



NEURONA
THERAPEUTICS

Interneuron Cell Therapy
For Epilepsy And Other Neurological Disorders

Cory R. Nicholas, PhD
Co-Founder
CEO

Regenerative Cell Therapy Platform

- Founded in 2015, based on >15 years of research at UCSF.
- Core Technology: Deep developmental understanding of interneuron biology.
- Objective: To develop disease modifying interneuron cell therapies that rebalance dysregulated neural circuits.
- Lead Program: NRTX-1001 interneuron cell therapy for drug-resistant epilepsy, entering Phase 3.

Founders and Key Discoveries



John Rubenstein,
MD, PhD



Arturo Alvarez-Buylla,
PhD



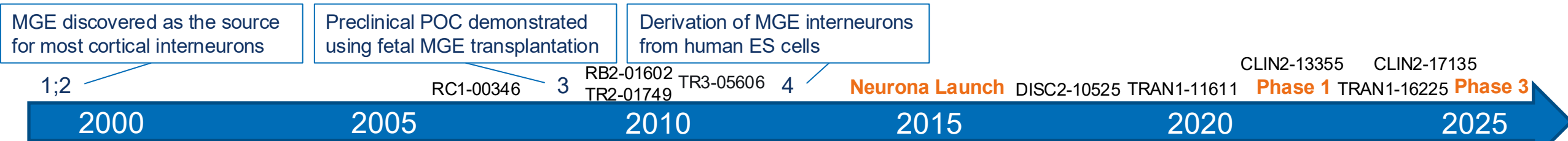
Arnold Kriegstein,
MD, PhD



Cory Nicholas,
PhD

1. Anderson SA, Eisenstat DD, Shi L, **Rubenstein JL.** (1997). Interneuron migration from basal forebrain to neocortex: dependence on Dlx genes. *Science*.
2. Wichterle H, Garcia-Verdugo JM, Herrera DG, **Alvarez-Buylla A.** (1999). Young neurons from medial ganglionic eminence disperse in adult and embryonic brain. *Nat Neurosci*.
3. Baraban S. C., Southwell D. G., Estrada R. C., et al, **Rubenstein J. L. R., and Alvarez-Buylla A.**, Reduction of seizures by transplantation of cortical GABAergic interneuron precursors into Kv1.1 mutant mice. (2009) *PNAS*.
4. **Nicholas C. R.**, Chen J., Tang Y., Southwell D. G., et al, **Alvarez-Buylla A., Rubenstein J. L., Kriegstein A. R.** (2013). Functional maturation of hPSC-derived forebrain interneurons requires an extended timeline and mimics human neural development. *Cell Stem Cell*.

Timeline and CIRM Support



NRTX-1001 Programs









Indication	Preclinical Development & IND-Enabling	Phase 1/2	Phase 3	BLA Filing	Upcoming Catalysts
Unilateral Temporal Lobe Epilepsy		CLIN2-13355	} Ph 3 EPIC study enrolling both bilateral and unilateral patients		<ul style="list-style-type: none"> 1H2026: FPI in Ph 3 EPIC 2026: Updated efficacy & durability data from P1/2 studies in uni- & bilateral MTLE
Bilateral Temporal Lobe Epilepsy		CLIN2-17135			
Neocortical Focal Epilepsy					
Alzheimer's Disease					

- All programs wholly-owned
- Additional programs in pipeline include preclinical development of other cell types and indications

Many with Epilepsy still have Drug-Resistant Seizures

Centers for Disease Control and Prevention
MMWR | **WHEN SEIZURES DON'T STOP**

EPILEPSY IS COMMON	A SPECIALIST CAN HELP STOP SEIZURES	ADULTS WITH UNCONTROLLED SEIZURES SHOULD
<p>3 MILLION U.S. ADULTS HAVE ACTIVE EPILEPSY</p>  <p>56% OF ADULTS WITH EPILEPSY STILL HAVE SEIZURES</p>	<p>1 OUT OF 3 ADULTS WITH EPILEPSY DIDN'T SEE A SPECIALIST IN THE PAST YEAR</p> 	<ul style="list-style-type: none"> SEE AN EPILEPSY SPECIALIST TAKE MEDICINE AS PRESCRIBED LEARN TO MANAGE EPILEPSY CALL EPILEPSY FOUNDATION HELPLINE 1-800-332-1000

Data as of 2015 as published in Tian et al. *MMWR*, April 2018
<https://go.usa.gov/xQjSw>

WWW.CDC.GOV

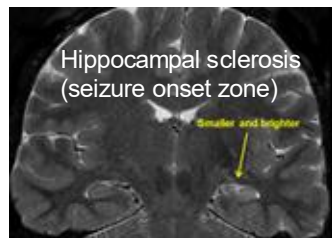
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- The most common form of epilepsy in adults is **mesial temporal lobe epilepsy (MTLE)**
- ~600,000 people in USA have drug-resistant TLE
- ~100,000 people in California are affected

Standard of Care for Refractory Focal Epilepsy is Suboptimal: Destructive Surgery

People with
Drug-Resistant
Seizures

Level 3/4
NAEC Center



MRI/PET Imaging

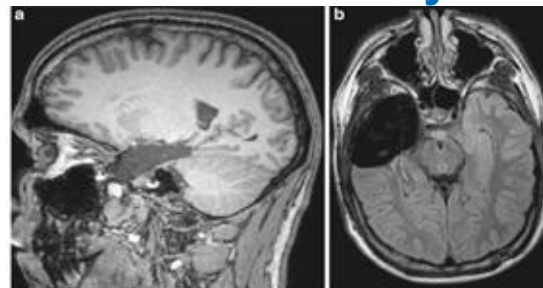


Intra-cranial EEG

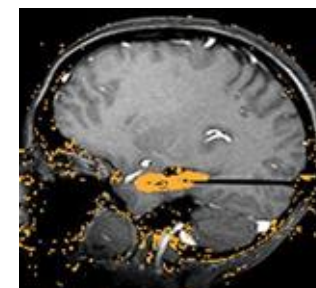
Focal
Temporal
Lobe Onset
Confirmed



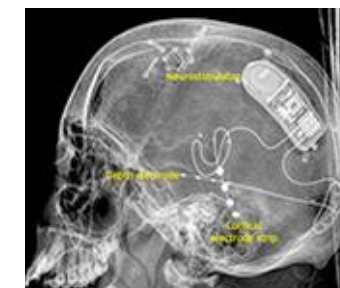
Temporal Lobectomy



Laser Ablation



RNS / DBS Stimulator

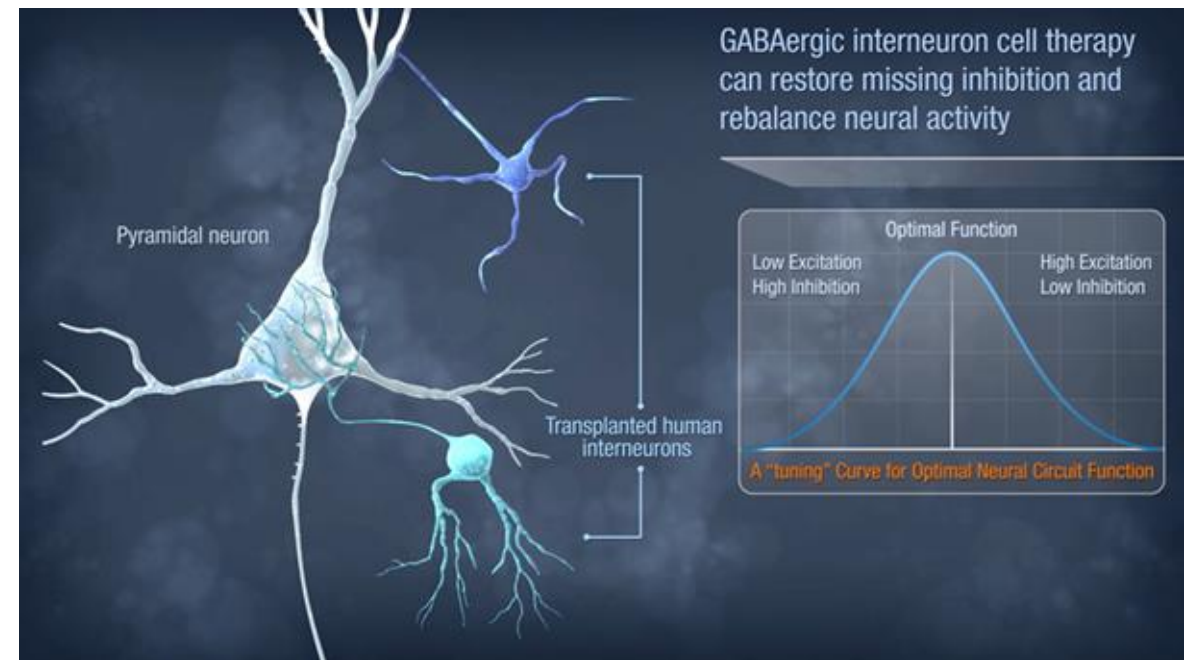
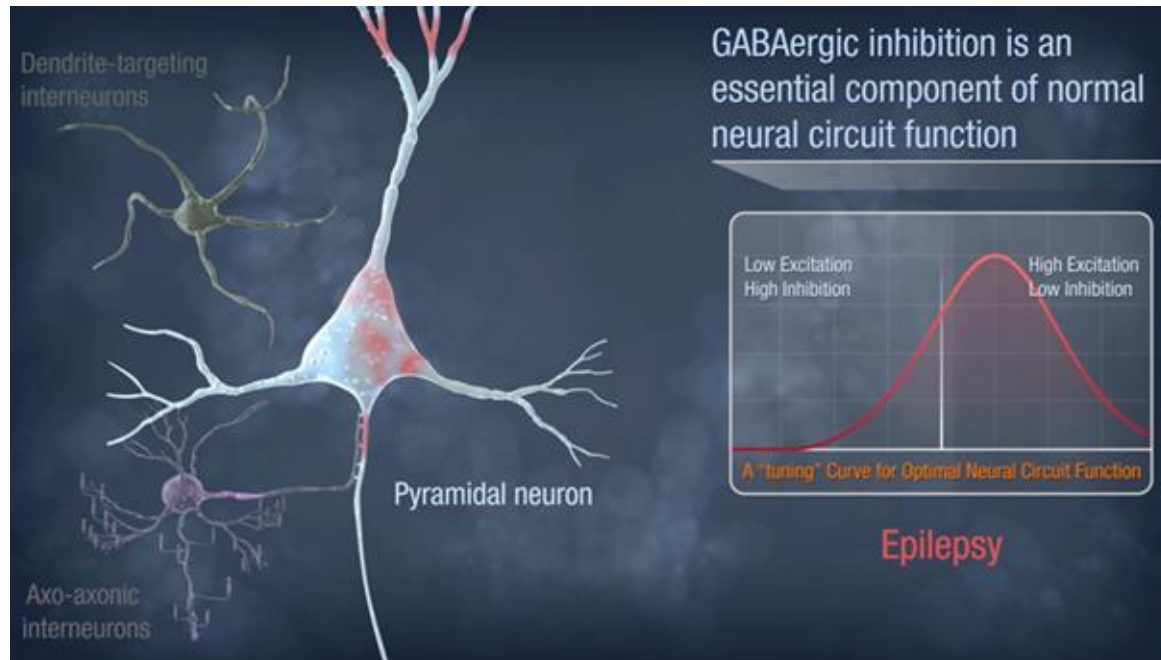


- Most patients are not eligible for lobectomy/ablation due to risk of cognitive impairment and/or are not interested due to brain tissue destruction
- RNS/DBS avoids tissue destruction but is invasive/indwelling and failed to control seizures in 2/3rd of patients in Phase 3

Key Unmet Need for Drug-Resistant Focal Epilepsy:

Seizure control without tissue-destruction and cognitive impairment

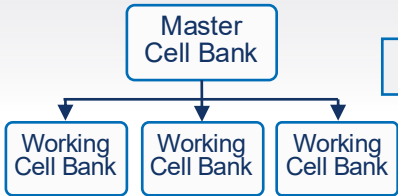
Therapeutic Strategy: Restore balanced activity with GABA interneuron cell therapy



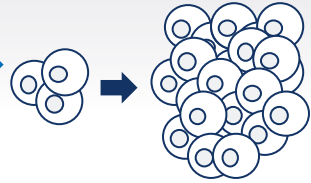
NRTX-1001 Manufacturing: GABAergic Interneurons derived from a Human Pluripotent Stem Cell Line (hPSC)



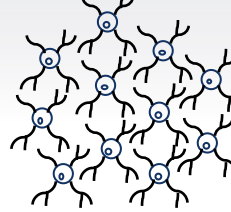
Cell Bank



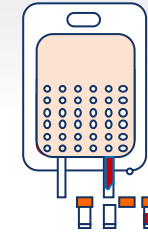
MGE Patterning



Cortical Interneuron Differentiation



NRTX-1001: Cryopreserved GABAergic Interneurons



- >98% purity
- Post-mitotic stage

NRTX-1001 Attributes:

- Reproducible and robust process
- No genetic modification
- Manufactured in-house
- Phase 3 manufacturing completed



NRTX-1001 Efficacy: Model of Chronic Mesial Temporal Lobe Epilepsy (MTLE)

Drug-Resistant Model of MTLE

Intra-Hippocampal Kainate



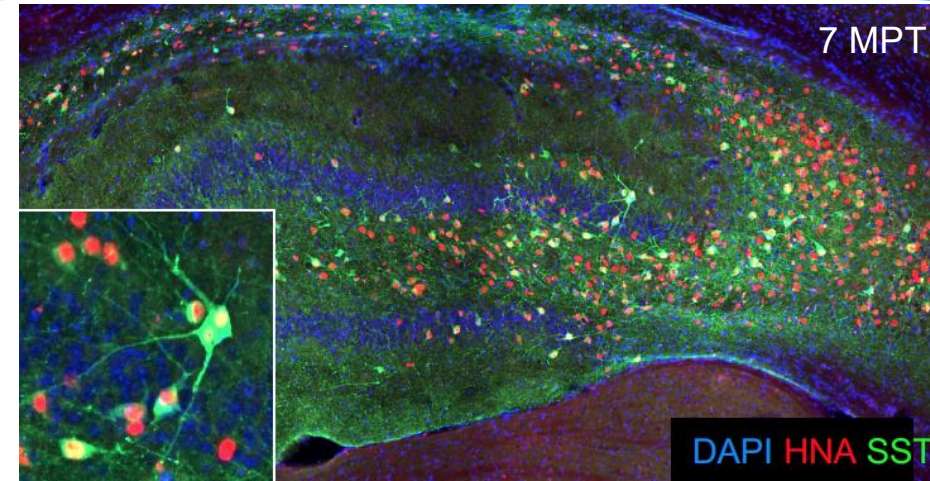
1 month



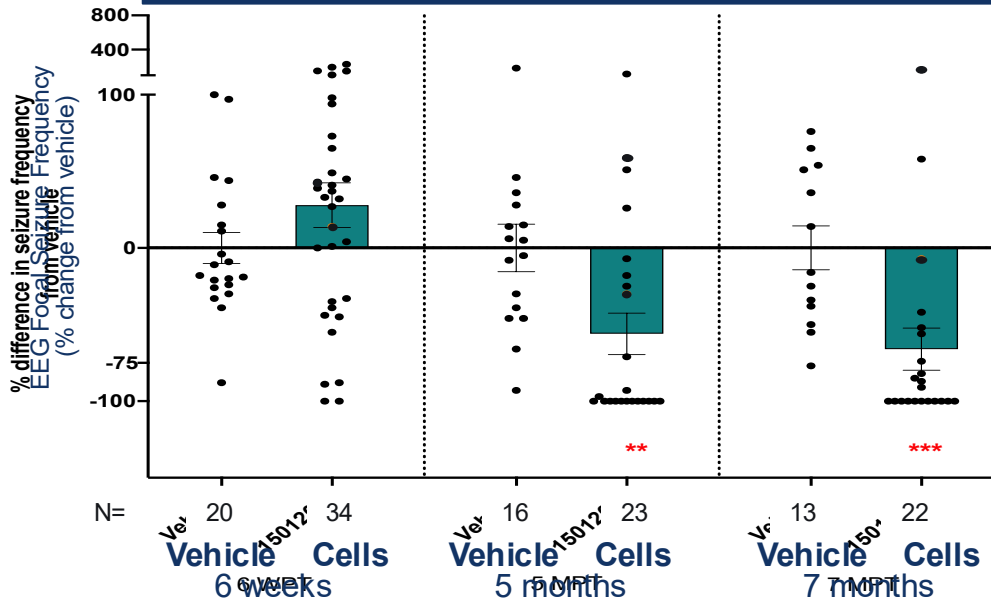
Intra-Hippocampal EEG Electrode Detects Seizures (20 seizures/hr)



Intra-Hippocampal Cell Delivery



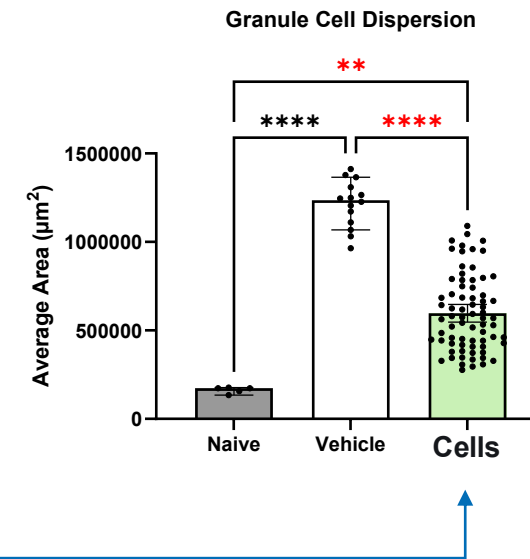
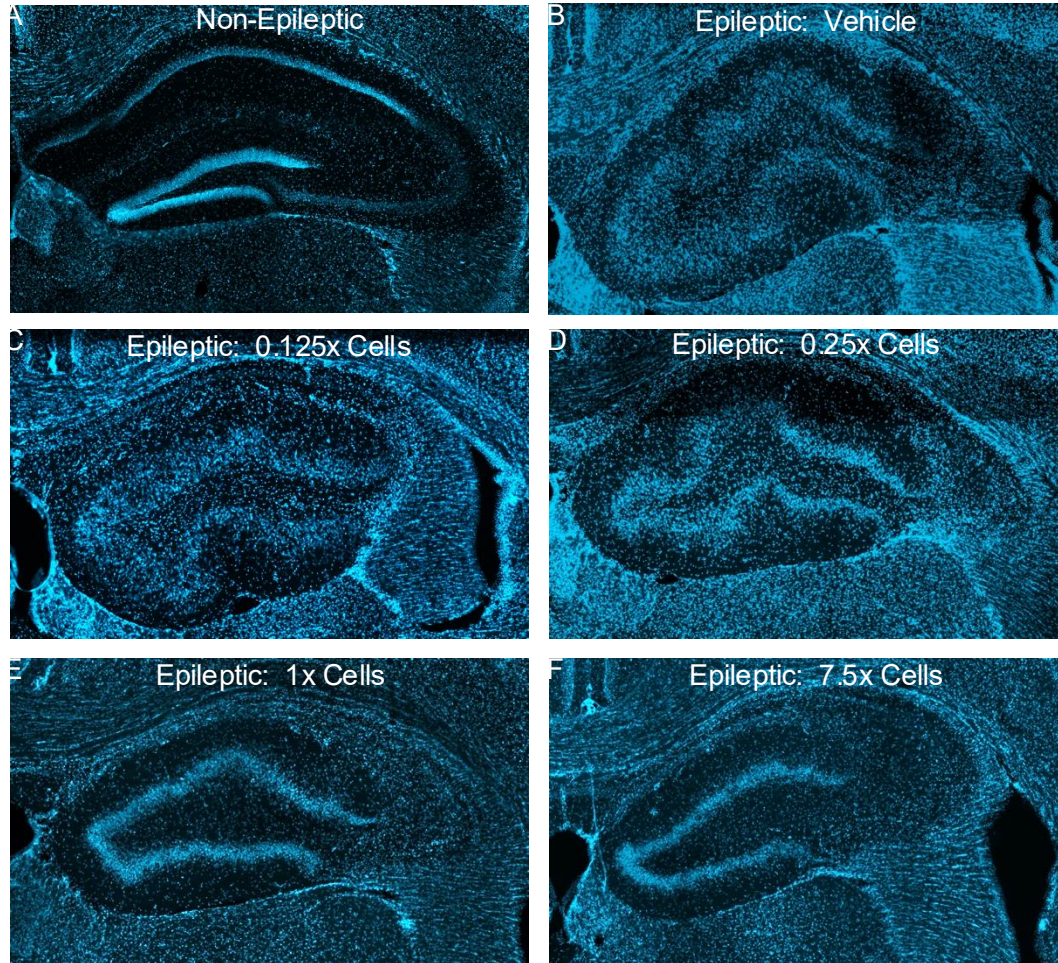
Single Dose of NRTX-1001 Durably Suppresses Hippocampal Seizures



Seizure-free

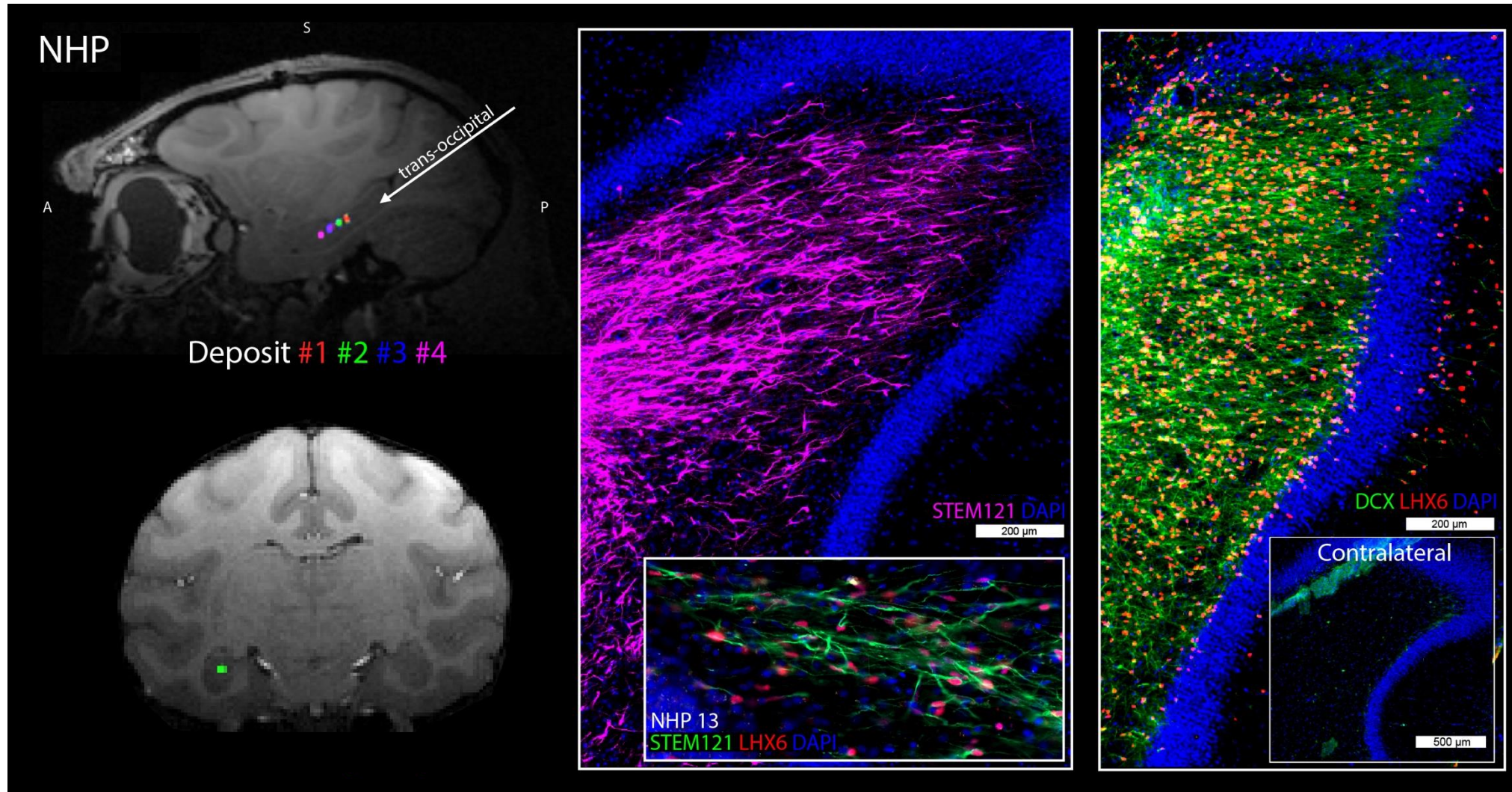
- 92% median seizure reduction across product lots
- 64% of animals with >75% seizure reduction
- 50% of animals are seizure-free

NRTX-1001 Disease Modifying Activity: Dose-Dependent Reduction of Hippocampal Pathology



NRTX-1001 reduced hippocampal pathology

NRTX-1001 Delivery Strategy: On-Target and Safe Intracerebral MRI- or CT-guided Delivery



NRTX-1001 Clinical Studies: Two Ongoing Phase 1/2 Trials for Uni- and Bi-lateral MTLE



Design: Adults with drug-resistant MTLE

Key Eligibility Criteria:

- Drug-resistant focal seizures from hippocampus
- >2 disabling focal seizures/mo at baseline
 - Focal aware with objective component
 - Focal impaired awareness
 - Focal to bilateral tonic-clonic

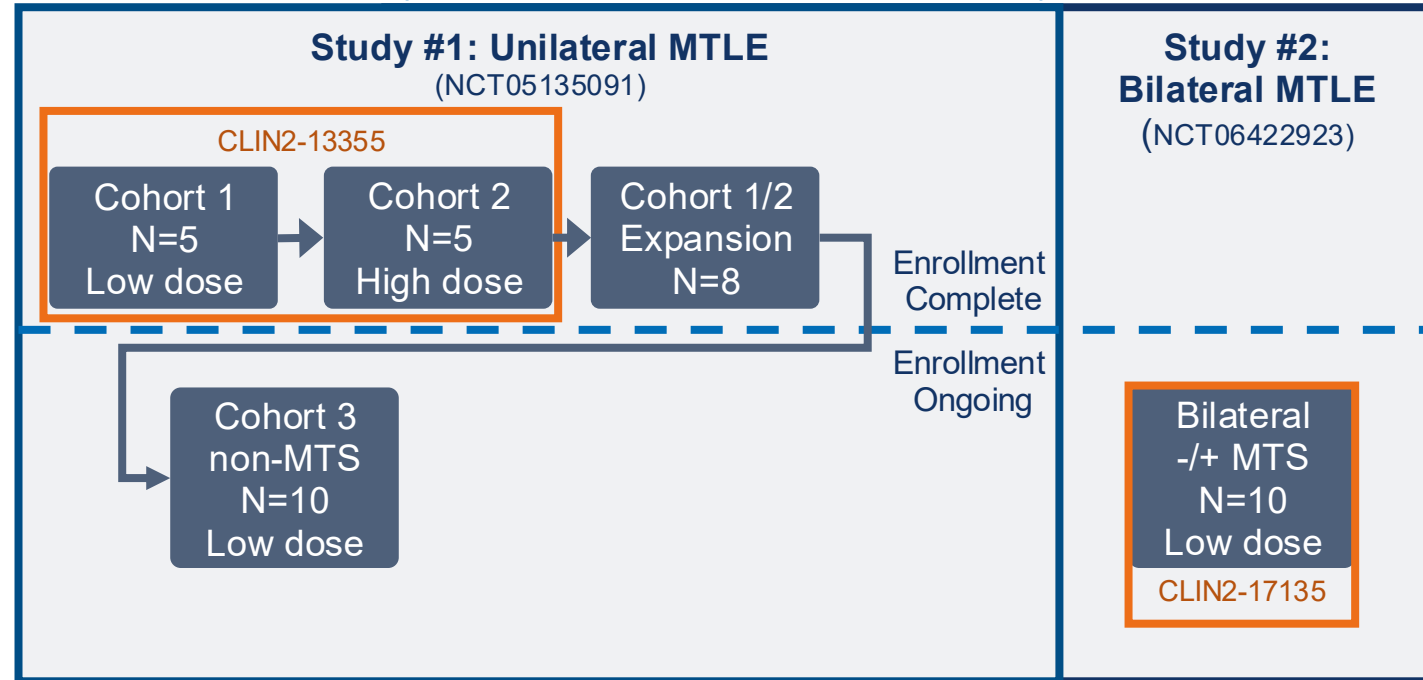
Delivery: Single image-guided cell delivery

Immunosuppression: 1 year

Objectives:

- **Primary**
 - Safety during months 1-12
- **Secondary**
 - Reduction in seizure frequency during months 7-12

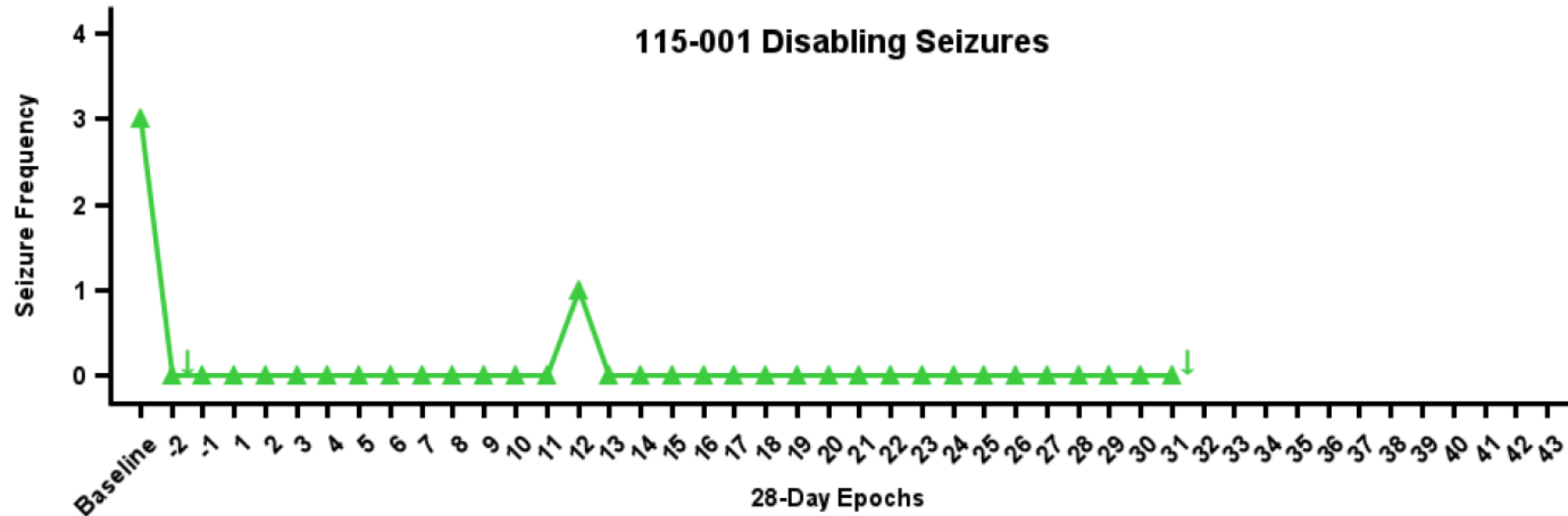
Two phase-1/2: open-label, multicenter studies in USA
(N=38 total patients to be enrolled)



- 30 patients treated to date (8 patients treated in CA)
- 32 clinical centers are active (19 centers have treated patients; 7 centers in CA)
- Data cut presented here from October 27, 2025 (N=26 patients)

- **No serious adverse events attributed to NRTX-1001**
- No serious surgical complications
- Non-serious events related to procedure & immunosuppression
 - Procedural AEs resolved post-implantation
 - Immunosuppression AEs resolved in 9 of 10 subjects who have discontinued immunosuppression
- No group decline in cognitive performance over long-term follow up, including word retrieval, verbal memory, and visuospatial memory batteries

Seizure Count: First Unilateral MTLT Patients (low dose)



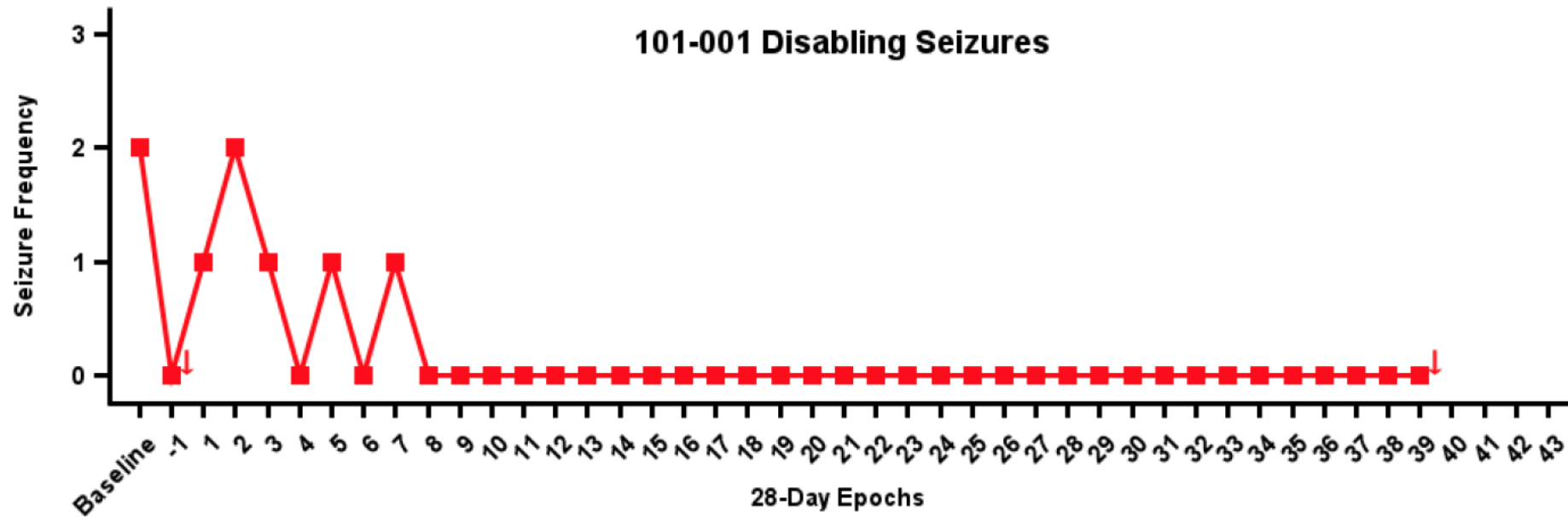
Before NRTX-1001: "passed out while managing scuba store"

- Passion was swimming and open-water diving
- Had to stop due to seizures
- Quit his dream job
- Can't drive
- Drank heavily to cope
- When offered to be the 3rd person to receive cell therapy; said:
"Yes, but I didn't understand the magnitude of it"

After NRTX-1001:

- Seizures have decreased
- Loves the idea of being able to help people all over the world
- Had only one disabling seizure since treatment with cells
"Hasn't changed anything else, what else could it be?"

Seizure Count: First Unilateral MTLT Patients (low dose)



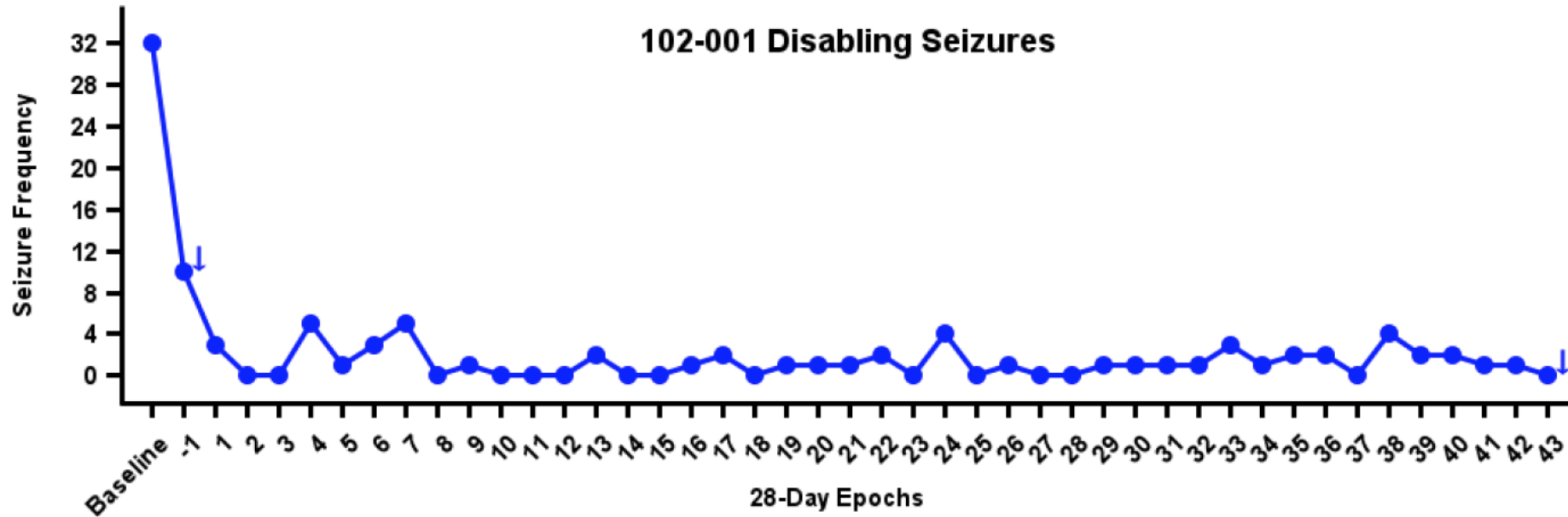
Before NRTX-1001: "it happened in my sleep"

- Sudden grand mal seizure, was foaming at the mouth
- Anti-seizure drugs have not helped
- Had to quit job – very hard. Important part of her life.
- Avid hiker – backpacking several miles/day – had to stop
- EEG showed 11 seizures over 2 days
- Didn't want laser ablation due to risks of brain tissue destruction
- When offered to be the 2nd person to receive cell therapy; said:
"Let's go for it!"

After NRTX-1001:

- "Delivery procedure was a piece of cake!"
- Seizure-free since month-7
- Fatigue has improved
- Able to hike again up to 3 miles per day
- Able to get on with her retirement plans, traveling, seeing her grandchild

Seizure Count: First Unilateral MTLT Patients (low dose)



Mother of first patient (26-yr old)

Before NRTX-1001: "an epilepsy hostage situation"

- Taking 4 different anti-seizure drugs at high doses
- Multiple debilitating seizures daily
- Had to quit two jobs and unable to live alone/function
- Mother had to stop working to care for son
- Memory impaired; poor quality of life
- EEG showed 200 seizures over 7 days
- Didn't want lobectomy due to risks of brain tissue removal
- When offered to be the first to receive cell therapy; told his mom:

"Someone has to be first!"

After NRTX-1001:

- Noticed improvements by month-3
- Improvements continued to date
- Hasn't had a loss-of-consciousness seizure since month-1
- Coherence and balance have improved
- Able to decrease anti-seizure drugs
- Regaining independence
- Spirit has improved
- Told that patient and his mom are working again

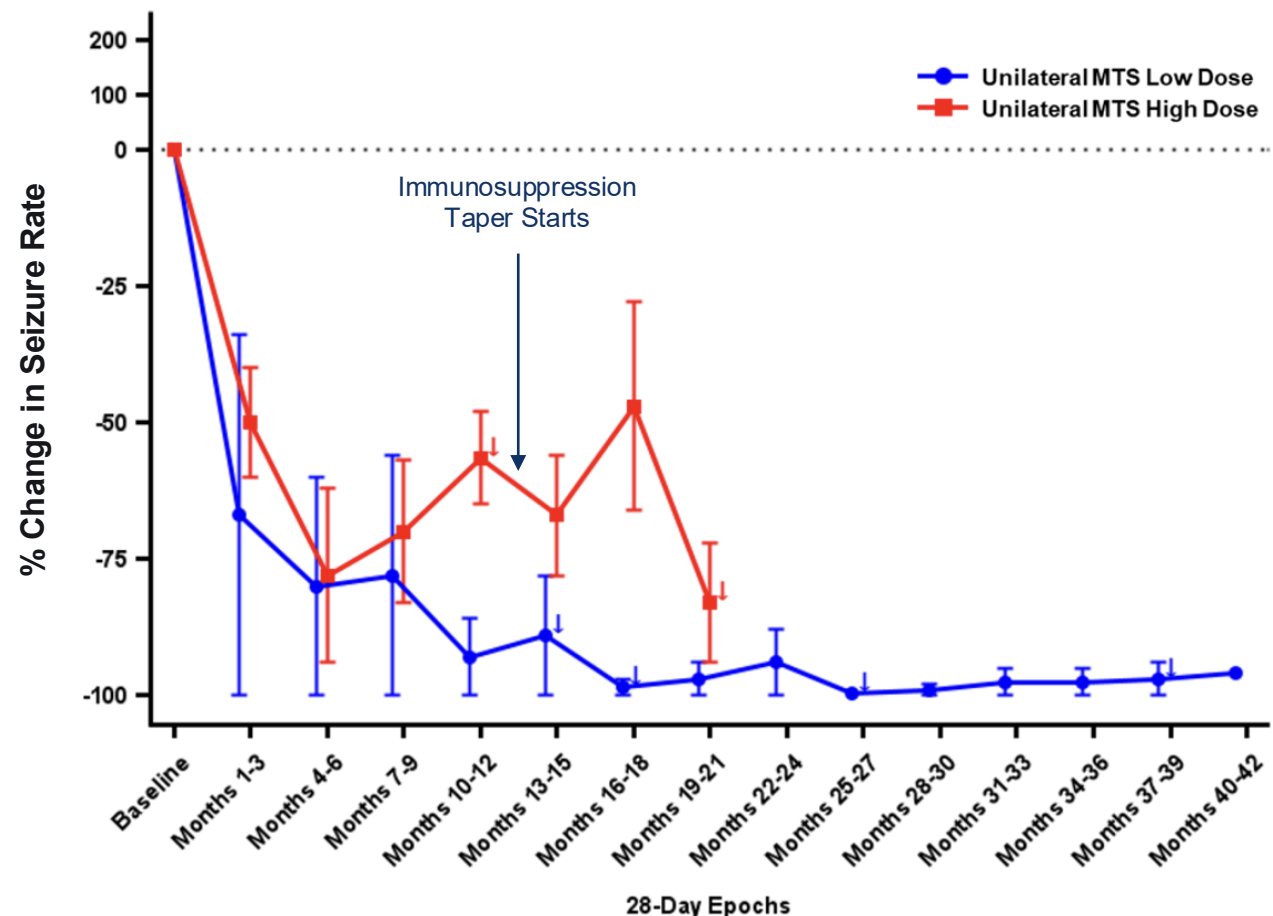
First Unilateral MTLE Patient Treated with NRTX-1001



Aggregated Efficacy Data for Cohorts 1 and 2: Unilateral MTLE with MTS

CLIN2-13355

Median % Change in Seizure Rate
Disabling Seizures



Cohort 1 Low Dose

Months 7-12 (n=9):

- 89% median disabling seizure reduction
- 78% (7/9 subjects) with $\geq 50\%$ responder rate

Cohort 2 High Dose

Months 7-12 (n=5)^a:

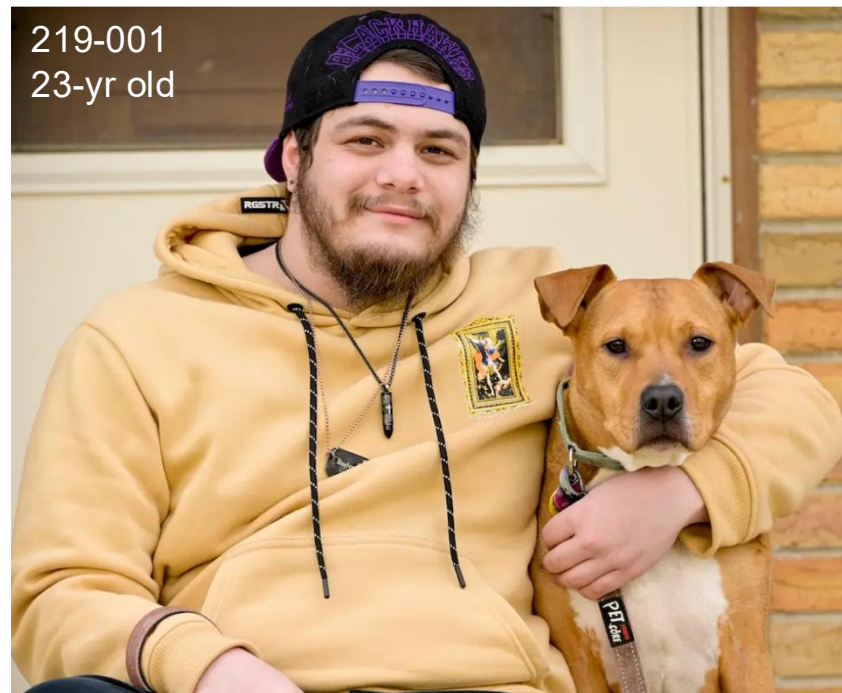
- 58% median disabling seizure reduction
- 80% (4/5 subjects) with $\geq 50\%$ responder rate

^a 4 High Dose subjects have yet to complete 12-month endpoint

Number of Patients

Low Dose	9	9	9	9	9	7	6	5	5	4	2	2	2	2	1
High Dose	9	9	9	8	6	5	5	3							

Individual Efficacy Data for Cohort 3 and Bilateral Trial: Unilateral MTLE (-MTS), and Bilateral MTLE (-/+ MTS)



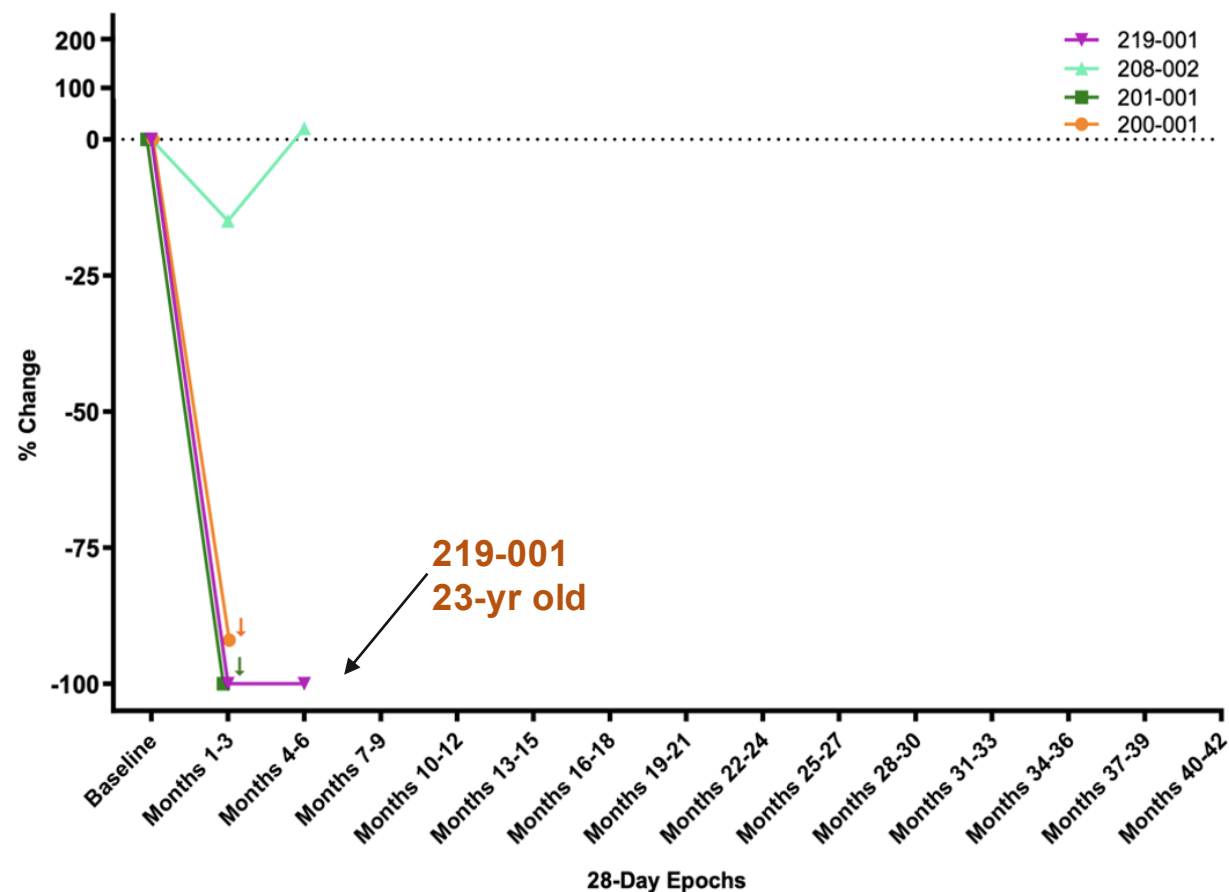
219-001
23-yr old

Seizures - Disabling Seizures
Dose

- 126-001
- 114-004
- ▲ 125-001
- ▼ 110-001

CLIN2-17135

% Change from Baseline by 3-Month Intervals - Disabling Seizures
Bilateral w/ and w/out MTS Low Dose



Before NRTX-1001:

- Seizures broke spine twice
- Unable to drive
- Stays home, depressed
- Feels he is a burden
- Medications not working
- Not eligible for lobectomy

After NRTX-1001:

- So far has been seizure-free
- “Just maybe we can get a cure for epilepsy”

- NRTX-1001 has been well-tolerated to date
- Significant and durable control of drug-resistant seizures across MTLE patient populations
- No neurocognitive impairments detected, with trend to cognitive improvement, and improved quality-of-life
- RMAT designation granted by FDA in 2024; PRIME granted by EMA in 2025
- Single pivotal Phase 3 EPIC double-blind trial to dose first patients in 1H 2026



Thank You!

C I R M
CALIFORNIA INSTITUTE FOR
REGENERATIVE MEDICINE