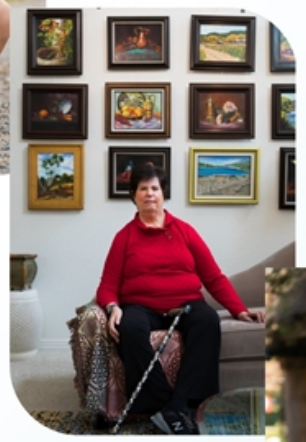
Exhibit 99.1

AVIDITY® BIOSCIENCES



Virtual Investor & Analyst Event Series – Volume 6:

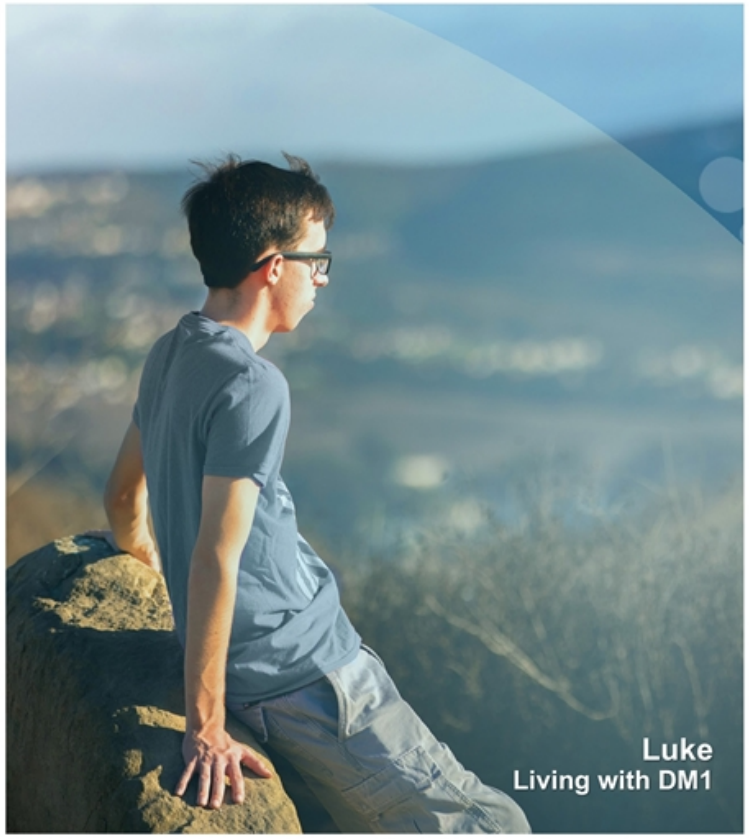
AOC 1001 MARINA™ Phase 1/2 Trial Preliminary Data Assessment

Forward Looking Statements

We caution the reader that this presentation contains forward-looking statements that involve substantial risks and uncertainties. All statements other than statements of historical facts contained in this presentation, including, but not limited to, statements regarding our future results of operations and financial position, business strategy, the anticipated timing, costs, design and conduct of our ongoing and planned preclinical studies and clinical trials, research and development plans, plans and projected timelines for AOC 1001, AOC 1020 and AOC 1044; timing and likelihood of success, prospective products, product approvals, plans and objectives of management for future operations, and future results of anticipated product development efforts, are forward-looking statements. In some cases, the reader can identify forward-looking statements by terms such as "may," "will," "should," "expect," "plan," "anticipate," "could," "intend," "target," "project," "contemplates," "believes," "estimates," "predicts," "potential" or "continue" or the negative of these terms or other similar expressions. The inclusion of forward-looking statements should not be regarded as a representation by Avidity that any of our plans will be achieved. Actual results may differ from those set forth in this presentation due to the risks and uncertainties inherent in our business, including, without limitation: we may not be able to resolve the partial clinical hold, and the analysis related to the underlying cause of the serious adverse event may result in delays in the MARINA study or an inability to compete the study; the Phase 1/2 MARINA trial results are based on a preliminary analysis of interim data available as of the data cutoffs, and the interim results do not predict the final results of the trial, and one or more of the safety or biomarker results may materially change following more comprehensive reviews of the data, as follow-up on the outcome of any particular patient continues, as and if additional patients enroll in the trial and as more patient data become available, any of which may materially alter the findings and conclusions from our preliminary analysis; unexpected adverse side effects or inadequate efficacy of our product candidates may delay or limit their development, regulatory approval and/or commercialization, or may result in clinical holds, recalls or product liability claims; we are early in our development efforts and many of our development programs are in the preclinical or discovery stage; our approach to the discovery and development of product candidates based on our AOC platform is unproven, and we do not know whether we will be able to develop any products of commercial value; the success of our preclinical studies and clinical trials for our product candidates; the results of preclinical studies and early clinical trials are not necessarily predictive of future results; potential delays in the commencement, enrollment and completion of clinical trials; our dependence on third parties in connection with preclinical and clinical testing and product manufacturing; disruption to our operations from the COVID-19 pandemic; the war in Ukraine; regulatory developments in the United States and foreign countries, including acceptance of INDs and similar foreign regulatory submissions and our proposed design of future clinical trials; our ability to obtain and maintain intellectual property protection for our product candidates and proprietary technologies; we may use our capital resources sooner than we expect; and other risks described in our filings with the SEC, including under the heading "Risk Factors" in our Form 10-K for the year ending on December 31, 2021, filed with the SEC on March 1, 2022, and any subsequent filings with the SEC. The reader is cautioned not to place undue reliance on these forward-looking statements, which speak only as of the date hereof, and except as required by applicable law, we do 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. All forward-looking statements are qualified in their entirety by this cautionary statement, which is made under the safe harbor provisions of the Private Securities Litigation Reform Act of 1995.

This presentation also contains estimates and other statistical data made by independent parties and by us relating to market size and growth and other data about our industry. This data involves a number of assumptions and limitations, and the reader is cautioned not to give undue weight to such estimates. In addition, projections, assumptions, and estimates of our future performance and the future performance of the markets in which we operate are necessarily subject to a high degree of uncertainty and risk. These and other factors could cause results to differ materially from those expressed in the estimates made by the independent parties and by us.

Our Vision



To profoundly improve people's lives by revolutionizing the delivery of RNA therapeutics

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Our Vision To profoundly improve people's lives by revolutionizing the delivery of RNA therapeutics Luke Living with DM1

Delivering on Our Vision

DISRUPTIVE & BROAD
PLATFORM

- Committed to delivering a new class of RNA therapies
- Advancing three AOCs in clinical development; two siRNAs and first PMO
- Broadening to other tissues & cell types through partnerships & internal discovery

ADVANCING & EXPANDING
PIPELINE

- Progressing robust pipeline in muscle; 3 programs in clinical development in approx. a year
- AOC 1001* Phase 1/2 MARINA™ trial and MARINA-OLE™ ongoing
- AOC 1020 for FSHD in Phase 1/2 FORTITUDE™ trial
- AOC 1044 for DMD in Phase 1/2 EXPLORE44™ trial

AGILE & DIVERSE
COMPANY

- Leveraging expertise in clinical and commercial execution
- Assembling an experienced team in rare & RNA therapies
- Building an integrated and diverse company in service of our patients

*Sept. 2022, FDA placed a partial clinical hold on new participant enrollment. All current participants may continue in their current dosing cohort. All participants in MARINA may roll over into the MARINA-OLE where they will receive AOC 1001 as planned. Avidity is working to resolve the partial clinical hold as quickly as possible.

Delivering on 2022 Goals

Three programs in three distinct rare diseases in clinical development

DM1: AOC 1001* MARINA™

Successfully completed preliminary assessment

Top-line data and program updates planned for 2023

MARINA™

MARINA-OLE™

FSHD: AOC 1020 FORTITUDE™

IND cleared; trial initiation underway

Preliminary assessment in approximately half of participants in 1H 2024

FORTITUDE™

DMD: AOC 1044 EXPLORE44™

IND cleared; trial initiation underway

Results from healthy volunteers in 2H 2023

Overall program planned for potential Accelerated Approval

explore 44™

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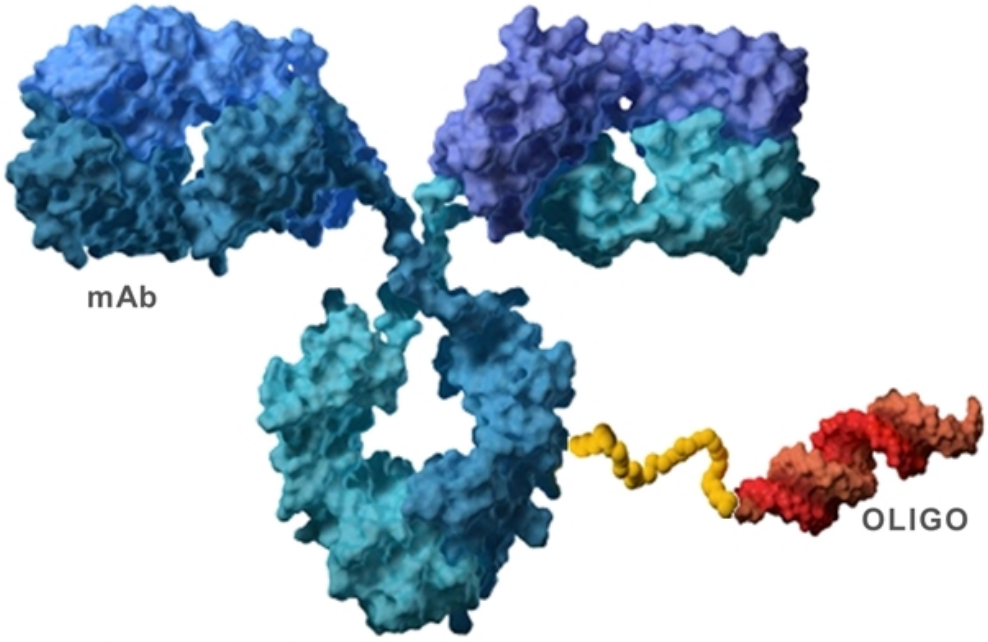
*Sept. 2022, FDA placed a partial clinical hold on new participant enrollment. All current participants may continue in their current dosing cohort. All participants in MARINA may roll over into the MARINA-OLE where they will receive AOC 1001 as planned. Avidity is working to resolve the partial clinical hold as quickly as possible.

Goals for the Day

- AOC 1001 Preliminary Data Assessment
- Living with DM1
- Disruptive and Broad AOC Platform
- Answer your questions



AOC 1001

Goals for the Day AOC 1001 Preliminary Data Assessment Living with DM1 Disruptive and Broad AOC Platform Answer your questions mAb OLIGO AOC 1001

AOCs Deliver to Muscle – Revolutionary Advancement for the Field of RNA Therapeutics

MARINA™

Safety & Tolerability — *MARINA Primary Endpoint*; Phase 1/2 trial ongoing

Delivery to Muscle — First-ever successful targeted delivery of RNA to muscle – reinforces disruptive and broad potential of the AOC platform

DMPK Reduction — 100% of treated participants had a DMPK reduction
45% mean DMPK reduction in treated participants

Impact on Disease Mechanism — 16% splicing improvement across 22 gene panel
31% improvement in key set of muscle-specific genes

Early Signs of Clinical Activity — Myotonia improvement in early responders

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Sarah Boyce
President and CEO

Steve Hughes, M.D.
Chief Medical Officer

Mike Flanagan, Ph.D.
Chief Technical Officer

Art Levin, Ph.D.
Chief Scientific Officer

Avidity Management Team Members

Nicholas E. Johnson, M.D., M.Sci., FAAN

Virginia Commonwealth University

AOC 1001 MARINA™ Phase 1/2 Trial
Preliminary Data Assessment

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Steve Hughes, M.D. Chief Medical Officer Sarah Boyce President and CEO Art Levin, Ph.D. Chief Scientific Officer Mike Flanagan, Ph.D. Chief Technical Officer AOC 1001 MARINATM Phase 1/2 Trial Preliminary Data Assessment Avidity Management Team Nicholas E. Johnson, M.D., M.Sci., FAAN Virginia Commonwealth University

Agenda

• **Welcome & Introduction**	**Sarah Boyce**, President & CEO
• **MARINA™: AOC 1001 Phase 1/2 Preliminary Data Assessment**	**Steve Hughes,** M.D., CMO **Mike Flanagan,** Ph.D., CTO
• **Living with Myotonic Dystrophy Type 1**	**Nicholas E. Johnson,** M.D., M.Sci., FAAN Virginia Commonwealth University
• **Broad Utility & Power of the Platform**	**Art Levin**, Ph.D., CSO
• **Q&A Session**	**Avidity Management** **Dr. Nicholas Johnson**, VCU **Kath Gallagher**, SVP, Communications & IR (Moderator)
• **Closing Remarks**	**Sarah Boyce**, President & CEO

MARINA™

MARINA: A Phase 1/2 Clinical Trial to Evaluate AOC 1001 in Adult Patients with DM1

Steve Hughes, M.D., Chief Medical Officer

Myotonic Dystrophy Type 1 (DM1): Disease Overview

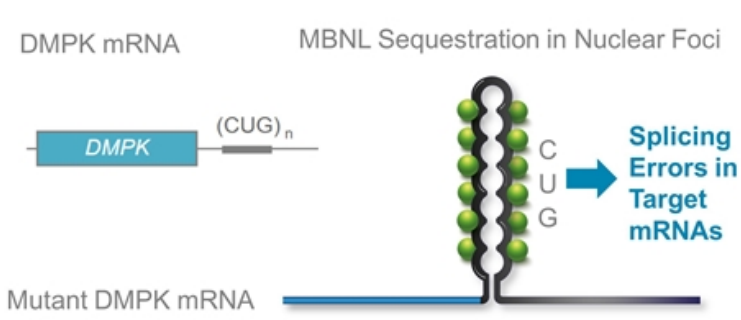
>40,000
PEOPLE WITH DM1 IN THE US

0
APPROVED THERAPIES

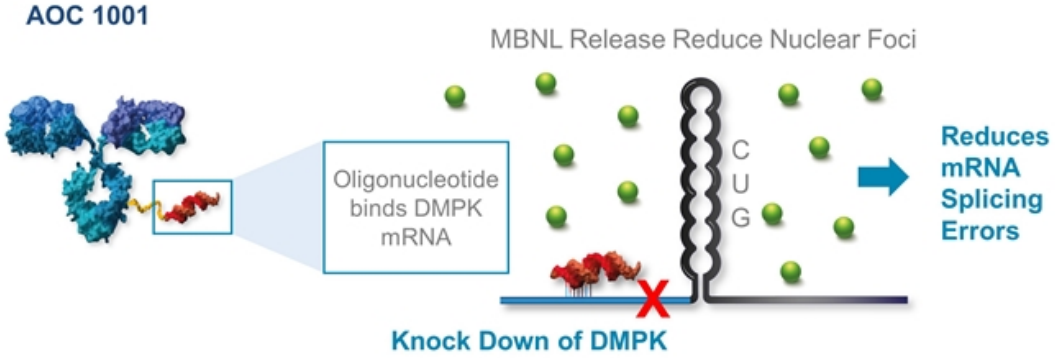
- DM1 is a complex disease with symptoms that present with high variability from patient to patient
- Monogenic, autosomal dominant, progressive disease that primarily affects muscle: skeletal, cardiac & smooth
- Increases in severity from generation to generation
- Significant impact on quality of life
- Shortened life-expectancy

DM1 is Caused by a Toxic Gain-of-Function mRNA and is Well Suited to an siRNA Approach

Mechanism of Disease



Potential Therapeutic Approach



MBNL (Muscleblind-like)

- Trinucleotide expansion in DMPK mRNA sequesters an RNA splicing protein MBNL (Muscleblind-like) in nuclear foci
- Sequestration of MBNL leads to RNA splicing errors in multiple muscle-related RNAs and induces DM1 disease manifestations
- Allows MBNL to be released to perform its natural function to aid in splicing key mRNAs in muscle
- Improves the splice patterns and muscle function. Splice patterns can serve as biomarkers

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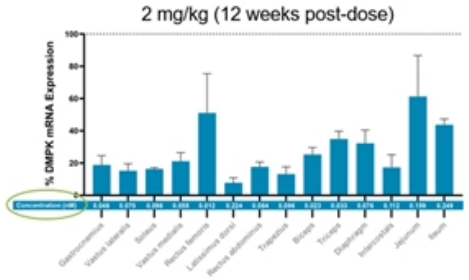
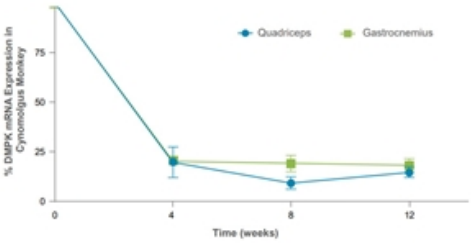
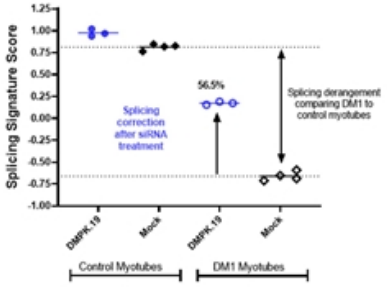
AOC 1001's Compelling Preclinical Package

Safety and Tolerability	Delivery to Muscle	DMPK Reduction	Impact on Disease Mechanism
Favorable toxicology profile in Non-Human Primates (NHPs)	Duration and delivery shown in wide range of muscles in multiple preclinical models	75% reduction in NHPs	Splicing Improvement in patient-derived muscle cells

IND



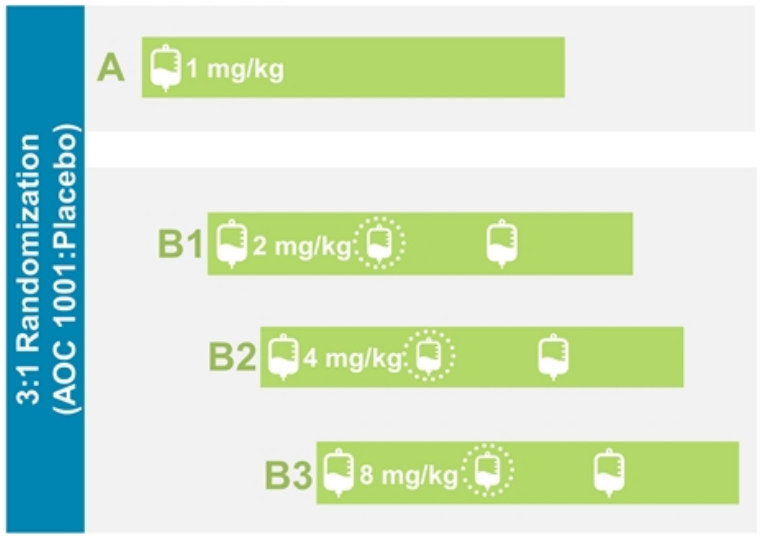




IND AOC 1001's Compelling Preclinical Package Safety and Tolerability Delivery to Muscle DMPK Reduction 75% Impact on Disease Mechanism Favorable toxicology profile in Non-Human Primates (NHPs) Duration and delivery shown in wide range of muscles in multiple preclinical models Splicing Improvement in patient-derived muscle cells

MARINA™ and MARINA-OLE™ Allow for Both Short- and Long-term Data Collection to Support AOC 1001*

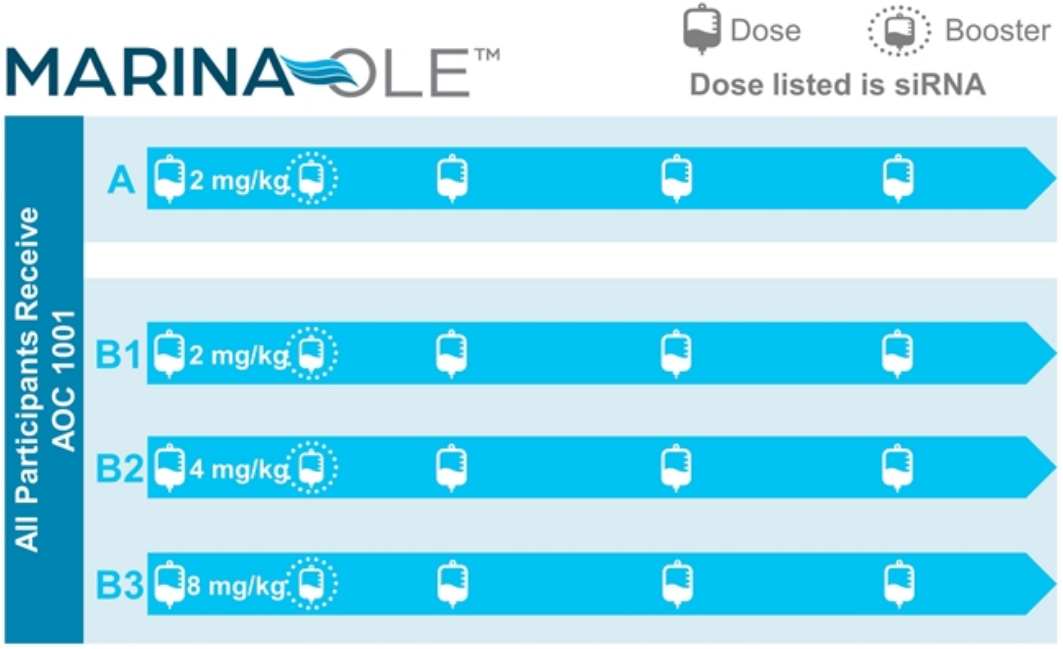
MARINA™



N = ~44 Ages 18-65 (3:1 randomization)
Part A receives single IV dose
Part B receives multi-ascending IV doses
- Quarterly doses - 1 booster after first 6 weeks

6-month treatment and observation duration

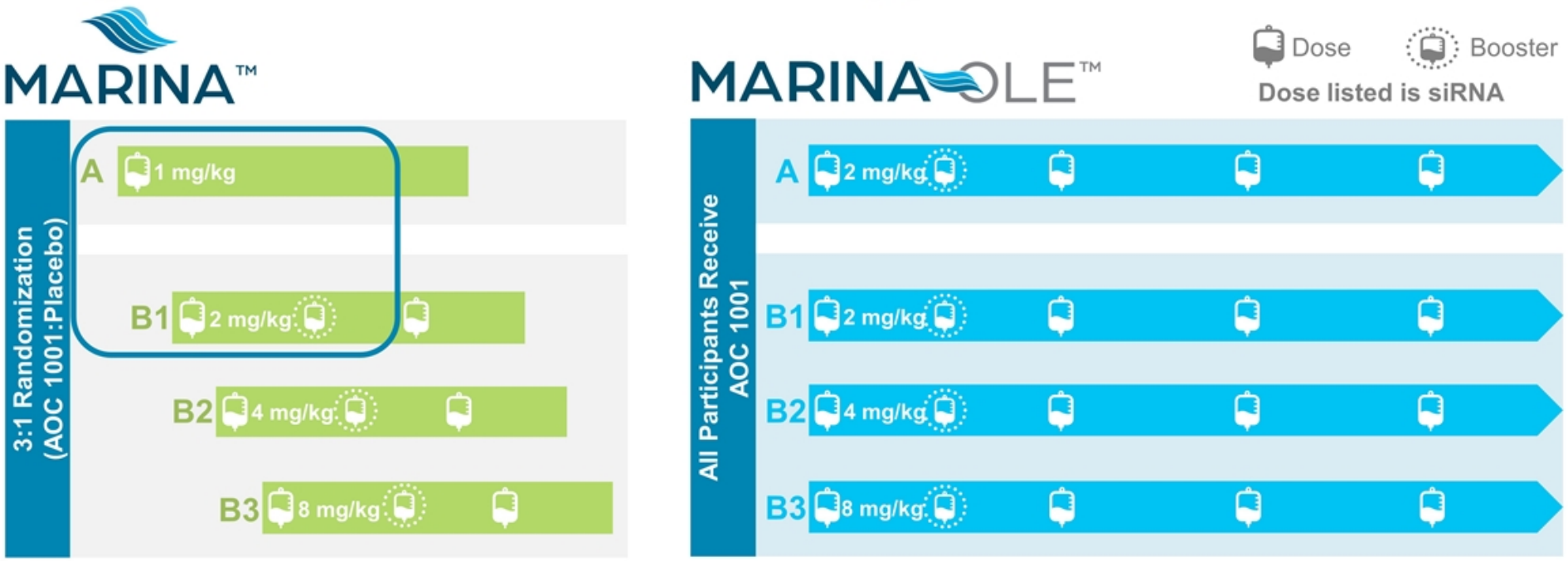
MARINA-OLE™



N = ~44 Ages 18-65
All participants receive AOC 1001
Quarterly doses - 1 booster after first 6 weeks
24-month treatment and 9-month observation duration

*Sept. 2022, FDA placed a partial clinical hold on new participant enrollment. All current participants may continue in their current dosing cohort. Avidity is working to resolve the partial clinical hold as quickly as possible.

MARINA™ and MARINA-OLE™ Allow for Both Short- and Long-term Data Collection to Support AOC 1001*



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6-month treatment and observation duration

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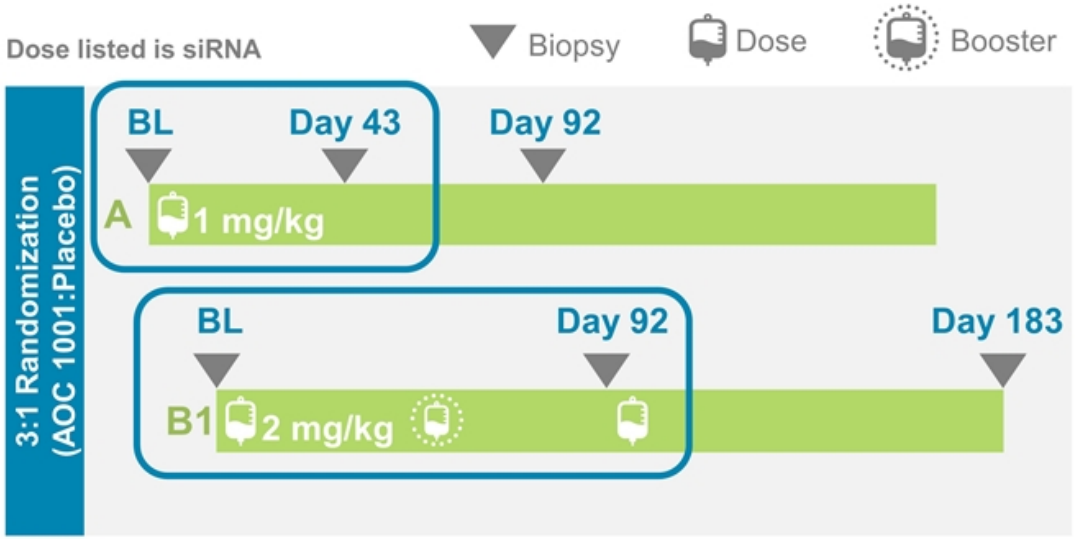
24-month treatment and 9-month observation duration

AVIDITY BIOSCIENCES

*Sept. 2022, FDA placed a partial clinical hold on new participant enrollment. All current participants may continue in their current dosing cohort. Avidity is working closely to resolve the partial clinical hold as quickly as possible.

Early Data from MARINA Mid-Point at 6 weeks post 1 or 2 doses of AOC 1001

MARINA™



Safety includes all cohorts (including 4mg/kg) with a data cutoff of November 17th

NOTE: Day 92 biopsy in 2mg/kg cohort taken prior to third dose of AOC 1001

Biopsy	1 mg/kg (n=8 Participants)		2mg/kg (n=12 Participants)	
	Baseline	Day 43	Baseline	Day 92
DMPK	6 Active 2 Placebo	5* Active 2 Placebo	9 Active 3 Placebo	9 Active 3 Placebo
Splicing				8** Active 3 Placebo

Data at 3 Months: n=19 participants*

1mg/kg Cohort (n=5 active participants)
2mg/kg Cohort (n=9 active participants)
Pooled placebo (n=5 participants)

*One participant in the 1mg/kg cohort had insufficient tissue for analysis

**Due to timing, one splicing sample from the 2mg/kg cohort will be evaluated in the next batch analysis

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MARINA™ MARINA-OLE™ Update*

- **MARINA™ is on a partial clinical hold for new participant enrollment**
  - The partial hold is in response to a serious adverse event (SAE) reported in a single participant in the 4mg/kg cohort.
  - No similar events observed in other participants in either MARINA or the MARINA-OLE
  - Avidity working to conclude the investigation of the SAE
- **Participants already in MARINA or the MARINA open label extension (MARINA-OLE™) continue to receive either AOC 1001 or placebo**
  - 38 participants enrolled in MARINA; to date, 100% of participants who completed MARINA have chosen to roll into the MARINA-OLE
- **Anticipate sharing an update on the partial hold by the end of the first quarter in 2023**
  - Plan to disclose more information on the SAE at that time
- **MARINA top-line data anticipated in 2023**

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*Current as of December 13, 2022.

Baseline Demographics* Generally Well Matched Between Cohorts

MARINA™

Cohort A and B1 Enrolled Participants with Mild-Moderate Disease Severity

Mean (Range) or Number of subjects	Cohort A1 (1 mg/kg) N=8	Cohort B1 (2 mg/kg) N=12
Age	37.9 (21–64)	38.8 (18-60)
Sex	Male: 2 / Female: 6	Male: 1 / Female: 11
BMI	22.0 (16.1–29.2)	25.0 (17.5–32.0)
Mean CTG repeat length (range)	504 (150-725)	707 (150-1250)
Baseline Splicing (composite of 22 splicing events; higher number is more severe)	74 (38-96)	72 (39-105)

*Preliminary Results Based on Live, Unlocked Clinical Database – Numbers Subject to Change

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Generally Favorable Safety and Tolerability

MARINA™

Subjects with ≥ 1 AE n (%)	Placebo n=10	1mg/kg n=6	2mg/kg n=9	4mg/kg n=13	Total AOC 1001 N=28
Any AE	8 (80%)	6 (100%)	9 (100%)	12 (92%)	27 (96%)
Related to study drug	2 (20%)	1 (17%)	3 (33%)	10 (77%)	14 (50%)
Serious AE (SAE)	0	0	1 (11%)	1 (8%)	2 (7%)
AE leading to study discontinuation	0	0	0	0	0
AE leading to death	0	0	0	0	0

17-Nov-2022 data cutoff. MARINA data only presented

Preliminary Results Based on Live, Unlocked Clinical Database – Numbers Subject to Change

AVIDITY BIOSCIENCES

Generally Favorable Safety and Tolerability

MARINA™

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AE leading to study discontinuation	0	0	0	0	0
AE leading to death	0	0	0	0	0

17-Nov-2022 data cutoff. MARINA data only presented

Preliminary Results Based on Live, Unlocked Clinical Database – Numbers Subject to Change

- **Majority of treatment emergent adverse events (AEs) were mild or moderate**
  - The most common in the study were COVID-19 (16%) and headache (16%)
  - Other AEs include:
    - Infusion related reactions
    - Reductions in hemoglobin
    - Elevations in ASTs or ALTs
      - No changes in bilirubin
    - No thrombocytopenia and no renal impairment reported
- **2 Serious Adverse Events (SAEs)**
  - 1 SAE in the 4mg/kg cohort resulted in a partial clinical hold
  - 1 unrelated SAE in reaction to opioid pain medication after an elective surgery

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Summary

MARINA™

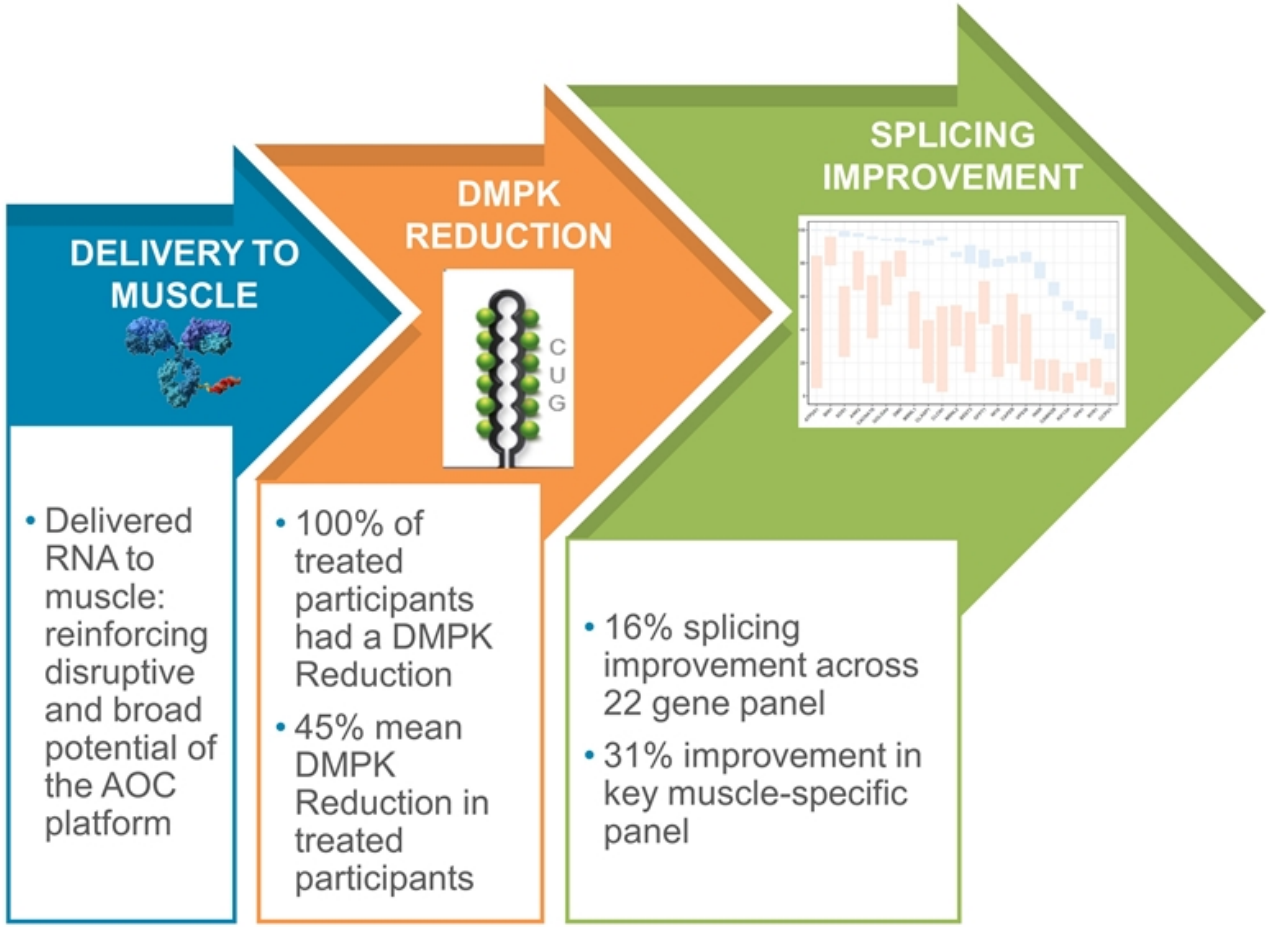
- **DM1 underrecognized, progressive and often fatal neuromuscular disease with a high unmet need and no approved therapies**
- **Data presented today is an early mid-point look at MARINA 6 weeks post 1 or 2 doses of AOC 1001**
  - Baseline demographics generally well matched between cohorts
  - Generally favorable safety and tolerability profile
- **Anticipate update on MARINA partial hold by the end of Q1 2023**
  - Plan to disclose more information on the SAE at that time
- **MARINA top-line data anticipated in 2023**

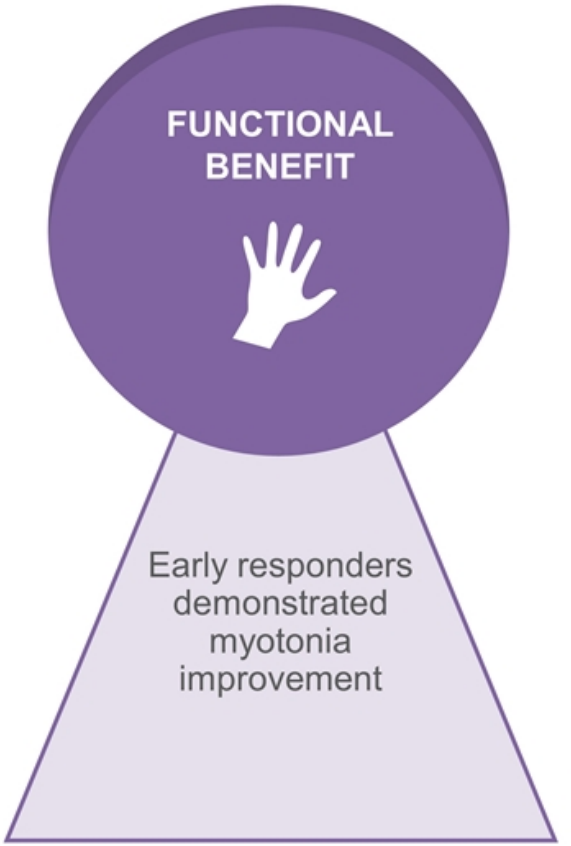
Delivering on the AOC Platform and Impacting the Underlying Disease Mechanism of DM1

W. Michael Flanagan, Ph.D., Chief Technical Officer

Delivering on the AOC Platform and Impacting the Underlying Disease Mechanism of DM1 W. Michael Flanagan, Ph.D., Chief Technical Officer

The DM1 Cascade to Functional Benefit





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DM1 Cascade to Functional Benefit Delivered RNA to muscle: reinforcing disruptive and broad potential of the AOC platform 100% of treated participants had a DMPK Reduction 45% mean DMPK Reduction in treated participants 16% splicing improvement across 22 gene panel 31% improvement in key muscle-specific panel Early responders demonstrated myotonia improvement

AOC 1001 Delivered siRNA to Muscle

Potential to Expand siRNA Therapeutics Beyond Liver

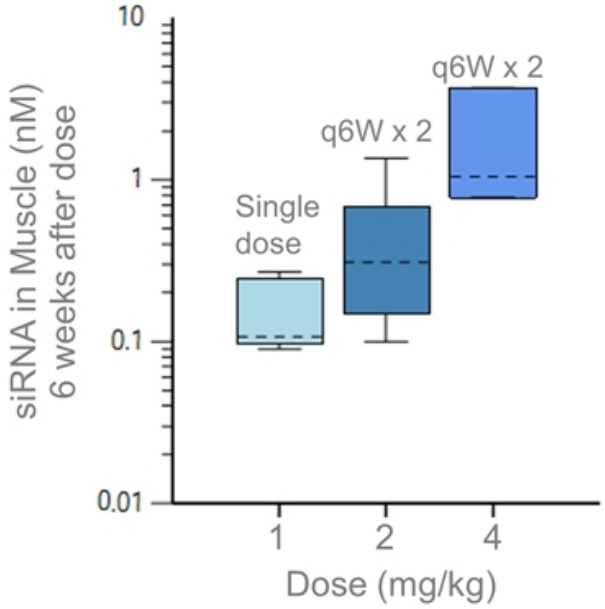
DELIVERY TO MUSCLE

DMPK REDUCTION

SPLICING IMPROVEMENT

FUNCTIONAL BENEFIT

Dose Proportional Increase in Muscle siRNA Concentrations



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AOC 1001 Delivered siRNA to Muscle Potential to Expand siRNA Therapeutics Beyond Liver DELIVERY TO MUSCLE SPLICING IMPROVEMENT DMPK REDUCTION FUNCTIONAL BENEFIT Dose Proportional Increase in Muscle siRNA Concentrations Single dose q6W x 2

Every Participant Treated with AOC1001 Showed DMPK Reduction*

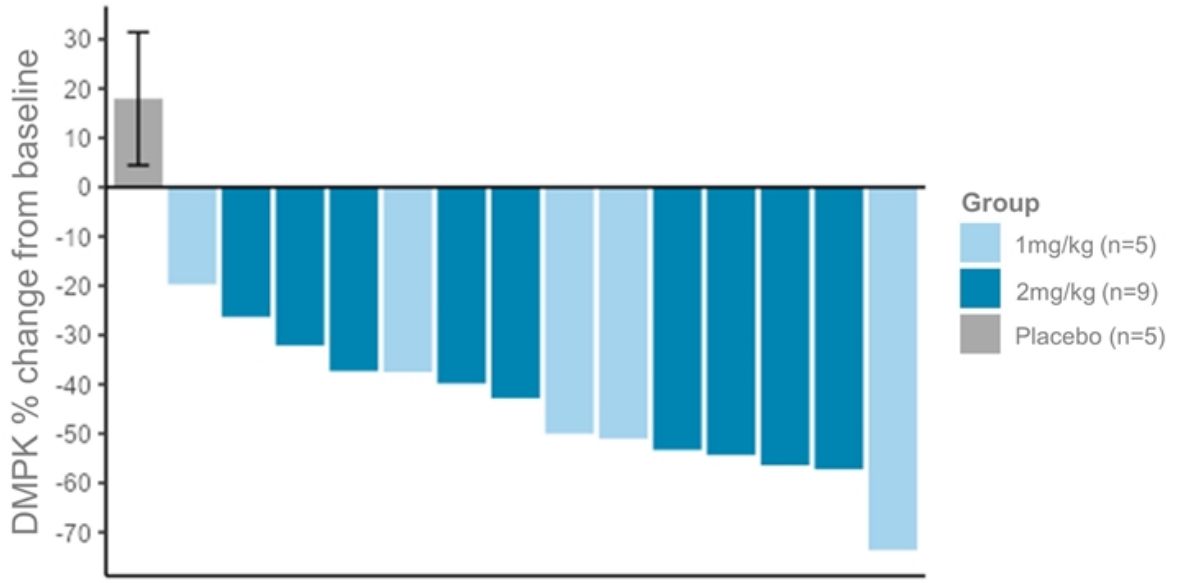
DELIVERY TO MUSCLE

DMPK REDUCTION

SPLICING IMPROVEMENT

FUNCTIONAL BENEFIT

All Treated Participants Demonstrate DMPK Reduction



- Placebo group combined from both cohorts and shown as standard error of mean
- Data represented as 6 weeks post last dose

*One participant in the 1mg/kg cohort had insufficient tissue for analysis

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Meaningful DMPK RNA Reduction Observed in Muscle

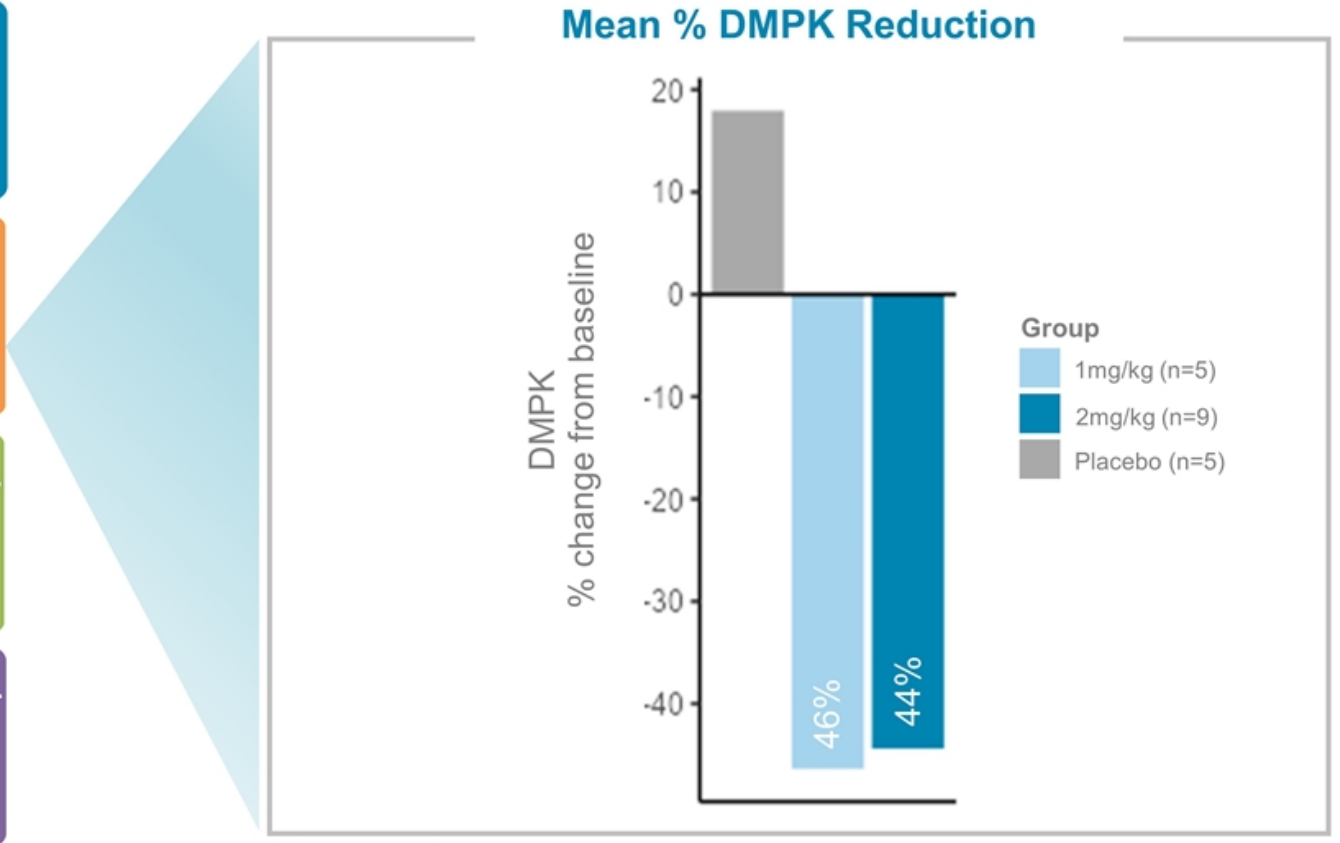
45% DMPK reduction after a single dose at 1 mg/kg or two doses at 2mg/kg

DELIVERY TO MUSCLE

DMPK REDUCTION

SPLICING IMPROVEMENT

FUNCTIONAL BENEFIT

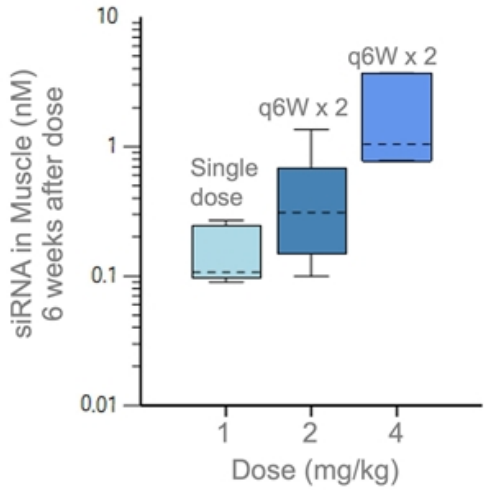


- Data represented as 6 weeks post last dose

Meaningful DMPK RNA Reduction Observed in Muscle 45% DMPK reduction after a single dose at 1 mg/kg or two doses at 2mg/kg DELIVERY TO MUSCLE DMPK REDUCTION SPLICING IMPROVEMENT FUNCTIONAL BENEFIT 1mg/kg (n=5) 2mg/kg (n=9) Placebo (n=5) Group 46% 44% Mean % DMPK Reduction Data represented as 6 weeks post last dose DMPK % change from baseline - 46 % DELIVERY TO

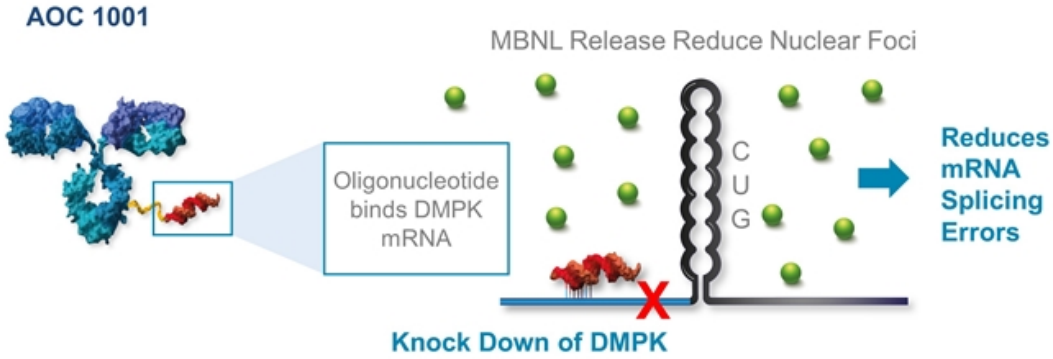
Why is DMPK inhibition similar between 1 and 2 mg/kg doses?

siRNA Concentrations



siRNA muscle tissue concentrations are overlapping between the 1 mg/kg and 2 mg/kg cohorts leading to similar DMPK inhibition

Therapeutic Hypothesis



Dose and Time Dependence: Potential to observe dose-dependent DMPK inhibition with higher and longer dosing

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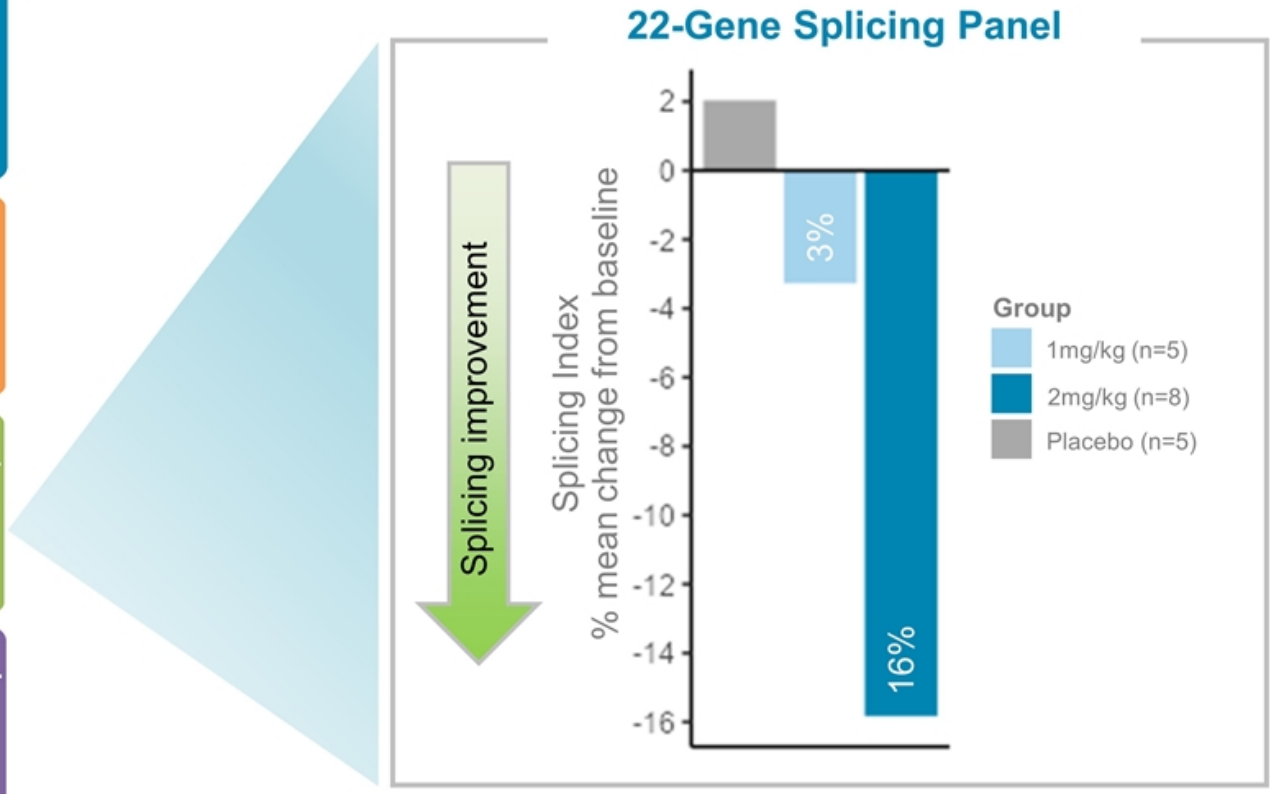
Sustained DMPK Reduction Leads to Dose-Dependent Splicing Improvements

DELIVERY TO MUSCLE

DMPK REDUCTION

SPLICING IMPROVEMENT

FUNCTIONAL BENEFIT



- Splicing measured by targeted RNA sequencing and calculated using published formula (Tanner et. al 2021)
- % mean change is calculated as mean change from baseline/mean baseline score across all matched samples in a cohort
- Data represented as 6 weeks post last dose

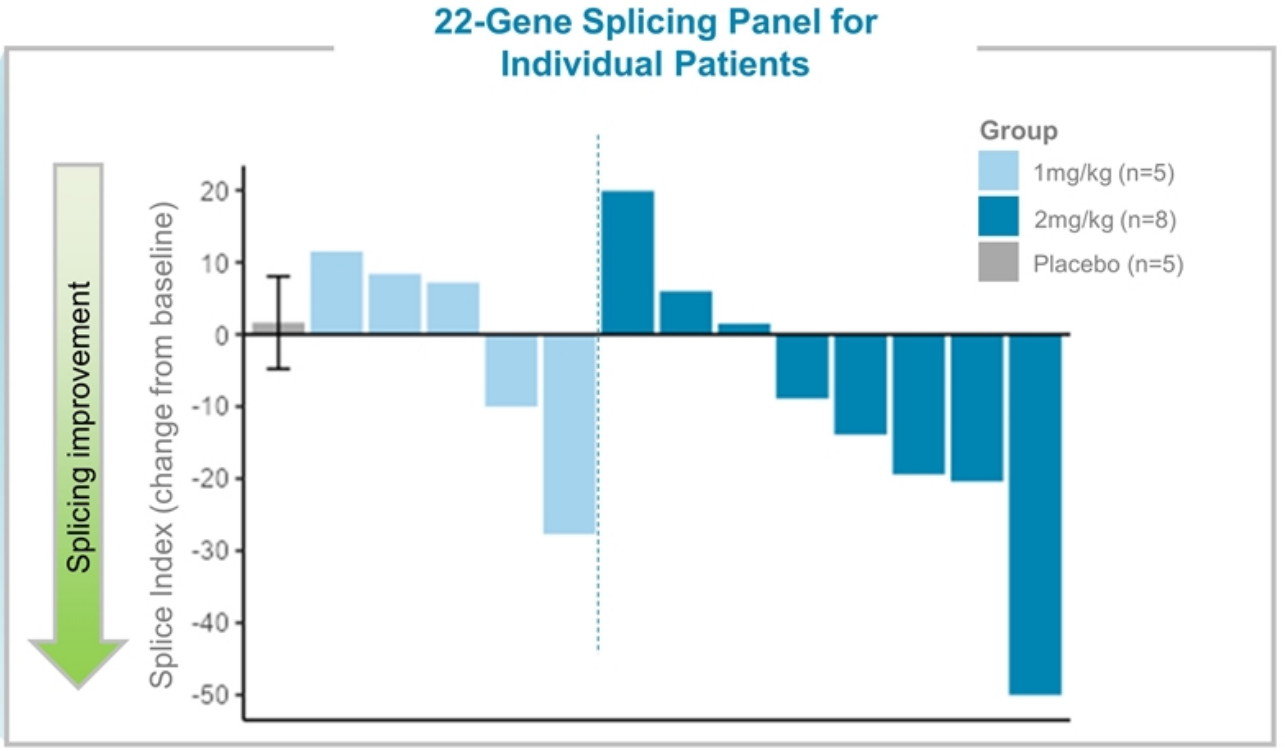
Splicing Improvements in Participants with DM1 Demonstrates AOC 1001 is Impacting Disease Mechanism

DELIVERY TO MUSCLE

DMPK REDUCTION

SPLICING IMPROVEMENT

FUNCTIONAL BENEFIT



- Splicing measured by targeted RNA sequencing and calculated using published formula (Tanner et. al 2021)
- Splicing Index for each participant is calculated as absolute change from baseline (22-gene panel)
- Data represented as 6 weeks post last dose with placebo group combined from all cohorts (standard error of the mean)

Muscle-Specific Biomarkers Shows 31% Splicing Improvement

Refining biomarker panel to guide future clinical development

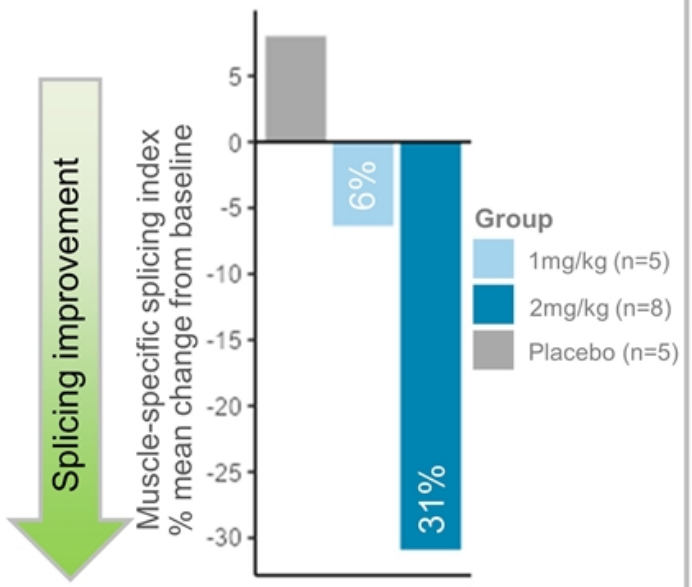
DELIVERY TO MUSCLE

DMPK REDUCTION

SPLICING IMPROVEMENT

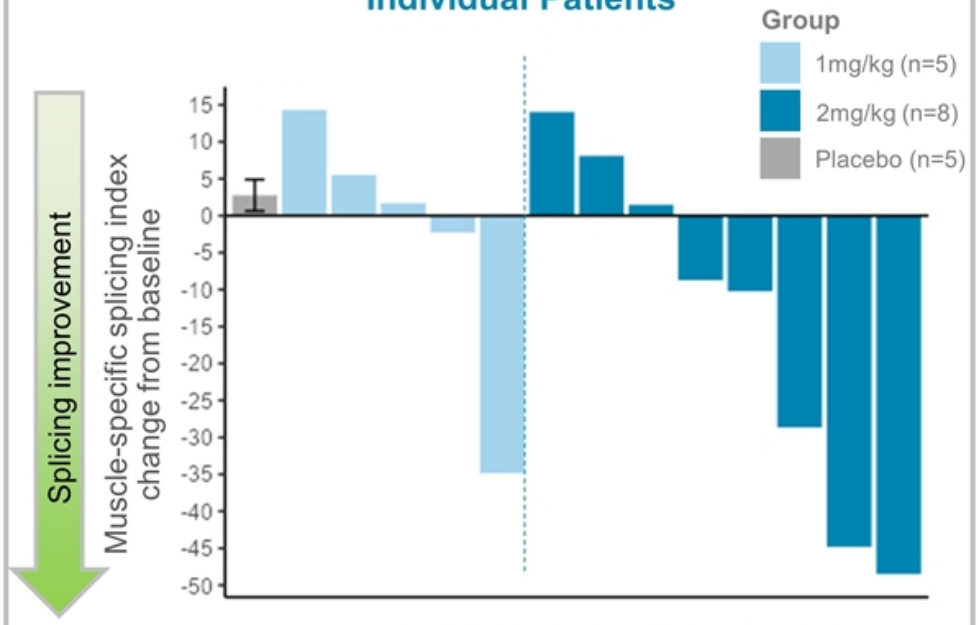
FUNCTIONAL BENEFIT

Muscle-Specific Panel for each Cohort



Muscle panel: CLCN1, CACNA1S, ATP2A1, BIN1

Muscle-Specific Splicing Panel for Individual Patients

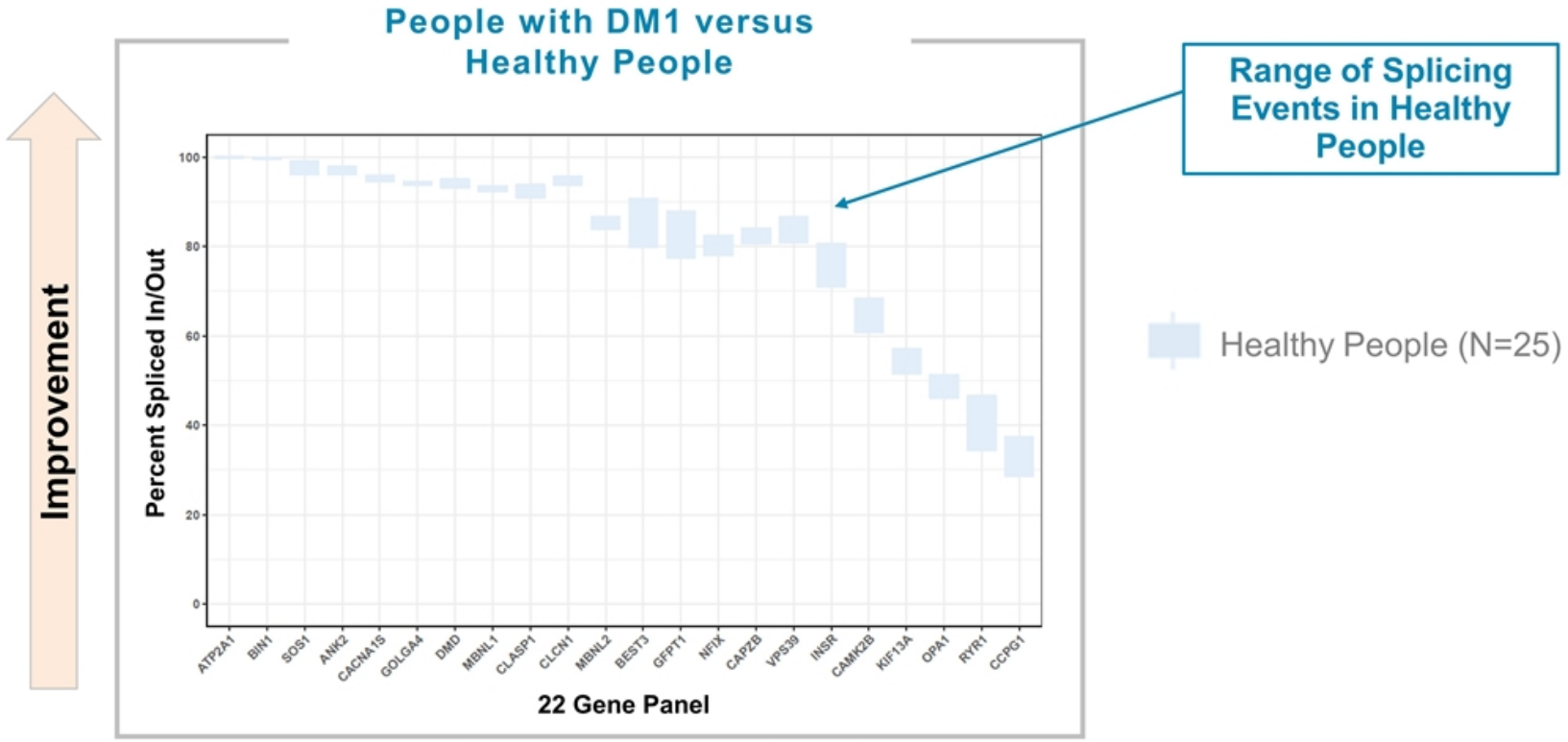


Muscle panel: CLCN1, CACNA1S, ATP2A1, BIN1

- Splicing measured by targeted RNA sequencing and calculated using published formula (Tanner et. al 2021)
- Splicing Index for each participant is calculated as absolute change from baseline (4-gene panel)
- Data represented as 6 weeks post last dose with placebo group combined from all cohorts

AVIDITY BIOSCIENCES

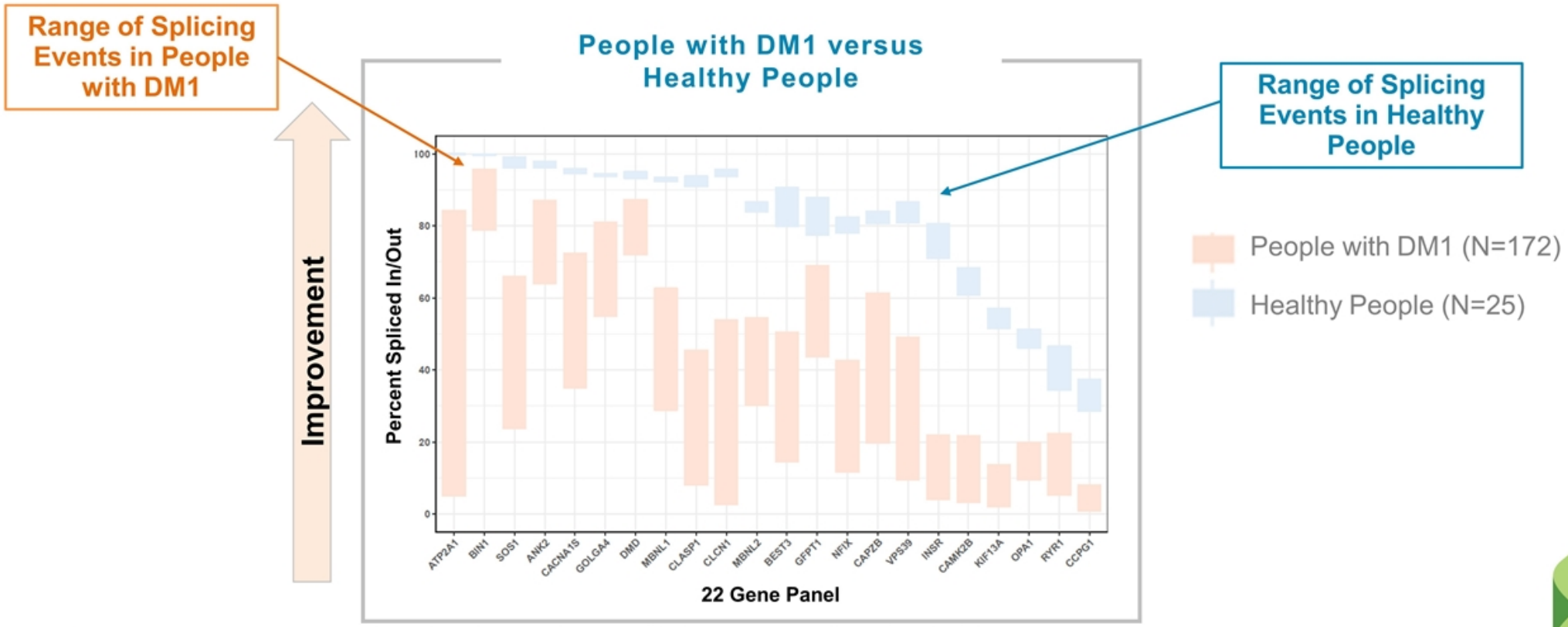
Framework for Assessing Splicing Data Across 22 Genes in Healthy and DM1 Participants



Data from Charles Thornton, MD, University of Rochester Medical Center

Framework for Assessing Splicing Data Across 22 Genes in Healthy and DM1 Participants People with DM1 versus Healthy People Healthy People (N=25) Improvement Range of Splicing Events in Healthy People Percent Spliced In/Out Data from Charles Thornton, MD, University of Rochester Medical Center

Framework for Assessing Splicing Data Across 22 Genes in Healthy and DM1 Participants

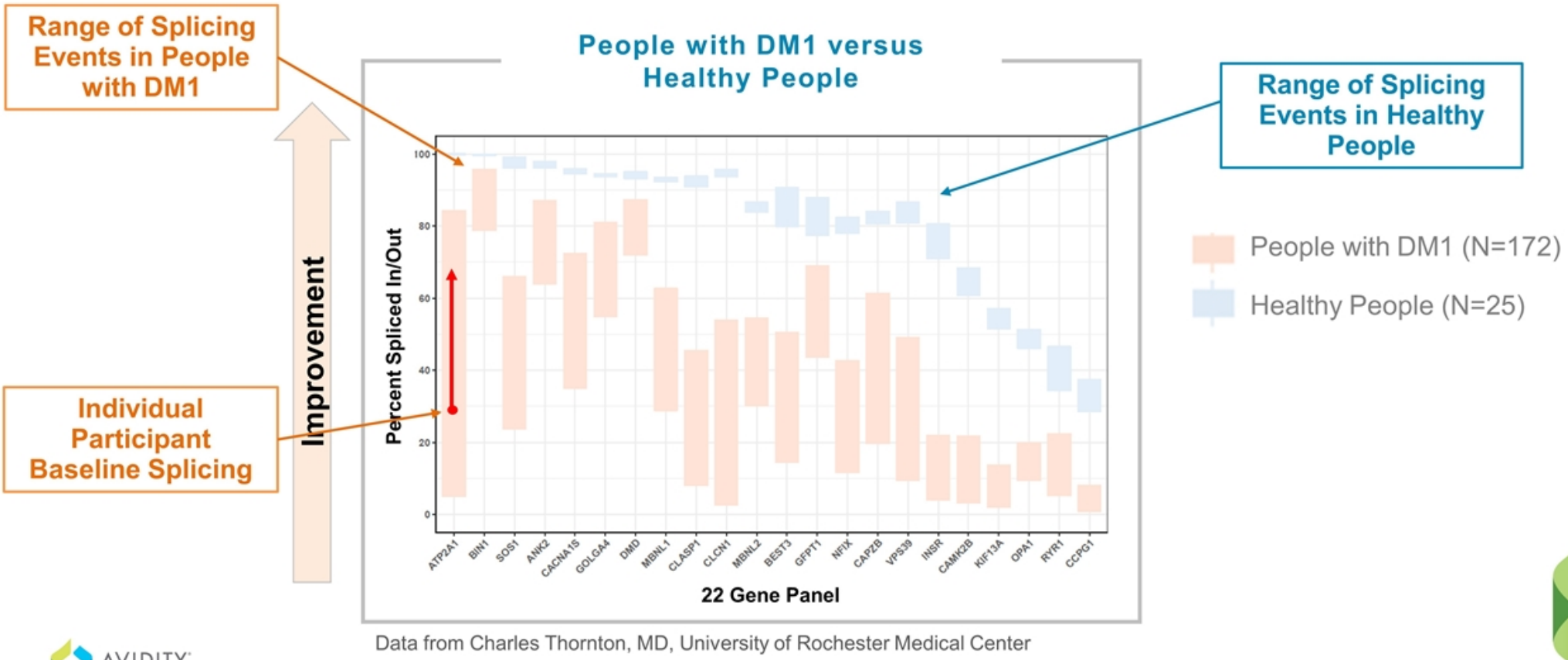


Data from Charles Thornton, MD, University of Rochester Medical Center

AVIDITY BIOSCIENCES

Healthy People Assessing Splicing Data Across 22 Gene Panel Data from Charles Thornton, MD, University of Rochester Medical Center People with DM1 (N=172) Healthy People (N=25) Range of Splicing Events in People with DM1 Range of Splicing Events in

Framework for Assessing Splicing Data Across 22 Genes in Healthy and DM1 Participants

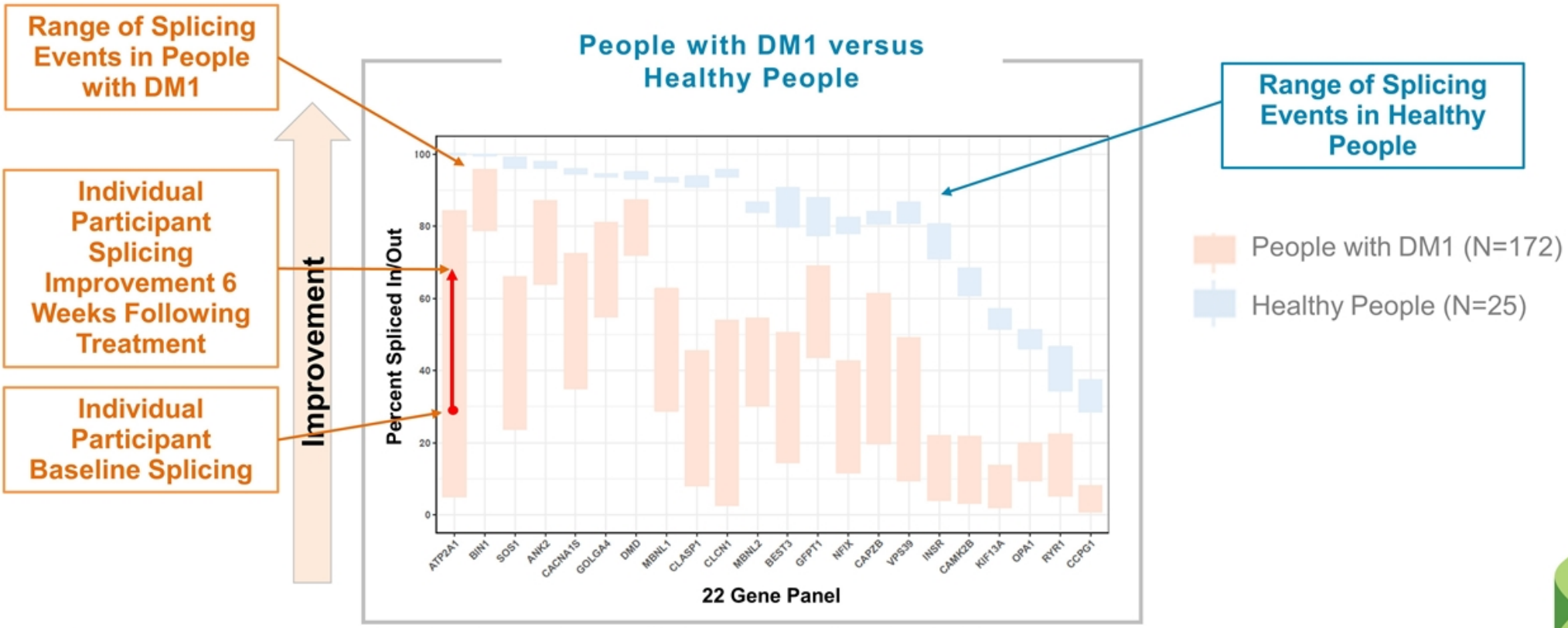


Data from Charles Thornton, MD, University of Rochester Medical Center

AVIDITY BIOSCIENCES

Healthy People Assessing Splicing Data Across 22 Genes Improvement Individual Participant Baseline Splicing Data from Charles Thornton, MD, University of Rochester Medical Center Range of Splicing Events in People with DM1 Range of Splicing Events in

Framework for Assessing Splicing Data Across 22 Genes in Healthy and DM1 Participants



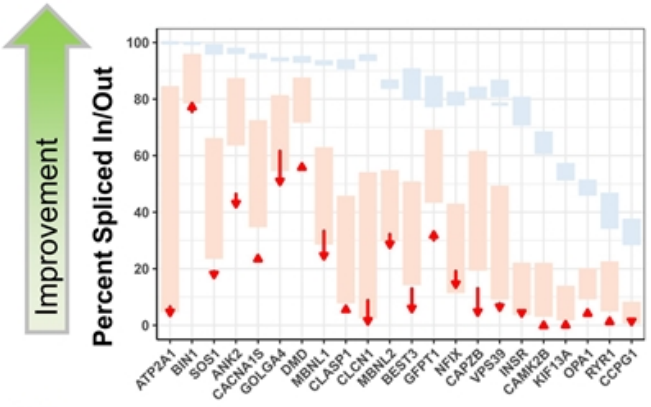
Data from Charles Thornton, MD, University of Rochester Medical Center

AVIDITY BIOSCIENCES

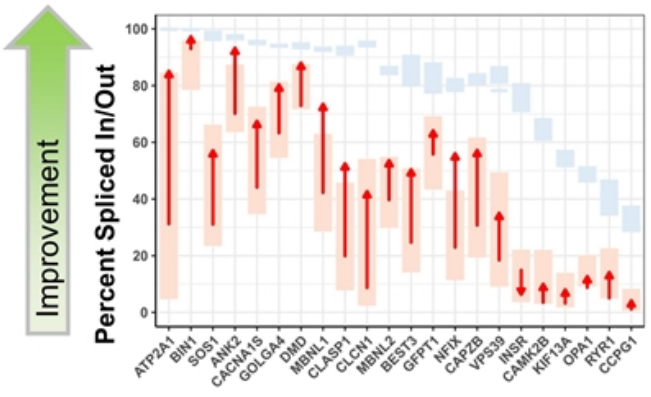
Framework for Assessing Splicing Data Across 22 Genes in Healthy and DM1 Participants Range of Splicing Events in People with DM1 Individual Participant Splicing Improvement 6 Weeks Following Treatment Individual Participant Baseline Splicing Improvement People with DM1 versus Healthy People Percent Spliced In/Out 22 Gene Panel Range of Splicing Events in Healthy People People with DM1 (N=172) Healthy People (N=25) Data from Charles Thornton, MD, University of Rochester Medical Center

Improved Splicing Observed Across 22-gene Panel in Two Early Responders Following Treatment

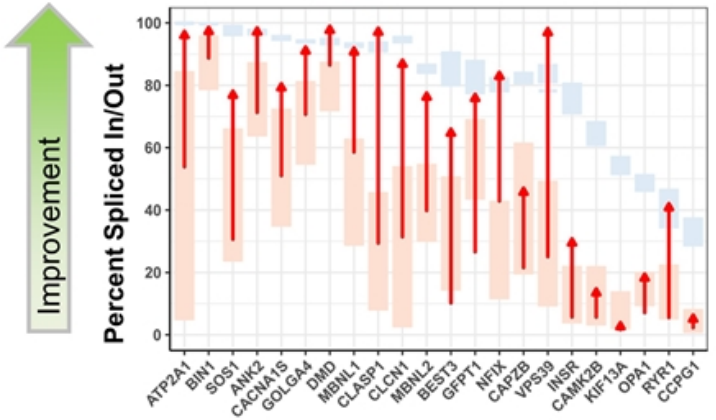
Representative Placebo Participant



Early Responder 1 mg/kg, single dose



Early Responder 2mg/kg, two doses



People with DM1 (N=172)

Healthy People (N=25)

Splicing change – study participant

Splicing improvements demonstrate AOC 1001 activity in the nucleus

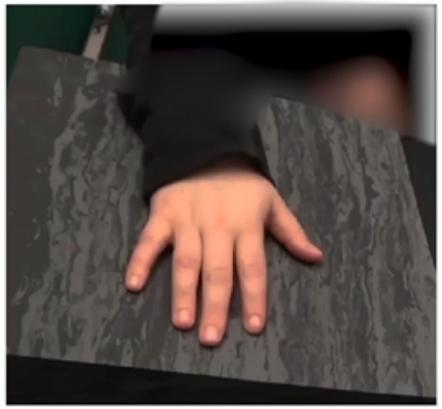
AVIDITY BIOSCIENCES

Population data from Charles Thornton, MD, University of Rochester Medical Center

AOC 1001 Shows Early Signs of Myotonia Benefit

Early responder from Cohort A (1mg/kg) shows improvement weeks after first dose

Participant from 1mg/kg Single Dose

Baseline vHOT	Day 43 vHOT 6 weeks after single dose	Day 92 vHOT 12 weeks after single dose	Day 183 vHOT 24 weeks after single dose
			

Improvement visible at Day 43 but myotonia benefit wanes by 6 months following a single dose at 1 mg/kg

AVIDITY BIOSCIENCES

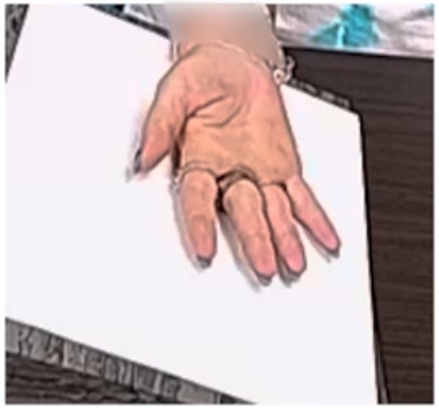
vHOT = video hand opening time

AOC 1001 Shows Early Signs of Myotonia Benefit Early responder from Cohort A (1mg/kg) shows improvement weeks after first dose Participant from 1mg/kg Single Dose Baseline vHOT Day 43 vHOT 6 weeks after single dose Day 92 vHOT 12 weeks after

AOC 1001 Shows Early Signs of Myotonia Benefit

Early responder from Cohort B1 (2mg/kg) shows improvement weeks after first dose

Participant from 2mg/kg Multidose

Baseline vHOT	Day 43 vHOT 6 weeks after first dose	Day 92 vHOT 6 weeks after second dose	Day 183 vHOT 12 weeks after third dose
			

Improvement visible at Day 43 that is sustained for at least 12 weeks following the third dose at 2 mg/kg

vHOT = video hand opening time

AOC 1001 Shows Early Signs of Myotonia Benefit Early responder from Cohort B1 (2mg/kg) shows improvement weeks after first dose Day 43 vHOT 6 weeks after first dose Day 92 vHOT 6 weeks after second dose Participant from 2mg/kg Multidose Baseline

AOC 1001 Shows Early Signs of Myotonia Benefit

Early responder from Cohort B1 (2mg/kg) shows improvement

Participant from 2mg/kg Multidose

Baseline vHOT

Day 183 vHOT
12 weeks after third dose

Improvement visible at Day 43 that is sustained for at least 12 weeks following the third dose at 2 mg/kg

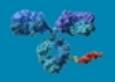
vHOT = video hand opening time

AVIDITY BIOSCIENCES

AOC 1001 Shows Early Signs of Myotonia Benefit Early responder from Cohort B1 (2mg/kg) shows improvement Participant from 2mg/kg Multidose Baseline vHOT Day 183 vHOT 12 weeks after third dose vHOT = video hand opening time Improvement

Delivering on the Platform and Impacting Disease Mechanism

DELIVERY TO MUSCLE



DMPK REDUCTION

SPLICING IMPROVEMENT

EARLY SIGNS OF CLINICAL ACTIVITY

Platform Achievements:

- AOC technology delivered siRNA to muscle – a first for the RNA field
- AOC 1001 achieved a meaningful DMPK reduction in 100% of treated participants
- 45% mean DMPK Reduction in treated participants

DM1 Advancements:

- AOC 1001 showed early signs of myotonia improvement just weeks after dosing with the two lowest doses in the trial
- Splicing improvements demonstrated AOC 1001 activity in the nucleus
  - 16% splicing improvement across 22 gene panel
  - 31% improvement in key muscle-specific panel

Next Steps:

- Continuing batch analyses of 2mg/kg and 4mg/kg samples from participants in MARINA & MARINA-OLE
- Refining biomarker panel to be utilized in pivotal trials

AVIDITY BIOSCIENCES

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• **Broad Utility & Power of the Platform**	**Art Levin**, Ph.D., CSO
• **Q&A Session**	**Avidity Management** **Dr. Nicholas Johnson**, VCU **Kath Gallagher**, SVP, Communications & IR (Moderator)
• **Closing Remarks**	**Sarah Boyce**, President & CEO

Clinical Impact of Myotonic Dystrophy Type 1

Nicholas E. Johnson, M.D., M.Sci., FAAN
Vice Chair for Research, Department of Neurology, Virginia Commonwealth University

Dr. Johnson is an associate professor, division chief of neuromuscular, and vice chair of research in the department of neurology at Virginia Commonwealth University with a focus in inherited neuromuscular disorders. He received his undergraduate degree in molecular and cellular biology and psychology at the University of Arizona. He then obtained his medical degree at the University of Arizona. He completed his neurology residency and combined fellowship in neuromuscular medicine and experimental therapeutics at the University of Rochester. His laboratory is focused on identifying the pathogenesis of myotonic dystrophy, the limb girdle muscular dystrophies, and facioscapulohumeral muscular dystrophy and identifying appropriate clinical endpoints for these conditions. Dr. Johnson conducts therapeutic trials in many other inherited nerve and muscle disorders.

Clinical Impact of Myotonic Dystrophy Type 1

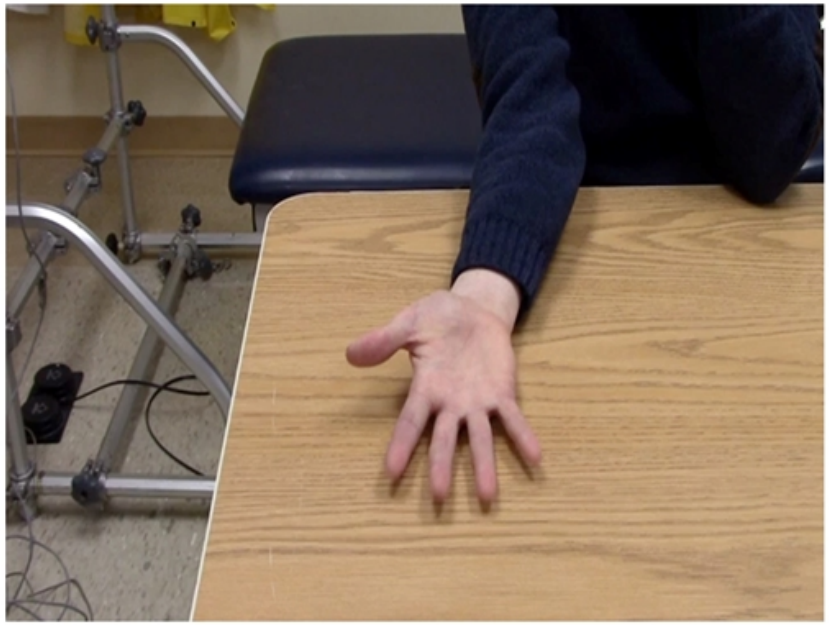
Nicholas Johnson, MD, Msci, FAAN
Vice Chair of Research, Associate Professor
Director, Muscular Dystrophy Translational Program
Departments of Neurology, Human Molecular Genetics
Virginia Commonwealth University

Clinical Impact of Myotonic Dystrophy Type 1 Nicholas Johnson, MD, Msci, FAAN Vice Chair of Research, Associate Professor Director, Muscular Dystrophy Translational Program Departments of Neurology, Human Molecular Genetics Virginia Commonwealth University

Myotonic Dystrophy Type 1

- Autosomal Dominant
- Core features in skeletal muscle
  - Weakness/wasting
    - Preferentially affects distal, cranial, and respiratory muscles
  - Myotonia
    - Preferentially affects hand/forearm muscles
- Multi-systemic
- Mean age of death is age 55

Example of grip myotonia



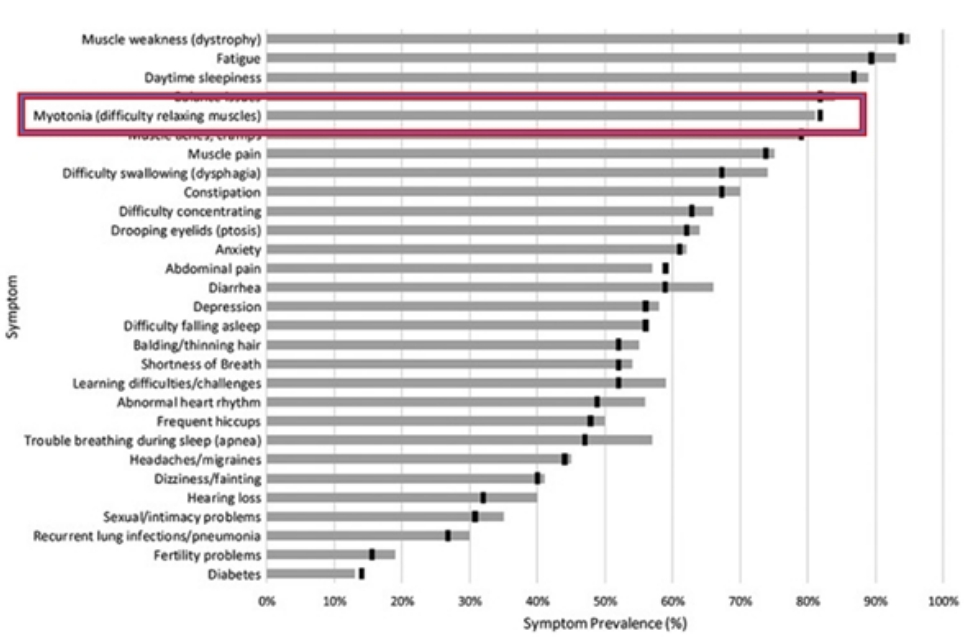
Myotonic Dystrophy Type 1 Autosomal Dominant Core features in skeletal muscle Weakness/wasting Preferentially affects distal, cranial, and respiratory muscles Myotonia Preferentially affects hand/forearm muscles Multi-systemic Mean age of death is age 55

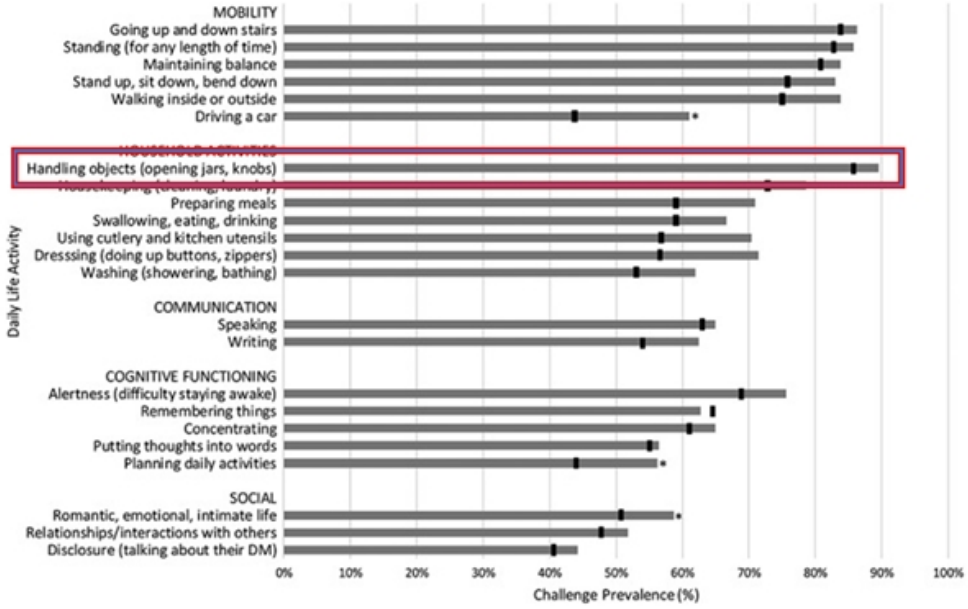
Other Systems

- Respiratory
  - Respiratory failure is most common cause of death
- Cardiac
  - Bradycardia, heart block, sudden death
- Ocular
  - Cataracts
- Gastrointestinal
  - Smooth muscle is affected
- Endocrine
  - insulin resistance
- CNS
  - Sleep regulation
  - A range of behavioral & cognitive changes may occur
- Increased risk of neoplasms

Other Systems Respiratory Respiratory failure is most common cause of death Cardiac Bradycardia, heart block, sudden death Ocular Cataracts Gastrointestinal Smooth muscle is affected Endocrine insulin resistance CNS Sleep regulation A range of behavioral &

Myotonia is a prevalent cause of disability





Survey of 1,180 Individuals with myotonic dystrophy (457 DM1 participants)

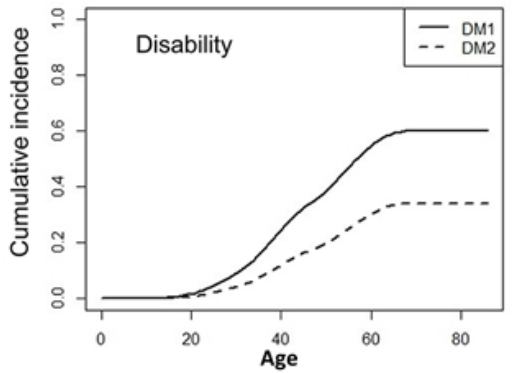
Hagerman, et al. 2019

Myotonia is a prevalent cause of disability Survey of 1,180 Individuals with myotonic dystrophy (457 DM1 participants) Hagerman, et al. 2019

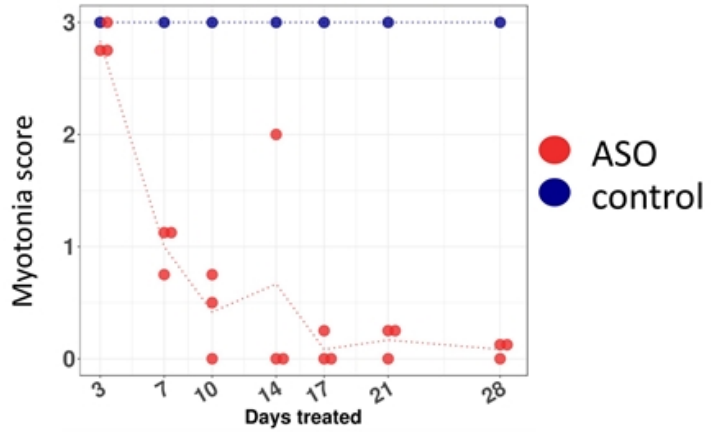
Myotonia in DM1 relates to ion channelopathies

- Chloride channel mis-splicing causes myotonia
- Calcium channel mis-splicing aggravates myotonia
- Together they may also cause inexcitability / weakness
- Hands are selectively affected

Hand impairment leads to disability



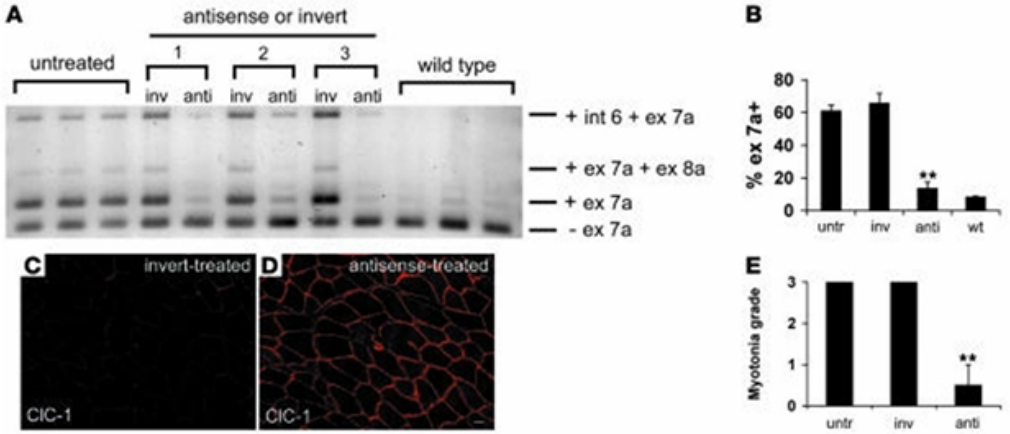
Twice weekly SQ injection transgenic mice



Myotonia in DM1 relates to ion channelopathies Chloride channel mis-splicing causes myotonia Calcium channel mis-splicing aggravates myotonia Together they may also cause

Correction of chloride channel splicing improves myotonia

- Mouse model of myotonic dystrophy (HSA^{LR})
- Use ASO to correct chloride channel splicing associated with DM1
- Correction of chloride channel improves myotonia



Wheeler, et al., 2007

The Importance of Myotonia

- Prevalent cause of disability
- Directly tied to repeat expansion
- Channel dysfunction (e.g., myotonia) may change faster than strength

The Importance of Myotonia Prevalent cause of disability Directly tied to repeat expansion Channel dysfunction (e.g., myotonia) may change faster than strength

The International END-DM1 Study will Help Establish Biomarkers and Clinical Endpoints Needed to Support DM1 Clinical Trial Design

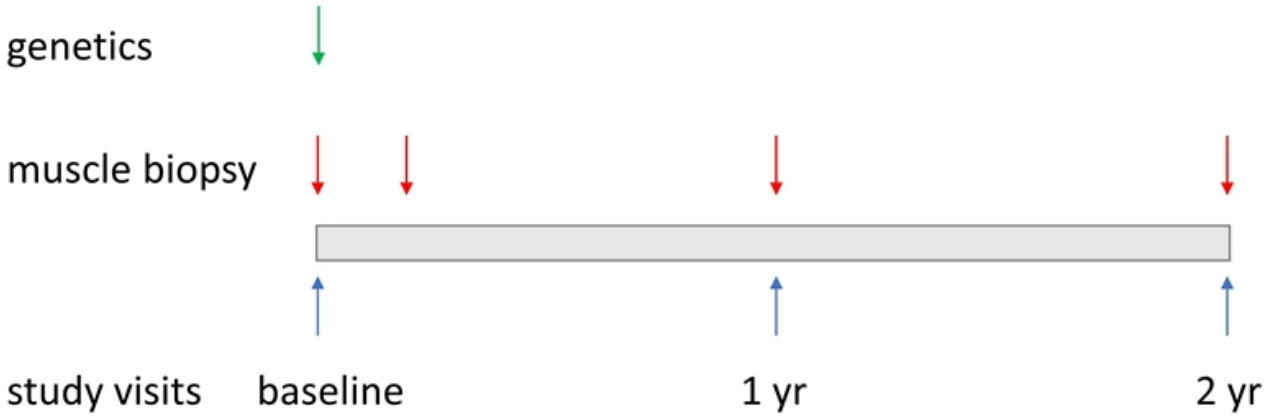
END-DM1, Establishing Biomarkers and Clinical Endpoints in Myotonic Dystrophy Type 1. ClinicalTrials.gov. NCT03981575 (END-DM1). [Last accessed March 2022].

- Current natural history study for the Myotonic Dystrophy Clinical Research Network (DMCRN)
- Enrolling 700 participants
- Observation period: 24 months
- Characterizing endpoints, patient-reported outcomes, and patient populations to support design and recruitment of interventional trials

Specific goals of END-DM1 study

- Characterize DM1 severity and disease progression over two years in a large cohort (n = 700)
  - Determine basal levels of impairment using standardized measures motor function and muscle strength and a patient-reported outcome (PRO)
  - Test for patient characteristics at baseline that predict subsequent progression
- Complete the development of muscle RNA alternative splice events as biomarkers of DM1 severity.
  - Optimize sample collection (smaller needles, less invasive)
  - Test-retest reliability

Scheme of END-DM1 study



- 700 patients (320 enrolled)
- International network
- Supported by FDA. Now also buttressed by Myotonic Dystrophy Foundation and industry* (expansion to EU/NZ/CA)

* Avidity Biosciences, Dyne Therapeutics, Entrada Therapeutics, Vertex Pharmaceuticals

700 patients (320 enrolled) International network Supported by FDA. Now also buttressed by Myotonic Dystrophy Foundation and industry* (expansion to EU/NZ/CA) * Avidity Biosciences, Dyne Therapeutics, Entrada Therapeutics, Vertex Pharmaceuticals

Clinical outcomes in END-DM1 study

Mobility (leg function)
- 10 m walk/run
- 6-minute walk
- Timed up and go
- 4 stair climb

Respiratory function
- vital capacity sitting and supine

Hand function
- 9-hole peg
- Grip strength
- Pinch strength

Myotonia
- Video-recorded hand opening time (vHOT)

General muscle function
- Quantitative myometry (maximal isometric strength of limb muscles
- tongue and lip muscle strength (IOPI)

Cardiac
- ECG

Patient reported outcomes
- DM Activ
- MDHI
- Anchoring questions for MCID

CNS
- Cogstate

Clinical outcomes in END-DM1 study Mobility (leg function) 10 m walk/run 6-minute walk Timed up and go 4 stair climb Respiratory function vital capacity sitting and supine Hand function 9-hole peg Grip strength Pinch strength Myotonia Video-recorded hand opening time (vHOT) General muscle function Quantitative myometry (maximal isometric strength of limb muscles tongue and lip muscle strength (IOPI) Cardiac ECG Patient reported outcomes DM Activ MDHI Anchoring questions for MCID CNS Cogstate

Summary

- DM1 is a prevalent disease with significant morbidity and mortality
- The DMCRN natural history studies inform therapeutic trial design including:
  - COAs
  - Biomarkers
- This support will be provided to the Avidity program

Summary DM1 is a prevalent disease with significant morbidity and mortality The DMCRN natural history studies inform therapeutic trial design including: COAs Biomarkers This support will be provided to the Avidity program

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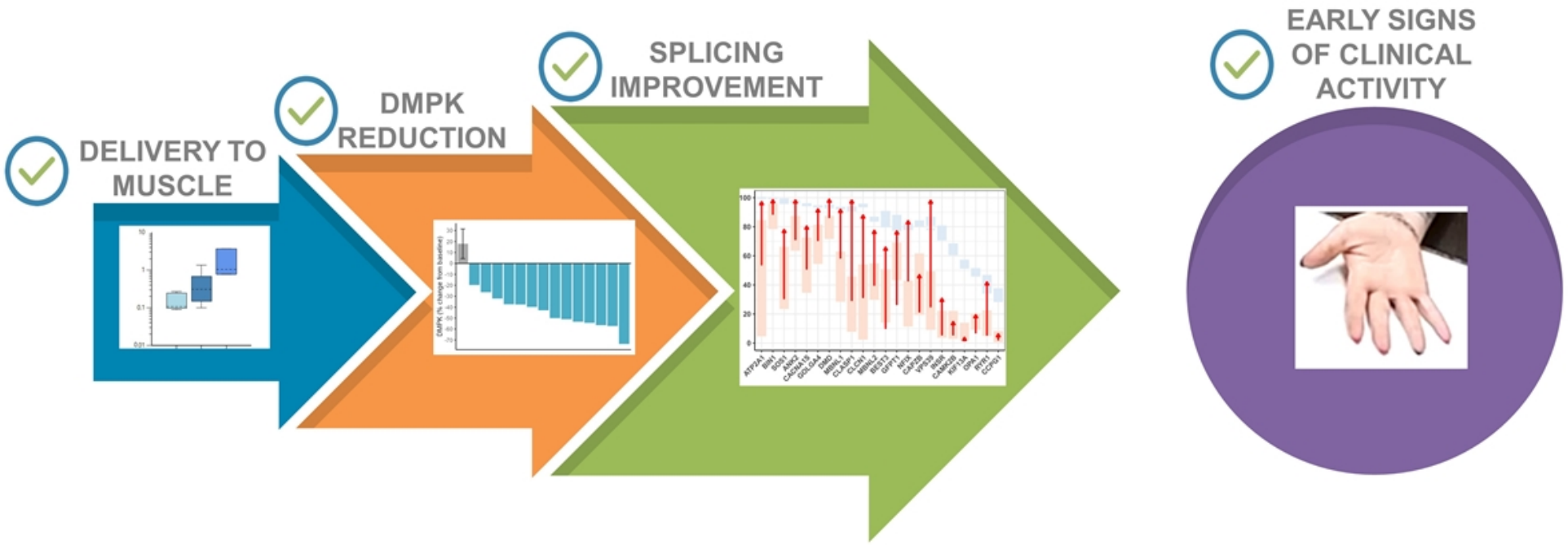
Delivering on the RNA Revolution

Art Levin, Ph.D., Chief Scientific Officer

Delivering on the RNA Revolution Art Levin, Ph.D., Chief Scientific Officer

The DM1 Cascade to Functional Benefit

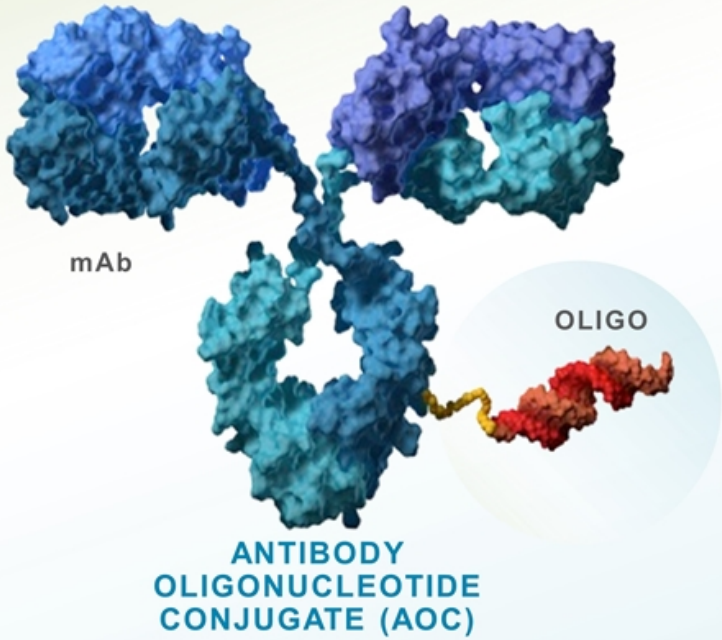


Splicing improvements leading to early signs of clinical activity with improvement in myotonia

AVIDITY BIOSCIENCES

DELIVERY TO MUSCLE DMPK REDUCTION SPLICING IMPROVEMENT The DM1 Cascade to Functional Benefit EARLY SIGNS OF CLINICAL ACTIVITY Splicing improvements leading to early signs of clinical activity with improvement in myotonia

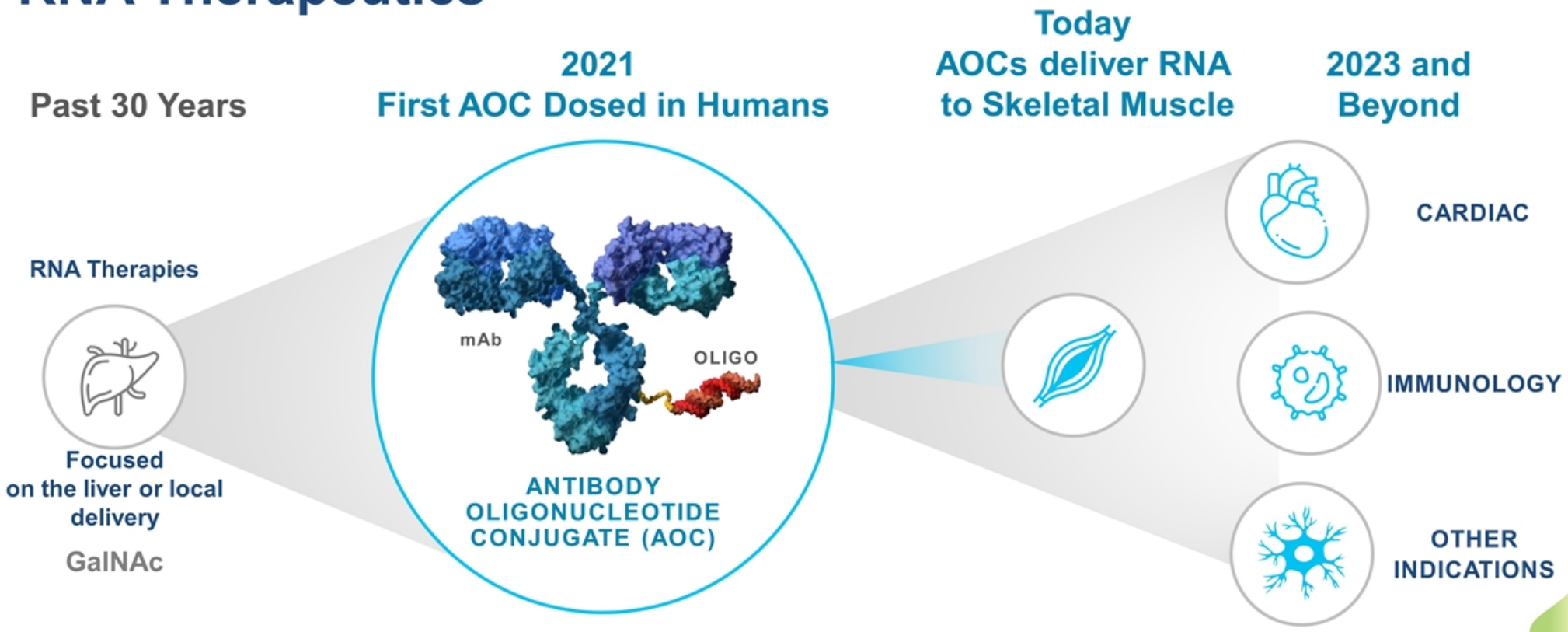
Avidity Followed the Data to Engineer AOCs - A Powerful Potential New Class of Drugs



- Designed to combine the proven and safe technologies of approved monoclonal antibodies and oligonucleotides
  - ✓ Specificity of targeting with mAbs
  - ✓ Potency & precision of oligonucleotides
  - ✓ Targets tissues with durable agents
- Designed to deliver to tissues previously untreatable with RNA therapeutics
- Focused first on muscle, broadening to other tissues (i.e. cardiac) and cell types (i.e. B Cells)
- Readily scalable with many experienced manufacturers

AVIDITY BIOSCIENCES

AOCs Deliver to Muscle Starting A Breakthrough for RNA Therapeutics



AOCs Deliver to Muscle Starting A Breakthrough for RNA Therapeutics Past 30 Years 2021 First AOC Dosed in Humans Today AOCs deliver RNA to Skeletal Muscle CARDIAC

Delivering on the RNA Revolution

- **Broad and disruptive AOC platform - new class of RNA therapeutics**
  - Followed the data to design and engineer AOCs
  - Delivered siRNA to muscle for the first time ever with AOC 1001 - a breakthrough for the field of RNA therapeutics
  - AOC platform expands ability to address targets and diseases previously unreachable with existing RNA therapies
- **Avidity AOC clinical and development programs**
  - AOC 1001 data reads through to the AOC platform
  - Advancing our three AOC clinical programs for the treatment of muscle diseases
  - Continue to expand our pipeline and programs in cardiology, immunology and other diseases

AVIDITY BIOSCIENCES

Delivering on the RNA Revolution

DM1

MARINA™ / MARINA-OLE™ ongoing MARINA Top-Line Data anticipated in 2023

DMD

Cleared to initiate EXPLORE44™ Results from Healthy Volunteers anticipated in 2H 2023

FSHD

Cleared to initiate FORTITUDE™ Preliminary Assessment anticipated in 1H 2024

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AOCs Deliver to Muscle – Revolutionary Advancement for the Field of RNA Therapeutics

MARINA™

Safety & Tolerability

MARINA Primary Endpoint; Phase 1/2 trial ongoing

Delivery to Muscle

First-ever successful targeted delivery of RNA to muscle – reinforces disruptive and broad potential of the AOC platform

DMPK Reduction

100% of treated participants had a DMPK reduction

45% mean DMPK reduction in treated participants

Impact on Disease Mechanism

16% splicing improvement across 22 gene panel

31% improvement in key set of muscle-specific genes

Early Signs of Clinical Activity

Myotonia improvement in early responders

AVIDITY BIOSCIENCES

Delivering on the RNA Revolution

DM1

MARINA™ / MARINA-OLE™ ongoing MARINA Top-Line Data anticipated in 2023

DMD

Cleared to initiate EXPLORE44™ Results from Healthy Volunteers anticipated in 2H 2023

FSHD

Cleared to initiate FORTITUDE™ Preliminary Assessment anticipated in 1H 2024

DELIVERING NEXT

Pursuing preclinical proof of concept in additional skeletal muscle and other tissues

AVIDITY BIOSCIENCES

Delivering on the RNA Revolution Pursuing preclinical proof of concept in additional skeletal muscle and other tissues DELIVERING NEXT

Virtual Investor & Analyst Event Series – Volume 6:

AOC 1001 MARINA™ Phase 1/2 Trial Preliminary Data Assessment