the therapeutic window
Safety Limitations	✓ **Novel and proprietary EXACT gene regulation technology** designed to avoid transgene related toxicity associated with conventional gene therapy
Inefficient Gene Delivery	✓ Select **ICV delivery approach** to maximize **AAV9** distribution to target CNS tissues ✓ Design products to **maximize potency and purity** for potentially optimized efficacy/safety profile

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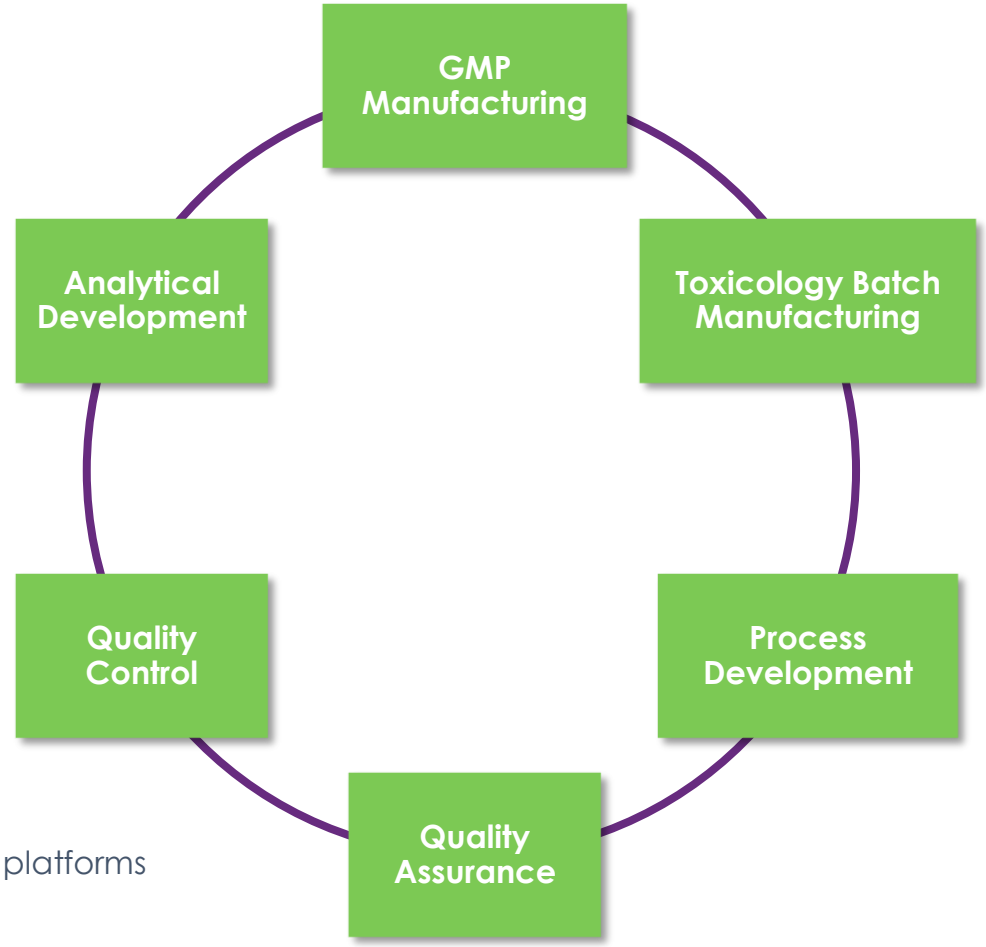
ICV = intracerebroventricular
AAV = Adeno-associated virus
CNS = central nervous system

Wholly-Owned and Fully Integrated In-House AAV Manufacturing



- Flexibility to manufacture AAV product at low cost
- Own product quality and development timelines
- Process development expertise supports both HEK293 and Sf9/rBV manufacturing platforms
- Flexibility to rapidly adapt CMC execution to program needs

Current research and clinical-grade manufacturing capabilities are designed for commercial-grade product to avoid potential future comparability challenges

Experienced Leadership Team Backed by Top Tier Investors

Leadership and Senior Management Team

Rachel McMinn, Ph.D.
Founder and CEO

Intercept · Bank of America Merrill Lynch

Christine Mikail, J.D.
President and CFO

axovant GENE THERAPIES · Lilly · Dendreon · NPS Pharma. · ImClone Systems Incorporated

Stuart Cobb, Ph.D.
CSO

THE UNIVERSITY of EDINBURGH

Ricardo Jimenez
SVP, Technical Operations

Lonza · INTROGEN Therapeutics, Inc. · Vivante GMP SOLUTIONS

Albena Patroneva, M.D.
SVP, Clinical Development

AstraZeneca · HARMONY BIOSCIENCES · teva · Wyeth · Takeda

Effie Albanis, M.D.
SVP, Early Clinical and Translationall Research

Intercept · PHARMASSET · Mount Sinai

Andrew Mulberg, M.D.
SVP, Regulatory Affairs

Amicus Therapeutics · FDA U.S. FOOD & DRUG ADMINISTRATION · Johnson & Johnson

Arvind Sreedharan
SVP, Business Operations

AUSPEX PHARMACEUTICALS · avexis · Lundbeck

Backed by a Syndicate of Thought-Leading Investors

ALEXANDRIA · ARROWMARK PARTNERS · AVIDITY PARTNERS · BlackRock · CASDIN CAPITAL · CORMORANT ASSET MANAGEMENT

EcoR1 CAPITAL · Great Point Partners · Janus Henderson INVESTORS · Redmile Group · SAMSARA BIOCAPITAL · Healthcare Investment Fund

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NGN-401 for Rett Syndrome

Leveraging EXACT gene regulation technology

Rett Syndrome – Devastating Disorder with High Unmet Need

Genetics

- X-Linked disorder causing mutations in the gene encoding for methyl-CpG binding protein 2 (MeCP2)
- One of the most common genetic causes of developmental and intellectual impairment in females
- Unknown incidence in boys, but typically lethal by ~3 years of age due to no healthy copy of MeCP2

Compelling Market Opportunity

- U.S. prevalence - ~6,000-9,000 patients
- WW Incidence - 1:10,000-1:15,000 live female births

High Unmet Need

- There are no approved treatments that address root cause of disease
- Significant unmet need remains for new treatment options

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U.S. prevalence estimate based on published incidence rates; Laurvick CL, et al. J Pediatr 2006;148(3):347–35.
WW incidence estimate based on published incidence rates; Pini G, et al. Orphanet Journal of Rare Diseases (2016) 11:132.

Rett Syndrome Treatment Requires Tight Gene Regulation

Rett Syndrome*

Too little
gene expression drives disease

- ~50% of cells express WT levels of MeCP2
- ~50% are MeCP2 **deficient**

Balanced treatment goal

MeCP2 Duplication Disorder**

Too much
gene expression drives disease

- ~100% cells express **2x** MeCP2 levels

- Rett syndrome (RTT) is a severe neurological disorder caused by mosaic mutations in X-linked MeCP2 gene
- Mice modeling RTT recapitulate many neurological phenotypes observed clinically; disease reversibility has been demonstrated in both immature and mature adult animals

NGN-401 is designed to deliver therapeutic levels of MeCP2 to deficient cells while maintaining a non-toxic level in unaffected cells

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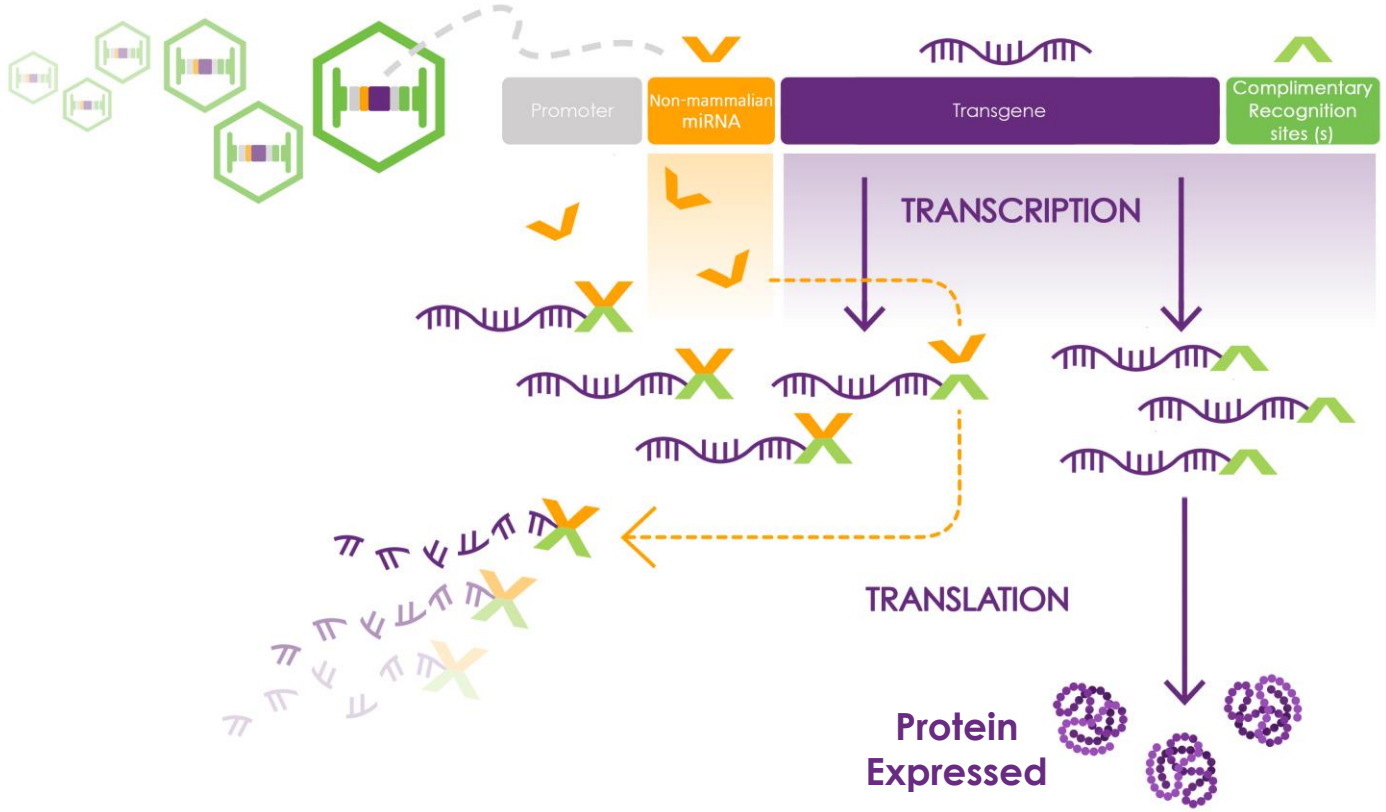
*Represents female Rett syndrome; **Represents male duplication disorder; WT = wildtype
Pini G, et al. Orphanet Journal of Rare Diseases (2016) 11:132.

EXACT Acts As a Genetic Thermostat, Limiting Transgene Expression

EXACT miRNA controls transgene levels to targeted range

Regulatory elements designed to avoid off-target effects

EXACT is expected to enable gene therapy for Rett syndrome and other complex disorders



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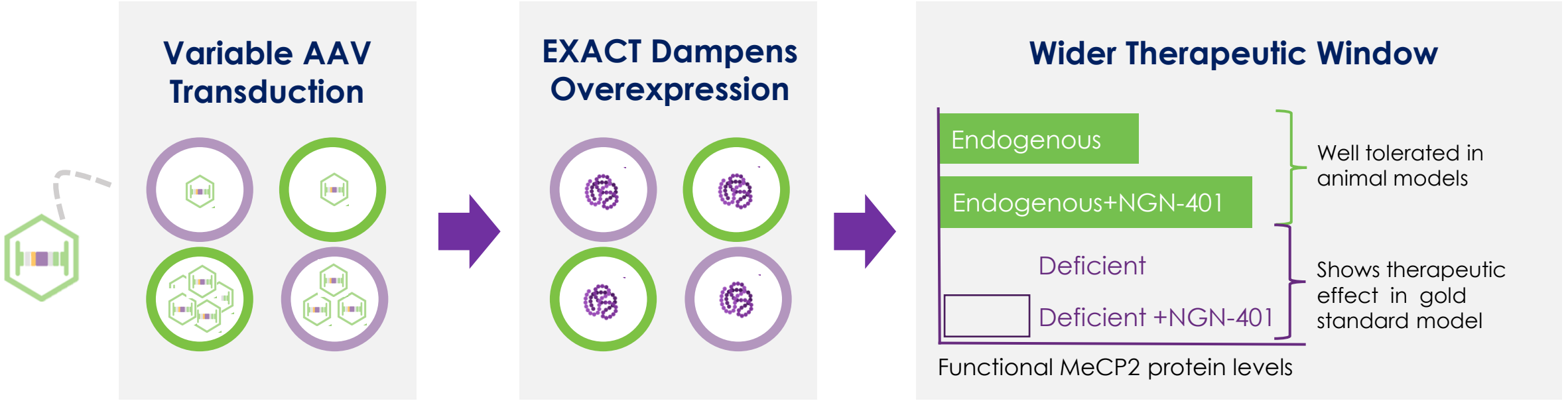
EXACT Designed to Widen Therapeutic Window and Enable Gene Therapy for Rett Syndrome



- ~50% of cells express WT levels of MeCP2
- ~50% are MeCP2 **deficient**

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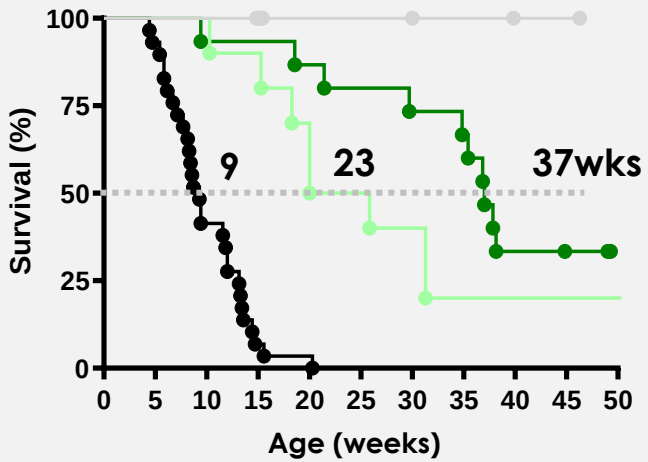
NGN-401 Demonstrates Efficacy and Safety in Mecp2 Mouse Models

ICV Delivery of NGN-401 Delivers Targeted MeCP2 Levels

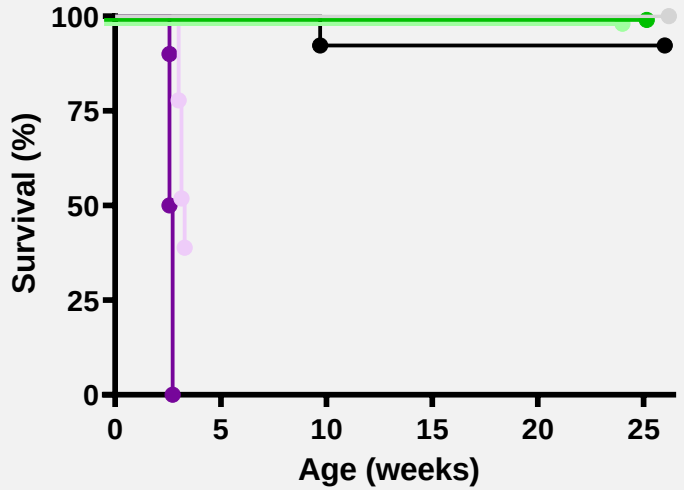
AAV9 capsid

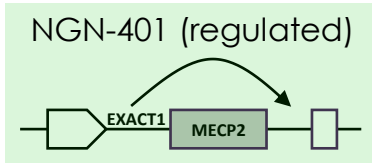
Promoter	EXACT miRNA	**Full length human MECP2**	EXACT recognition sites

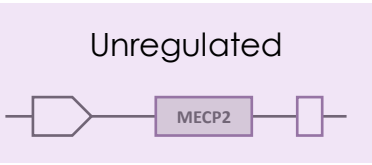
Survival in Male Knockout



Survival in Female Het







- NGN-401 1e11 vg
- NGN-401 3e11 vg
- Unregulated 1e11 vg
- Unregulated 3e11 vg
- WT + Vehicle
- Male or female + Vehicle

Het=heterozygous for Mecp2, mirroring genetic makeup of human females with Rett syndrome

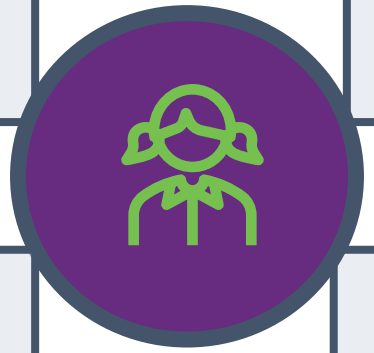
NGN-401 Preclinical Data Enabled Pediatric Clinical Approach

Promising efficacy, favorable safety profile

DEMONSTRATED CONTROLLED MeCP2 LEVELS

Delivery of full-length MeCP2

MAXIMIZES THERAPEUTIC POTENTIAL



Robust MeCP2 levels to key brain areas

PROVIDES TRANSLATIONAL FOUNDATION FOR HUMANS

No evidence of off-target or MeCP2 tox

GENERATED COMPREHENSIVE SAFETY PACKAGE

U.S. FDA and UK MHRA cleared dosing directly into pediatric patients

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Cardinal Clinical Features of Rett Syndrome

Inability to Communicate

- Loss of purposeful hand use & involuntary hand movements
- Loss of spoken language

Impaired Fine and Gross Motor Skills

- Loss of hand function
- Gait abnormalities
- Ambulation requiring assistance or non-ambulatory

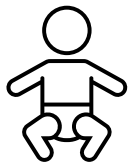
Autonomic Dysfunction

- Severe apnea episodes
- Hyperventilation
- Constipation
- Difficulty swallowing
- Sleep disturbance

Additional Disease Manifestations

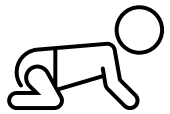
- Seizures
- Anxiety
- Scoliosis
- Muscle contractures

Normal



Birth

Developmental delay
Regression of gained skills
Hand stereotypies



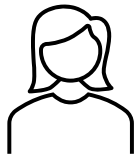
~1-4 yrs

"Relative" stability
Risk of scoliosis increases
Risk of seizures developing
Hand function loss

~4-10 yrs

GI tube placement common
Spinal fusion surgery common
Significant muscle rigidity/contractures
Increased mobility loss

Adolescents to adults



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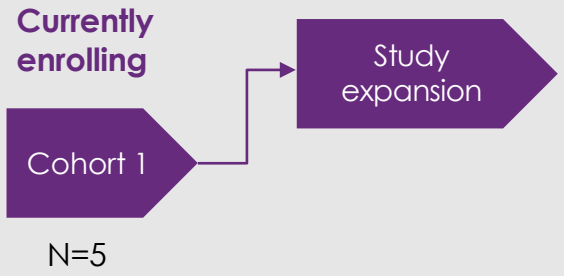
Pini G, et al. Orphanet Journal of Rare Diseases (2016) 11:132.

Clinical Study For NGN-401 Designed to Evaluate Pediatric Population



- **Starting dose of 1E15 vg (total) bracketed by two efficacious mouse doses, with > 4x safety margin from GLP tox study**
- **Preparing for dose escalation and cohort expansion to generate additional clinical data**
- **Key assessments at 3, 6, and 12 months, which include caregiver and clinician assessments – RSBQ, CGI-I and CGI-S**

Key Eligibility Criteria

- Female, age ≥4 to ≤10 years with Classic Rett syndrome
- Clinical diagnosis & genetic confirmation of pathogenic MeCP2 mutation
- Clinical Global Impression-Severity (CGI-S) score of 4-6

Efficacy Assessments of Interest

Autonomic Function	Objective device to monitor breathing
Hand Function	Physician assessment of improvement
Communication	Physician assessment of improvement
Gross Motor Function	Physician assessment of improvement

NEUROGENE GLP = Good Laboratory Practice

NGN-401 Study Inclusion Criteria is Driven by Severity of Rett Syndrome Domains Under CGI-S

Limited impairment | **Modest impairment** | **Eligible for Phase 1/2 clinical trial**

Clinical domains	CGI-S=1	CGI-S=2	CGI-S=3	CGI-S=4	CGI-S=5	CGI-S=6	CGI-S=7
Language/ Communication	Normal	May have unusual features (eg echolalia, reading disability)	Phrases-sentences. May have conversations or echolalia	<5 words Babbles Makes choices 25%-50%	No words Babbles Makes choices ≤25%	Vocalizations Occasionally screams Rarely or makes no choices	No words No vocalizations Screams No choices
Ambulation	No impairment	Normal, may have slight evidence of dystonia/ ataxia/ dyspraxia	Walks, able to use stairs/run May ride tricycle or climb	Walks independently Unable to use stairs or run	Walks with assistance	Stands with support or independently May walk with support Sits independently or with support	Cannot sit Doesn't stand or walk
Hand use	Normal, no impairment	Normal, may have slight fine motor issue	Bilateral pincer grasp. May use pen to write but has fine motor issues like tremor	Reaches for objects, raking grasp or unilateral pincer May use utensils/cup	Reaches No grasps	Rarely-occasionally reaches out No grasp	None
Social (eye contact)	Normal	Occasional eye gaze avoidance	Appropriate eye contact, >30s	Eye contact <20s	Eye contact <10s	Eye contact, inconsistent 5s	None
Autonomic	None	Minimal	No or minimal breathing abnormalities (<5%) warm, pink extremities	Breathing dysrhythmia <50% No cynanosis Cool UE, Pink LE	Breathing dysrhythmia 50% No cynanosis Cold UE, Pink LE	Breathing dysrhythmia 50-100% May have cynanosis Cool UE or LE, may be blue	Breathing dysrhythmia constantly with cynanosis Cold UE and LE, Mottled/blue
Seizures	None	None or controlled	None, with or without meds	Monthly-weekly	Weekly	Weekly-daily	Daily
Attentiveness	Normal	Occasional inattention	Attentive to conversation, follows commands	50-100%	50%	<50%	0%

NGN-401 Phase 1/2 Clinical Trial Status Update and Anticipated Near Term Milestones

Phase 1/2 Clinical Trial Status

- First patient dosed 3Q:23, second patient dosed 4Q:23
- DSMB meeting completed in January 2024 to enable third patient dosing in early 1Q:24
- No treatment-emergent, procedure-related or overexpression toxicity observed to date

2024 Anticipated Key Milestones

- Expand ongoing Phase 1/2 clinical trial in 1H:24 to enroll a larger cohort of patients
- Interim Phase 1/2 clinical data 4Q:24
- Additional Phase 1/2 clinical data from expansion and higher dose cohorts in 2H:25

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DSMB = Data safety monitoring board

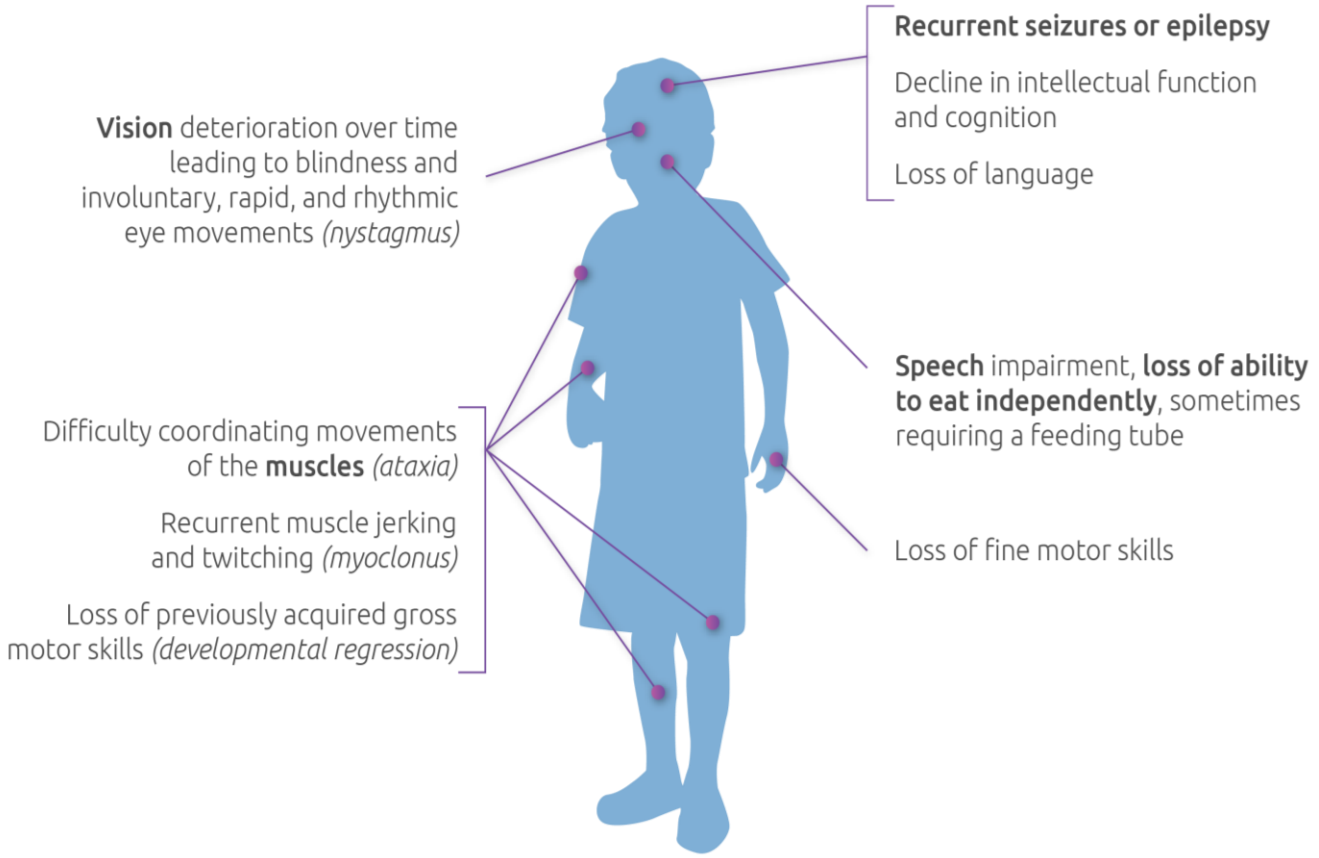
NGN-101 for CLN5 Batten Disease

Treating both CNS and vision through dual route of administration

CLN5 Batten Disease - Fatal, Neurodegenerative Disease With No Disease-Specific Treatment Options

CLN5 Batten disease has no available treatment options

Brineura, approved globally for a similar indication, CLN2, has transformed clinical outcomes in Batten disease

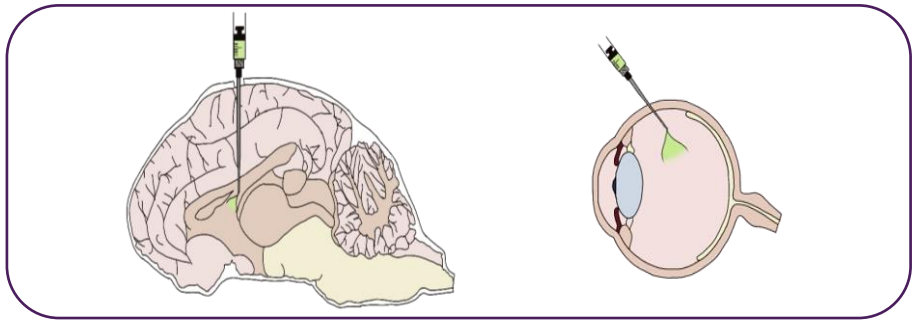


Simonati A et al, Phenotype and natural history of variant late infantile ceroid-lipofuscinosis 5. Dev Med Child Neurol. 2017 Aug;59(8):815-821.

NGN-101 Dual Delivery Supported by Compelling Preclinical Data

Dual route of administration

First clinical gene therapy study targeting both neurodegeneration and vision loss



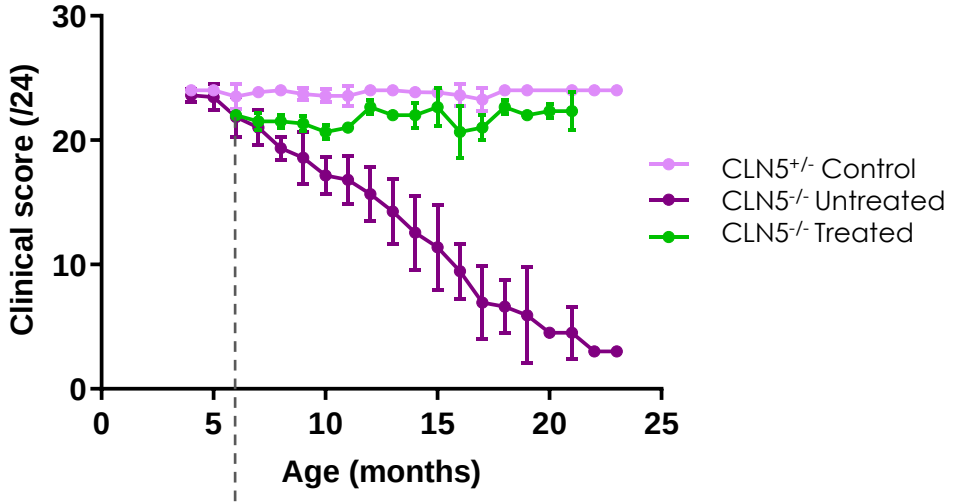
NGN-101 product design

AAV9 capsid

Promoter | **Full length Human CLN5**

NGN-101 dosing (ICV+IVT) in CLN5 knockout sheep

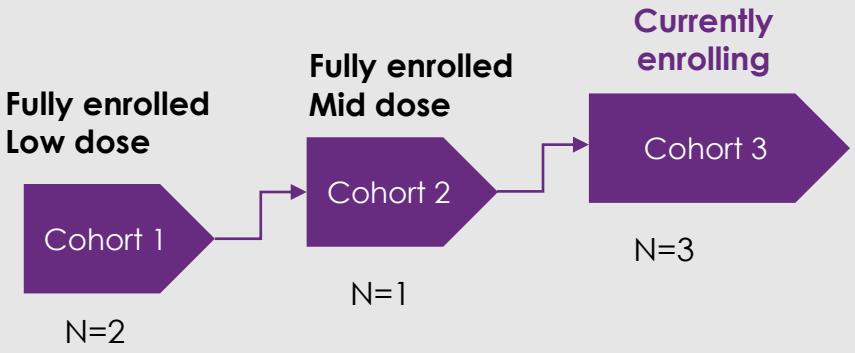
Combination dosing leads to halting of disease progression



NGN-101 dosing

NEUROGENE IVT = Intravitreal

Clinical Study Design For NGN-101 Addresses Vision and CNS



- **Dose selection based on sheep studies showing significant treatment effects**
- **Key assessments every 6 and 12 months**

Key Eligibility Criteria

- Age ≥3 to ≤9 years
- Genetic diagnosis of CLN5
- Onset of disease ≤5 years of age
- Score of ≥1 on the Hamburg motor domain at minimum, the equivalent of 20/200 visual acuity or better at the time of screening

Efficacy Endpoints/Markers of Interest

Optical Coherence Tomography (OCT)	Preservation of key retinal layers is a leading indicator of vision stability
Visual Acuity	Stability in treated eye vs. worsening in untreated eye could provide evidence of clinical benefit
Hamburg Motor Scale	Scale has been used previously to support BMRN's ERT Brineura® for CLN2 disease

NEUROGENE ERT = Enzyme replacement therapy

NGN-101 — Defining a Registration Path

FDA meeting focused on finalizing CMC plans completed 4Q:23

Potency Assay

FDA accepted proposed potency assay strategy, a first milestone in determining continuation of the program

Improved Manufacturing Process

FDA alignment on proposed comparability strategy for using Neurogene-made material with substantially improved profile to Phase 1/2 drug product

Plan to request FDA meeting in 2H:24 to align on clinical requirements for streamlined registration

- **Complete enrollment of high dose cohort in 2024**
- **Continue collection of clinical trial data on vision and motor for analysis**
- **Ongoing natural history data collection and analysis**

Alignment with FDA on streamlined registration pathway required to move program forward

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Key Milestone Events

Key Upcoming Anticipated Milestones and Pipeline Developments

Rett syndrome (NGN-401)

- Expand ongoing Phase 1/2 clinical trial in 1H:24 to enroll a larger cohort of patients
- Interim Phase 1/2 clinical data 4Q:24
- Additional Phase 1/2 clinical data from expansion and higher dose cohorts in 2H:25

CLN5 Batten disease (NGN-101)

- Interim Phase 1/2 clinical data in 2H:24
- Engage in FDA discussions regarding a streamlined registrational pathway in 2H:24

Early-stage discovery

- Advance one program into the clinic (2025)

Approximately $200 million cash on hand as of Dec 2023 expected to fund operations into 2H:26

NEUROGENE

Why Neurogene?

- **Unlocking multi-billion dollar neurological disease markets**
- **Proprietary capabilities and technology enable addressing complex diseases**
- **Strategy focused on efficiency and maximizing probability of success**
- **Leadership team with deep operational, technological and clinical experience**
- **Leading life sciences investor syndicate**
- **Strong balance sheet and fiscally disciplined approach**

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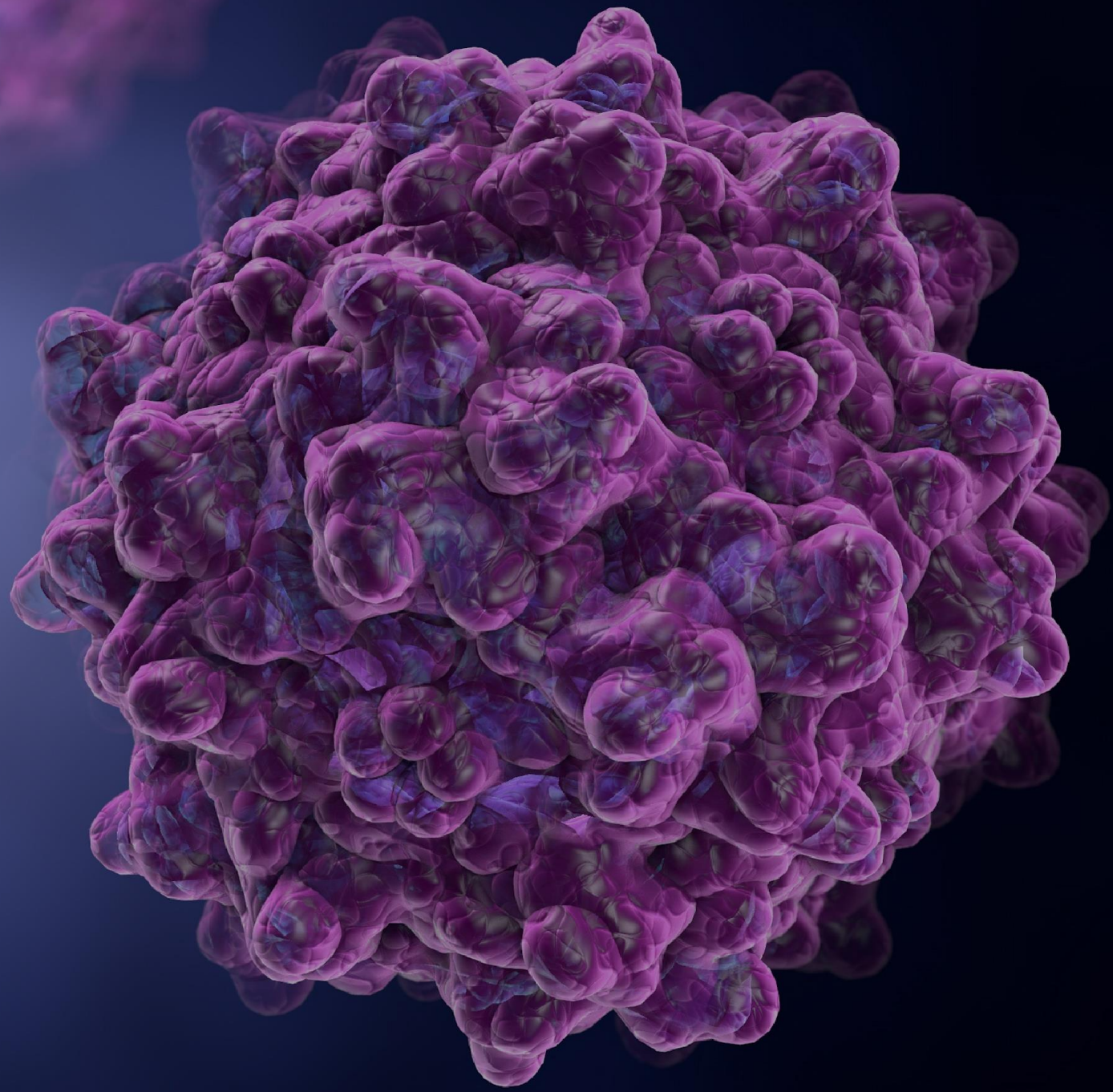
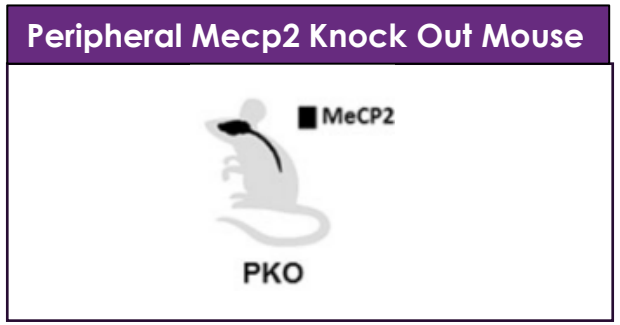
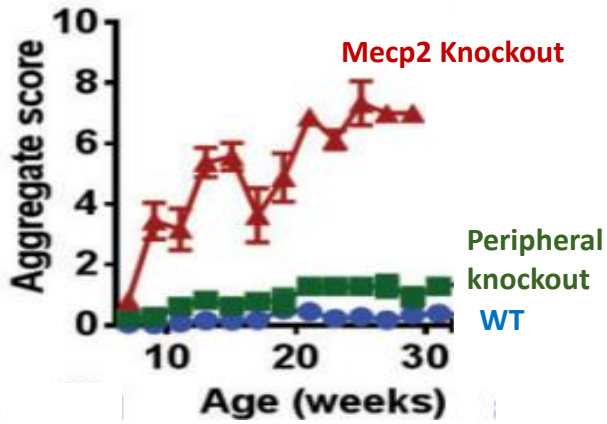
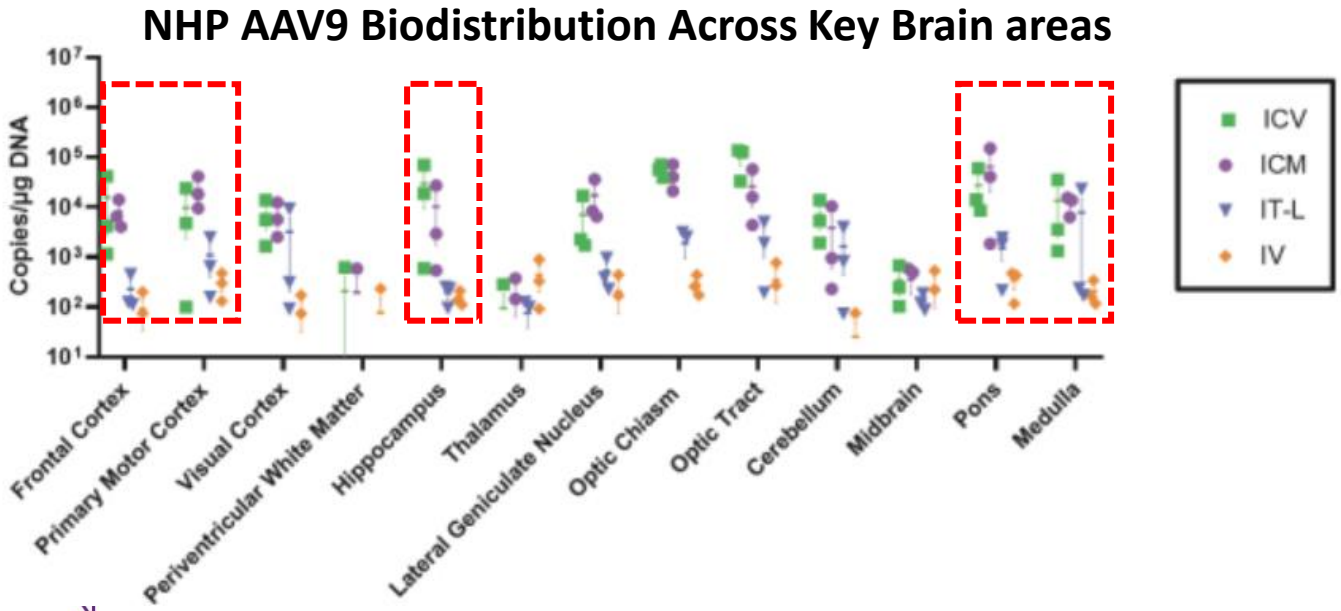
Appendix



Rett Syndrome Primarily Results from Loss of MECP2 Function in the Brain, Making the Brain the Key Target Area for Gene Therapy







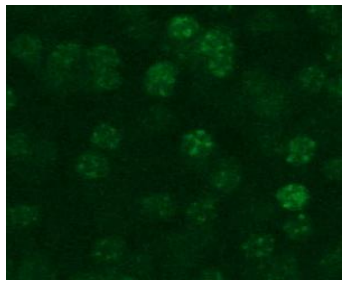
- Limiting expression of MeCP2 to only the brain/spinal cord results in a near normal mouse
- NHP biodistribution study shows 10-100x greater distribution for ICV/ICM compared to IT-L
- Delivery of NGN-401 via ICV chosen to maximize *MECP2* expression in the brain

Ross et al., 2016 Hum. Mol. Genetics. PMID: 28173151

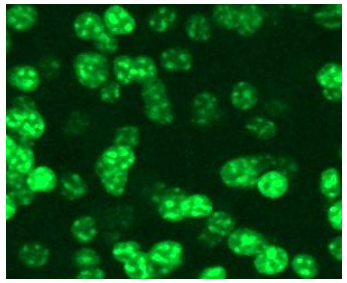
NHP data from ASGCT 2021 Annual meeting May 11-14

EXACT Delivers Consistent Levels of MECP2 Expression on Cell-by-Cell Basis

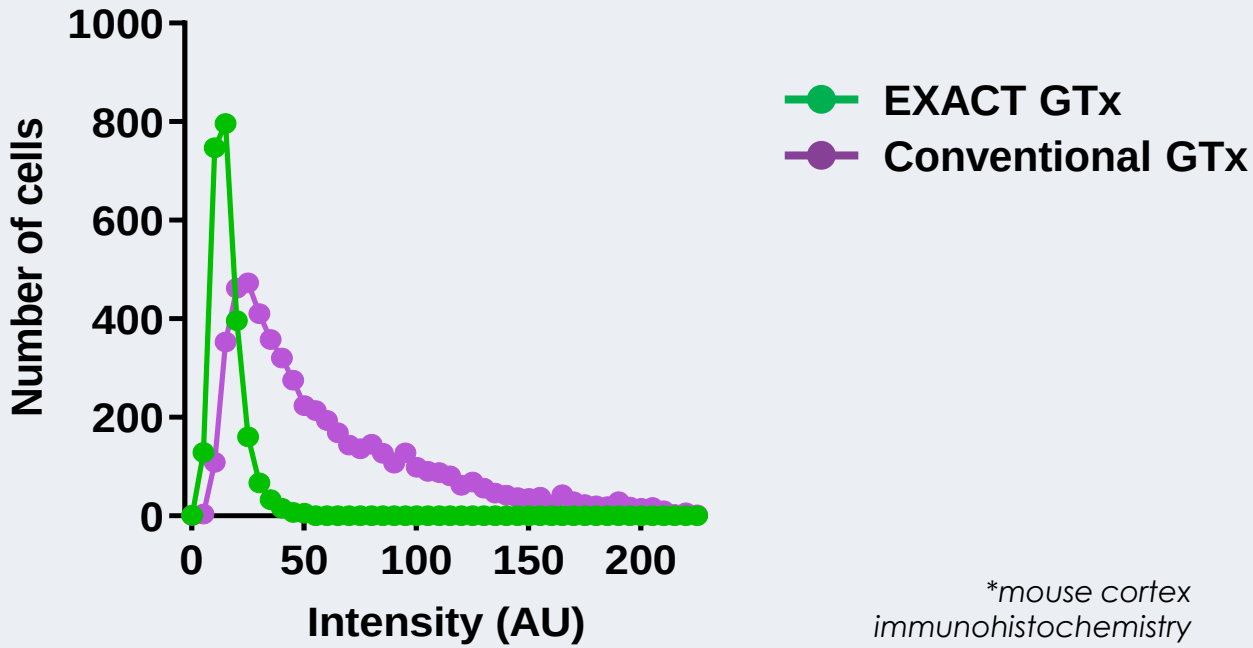
EXACT



Conventional



NGN-MECP2 Achieves Narrow Expression of MECP2*



mouse cortex immunohistochemistry

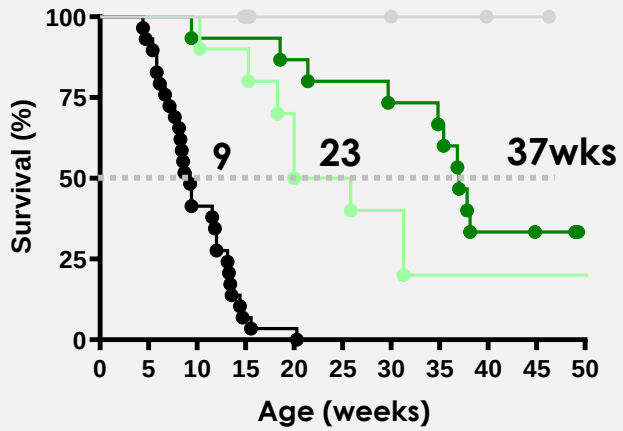
NGN-401 Demonstrates Tight MECP2 Regulation That Translates to Compelling Outcomes in a Knockout Mouse Model

ICV Delivery of NGN-401 Delivers Targeted MECP2 Levels

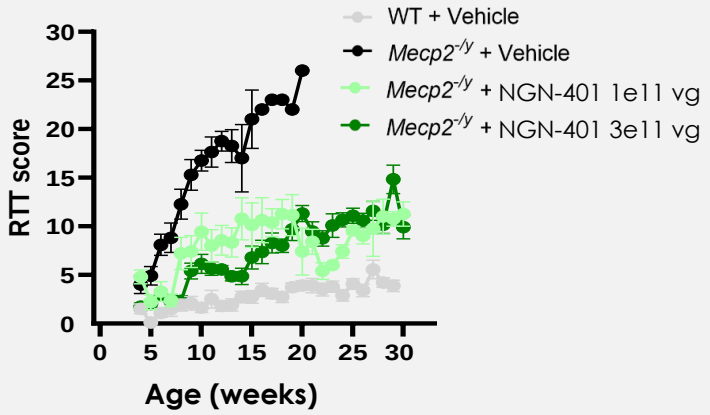
AAV9 capsid

Promoter	EXACT miRNA	**Full length human MECP2**	EXACT recognition sites

Survival



Clinical Score*



Key domains improved:

- **Motor**
- **Gait**
- **Breathing**

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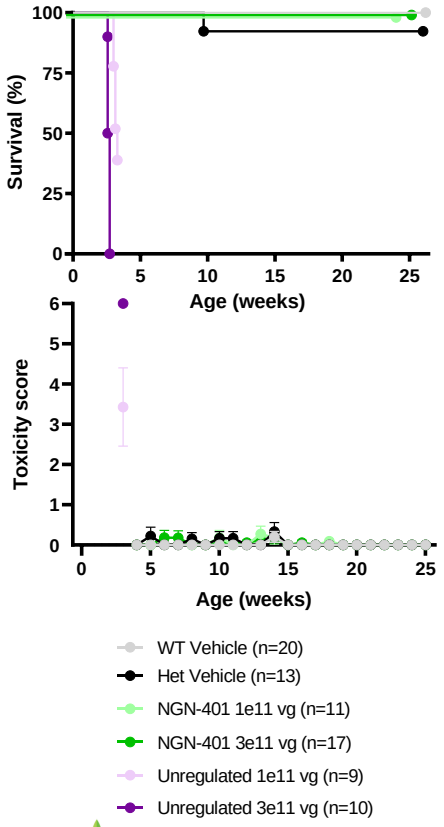
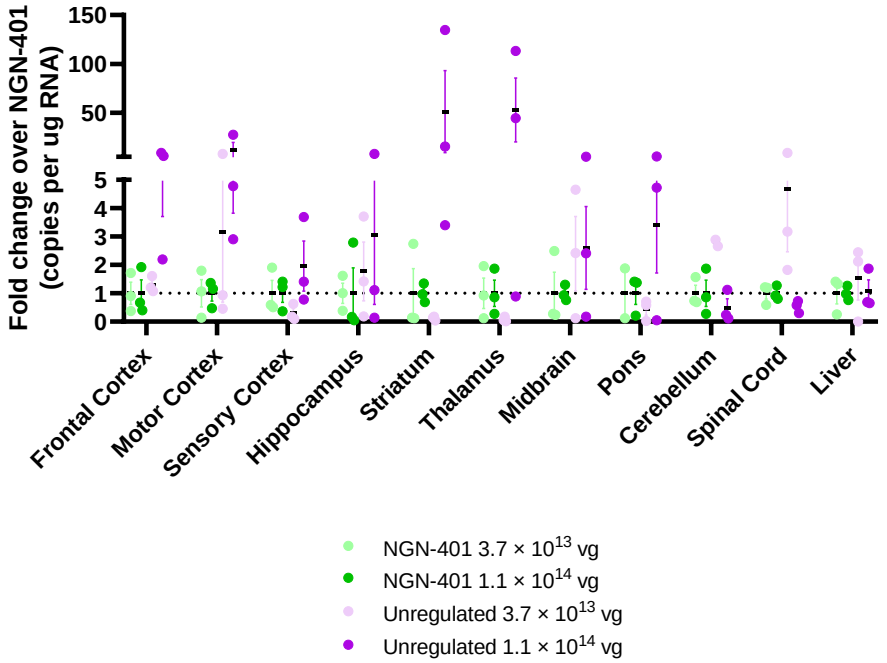
*RTT scored 0-5 for six domains: mobility, gait, clasping, breathing, tremor, body condition

NGN-401 Via ICV Delivery Well Tolerated in Multiple Studies While Conventional Unregulated Gene Therapy is Toxic

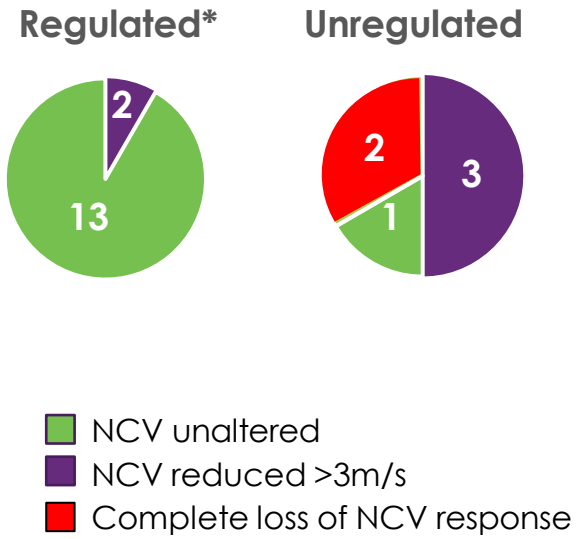
NGN-401 Well Tolerated in Female Mouse Model, Unregulated MeCP2 Highly Toxic



Tight mRNA Levels in NHPs for NGN-401, While Unregulated Has Substantially Greater Variance



NGN-401 Well Tolerated in NHP studies, While Unregulated MeCP2 Demonstrates Early Toxicity

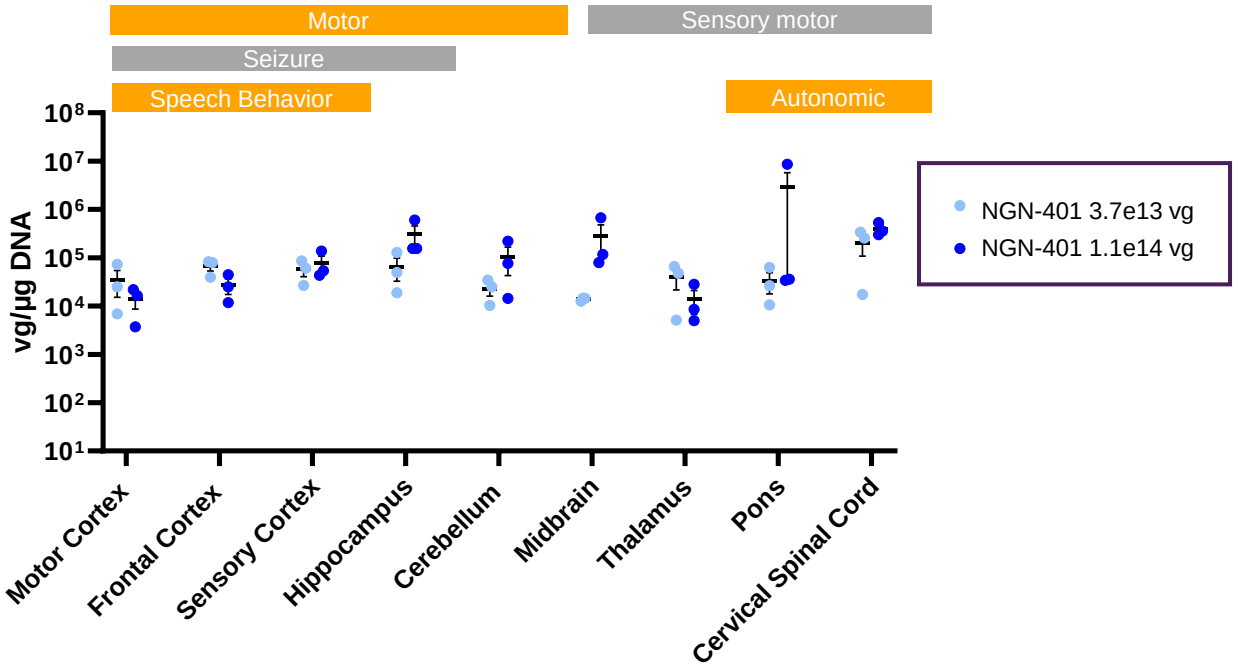


NOTE: toxicity scoring developed to capture phenotypes associated with MeCP2 overexpression including general condition, tremor, loss of limb use.
*Regulated includes NGN-401 and another EXACT vector; data at 30 days
NCV=nerve conduction velocity; NHP = non-human primates

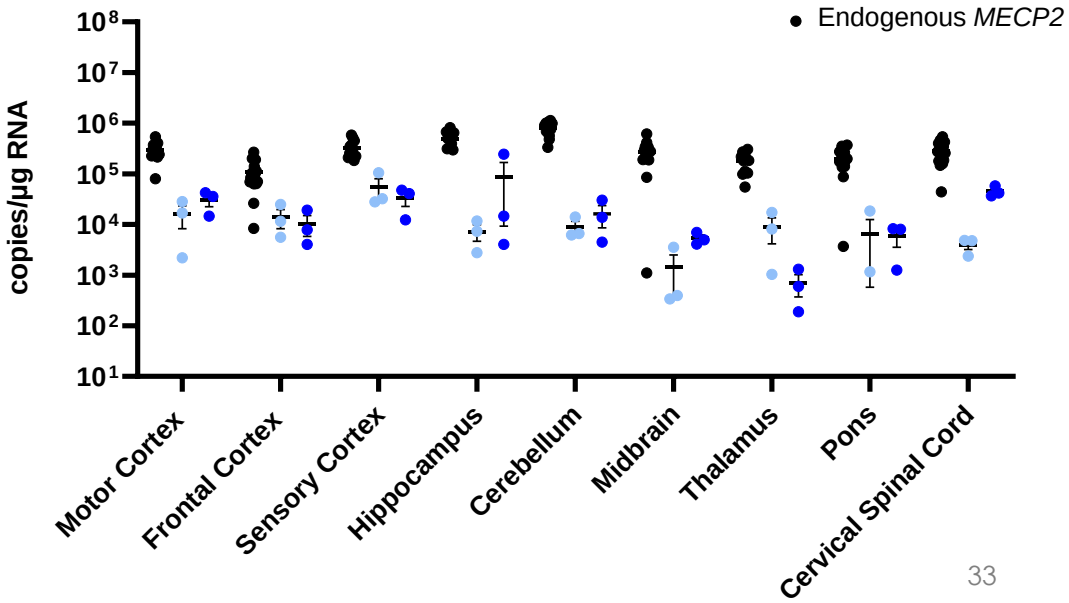
NGN-401 Distribution and Expression Levels in NHPs Support Encouraging Profile for Human Testing

- NGN-401 distributes to key regions underlying RTT pathophysiology in WT non-human primates
- Degree of mRNA expression tracks vector genome biodistribution of AAV9 across key brain regions
- Aggregate transgene expression below levels of endogenous MECP2 mRNA (100% of cells), avoiding overexpression concerns

Vector Biodistribution with ICV Administration Addresses Key Areas of the Brain Affected in Rett Syndrome



NGN-401 mRNA Expression Levels Below Endogenous



GLP Toxicology in NHPs Support Favorable Safety Profile

- NGN-401 evaluated in GLP NHP toxicology study with 90-day and 180-day cohorts
- No signs or symptoms of MeCP2 overexpression observed
- >4x safety margin relative to NGN-401 clinical starting dose in Phase 1/2
- Overall toxicology profile consistent with typical profile of intra-CSF administered AAV9 product
  - Slight to minimal non-adverse pathology detected in the dorsal root ganglion (DRG) nerves
  - Early and transient liver enzyme elevations observed, which resolved quickly without intervention

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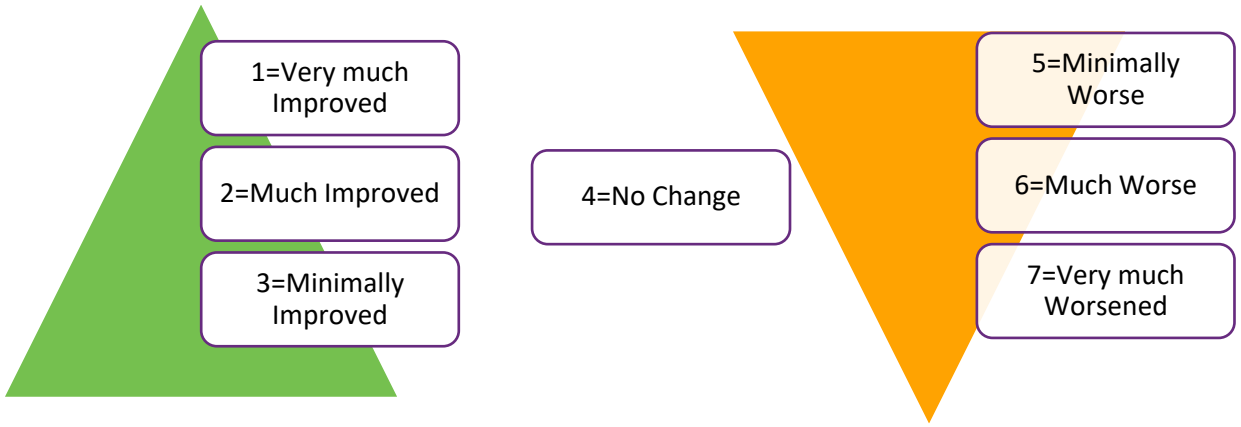
Explanation of CGI-I and RSBQ

CGI-I
(Clinician Global Impression of Improvement)



RSBQ
(Rett Syndrome Behavior Questionnaire)

Score	Definition
0	not true
1	somewhat or sometimes true
2	very true

Domain	Total Possible Points (90)
General mood	16
Breathing problems	10
Hand behaviors	12
Repetitive face movements	8
Body rocking and expressionless face	12
Nighttime behaviors	6
Fear/anxiety	8
Other	18

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