Global Leader in Allogeneic Cellular Medicines for Inflammatory Diseases

Operational Highlights & Financial Results for the Year Ended June 30, 2022

August 2022

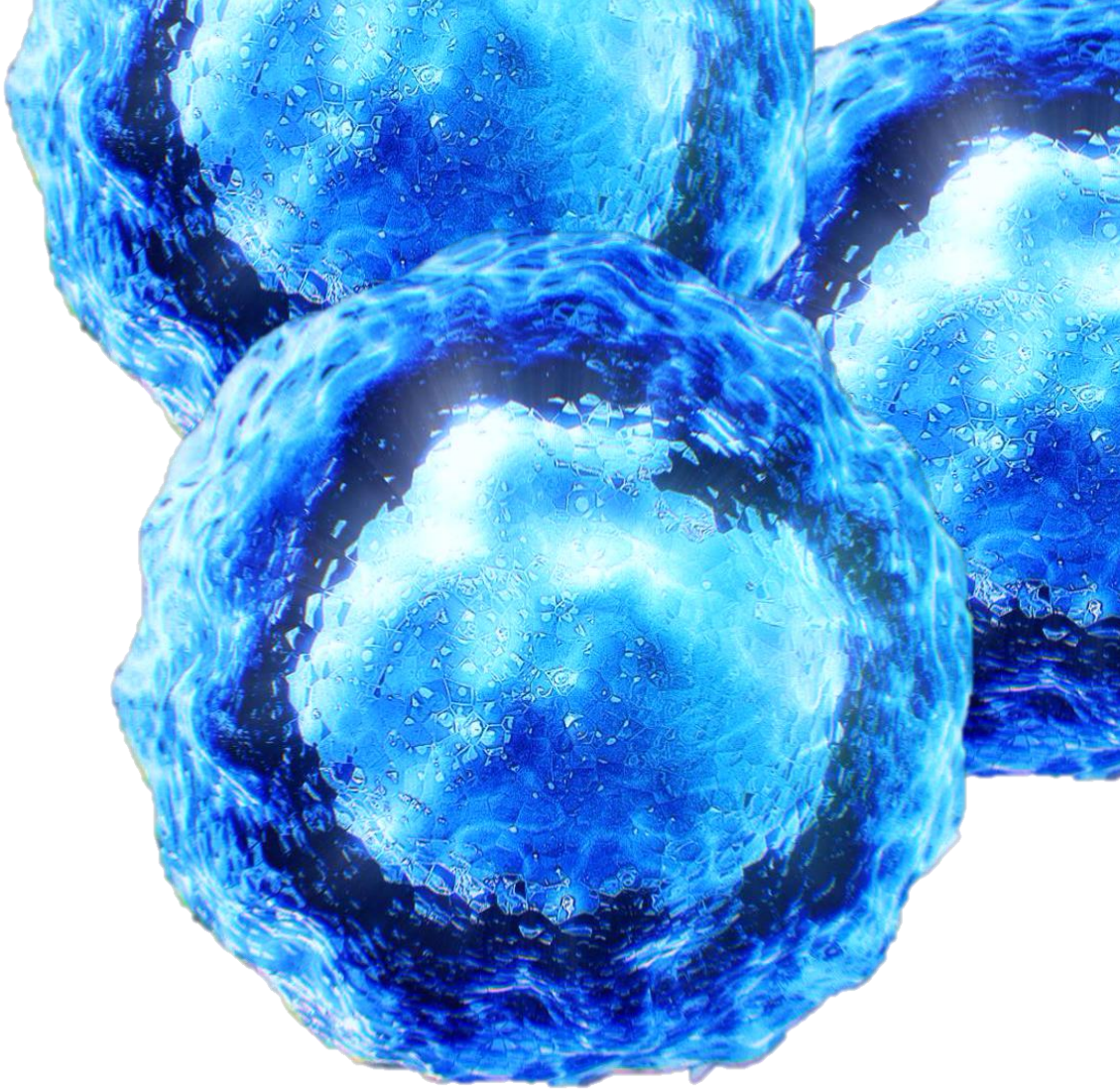
ASX: MSB; Nasdaq: MESO

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

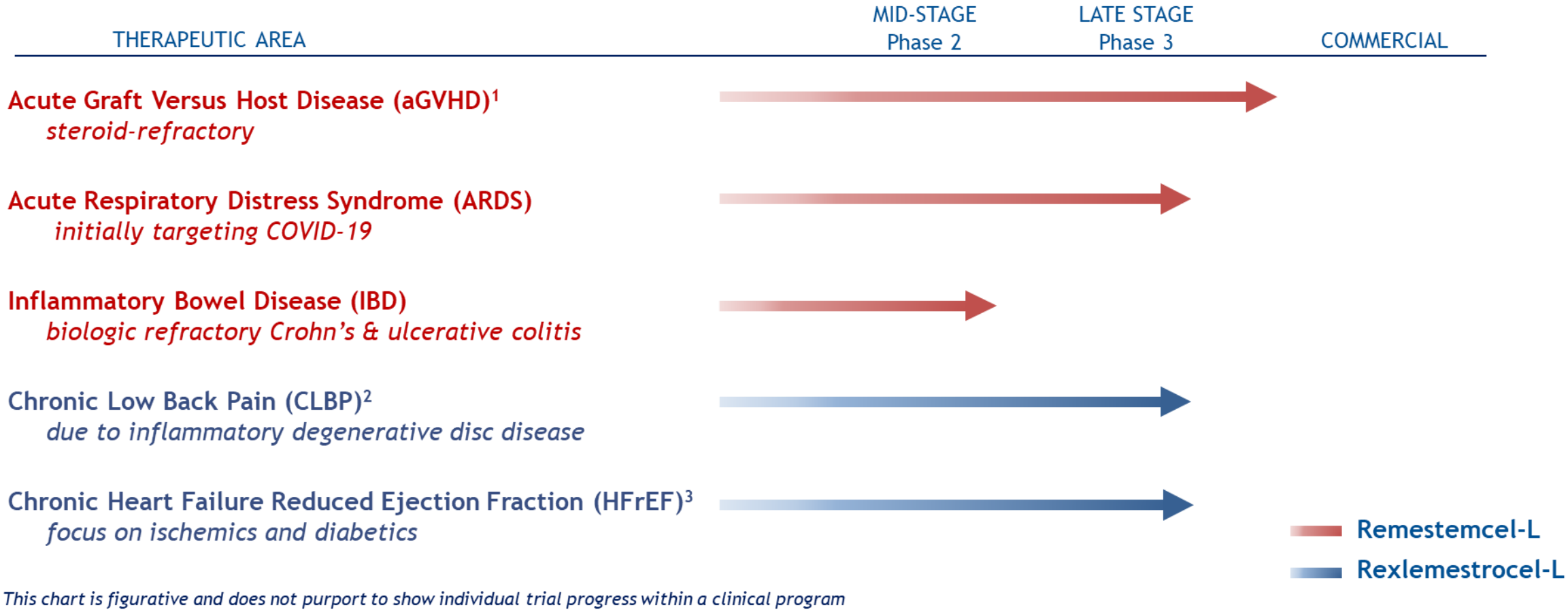
This presentation includes forward-looking statements that relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to differ materially from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. We make such forward- looking statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and other federal securities laws. All statements other than statements of historical facts contained in this presentation are forward-looking statements. Words such as, but not limited to, “believe,” “expect,” “anticipate,” “estimate,” “intend,” “plan,” “targets,” “likely,” “will,” “would,” “could,” and similar expressions or phrases identify forward-looking statements. We have based these forward-looking statements largely on our current expectations and future events , recent changes in regulatory laws, and financial trends that we believe may affect our financial condition, results of operation, business strategy and financial needs. These statements may relate to, but are not limited to: expectations regarding the safety or efficacy of, or potential applications for, Mesoblast's adult stem cell technologies; expectations regarding the strength of Mesoblast's intellectual property, the timeline for Mesoblast's regulatory approval process, and the scalability and efficiency of manufacturing processes; expectations about Mesoblast's ability to grow its business and statements regarding its relationships with current and potential future business partners and future benefits of those relationships; statements concerning Mesoblast's share price or potential market capitalization; and statements concerning Mesoblast's capital requirements and ability to raise future capital, among others. Forward-looking statements should not be read as a guarantee of future performance or results, and actual results may differ from the results anticipated in these forward-looking statements, and the differences may be material and adverse. You should read this presentation together with our financial statements and the notes related thereto, as well as the risk factors, in our most recently filed reports with the SEC or on our website. Uncertainties and risks that may cause Mesoblast's actual results, performance or achievements to be materially different from those which may be expressed or implied by such statements, include, without limitation: risks inherent in the development and commercialization of potential products; uncertainty of clinical trial results or regulatory approvals or clearances; government regulation; the need for future capital; dependence upon collaborators; and protection of our intellectual property rights, among others. Accordingly, you should not place undue reliance on these forward-looking statements. We do not undertake any obligations to publicly update or revise any forward-looking statements, whether as a result of new information, future developments or otherwise.

Our Mission

Mesoblast is committed to bringing to market innovative cellular medicines to treat serious and life-threatening illnesses



Late-Stage Clinical Pipeline



This chart is figurative and does not purport to show individual trial progress within a clinical program

1. JCR Pharmaceuticals Co., Ltd. (JCR), has the right to develop mesenchymal stromal cells (MSCs) in certain fields for the Japanese market, including for the treatment of hematological malignancies, such as Graft vs Host Disease, and for hypoxic ischemic encephalopathy (HIE). Mesoblast has the right to use safety and efficacy data generated by JCR to support its development and commercialization plans for remestemcel-L in the US and other major healthcare markets, including for GVHD and HIE
2. Grünenthal has exclusive commercial rights to rexlemestrocel-L for chronic low back pain in Europe and Latin America/Caribbean
3. Tasly Pharmaceuticals has exclusive commercial rights to rexlemestrocel-L for the treatment or prevention of chronic heart failure in China

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Near Term Milestones

Remestemcel-L

- BLA resubmission for remestemcel-L in children with SR-aGVHD expected to be filed this quarter, with potential US approval Q1 CY2023
- Mesoblast and Vanderbilt University Medical Center, which coordinates a clinical trial network at over 40 sites across the US focused on ARDS, to jointly develop a trial protocol to confirm the previously observed reduction in mortality in COVID-19 ARDS patients under age 65.

Rexlemestrocel-L

- Plan to meet with FDA next quarter under existing regenerative medicine advanced therapy (RMAT) designation to discuss common mechanism of action in HFrEF including those with LVADs, and potential pathway to marketing approval
- FDA clearance by year end 2022 to commence a pivotal study for potential marketing approval of rexlemestrocel-L in chronic lower back pain due to degenerative disc disease

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Manufacturing Remestemcel-L

Financial Results

for the Period Ended June 30, 2022

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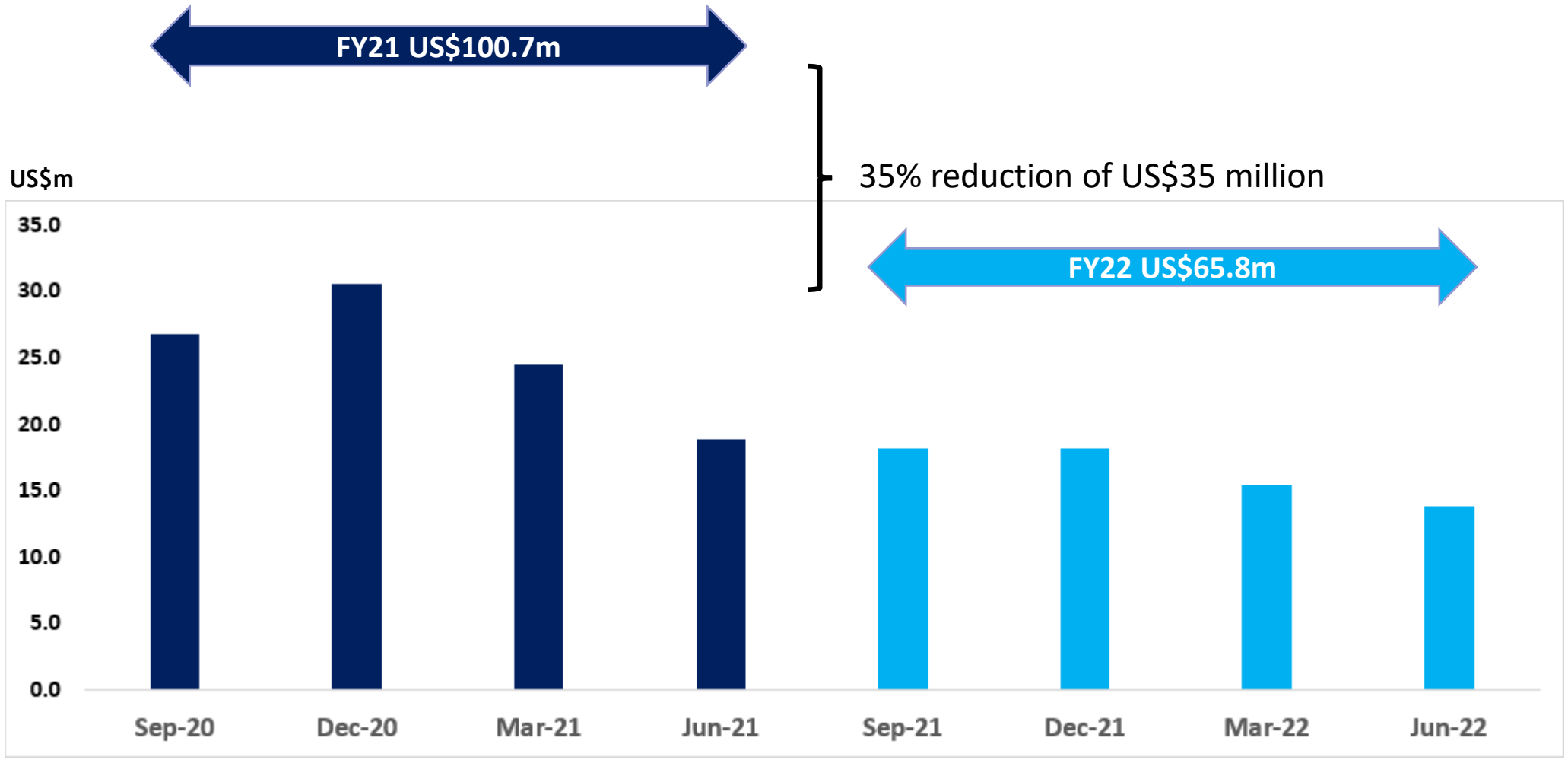
Financial Highlights

- Total Revenue from royalties and milestones increased 37% to US$10.2 million for FY2022 compared to US$7.5 million for FY2021
- Royalties from sales of TEMCELL® HS Inj.[1] sold in Japan by our licensee in FY2022, were US$8.7 million and US$9.8 million on a constant currency[2] basis, an increase of 21% and 36% respectively versus FY2021, predominantly due to increased volume of product sold
- At June 30, 2022, cash-on-hand was US$60.4 million with pro-forma US$105.5 million after raising gross proceeds of US$45 million via a private placement in August 2022
- Up to an additional US$40 million available from existing facilities subject to certain milestones
- For the year ended June 30, 2022, net cash usage reported for operating activities was US$65.8 million, a reduction of 35% relative to the comparative period last year, with continued focus on cost control

Quarterly Net Operating Cash Burn has been significantly reduced



- Quarterly net operating cash burn has been reduced over the last 6 quarters.

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Reduction in R&D Spend; Steady Investment in Manufacturing

P&L for the 12 months ended (US$m)	Jun 30, 2022	Jun 30, 2021
Total Revenue	**10.2**	**7.5**
Research and development	(32.8)	(53.0)
Manufacturing	(30.8)	(32.7)
Management & administration	(27.2)	(30.9)
Revaluation of contingent consideration	0.9	18.7
Revaluation of warrant liability	5.9	-
Other operating income & expenses	(0.5)	1.5
Finance costs	(17.3)	(10.7)
Loss before tax	**(91.6)**	**(99.6)**
Income tax benefit	0.2	0.8
Loss after tax	**(91.4)**	**(98.8)**

- **Decreased R&D Spend:**
  38% reduction ($20.2m) predominantly due to reduced spend on clinical trial activities.

- **Steady Investment in Manufacturing:**
  Continued build of pre-launch inventory of remestemcel-L to support the launch of SR-aGVHD.

  On FDA approval, remestemcel-L inventory will be recognized on the balance sheet, currently at US$28.9 million.

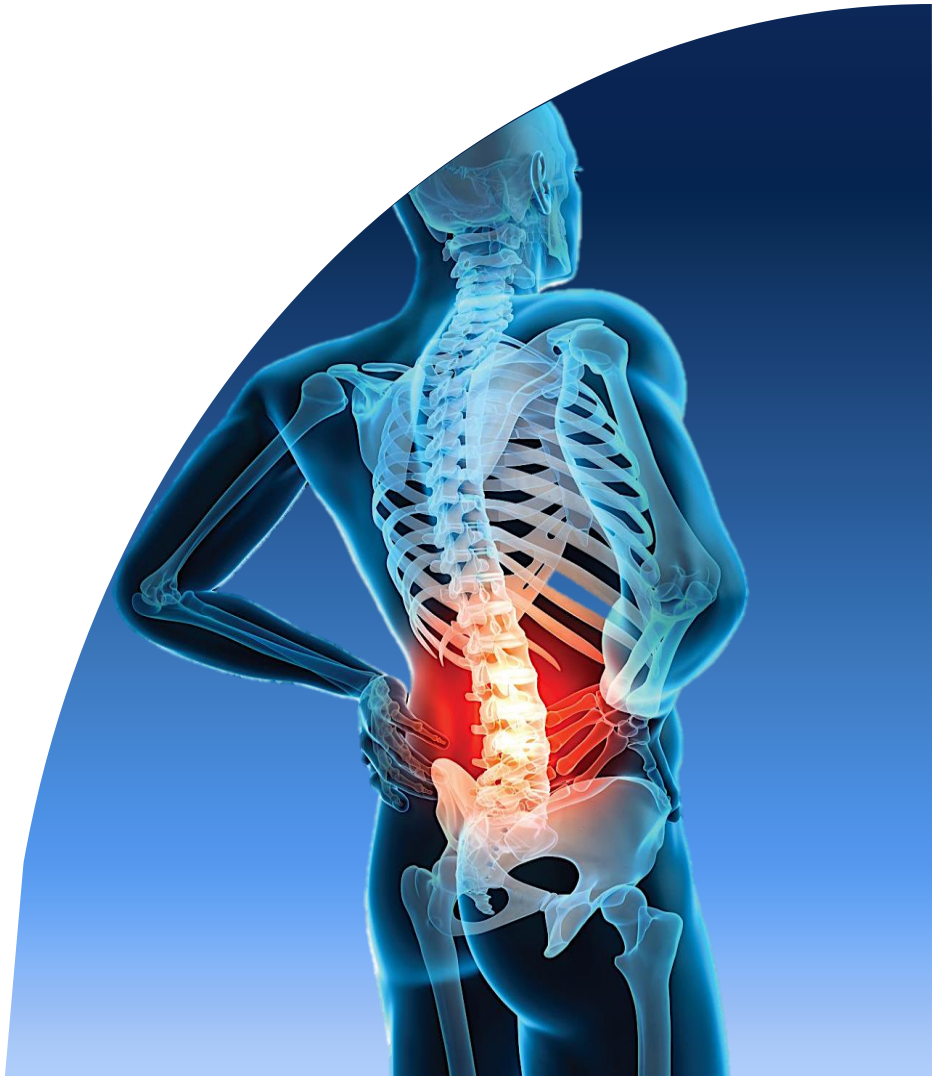
- **Finance Costs** included actual cash interest paid of US$6.1 million for FY2022, compared to US$5.9 million for FY2021.

  The increase in reported Finance Costs was primarily due to the recognition of a non-cash gain on revaluation of our borrowings in the comparative year due to a reduction in expected value of future repayments.

Figures have been rounded.

Clinical Pipeline

Current Status and Anticipated Milestones



Remestemcel-L: Steroid-Refractory Acute Graft Versus Host Disease

Significant Unmet Need with High Mortality

Treatment Options

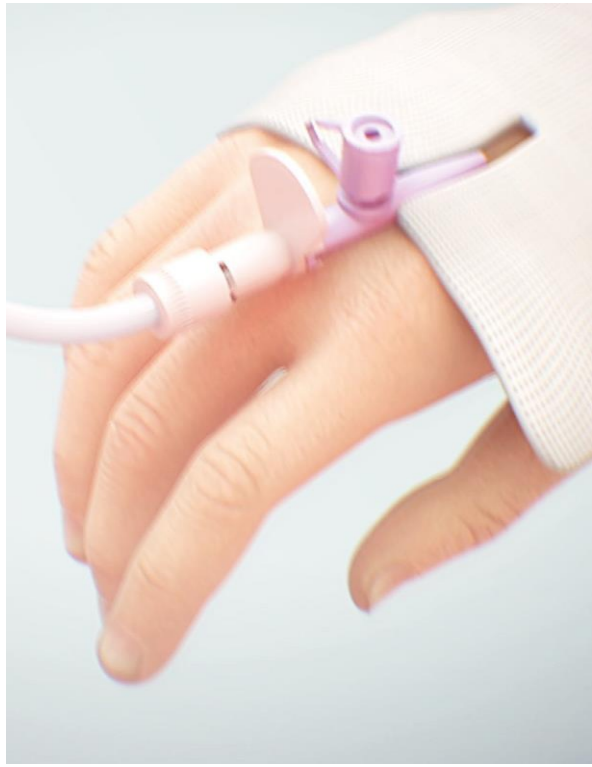
- Corticosteroids are first-line therapy for aGVHD
- There is only one approved treatment for disease refractory to steroids and no approved treatment in the US for children under 12 years old
- In Japan, Mesoblast's licensee has received the only product approval for SR-aGVHD in both children and adults

Burden of Illness

- Acute GVHD is a life-threatening complication that occurs in ~50% of patients receiving allogeneic bone marrow transplants (BMTs)[1]
- Acute GVHD primarily affects skin, GI tract, and liver
- Steroid-refractory aGVHD is associated with mortality rates as high as 90%[1,5] and significant extended hospital stay costs[2]

Market Opportunity

- More than 30,000 allogeneic BMTs performed globally (>20K US/EU) annually, ~20% pediatric[3,4]
- Approx. 1,500 allogeneic BMTs in children and adolescents in US[4]



1. Westin, J., Saliba, RM., Lima, M. (2011) Steroid-refractory acute GVHD: predictors and outcomes. Advances in Hematology. 2. Anthem-HealthCore/Mesoblast claims analysis (2016). Data on file 3. Niederwieser D, Baldomero H, Szer J. (2016) Hematopoietic stem cell transplantation activity worldwide in 2012 and a SWOT analysis of the Worldwide Network for Blood and Marrow Transplantation Group including the global survey. 4. HRSA Transplant Activity Report, CIBMTR, 2019 5. Axt L, Naumann A, Toennies J (2019) Retrospective single center analysis of outcome, risk factors and therapy in steroid refractory graft-versus-host disease after allogeneic hematopoietic cell transplantion. Bone Marrow Transplantation.

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Remestemcel-L for Steroid-Refractory Graft Versus Host Disease

Consistent Efficacy and Safety Outcomes in a Total of 309 Children from Three Studies

- Remestemcel-L was used as first-line therapy in a randomized controlled Phase 3 trial of 260 patients, with SR-aGVHD, including 27 children
- Remestemcel-L was used as salvage therapy in an expanded access program in 241 children with SR-aGVHD, 80% of whom had Grade C/D disease, and failed institutional standard of care
- Remestemcel-L was used as first-line therapy in Mesoblast's open-label Phase 3 trial in 54 children with SR-aGVHD, 89% of whom had Grade C/D disease

		Protocol 280 (pediatric)		EAP 275	Study 001
	MAGIC[1] N=30[2]	Placebo N=13	Remestemcel-L N=14	Remestemcel-L N=241	Remestemcel-L N=54[3]
Day 28 Overall Response	43%	38%	64%	65%	69%
Day 100 Survival	57%	54%	79%	66%	74%

1. Mount Sinai Acute GVHD International Consortium (MAGIC) - a group of ten BMT centers throughout the US and Europe whose purpose is to conduct ground-breaking clinical trials in GVHD, including developing informative biorepositories that assist in developing treatments that can guide GVHD therapy; 2. Two subjects in the MAGIC cohort had follow-up <100 days; these subjects are excluded from the respective survival analyses; 3.GVHD001 had 55 randomized patients, however one patient dropped out before receiving any dose of remestemcel-L

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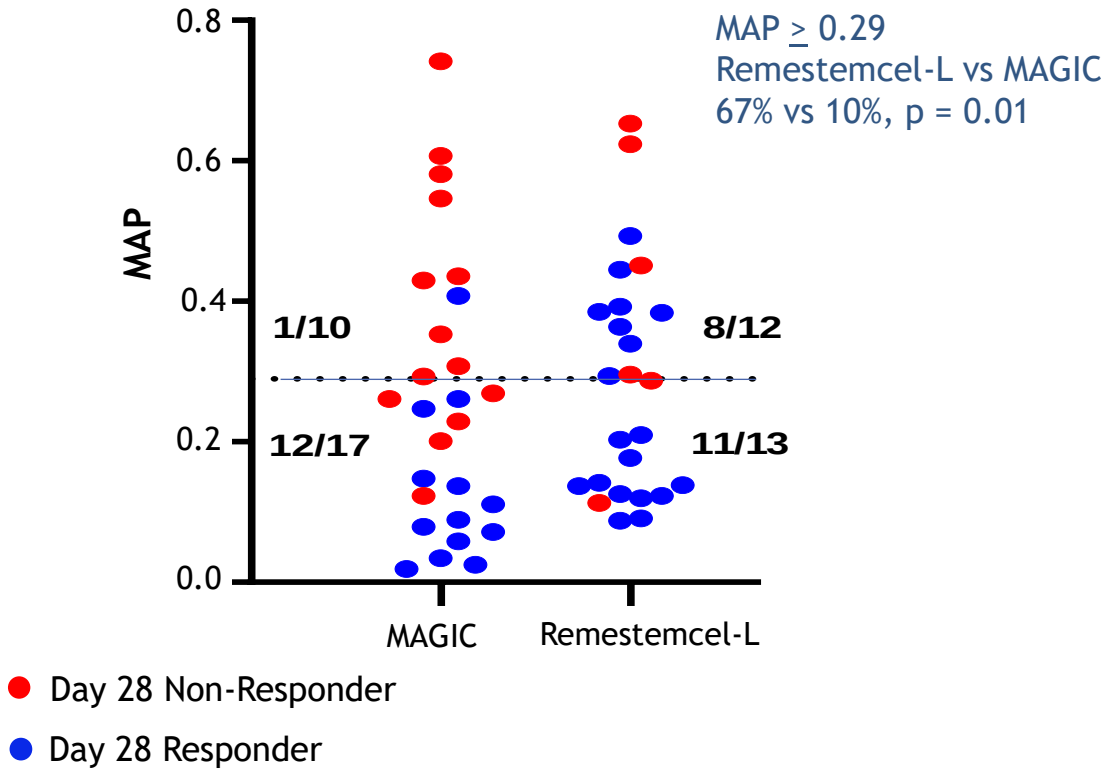
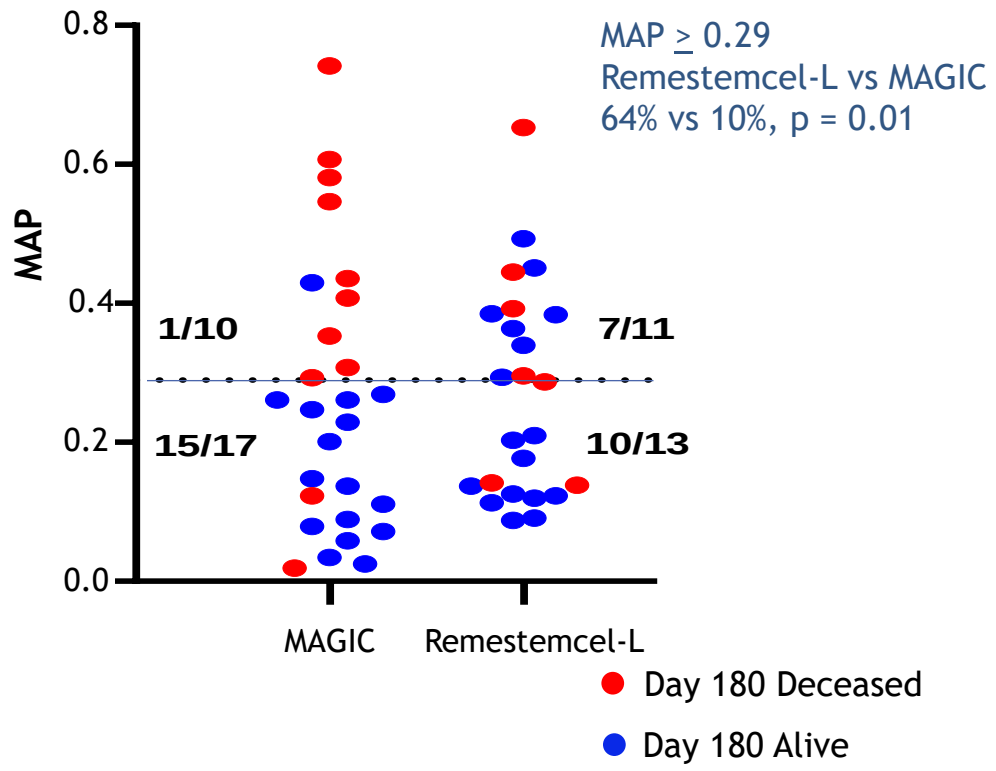
Remestemcel-L for Steroid-Refractory Graft Versus Host Disease

Significantly Greater Day 28 Overall Responses and Day 180 Survival in Steroid-Refractory Patients with Baseline MAP ≥ 0.29

Response by Baseline MAP



Survival by Baseline MAP



Kasikis S et al. Bone Marrow Transplantation 2021; 56:2869-2870.

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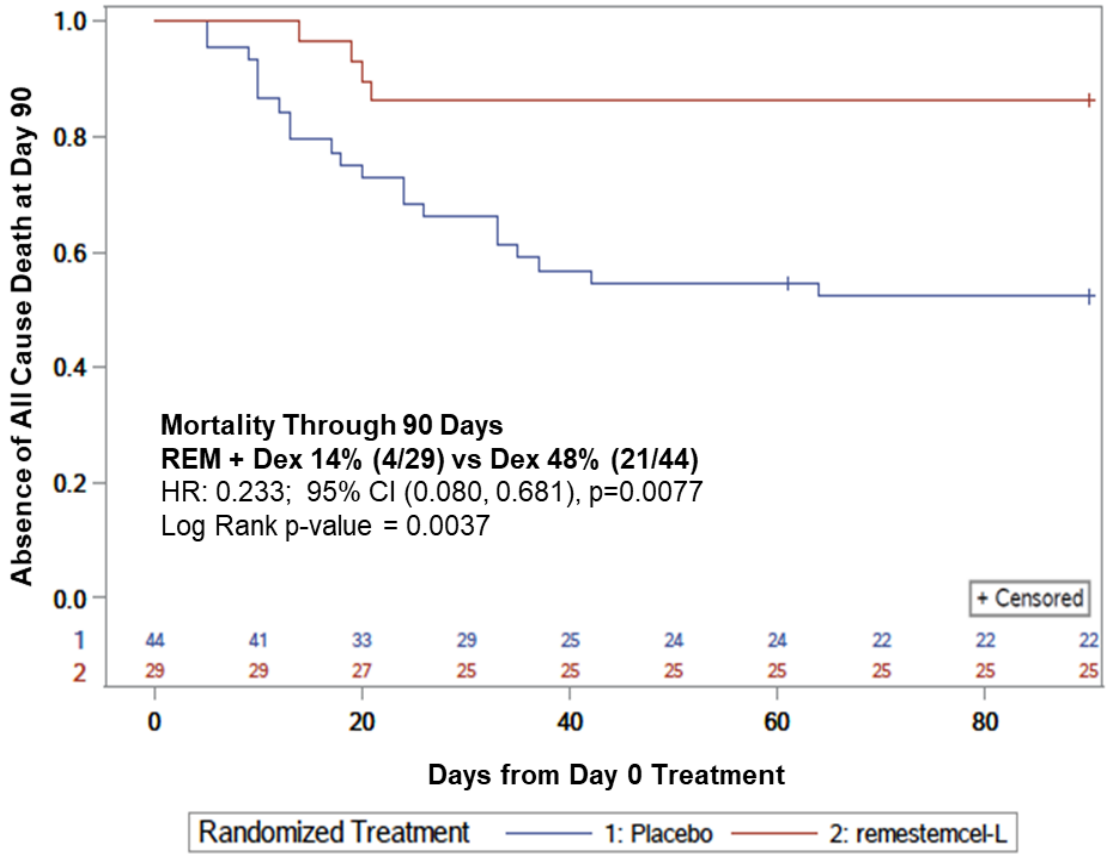
Remestemcel-L: Plan for BLA Resubmission for Steroid-Refractory Graft Versus Host Disease

- In response to FDA guidance, Mesoblast has optimized a potency assay that was in place at the time of the 54-patient Phase 3 trial in children with SR-aGVHD
- Mesoblast believes that the proposed potency assay measuring remestemcel-L's in vitro anti-inflammatory and immunomodulatory activity helps establish a clear understanding of remestemcel-L's mechanism of action in SR-aGVHD
- The potency assay from the Phase 3 trial demonstrates a relationship between the product's activity in vitro and its effects on survival in the Phase 3 trial, with the strongest correlation to survival in those patients at highest mortality risk as measured by clinical severity or high biomarker levels of inflammation
- Additionally, Mesoblast has now generated data from the expanded access program (EAP 275) of 241 children which confirm the ability of the in-vitro potency assay to measure product activity relevant to survival outcomes
- In preparation for the expected FDA review, during the last quarter Mesoblast completed a mock pre-approval inspection of its GMP manufacturing facility and process comprising both on-site and virtual inspections by external auditors
- Mesoblast will provide these new data to FDA and address all chemistry, manufacturing and controls (CMC) outstanding items as required for the planned BLA resubmission in the current quarter. If the resubmission is accepted, CBER will consider the adequacy of the clinical data in the context of the related CMC issues

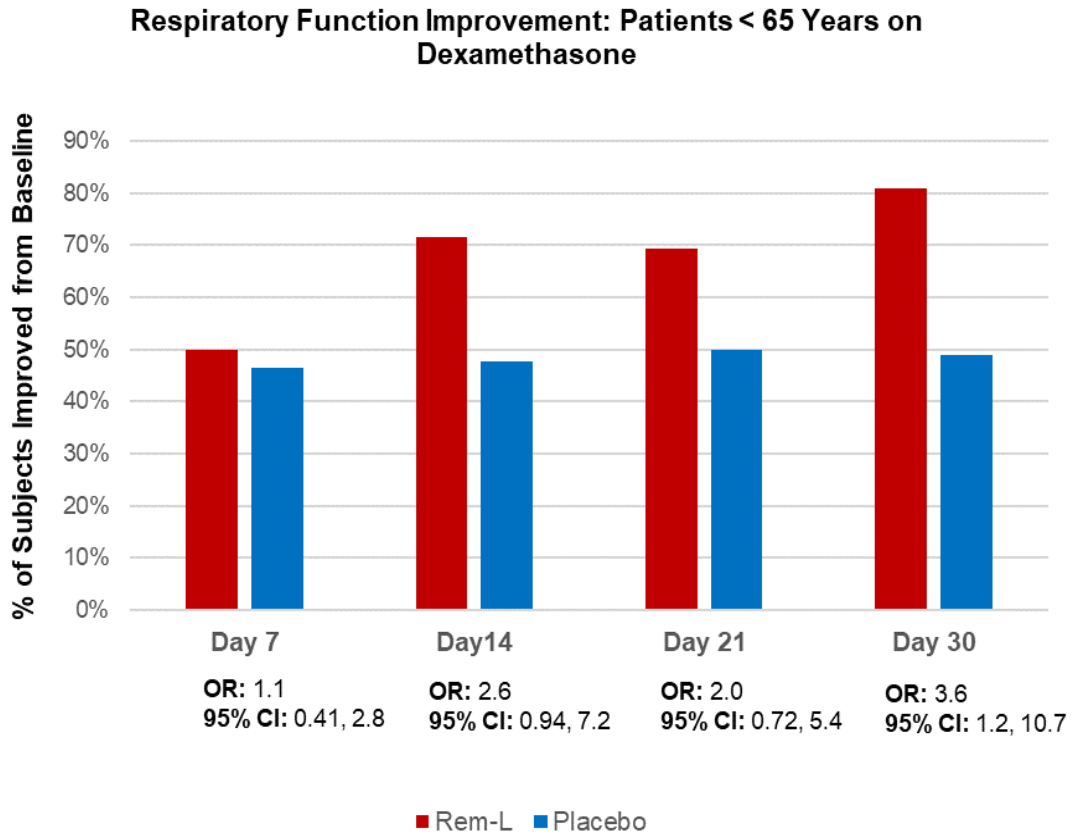
Remestemcel-L for Acute Respiratory Distress Syndrome (ARDS) due to COVID-19

Remestemcel-L Plus Dexamethasone Shows Synergy in Mortality Reduction and Improvement in ARDS Severity* in Exploratory Population < 65 years old

Treated Patients (mITT) < 65 years old on Dexamethasone (n=73) through 90-Days



Treated Patients (mITT) < 65 years old on Dexamethasone (n=73)



* Measured as resolution and/or improvement of ARDS as defined by the Berlin criteria at Days 7, 14, 21, and 30 post-randomizations

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Remestemcel-L: Regulatory Pathway to Potential EUA for COVID-19 ARDS

- Acute respiratory distress syndrome (ARDS) remains a major cause of mortality for COVID-19 patients who are immunocompromised, unvaccinated, or with comorbidities, as well as those with seasonal influenza and other pathogens
- FDA has advised Mesoblast that an additional clinical study in acute respiratory distress syndrome (ARDS) due to COVID19, if statistically positive, could provide sufficient evidence to support an emergency use authorization (EUA)
- Mesoblast has entered into a non-binding Memorandum of Understanding (MOU) with Vanderbilt University Medical Center, which coordinates and works closely with clinical investigators at over 40 sites across the United States focused on studying ARDS and other critical illnesses
- The MOU proposes a collaboration toward the design and execution of a second COVID-19 trial for remestemcel-L; to jointly develop a trial protocol; and seek FDA approval for the trial

Rexlemestrocel-L – Opportunity in Chronic Low Back Pain

A New Paradigm for Treatment of Chronic Low Back Pain due to Degenerative Disc Disease

Burden of Illness

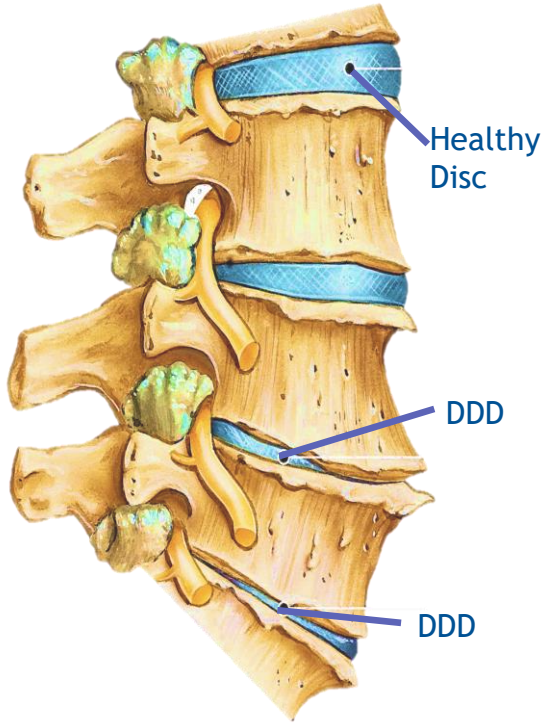
- Back pain causes more disability than any other condition[1]
- Inflicts substantial direct and indirect costs on the healthcare system,[1] including excessive use of opioids in this patient population

Treatment Options

- Minimal treatment options for patients with chronic low back pain (CLBP) who fail conservative therapy include opioids and surgery
- 50% of opioid prescriptions are for CLBP[3]
- Durable improvement in pain has potential to reduce opioid use and prevent surgical intervention

Market Opportunity

- Over 7m patients are estimated to suffer from CLBP due to degenerative disc disease (DDD) in each of the U.S. and E.U.5 [3,4,5]



1. Williams, J., NG, Nawi, Pelzter, K. (2015) Risk factors and disability associated with low back pain in older adults in low-and middle-income countries. Results from the WHO Study on global ageing and adult health (SAGE). PloS One. 2015; 10(6): e0127880., 2. Simon, J., McAuliffe, M., Shamim, F. (2015) Discogenic Low Back Pain. Phys Med Rehabil Clin N Am 25 (2014) 305–317., 3.Decision Resources: Chronic Pain December 2015., 4. LEK & NCI opinion leader interviews, and secondary analysis., 5. Navigant: Commercial Assessment for a Proprietary Cell-Based Therapy for DDD in the U.S. and the EU3 – August 2014., 6. HealthCare Utilization and Cost of Discogenic Lower Back Pain in the US – Anthem/HealthCore.

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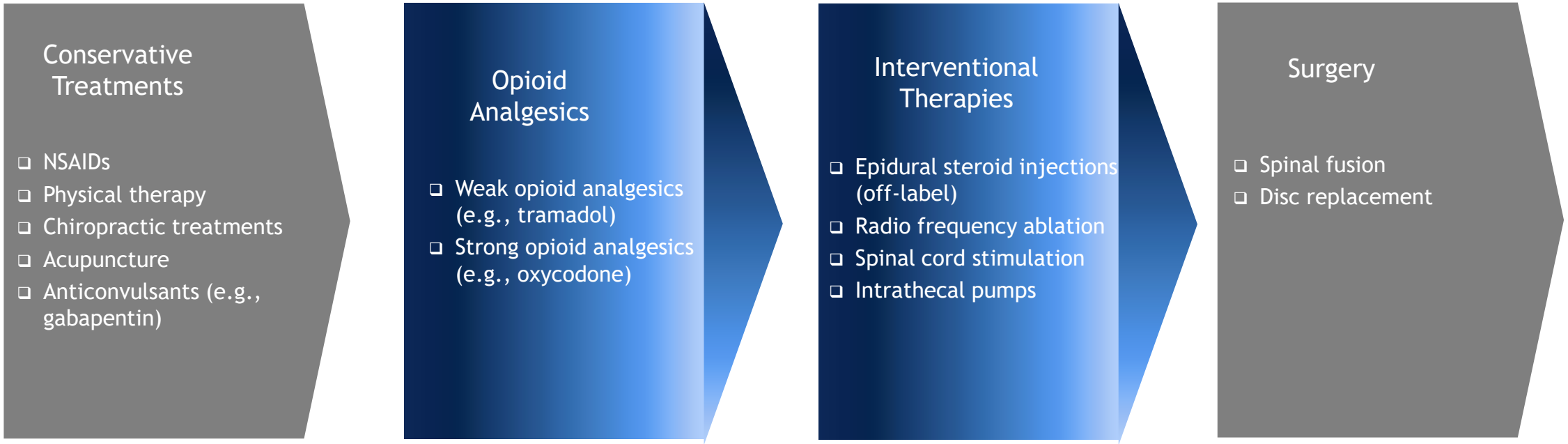
The Patient Treatment Journey

Rexlemestrocel-L Potential for First-Line CLBP associated with DDD, Refractory to Conservative Treatment

Rexlemestrocel-L targeting moderate-to-severe DCLBP



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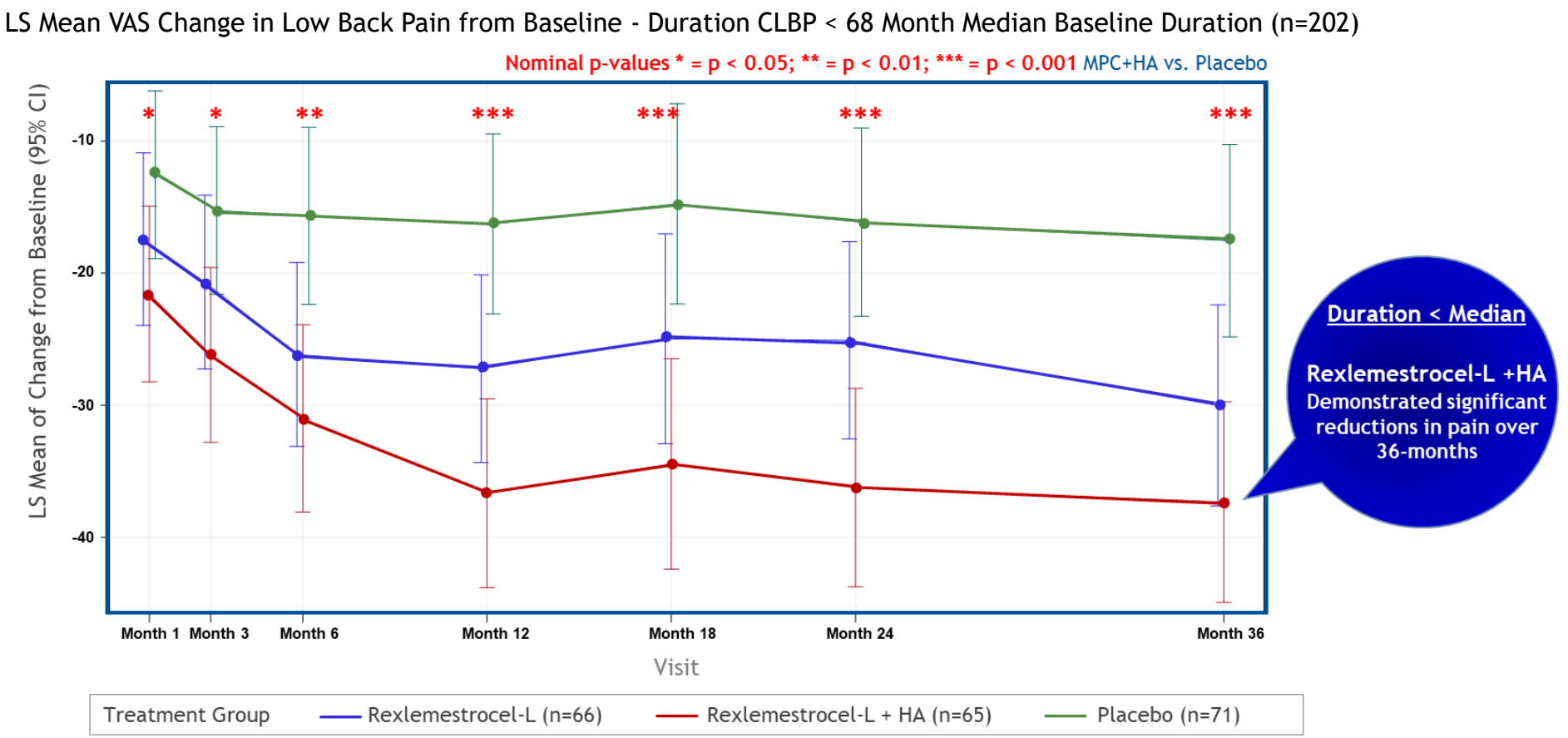
Phase 3 Trial Outcomes – Rexlemestrocel-L for Chronic Low Back Pain

Single Injection of Rexlemestrocel-L + HA Results in >Three Years of Pain Reduction

Greatest pain reduction was observed in the pre-specified population of subjects with CLBP duration shorter than the baseline study median of 68 months (n=202) with significantly greater reduction (nominal p-value < 0.05) at all time points analyzed over 36 months compared with saline controls



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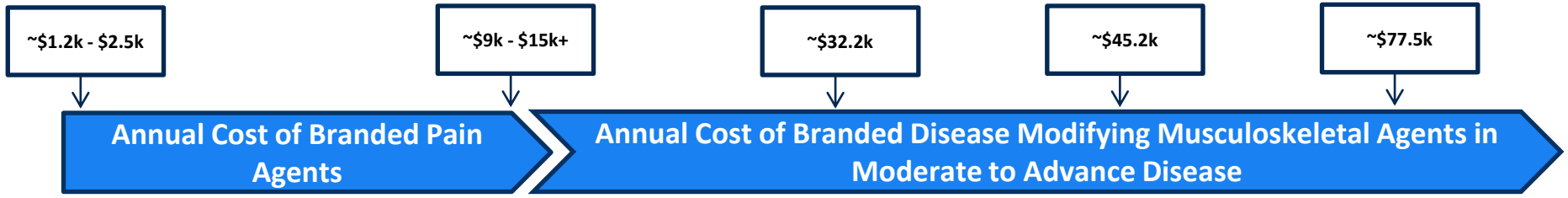
Market Access & Pricing Insights: Pricing will be Driven by Overall Value Offering; US Reference Pricing Suggests Higher Price Points for Disease Modifying Agents



- **Vivlodex® (meloxicam): $10.3k**
  - Osteoarthritis
- **Abuse-Deterrent Opioids**
  - OxyContin®: $1.2k - $6.8k+
  - Embeda®: $2.2k - $8.9k+
  - Xtampza ER®: $2.4k - $15.5k+
  - Hysingla ER®: $2.8k - $15.5k+

- **Teriparatide (Biosimilar to Forteo®)**
  Osteoporosis: ↓ incidence of hip fraction, ↑ bone mass

- **MACI® (autologous cultured chondrocytes on porcine collagen membrane)**
  - Indicated for the repair of symptomatic, single or multiple full-thickness cartilage defects of the knee with or without bone involvement in adults

- **Humira® (adalimumab)**
  Rheumatoid Arthritis: reduce signs and symptoms, improve physical function, inhibit the progression of structural damage

*Wholesale Acquisition Cost (WAC): Redbook 03/30/2021

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Rexlemestrocel-L – Preparing for Next Phase 3 Trial in Chronic Low Back Pain

- FDA Office of Tissues and Advanced Therapies (OTAT) agreed with Mesoblast's proposal for mean pain reduction at 12 months to serve as the primary endpoint of the next trial, with mean functional improvement and reduction in opioid use as secondary endpoints
- A key objective is to demonstrate durable reduction in pain and position rexlemestrocel-L as a potential opioid-sparing agent
- The planned upcoming US trial will include at least 20% of subjects from the EU to support submissions to both FDA and EMA
- Active discussions ongoing with key investigators and advisors on final protocol design

Rexlemestrocel-L – Chronic Heart Failure

Rising Incidence & High Mortality

- Cardiovascular disease (CVD) remains the leading cause of death in the United States[1]
- Heart failure affects 6.5 million patients in the US and 26 million patients globally. As populations age, the prevalence is increasing[2]
- Chronic heart failure is a progressive disease with a high mortality that approaches 50% at 5 years[2,3] and at least 75% after an initial hospitalization[4]
- Patients with heart failure are also at high risk of recurrent major adverse cardiac events involving large vessels (heart attacks / strokes)

New therapies for chronic heart failure reduce recurrent hospitalizations due to cardiac decompensation, however they do not materially improve cardiac mortality or major ischemic events (heart attacks/strokes)

1. Muntner BEJ, et al. Heart Disease and Stroke Statistics-2019 Update: A Report From the American Heart Association. Circulation. Feb 19, 2019. 2. United States Food & Drug Administration. Treatment for Heart Failure: Endpoints for Drug Development. Draft Guidance. June 2019. 3. Taylor CJ, et al. Trends in survival after a diagnosis of heart failure in the United Kingdom 2000-2017: population based cohort study. BMJ. 2019;364:I223. 4. Shah KS, et al. Heart Failure with Preserve, Borderline, and Reduced Ejection Fraction; 5-Year Outcomes. JACC. 2017;Nov12.

The Patient Treatment Journey

Rexlemestrocel-L for Chronic Heart Failure

Treatment Algorithm in Progressive Heart Failure

Progressive Vascular (Endothelial) Dysfunction and Heart Failure

Early

- ACEI or ARB
- Statins
- Beta blockers
- Re-vascularization or valvular surgery

Mesoblast Target Market
Chronic Heart Failure[1]

↑ Left Ventricular Systolic Function

↓ Cardiac Death / Heart Attack / Stroke

Class I | **Class II** | **Class III** | **Class IV**

Pharmacological Add-on

- Diuretics for fluid retention
- Aldosterone antagonists
- Hydralazine / isosorbide dinitrate
- Digitalis

New Oral Therapies for Class II

↓ Decompensated Hospitalization Events

- sacubitril / valsartan
- SGLT2 inhibitors

LVAD (Left Ventricular Assist Device) for Class IV

1. GlobalData-PharmaPoint Heart Failure (2016); McMurray et al., 2012;Yancy et al., 2013, 2016 ACC/AHAHFSA Focused Update on New Pharmacological Therapy for Heart Failure: An Update of the 2013 ACCF/AHA Guideline for the Management of Heart Failure.

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Rexlemestrocel-L: Phase 3 Trial in Heart Failure with Reduced Ejection Fraction (HFrEF)

Rexlemestrocel-L Improved Left Ventricular Systolic Function, as Measured by Left Ventricular Ejection Fraction (LVEF) at 12 Months: Potential Early Surrogate Endpoint

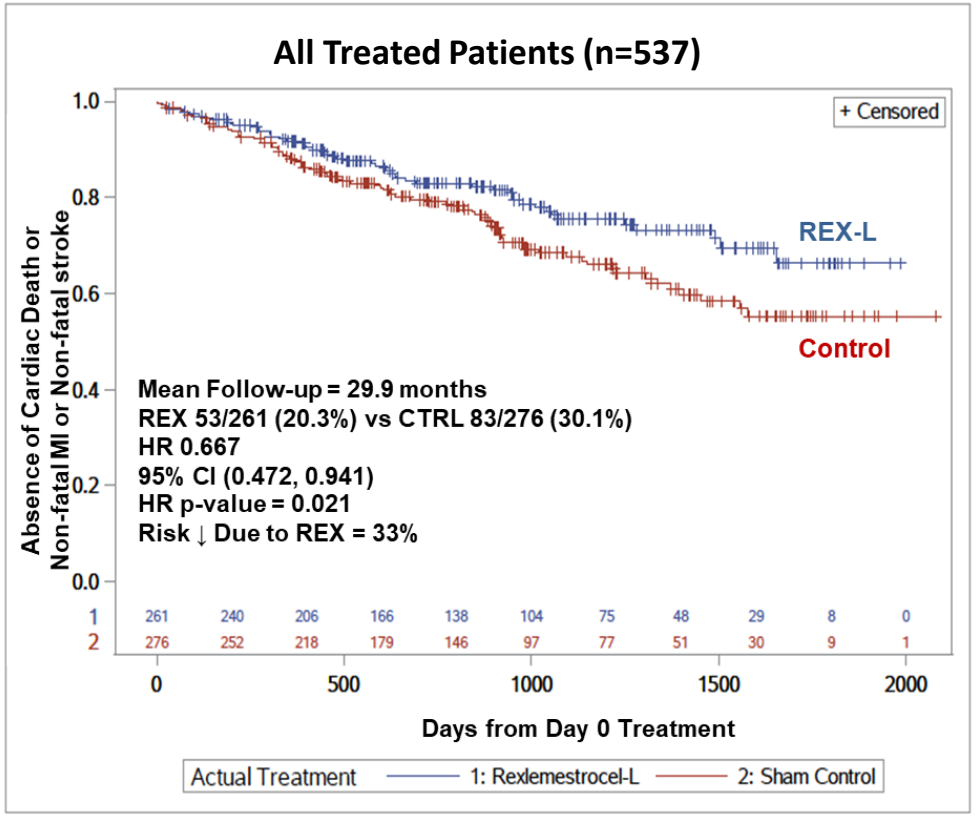
- In all treated patients (n=537) rexlemestrocel-L resulted in 52% greater increase in LVEF from baseline to 12 months compared with controls
- While both groups had similar LVEF at baseline (28.7% and 28.6%), at 12 months least squared mean change from baseline was 5.0 for the rexlemestrocel-L group and 3.3 for controls (p=0.021)
- In treated patients with CRP >2 (n=301) rexlemestrocel-L resulted in 86% greater increase in LVEF from baseline to 12 months compared with controls
- While both groups had similar LVEF at baseline (29.1% and 28.2%), at 12 months least squared mean change from baseline was 5.6 for the rexlemestrocel-L group and 2.9 for controls (p=0.005)

LVEF, 2-point MACE, and recurrent hospitalizations due to heart attack or stroke were pre-specified endpoints and the 3-point MACE was a post-hoc analysis of pre-specified endpoint components

DREAM-HF Phase 3 Trial in HFrEF

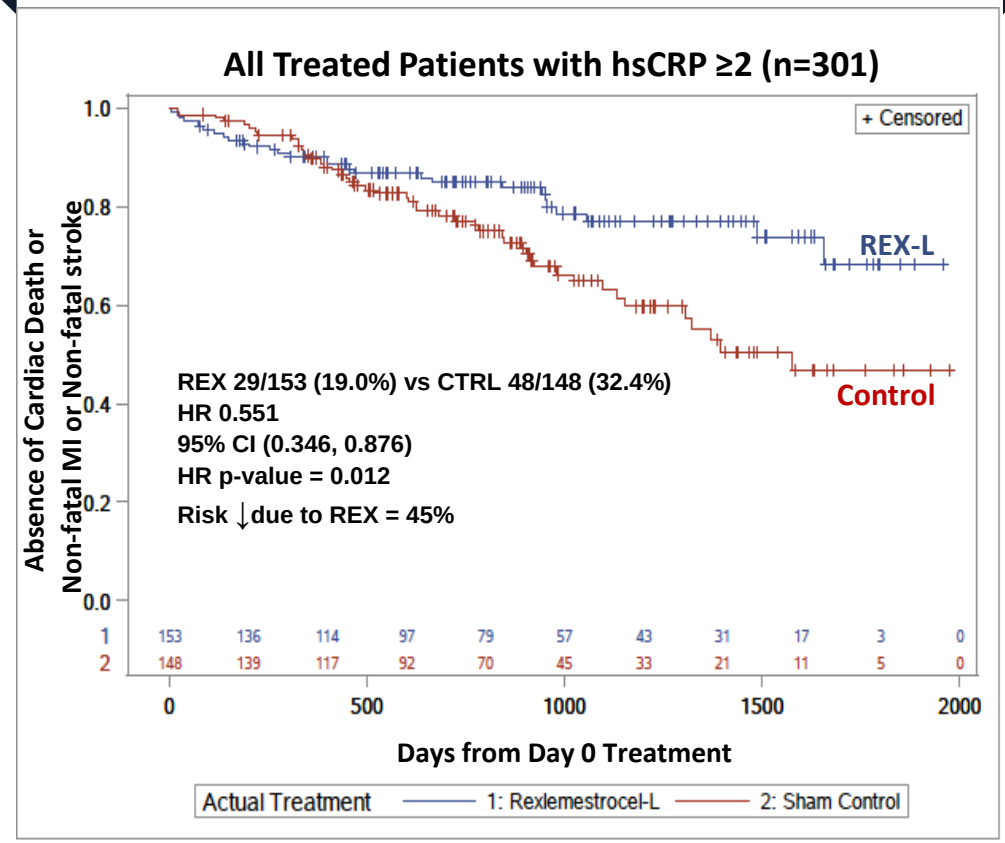
Rexlemestrocel-L Reduced Incidence of 3-Point Composite MACE - CV Death, MI or Stroke - Compared to Controls Across All 537 Treated Patients, with Enhanced Effect in Those with Active Inflammation as Measured by CRP >2

Time-to-First-Event (TTFE) for Cardiovascular Death or Non-fatal MI or Non-fatal Stroke (3P-MACE)



Kaplan-Meier log rank statistics

Time-to-First-Event (TTFE) for Cardiovascular Death or Non-fatal MI or Non-fatal Stroke



MACE=Major Adverse Cardiovascular Event; TTFE=Time To First Event; MI=Myocardial Infarction (Heart Attack)

LVEF, 2-point MACE, and recurrent hospitalizations due to heart attack or stroke were pre-specified endpoints and the 3-point MACE was a post-hoc analysis of pre-specified endpoint components

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Major Clinical & Regulatory Milestones Next 12 Months

Remestemcel-L

- FDA filing BLA this quarter for remestemcel-L in the treatment of SR-aGVHD
- Potential FDA approval of BLA six months after filing, and planned US product launch in Q1 CY2023
- Mesoblast and Vanderbilt University Medical Center, which coordinates a clinical trial network at over 40 sites across the US focused on ARDS, to jointly develop a trial protocol to confirm the previously observed reduction in mortality in COVID-19 ARDS patients under age 65.

Rexlemestrocel-L

- Plan to meet with FDA next quarter under existing RMAT designation to discuss common mechanism of action in HFrEF including those with LVADs, and potential pathway to marketing approval
- FDA clearance by year end 2022 to commence a pivotal study for potential marketing approval of rexlemestrocel-L in chronic low back pain due to degenerative disc disease

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Thank You