ACCELERON

Second Quarter 2017 Financial and Operational Results

August 3, 2017

Accelerating Drug Discovery to Transform Patients' Lives

Acceleron Forward-Looking Statements

This presentation contains forward-looking statements about the Company's strategy, future plans and prospects, including statements regarding the development of the Company's compounds, the timeline for clinical development and regulatory approval of the Company's compounds and the expected timing for reporting of data from ongoing clinical trials. The words "anticipate," "believe," "could," "estimate," "expect," "intend," "may," "plan," "potential," "project," "should," "target," "will," "would," and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words.

Actual results could differ materially from those included in the forward-looking statements due to various risks and uncertainties, including, but not limited to, that preclinical testing of the Company's compounds and data from clinical trials may not be predictive of the results or success of ongoing or later clinical trials, that the development of the Company's compounds will take longer and/or cost more than planned, that the Company or its collaboration partner, Celgene, will be unable to successfully complete the clinical development of the Company's compounds, that the Company or Celgene may be delayed in initiating, enrolling or completing any clinical trials, and that the Company's compounds will not receive regulatory approval or become commercially successful products. These and other risks and uncertainties are identified under the heading "Risk Factors" included in the Company's most recent Annual Report on Form 10-K, and other filings that the Company has made and may make with the SEC in the future.

The forward-looking statements contained in this presentation are based on management's current views, plans, estimates, assumptions and projections with respect to future events, and the Company does not undertake and specifically disclaims any obligation to update any forward-looking statements.

Habib Dable
President and CEO

Luspatercept: MEDALIST and BELIEVE Phase 3 Trials Fully Enrolled

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MEDALIST

Lower-Risk
MDS (RS+)
(N=229)

BELIEVE

β-Thalassemia (TD)
(N=336)

Top-line Results
Mid-2018

MEDALIST Trial ID: NCT02631070 / BELIEVE Trial ID: NCT02604433

Key Takeaways from 2017 MDS Symposium and EHA: Phase 2 Results

MDS

Meaningful responses across all lower-risk MDS patient populations regardless of prior use of ESAs, baseline EPO levels, and RS status.

Results in RS- patients are promising, specifically in patients with baseline EPO ≤ 500 IU/L

Luspatercept was generally well-tolerated for patients on treatment up to and greater than 26 months

Beta-thalassemia

Proportion of transfusion dependent patients achieving and sustaining ≥ 33% reduction in RBC transfusions is meaningful

A majority of non-transfusion-dependent patients achieved a ≥ 1.0 g/dL increase in Hb

Luspatercept was generally well-tolerated for patients on treatment up to and greater than 24 months

New Phase 2 and Phase 3 Trial Starts Planned for 2017/2018

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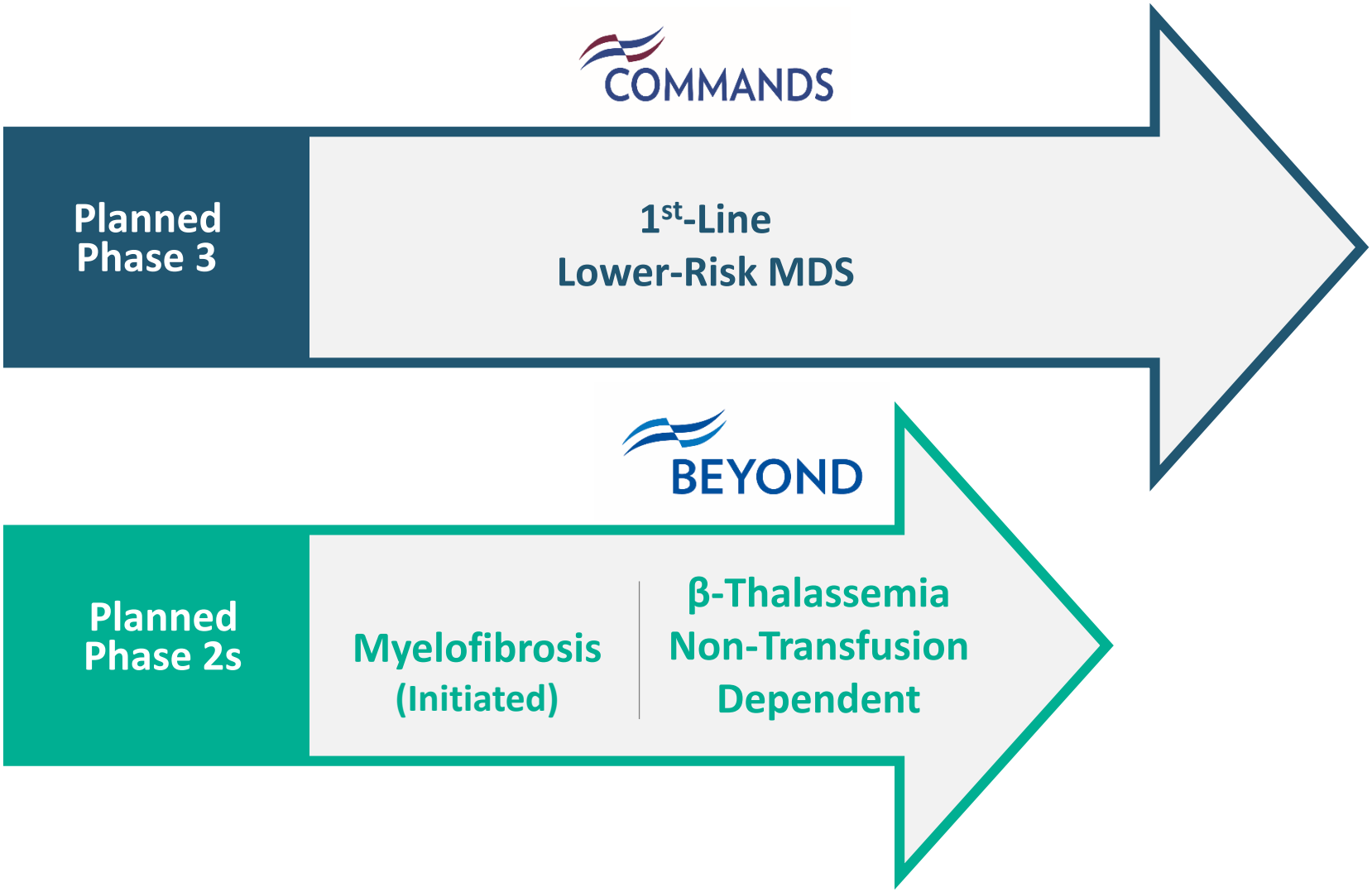
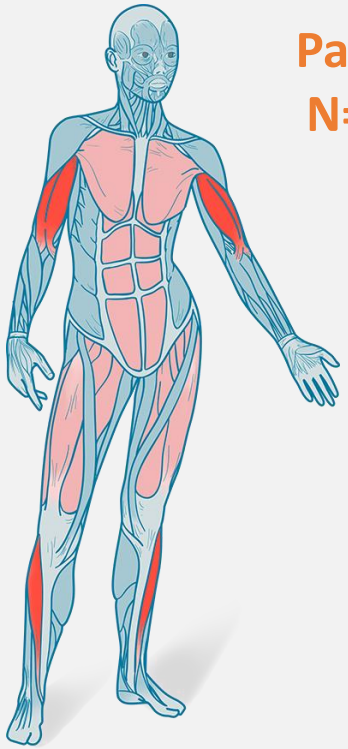


ACE-083: Potential to be First-in-Class

Phase 2 Study in FSHD

Part 1:
N=36

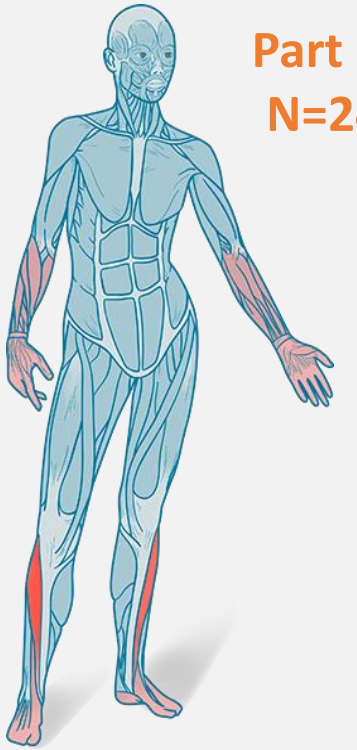


Part 2:
N=40

Part 1 FPI December 2016

Phase 2 Study in CMT

Part 1:
N=18



Part 2:
N=24

Part 1 FPI July 2017

Kevin McLaughlin
Chief Financial Officer

Q2 2017 Financial Results

Cash	
Cash, cash equivalents and investments	$194.0M
Revenue	
Collaboration Revenue	$3.1M
Costs, Expenses and Other Income	
Total Costs and Expenses	$33.0M
R&D Expenses	$21.6M
G&A Expenses	$11.4M
Includes One-Time, Non-Cash, Charge	$3.6M
Net Loss	
Net Loss	$29.7M

Current cash, cash equivalents and investments provide funding into **2H 2019**

Note: Numbers may not foot due to rounding

Key Corporate Priorities

- **Luspatercept**
  - MEDALIST and BELIEVE Phase 3 Top-line results expected in **mid-2018**
  - Initiate the COMMANDS Phase 3 trial in first-line, lower-risk MDS in **early 2018**
  - Enroll the first myelofibrosis patient in Phase 2 by **YE 2017**
  - Initiate BEYOND Phase 2 trial in NTD beta-thalassemia by **YE 2017**
  - Additional Phase 2 results to be presented at medical conferences in **2017**
- **ACE-083**
  - Report FSHD Phase 2 Part 1 dose-cohort 1 results in **late 2017**
  - Report FSHD Phase 2 Part 1 results from all dose-escalation cohorts in **2018**
  - Report CMT Phase 2 Part 1 results from all dose-escalation cohorts by **YE 2018**
- **ACE-2494**
  - Initiate Phase 1 healthy volunteer study in **2017**

SAVE THE DATE

Research & Development Day
Tuesday, September 19th
New York City

Accelerating Drug Discovery to Transform Patients' Lives

Presentations by Acceleron Management & External Speakers

Q2 2017 Results Q&A Session

Habib Dable	President and Chief Executive Officer
Matthew Sherman, M.D.	Chief Medical Officer
Kevin McLaughlin	Chief Financial Officer
Chris Rovaldi	SVP, Operations & Program Mgmt.
Todd James, IRC	VP, IR and Corp. Comm.

Thank You

www.acceleronpharma.com
NASDAQ: XLRN