prospective product candidates, including AVR-RD-04 for the and the potential therapeutic benefits of our current and include, without limitation, statements regarding our business strategy identify forward-looking statements. These forward-looking statements these words and phrases or similar expressions that are intended to "may," "plans," "possible," "potential," "seeks," "will," and variations of "designed to," "estimates," "expects," "goal," "intends," "may," "plans," "possible," "potential," "seeks," "will," and variations of these words and phrases or similar expressions that are intended to identify forward-looking statements. These forward-looking statements include, without limitation, statements regarding our business strategy for and the potential therapeutic benefits of our current and prospective product candidates, including AVR-RD-04 for the treatment of cystinosis; the design, commencement, enrollment and timing of ongoing or planned clinical trials and regulatory pathways; our plans and expectations with respect to the development of our clinical and preclinical product candidates, including timing, design and initiation of our potential clinical and registration trials and anticipated interactions with regulatory agencies; the timing of anticipated clinical and regulatory updates; the timing of patient recruitment and enrollment activities, clinical trial results, and product approvals; the timing and results of our ongoing preclinical studies; the anticipated benefits of our gene therapy platform including the potential impact on our commercialization activities, timing and likelihood of success; the expected benefits and results of our manufacturing technology, including the implementation of our plato® platform in our clinical trials and gene therapy programs; and the expected safety profile of our investigational gene therapies. Any such statements in this presentation that are not statements of historical fact may be deemed to be forward-looking statements. Any forward-looking statements in this presentation are based on our current expectations, estimates and projections about our industry as well as management’s current beliefs and expectations of future events only as of today and are subject to a number of risks and uncertainties that could cause actual results to differ materially and adversely from those set forth in or implied by such forward-looking statements. These risks and uncertainties include, but are not limited to, the risk that any one or more of our product candidates, including AVR-RD-04 for the treatment of cystinosis, will not be successfully developed or commercialized; the risk that regulatory agencies may disagree with our anticipated development approach for any one or more of our product candidates; the risk of cessation or delay of any ongoing or planned clinical trials of AVROBIO or our collaborators; the risk that we may not successfully recruit or enroll a sufficient number of patients for our clinical trials; the risk that we may not realize the intended benefits of our gene therapy platform, including the features of our plato® platform; the risk that our product candidates or procedures in connection with the administration thereof, including our use of busulfan as a conditioning agent or potential use of monoclonal antibody conditioning agents, will not have the safety or efficacy profile that we anticipate; the risk that prior results, such as signals of safety, activity or durability of effect, observed from preclinical or clinical trials, will not be replicated or will not continue in ongoing or future studies or trials involving our product candidates; the risk that we will be unable to obtain and maintain regulatory approval for our product candidates; the risk that the size and growth potential of the market for our product candidates will not materialize as expected; risks associated with our dependence on third-party suppliers and manufacturers; risks regarding the accuracy of our estimates of expenses and future revenue; risks relating to our capital requirements and needs for additional financing; risks relating to clinical trial and business interruptions resulting from the ongoing COVID-19 pandemic or similar public health crises, including that such interruptions may materially delay our development timeline and/or increase our development costs or that data collection efforts may be impaired or otherwise impacted by such crises; and risks relating to our ability to obtain and maintain intellectual property protection for our product candidates. For a discussion of these and other risks and uncertainties, and other important factors, any of which could cause AVROBIO’s actual results to differ from those contained in the forward-looking statements, see the section entitled “Risk Factors” in AVROBIO’s most recent Quarterly Report, as well as discussions of potential risks, uncertainties and other important factors in AVROBIO’s subsequent filings with the Securities and Exchange Commission. AVROBIO explicitly disclaims any obligation to update any forward-looking statements except to the extent required by law. Note regarding trademarks: plato® is a registered trademark of AVROBIO. Other trademarks referenced in this presentation are the property of their respective owners. Copyright© 2022 AVROBIO, Inc. All rights reserved.
Expanding Phase 1/2 data set shows systemic gene therapy impact

AVR-RD-04 is first and only investigational gene therapy for cystinosis

All five patients dosed remain off oral cysteamine

- Improvements in neurocognitive assessments
- Stable muscle/grip strength
- Reduction in cystine crystals in skin and gastrointestinal mucosa
- Improved or stable eye measures
- Reduction in leukocyte cystine to target levels
- Quantified increase in hair strand pigmentation

Safety and tolerability profile remains strong*

* Data as of May 6, 2022

Proof-of-concept demonstrated in adult population

Plan to meet with regulators in 2H 2022 to discuss company-sponsored trial
Cystinosis is an attractive commercial market

**SOC is burdensome**

- Shortcomings of cysteamine pills often lead to poor patient compliance:
  - Cause sulfur odor on body and breath
  - High daily pill burden can lead to GI discomfort and vomiting

**SOC does not stop disease progression**

Disease symptoms persist despite SOC:

- **Kidney function**
  - Frequently require multiple kidney transplants

- **Vision**
  - Corneal cystine accumulation, photophobia

- **CNS and muscular complications**
  - Myopathy, hypotonia, neurodevelopmental issues

- **Endocrine disorders**
  - Softening & deformation of bones, hypothyroidism, diabetes, infertility

**Billion-dollar revenue opportunity**

- 5-year cystinosis SOC treatment cost ~$4.3 million* in U.S.
- ~1,600 patients in U.S., Europe and Japan alone
- Most severe form, infantile nephropathic cystinosis, affects ~95% of cystinosis population

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* SOC: standard of care; WAC pricing from Redbook using standard dosing assumptions. Horizon’s Procysbi oral therapy (delayed release cysteamine bitartrate), midpoint between avg. adult and pediatric
Cystinosis caused by defective gene that encodes cystinosin, an exporter protein

Cystine crystals build up in lysosomes causing tissue and organ damage

---

Source: Cherqui et al, Nat Rev Nephrol. 2017
All patients continue to be oral cysteamine-independent
Patient #1 out 2 ½ years

<table>
<thead>
<tr>
<th>PATIENT</th>
<th>MONTHS OFF CYSTEAMINE PILLS AND EYE DROPS POST AVR-RD-04 INFUSION</th>
<th>CURRENT STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>cysteamine pills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PATIENT 1</td>
<td>31</td>
<td>OFF</td>
</tr>
<tr>
<td>PATIENT 2</td>
<td>22</td>
<td>OFF</td>
</tr>
<tr>
<td>PATIENT 3</td>
<td>17</td>
<td>OFF</td>
</tr>
<tr>
<td>PATIENT 4</td>
<td>5</td>
<td>OFF</td>
</tr>
<tr>
<td>PATIENT 5</td>
<td>1</td>
<td>OFF</td>
</tr>
<tr>
<td>cysteamine eye drops</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PATIENT 1</td>
<td>31</td>
<td>OFF</td>
</tr>
<tr>
<td>PATIENT 2</td>
<td>13</td>
<td>ON (patient restarted July 2021)</td>
</tr>
<tr>
<td>PATIENT 3</td>
<td>17</td>
<td>OFF</td>
</tr>
<tr>
<td>PATIENT 4</td>
<td>Was not on cysteamine eye drops prior to infusion</td>
<td>OFF</td>
</tr>
<tr>
<td>PATIENT 5</td>
<td>1</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Note: Patients 2, 3 and 5 stopped cysteamine eye drops 1-month post-transplant (per protocol); Patient 1 stopped cysteamine eye drops prior to baseline; Patient 4 was not on cysteamine drops prior to infusion. Data as of May 6, 2022.
Improvement in motor coordination and visual perception observed post gene therapy

BEERY TEST OF VISUAL MOTOR INTEGRATION (VMI)

MOTOR COORDINATION SUBSCORE

VISUAL PERCEPTION SUBSCORE

Data for Patient 2 are not available; The Beery – Buktenica Developmental Test of Visual Motor Integration (Beery VMI) is a standardized test evaluating the ability of the brain to interpret and translate visual information into an exact motor response.
Average grip strength stable up to 27 months
Disease progression typically leads to loss of muscle strength over time

Average Grip Strength (kg) is defined as the average of the largest reading from each hand
Reduction in number of skin cystine crystals below patients’ own SOC baseline at 12+ months

SKIN BIOPSY: AVERAGE INTRACYTOPLASMIC CRYSTALS PER CELL

For Patient 4 and 5, only their Baseline data is currently available.
Reduction in number of cystine crystals in gastrointestinal mucosa below patients’ own SOC baseline at 12+ months

**RECTAL BIOPSY: AVERAGE INTRACYTOPLASMIC CRYSTALS PER CELL**

For Patient 4 and 5, only their Baseline data is currently available.
Crystal buildup in eye clearly visible before gene therapy

Treatment goal is to prevent or halt further accumulation of corneal crystals; complete clearance not expected

Patient 1 at baseline
Decline in corneal crystals and improved photophobia grade

### IVCM Images

**Baseline**

<table>
<thead>
<tr>
<th>Eye layers</th>
<th>Right eye</th>
<th>Left eye</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>12 months</td>
</tr>
<tr>
<td>Anterior Stroma</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Middle Stroma</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Posterior Stroma</td>
<td>4</td>
<td>2.1</td>
</tr>
</tbody>
</table>

**18 MONTHS IMAGES/24 MONTHS PHOTOPHOBIA GRADE**

<table>
<thead>
<tr>
<th>Eye layers</th>
<th>Right eye</th>
<th>Left eye</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline</td>
<td>12 months</td>
</tr>
<tr>
<td>Anterior Stroma</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Middle Stroma</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>Posterior Stroma</td>
<td>4</td>
<td>2.1</td>
</tr>
</tbody>
</table>

**Photophobia Grade**

- **Baseline**: OD 3, Back of Cornea 1
- **18 Months**: OD 1, Back of Cornea 1

**Images**

- **Patient 1**
  - Front of Cornea: OD 174 µm, Back of Cornea: OD 331 µm
  - Front of Cornea: OD 176 µm, Back of Cornea: OD 331 µm

---

**Notes**

- IVCM: In Vivo Confocal Microscopy; exploratory method; These results are for a single patient only and may vary in the study population; OD: Oculus Dexter (right eye);
- HRT3: Heidelberg Retina Tomograph 3; Scoring instructions: for each layer, assign a score of 0-4, where 0=no crystal; 1 <25%; 2=25-50%; 3=50-75%; 4>75%; Liang et al., IOVS 2015; * Score range: 1-5 where 1 is no photophobia and 5 is severe; Images obtained for Patient 1 at baseline using Nidek Confoscan and used Heidelberg HRT3 w/ Rostock Corneal Module for all other images
Stable corneal crystals and photophobia grade

<table>
<thead>
<tr>
<th></th>
<th>BASELINE</th>
<th>12 MONTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IVCM Images</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Photophobia Grade (patient reported)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Front of Cornea</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Back of Cornea</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>PATIENT 2</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front of Cornea</td>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
</tr>
<tr>
<td>Back of Cornea</td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
<tr>
<td>OD</td>
<td>43 µm</td>
<td>43 µm</td>
</tr>
<tr>
<td></td>
<td>66 µm</td>
<td>66 µm</td>
</tr>
<tr>
<td><strong>PATIENT 3</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Front of Cornea</td>
<td><img src="image5.png" alt="Image" /></td>
<td><img src="image6.png" alt="Image" /></td>
</tr>
<tr>
<td>Back of Cornea</td>
<td><img src="image7.png" alt="Image" /></td>
<td><img src="image8.png" alt="Image" /></td>
</tr>
<tr>
<td>OD</td>
<td>178 µm</td>
<td>178 µm</td>
</tr>
<tr>
<td></td>
<td>331 µm</td>
<td>331 µm</td>
</tr>
</tbody>
</table>

**NEW DATA**

IVCM: In Vivo Confocal Microscopy; exploratory method. These results are for a single patient only and may vary in the study population; OD: Oculus Dexter (right eye); HRT3: Heidelberg Retina Tomograph 3; Scoring instructions: for each layer, assign a score of 0-4, where 0=no crystal; 1<25%; 2=25-50%; 3=50-75%; 4>75%; Liang et al., IOVS 2015; * Score range: 1-5 where 1 is no photophobia and 5 is severe;
Early cystinosis treatment is essential to prevent kidney complications

<table>
<thead>
<tr>
<th>Disease phenotype</th>
<th>Nephropathic cystinosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Infantile</td>
</tr>
<tr>
<td>Frequency¹</td>
<td>~95% of patients</td>
</tr>
<tr>
<td>Characteristics</td>
<td></td>
</tr>
<tr>
<td>of phenotype¹</td>
<td></td>
</tr>
</tbody>
</table>

- Clinical symptoms related to renal Fanconi syndrome during **first year of life**
  - Fanconi syndrome: Defect of kidney tubules resulting in malabsorption of electrolytes / substances in kidneys²
- Frequently require **multiple renal transplants with lifetime of immunosuppression**
- Most severe form of cystinosis

- Usually diagnosed **later in childhood or during adolescence** (after age 10)
- Typically experience **renal Fanconi syndrome and proteinuria**
- Frequently require **multiple renal transplants with lifetime of immunosuppression**

eGFR data reinforce need for early intervention

Entered trial with progressive kidney disease (eGFR of 48), decline accelerates in line with natural history

NEW DATA POINT

Normal Kidney Function

Mild CKD

Moderate CKD

Severe CKD

eGFR: Estimated Glomerular Filtration Rate; eGFR calculated using CKD-EPI formula
Transplanted kidney not impacted by treatment, as expected

Serum creatinine remains stable post infusion
Leukocyte cystine levels in blood suppressed out to 28 months

Note: Data from Patient 1 up to 12 months have been previously disclosed. Therapeutic range is <1.0 Half Cystine (nmol/mg protein). Measure of 1 is level of healthy heterozygote.; For Patient 1, Leukocyte Cystine Quantification was initiated at approximately week 20.; *Patient 1: Hemolyzed sample which may potentially lead to lower results; **Patient 1: Sample processed outside of the range of the stability; †Patient 2: Sample was not collected and shipped according to study protocol.
Darker pigmentation may be a sign of multi-functional cystinosin activity post gene therapy
Further enforces systemic reach of gene therapy

Cystinosin is located in melanosomes and regulates melanin synthesis

Note: GT: gene therapy; Source: Chiaverini et al., FESEB, 2012
Darker pigmentation may be a sign of multi-functional cystinosin activity post gene therapy
Further enforces systemic reach of gene therapy

Cystinosin is located in melanosomes and regulates melanin synthesis

Source:* Do not have permission to show patient image; Chiaverini et al., FESEB, 2012
Sustained engraftment to date demonstrated by VCN plateau for patients beyond 12 months

* From second apheresis; VCN: Vector Copy Number; PBCs: Peripheral Blood Cells; dg: Diploid Genome
Phase 1/2 Cystinosis trial (5 patients)

No unexpected safety events or trends related to AVR-RD-04 identified

No SAEs or AEs related to AVR-RD-04 drug product
No SAEs reported

Preliminary AEs reported

- N=40 for subject 1; N=22 for subject 2; N=8 for subject 3; N=25 for subject 4; N=13 for subject 5
- Majority of AEs are mild or moderate
  - 1 severe -- Appendicitis unrelated to study treatment or procedures
  - AEs generally consistent with myeloablative conditioning or underlying disease:
    - Pre-treatment and prior to conditioning (not all events listed)
      - Diarrhea, hypokalemia, dizziness
      - Dehydration, vomiting
    - Post-treatment (not all events listed)
      - Alopecia, intermittent diarrhea, vomiting, loss of appetite
      - Mucositis, intermittent febrile neutropenia, intermittent epistaxis
      - Intermittent blurry vision, intermittent hypokalemia, mucoceles
      - Thrombocytopenia

AE: Adverse Event; SAE: Serious Adverse Event; safety data cut-off date is May 6, 2022
Building regulatory momentum
Active IND with US/EU Orphan Designation and US Fast Track Designation

AVROBIO IND
FDA approved
July 2021

Preclinically focused
FDA Type C meeting
Dec. 2021

Clinical/CMC
FDA Type C meeting
planned
2022

Plan to initiate
AVROBIO-sponsored trial
2023

Two-stage clinical strategy planned:
• Pre-renal transplant population for initiation in 2023
• Post-renal transplant population as second stage
• Several endpoints across renal/ocular/neuromuscular systems under evaluation
• US, UK and EU trial sites

Actionable feedback incorporated

Trial enabling interaction

Long-term follow-up study
Expanding Phase 1/2 data set shows systemic gene therapy impact

AVR-RD-04 is first and only investigational gene therapy for cystinosis

All five patients dosed remain off oral cysteamine

- Improvements in neurocognitive assessments
- Stable muscle/grip strength
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- Quantified increase in hair strand pigmentation

Safety and tolerability profile remains strong*

* Data as of May 6, 2022

Proof-of-concept demonstrated in adult population

Plan to meet with regulators in 2H 2022 to discuss company-sponsored trial
Appendix
# Patient baseline characteristics

<table>
<thead>
<tr>
<th>Patient</th>
<th>PATIENT 1</th>
<th>PATIENT 2</th>
<th>PATIENT 3</th>
<th>PATIENT 4</th>
<th>PATIENT 5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age of symptom onset/diagnosis</strong></td>
<td>0 year / 8 months</td>
<td>0 year / 6 months</td>
<td>4 years</td>
<td>6 years</td>
<td>8 months</td>
</tr>
<tr>
<td><strong>Age dosed with CTNS-RD-04</strong></td>
<td>20 years</td>
<td>46 years</td>
<td>22 years</td>
<td>33 years</td>
<td>31 years</td>
</tr>
<tr>
<td></td>
<td>Infused October 2019</td>
<td>Infused June 2020</td>
<td>Infused November 2020</td>
<td>Infused November 2021</td>
<td>Infused March 2022</td>
</tr>
<tr>
<td><strong>Gender</strong></td>
<td>Male</td>
<td>Male</td>
<td>Male</td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td><strong>Mutation</strong></td>
<td>• 57-kb deletion</td>
<td>• 57-kb deletion</td>
<td>• c.18_21del, p.Thr7Phefs*7</td>
<td>• 57-kb deletion</td>
<td>• 57-kb deletion</td>
</tr>
<tr>
<td><strong>Kidney transplant status and cysteamine dosing prior to CTNS-RD-04 dosing</strong></td>
<td>• No kidney transplant; stage 3 (moderate CKD) renal failure</td>
<td>• 2 renal transplants (1987 and 1999)</td>
<td>• 1 renal transplant (2010)</td>
<td>• 2 renal transplants (2008 and 2017)</td>
<td>• No renal transplant; stage 3 (moderate CKD) renal failure</td>
</tr>
<tr>
<td></td>
<td>• On oral Cysteamine</td>
<td>• On oral Cysteamine</td>
<td>• On oral Cysteamine</td>
<td>• On oral Cysteamine</td>
<td>• On oral Cysteamine</td>
</tr>
<tr>
<td></td>
<td>• On Cysteamine drops</td>
<td>• On Cysteamine drops</td>
<td>• On Cysteamine drops</td>
<td>• Off Cysteamine drops</td>
<td>• On Cysteamine drops</td>
</tr>
<tr>
<td><strong>Manufactured CTNS-RD-04 product and busulfan dose</strong></td>
<td>• 7.88 x 10e6 CD34+ cells/kg</td>
<td>• 5.07 x 10e6 CD34+ cells/kg</td>
<td>• 9.59 x 10e6 CD34+ cells/kg</td>
<td>• 3.63 x 10e6 CD34+ cells/kg</td>
<td>• 9.12 x 10e6 CD34+ cells/kg</td>
</tr>
<tr>
<td></td>
<td>• VCN: 2.07</td>
<td>• VCN: 1.27</td>
<td>• VCN: 1.59</td>
<td>• VCN: 0.59</td>
<td>• VCN: 2.5</td>
</tr>
<tr>
<td></td>
<td>• 94% viability</td>
<td>• 91% viability</td>
<td>• 95% viability</td>
<td>• 90% viability</td>
<td>• 95% viability</td>
</tr>
<tr>
<td></td>
<td>• AUC Bu: 81.8 mg.h/L</td>
<td>• AUC Bu: 86.7 mg.h/L</td>
<td>• AUC Bu: 90 mg.h/L</td>
<td>• AUC Bu: 88.5 mg.h/L</td>
<td>• AUC Bu: 88.2 mg.h/L</td>
</tr>
</tbody>
</table>