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**Challenging the status quo** of genomic medicines with small molecules (GeneTAC<sup>™</sup> Molecules) that dial up or dial down transcription...

...to treat significant monogenic disorders

BECAUSE WE BELIEVE YOUR FATE DOESN'T HAVE TO BE WRITTEN IN YOUR GENES



## **The Design Opportunity**

- Led by expert team with track record of success
- Proprietary GeneTAC<sup>TM</sup> platform with firstand/or best-in-disease potential
- Opportunity to surpass other genomic medicine approaches like gene therapy, gene editing and oligonucleotides
- 5 years of cash runway to enable clinical proofof-concept of up to 4 programs



Pratik Shah, Ph.D.
Chief Executive Officer

Former Chair Synthorx (\$2.5 B acquisition by Sanofi), Former CEO Auspex (\$3.5 B acquisition by Teva)



Sean Jeffries, Ph.D. Chief Operating Officer

Former BCG



Jae Kim, M.D.
Chief Medical Officer

Former Alnynam, MyoKardia, Amgen

# **Advancing four GeneTAC™ molecule programs**

	Friedreich Ataxia	FECD	Huntington's Disease	Myotonic Dystrophy 1	
Gene	FRATAXIN (FXN)	TCF4	HUNTINGTIN (HTT)	DMPK	
Monogenic disease	GAA repeat expansion leads to reduced transcription	CTG repeat expansion causes nuclear foci & corneal endothelial cell dysfunction	CAG repeat expansion leads to toxic mRNA and protein product	CTG repeat expansion causes nuclear foci & cellular dysfunction	
Differentiated profile	New drug product DT- 216P2 with improved PK and injection site safety profiles observed in non- clinical studies	Allele-selective reduction of mutant transcript (TCF4) DT-168 in an eye drop	Allele-selective reduction of mutant HTT	Allele-selective reduction of mutant DMPK leads to foci resolution and splicing correction	
Status	DT-216 effect confirmed in previous FA patient trials	DT-168 IND cleared Phase 1 start in 2024	Next step: Select DC	Next step: Select DC	
Significant market	\$7.3B enterprise patients with TCF4 symptomatic an value (Skyclarys) repeat expansion 200,000 at-risk		<ul> <li>In US, &gt;40,000 symptomatic and 200,000 at-risk</li> <li>Multi-billion \$ oppty</li> </ul>	<ul> <li>Estimated &gt;70K cases in US</li> <li>Multi-billion \$ oppty</li> </ul>	

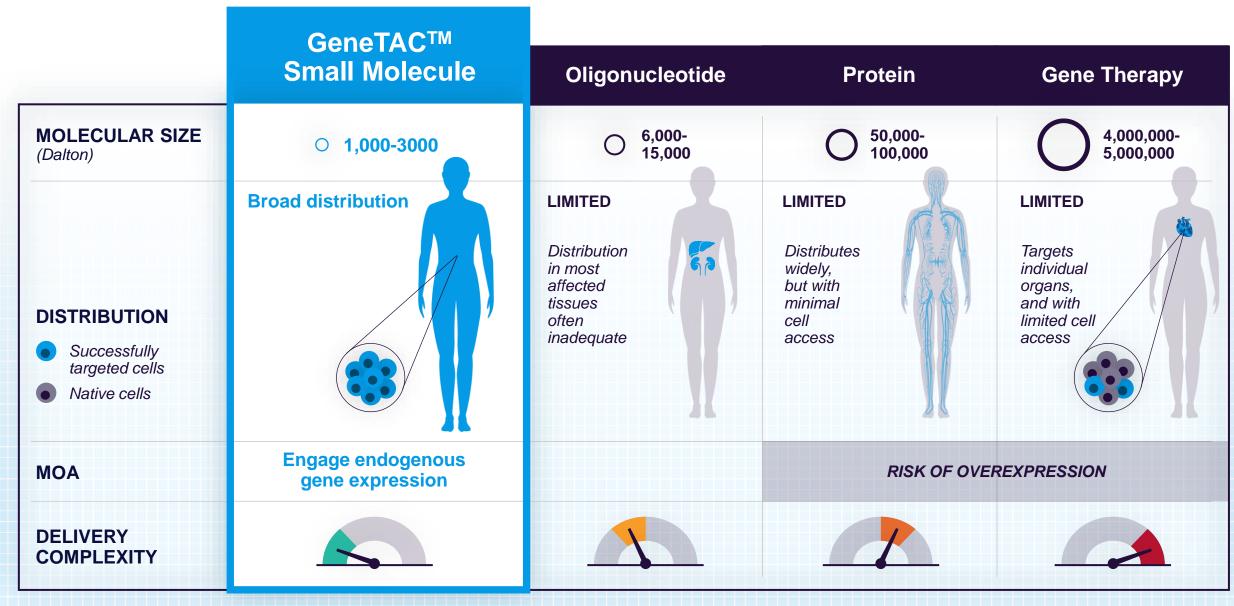
## **GeneTAC™ Molecules have several advantages** over traditional genomic medicine approaches

	Simple drug delivery	Working with natural genome	Distribute widely	Low burn rate		Annual R&D spend
Sene editing/ ene therapy	$\times$	$\times$	X	$\langle \times \rangle$		\$130-460M <sup>1</sup>
go cleotide	$\times$		$\times$	$\times$	0	\$50-150M <sup>1</sup>
neTAC™ tform						\$60 - 80M <sup>2</sup>

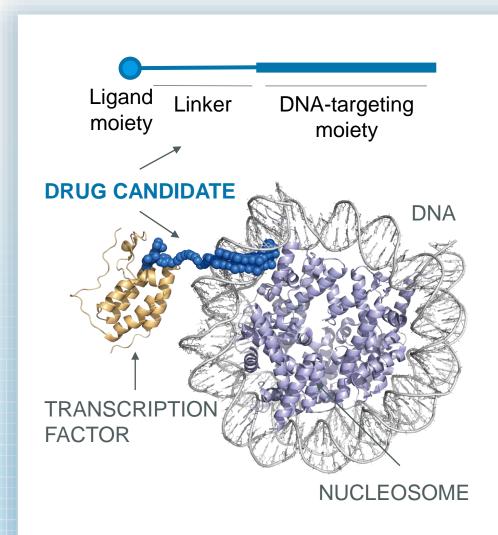
<sup>1.</sup> Estimates derived from analysis of R&D spend of select peers in 2022. Gene therapy/gene editing peers included in the analysis: Beam Therapeutics, Crispr Therapeutics, Editas Medicine, Intellia Therapeutics, Sangamo Therapeutics, Verve Therapeutics, Bluebird Bio. Oligonucleotide peers included in the analysis: Avidity Biosciences, Dyne Therapeutics, Entrada Therapeutics, PepGen.

<sup>2.</sup> Based on analyst consensus forecast for 2024 - 2027

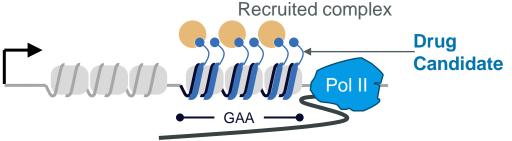
# GeneTAC™ Molecules can distribute widely overcoming a central challenge for traditional genomic medicines



#### Differentiated mode of action of GeneTAC™ molecules

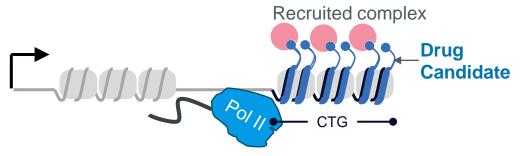


#### **DIAL UP EXPRESSION**



Designed to facilitate transcription through the locus

#### **DIAL DOWN EXPRESSION**



Designed to block transcription at the mutant locus

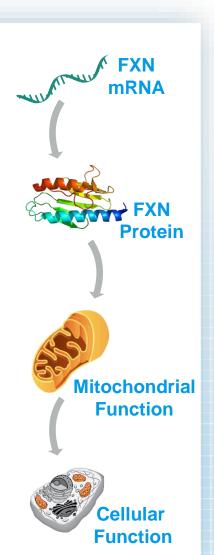
# DT-216P2 for Friedreich Ataxia

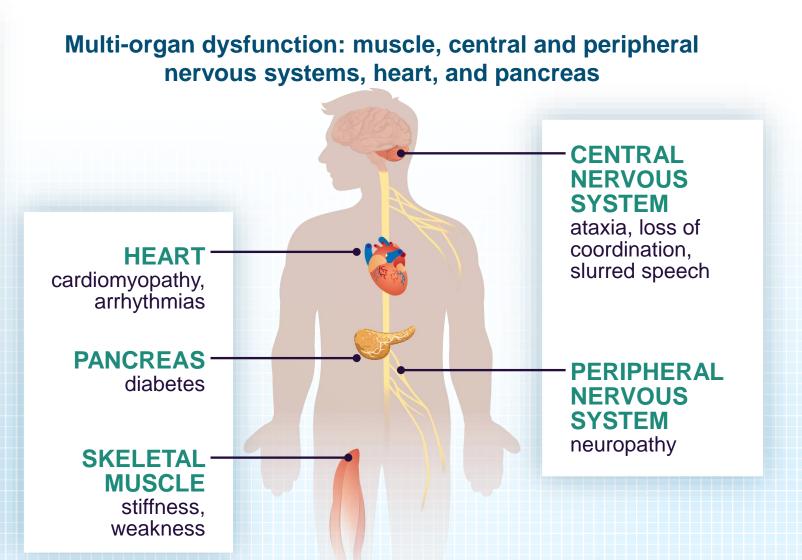


## FA: Debilitating disease with limited treatment options today

Monogenic disease caused by GAA-repeat expansion in 1<sup>st</sup> intron of frataxin (FXN) gene

Mutation leads to reduced FXN transcription, which is necessary for mitochondrial and cellular function

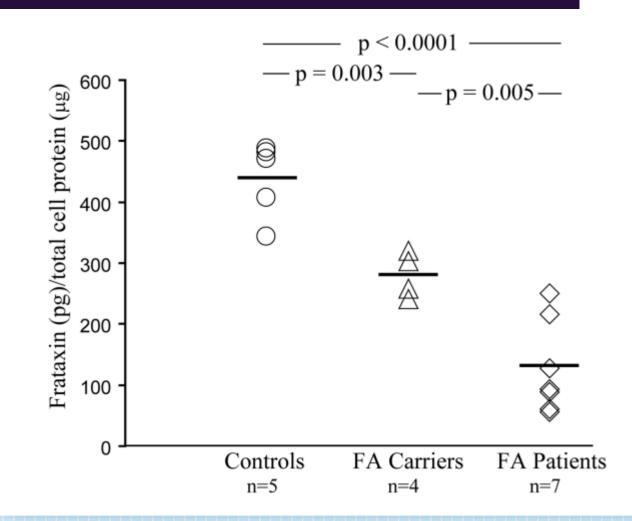




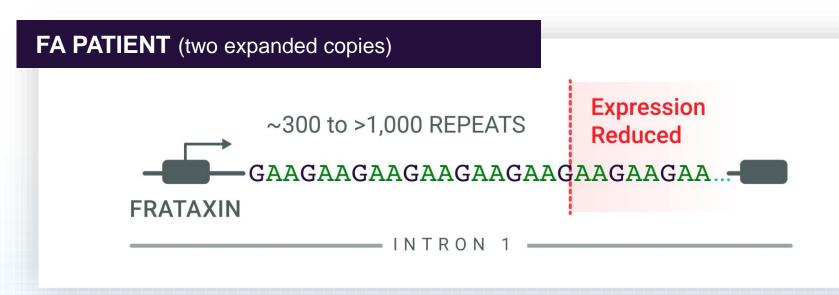
# Therapeutic goal: increase FXN

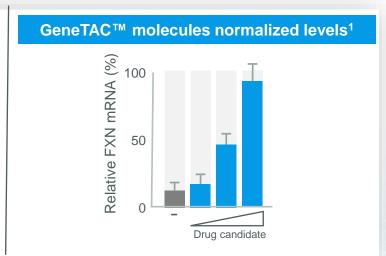
- FA patients, carriers and controls have different average FXN protein levels
- Carriers are free of FA symptoms
- ~2X increase of FXN
   protein could potentially
   bring patients' levels into
   asymptomatic carrier
   range

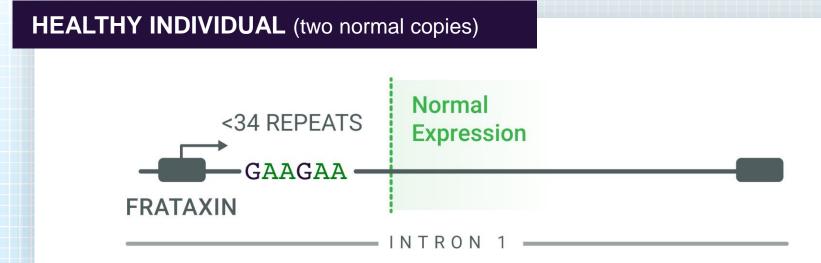
#### **FXN** protein level in lymphoblastoid cells

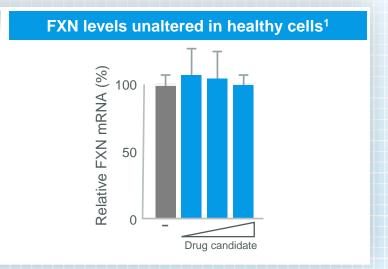


## **FA GeneTAC™** molecules normalized **FXN** levels in **FA** patient cells but did not alter FXN levels in healthy cells



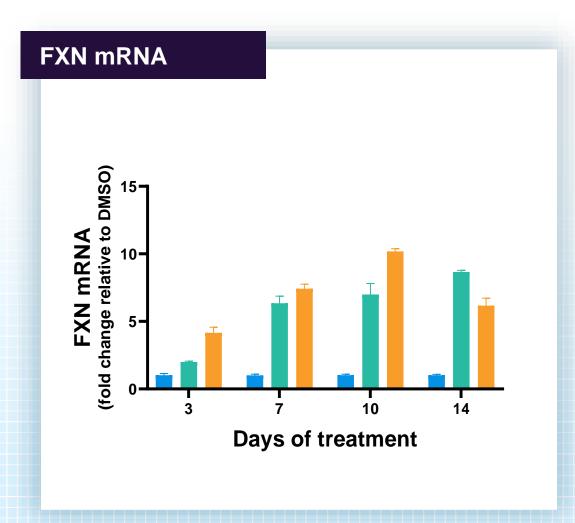


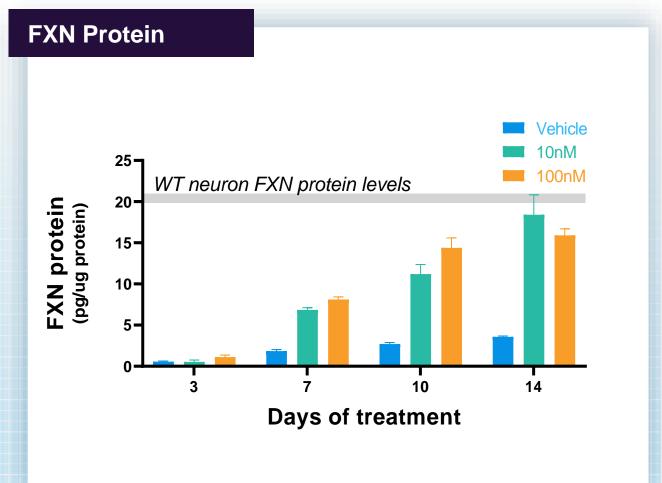




<sup>1.</sup> Graph x-axis represents increasing levels of cellular exposure to FA GeneTAC™ molecules. Bars represent standard error of the mean.

# Low concentrations of DT-216 molecule restored endogenous FXN levels in FA patient iPS-neurons





## Phase 1 trial with prior DT-216 drug product in FA patients

- Primary and secondary objectives: evaluate safety, tolerability and pharmacokinetics (PK)
- Exploratory objective: evaluate FXN gene expression

#### **Study Population**

- Age 18 to 55
- Genetically confirmed FA
- Stage ≤ 5.5 (Functional Staging of Ataxia\*)
- Without clinically significant concomitant medical conditions

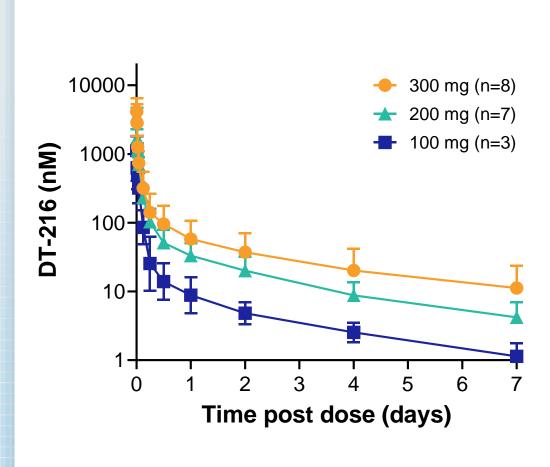
Randomization (DT-216: Placebo)

**Single Ascending Dose (SAD)** 600mg IV x 1 400mg IV x 1 Injection site thrombophlebitis observed at 400 and 600mg doses 200mg IV x 1 100mg IV x 1 50mg IV x 1 25mg IV x 1 Placebo IV x 1

## **Multiple Ascending Dose (MAD)** Selection of initial MAD doses based upon anticipated: Tissue exposures in therapeutic range at 200-300mg dose levels Injection site tolerability 300mg IV weekly x 3 MUSCLE **BIOPSIES** 200mg IV weekly x 3 100mg IV weekly x 3 Placebo IV weekly x 3

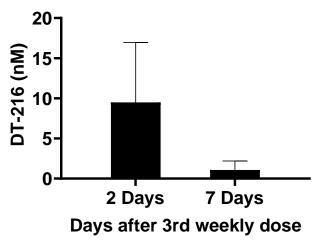
# Prior DT-216 drug product Phase 1 MAD study revealed plasma PK and tissue distribution are both transient with QW IV dosing

#### Plasma DT-216 PK after 3rd Dose



#### Muscle DT-216 PK after 3rd Dose

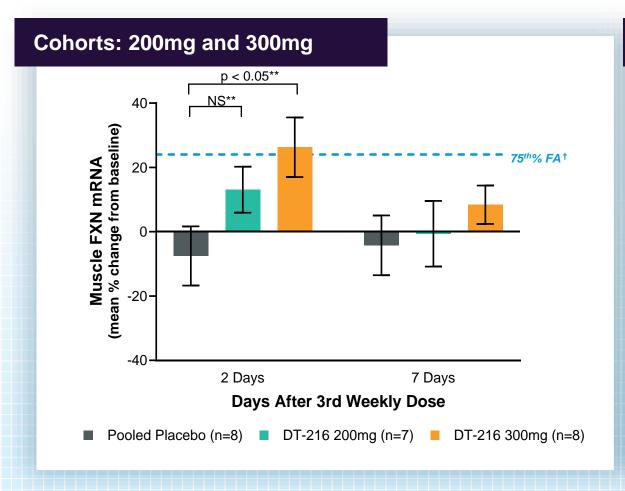
- Average DT-216 levels in skeletal muscle at both 200mg and 300mg cohorts were ~8-10nM two days after 3rd weekly dose & ~1nM seven days after 3rd weekly dose
  - Combined 200 mg and 300 mg cohort

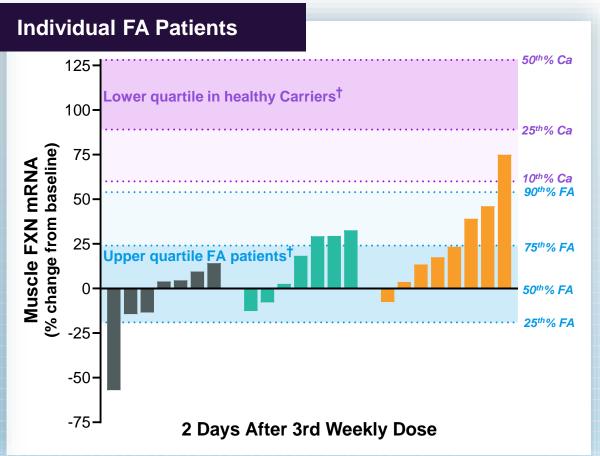


 DT-216 concentrations in muscle were lower than projected based on nonclinical studies in animals

# Prior DT-216 drug product Phase 1 MAD study showed FXN expression is dialed up in response to drug exposure in FA Patients

Muscle FXN mRNA response correlated with dose and muscle DT-216 exposure, p < 0.05\*





<sup>\*</sup> Exploratory analyses for dose-response and exposure-response were conducted using a non-parametric trend test and non-parametric correlation test, respectively.

<sup>\*\*</sup> Exploratory analyses were conducted using a non-parametric Wilcoxon Rank-Sum model. A parametric ANCOVA model gave similar results. Bars represent standard error of the mean. NS, not significant.

<sup>†</sup> Percentiles and quartiles assume individual FA patient baselines in the MAD study are the median FA patient FXN mRNA value from the observational muscle biopsy study.

# Injection site thrombophlebitis issue appears addressed with new drug product DT-216P2

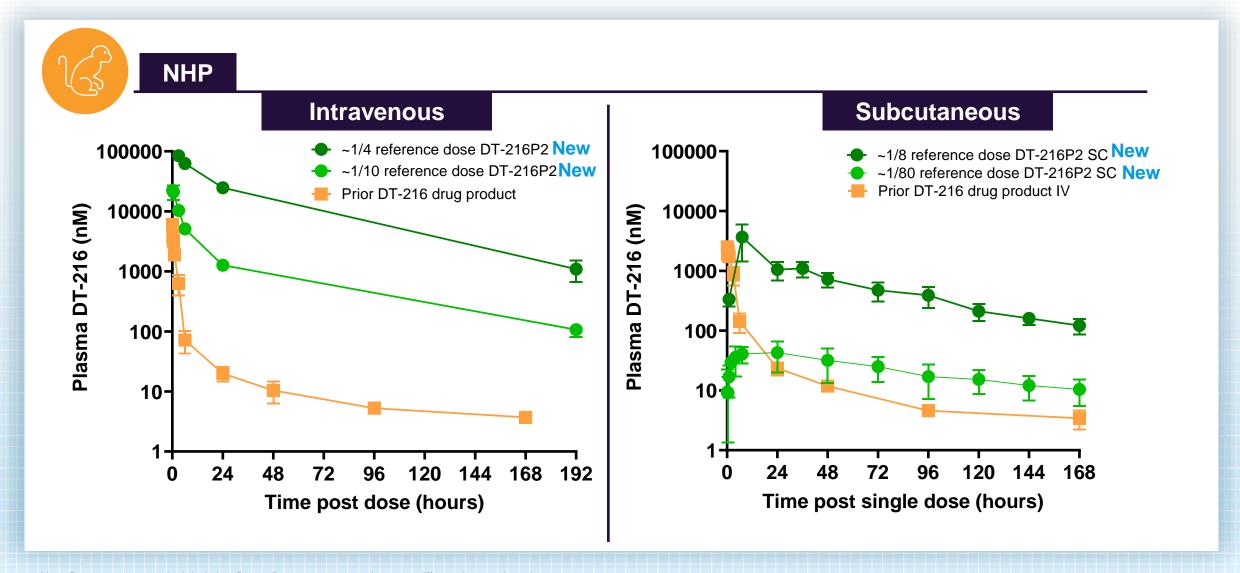
#### Prior DT-216 drug product Phase 1 MAD safety

- No serious or severe adverse events (AEs) and no treatment-related discontinuations (1 unrelated study withdrawal due to COVID infection)
- 5 AEs of injection site thrombophlebitis on DT-216 arm - 100mg cohort (1 mild); 200mg cohort (3 mild); 300mg cohort (1 moderate), none in placebo group

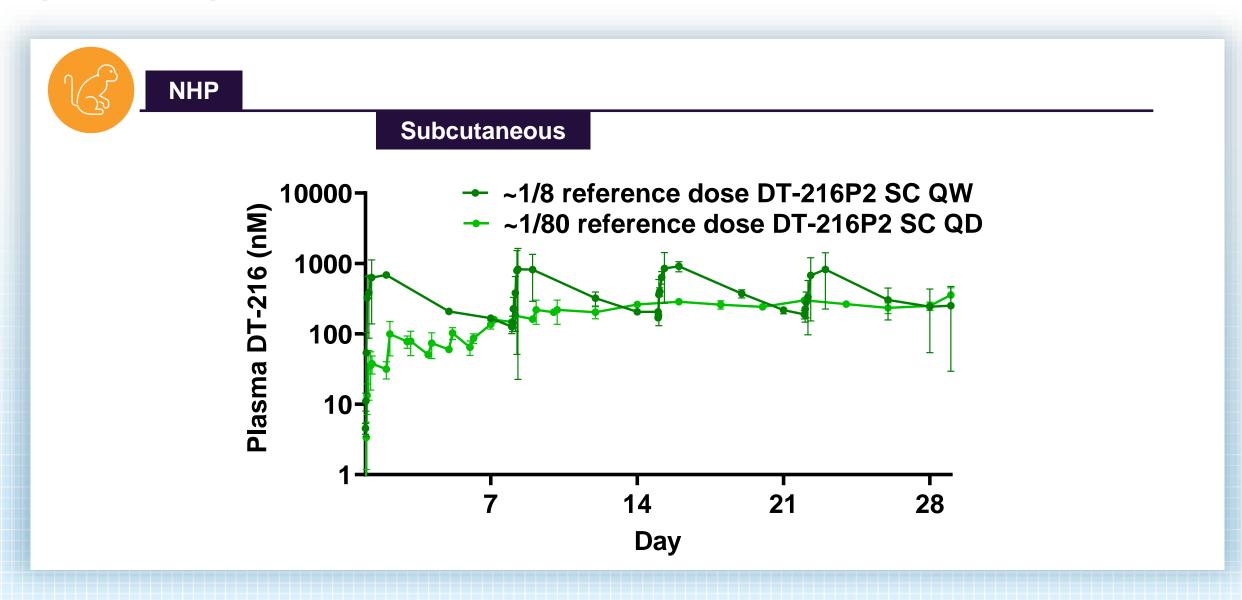
# Nonclinical observations with DT-216P2 compared with prior drug product

- Nonclinical studies showed that the injection site reactions were attributable to the formulation excipients in the prior drug product
- DT-216P2 Non-GLP animal studies conducted support conclusion that new drug product formulation potentially addresses the injection site issues and is suitable for confirmatory GLP studies
- DT-216P2 appears suitable for IV administration (compatible with injections or infusions, peripheral or central with port systems for chronic dosing) or subcutaneous injections or infusions

# DT-216P2 demonstrates superior product profile in NHPs using a proprietary and novel excipient



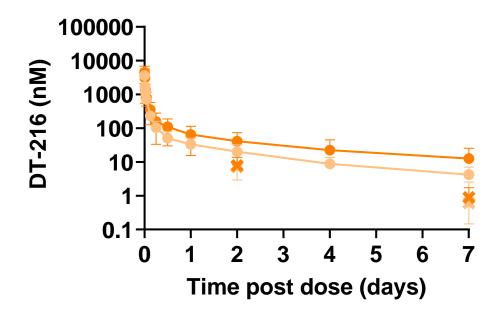
# Daily or weekly administration of DT-216P2 reaches steady state plasma exposure



## DT-216P2 achieved comparable drug levels in tissue and plasma

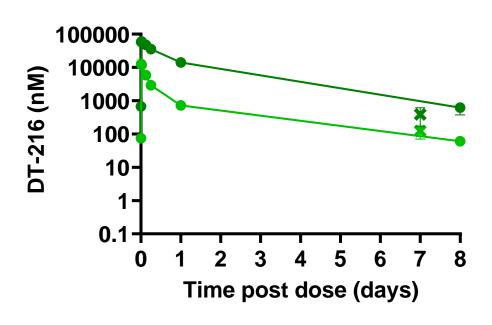
# Clinical MAD study prior DT-216 drug product QW IV

- 300mg cohort plasma PK after 3rd dose
- ★ 300mg cohort muscle biopsy after 3rd dose
- 200mg cohort plasma PK after 3rd dose
- 200mg cohort muscle biopsy after 3rd dose

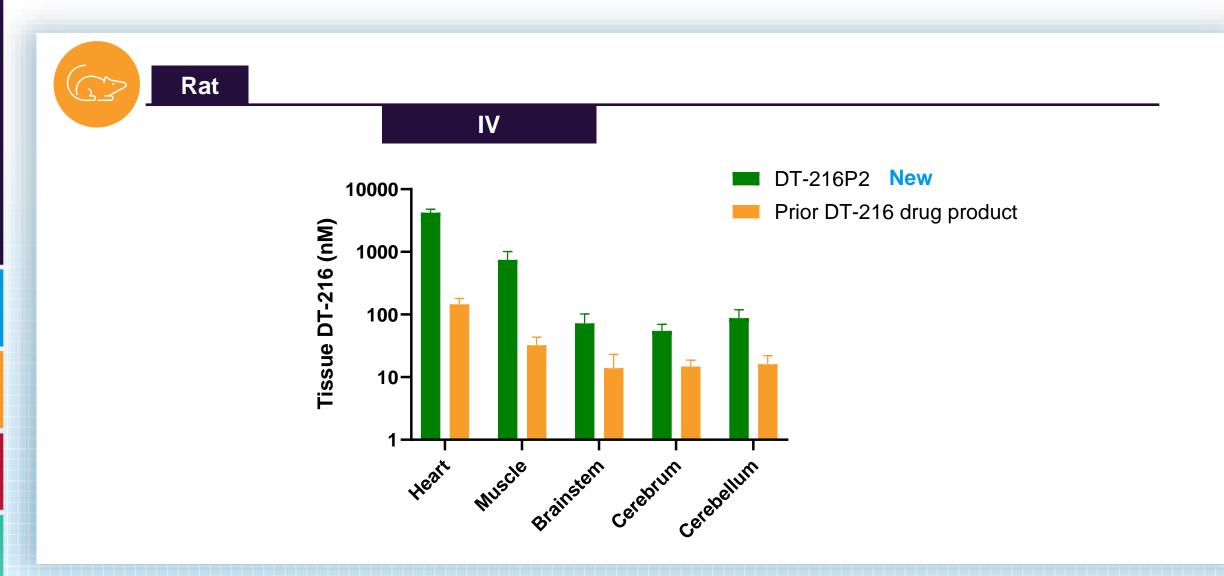


#### NHP DT-216P2 QW IV

- → ~1/4 reference dose plasma PK after 4th dose
- → ~1/10 reference dose plasma PK after 4th dose



## Biodistribution of DT-216P2 IV compared with the prior drug product



## **FA** program next steps

#### IND enabling Phase 1 Phase 2

- Repeat administration of DT-216P2 in rats and NHPs well-tolerated at doses that achieved higher and more durable exposure than prior DT-216 drug product
- Non-GLP animal studies support that DT-216P2 has addressed the injection site reactions seen with prior DT-216 drug product
- DT-216P2 data to be confirmed in GLP studies
- GLP activities to complete by YE2024 to start patient trials in 2025

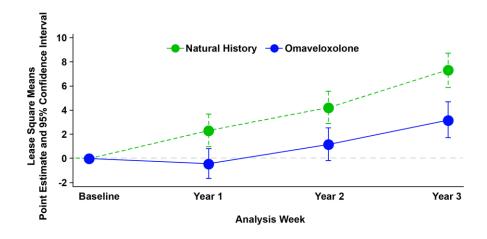
- PK data in healthy volunteers
- Begin treating patients in 2025 to understand safety, PK, and pharmacodynamics

## The unmet need in FA remains significant





- Skyclarys does not address the genetic root cause of FA or change FXN level
- Skyclarys slows disease progression on neurological end point (mFARS) but only during the 1<sup>st</sup> year
- Estimated peak sale of \$1.6B/yr



- Other drug candidates in clinical development that aim to address the root cause of FA involve complex modalities
- None of these change endogenous FXN

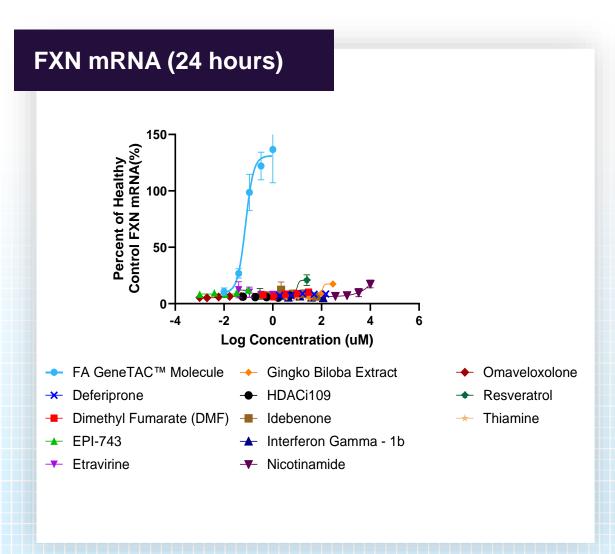


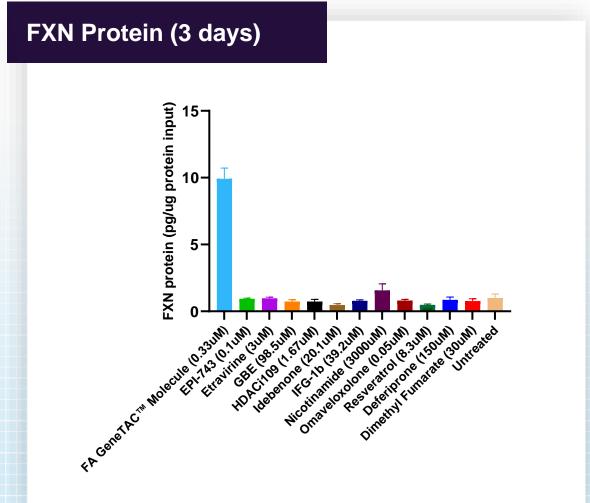
**HIV-TAT-FXN** protein



**AAV** gene therapy targeting cardiac tissue

# Activity of FA GeneTAC™ molecules compared with other compounds that have purportedly increased FXN in FA patient LCLs





# DT-168 for Fuchs Endothelial Corneal Dystrophy



# No disease-modifying options for FECD today, majority of ~5M US patients quietly suffer declining visual function

## ~5M US FECD patients

18 to 30K corneal transplant surgeries annually

(0.5% of all FECD)<sup>1</sup>

#### **Increasing Endothelial Dysfunction**





Loss of visual function



Patient can't stand symptoms

4.6-5.3M US FECD patients with TCF4 repeat expansion<sup>2</sup>

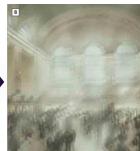
Surgical Descemet membrane stripping or corneal transplant is limited to 18,000-30,000 by capacity, morbidity and complexity

"If there was something that would halt progression — I would treat everyone. Even people without symptoms."

- Optometrist

#### Vision with FECD<sup>1</sup>





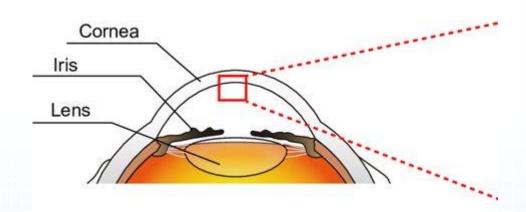
# Reduced Vision Quality

- tision acuity, esp. low contrast
- Blurriness in the morning
- Glare and halo
- ↓ contrast sensitivity

## Discomfort and Pain

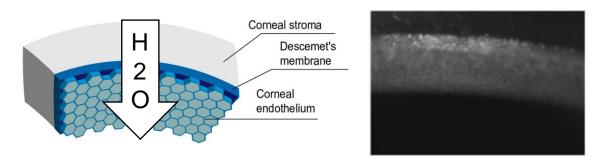
- "Grittiness" in the eye
- Floaters
- Episodes of pain

## Treatment goal: Restore endothelial function and visual function

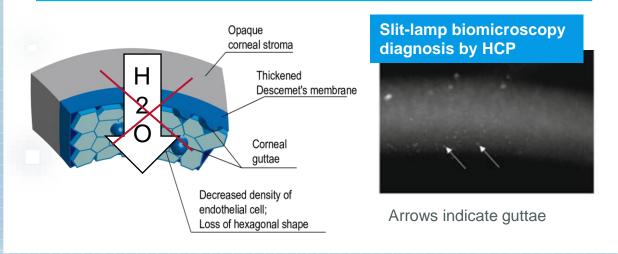


- Corneal endothelial cells (CECs) pump water out of the stroma to ensure proper dehydration of collagen fibrils for corneal transparency
- CEC loss or dysfunction leads to excess hydration of corneal stroma, resulting in loss of corneal transparency, and visual dysfunction
- As CECs are lost, ECM masses called guttae also form in the basement membrane with concurrent reduction in cell density, cell shape, and/or bullae and ultimately fibrosis

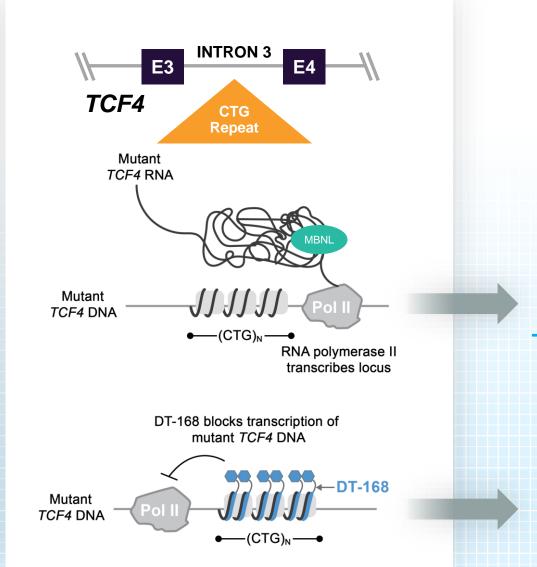
## **Healthy individuals**



#### **Patients with FECD**



# FECD GeneTAC™ Molecules are designed to suppress transcription of *TCF4* DNA that contains expanded CTG repeats



Mutant *TCF4* RNA induces FECD molecular pathology:

Hairpin formation

Variable Nuclear foci

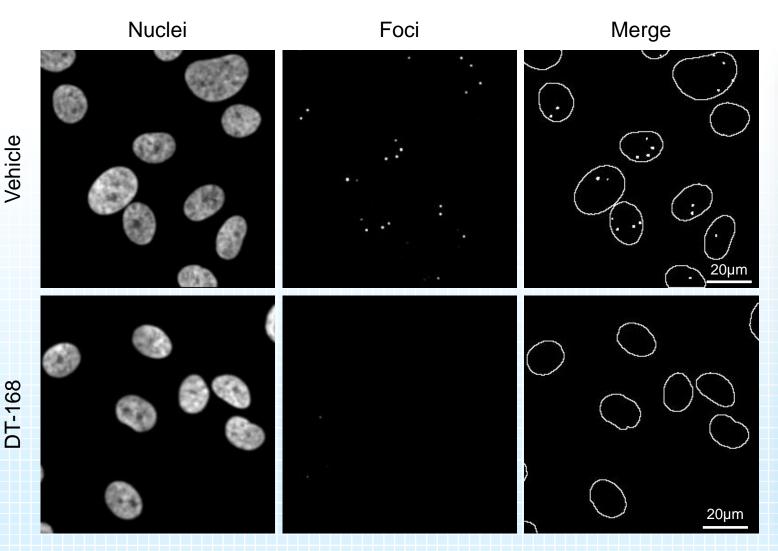
MBNL sequestration

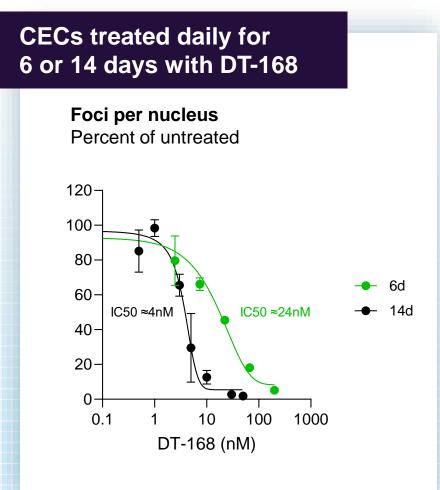
Spliceopathy

CEC dysfunction and loss

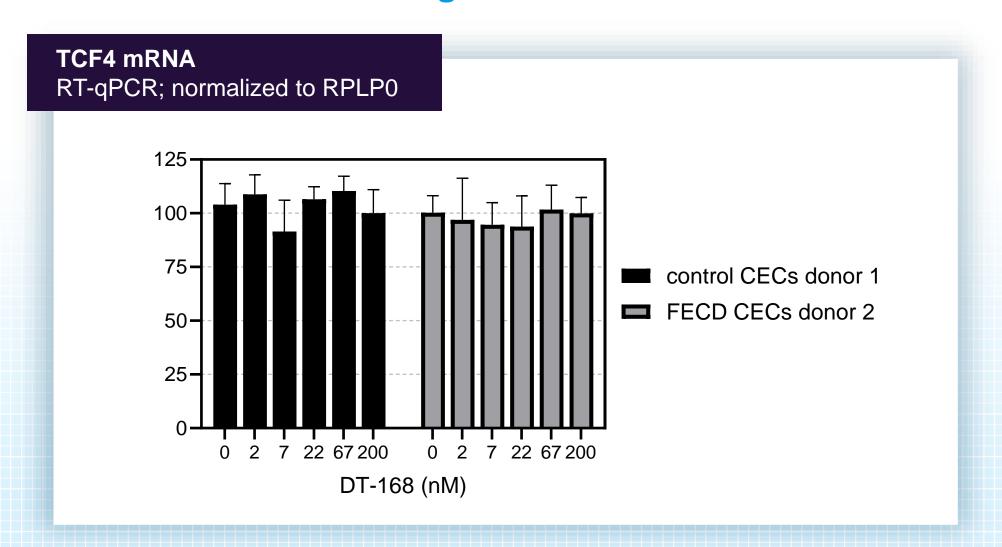
DT-168 designed to suppress initiation of FECD molecular pathology thereby restoring CEC function and preventing further CEC loss

## DT-168 reduces nuclear foci in primary CECs isolated from patients with FECD with high potency (<5nM foci IC<sub>50</sub>)



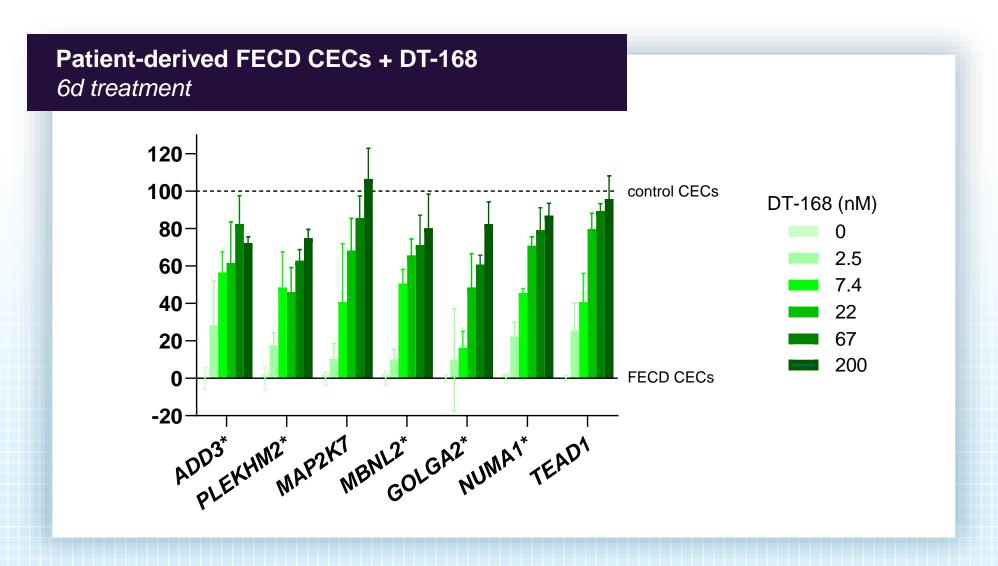


# Wild-type TCF4 transcripts are unaffected in primary control and FECD CECs following treatment with DT-168



## DT-168 improves spliceopathy in primary FECD CECs

Top 7 improved genes for FECD CECs derived from donor 2



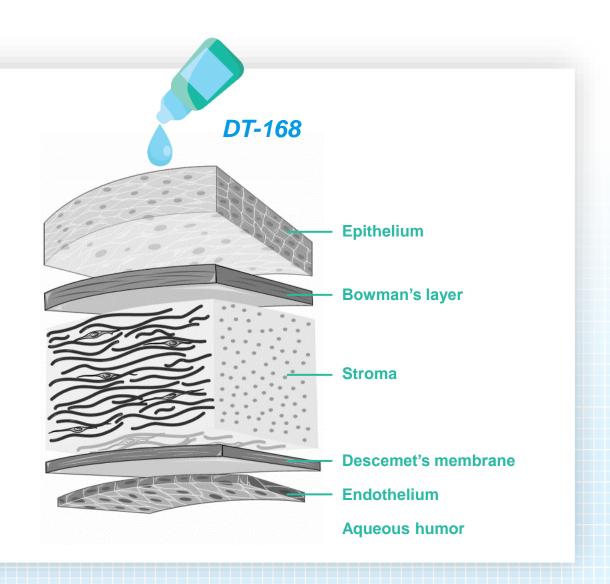
## DT-168 eye-drops were well-tolerated and readily distributed to CECs

#### Key observations from nonclinical studies

- Well-tolerated after single and multiple doses per day for 14 days with clean histology
- DT-168 distributed throughout cornea after topical delivery, measurable levels of drug in the aqueous humor
- Micromolar DT-168 levels present in cornea at 24 hours post-dose
- Negligible systemic exposure following dosing

DT-168 IND filed in late 2023 and cleared by FDA

**Initiate Phase 1 development in 2024** 



# FECD Observational Study aims to increase probability of DT-168 programmatic success



- Targeting recruitment of 200 patients (~400 eyes) with genetically confirmed TCF4 mutations 2-year follow-up
- Confirm disease characteristics and deterioration in context of running a trial
- Identify characteristics for FECD patients at risk of more rapid disease progression



- Anterior eye tomography
- Corneal endothelium microscopy
- Visual acuity (low luminance, contrast sensitivity, glare disability)
- Visual disability
- Patient reported outcome



- Measure disease progression in patients with at least 1 tomographic feature of subclinical edema<sup>1</sup>
- Evaluate patient characteristics and obtain satisfactory markers of disease progression and measurable endpoints
- Observational study could expedite recruitment in interventional trials

Phase 1 development for DT-168 expected to begin in 2024

# **Huntington's Disease (HD)**



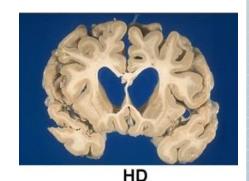
## **Huntington's Disease (HD)**

#### GeneTAC™ molecules selectively reduce mutant Huntingtin and spare the normal Huntingtin allele

- Causes brain atrophy due to death of neurons
- Symptoms range from motor function to neurological
- Universally fatal
- HD Prevalence: >40,000 in the U.S.

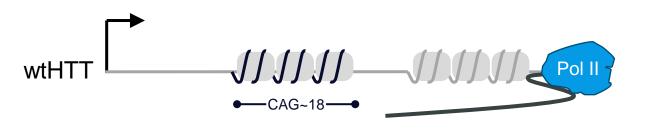


Control – no atrophy



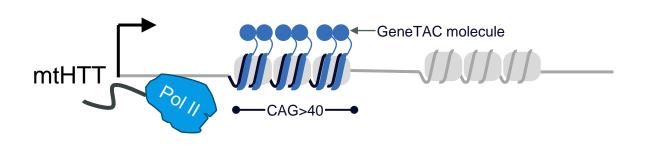
Normal HTT gene — thought to be important to normal state

GeneTAC<sup>™</sup> molecules *preserve transcription* at the *wild type locus* 



#### **HTT gene with expansion**

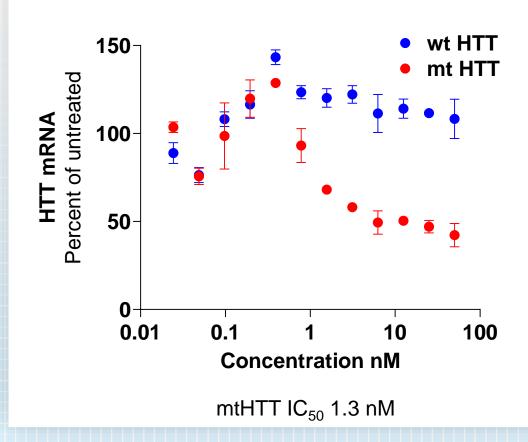
GeneTAC™ molecules *block transcription* specifically at the *mutant locus* 



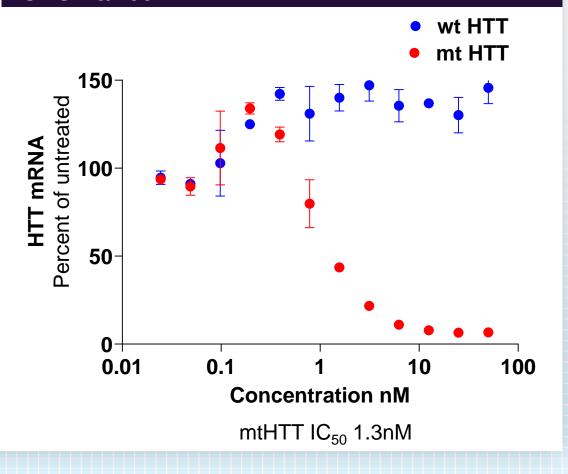
# GeneTAC™ Molecule treatment causes potent, allele-selective reduction of mtHTT mRNA in HD patient fibroblasts

#### Candidate 1

Normal onset HD patient-derived fibroblasts CAG 18/44



Early onset HD patient-derived fibroblasts CAG 18/180



## GeneTAC™ Molecule treatment causes potent, allele-selective reduction of mtHTT protein in HD patient fibroblasts

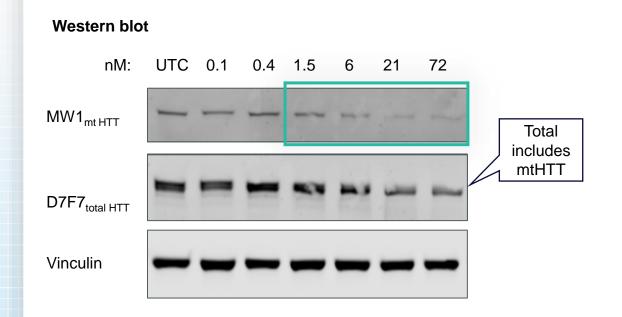
#### **Candidate 1**

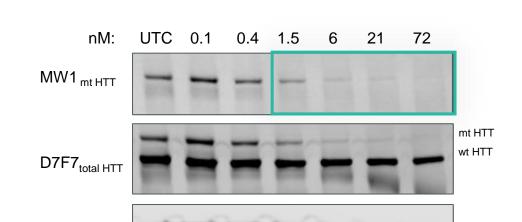
**Normal onset HD patient-derived fibroblasts CAG 18/44** 

**Early onset HD patient-derived fibroblasts** CAG 18/180

Western blot

Vinculin

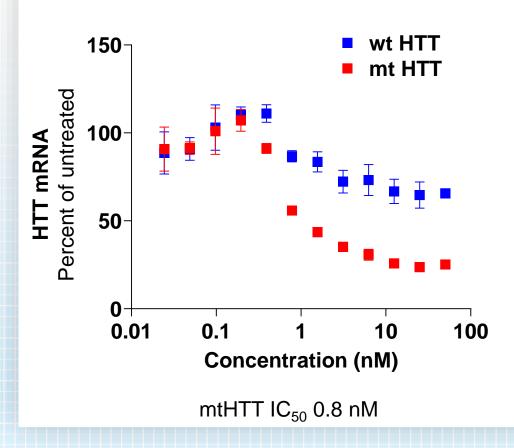




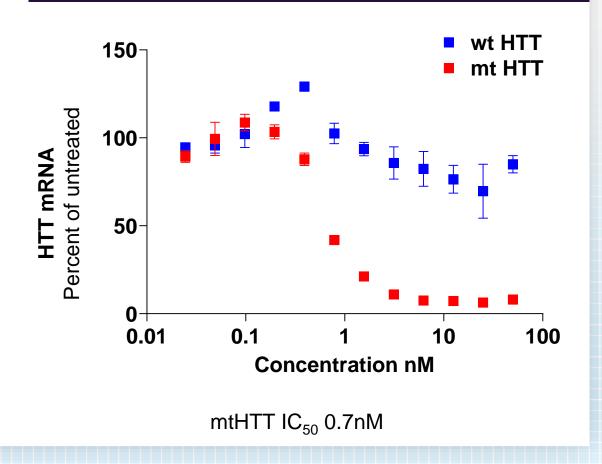
# **GeneTAC™ Molecule treatment causes potent, allele-selective reduction of mtHTT mRNA in HD patient-derived fibroblasts**

### **Candidate 2**

Normal onset HD patient-derived fibroblasts CAG 18/44



# Early onset HD patient-derived fibroblasts CAG 18/180

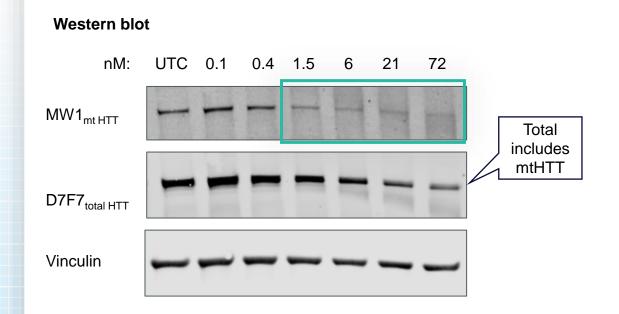


### GeneTAC™ Molecule treatment causes potent, allele-selective reduction of mtHTT protein in HD patient-derived fibroblasts

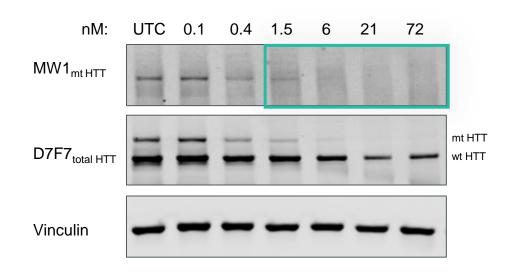
### **Candidate 2**

**Normal onset HD patient-derived fibroblasts CAG 18/44** 

**Early onset HD patient-derived fibroblasts CAG 18/180** 



#### Western blot



### Candidates well-tolerated in both rodents and NHPs

### Rodents

Tested in wild-type rats and mice:

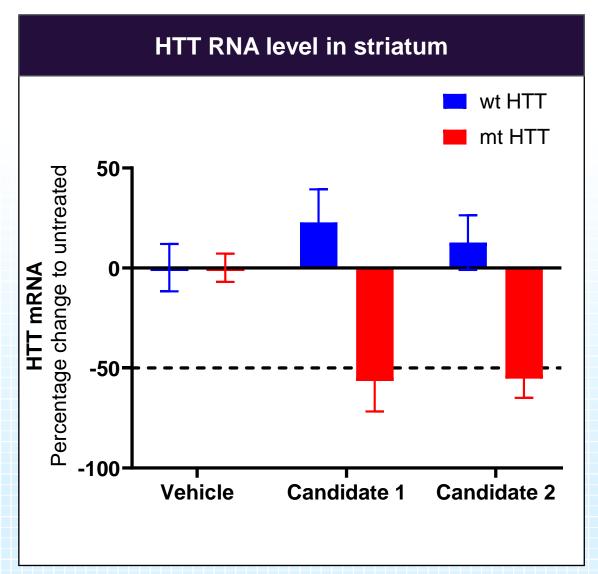
- Well-tolerated in ongoing studies:
  - Weekly doses for three weeks in rats
  - Daily doses for one week in mice
- Tolerability assessed across all macroscopic measures including weight, blood chemistry and liver function tests

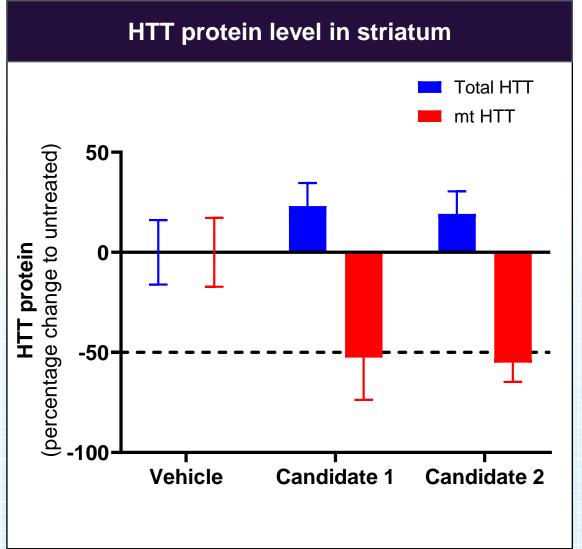
### **NHP**

Tested in wild-type non-naïve NHPs

- Well-tolerated in ongoing studies
- Tolerability assessed across all macroscopic measures including weight, blood chemistry and liver function tests

### Allele-specific reductions of RNA and protein observed in the brain in zQ175DN HD mouse model after 8 weeks of systemic administration





# GeneTAC<sup>TM</sup> HD candidates have significant advantages over other HTT lowering therapeutic approaches

Increased NfL observed

#### Allele-selective

Reduce mutant Huntingtin and spare the normal Huntingtin

Non-selective
Reduce both normal and
mutant Huntingtin

	GeneTAC™ HD candidates	WVE-003	
Modality	Small molecule Facilitate drug biodistribution to the whole brain	ASO Intrathecal administration	
Delivery	Parenteral administration		
Target somatic expansion	Yes Target repeats, increased efficacy as repeats expand during disease progression  No Target SNP3		
Patient All HD patients		~40% of patients with SNP3	
Latest milestone	Selective reduction of mtHTT in patient cells ( IC50=~1nM)	Phase 1/2 • Reduced mtHTT	

Well tolerated in rodents and NHPs







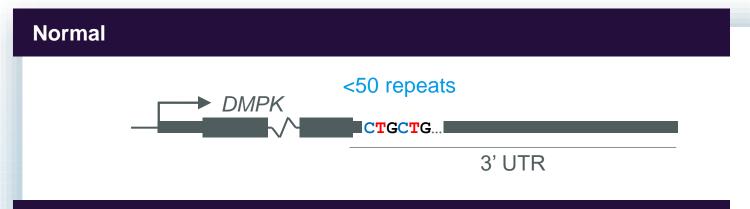
# **Myotonic Dystrophy Type 1 (DM1)**



## **Myotonic dystrophy type 1 (DM1)**

### **Dominant repeat expansion drive disease**

DM1 patients have expanded CTG repeat in the 3' UTR of one copy of their DMPK gene.



### Diseased (one copy)

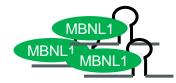
>50 to 1000+ repeats

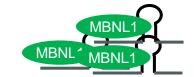
TOXIC GAIN OF FUNCTION

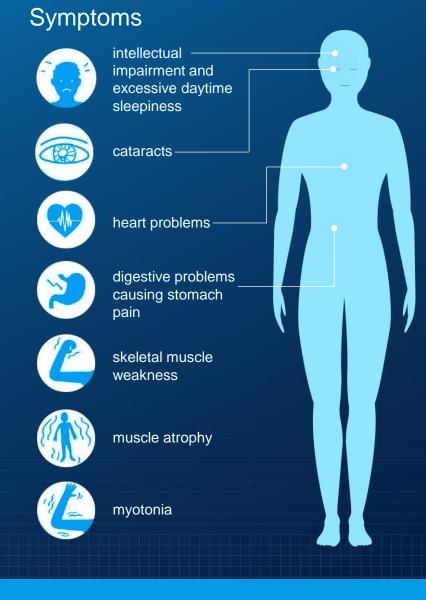
CTGCTGCTGCTGCTGCTGCTGCT...

3' UTR

Expanded CTG repeats in the DMPK mRNA trap MBNL1 splicing factors in CUG foci. Reduced MBNL1 activity leads to improperly spliced genes and cellular dysfunction





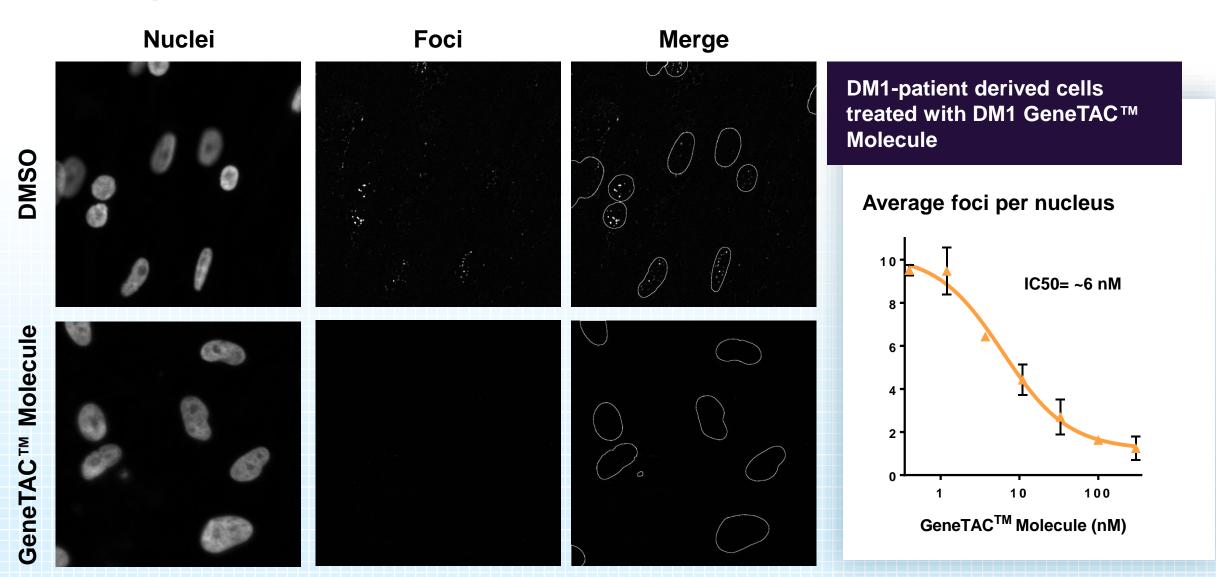


70,000+ individuals affected in the U.S. 90,000+ individuals affected in Europe

## **GeneTAC™** molecules for **DM1** have several advantages

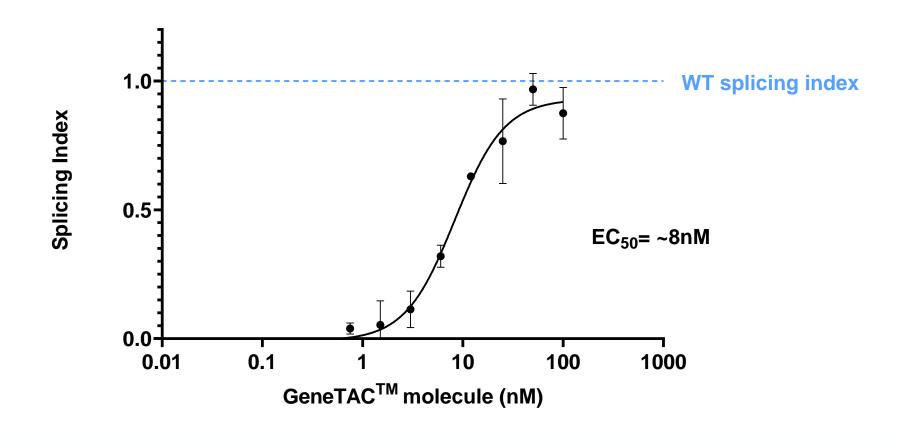
	GeneTAC <sup>™</sup> DM1 candidates	AVIDITY AOC 1001	YDyne DYNE-101
Allele selectivity	Allele-selective	Non-selective	Non-selective
Modality	Small molecule	siRNA conjugated to TfR1 targeting mAb	ASO conjugated to TfR1 targeting Fab
Target tissue	Distributes widely to impacted tissues	Muscle	Muscle
In vitro efficacy for foci reduction	~90% foci reduction	"Quantifiable reduction" in nuclear foci	"Approximately 40% reduction in nuclear foci"

## **GeneTAC™ Molecule causes potent foci reduction** in DM1 patient-derived cells



# **GeneTAC™ Molecule leads to robust correction of mis-spliced transcripts in patient-derived cells**

**DM1 patient-derived cells**7d treatment with DM1 GeneTAC™ Molecule



### Strong financial position to enable programs and platform

**PLATFORM** 

 Proprietary GeneTAC™ platform designed to generate blockbuster products with first/best-in-class profiles for severe monogenic disorders

**PROGRAMS** 

- Two clinical-stage programs in 2025 FA and FECD
- Active research pipeline led by HD and DM1 GeneTAC<sup>TM</sup> programs

**PLAN** 

Balance sheet as of *March 31, 2024* 

**\$270.7 MILLION** 

Current cash to fund planned operations through the

**NEXT 5 YEARS** 

Cash runway enables up to

4 PROGRAMS TO CLINICAL POC\*