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EMERALD-1

Full Data Presentation

October 12, 2023

Forward-Looking Statements

This presentation contains "forward-looking" statements within the meaning of the "safe harbor" provisions of the Private Securities Litigation Reform Act of 1995, including, but not limited to statements regarding the timing and success of Morphic's ongoing clinical trials and related data, updates and results from Morphic's clinical trials and the potential therapeutic benefits of MORF-057.

Certain data in this presentation are based on cross-study comparisons and are not based on any head-to-head clinical trials. Cross-study comparisons are inherently limited and may suggest misleading similarities and differences. The values shown in the cross-study comparisons are directional and may not be directly comparable.

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Phase 2a Study Designed to Confirm Efficacy Signal: Results Exceeded Expectations

- Primary endpoint achieved, with consistent and expected clinical improvement seen across key measures
- PK in patients consistent with healthy volunteers
- RO and T-cell subsets consistent with healthy volunteers
- Generally well tolerated with no safety signal observed
- Further clinical improvement in patients continuing treatment beyond week 12, especially in refractory patients

Agenda

- Welcome and Introduction
  - Chris Erdman, SVP Investor & Corporate Communications
- Trial Design, Patient Disposition, Safety, PK/PD
  - Dr. Brihad Abhyankar, SVP Clinical Development, Morphic Therapeutic
- Detailed Clinical Efficacy Results
  - Dr. Bruce Rogers, President, Morphic Therapeutic
- Concluding Thoughts and Corporate Update
  - Dr. Marc Schegerin, COO & CFO, Morphic Therapeutic
- Q&A
  - Dr. Brian Feagan
  - Morphic Team

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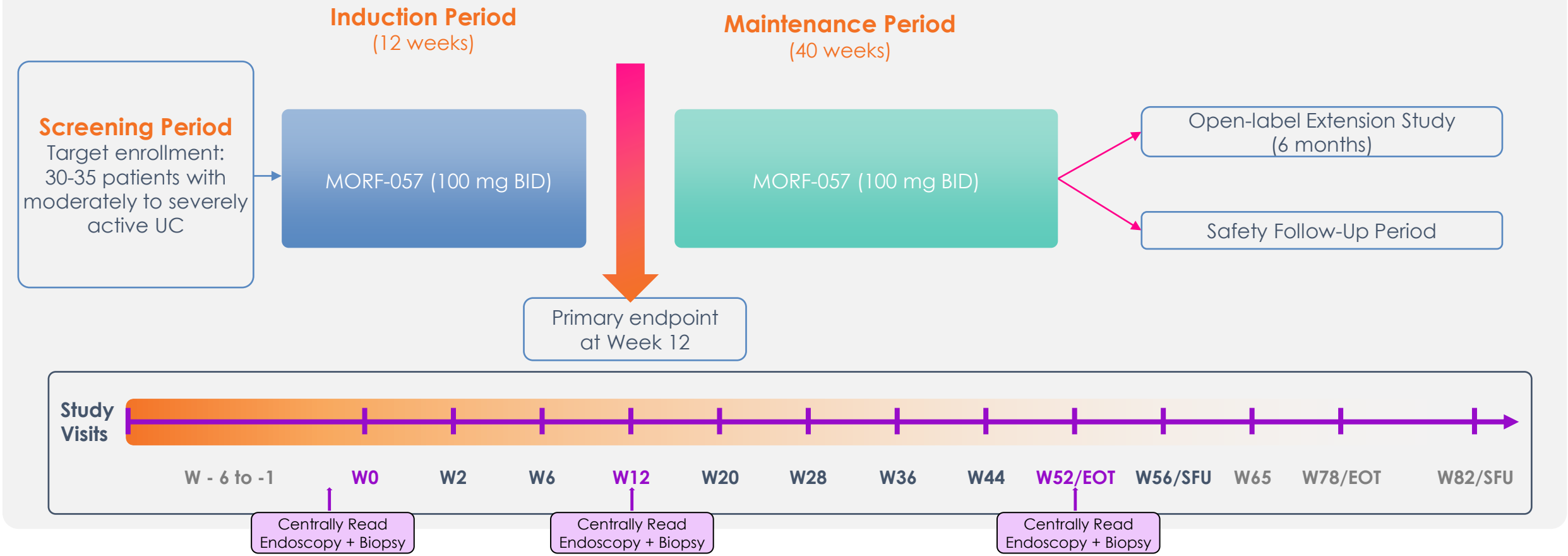
EMERALD-1
Trial Design and Patient Disposition

MORF-057 Phase 2a EMERALD-1



***Primary Endpoint*: Change in RHI measured at 12 weeks**
Secondary Endpoint: Change in the mMCS from baseline at w12

RHI, Robarts Histopathology Index; mMCS, modified Mayo Clinic Score

Baseline Patient Demographics: a Moderately-to-Severely Active UC population with High Disease Burden

Category		Patients, N=35
Age, mean ± SD	Years	39.2 ± 14.1
Sex, n (%)	Female	16 (45.7)
Geography, n (%)	Poland United States	28 (80.0) 7 (20.0)
Duration of disease, mean ± SD	Years	7.5 ± 8.0
Extent of disease, n (%)	Proctosigmoiditis L-sided colitis Pancolitis	12 (34.3) 10 (28.6) 10 (28.6)
RHI Score, mean ± SD	Points	22.7 ± 7.3
mMCS, mean ± SD	Points	6.7 ± 1.1
MES, n (%)	2 3	18 (51.4) 17 (48.6)
Corticosteroid use, n (%)	No Yes	26 (74.3) 9 (25.7)
Previous use of AT*, n (%)	Naïve Experienced	21 (60.0) 14 (40.0)

AT, advanced therapy; MES, Mayo endoscopic score; mMCS, modified Mayo Clinic score; RHI, Robarts histopathology index; SD, standard deviation

*The number of AT-experienced patients was updated from n=13/35 to n=14/35 during re-review of data for presentation at a medical conference. During this re-review, It was determined that one patient had received an investigational agent deemed to be an advanced therapy before the MORF-057-201 trial. This change does not impact any of the clinical efficacy data presented from the EMERALD-1 study.

Demographics and Baseline Characteristics by Prior Treatment Status & Mayo Endoscopic Score

Baseline Characteristics	Main Cohort (N=35)	AT-N (N=21, 60%)	AT-E (N=14, 40%)	MES =2 (N=18, 51.4%)	MES =3 (N= 17, 48.6%)
Age, years, mean (SD)	39.2 (14.10)	39.9 (14.89)	38.3 (13.32)	40.1 (11.22)	38.4 (16.95)
Sex, n (%) Male/ Female	19 (54.3) / 16 (45.7)	10 (47.6) / 11 (52.4)	9 (64.3) / 5 (35.7)	9 (50.0) / 9 (50.0)	10 (58.8) / 7 (41.2)
Geography, n (%) USA / Poland	7 (20.0) / 28 (80.0)	5 (23.8) / 16 (76.2)	2 (14.3) / 12 (85.7)	4 (22.2) / 14 (77.8)	3 (17.6) / 14 (82.4)
RHI, mean (SD)	22.7 (7.32)	22.0 (7.51)	23.6 (7.19)	21.1 (8.04)	24.3 (6.30)
mMCS (central), mean (SD)	6.7 (1.07)	6.4 (1.12)	7.2 (0.80)	6.2 (1.06)	7.2 (0.83)
Total Mayo Clinic Score (tMCS), mean (SD)	8.9 (1.35)	8.5 (1.47)	9.6 (0.85)	8.2 (1.31)	9.7 (0.92)
Mayo Endoscopy Score (MES), n (%): 2/3	18 (51.4) / 17 (48.6)	14 (66.7) / 7 (33.3)	4 (28.6) / 10 (71.4)	18 (100) / 0	0 / 17 (100)
Previous Use of AT, n (%) Naïve/Experienced	21 (60.0) / 14 (40.0)	21 (100) / 0	0 / 14 (100)	14 (77.8) / 4 (22.2)	7 (41.2) / 10 (58.8)
Corticosteroid Use at Baseline, n (%) No/Yes	26 (74.3) / 9 (25.7)	17 (81.0) / 4 (19.0)	9 (64.3) / 5 (35.7)	14 (77.8) / 4 (22.2)	12 (70.6) / 5 (29.4)

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AT, advanced therapies; MES, Mayo endoscopic score; mMCS, modified Mayo Clinic score; RHI, Robarts histopathology index; SD, standard deviation

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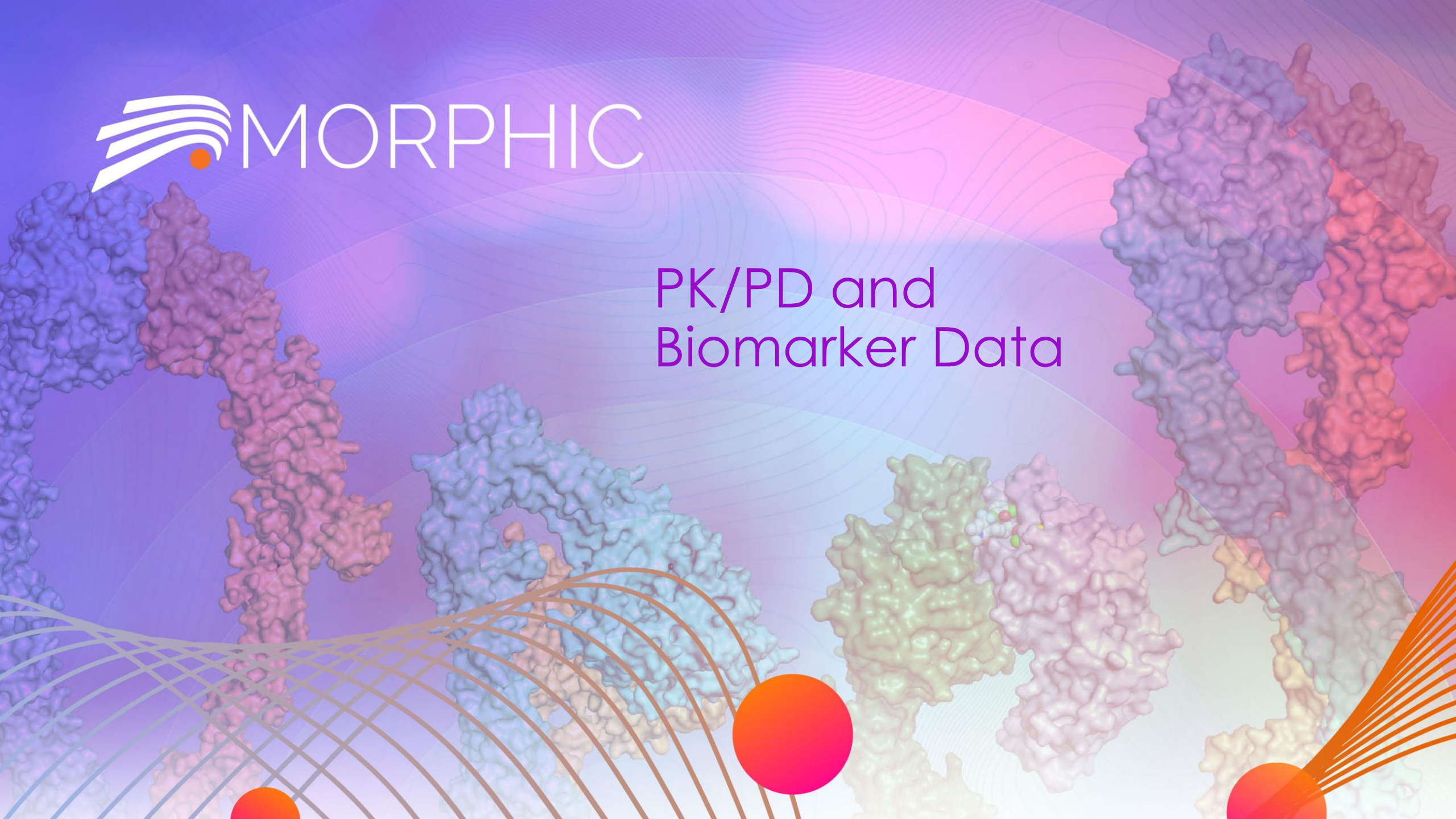
Safety and Tolerability

MORF-057: Generally Well-Tolerated in EMERALD-1 No Safety Signal Observed (as of 10/10/23)

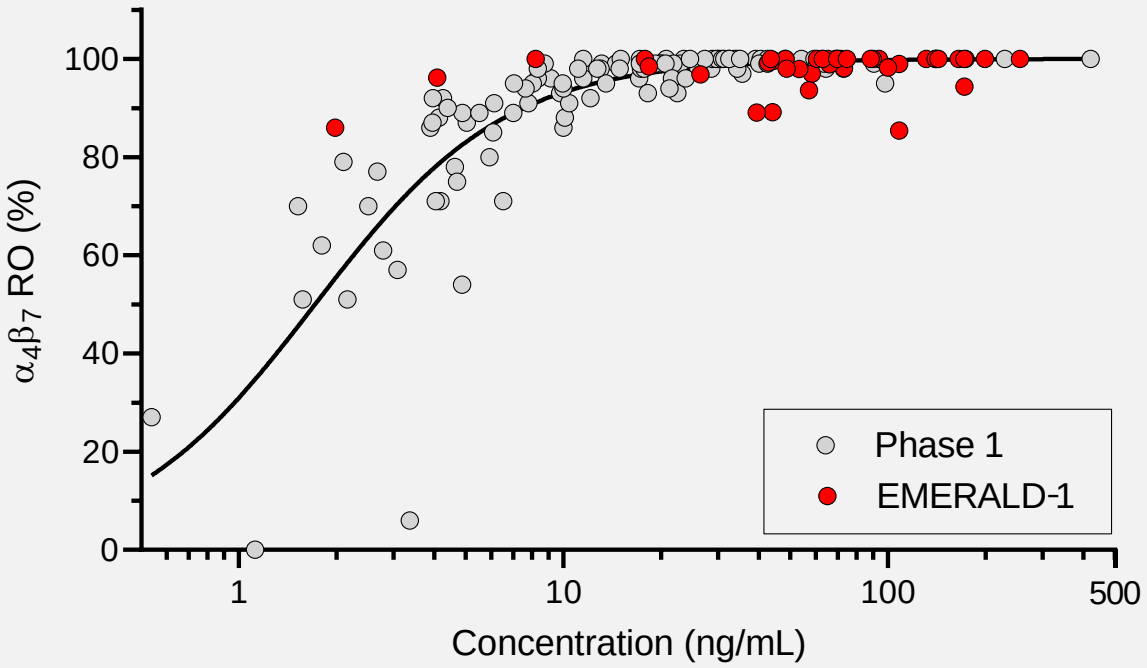
Endpoint	Patients, N = 35
Patients with ≥1 TEAE, n (%)	12 (34.3)
Serious TEAEs, n (%)	0
Patients with AE leading to death, n (%)	0
Patients with any grade 3 TEAEs, n (%) UC exacerbation[a]	 2 (5.7)
Common TEAEs (>5%), n (%) UC exacerbation Anemia[b,c]	 4 (11.4) 3 (8.6)
Treatment-related TEAE, n (%)	2 (5.7)

a. One UC exacerbation led to early discontinuation
b. All anemia events occurred in patients who had anemia at baseline and continued on study with iron supplements.
c. A third of patients with inflammatory bowel disease have iron-deficiency anemia
TEAE, treatment-emergent adverse event; UC, ulcerative colitis
*Data shown for 12-week induction period; as of 10/10/23, patients have been on EMERALD-1 study beyond the 12-week induction period and no other safety signals or SAEs have been reported.



PK/PD and Biomarker Data

Patient α4β7 Receptor Occupancy (RO) Consistent with Healthy Volunteer RO



α4β7 selectivity over α4β1 consistent with Phase 1 results

RO at 12 weeks		
	α4β7	α4β1
Mean	**>98%**	BLQ
Median	**>99%**	BLQ

- α4β7 RO achieved early and sustained saturating levels
- α4β1 RO remained at low levels
- No lymphocytosis or changes to circulating naïve T-cells were observed
- α4β1 projected RO was below the limit of quantitation with mean trough value estimated to be <15%

RO: Receptor Occupancy; BLQ, Below Limit of Quantification

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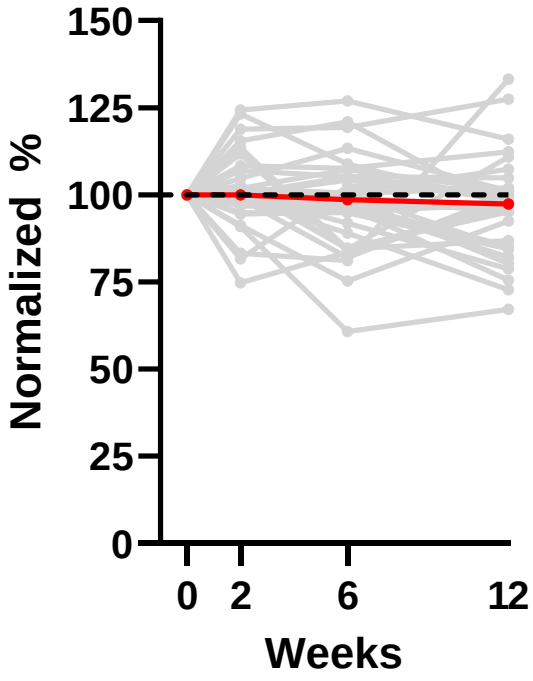
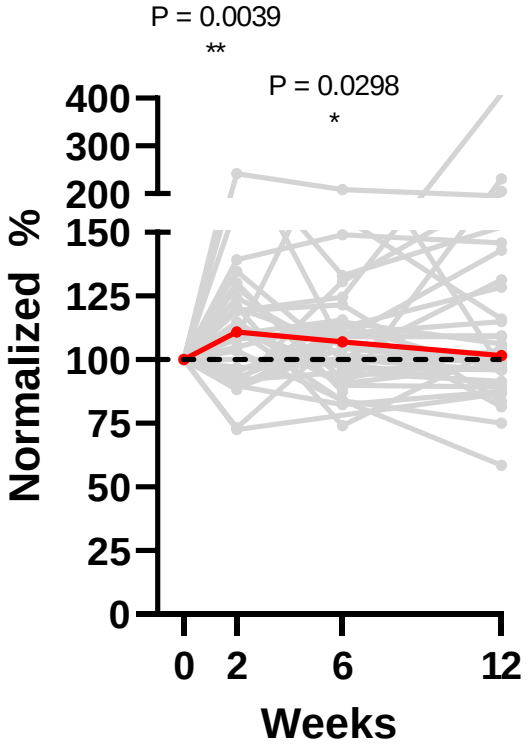
Substantial Lymphocyte Subset Changes Observed, Consistent With Engagement Of α4β7

CD4 Expressing T Cells

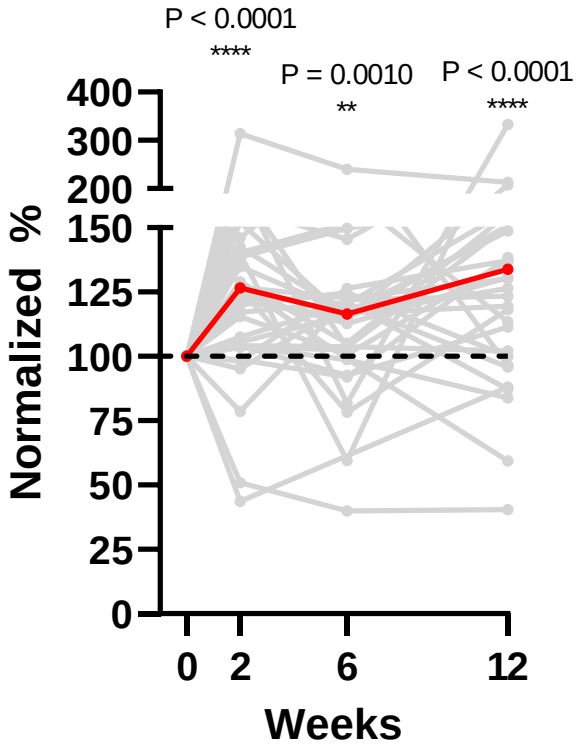
Naïve (Neg. Control)



Central Memory (ITGB7+)

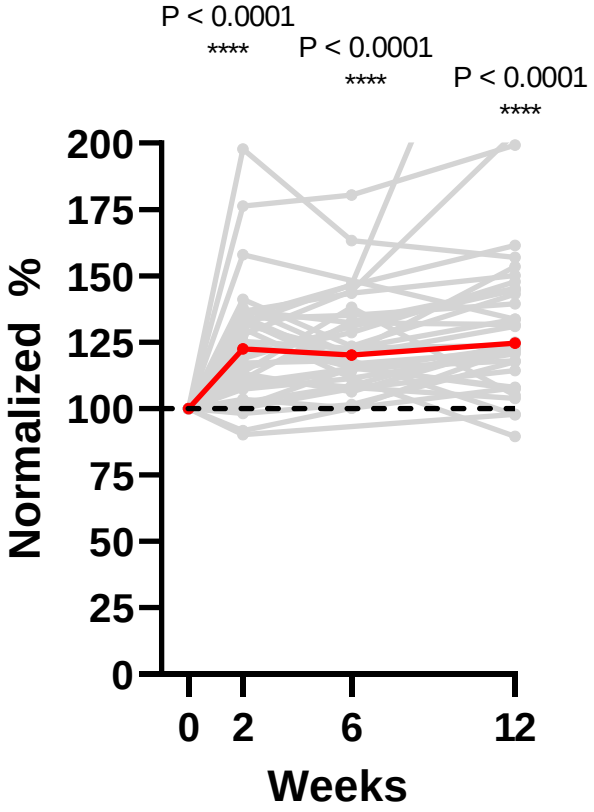


Effector Memory (ITGb7 Hi)



B Cells

Switched Memory (ITGb7+)



Median of all patients
Individual patients

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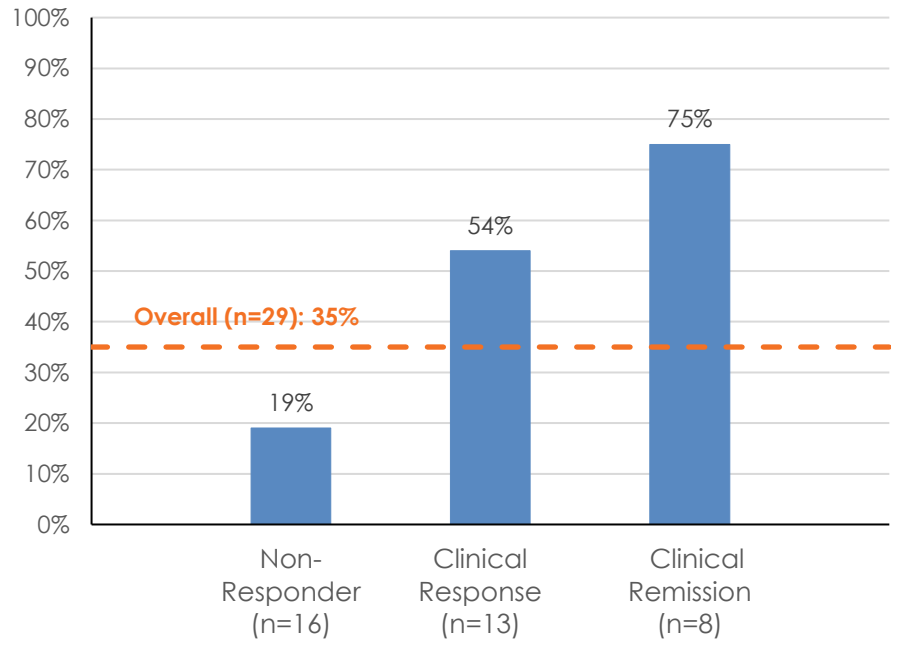
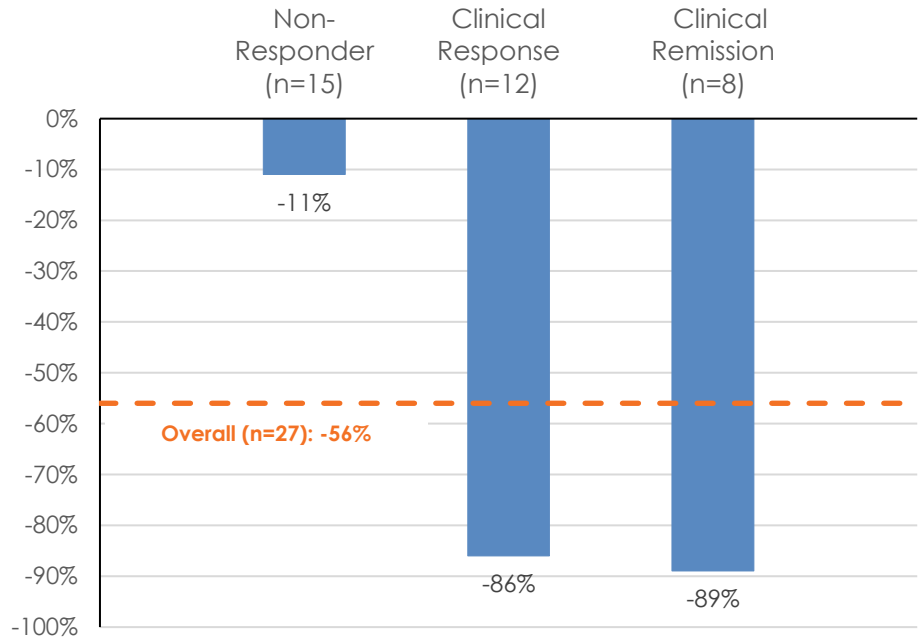
Fecal Calprotectin Decreases Correlated with Disease Improvement

Proportion of Patients with Fecal Cal < 250 mg/kg at Week 12 (Baseline > 250 mg/kg), n=29



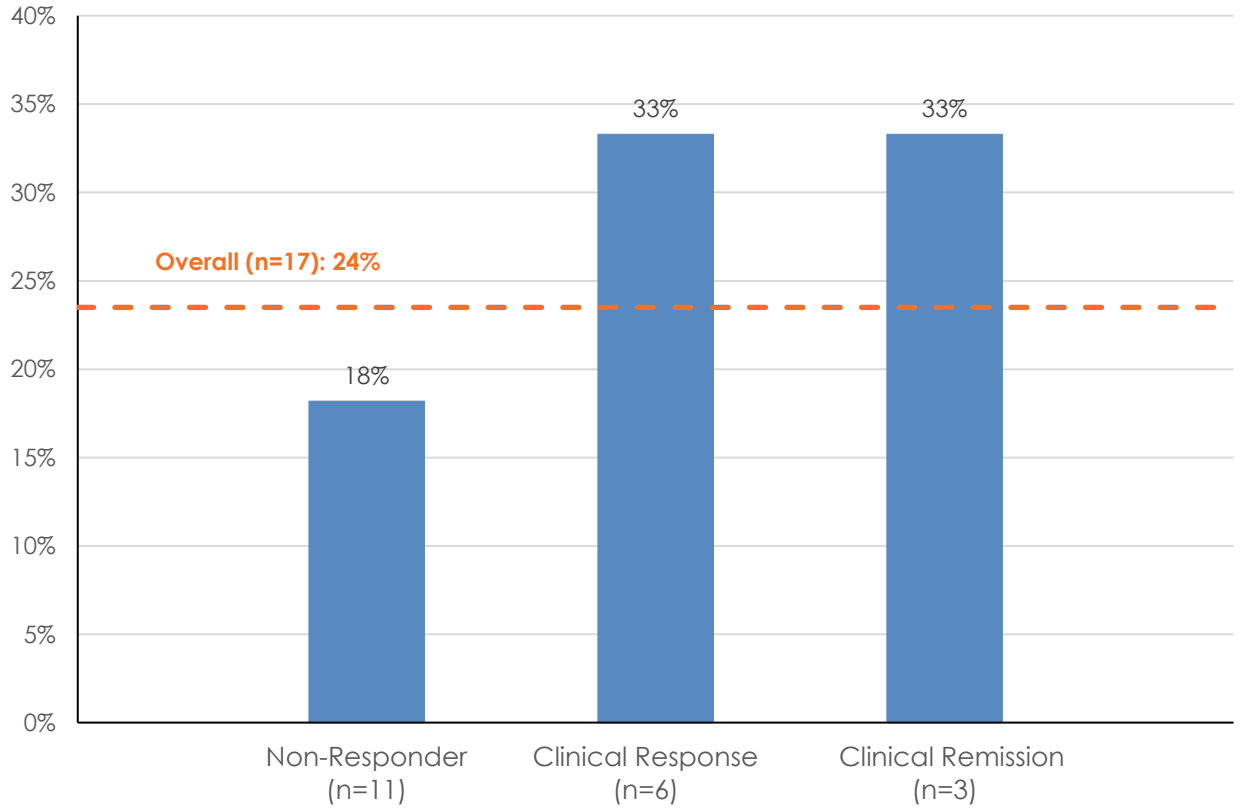
Percentage Reduction From Baseline in Fecal Cal at Week 12 (Baseline > 250 mg/kg & Week 12 data available), n=27[a]



n = Patients with baseline FC > 250 mg/kg. No inclusion/exclusion criteria for FC levels
Patients experiencing clinical remission also included in clinical response
a. Data unavailable for 2 patients at week 12

Expected Changes in C-Reactive Protein Observed

Proportion of Patients with hs-CRP < 3 mg/L at week 12 (Baseline > 3 mg/L)



No inclusion/exclusion criteria for CRP levels: n= 17 pts with baseline > 3 mg/L
Patients experiencing clinical remission also included in clinical response

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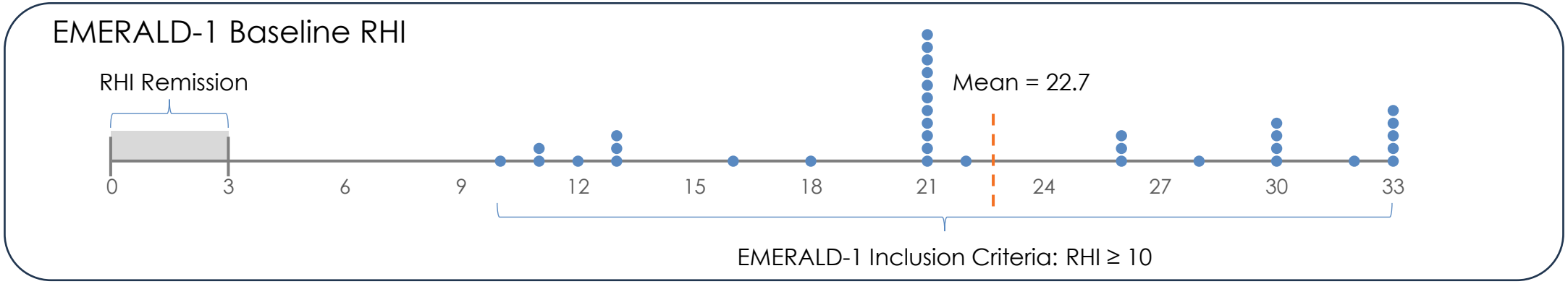
Clinical Efficacy Results

Robarts Histopathology Index for UC

- RHI: a validated histology index derived from the Geboes Score and designed to be reproducible and responsive to clinically meaningful change in disease activity in UC over time
- Calculated by evaluating 4 centrally read, individually weighted histologic items, each on a scale from 0 to 3
- RHI = (1 × chronic inflammatory infiltrate score) + (2 × lamina propria neutrophils score) + (3 × neutrophils in epithelium score) + (5 × erosion or ulceration score)
  - Thus, total RHI Score ranges from 0 (no disease activity) to 33 (severe disease activity)
- Remission: RHI ≤ 3



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Modified Mayo Clinic Score for UC

Stool Frequency (SFS)	
0	Normal
1	1-2/day > Normal
2	3-4/day > Normal
3	5+/day > Normal
Rectal Bleeding (RBS)	
0	None
1	Streaks
2	Obvious
3	Mostly Blood
Endoscopy / Mucosa (MES)	
0	Normal
1	Mild Friability
2	Moderate Friability
3	Spontaneous Bleeding
0-9	Total

- **Modified Mayo Clinic Score (mMCS)**
  - Three component score
  - 0 to 9 scale with moderate to severe UC 5 to 9
  - Clinical Remission
    - SFS ≤ 1
    - RBS = 0
    - MES ≤ 1 without friability
  - Endoscopic Response / Improvement: MES ≤ 1
  - Symptomatic Remission: SFS = 0 (or = 1 with ≥ 1 point decrease from baseline) and RBS = 0
  - PRO2: SFS + RBS

Primary Endpoint Met with High Statistical Significance

Consistent Effects Observed Among All Exploratory Measures

Endpoint @ Week 12	Overall (N=35)
Change in RHI, Mean (SD)	**-6.4 (11.18)** *p=0.0019*
RHI remission, n (%)	8 (22.9%)
Clinical response (mMCS)[1], n (%)	16 (45.7%)
Clinical remission (mMCS)[2], n (%)	9 (25.7%)
Endoscopic Response/Improvement[3], n (%)	9 (25.7%)
Change from baseline to Week 12 in the Modified MCS, Mean (SD)	-2.3 (2.14)

1. Clinical response (mMCS): decrease from baseline in the mMCS ≥2 points and ≥30% from baseline, plus a decrease in rectal bleeding subscore ≥1 or an absolute rectal bleeding subscore ≤1
2. Clinical remission (mMCS): rectal bleeding subscore of 0; a stool frequency subscore of ≤1; and an MES of ≤1 without friability
3. Endoscopic response / improvement: MES ≤1

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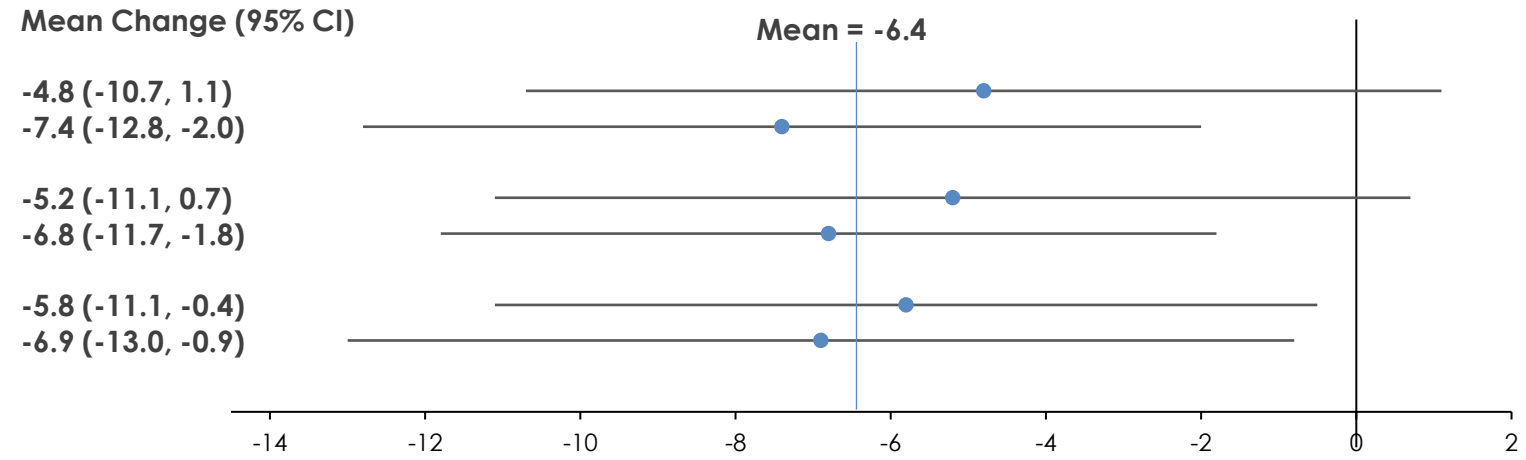
EMERALD-1 Efficacy Results by AT Status and MES

Endpoint @ Week 12	Overall N=35	AT-naïve n=21	AT-experienced n=14	MES =2 n=18	MES =3 n= 17
Change in RHI, mean ± SD	**-6.4 ± 11.2**	**-7.4 ± 11.9**	**-4.8 ± 10.3**	**-6.9 ± 12.1**	**-5.8 ± 10.4**
RHI change ≥ 7 points, n (%)	17 (48.6)	12 (57.1)	5 (35.7)	10 (55.6)	7 (41.2)
RHI remission[1], n (%)	8 (22.9)	6 (28.6)	2 (14.3)	6 (33.3)	2 (11.8)
RHI reduction ≥ 50%, n (%)	12 (34.3)	9 (42.9)	3 (21.4)	9 (50.0)	3 (17.6)
Change in mMCS, mean ± SD	-2.3 ± 2.1	-2.9 ± 2.4	-1.6 ± 1.5	-2.7 ± 2.3	-1.9 ± 1.9
Clinical response (mMCS)[2], n (%)	16 (45.7)	11 (52.4)	5 (35.7)	9 (50)	7 (41.2)
Clinical remission (mMCS)[3], n (%)	9 (25.7)	9 (42.9)	0	6 (33.3)	3 (17.6)
Symptomatic remission[4], n (%)	11 (31.4)	10 (47.6)	1 (7.1)	7 (38.9)	4 (23.5)
Endoscopic response / improvement[5], n (%)	9 (25.7)	9 (42.9)	0	6 (33.3)	3 (17.6)
Change in SF, mean ± SD	-0.8 ± 1.1	-1.0 ± 1.2	-0.5 ± 0.7	-0.9 ± 1.3	-0.6 ± 0.8
Change in RB, mean ± SD	-1.1 ± 0.8	-1.1 ± 0.9	-0.9 ± 0.8	-1.4 ± 0.8	-0.7 ± 0.7

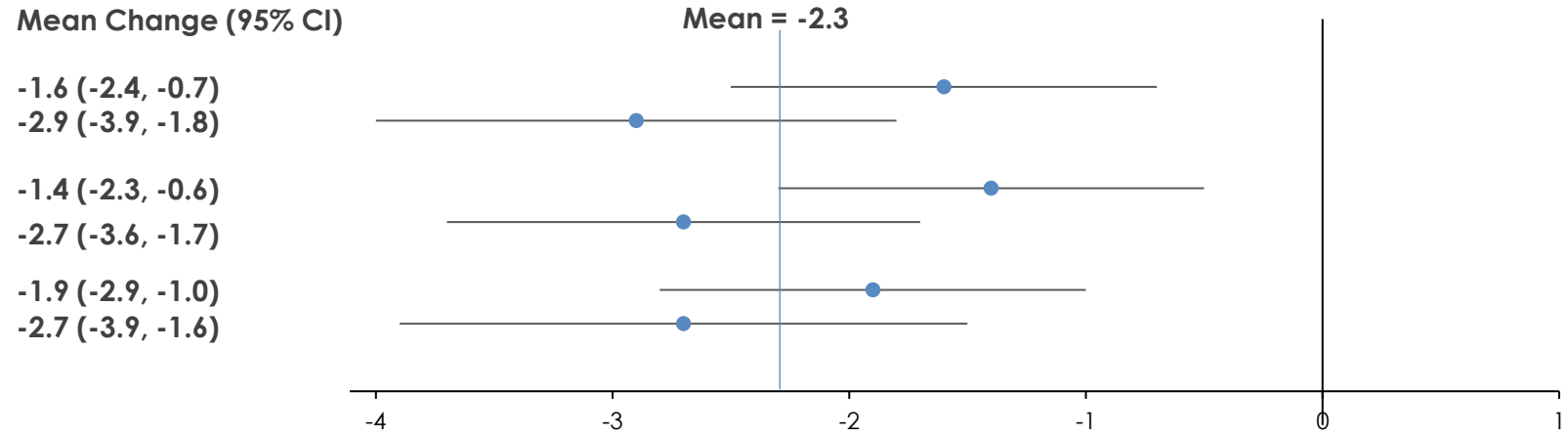
AT, advanced therapy; MCS, Mayo Clinic Score; mMCS, modified MCS; RHI, Robarts histopathology index; SF, Stool Frequency; RB, Rectal Bleeding; SD, standard deviation
1. RHI Remission: RHI ≤ 2
2. Clinical response (mMCS): decrease from baseline in the mMCS ≥2 points and ≥30% from baseline, plus a decrease in rectal bleeding subscore ≥1 or an absolute rectal bleeding subscore ≤1
3. Clinical remission (mMCS): rectal bleeding subscore of 0; a stool frequency subscore of ≤1; and an MES of ≤1 without friability
4. Symptomatic remission: SFS = 0 (or = 1 with ≥ 1 point decrease from baseline) and RBS = 0
5. Endoscopic response/improvement: MES ≤1

Consistent "Across-the-Board" Efficacy Signals Observed

Robarts Histopathology Index (RHI)



Modified Mayo Clinical Score (mMCS)



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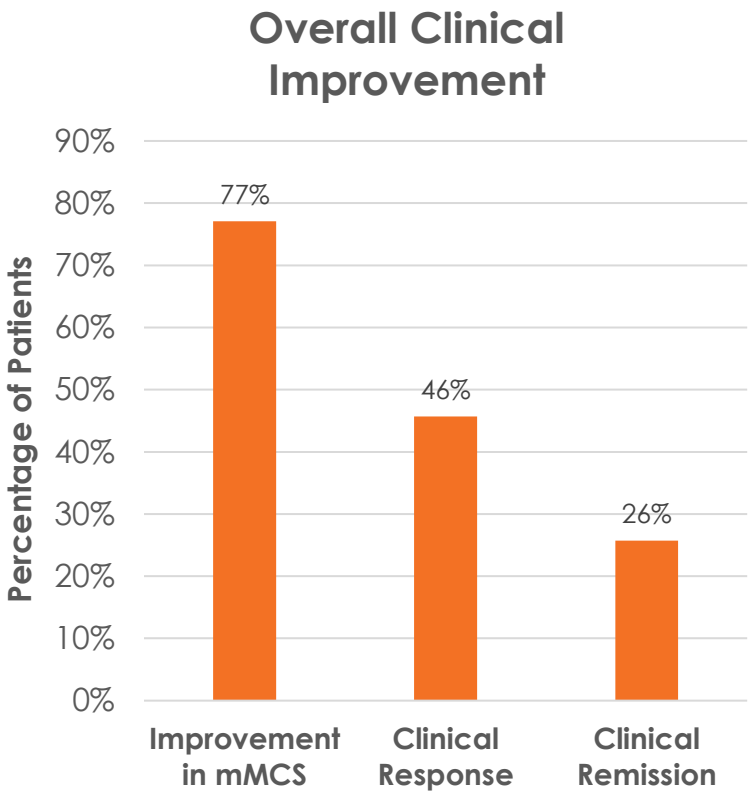
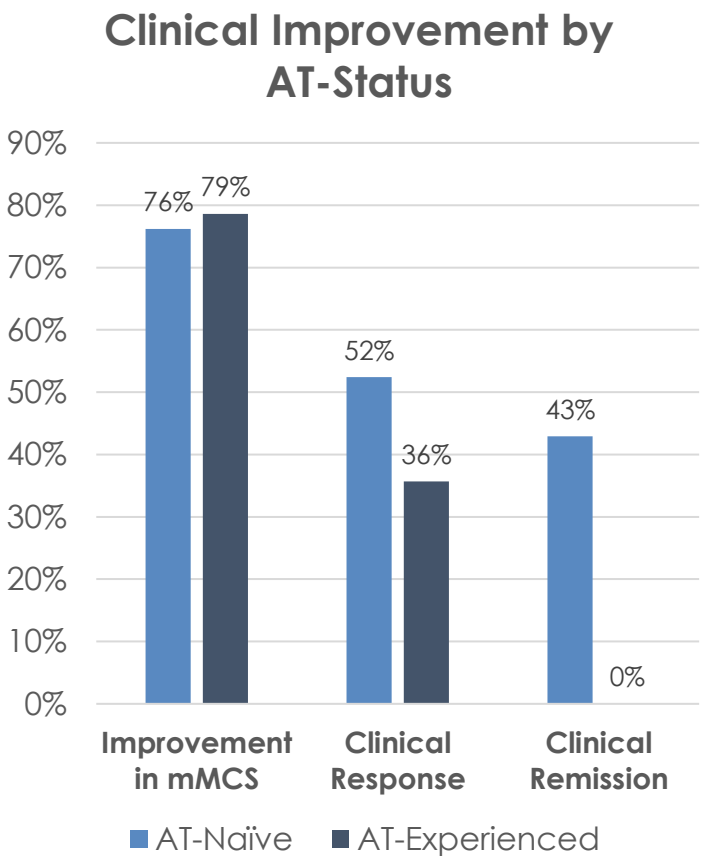
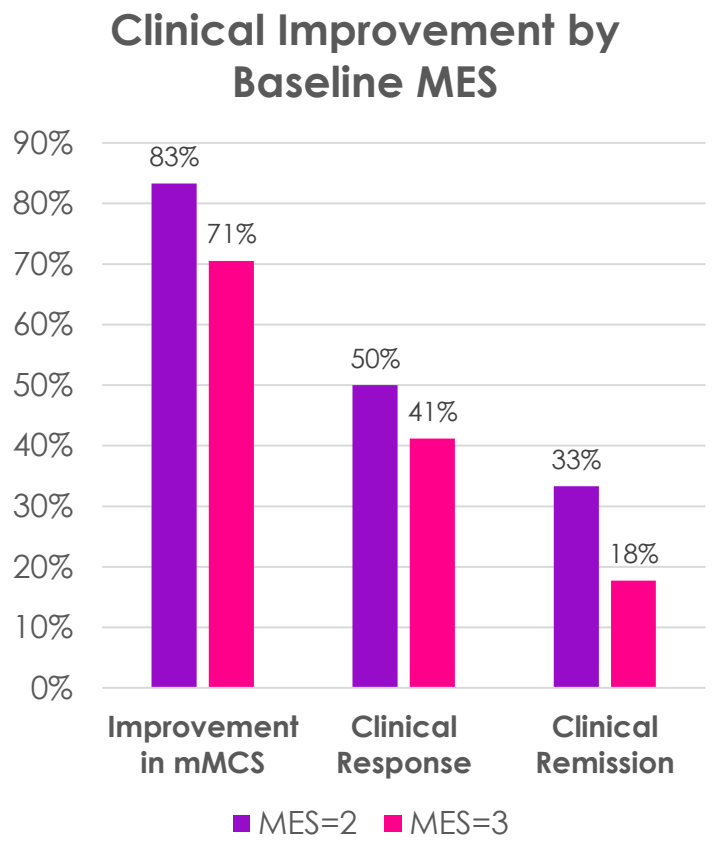
Clinical Improvement in >75% of All Patients, Regardless of Prior Therapy and Baseline MES



N=35



AT-Naïve: n=21; AT-Experienced: n=14



Baseline MES=2: n=18; Baseline MES=3: n=17

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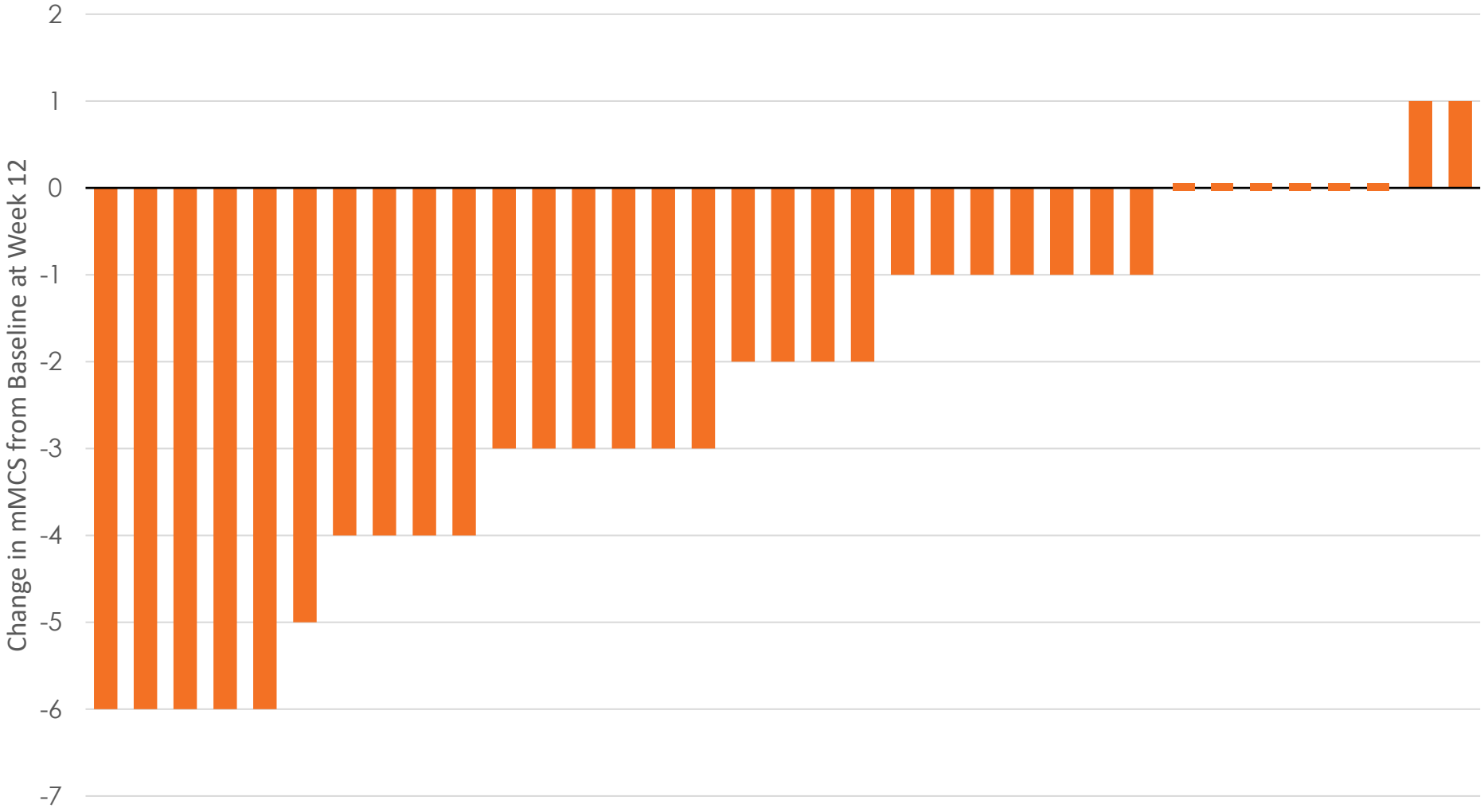
Change in Central mMCS By Patient from Baseline at Week 12



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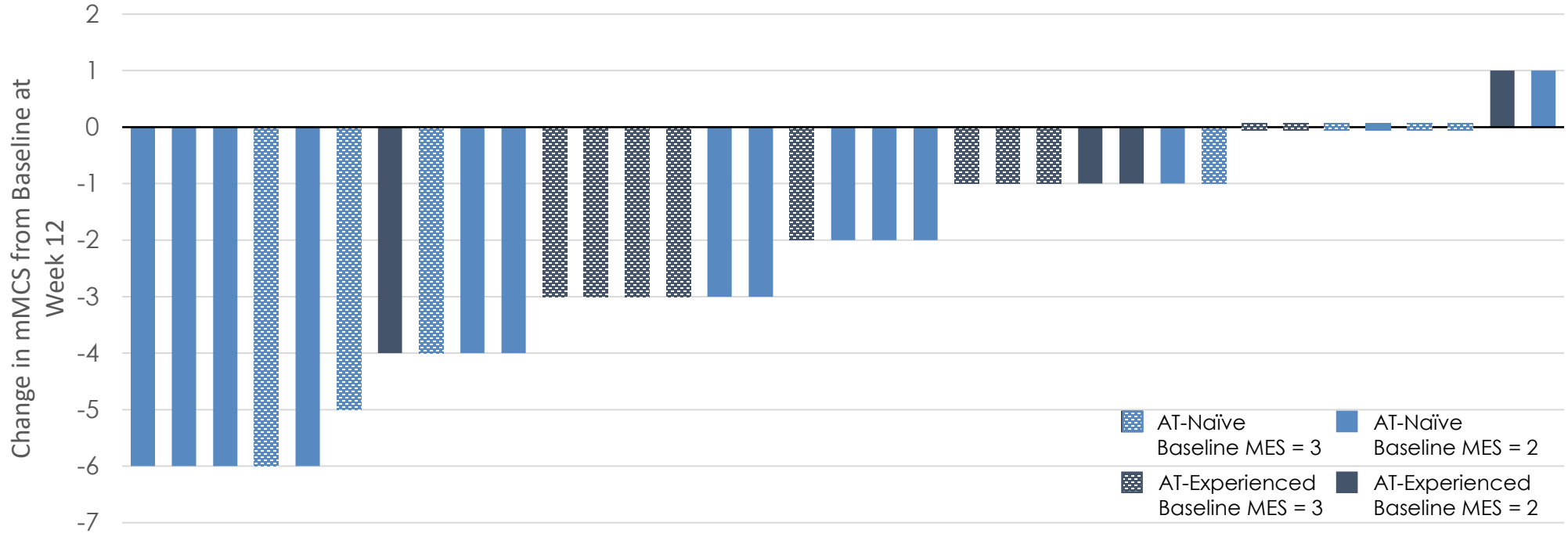
Change in Central mMCS from Baseline by Subgroup at Week 12



Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			✓																	
Remission	✓	✓	✓	✓	✓	✓		✓	✓						✓																				
RHI decrease from baseline ≥ 7	✓	✓		✓	✓	✓	✓	✓						✓	✓	✓		✓			✓			✓	✓	✓	✓			✓					
Steroid Use	N	N	N	N	N	N	N	N	N	N	N	N	Y	N	Y	N	Y	Y	N	N	N	N	Y	Y	N	N	Y	N	Y	N	Y	N	N	N	N
Baseline MES	2	2	2	3	2	3	2	3	2	2	3	3	3	3	2	2	3	2	2	2	3	3	3	2	2	2	3	3	3	3	2	3	3	2	2
# Prior AT							1				2	2	1	1			1				2	2	1	1	2			1	1					1	

AT, advanced therapy; RHI, Robarts histopathology index; MES, Mayo endoscopic score

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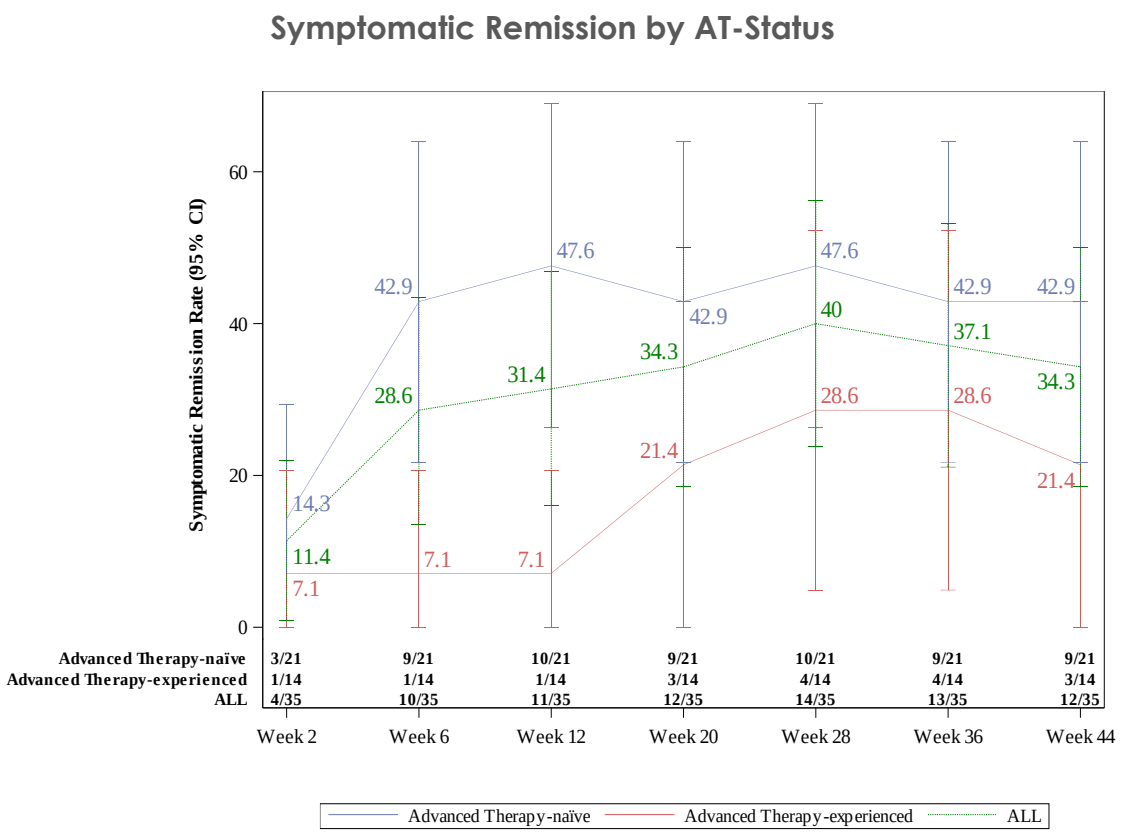
Data Beyond 12 weeks

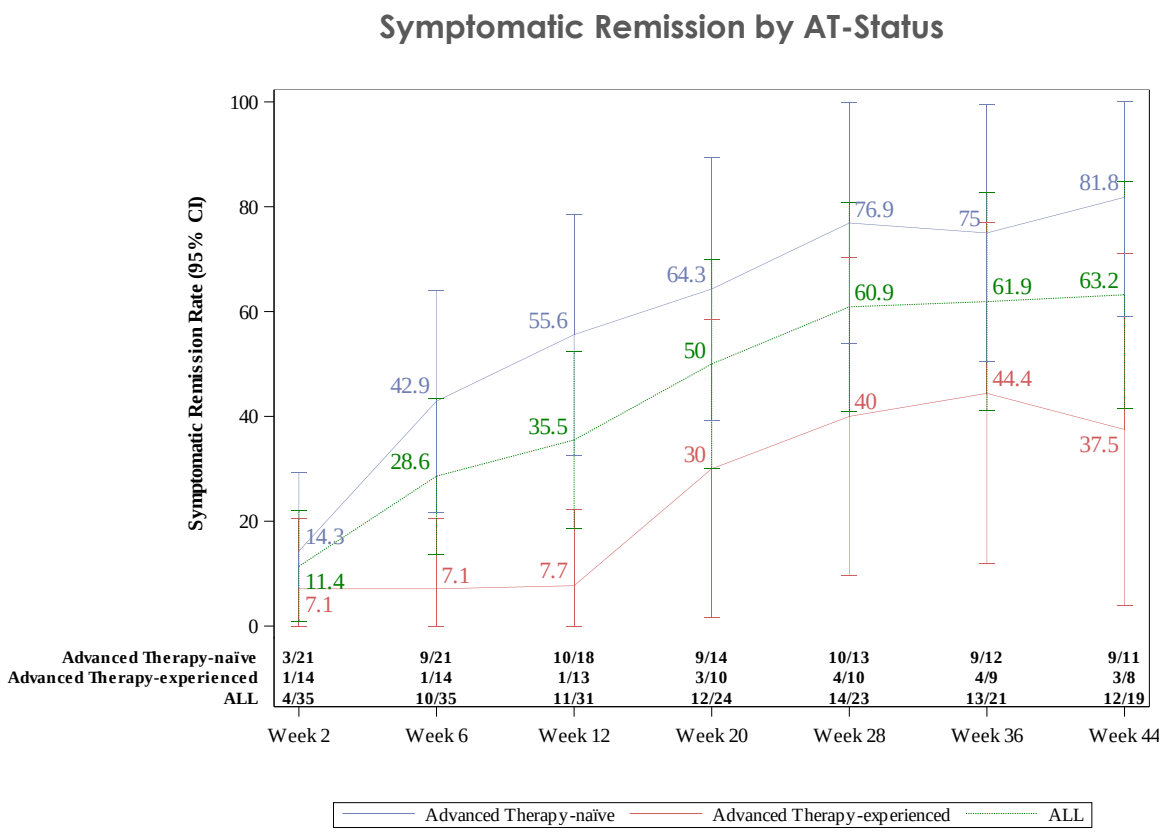
Symptomatic Remission By AT-Status: Week 44

Intent to Treat (ITT): Denominator includes all enrolled patients (N=35)



Symptomatic remission is defined as an stool frequency subscore=0 (or =1 with a >=1-point decrease from baseline) and rectal bleeding subscore=0

As observed: Denominator includes only patients who completed the visit



Symptomatic remission is defined as an stool frequency subscore=0 (or =1 with a >=1-point decrease from baseline) and rectal bleeding subscore=0

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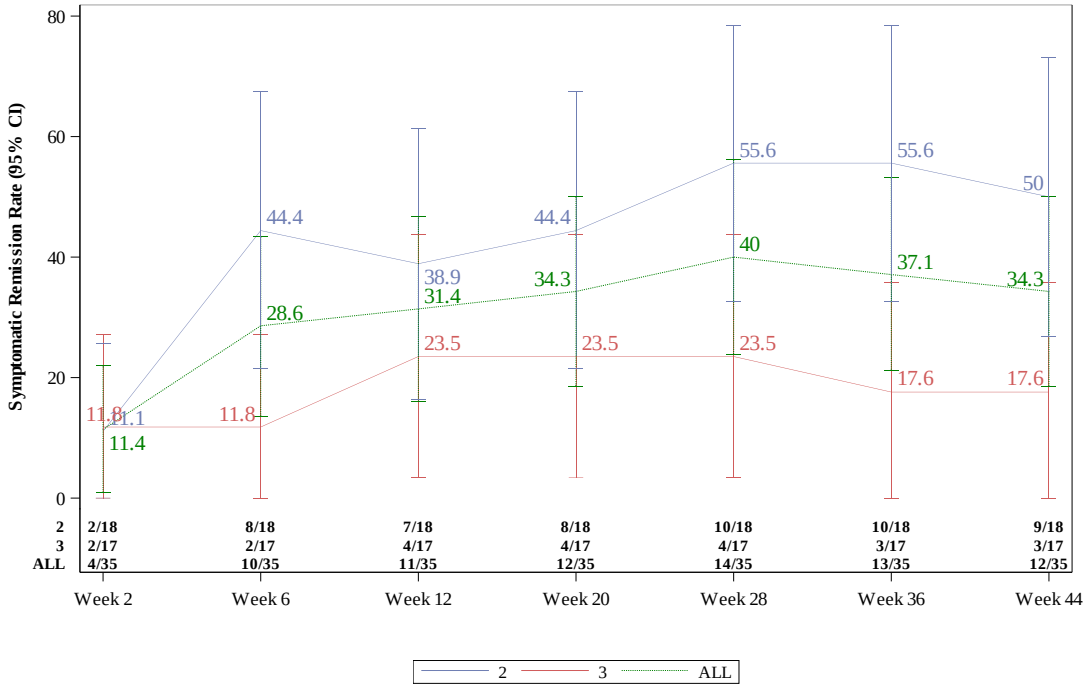
Note: These are ad hoc analyses and are subject to change during the quality control and trial completion processes

Symptomatic Remission By Baseline MES: Week 44

ITT: Denominator includes all enrolled patients (N=35)

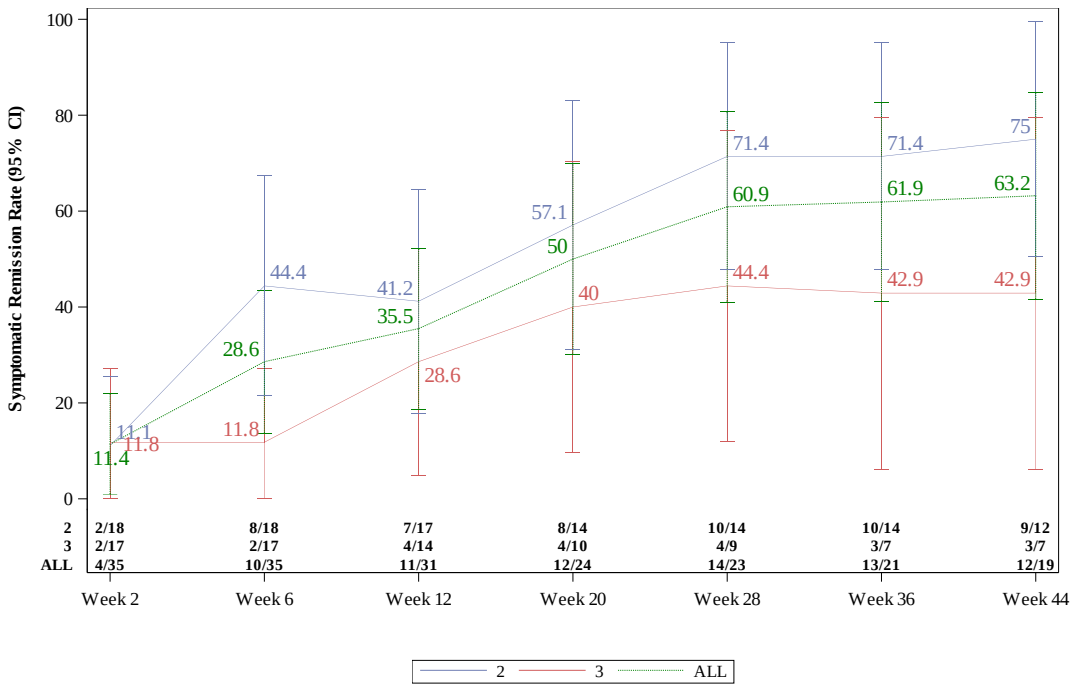
Symptomatic Remission by Baseline Endoscopy Score



Symptomatic remission is defined as an stool frequency subscore=0 (or =1 with a >=1-point decrease from baseline) and rectal bleeding subscore=0

As observed: Denominator includes only patients who completed the visit

Symptomatic Remission by Baseline Endoscopy Score



Symptomatic remission is defined as an stool frequency subscore=0 (or =1 with a >=1-point decrease from baseline) and rectal bleeding subscore=0

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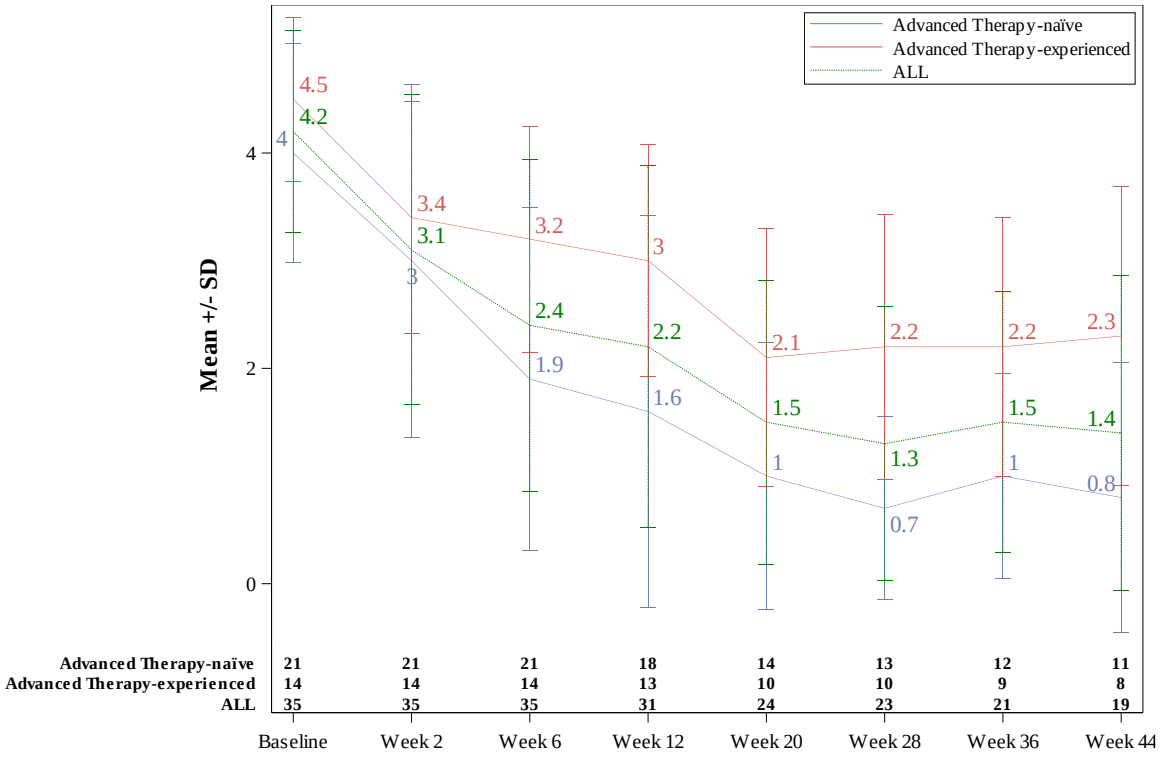
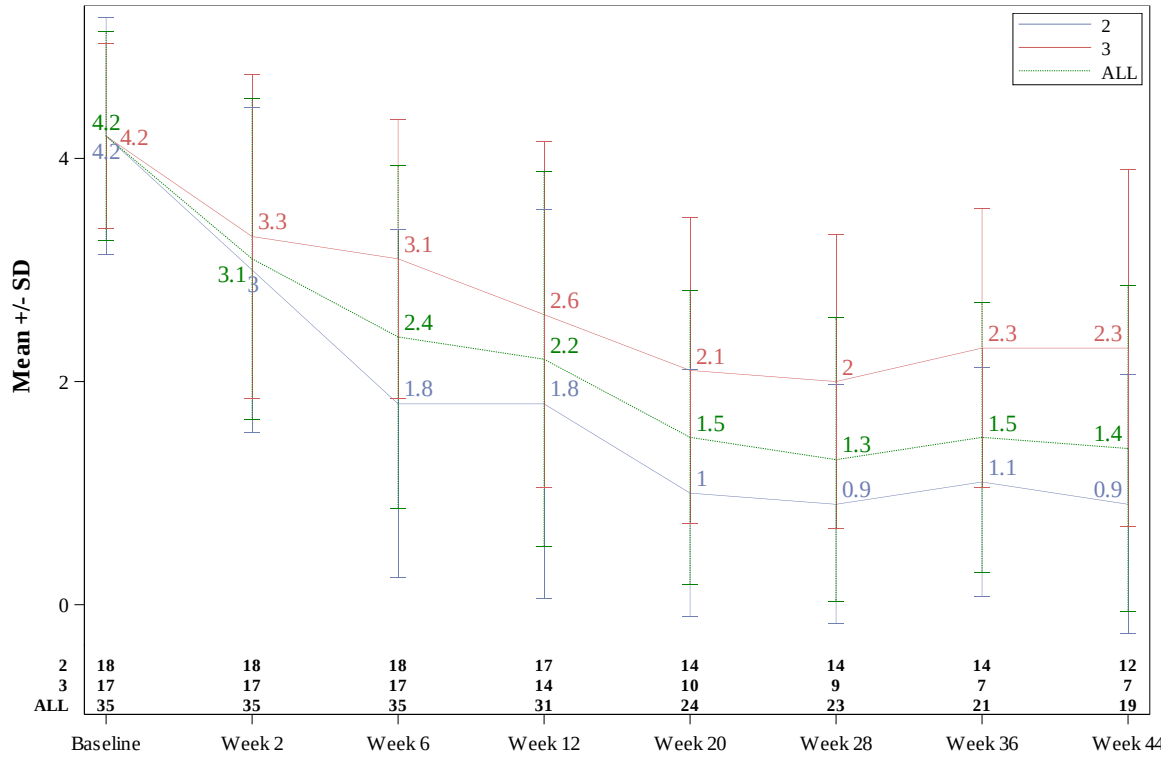
Note: These are ad hoc analyses and are subject to change during the quality control and trial completion processes

PRO2 (SFS+RBS) Scores by Subgroup: Week 44

PRO2 (Sum of Stool Frequency and Rectal Bleeding Scores) by AT-Status



PRO2 (Sum of Stool Frequency and Rectal Bleeding Scores) by Baseline Endoscopy Score



Note: These are ad hoc analyses and are subject to change during the quality control and trial completion processes

Phase 2a Study Designed to Confirm Efficacy Signal: Results Exceeded Expectations

- Primary endpoint achieved, with consistent and expected clinical improvement seen across key measures
- PK in patients consistent with healthy volunteers
- RO and T-cell subsets consistent with healthy volunteers
- Generally well tolerated with no safety signal observed
- Further clinical improvement in patients continuing treatment beyond week 12, especially in refractory patients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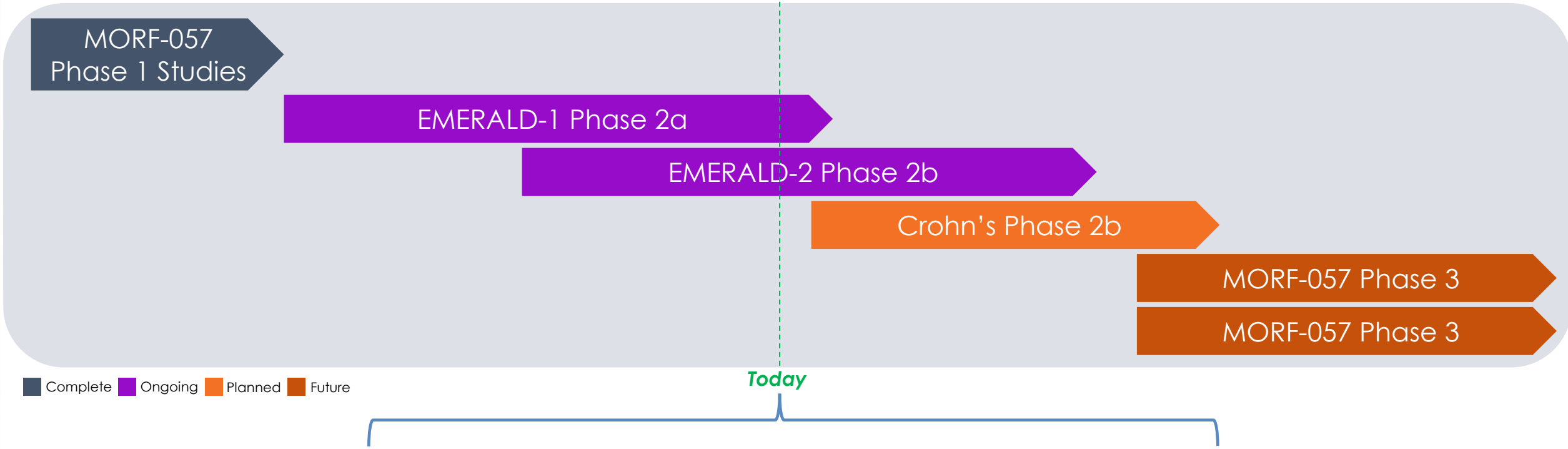
Corporate Update

MORF-057 and Corporate Guidance



MORF-057

- EMERALD-1 maintenance phase continuing on track
- EMERALD-2 enrolling on track
  - 1H25 primary endpoint data
- Phase 2b in Crohn's on track for '24 initiation

Corporate Status

- $725m in cash, cash equivalents and marketable securities as of 09/30/2023
  - Well funded to execute with cash into 2H27
  - Cash and guidance reflect fully burdened operating plan

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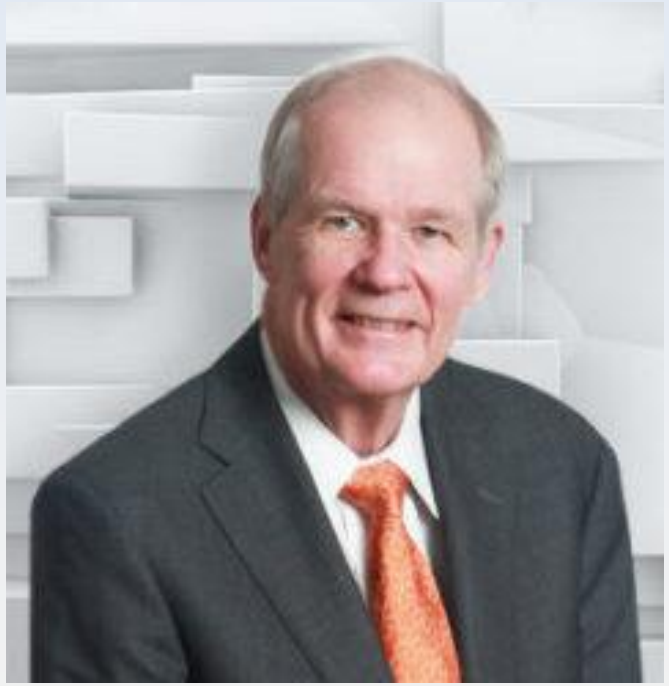
Q&A Participants

Q&A Participants

- Brian G. Feagan, MD
- Brihad Abhyankar, FRCS
- Bruce Rogers, PhD
- Marc Schegerin, MD
- Chris Erdman, MPH

Brian G. Feagan, MD



Dr. Brian Feagan is a gastroenterologist, with training in Clinical Epidemiology and Biostatistics. His research focus is the design, conduct and execution of large-scale randomized controlled trials (RCTs) in Crohn's disease (CD) and ulcerative colitis (UC), and over the past 30 years, has been Principal Investigator in over 140 multi-center RCTs. His research has been devoted to the development, validation and optimization of outcome measures to assess the efficacy of novel therapeutics in CD and UC. Dr. Feagan is Professor of Medicine at the Schulich School of Medicine & Dentistry, a gastroenterologist at London Health Sciences Centre and Senior Scientific Director of Alimentiv Inc.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Thank You