

# Stoke Therapeutics

NASDAQ: STOK

December 2022

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This presentation contains “forward-looking” statements within the meaning of the “safe harbor” provisions of the Private Securities Litigation Reform Act of 1995, including, but not limited to: the ability of our TANGO platform to design medicines to increase protein production and the expected benefits thereof; expectations regarding our aspirations to execute in the clinic with STK-001, advance to the clinic with STK-002, and expand our pipeline through internal discovery and collaboration; the ability of STK-001 to treat the underlying causes of Dravet syndrome and reduce seizures or show improvements in non-seizure comorbidities at the indicated dosing levels or at all; the ability of STK-002 to treat the underlying causes of Autosomal Dominant Optic Atrophy (ADOA); the preclinical data and study results regarding OPA1; our future operating results, financial position and liquidity; our expectations about timing and execution of anticipated milestones, responses to regulatory authorities, expected nomination of future product candidates and timing thereof; and our expectations, plans, aspirations and goals, including those related to the goals of our collaboration with Acadia. These forward-looking statements may be accompanied by such words as “aim,” “anticipate,” “believe,” “could,” “estimate,” “expect,” “forecast,” “goal,” “intend,” “may,” “might,” “plan,” “potential,” “possible,” “will,” “would,” and other words and terms of similar meaning. These forward-looking statements involve risks and uncertainties, as well as assumptions, which, if they do not fully materialize or prove incorrect, could cause our results to differ materially from those expressed or implied by such statements, including: our ability to develop, obtain regulatory approval for and commercialize STK-001, STK-002, and future product candidates, including any future product candidates nominated for SYNGAP1 or MECP2; the timing and results of preclinical studies and clinical trials; the risk that positive results in a clinical trial may not be replicated in subsequent trials or success in early stage clinical trials may not be predictive of results in later stage clinical trials, and that interim data readouts of ongoing trials may show results that change when such trials are completed; risks associated with clinical trials, including our ability to adequately manage clinical activities, unexpected concerns that may arise from additional data or analysis obtained during clinical trials, regulatory authorities may require additional information or further studies, or may fail to approve or may delay approval of our drug candidates; the occurrence of adverse safety events; failure to protect and enforce our intellectual property and other proprietary rights; failure to successfully execute or realize the anticipated benefits of our strategic and growth initiatives, including our collaboration with Acadia; risks relating to technology failures or breaches; our dependence on collaborators, including Acadia, and other third parties for the development, regulatory approval, and commercialization of products and other aspects of our business, which are outside of our full control; the direct and indirect impacts of the ongoing COVID-19 pandemic and its variants on our business, financial condition and operations, including on our expenses, supply chain, strategic partners, research and development costs, clinical trials and employees; risks associated with current and potential future healthcare reforms; risks relating to attracting and retaining key personnel; failure to comply with legal and regulatory requirements; risks relating to access to capital and credit markets; environmental risks; risks relating to the use of social media for our business; and the other risks and uncertainties that are described in the Risk Factors section of our most recent Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and in other reports we have filed with the U.S. Securities and Exchange Commission. These statements are based on our current beliefs and expectations and speak only as of the date of this presentation. We do not undertake any obligation to publicly update any forward-looking statements.

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## Boldly Restoring Genetic Health

Addressing the underlying cause of severe  
diseases by upregulating protein expression with  
RNA-based medicines

Executing in the clinic with STK-001, the first potential  
disease-modifying approach for the treatment of Dravet  
syndrome

.....

Advancing to the clinic with STK-002, the first potential  
disease-modifying approach for the treatment of  
Autosomal Dominant Optic Atrophy (ADOA)

.....

Expanding our pipeline through internal discovery and  
collaboration

# A Differentiated Platform for the Discovery and Development of Novel RNA-Based Medicines

## Proprietary RNA therapeutics platform (TANGO)

Targets pre-mRNA splicing to restore target protein to near-normal levels

## Disease-modifying approach

We aim to address the underlying cause of severe diseases

## Clinical stage with emerging pipeline

Phase 1/2a studies ongoing with STK-001 for Dravet syndrome (DS). Preclinical development ongoing for STK-002 for autosomal dominant optic atrophy (ADOA)



## Broad therapeutic potential

~1,200 monogenic disease genes and ~6,500 additional genes with TANGO target signatures



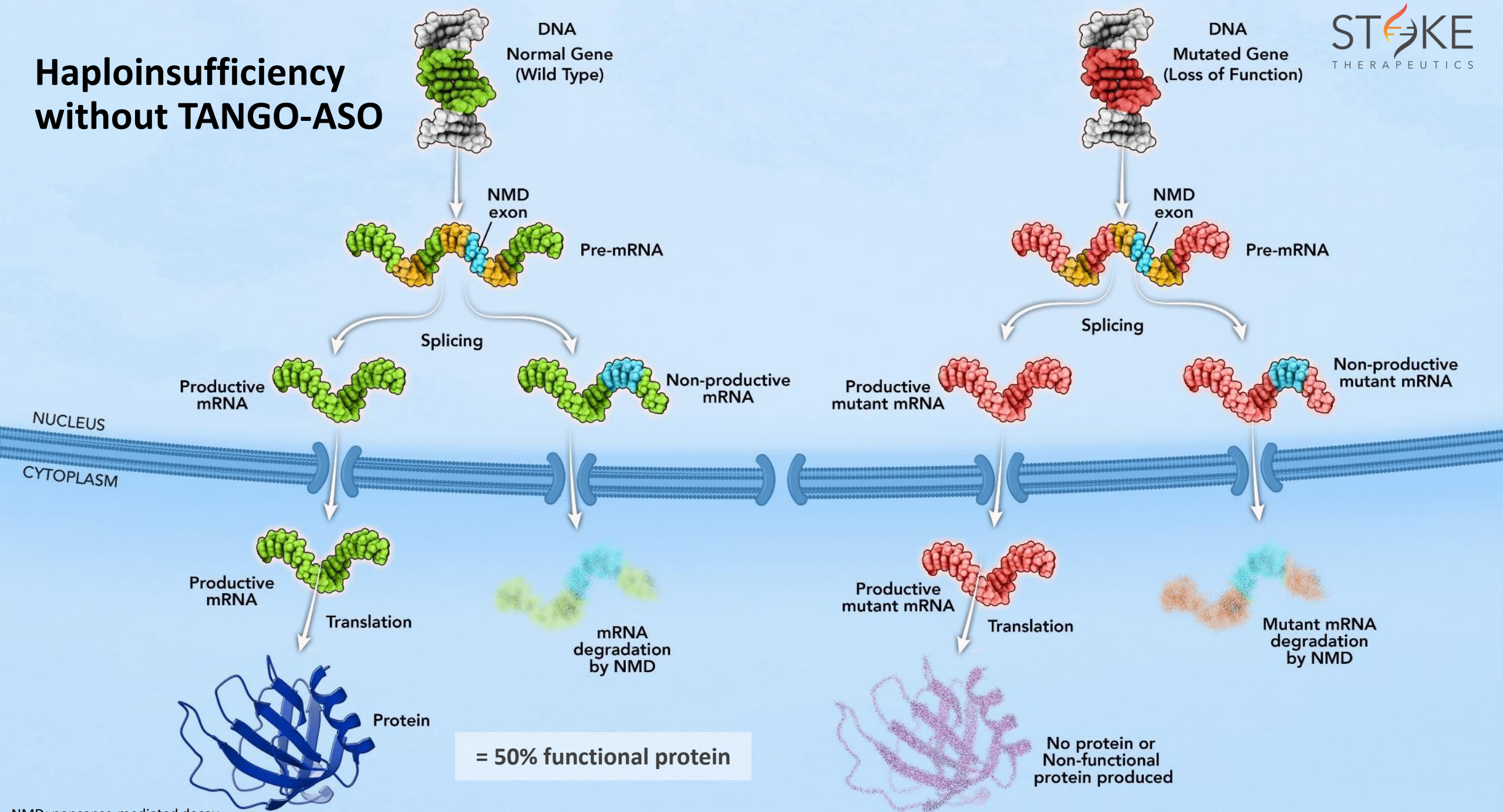
# Targeted Augmentation of Nuclear Gene Output

**Our compounds aim to restore protein levels by increasing protein production from the functional copy of a gene and:**

- ▶ Selectively boost expression only in tissues where the protein is normally expressed
- ▶ Offer one drug for diseases caused by many different loss-of-function mutations
- ▶ Apply to genes of diverse size: can be used to address small or large gene targets

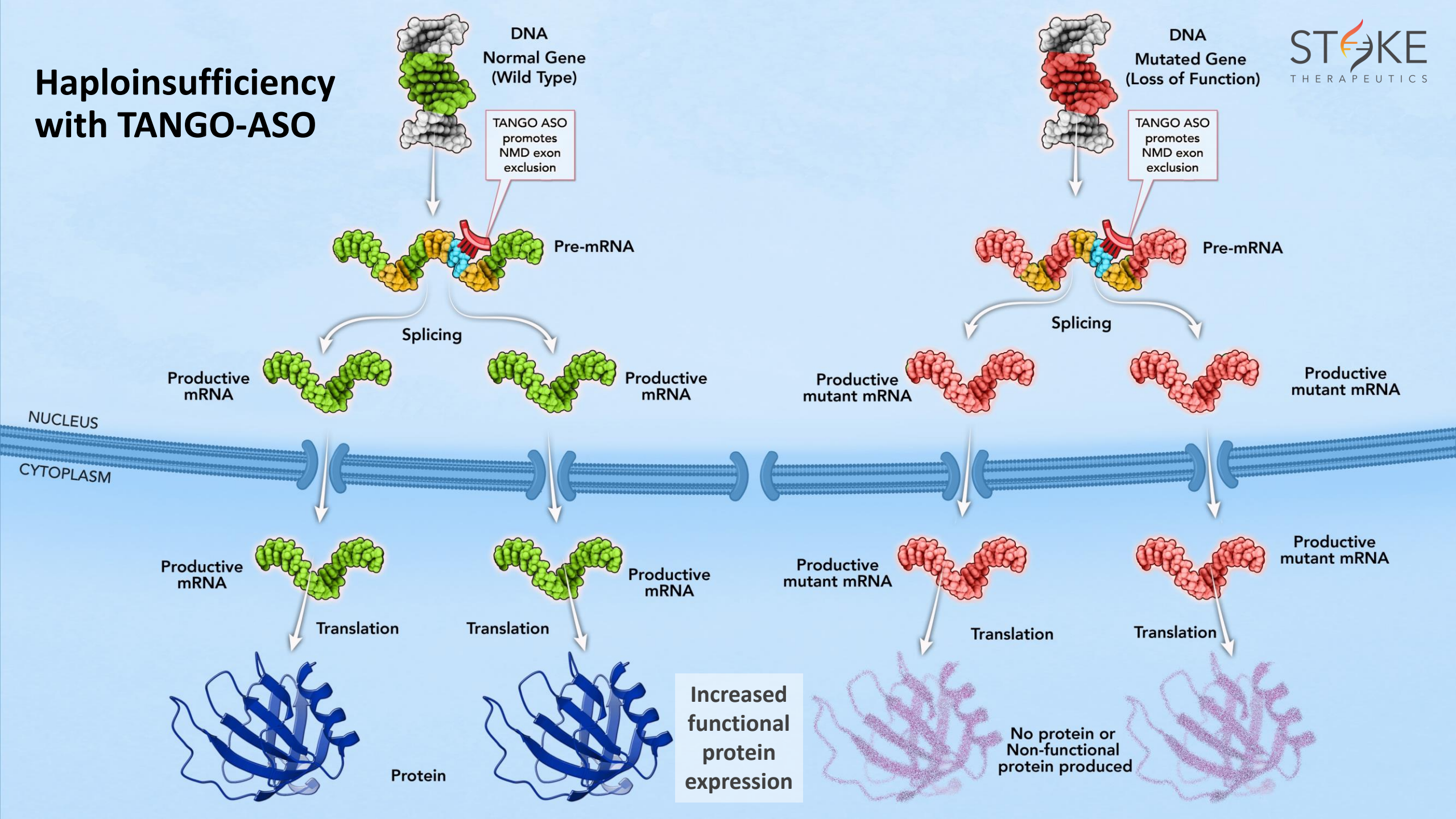


# Haploinsufficiency without TANGO-ASO





# Haploinsufficiency with TANGO-ASO



# Dravet Syndrome: A Severe, Progressive Genetic Epilepsy

**85%**

of cases caused by a  
**HAPLOINSUFFICIENCY**  
of the *SCN1A* gene



RESULTING in



**50%**

Na<sub>v</sub>1.1 protein  
expression



**1 out of 16,000**

babies are born with Dravet syndrome

**Up to 20%**

of children and adolescents with Dravet syndrome die before adulthood, due to SUDEP<sup>1</sup>, prolonged seizures, seizure-related accidents or infections



Seizures are not adequately controlled in  
**90%** of people with Dravet syndrome

**~35,000**

people affected in the U.S., Canada, Japan, Germany, France and the UK



*Dravet syndrome is not concentrated in a particular geographic area or ethnic group*

<sup>1</sup> Sudden Unexpected Death in Epilepsy  
Sources: 2018 Health Advances Report; Djémié et al., *Molecular Genetics & Genomic Medicine*, 2016; Lagae et al., *Developmental Medicine & Child Neurology*, 2017; Nabbout et al., *Orphanet Journal of Rare Diseases*, 2013





# No Approved Disease-Modifying Therapies for Dravet Syndrome

## Non-Seizure Comorbidities of Dravet Syndrome Are Not Addressed by Current Therapies

- Intellectual disability
- Developmental delays
- Movement and balance issues
- Language and speech disturbances
- Growth defects
- Sleep abnormalities
- Disruptions of the autonomic nervous system
- Mood disorders

**Dravet syndrome is classified as a developmental and epileptic encephalopathy due to the developmental delays and cognitive impairment associated with the disease**

# Non-Seizure Comorbidities of DS are Progressive and Measurable

Gap in overall intellectual development and adaptive function between patients and neurotypical children appears to widen with age



## BUTTERFLY

An observational study of  
Dravet Syndrome patients

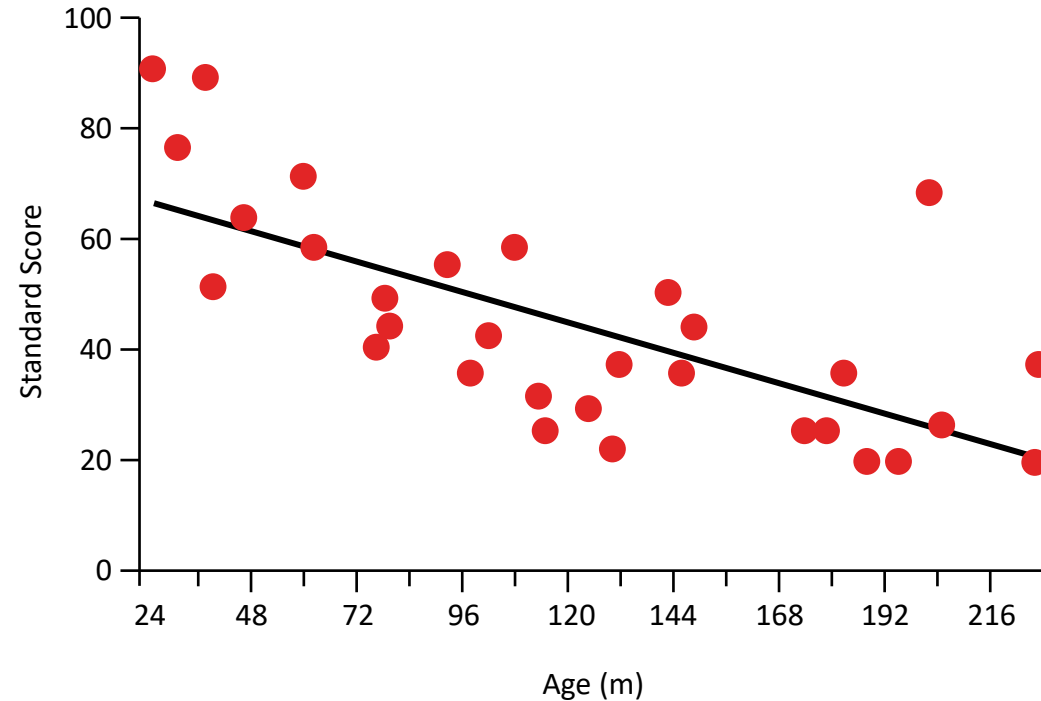
### Initial findings showed:

- Validation of standard cognitive measures for use in DS patients
- Substantially decreased neurocognitive abilities despite the use of multiple anti-seizure medications
- A gap in adaptive functioning was observed in VABS\* testing

(n=36, 2-18 year-olds). Study ongoing.

Results from the VABS Assessment

Adaptive Behavior Composite (ABC)\*

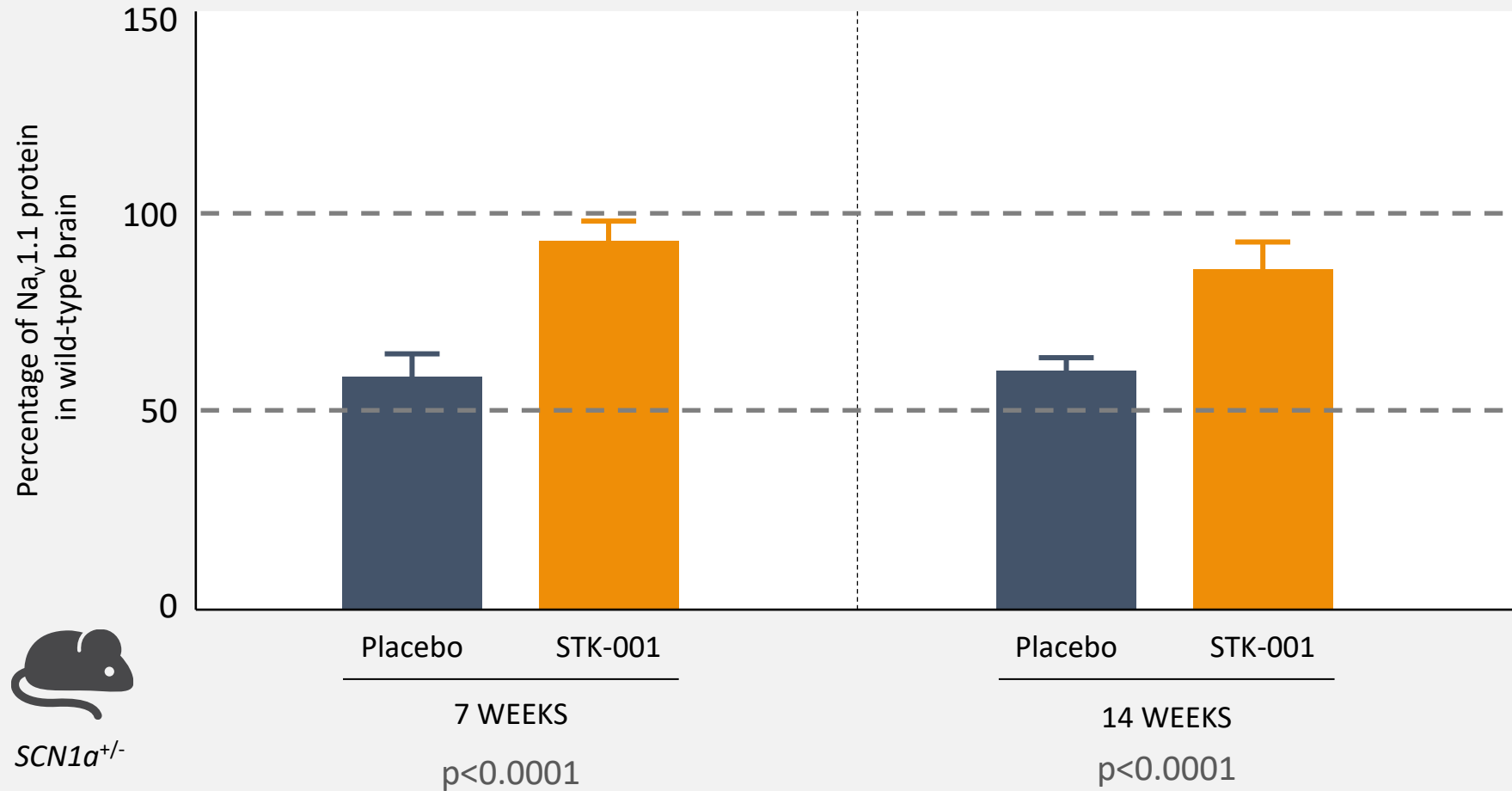


\* VABS = Vineland Adaptive Behavior Scales

\* ABC score based on Communication, Daily Living, and Socialization domains and expressed relative to normative mean of 100

Source: BUTTERFLY: An Observational Study to Investigate Cognition and Other Non-seizure Comorbidities in Children and Adolescents with Dravet Syndrome (DS) (AES 2021).

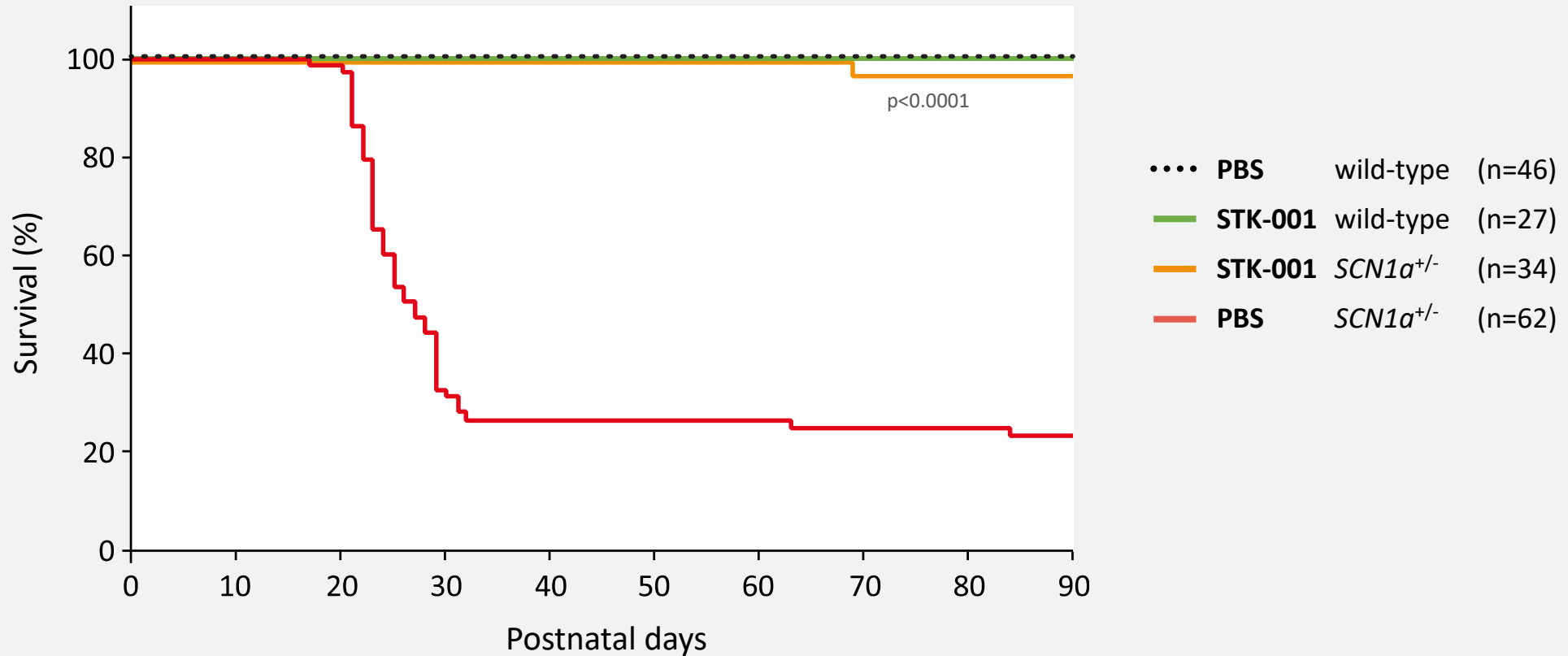
# STK-001 Restores $\text{Na}_v1.1$ to Near Normal Levels for >3 Months in Dravet Syndrome (DS) Mice after a Single Dose





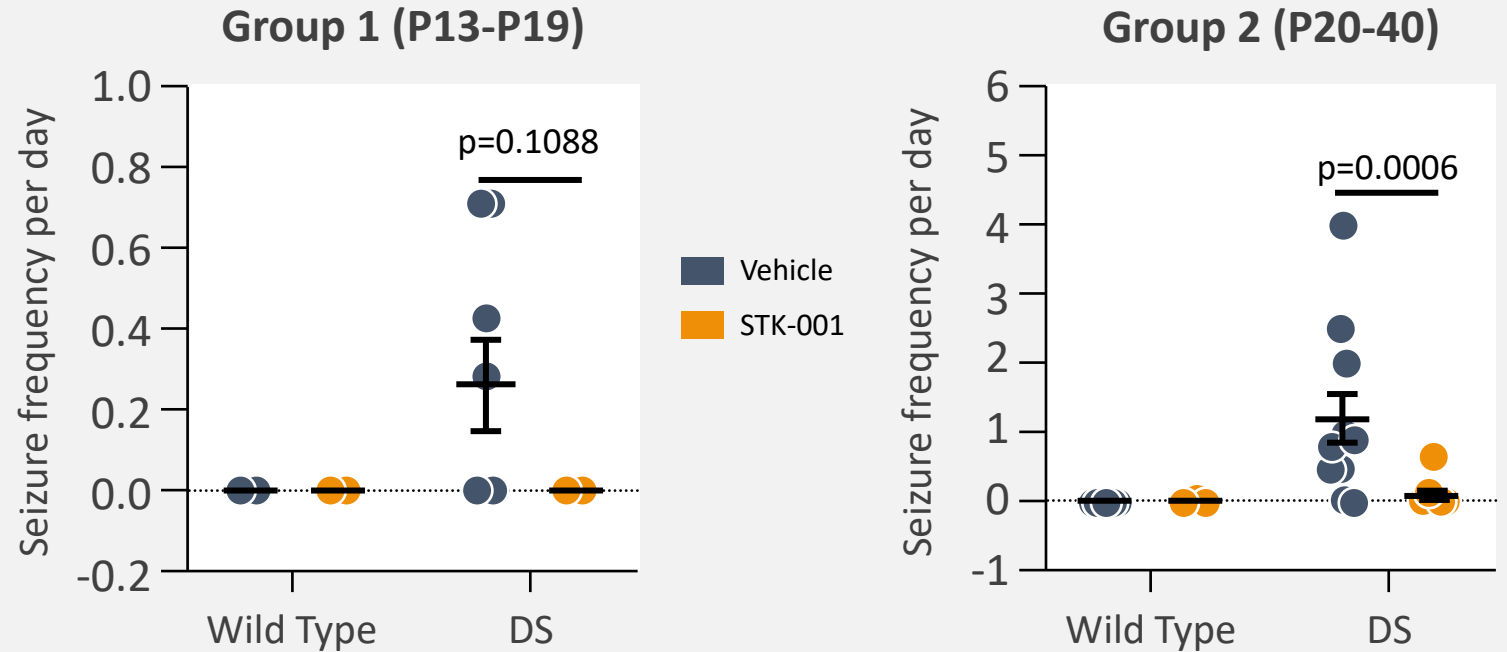
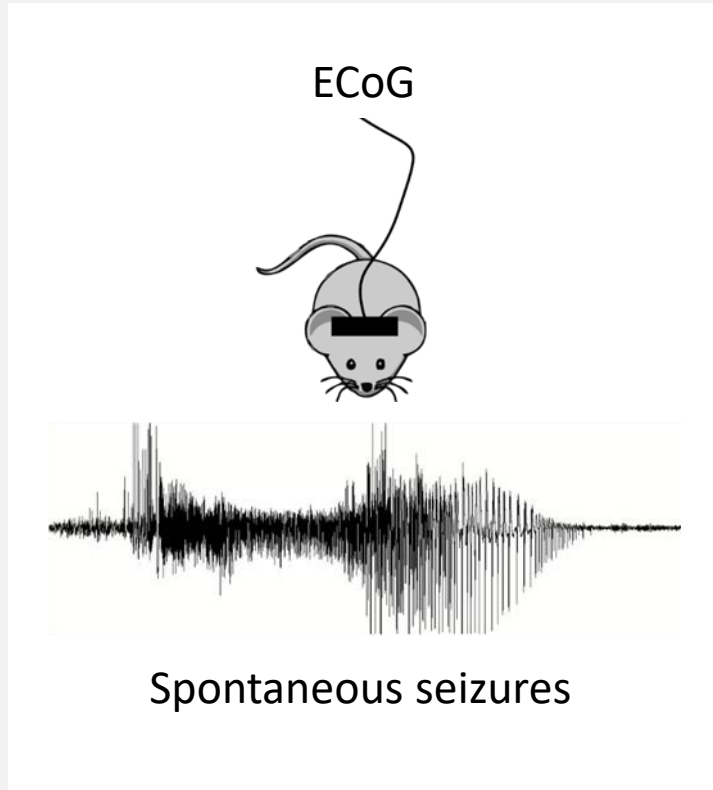
# STK-001 Significantly Reduces Premature Mortality in DS Mice After a Single Dose

Significant improvements in survival after STK-001 administration at postnatal day 2



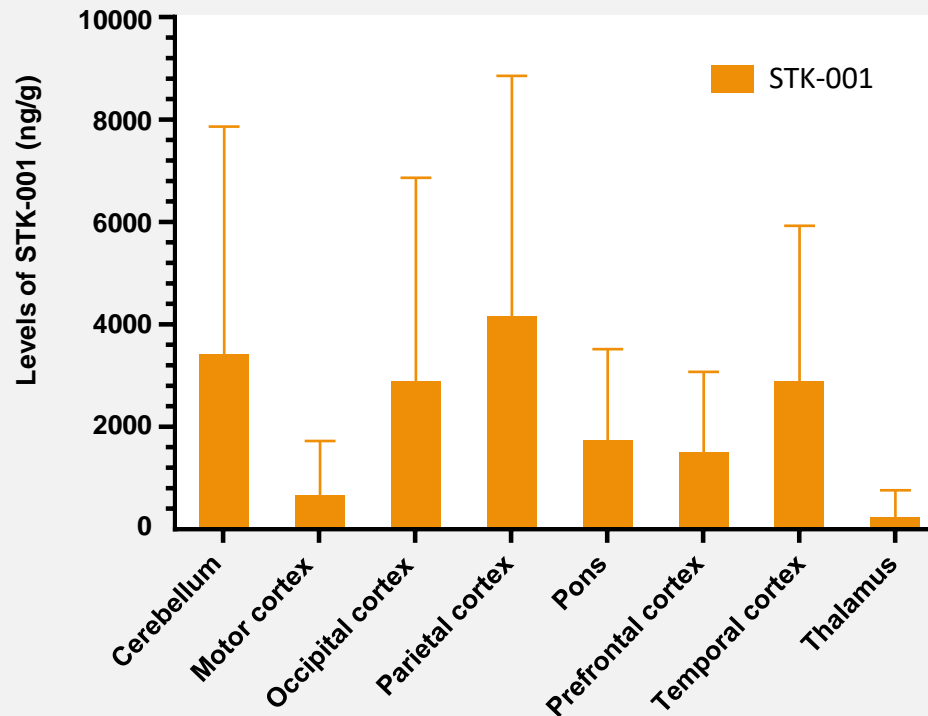
# STK-001 Administration Reduces Seizure Frequency in DS Mice

**A single dose of STK-001 completely stopped seizure events early (P13-19) and substantially reduced seizure frequency late (P20-40)**

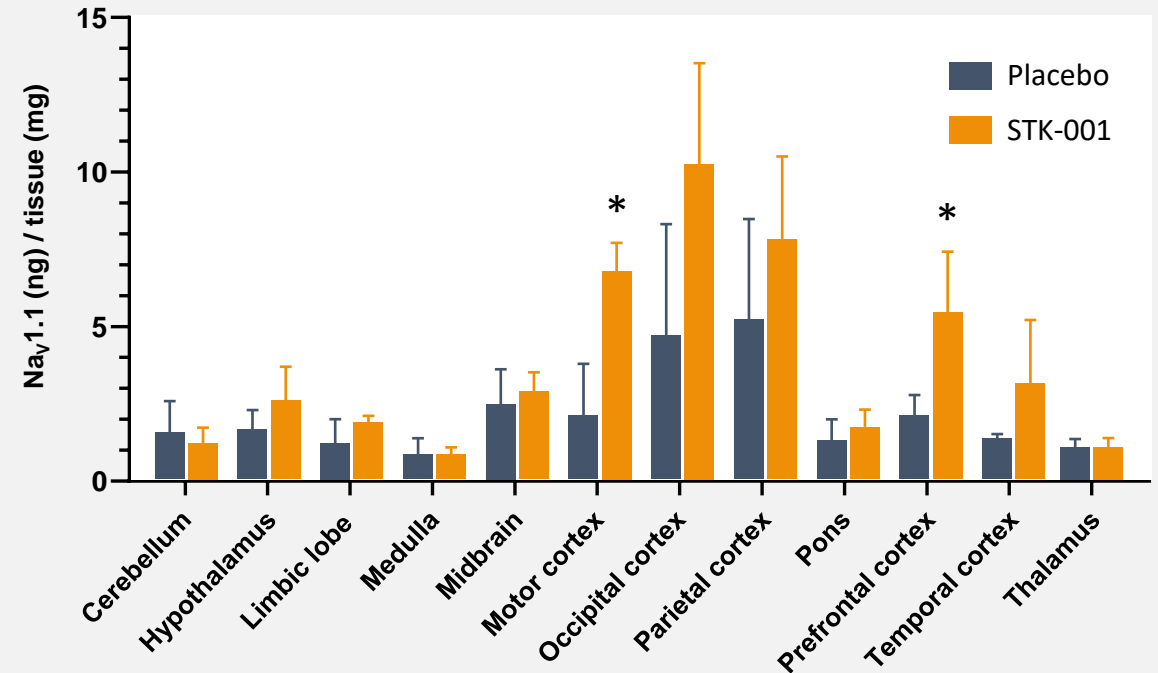


# STK-001 Achieves Broad Distribution and Increases Na<sub>v</sub>1.1 Protein Expression in NHPs

Study 1: Exposure of STK-001 observed in all brain regions



Study 2: Na<sub>v</sub>1.1 protein levels increased up to 3-fold



\* = p<0.05



# Preclinical Findings Support Clinical Development of STK-001

Single dose restores  $\text{Na}_v1.1$  to near-normal levels for >3 months in DS mice



Significantly reduces mortality and seizure frequency in DS mice



Achieves broad distribution and increases  $\text{Na}_v1.1$  protein expression in NHPs





NHP toxicology studies support current clinical dosing



# Phase 1/2a Trials of STK-001 for Dravet Syndrome are Ongoing

Parallel studies in the US & UK evaluating children and adolescents ages 2 to 18 years old



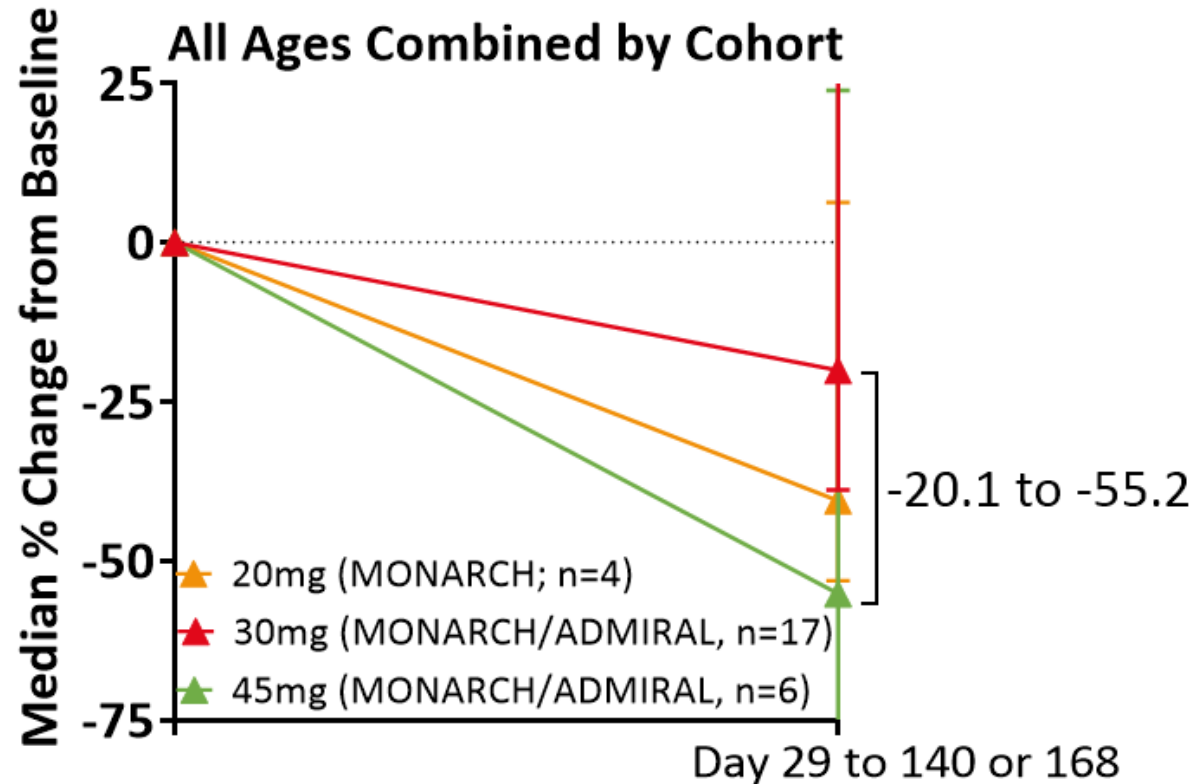
Design	Evaluation of STK-001 (up to 45mg*)	Evaluation of STK-001 (up to 70mg)
Status	MAD @45mg: Dosing ongoing	MAD @70mg: Dosing ongoing
Primary Endpoint	Safety and tolerability of SAD and MAD dose levels Characterize human pharmacokinetics (PK) and cerebrospinal fluid (CSF) drug exposure	Safety and tolerability of MAD dose levels
Secondary Endpoint	Change in seizure frequency, overall clinical status, and quality of life	
Open-Label Extension	Enrollment and dosing ongoing (30mg)  swallowtail	Enrollment and dosing ongoing (45mg)  Longwing

\*Doses >45mg remain on FDA partial clinical hold

Sources: Interim Safety, PK, and CSF Exposure Data from the Phase 1/2a MONARCH Study of STK-001, an Antisense Oligonucleotide (ASO), in Children and Adolescents with Dravet Syndrome (AES 2021). ADMIRAL: A UK Study of the Safety and Pharmacokinetics of Antisense Oligonucleotide STK-001 in Children and Adolescents with Dravet Syndrome (AES 2021). © Copyright 2022 Stoke Therapeutics  
Interim Analysis of STK-001 for the Treatment of Dravet Syndrome, Presented on November 14, 2022.

# 55% Median Reduction in Convulsive Seizure Frequency Observed in Patients Treated With Three Doses of STK-001 (45mg)

Across the multiple dose cohorts (20mg, 30mg, 45mg), 74% (20/27) of patients experienced reductions in seizures

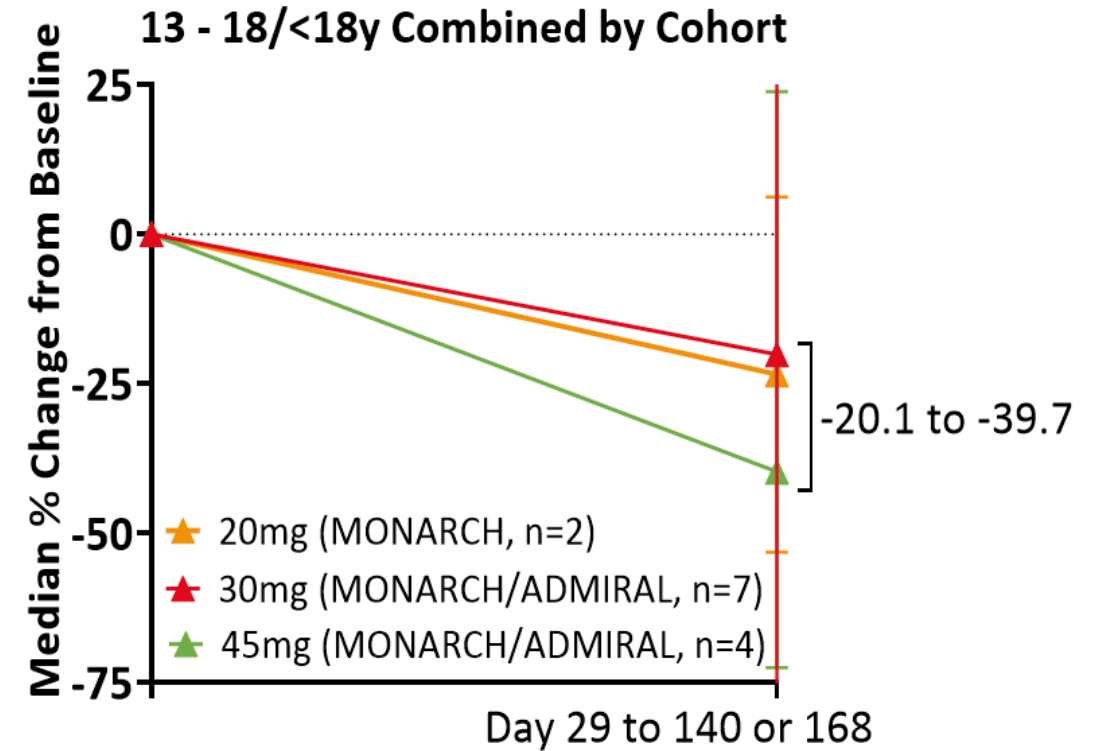
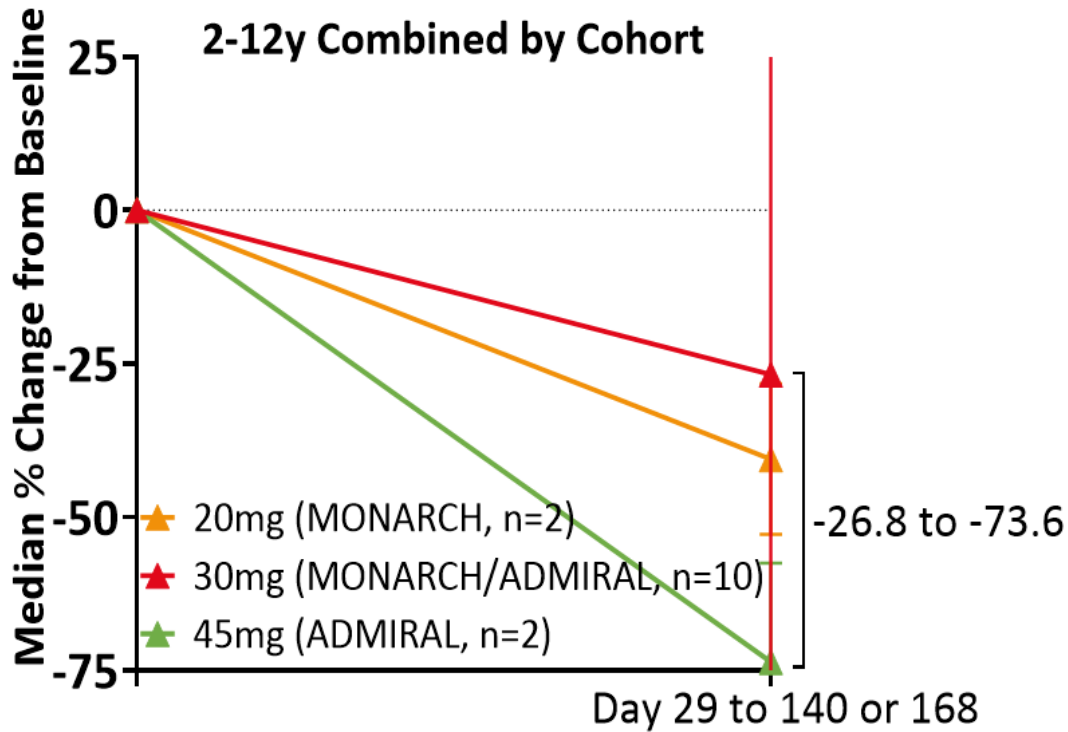


Similar seizure reduction was observed among patients taking or not taking concomitant fenfluramine (>50% of patients were taking concomitant fenfluramine)



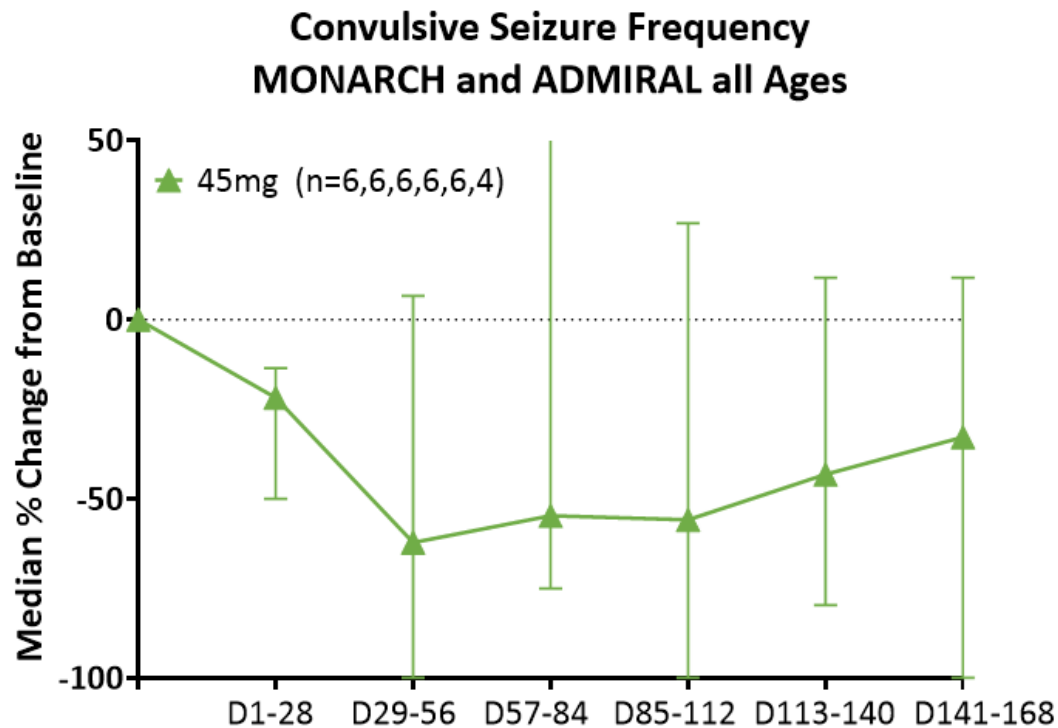
# Reductions in Convulsive Seizure Frequency Observed Across Age Groups

Seizure reductions more evident among patients ages 2-12

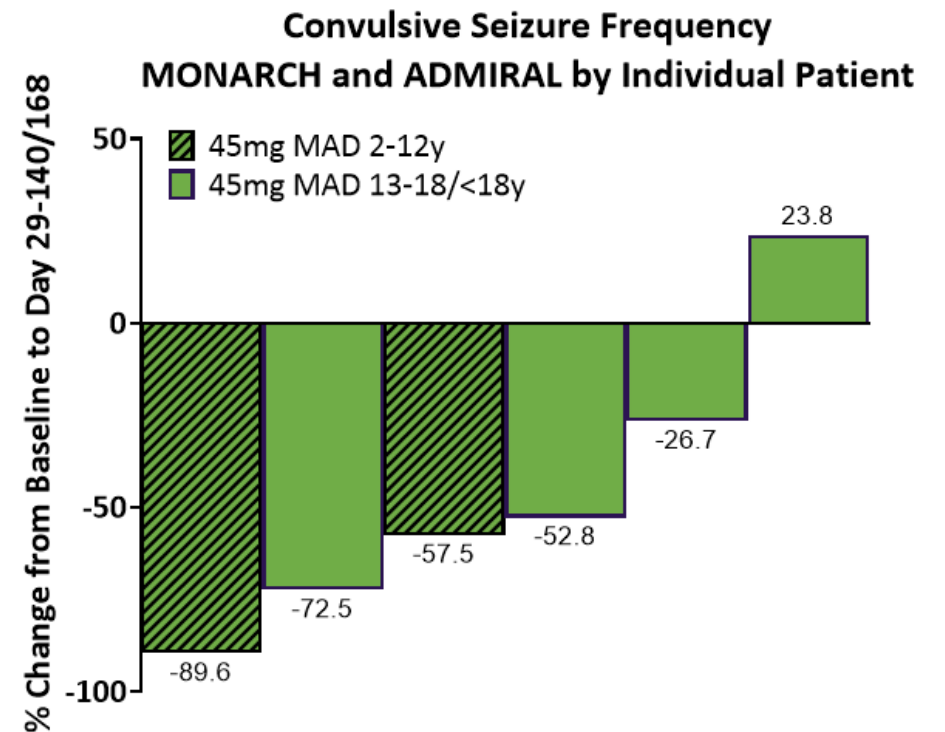


# 67% (4/6) Patients Experienced a Greater Than 50% Reduction in Convulsive Seizure Frequency

Reductions began after the first dose and continued with additional treatment



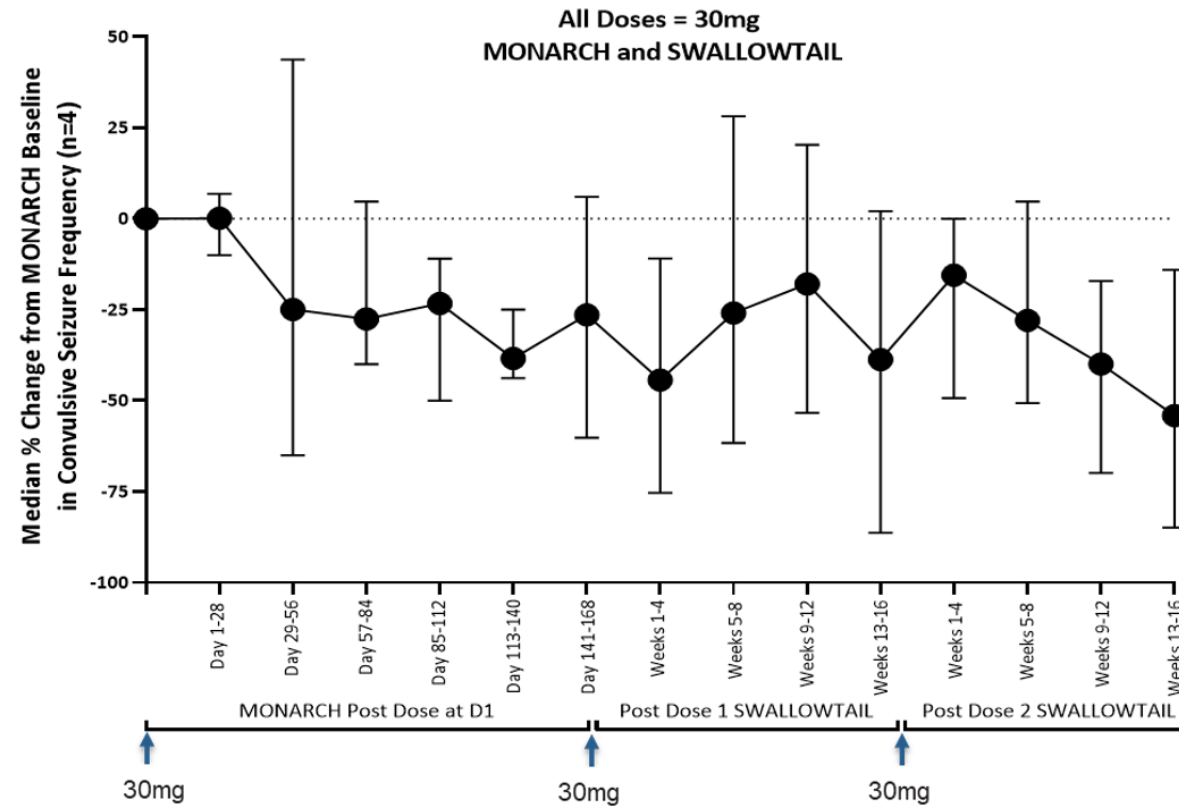
83% (5/6) experienced a reduction from baseline in convulsive seizure frequency after three doses (45mg)



4/6 patients were taking concomitant fenfluramine

# Reductions in Seizure Frequency Were Maintained with Ongoing Treatment

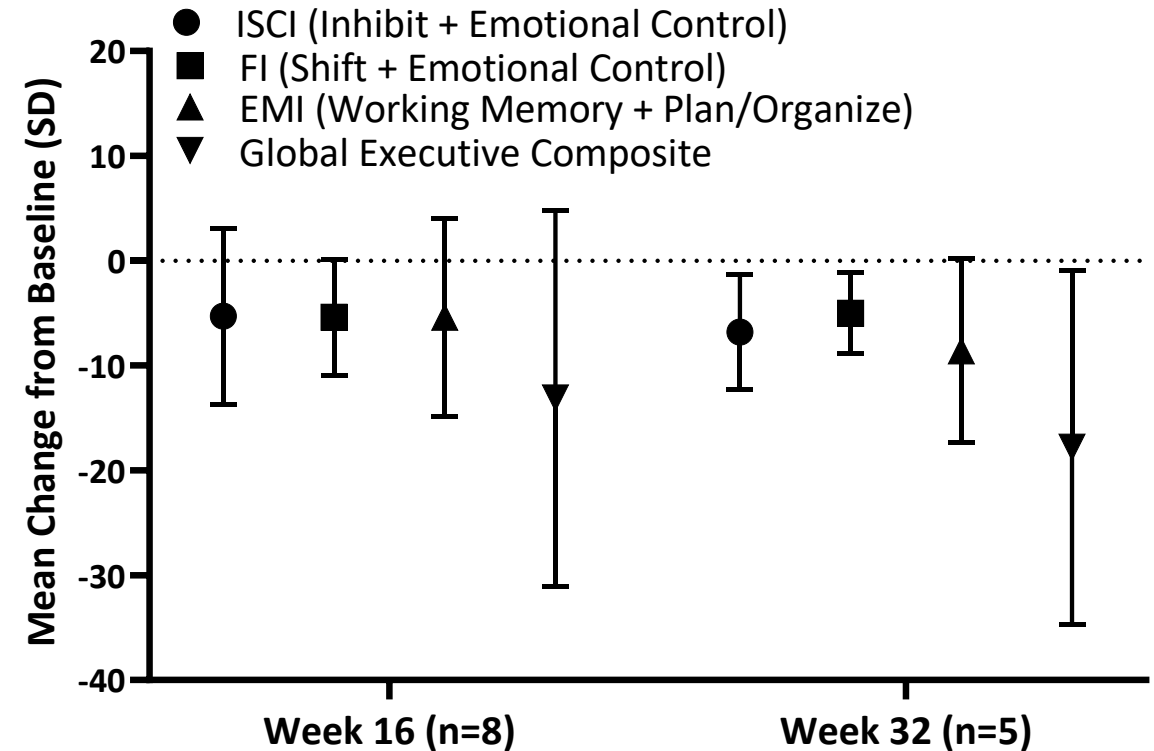
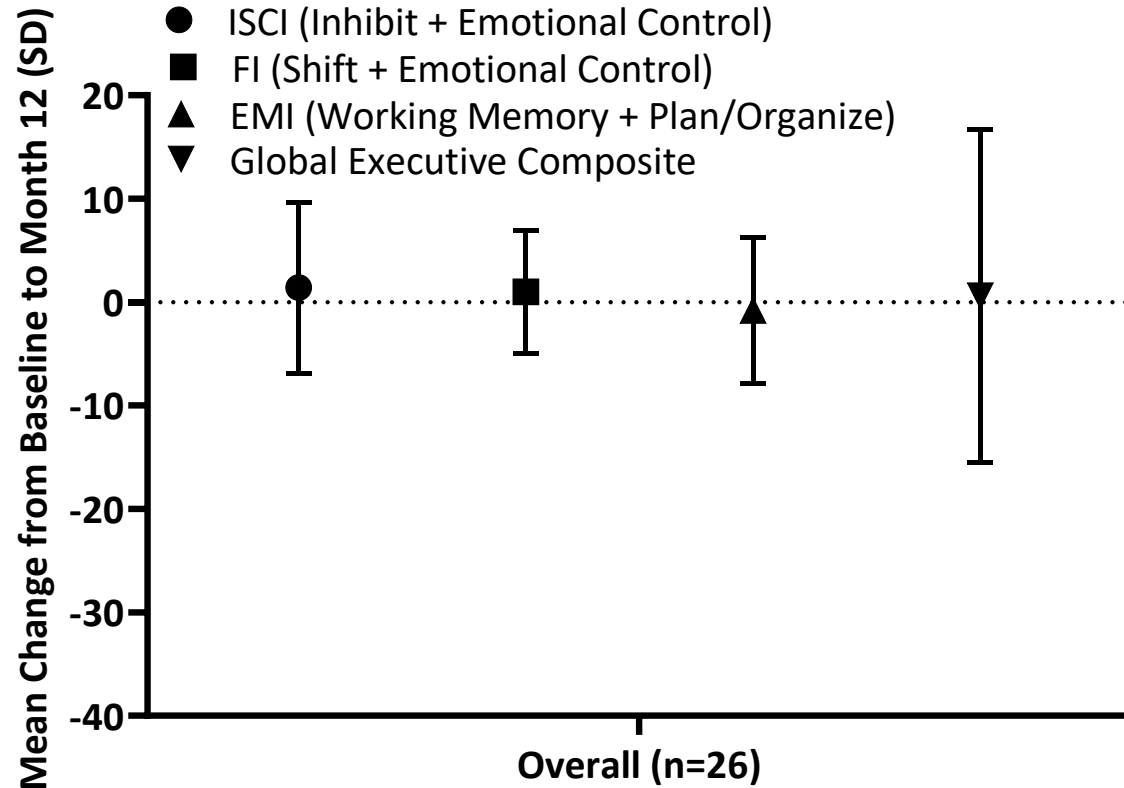
## CONVULSIVE SEIZURE FREQUENCY



No exclusions for AED modification



# Early Indication of Improvements in Non-Seizure Comorbidities as Measured by BRIEF-P\*



All Doses = 30mg in Swallowtail

\*Behavior Rating Inventory of Executive Function–Preschool Version, an assessment of pediatric executive function

Source: Preliminary Interim Analysis of STK-001 for the Treatment of Dravet Syndrome from the Phase 1/2a MONARCH and ADMIRAL Studies, Presented on November 14, 2022.

# STK-001 Has Potential to Address the Genetic Cause of Dravet Syndrome (DS)

## Summary of Key Ph1/2a Interim Data

Single and multiple doses of STK-001 up to 45mg were well-tolerated



55% median reduction in convulsive seizure frequency observed in patients treated with three doses of STK-001 (45mg)



Reductions in Seizure Frequency Were Maintained with Ongoing Treatment



Early indication of improvements in non-seizure comorbidities as measured by BRIEF-P\*\*



**Additional data anticipated in 2023 from the 45mg and 70mg multiple dose cohorts**

# Autosomal Dominant Optic Atrophy (ADOA): A Severe, Progressive Optic Nerve Disorder

**65-90%**

of cases caused by mutations in one allele of the *OPA1* gene, most of which lead to a **HAPLOINSUFFICIENCY**



RESULTING in



**50%**

*OPA1* protein expression and disease manifestation

**1 out of 30,000**

people are affected globally with a higher incidence of ~1 out of 10,000 in Denmark due to a founder effect



Up to

**46%**

of patients are registered legally blind



**>400**

Different *OPA1* mutations reported in ADOA patients

**80%**

of patients are symptomatic by age 10

**~18,000**

people affected in the U.S., Canada, Japan, Germany, France and the UK



# No Approved Disease-Modifying Therapies for ADOA

## Healthy Vision



## Simulation of Optic Neuropathy



- Most common inherited optic nerve disorder
- Leads to central field defects and reduced color vision in both eyes
- Severity can vary; rate of vision loss difficult to predict
- Supportive services and low-vision aids are offered for patients



Healthy

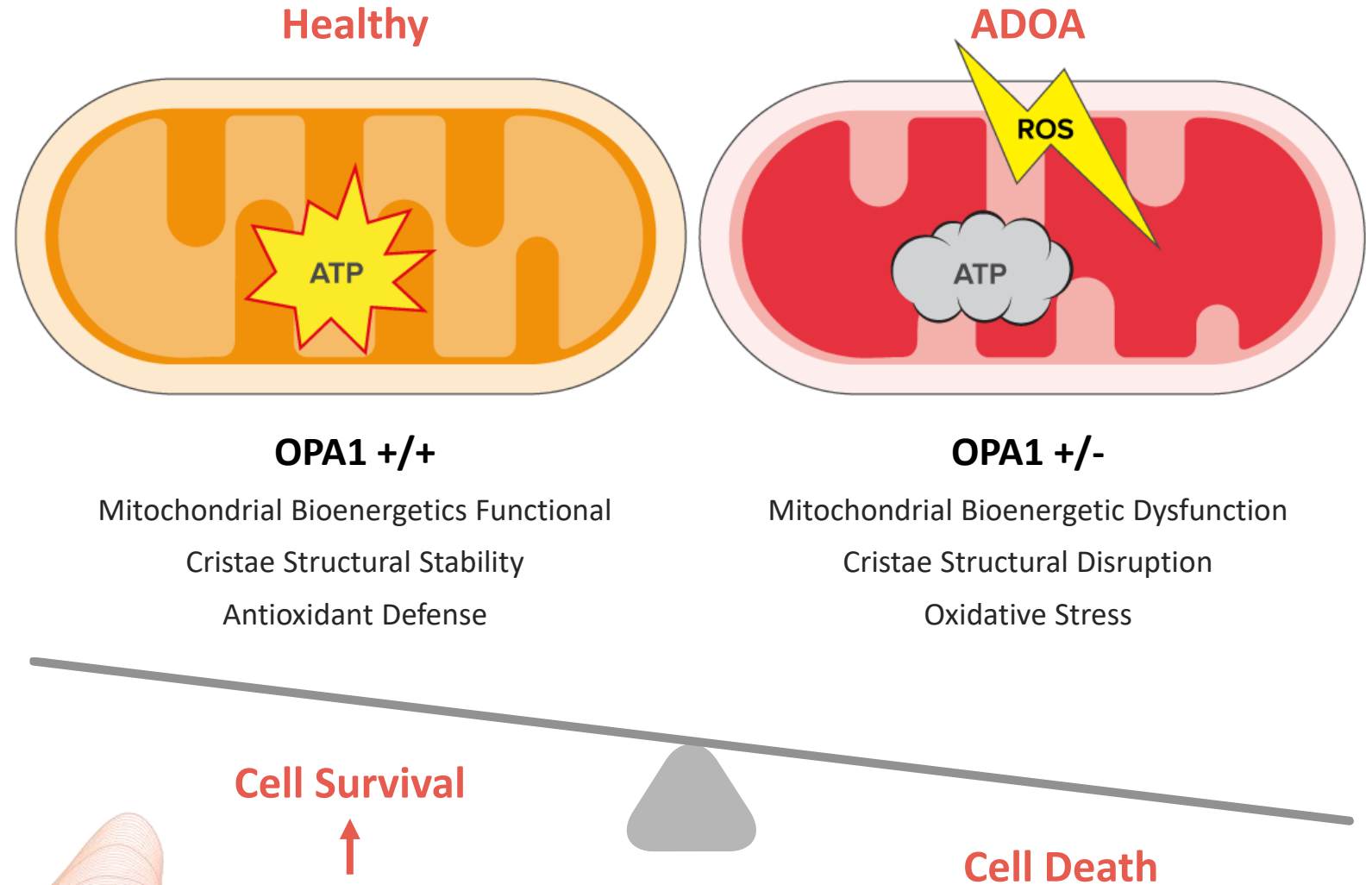


ADOA patient



# OPA1 is Critical for Normal Mitochondrial Function and Cellular Metabolism

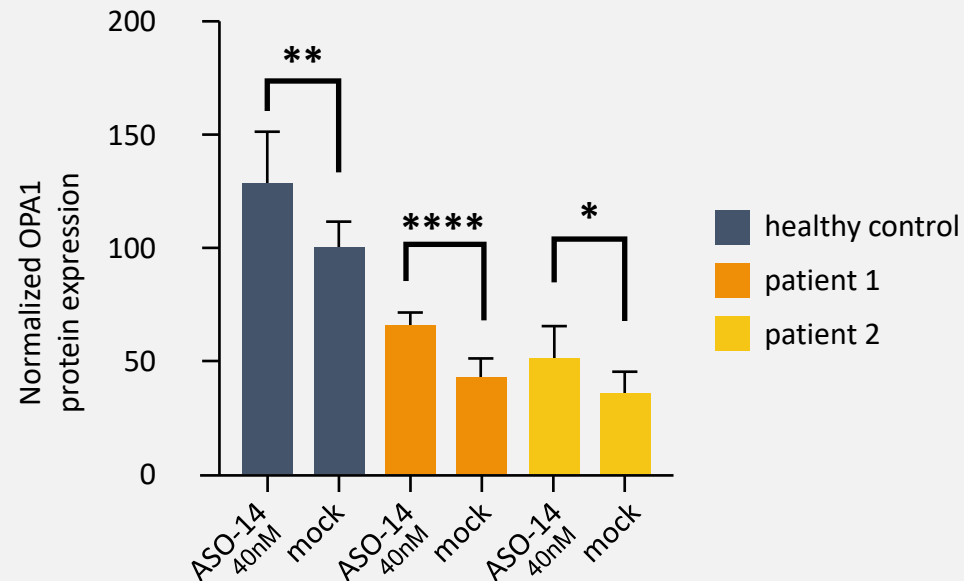
- Retinal ganglion cells have very high energy (ATP) requirements
- Impaired mitochondrial function leads to cell death
- OPA1 is critical for mitochondrial function and energy production



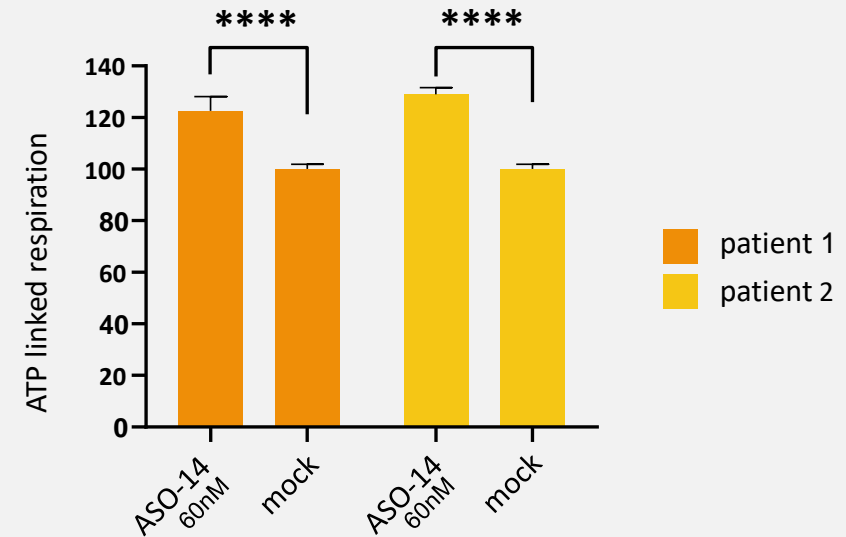


# TANGO ASO Increases OPA1 Protein and ATP Linked Mitochondrial Respiration in ADOA Patient Cells

ASO treatment increased OPA1 protein levels in OPA1 deficient ADOA patient cells



ASO treatment increased ATP linked respiration in OPA1 deficient ADOA patient cells

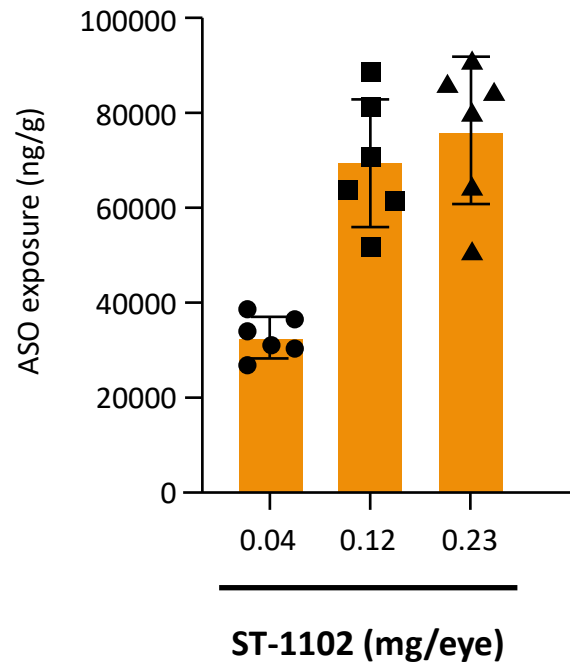


Source (left graph): Stoke data

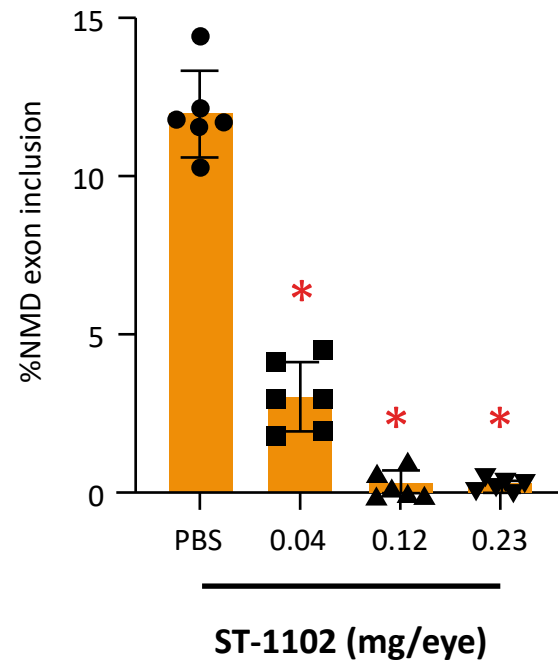
Source (right graph): Venkatesh A, et al. Antisense oligonucleotide mediated increase in OPA1 improves mitochondrial function in fibroblasts derived from patients with autosomal dominant optic atrophy (ADOA). Presented at The Association for Research in Vision and Ophthalmology; May 1-7, 2021.

# TANGO ASO Demonstrates Dose-Dependent OPA1 Protein Increases in Rabbit Retina

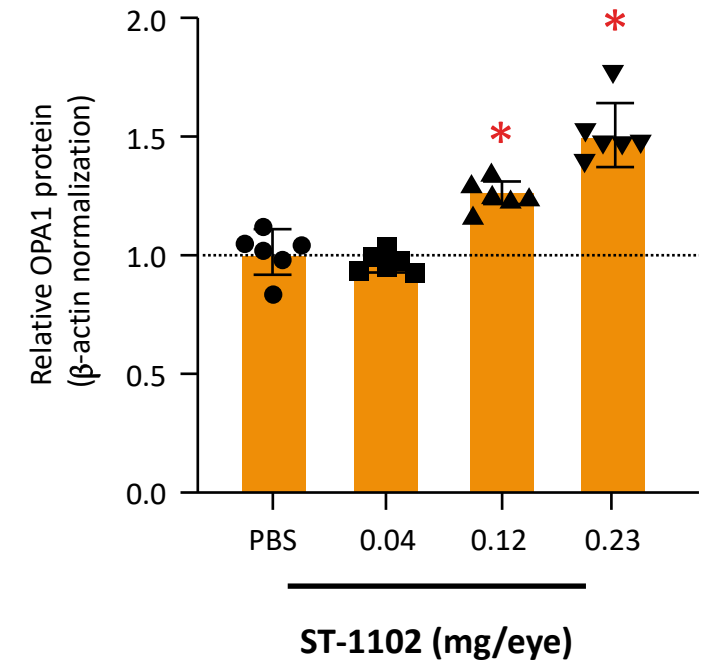
ASO exposure in retina  
Day 29



Target engagement  
Day 29

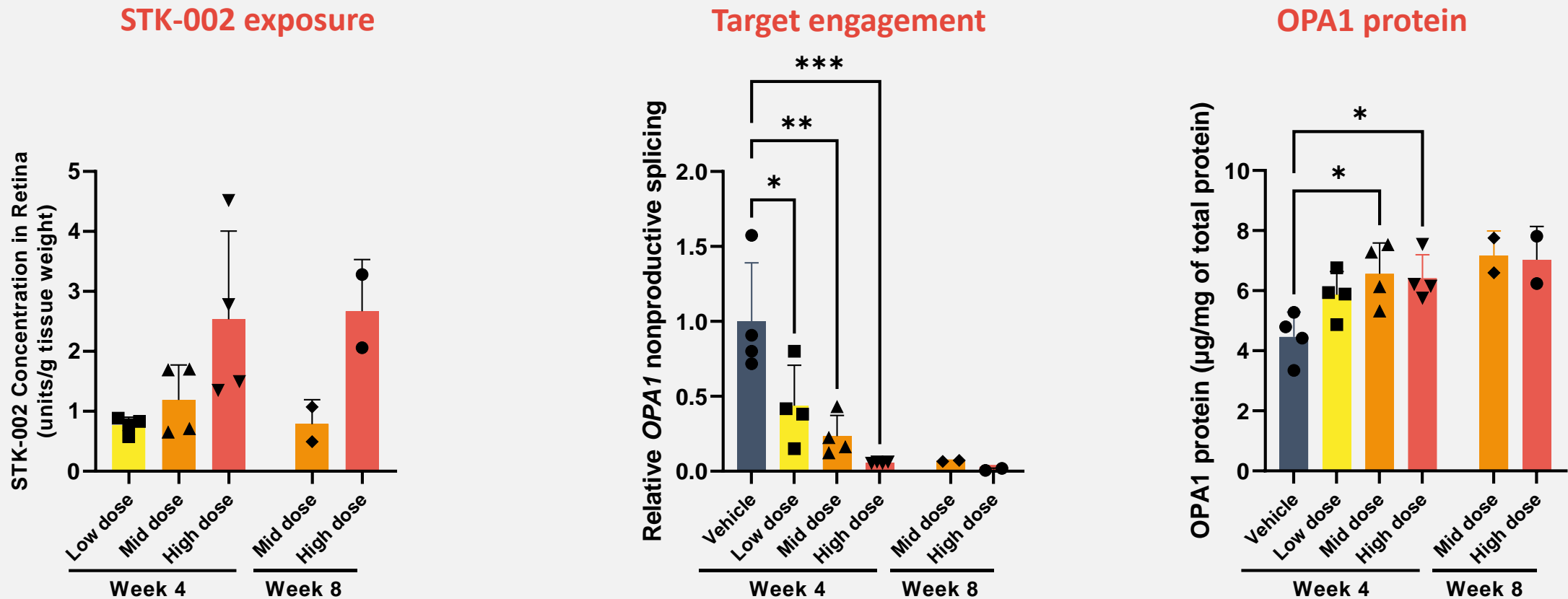


OPA1 protein  
Day 29



\* $P < 0.0005$  by one-way ANOVA compared to PBS group

# Dose-Related Target Engagement and OPA1 Protein Upregulation in Retinal Tissue of NHPs following IVT Administration of STK-002



NHP: Non-human primates

IVT: Intravitreal

Source: Venkatesh A, et al. STK-002, an Antisense Oligonucleotide (ASO) for the Treatment of Autosomal Dominant Optic Atrophy (ADOA), is Taken Up by Retinal Ganglion Cells (RGC) and Upregulates OPA-1 Protein Expression After Intravitreal Administration to Non-human Primates (NHPs). ASGCT; May 16-19, 2022.

# TANGO ASOs Have the Potential to Address the Genetic Cause of ADOA

## Summary of Key Preclinical Data

Increase OPA1 protein and ATP linked respiration in ADOA patient cells



Result in dose-dependent increases in OPA1 protein expression in rabbit retina



Were well tolerated for up to 29 days after intravitreal injection in rabbit



Dose-related increase in OPA1 protein expression was observed in NHP RGCs



**Preclinical toxicology studies ongoing in 2022 to support future clinical trials for STK-002**

# Collaboration with Acadia Pharmaceuticals to Pursue RNA-Based Treatments for Severe & Rare Genetic Neurodevelopmental Diseases

Collaboration leverages Stoke's proprietary TANGO research platform and Acadia's expertise in neurology drug development and commercialization

## 3 targets focused on severe and rare genetic neurodevelopmental diseases of the central nervous system

- Acadia receives exclusive worldwide licenses for:
  - Rett syndrome (*MECP2*)
  - Undisclosed neurodevelopmental target
- 50:50 co-development co-commercialization of SYNGAP1

## Stoke receives a \$60M upfront payment and potential milestones up to \$907M as well as royalties on future sales

- Acadia fully funds the research and preclinical development activities for Rett syndrome (*MECP2*) and undisclosed neurodevelopmental program
- Share 50/50 in all world-wide costs and future profits for SYNGAP1 program



# Investing In Our Pipeline

PROGRAM	TARGET	DISCOVERY & PRECLINICAL	PHASE 1/2	PHASE 3	PARTNER
<b>Central Nervous System</b>					
Dravet Syndrome	SCN1A	STK-001			100% Stoke Global
SYNGAP1 Syndrome	SYNGAP1				Stoke : Acadia 50:50
Rett Syndrome	MECP2				Acadia Worldwide License
Undisclosed	Undisclosed				Acadia Worldwide License
<b>Ophthalmology</b>					
ADOA	OPA1	STK-002			100% Stoke Global

# Rett Syndrome: A Severe, Debilitating Neurological Disorder

~33%

of cases caused  
by hypomorphic  
mutations of the *MECP2*  
gene<sup>1</sup>

RESULTING in



Partial loss of  
function of the  
MeCP2 protein



**1** out of **10,000** to **15,000** females are born with Rett syndrome<sup>2</sup>

Period of rapid  
decline typically  
begins between

**6 to 18**  
months<sup>4</sup>

Symptoms include<sup>3</sup>:

- **Loss of purposeful hand use**
- **Involuntary hand movements such as handwringing**
- **Loss of speech**
- **Loss of mobility or gait disturbances**



**60-80%** of patients have **epilepsy**<sup>4</sup>

Note: All seizure types have been reported in Rett syndrome. Complex partial and generalized tonic-clonic are the most common

Sources: <sup>1</sup> RettBase (<http://mecp2.chw.edu.au/>); GnomAD (<https://gnomad.broadinstitute.org/>); NOMAD; <sup>2</sup> National Institutes of Health – National Institute of Neurological Disorders and Stroke; <sup>3</sup> International Rett Syndrome Foundation; <sup>4</sup> Operta et al., Brain Behav 2019

# SYNGAP1 Syndrome: A Severe Intellectual Disability / Developmental and Epileptic Encephalopathy (ID/DEE)

>80%

of cases caused by a  
**HAPLOINSUFFICIENCY**  
of the *SYNGAP1* gene<sup>1</sup>

RESULTING in

50%

SynGAP protein  
expression



**1-2** out of **100,000** children are born with SYNGAP1-ID/DEE



**1-2%**

of all **intellectual disability**  
cases<sup>2</sup>



**84%**

of patients have  
**generalized epilepsy**<sup>3</sup>

**100%**

of patients have **developmental delay**  
or **intellectual disability**<sup>3</sup>

**~50%**

of patients have **autism and other**  
**behavioral abnormalities**<sup>3</sup>

Sources: <sup>1</sup> Parker et al., *American Journal of Medical Genetics*, 2015; Jimenez-Gomez et al., *Journal of Neurodevelopmental Disorders*, 2019; <sup>2</sup> SYNGAP1 Resource Guide, Second Edition; An Overview of SYNGAP1 Basic Biology and Clinical Description. Bridge the Gap SYNGAP (now SYNGAP1 Foundation); SynGAP Research Fund; <sup>3</sup> SYNGAP1-Related Intellectual Disability: [https://www.ncbi.nlm.nih.gov/books/NBK537721/#\\_syngap1-id\\_Clinical\\_Characteristics\\_](https://www.ncbi.nlm.nih.gov/books/NBK537721/#_syngap1-id_Clinical_Characteristics_)



## Our Strategy For 2022

**Advance our wholly owned CNS and ophthalmology programs and expand the scope of our drug discovery efforts**

### Advance STK-001 for Dravet Syndrome

- Additional clinical data on STK-001 (30mg MAD) anticipated in 2H22
- Initiate dosing >30mg in MONARCH and ADMIRAL

### Advance STK-002 for ADOA

- Conduct preclinical toxicology studies to support future clinical trials for STK-002
- Begin enrollment in prospective ADOA natural history study
- Present additional preclinical data for STK-002 at scientific forum

### Develop & Expand Pipeline

- Continue discovery efforts to identify new targets
- Execute on collaboration with Acadia

## Current Liquidity Anticipated to Fund Operations into 2025

**\$252.2M**

Cash, Cash Equivalents,  
Marketable Securities, and Restricted Cash

*as of 9/30/2022*

**39.4M**

Common Shares Outstanding

*as of 9/30/2022*





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