

**UNITED STATES  
SECURITIES AND EXCHANGE COMMISSION**  
Washington, D.C. 20549

**Form 8-K**

**CURRENT REPORT  
Pursuant to Section 13 or 15(d)  
of the Securities Exchange Act of 1934**

Date of Report (Date of earliest event reported): July 29, 2019

**WAVE LIFE SCIENCES LTD.**  
(Exact name of registrant as specified in its charter)

**Singapore**  
(State or other jurisdiction  
of incorporation)

**001-37627**  
(Commission  
File Number)

**Not Applicable**  
(IRS Employer  
Identification No.)

**7 Straits View #12-00, Marina One  
East Tower  
Singapore 018936**  
(Address of principal executive offices)

**018936**  
(Zip Code)

Registrant's telephone number, including area code: +65 6236 3388

Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instruction A.2. below):

- Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)
- Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)
- Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))
- Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading symbol	Name of each exchange on which registered
<b>\$0 Par Value Ordinary Shares</b>	<b>WVE</b>	<b>The Nasdaq Global Market</b>

Indicate by check mark whether the registrant is an emerging growth company as defined in Rule 405 of the Securities Act of 1933 (§230.405 of this chapter) or Rule 12b-2 of the Securities Exchange Act of 1934 (§240.12b-2 of this chapter).

Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

**Item 2.02 Results of Operations and Financial Condition.**

On July 29, 2019, Wave Life Sciences Ltd. (the “Company”) announced its financial results for the quarter ended June 30, 2019. The full text of the press release issued in connection with the announcement is furnished as Exhibit 99.1 to this Current Report on Form 8-K and is incorporated by reference herein.

**Item 7.01 Regulation FD Disclosure.**

From time to time, the Company presents and/or distributes slides and presentations to the investment community to provide updates and summaries of its business. On July 29, 2019, the Company updated its corporate presentation, which is available on the “For Investors & Media” section of the Company’s website at <http://ir.wavelifesciences.com/>. This presentation is also furnished as Exhibit 99.2 to this Current Report on Form 8-K.

*The information in these Items 2.02 and 7.01 shall not be deemed “filed” for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), or otherwise subject to the liabilities of that section, nor shall it be deemed incorporated by reference in any filing under the Securities Act of 1933, as amended, or the Exchange Act, except as expressly set forth by specific reference in such a filing.*

**Item 9.01 Financial Statements and Exhibits.**

(d) Exhibits

The following exhibits relating to Items 2.02 and 7.01 are furnished and not filed:

<u>Exhibit No.</u>	<u>Description</u>
99.1	<a href="#">Press Release issued by Wave Life Sciences Ltd. dated July 29, 2019</a>
99.2	<a href="#">Corporate Presentation of Wave Life Sciences Ltd. dated July 29, 2019</a>

**SIGNATURES**

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

**WAVE LIFE SCIENCES LTD.**

By: /s/ Keith C. Regnante

Keith C. Regnante

Chief Financial Officer

Date: July 29, 2019



## Wave Life Sciences Reports Second Quarter 2019 Financial Results and Provides Business Update

*Interim efficacy data from ongoing suvodirsen open-label extension study on track for 4Q 2019*

*Phase 2/3 DYSTANCE 51 global, placebo-controlled study of suvodirsen initiated*

*First topline data from PRECISION-HD clinical program expected by year-end*

**CAMBRIDGE, Mass., July 29, 2019** – Wave Life Sciences Ltd. (Nasdaq: WVE), a clinical-stage genetic medicines company committed to delivering life-changing treatments for people battling devastating diseases, today announced financial results for the second quarter ended June 30, 2019 and provided a business update.

“Wave continues to make significant progress in advancing its pipeline and I am pleased to report that we are on track to deliver data from our first two clinical programs by the end of the year. First, we expect to share dystrophin biopsy data from the ongoing open-label extension study of investigational suvodirsen for the treatment of Duchenne muscular dystrophy (DMD) patients amenable to exon 51 skipping, followed by the first clinical data for our differentiated, allele-selective approach to treating Huntington’s disease,” said Paul Bolno, MD, MBA, President and Chief Executive Officer of Wave Life Sciences. “For suvodirsen, the recent initiation of our Phase 2/3 DYSTANCE 51 trial marks a significant milestone towards our goal of bringing new therapies to patients living with DMD globally. Lastly, we are leveraging our PRISM platform to advance several exciting preclinical programs in DMD, HD, ALS/FTD, and ophthalmology.”

### **Business Update**

Wave is committed to building a fully integrated genetic medicines company led by its clinical and preclinical programs for the treatment of neuromuscular, central nervous system and ophthalmologic diseases.

### **Neuromuscular Diseases**

#### **First clinical dystrophin data from the suvodirsen open-label extension study for DMD patients amenable to exon 51 skipping are expected in 4Q 2019**

- Suvodirsen is currently being studied in an open-label extension (OLE) study in boys with Duchenne muscular dystrophy (DMD) who are amenable to exon 51 skipping. The study was initiated in August 2018 with patients from the Phase 1 clinical trial. Wave is on track to deliver an interim analysis of dystrophin expression from muscle biopsies in boys receiving suvodirsen, which is expected in the fourth quarter of 2019. This interim analysis will include dystrophin expression from muscle biopsies taken 22 weeks after patients enrolled in the OLE were transitioned to one of the Phase 2/3 doses of suvodirsen, as well as a safety summary.
- In June at the 2019 Parent Project Muscular Dystrophy (PPMD) Annual Conference, Wave reported an apparent decline in infusion-associated symptoms with continued weekly dosing of suvodirsen in the OLE among the 25 patients (of 37 expected to enroll) dosed at the Phase 2/3 doses as of June 18, 2019. In total, 148 doses had



been administered and there were no study discontinuations in patients receiving Phase 2/3 doses as of the data cut off.

- The company expects to file for an accelerated approval of suvodirsen in the United States in the second half of 2020, pending positive clinical dystrophin expression data.

#### **Initiated Phase 2/3 DYSTANCE 51 clinical trial, the results of which are intended to support global regulatory filings for suvodirsen**

- In June 2019, Wave announced the initiation of DYSTANCE 51, its global Phase 2/3, multicenter, randomized, double-blind, placebo-controlled trial that will evaluate the efficacy and safety of suvodirsen. The trial is expected to enroll approximately 150 boys who are between 5 and 12 years of age (inclusive) with a genetically confirmed diagnosis of DMD amenable to exon 51 skipping therapy. The DYSTANCE 51 primary efficacy endpoints will measure change in dystrophin protein level and change in the North Star Ambulatory Assessment score. In addition, the trial will include multiple functional outcome measures as secondary efficacy endpoints.
- DYSTANCE 51 is the first study ever selected by the U.S. Food and Drug Administration (FDA) for its Complex Innovative Trial Design (CID) pilot program, through which Wave may potentially use Bayesian methods to adapt the trial with the aim of maximizing efficiency while ensuring robust clinical results.
- Results from the DYSTANCE 51 trial are intended to support global regulatory filings for suvodirsen.

#### **Advancing an exon-skipping pipeline to address more patients living with DMD**

- Wave continues to advance WVE-N531, its preclinical candidate to treat DMD in boys amenable to exon 53 skipping. WVE-N531 induced up to 71% dystrophin protein restoration in DMD *in vitro* patient-derived myoblasts compared with healthy human myoblasts as measured by western blot. Subject to submission of clinical trial applications and approval to proceed, Wave expects to deliver topline clinical data for WVE-N531 in the second half of 2020.
- The company is also exploring exon targets beyond those targeted by suvodirsen and WVE-N531, including exons 44, 45, 52, 54 and 55.

#### **Central Nervous System (CNS) Diseases**

##### **First topline results from the PRECISION-HD clinical program are anticipated by year-end and will be the first data for an allele-selective approach to treating Huntington's disease patients**

- Wave's PRECISION-HD program consists of two global, multicenter, double-blind, randomized, placebo-controlled Phase 1b/2a clinical trials, PRECISION-HD1 and PRECISION-HD2, for patients with Huntington's disease (HD). PRECISION-HD1 and PRECISION-HD2 are evaluating investigational WVE-120101 and WVE-120102, respectively, which are stereopure antisense oligonucleotides designed to selectively target the mutant huntingtin (mHTT) mRNA transcript of SNP rs362307 (SNP1) and SNP rs362331 (SNP2), respectively. Approximately 50% of the HD population carries SNP1 or SNP2 and, with overlap, up to 70% of the HD population carries either SNP1, SNP2 or both. Topline results for both trials are expected to include a summary of clinical safety results, the degree of mutant huntingtin protein lowering in cerebrospinal fluid (CSF) at 20 weeks, and the ratio of total huntingtin versus mutant huntingtin protein in CSF at 20 weeks to assess wild-type huntingtin protein.
- PRECISION-HD2 is fully recruited and dosing in the fourth cohort is underway to deliver topline clinical data from the four multi-dose cohorts, which are expected by the end of 2019. For the PRECISION-HD1 trial, the first two

multi-dose cohorts are fully recruited, dosing and expected to be complete by the end of 2019. Data from the four multi-dose cohorts of PRECISION-HD1 are expected in early 2020. The timing of PRECISION-HD1 data is affected by inherent sampling variability in the relative SNP frequencies for each patient group screened. Overall, the frequencies of SNP1 and SNP2 remain consistent with Wave's observational study and published literature (up to 70%). Going forward, Wave expects to direct all patients that screen positive for both SNP1 and SNP2, as well as those who are positive for SNP1 only, towards the PRECISION-HD1 trial sites.

- WVE-120101 and WVE-120102, which selectively target the mutant allele of the *huntingtin* (*HTT*) gene, have been shown to reduce levels of mutant *HTT* mRNA and protein, while leaving wild-type or healthy *HTT* mRNA and protein largely intact in *in vitro* studies with patient-derived cell-lines. The healthy transcript is required to produce healthy HTT protein which is important for neuronal function. Multiple preclinical studies in the literature indicate that long-term suppression of healthy HTT protein may have detrimental consequences. Wave's allele-selective approach may also enable the company to address the pre-manifest, or asymptomatic, HD patient population in the future.

#### **Advancing several additional development programs for CNS diseases**

- Wave is advancing WVE-C092 in amyotrophic lateral sclerosis (ALS) and frontotemporal dementia (FTD), which preferentially targets the transcript containing the GGGGCC (G4C2) expansion in the *C9ORF72* gene. Subject to the submission of clinical trial applications and approval to proceed, the company would expect to initiate clinical development of WVE-C092 in the second half of 2020.
- The company is utilizing the learnings from PRISM™ to design additional stereopure oligonucleotides with optimized profiles across other CNS diseases as part of its ongoing collaboration with Takeda.

#### **Ophthalmologic Diseases**

- Wave continues to advance stereopure oligonucleotides for the potential treatment of inherited retinal diseases. Preclinical data demonstrated that a single intravitreal injection of stereopure oligonucleotide in the eye of non-human primates resulted in greater than 95% knockdown of a target RNA in the retina for at least four months. Based on these data, the company is working to design clinical candidates that could achieve a therapeutic effect with only two doses per year. The company expects to announce its first ophthalmology candidate in the second half of 2019.

#### **Second Quarter 2019 Financial Results and Financial Guidance**

Wave reported a net loss of \$41.9 million in the second quarter of 2019 as compared to \$35.9 million in the same period in 2018. The increase in net loss in the second quarter of 2019 was largely driven by increased research and development efforts and continued organizational growth to support Wave's corporate goals.

Research and development expenses were \$41.6 million in the second quarter of 2019 as compared to \$32.5 million in the same period in 2018. The increase in research and development expenses in the second quarter of 2019 was primarily due to increased external expenses related to our suvodirsen clinical activities as well as increased investments in PRISM and other research and development expenses.

General and administrative expenses were \$11.6 million in the second quarter of 2019 as compared to \$8.9 million in the same period in 2018. The increase in general and administrative expenses in the second quarter of 2019 was mainly driven by increases in employee headcount to support Wave's corporate goals.

As of June 30, 2019, Wave had \$252.9 million in cash and cash equivalents as compared to \$174.8 million as of December 31, 2018. The increase in cash and cash equivalents was mainly due to the \$161.8 million in net proceeds from the January 2019 follow-on offering, partially offset by Wave's year-to-date net loss of \$86.1 million.

Wave expects that its existing cash and cash equivalents, together with expected and committed cash from existing collaborations, will enable Wave to fund its operating and capital expenditure requirements to the end of 2020.

#### **About PRISM™**

PRISM is Wave Life Sciences' proprietary discovery and drug development platform that enables genetically defined diseases to be targeted with stereopure oligonucleotides across multiple therapeutic modalities. PRISM combines the company's unique ability to construct stereopure oligonucleotides with a deep understanding of how the interplay among oligonucleotide sequence, chemistry and backbone stereochemistry impacts key pharmacological properties. By exploring these interactions through iterative analysis of in vitro and in vivo outcomes and artificial intelligence-driven predictive modeling, the company continues to define design principles that are deployed across programs to rapidly develop and manufacture clinical candidates that meet pre-defined product profiles.

#### **About Wave Life Sciences**

Wave Life Sciences (NASDAQ: WVE) is a clinical-stage genetic medicines company committed to delivering life-changing treatments for people battling devastating diseases. Wave aspires to develop best-in-class medicines across multiple therapeutic modalities using PRISM, the company's proprietary discovery and drug development platform that enables the precise design, optimization and production of stereopure oligonucleotides. Driven by a resolute sense of urgency, the Wave team is targeting a broad range of genetically defined diseases so that patients and families may realize a brighter future. To find out more, please visit [www.wavelifesciences.com](http://www.wavelifesciences.com) and follow Wave on Twitter @WaveLifeSci.

#### **Forward-Looking Statements**

This press release contains forward-looking statements concerning our goals, beliefs, expectations, strategies, objectives and plans, and other statements that are not necessarily based on historical facts, including statements regarding the following, among others: the anticipated commencement, patient enrollment, data readouts and completion of our clinical trials, and the announcement of such events; the protocol, design and endpoints of our ongoing and planned clinical trials; the future performance and results of our programs in clinical trials; future preclinical activities and programs; the progress and potential benefits of our collaborations with partners; the potential of our in vitro and in vivo preclinical data to predict the behavior of our compounds in humans; our identification of future candidates and their therapeutic potential; the anticipated therapeutic benefits of our potential therapies compared to others; our ability to design compounds using multiple modalities and the anticipated benefits of that model; the anticipated benefits of our proprietary manufacturing processes and our internal manufacturing facility; our future growth and anticipated transition to a fully integrated commercial-stage company; the potential benefits of PRISM and our stereopure oligonucleotides compared with stereorandom oligonucleotides; the benefit of nucleic acid therapeutics generally; the strength of our intellectual property; and the anticipated duration of our cash runway. Actual results may differ materially from those indicated by these forward-looking statements as a result of various important factors, including the following: our ability to finance our drug discovery and development efforts and to raise additional capital when needed; the ability of our preclinical programs to produce data sufficient to support our clinical trial applications and the timing thereof; our ability to continue to build and maintain the company infrastructure and personnel needed to achieve our goals; the clinical results of our programs, which may not support further development of product candidates; actions of regulatory agencies, which may affect the initiation, timing and progress of clinical trials; our effectiveness in managing future clinical trials and regulatory processes; the effectiveness of PRISM; the continued development and acceptance of oligonucleotides as a class of medicines; our ability to demonstrate the therapeutic benefits of our candidates in clinical trials, including our ability to develop candidates across multiple therapeutic modalities; our dependence on third parties, including contract research organizations, contract manufacturing organizations, collaborators and partners; our ability to manufacture or contract with third parties to manufacture drug

material to support our programs and growth; our ability to obtain, maintain and protect intellectual property; our ability to enforce our patents against infringers and defend our patent portfolio against challenges from third parties; and competition from others developing therapies for similar uses, as well as the information under the caption "Risk Factors" contained in our most recent Annual Report on Form 10-K filed with the Securities and Exchange Commission (SEC) and in other filings we make with the SEC from time to time. We undertake no obligation to update the information contained in this press release to reflect subsequently occurring events or circumstances.

**WAVE LIFE SCIENCES LTD.**  
**UNAUDITED CONSOLIDATED BALANCE SHEETS**

(In thousands, except share amounts)

	<u>June 30, 2019</u>	<u>December 31, 2018</u>
<b>Assets</b>		
Current assets:		
Cash and cash equivalents	\$ 252,906	\$ 174,819
Current portion of accounts receivable	20,000	10,000
Prepaid expenses and other current assets	16,685	17,454
Total current assets	<u>289,591</u>	<u>202,273</u>
Long-term assets:		
Accounts receivable, net of current portion	30,000	50,000
Property and equipment, net	38,363	39,931
Operating lease right-of-use assets	18,937	—
Restricted cash	3,637	3,625
Other assets	5,019	111
Total long-term assets	<u>95,956</u>	<u>93,667</u>
Total assets	<u>\$ 385,547</u>	<u>\$ 295,940</u>
<b>Liabilities, Series A preferred shares and shareholders' equity</b>		
Current liabilities:		
Accounts payable	\$ 11,464	\$ 13,089
Accrued expenses and other current liabilities	11,632	14,736
Current portion of deferred rent	—	115
Current portion of deferred revenue	97,964	100,945
Current portion of lease incentive obligation	—	1,156
Current portion of operating lease liability	3,024	—
Total current liabilities	<u>124,084</u>	<u>130,041</u>
Long-term liabilities:		
Deferred rent, net of current portion	—	5,132
Deferred revenue, net of current portion	60,483	68,156
Lease incentive obligation, net of current portion	—	9,247
Operating lease liability, net of current portion	30,985	—
Other liabilities	1,897	2,142
Total long-term liabilities	<u>93,365</u>	<u>84,677</u>
Total liabilities	<u>\$ 217,449</u>	<u>\$ 214,718</u>
Series A preferred shares, no par value; 3,901,348 shares issued and outstanding at June 30, 2019 and December 31, 2018	<u>\$ 7,874</u>	<u>\$ 7,874</u>
Shareholders' equity:		
Ordinary shares, no par value; 34,266,260 and 29,472,197 shares issued and outstanding at June 30, 2019 and December 31, 2018, respectively	\$ 538,537	\$ 375,148
Additional paid-in capital	47,270	37,768
Accumulated other comprehensive income	280	153
Accumulated deficit	(425,863)	(339,721)
Total shareholders' equity	<u>\$ 160,224</u>	<u>\$ 73,348</u>
Total liabilities, Series A preferred shares and shareholders' equity	<u>\$ 385,547</u>	<u>\$ 295,940</u>

**WAVE LIFE SCIENCES LTD.**  
**UNAUDITED CONSOLIDATED STATEMENTS OF OPERATIONS AND COMPREHENSIVE LOSS**

*(In thousands, except share and per share amounts)*

	<u>Three Months Ended June 30,</u>		<u>Six Months Ended June 30,</u>	
	<u>2019</u>	<u>2018</u>	<u>2019</u>	<u>2018</u>
Revenue	\$ 7,628	\$ 4,879	\$ 10,654	\$ 6,301
Operating expenses:				
Research and development	41,605	32,547	81,718	61,743
General and administrative	11,640	8,905	22,541	16,906
<b>Total operating expenses</b>	<b>53,245</b>	<b>41,452</b>	<b>104,259</b>	<b>78,649</b>
Loss from operations	(45,617)	(36,573)	(93,605)	(72,348)
Other income, net:				
Dividend income	1,544	934	2,968	1,290
Interest income, net	8	4	19	11
Other income, net	2,123	(259)	4,476	84
<b>Total other income, net</b>	<b>3,675</b>	<b>679</b>	<b>7,463</b>	<b>1,385</b>
Loss before income taxes	(41,942)	(35,894)	(86,142)	(70,963)
Income tax provision	—	—	—	(172)
Net loss	\$ (41,942)	\$ (35,894)	\$ (86,142)	\$ (71,135)
Net loss per share attributable to ordinary shareholders—basic and diluted	\$ (1.22)	\$ (1.23)	\$ (2.58)	\$ (2.49)
Weighted-average ordinary shares used in computing net loss per share attributable to ordinary shareholders—basic and diluted	34,260,298	29,144,466	33,433,322	28,535,149
Other comprehensive income (loss):				
Net loss	\$ (41,942)	\$ (35,894)	\$ (86,142)	\$ (71,135)
Foreign currency translation	30	36	127	85
Comprehensive loss	\$ (41,912)	\$ (35,858)	\$ (86,015)	\$ (71,050)

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Wave Life Sciences  
Corporate Presentation  
July 29, 2019



# Forward-looking statements

This document contains forward-looking statements. All statements other than statements of historical facts contained in this document, including statements regarding possible or assumed future results of operations, preclinical and clinical studies, business strategies, research and development plans, collaborations and partnerships, regulatory activities and timing thereof, competitive position, potential growth opportunities, use of proceeds and the effects of competition are forward-looking statements. These statements involve known and unknown risks, uncertainties and other important factors that may cause the actual results, performance or achievements of Wave Life Sciences Ltd. (the "Company") to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. In some cases, you can identify forward-looking statements by terms such as "may," "will," "should," "expect," "plan," "aim," "anticipate," "could," "intend," "target," "project," "contemplate," "believe," "estimate," "predict," "potential" or "continue" or the negative of these terms or other similar expressions. The forward-looking statements in this presentation are only predictions. The Company has based these forward-looking statements largely on its current expectations and projections about future events and financial trends that it believes may affect the Company's business, financial condition and results of operations. These forward-looking statements speak only as of the date of this presentation and are subject to a number of risks, uncertainties and assumptions, including those listed under Risk Factors in the Company's Form 10-K and other filings with the SEC, some of which cannot be predicted or quantified and some of which are beyond the Company's control. The events and circumstances reflected in the Company's forward-looking statements may not be achieved or occur, and actual results could differ materially from those projected in the forward-looking statements. Moreover, the Company operates in a dynamic industry and economy. New risk factors and uncertainties may emerge from time to time, and it is not possible for management to predict all risk factors and uncertainties that the Company may face. Except as required by applicable law, the Company does not plan to publicly update or revise any forward-looking statements contained herein, whether as a result of any new information, future events, changed circumstances or otherwise.



# Targeting genetically defined diseases with stereopure oligonucleotides

Building fully integrated genetic medicines company led by neurology development programs

## Neuromuscular

- **Lead clinical program: Suvodirsen Phase 2/3 trial initiated for DMD (exon 51); program on development path toward US and global approvals**
- Advancing additional exon skipping candidates for DMD
- Commercialization activities underway

100% global rights

## CNS

- **Lead clinical program: Two Phase 1b/2a trials ongoing for Huntington's disease using differentiated allele-selective approach**
- Advancing C9orf72 candidate for ALS and FTD
- SNP3 (HD) and ATXN3 (SCA3)

Takeda 50:50 option

## Ophthalmology

- Initial candidate selection ongoing for inherited retinal diseases

100% global rights

WAVE<sup>™</sup>  
LIFE SCIENCES

 **PRISM**  
DESIGN & OPTIMIZE



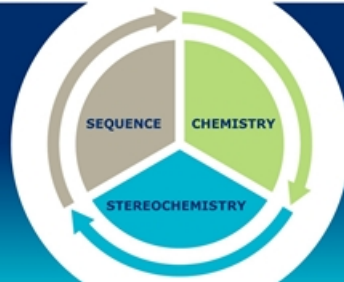
**Stereopure oligonucleotides across multiple therapeutic modalities**  
Antisense | RNAi | Splicing



Enables Wave to target genetically defined diseases with stereopure oligonucleotides across multiple therapeutic modalities

### DESIGN

Unique ability to construct stereopure oligonucleotides with one defined and consistent profile



### OPTIMIZE

A deep understanding of how the interplay among oligonucleotide sequence, chemistry, and backbone stereochemistry impacts key pharmacological properties

Through iterative analysis of *in vitro* and *in vivo* outcomes and artificial intelligence-driven predictive modeling, Wave continues to define design principles that are deployed across programs to rapidly develop and manufacture clinical candidates that meet pre-defined product profiles

# Designing the optimal, stereopure medicine



STANDARD OLIGONUCLEOTIDE APPROACHES

Pharmacologic properties include  
>500,000 permutations in every dose



Impact:  
Unreliable therapeutic effects  
Unintended off-target effects



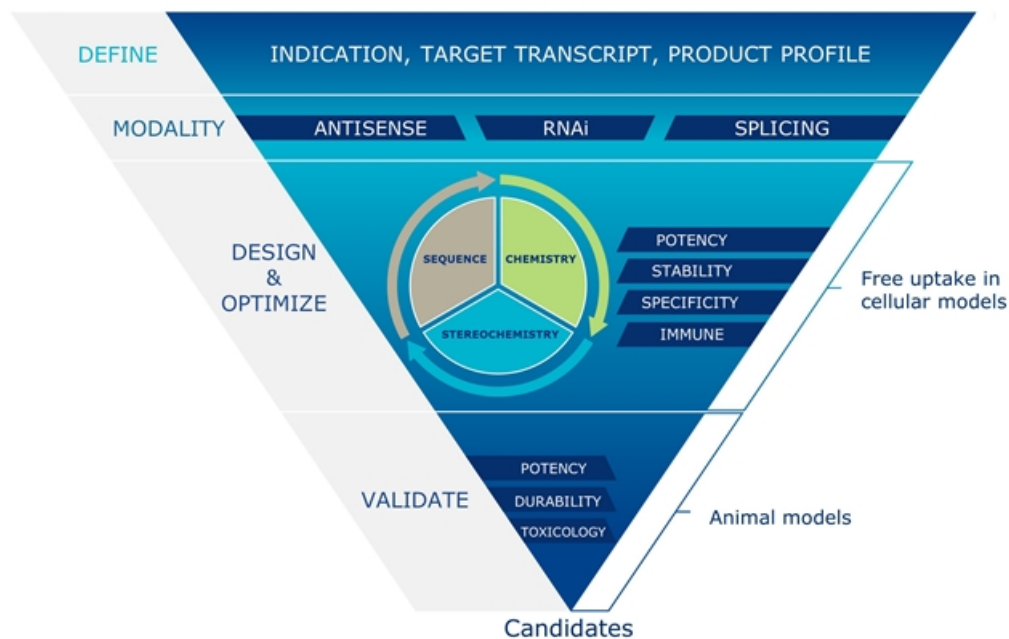
WAVE RATIONAL DESIGN

Control of stereochemistry enables the design and manufacture of oligonucleotides with one defined and consistent profile



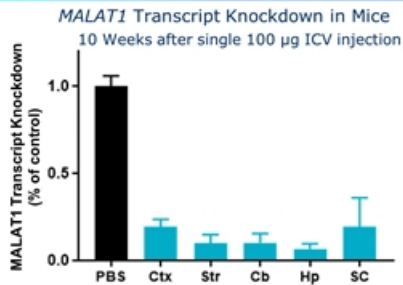
Impact:  
Potential for best-in-class medicines that can address difficult-to-treat diseases

# Creating a new class of oligonucleotides

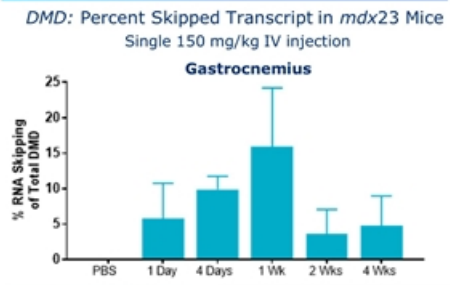


# Optimizing potency and durability across multiple tissues

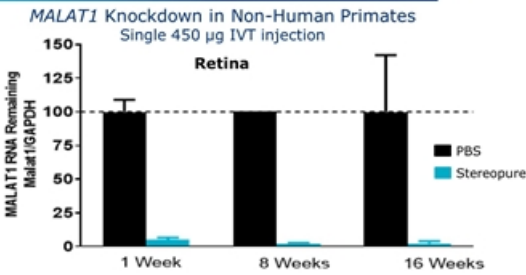
## CNS



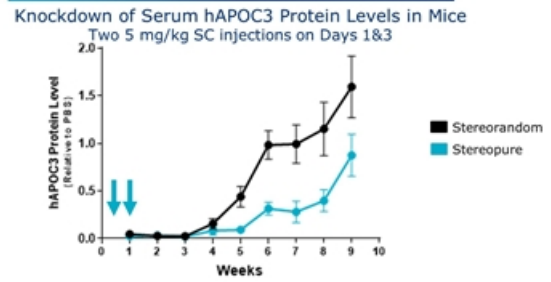
## Muscle



## Eye



## Liver



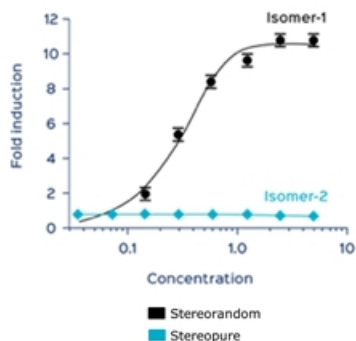
Data represented in this slide from *in vivo* studies. CNS: PBS = phosphate buffered saline; Ctx = cortex; Str = striatum; Cb = cerebellum; Hp = hippocampus; SC = spinal cord. ICV = intracerebral; IVT = intravitreal; IV = intravenous; SC = subcutaneous.



# Stereochemistry affects immune activation

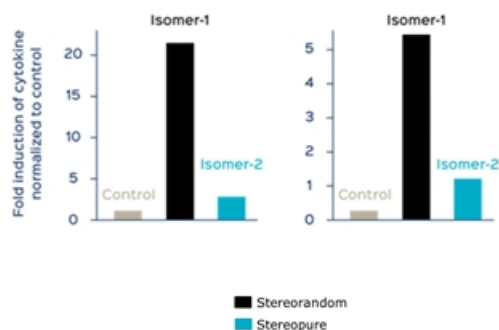
## Human TLR9 Activation

Human TLR9 activation assay with 5mC modified CpG containing MOE gapmer



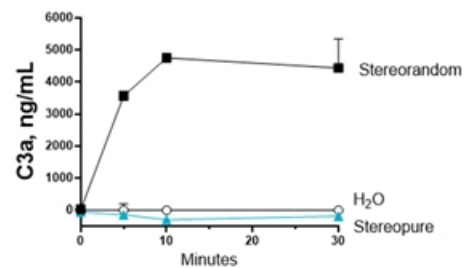
## Cytokine Induction

Cytokine induction in human PBMC assay



## Complement Activation

Complement activation in non-human primate serum assay



# Pipeline spanning multiple modalities, novel targets

THERAPEUTIC AREA/MODALITY	TARGET	DISCOVERY	CANDIDATE	CLINICAL	REGISTRATION	ESTIMATED U.S. PREVALENCE*	PARTNER
<b>MUSCLE</b>							
Duchenne muscular dystrophy Exon-skipping	Suvodirsen Exon 51			OLE and Phase 2/3	U.S. A.A. filing planned in 2H 2020 pending dystrophin data	~2,000	
	WVE-N531 Exon 53					~1,250	
	Exons 44, 45, 52, 54, 55					~3,000	
Neuromuscular diseases	Multiple						
<b>CNS</b>							
Huntington's disease Allele - selective silencing	WVE-120101 mHTT SNP1			Phase 1b/2a		~10,000 / ~35,000	Takeda 50:50 option
	WVE-120102 mHTT SNP2			Phase 1b/2a		~10,000 / ~35,000	Takeda 50:50 option
	mHTT SNP3					~8,000 / ~30,000	Takeda 50:50 option
ALS and FTD Allele - selective silencing	WVE-C092 C9orf72					~1,800 (ALS) ~7,000 (FTD)	Takeda 50:50 option
Spinocerebellar ataxia 3 Silencing	ATXN3					~4,500	Takeda 50:50 option
CNS diseases	Multiple†						Takeda milestones & royalties
<b>OPHTHALMOLOGY</b>							
Retinal diseases	Multiple						
<b>HEPATIC</b>							
Metabolic liver diseases Silencing	Multiple						Pfizer milestones & royalties



\*Estimates of U.S. prevalence and addressable population by target based on publicly available data and are approximate; for Huntington's disease, numbers approximate manifest and pre-manifest populations, respectively.

†During a four-year term, Wave and Takeda may collaborate on up to six preclinical targets at any one time.

A.A.: Accelerated approval; ALS: Amyotrophic lateral sclerosis; FTD: Frontotemporal dementia; CNS: Central nervous system



Suvodirsen  
Duchenne Muscular  
Dystrophy (DMD)



# DMD: a progressive, fatal childhood disorder

- Fatal, X-linked genetic neuromuscular disorder characterized by progressive, irreversible loss of muscle function, including heart and lung
- Genetic mutation in dystrophin gene prevents the production of dystrophin protein, a critical component of healthy muscle function
- Symptom onset in early childhood; one of the most serious genetic diseases in children worldwide
- Current disease modifying treatments have demonstrated minimal dystrophin expression and clinical benefit has not been established
- Impacts 1 in every 5,000 newborn boys each year; 20,000 new cases annually worldwide



# Potential benefits of stereopure oligonucleotide approach to treating Duchenne muscular dystrophy

## Delivery

- Entry into cells (including progenitor cells) via free-uptake
- Enhanced nuclear uptake

## Repeat administration

- Repeat administration may better address muscle cell turnover and need for broad distribution



## Functional dystrophin

- Production of meaningful levels of functional dystrophin protein
- Expected to result in therapeutic benefit

## Scalable manufacturing

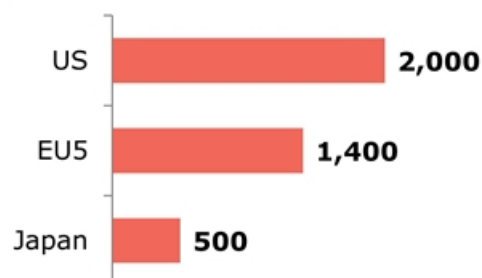
- Scalable manufacturing process to meet clinical and commercial supply requirements
- Cost of goods consistent with conventional oligonucleotide therapies

# Suvodirsen: Wave's lead stereopure exon skipping oligonucleotide for exon 51 amenable DMD

## Exon 51: Most frequent mutation among DMD patients

- ~13% of DMD patients amenable to Exon 51 skipping
- One exon-skipping therapy conditionally approved by FDA
  - Minimal increase in dystrophin expression over baseline observed after 48 weeks; **Mean increase 0.28%, Median increase 0.1%**<sup>1</sup>
  - Clinical benefit not established
  - Not approved ex-US
- Demand for additional treatment options remains high
- Established US and EU regulatory paths

## Prevalent patient populations amenable to exon 51 skipping<sup>2</sup>

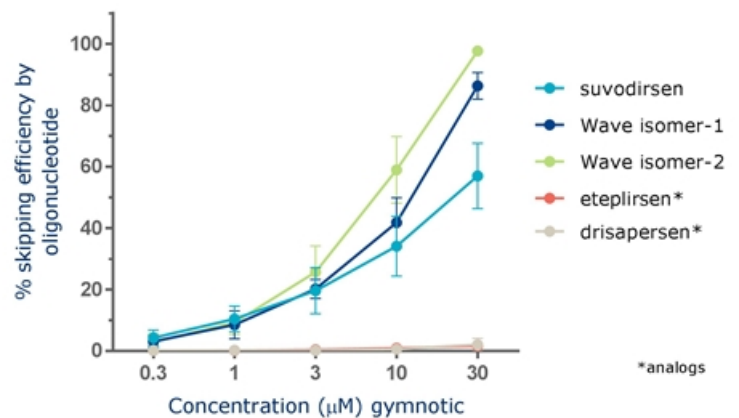


Prevalent patient population represents **>\$1.5B** global market opportunity<sup>3</sup>

## Exon 51: improved skipping efficiency

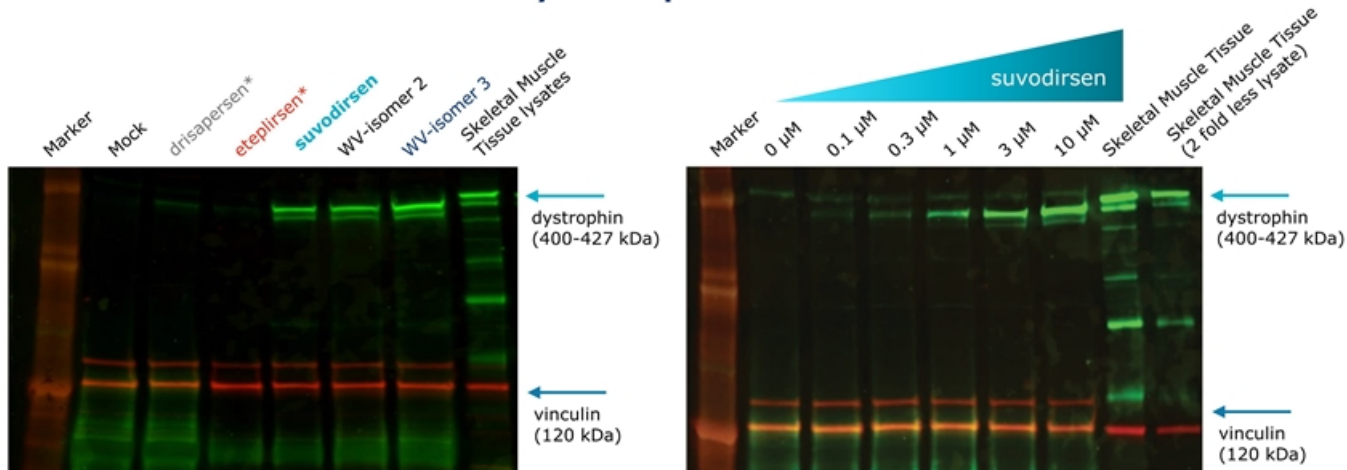
- RNA skipping determined by quantitative RT-PCR
- Wave isomers demonstrated a dose-dependent increase in skipping efficiency *in vitro*
- Free uptake at 10uM concentration of each compound with no transfection agent
- Same foundational stereopure chemistry for Wave isomers; individually optimized to select candidate

Dose Response on Skipping Efficiency (mRNA, *in vitro*) (4 days)



\*analogs

# Exon 51: increased dystrophin restoration *in vitro*



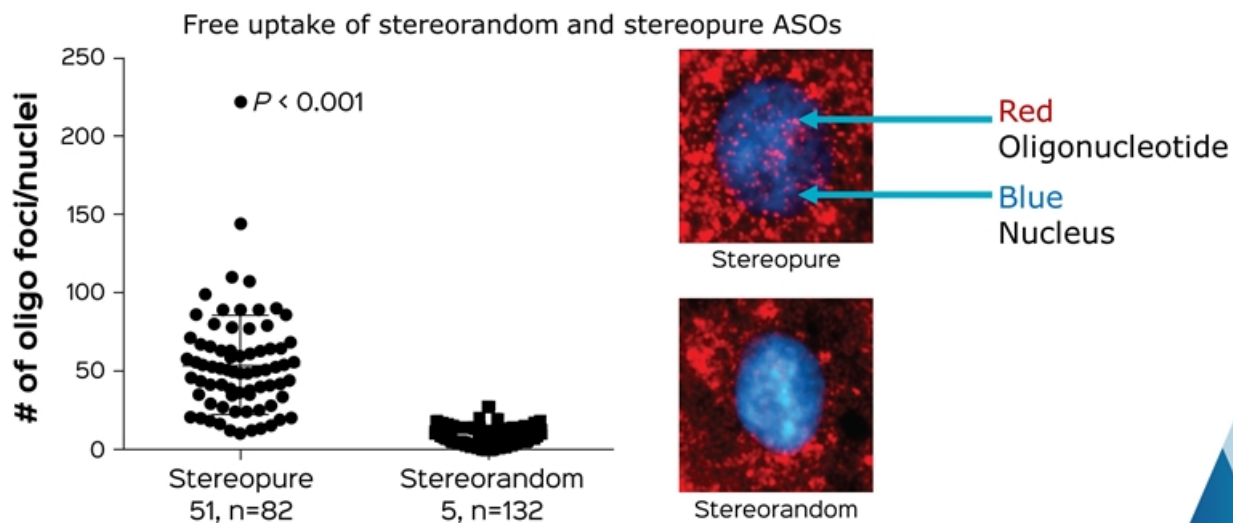
**Oligonucleotide at 10 µM concentration**

***In vitro* dystrophin restoration**

suvodirsen	~52%
drisapersen analogue	~1%
eteplirsen analogue	~1%

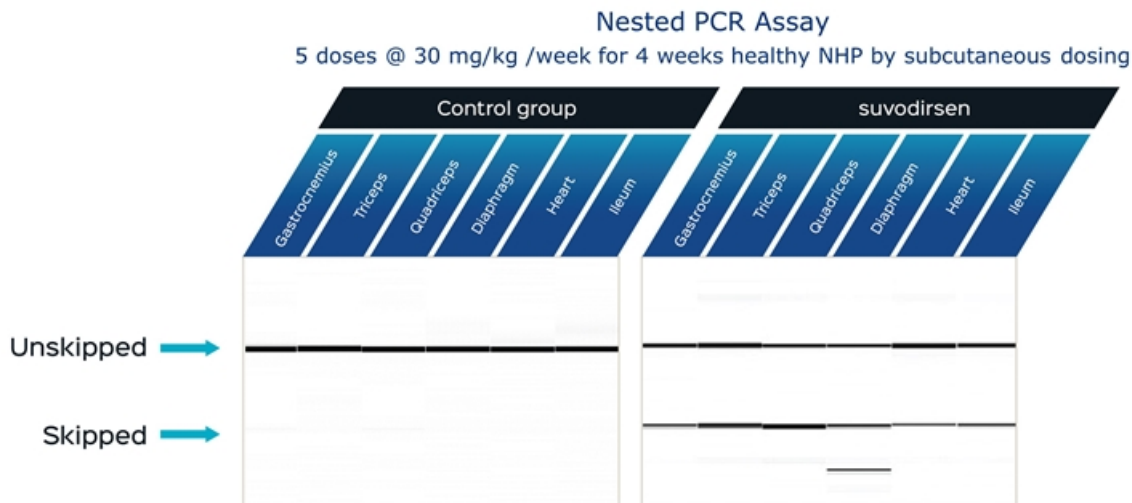
# Exon 51: improved oligonucleotide uptake in the nucleus where splicing occurs

Stereopure oligonucleotides are designed to readily enter the nuclei of cells under free-uptake conditions, which approximates natural delivery in the body



Experimental conditions: Free uptake of ASOs in 18 hour differentiating human DMD myoblasts ( $\Delta 48-50$ ).

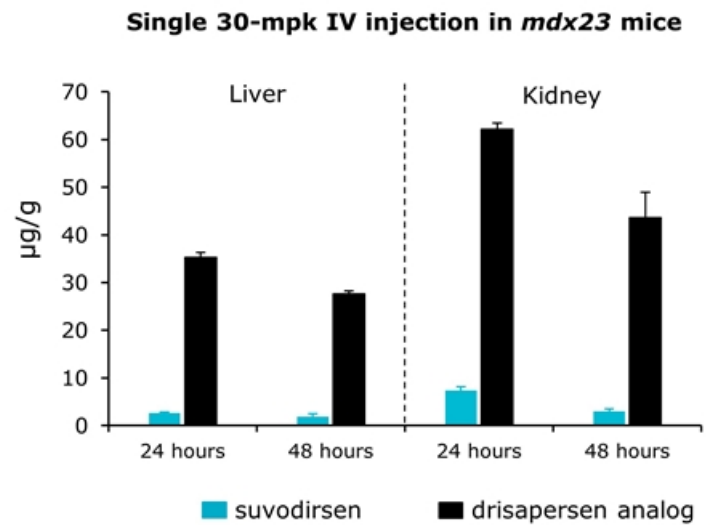
# Exon 51: *in vivo* target engagement of suvodirsen in healthy non-human primate





# Exon 51: no apparent tissue accumulation observed

- Standard oligonucleotides tend to accumulate in liver and kidney
- Wave rationally designed oligonucleotides optimized to allow compound to clear more effectively
- Suvodirsen demonstrated broad tissue distribution in dose dependent fashion
- No apparent accumulation observed after multiple doses



Experimental conditions: *Mdx23* mice received a single 30-mg/kg intravenous bolus injection of suvodirsen or drisapersen analog (n=3/group), and sacrificed 24 or 48 hours post dose. Oligo quantifications in tissues were performed using hybridization ELISA assay.



# Suvodirsen: Phase 1 and OLE clinical trials

## Phase 1 Single Ascending Dose Trial

- 40 DMD patients amenable to exon 51 skipping<sup>1</sup>
- ~20% of patients had received eteplirsen previously (following wash out)

**Suvodirsen had a favorable safety and tolerability profile in context of available treatments for continued development in OLE and Phase 2/3 trial**

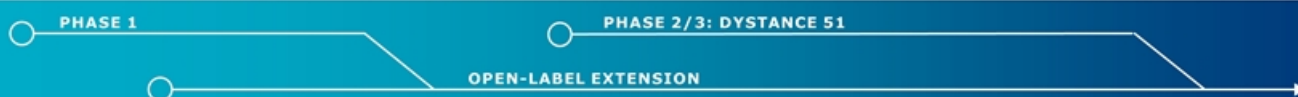
## Open-Label Extension Trial *Ongoing*

- Open to all patients in Phase 1 trial
- 1:1 randomization to 5 mg/kg and 3.5 mg/kg doses
- Patients receiving weekly IV doses of suvodirsen
- Interim analysis of dystrophin expression expected in 4Q 2019



<sup>1</sup>36 patients randomized in Phase 1 and four screened patients expected to enroll directly into Phase 1 OLE  
OLE: Open-label Extension; Full Phase 1 Results presented at MDA 2019 Scientific and Clinical Conference.

# Suvodirsen: Path towards US and global approvals



## Phase 1

- Phase 1 single ascending dose clinical trial
- Based on *in vitro* and *in vivo* preclinical studies and Phase 1 clinical results, two suvodirsen doses selected for Phase 2/3 clinical trial
- **Study complete**

## Open-label extension (OLE)

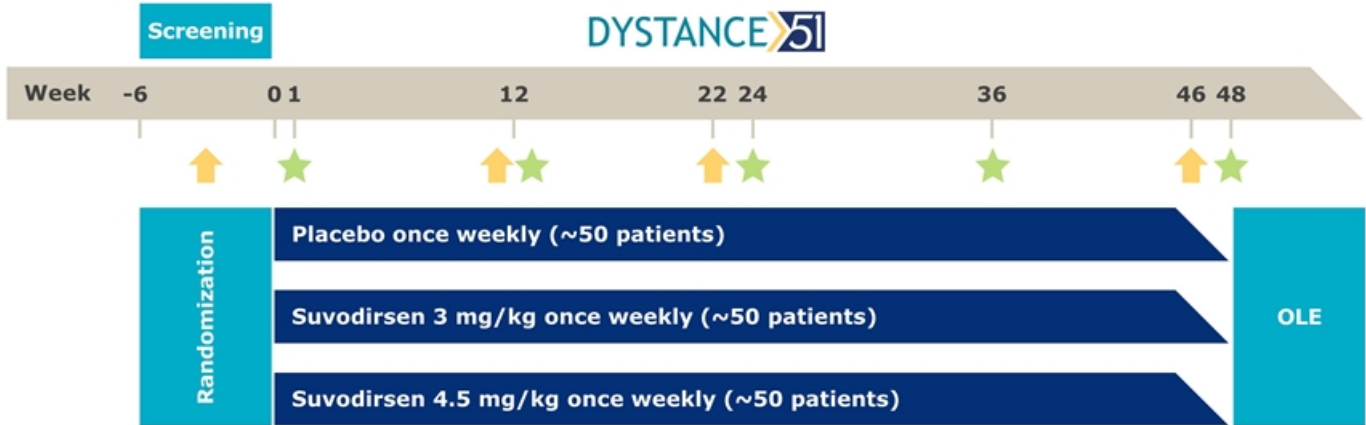
- Multi-dose, open-label study with patients from Phase 1 clinical trial currently underway
- Data will be an important component of submission for accelerated approval in US
- **On track to deliver interim analysis of dystrophin expression in 4Q 2019**

## Phase 2/3 DYSTANCE<sup>51</sup>

- Phase 2/3 clinical trial to assess clinical efficacy and dystrophin expression
- Efficacy and safety data to serve as basis of regulatory submissions globally
- **Trial initiated**

**2H 2020:** Potential FDA accelerated approval filing in exon 51 amenable DMD

# Phase 2/3 study selected for FDA Complex Innovative Trial Design (CID) pilot program



- Designed with input from global regulatory communities and DMD patient community
- DMD historical control data will be leveraged to potentially reduce number of patients required to deliver conclusive clinical efficacy results and to potentially accelerate study completion

# Building a portfolio to transform the care of DMD

## Suvodirsen targeting exon 51

- Phase 2/3 trial initiated for global regulatory submissions
- Potential FDA accelerated approval filing in 2H 2020, pending positive clinical dystrophin expression data

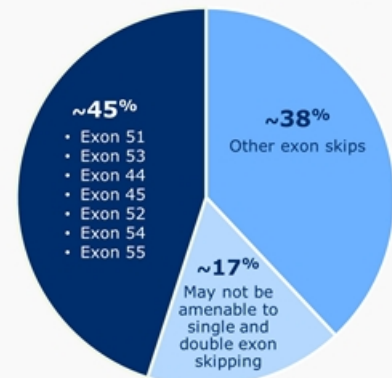
## WVE-N531 targeting exon 53

- Topline clinical data expected in 2H 2020

## Advancing candidate development for exons 44, 45, 52, 54, 55

- Early leads demonstrated similar *in vitro* exon skipping efficiency as suvodirsen and WVE-N531

Percentage of patients with DMD amenable to exon skipping therapeutic approach

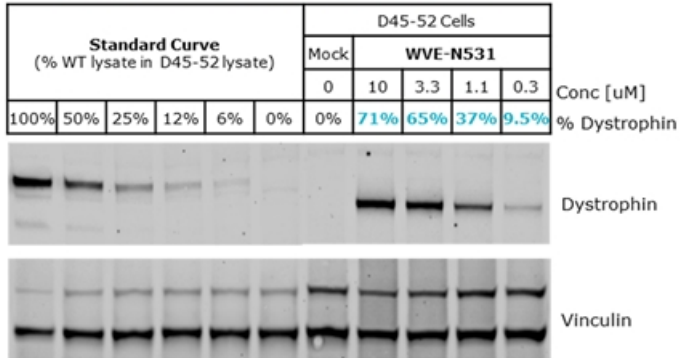


**Initiating commercialization activities in anticipation of first potential launch in US**

# Exon 53: WVE-N531 *in vitro* dose-dependent dystrophin restoration

Dystrophin protein restoration of up to 71%

Western Blot normalized to primary healthy human myoblast lysate



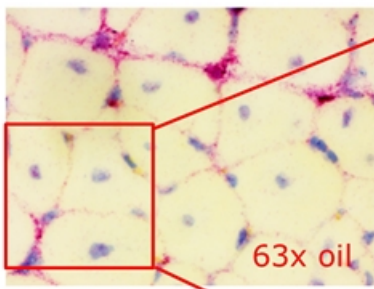
- Free uptake for 6 days in differentiation media with no transfection agent and no peptide conjugated to the oligonucleotide
- Wave stereopure exon 53 candidate demonstrated a dose-dependent increase in dystrophin restoration in DMD patient-derived myoblasts

Topline clinical data expected in 2H 2020

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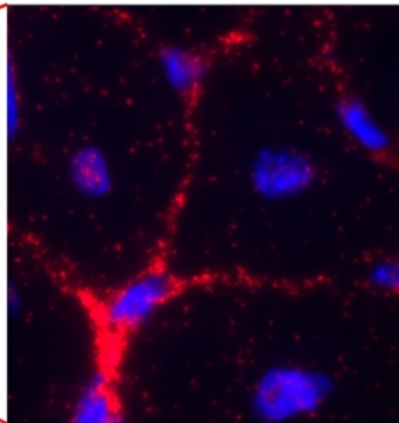
Experimental conditions: D45-52 patient myoblasts were treated with oligonucleotide for 6d under free-uptake conditions in differentiation media. Protein harvested in RIPA buffer and dystrophin restoration analyzed by Western Blot. Signal normalized to vinculin loading control and to primary healthy human myotube lysate (pooled from four donors) forming a standard curve in d45-52 cell lysate.

# Exon 53: targeting oligonucleotide rapidly distributes to muscle within 24 hours after injection



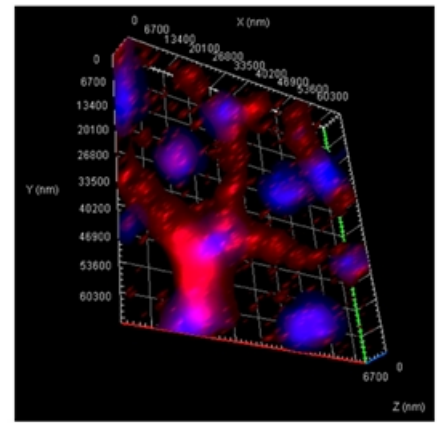
Bright field view

**Nucleus:** Hematoxylin; Light Blue  
**Wave oligo:** ViewRNA, Fast Red



Fluorescence channel view

**Nucleus:** Hoechst33342; Blue  
**Wave oligo:** Fast Red/Cy3; Pink Red



Z Stack view

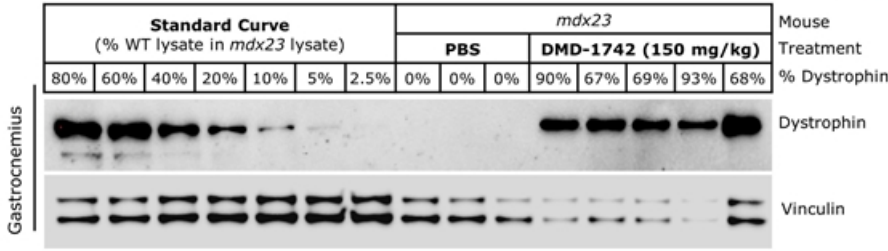
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Data derived from *in vivo* preclinical research.

Experimental conditions: A single dose of stereopure oligonucleotide 30 mg/kg IV was administered to *mdx* 23 mice. Tissues collected 24 hours post dose and ASO was detected in muscles using ViewRNA.

# In vivo mdx23 dystrophin protein with oligonucleotides

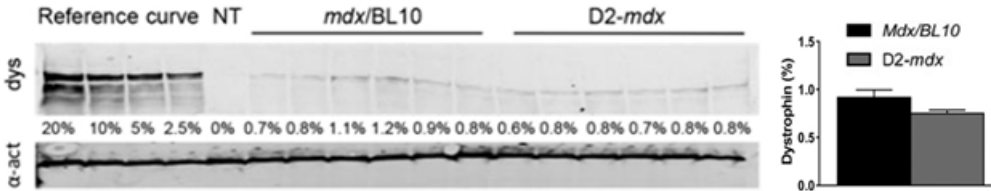
**In vivo dystrophin protein restoration (stereopure surrogate, 150 mg/kg, 4 weekly IV doses)**



70 – 90% dystrophin restoration  
87% reduction in creatine kinase (CK) levels

## Published literature

**In vivo dystrophin protein restoration (drisapersen surrogate, 200 mg/kg, 8 weekly IV doses)**



Less than 1.5% dystrophin restoration in two separate studies<sup>1,2</sup>  
No reduction in CK levels<sup>1</sup>

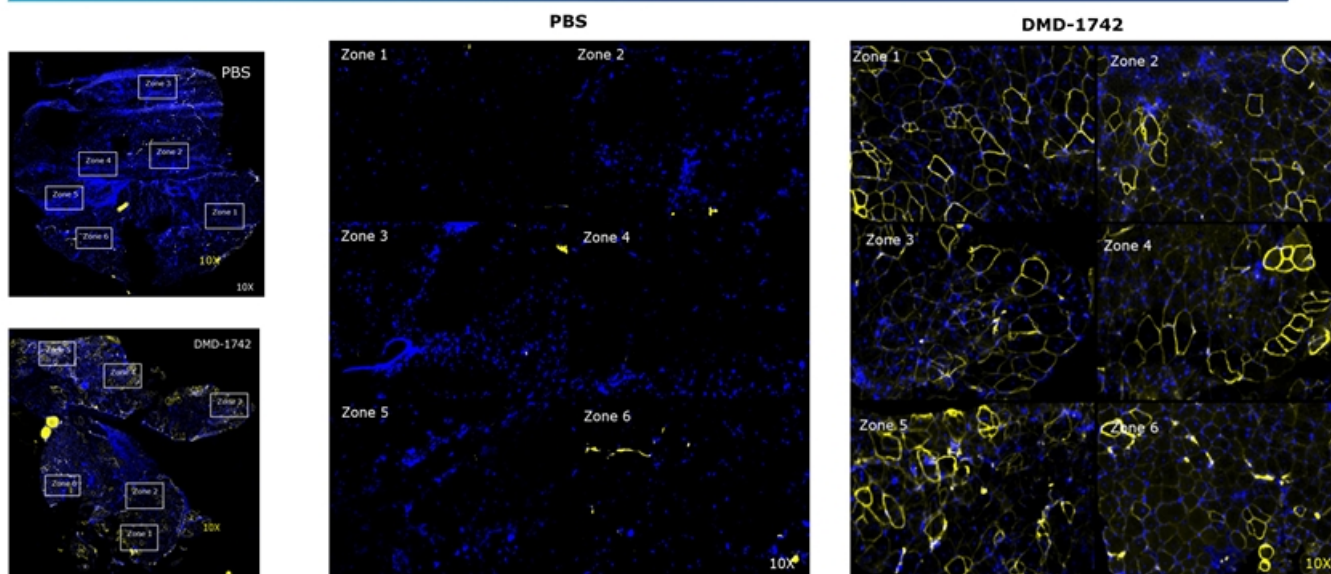


NT = nontreated mdx mouse; mdx/BL10 = mdx mouse in C57BL/10ScSn background; D2-mdx = mdx mouse crossed to DBA/2A background resulting in more severely affected model; CK = creatine kinase  
Experimental conditions (stereopure surrogate): Tissues collected 96 hours post final dose. Protein expression determined by western Blot.  
1. Experimental conditions (drisapersen surrogate); Tissues collected 1 week after the last injection. Protein expression determined by western blot.  
van Putten M, Tanganyika-de Winter C, Bosgra S, Aartsma-Rus A. Nonclinical Exon Skipping Studies with 2'-O-Methyl Phosphorothioate Antisense Oligonucleotides in mdx and mdx-utrn<sup>-/-</sup> Mice Inspired by Clinical Trial Results. *Nucleic Acid Ther.* 2019 Apr;29(2):92-103.  
2. *Molecular Therapy - Nucleic Acids* (2014) 3, e148



# Single dose of surrogate results in restoration of dystrophin in muscle fibers

Immunohistochemistry of dystrophin in gastrocnemius in *mdx23* mice at 4 weeks



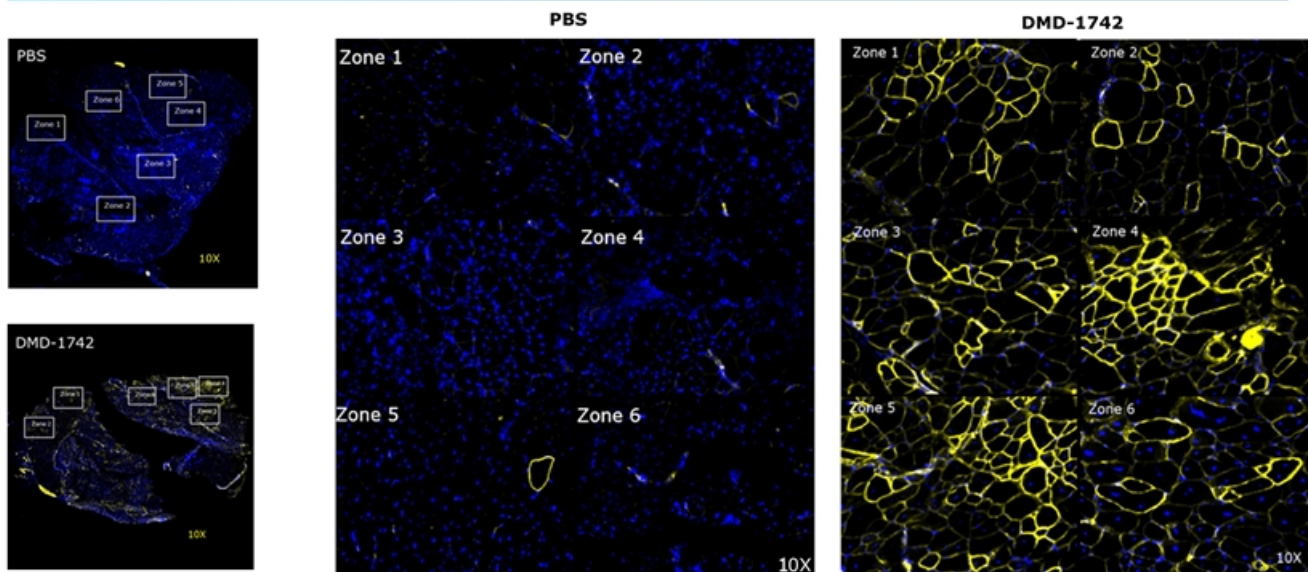
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Experimental conditions: *mdx23* mice received a single IV injection of PBS or DMD-1742 (150 mg/kg).  
Immunohistochemistry: Blue: Nuclei, Hoechst; Yellow: Rabbit anti-Dystrophin(#ab15277) 1:400 diluent, 555/Cy3, Cy3 staining is represented by the yellow color.  
10X magnification.



# Multiple doses of surrogate result in further restoration of dystrophin in muscle fibers

Immunohistochemistry of dystrophin in gastrocnemius in *mdx23* mice at 4 weeks



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Experimental conditions: *mdx23* mice received 4 weekly IV injections of PBS or DMD-1742 (150 mg/kg).  
Immunohistochemistry: Blue: Nuclei, Hoechst; Yellow: Rabbit anti-Dystrophin(#ab15277) 1:400 diluent, 555/Cy3, Cy3 staining is represented by the yellow color.  
10X magnification.

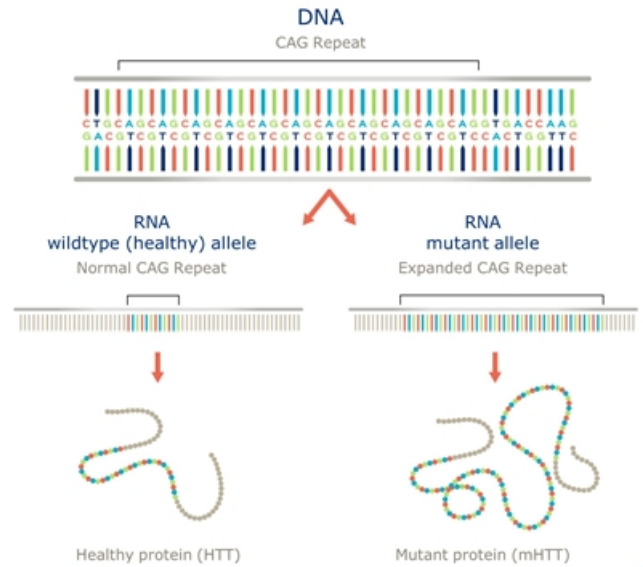


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WVE-120101  
WVE-120102  
Huntington's Disease

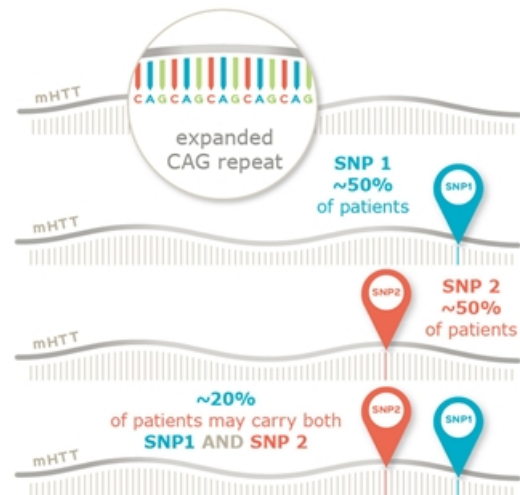
# Huntington's disease: a hereditary, fatal disorder

- Autosomal dominant disease, characterized by cognitive decline, psychiatric illness and chorea; fatal
- No approved disease-modifying therapies
- Expanded CAG triplet repeat in HTT gene results in production of mutant huntingtin protein (mHTT); accumulation of mHTT causes progressive loss of neurons in the brain
- Wildtype (healthy) HTT protein critical for neuronal function; suppression may have detrimental long-term consequences
- 30,000 people with Huntington's disease in the US; another 200,000 at risk of developing the condition



## Wave approach: novel, allele-selective silencing

- Utilize association between single nucleotide polymorphisms (SNPs) and genetic mutations to specifically target errors in genetic disorders, including HD
- Allele-selective possible by targeting SNPs associated with expanded long CAG repeat in mHTT gene
- Approach aims to lower mHTT transcript while leaving healthy HTT relatively intact
- Potential to provide treatment for up to 70% of HD population (either oligo alone could address approximately 50% of HD population)



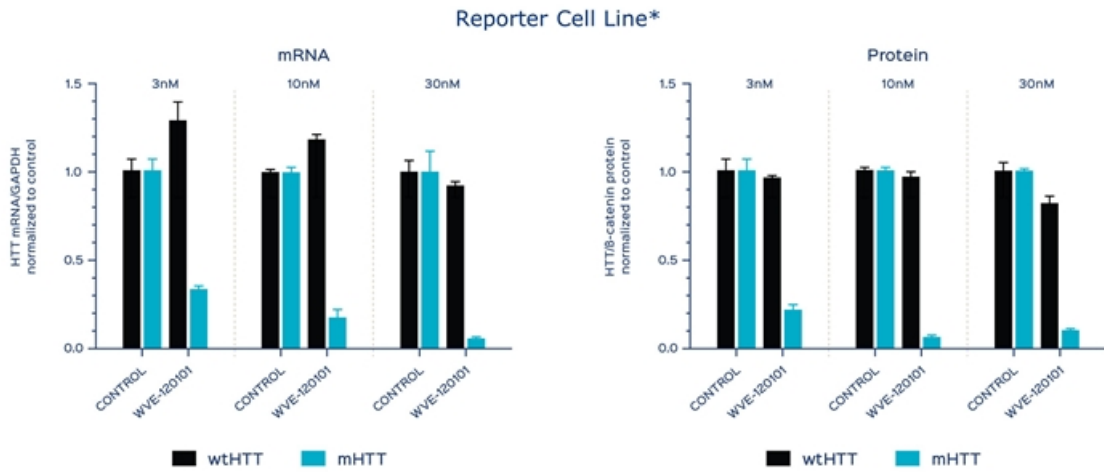
Total: Due to overlap, an estimated ~70% of the total HD patient population carry SNP1 and/or SNP2

## Two simultaneous Phase 1b/2a clinical trials

- PRECISION-HD is a global clinical program consisting of the PRECISION-HD1 trial evaluating WVE-120101 targeting SNP1 and the PRECISION-HD2 trial evaluating WVE-120102 targeting SNP2
  - Two parallel, multicenter, double-blind, randomized, placebo-controlled Phase 1b/2a clinical trials for WVE-120101 and WVE-120102, administered intrathecally, with single-ascending dose and multiple-ascending dose portions
  - Primary objective: Assess safety and tolerability of intrathecal doses in early manifest HD patients
  - Key additional objectives: Measurement of total HTT and mHTT; exploratory pharmacokinetic (PK), pharmacodynamic (PD), clinical and MRI endpoints
  - Key inclusion criteria: age  $\geq 25$  to  $\leq 65$ , stage I or II HD who have screened positively for the presence of SNP1 or SNP2
  - Expected to enroll approximately 50 patients per trial
  - **Topline data expected to include: summary of clinical safety results, degree of mHTT protein lowering in CSF at 20 weeks, the ratio of total HTT versus mHTT in CSF at 20 weeks**
- Open-label extension (OLE) study planned to allow for continued dosing and clinical assessments
  - To include patients previously in the Phase 1b/2a clinical trials
  - Assessments of safety, tolerability, PK, PD, MRI and efficacy using validated clinical outcome measures
- Intend to explore efficacy in early manifest and pre-manifest HD patient populations

Topline data readout for PRECISION-HD2 expected by YE 2019

# Selective reduction of mHTT mRNA & protein

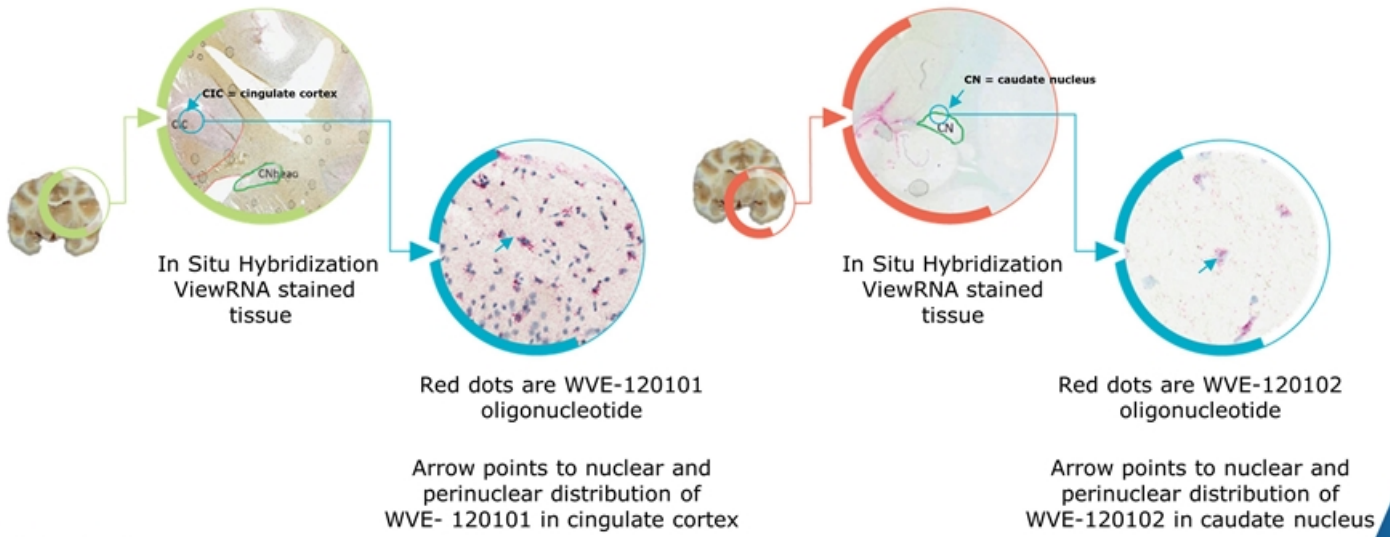


\*These results were replicated in a patient-derived cell line



# Demonstrated delivery to brain tissue

- WVE-120101 and WVE-120102 distribution in cynomolgus non-human primate brain following intrathecal bolus injection



WVE-C092

Amyotrophic Lateral Sclerosis (ALS)  
Frontotemporal Dementia (FTD)



## C9orf72: a critical genetic risk factor

- C9orf72 gene provides instructions for making protein found in various tissues, with abundance in nerve cells in the cerebral cortex and motor neurons
- C9orf72 genetic mutations are the strongest genetic risk factor found to date for the more common, non-inherited (sporadic) forms of Amyotrophic Lateral Sclerosis (ALS) and Frontotemporal Dementia (FTD); GGGGCC repeat drives the formation and accumulation of dipeptide repeat proteins that accumulate in brain tissue
- First pathogenic mechanism identified to be a genetic link between familial (inherited) ALS and FTD
- Most common mutation identified associated with familial ALS and FTD
- Availability of dipeptide biomarker in CSF has potential to accelerate drug development



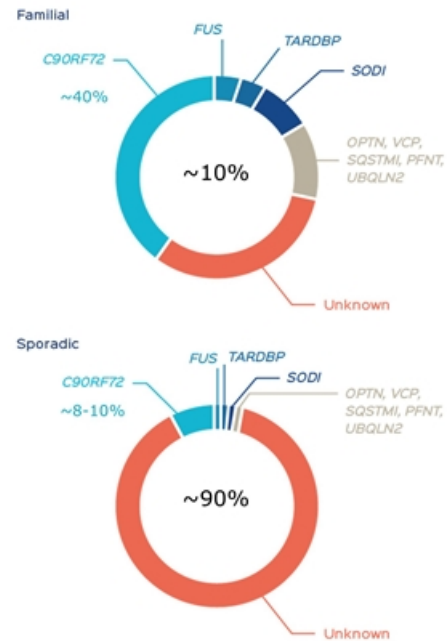
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Source: DeJesus-Hernandez M, Mackenzie IR, Boeve BF, et al. *Neuron*. 2011;72:245-256. Renton AE, Majounie E, Waite A, et al. *Neuron*. 2011;72:257-268.

# Amyotrophic lateral sclerosis

- Fatal neurodegenerative disease characterized by the progressive degeneration of motor neurons in the brain and spinal cord
- Affects approximately 15,000-20,000 people in the US with a median survival of three years
- C9orf72 is present in approximately 40% of familial ALS and 8-10% of sporadic ALS; currently the most common demonstrated mutation related to ALS, far more so than SOD1 or TDP-43
- Pathogenic transcripts of the C9orf72 gene contain hundreds to thousands of hexanucleotide repeats compared to 2-23 in wild-type transcripts; dominant trait with high penetrance

Clinical development expected to initiate in 2H 2020



# Frontotemporal dementia

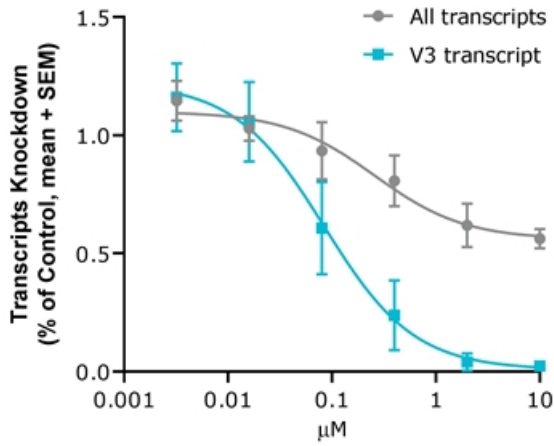
- Progressive neuronal atrophy with loss in the frontal and temporal cortices characterized by personality and behavioral changes, as well as gradual impairment of language skills
- Affects approximately 55,000 people in the US
- Second most common form of early-onset dementia after Alzheimer's disease in people under the age of 65
- Up to 50% of FTD patients have a family history of dementia, many inheriting FTD as an autosomal dominant trait with high penetrance
- Pathogenic transcripts of the C9orf72 gene contain hundreds to thousands of hexanucleotide repeats compared to 2-23 in wild-type transcripts



Clinical development expected to initiate in 2H 2020

# WVE-C092 demonstrated selective and potent silencing of expanded C9orf72 repeat transcripts

WVE-C092 preferentially reduces repeat-containing V3 transcripts



Stereochemistry and chemistry optimization improves potency

	IC <sub>50</sub> (nM)
<b>WVE-C092</b>	<b>84</b>
WVE-3972-01	411
Stereorandom ASO	845

10-fold

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*in vitro* experimental methods: C9 ALS patient derived MNs were treated with ASO gymnotically (free-uptake) for 1 week. Cells were harvested with Trizol reagent for RNA extraction. Taqman qPCR assays were used to detect V3 and all V.

## Ophthalmology

# Building a portfolio for inherited retinal diseases

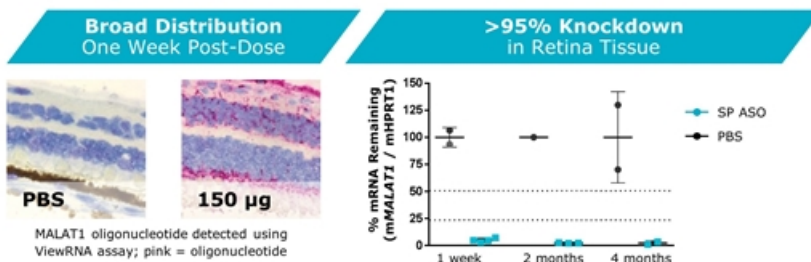
## Inherited retinal diseases (IRDs)

- Rare eye disorders caused by genetic mutations leading to progressive vision loss
- Only one approved therapy for an IRD
- Approximately 200,000 affected in the U.S. and millions world-wide

## Wave opportunity

- Oligonucleotides allow for intravitreal (IVT) injection; targeting twice per year dosing
- Stereopure oligonucleotides open up novel strategies in both dominant and recessive IRDs; potential for potent and durable effect with low immune response

Single IVT injection of stereopure oligonucleotide to NHP results in distribution throughout all layers of the retina and potent, extended duration of effect



Genetic target	Inherited retinal disease	US Population Addressable by Wave Approach
USH2A	Usher syndrome 2A	~5,000
RHO P23H	Retinitis pigmentosa	~1,800
ABCA4	Stargardt disease	~2,000
CEP290	Leber congenital amaurosis 10	~1,000

Initial candidate expected in 2H 2019

# Anticipated upcoming Wave milestones

## Neuromuscular

- **4Q 2019:** Interim dystrophin data readout for suvodirsen from OLE in DMD (exon 51)
- **2H 2020:** Accelerated approval filing for suvodirsen in DMD (exon 51) in US, pending positive clinical dystrophin expression data
- **2H 2020:** Topline clinical data for WVE-N531 in DMD (exon 53)

## CNS

- **By YE 2019:** Topline data readout from PRECISION-HD2 Phase 1b/2a trial in Huntington's disease
- **Early 2020:** Topline data readout from PRECISION-HD1 Phase 1b/2a trial in Huntington's disease
- **2H 2020:** Initiation of clinical development of WVE-C092 (C9orf72) in ALS and FTD

## Ophthalmology

- **2H 2019:** Selection of initial development candidate for inherited retinal disease



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## Realizing the potential of genetic medicines

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