Jasper THERAPEUTICS INC.

Transforming the Field of Hematopoietic Stem Cell Therapies

Nasdaq: JSPR

August 2022

Safe Harbor

Forward-Looking Statements

This investor presentation and any accompanying oral presentation (together, this "Presentation") contain forward-looking statements. All statements other than statements of historical fact contained in this Presentation, including statements regarding the future opportunities and prospects of Jasper Therapeutics, Inc. (together with its subsidiary, "Jasper" or the "Company"), including milestones, business strategy, and plans and objectives for future operations, are forward-looking statements. Jasper has based these forward-looking statements on its estimates and assumptions and its current expectations and projections about future events. These forward-looking statements are subject to a number of risks, uncertainties and assumptions, including those contained in the "Risk Factors" section of the Company's Annual Reports on Form 10-K for the year ended December 31, 2021, Quarterly Reports on Form 10-Q and Current Reports on Form 8-K that the Company has subsequently filed or may subsequently file with the SEC. In light of these risks, uncertainties and assumptions, the forward-looking events and circumstances discussed in this Presentation are inherently uncertain and may not occur, and actual results could differ materially and adversely from those anticipated or implied in the forward-looking statements. Accordingly, you should not rely upon forward-looking statements as predictions of future events. Jasper undertakes no obligation to update publicly or revise any forward-looking statements for any reason after the date of this Presentation or to conform these statements to actual results or to changes in Jasper's expectations.

Industry and Market Data

Certain data in this Presentation was obtained from various external sources, and neither the Company nor its affiliates, advisers or representatives has verified such data with independent sources. Accordingly, neither the Company nor any of its affiliates, advisers or representatives makes any representations as to the accuracy or completeness of that data or undertakes any obligation to update such data after the date of this Presentation. Such data involves risks and uncertainties and is subject to change based on various factors.

Trademarks

The trademarks included herein are the property of the owners thereof and are used for reference purposes only. Such use should not be construed as an endorsement of the products or services of the Company.

Jasper is developing multiple therapies to transform the field of stem and cellular medicine

JSP191: First in class, targeted anti-CD117 antibody starting pivotal study in AML/ MDS

- **AML/MDS:** Global pivotal study target initiation by Q1 2023 based on recent clinical data and FDA feedback in older AML/MDS patients ineligible for full myeloablative conditioning
- **SCID:** Potential near-term BLA and PRV opportunity in SCID patients based on clinical data with JSP191 as single-agent, safe conditioning in re-transplant patients
- **LR-MDS Therapeutic:** Pilot study launching 2H 2022 in lower-risk MDS as a disease-modifying therapeutic to directly deplete diseased stem cells allowing for recovery of blood / immune production by healthy stem cells
- **Other:** Additional ongoing and potential studies for indications in gene therapy, sickle cell disease, mast cell diseases, leukemias and other rare disorders of blood and immune systems

Jasper mRNA cell programming: Improving the efficacy and safety of cellular therapies

- **Gene therapies:** Jasper mRNAs designed to improve gene therapy engraftment leading to faster and higher levels of target protein
- **Allogeneic grafts:** Jasper mRNAs designed to eliminate need for toxic conditioning and reduce risk of GvHD to improve the therapeutic utility of donor grafts (matched, haplo or cord)
- **Other:** Potential uses in T- and NK cell therapies for homing and immune evasion

Jasper's expanding pipeline

Indication	R&D Partner	Research	Preclinical	Clinical	Anticipated Milestones
JSP191					
Jasper Sponsored Studies					
MDS/AML	Jasper Therapeutics Inc.				• Clinical data presented at TCT 2022 • Pivotal trial target initiation by Q1 2023
SCID					• Targeting FDA registrational feedback 2H 2022
Lower Risk MDS (primary treatment)					• 2H 2022 clinical study initiation
Partner Sponsored Studies					
Fanconi Anemia	Stanford University				• First patient dosed Q2 2022, enrollment ongoing
Sickle Cell & Beta Thalassemia	NIH National Heart, Lung, and Blood Institute				• 2022 patient enrollment ongoing
Chronic Granulomatous Disease	NIH National Institute of Allergy and Infectious Diseases				• 2022 patient enrollment
GATA2 MDS	NIH National Cancer Institute				• 2022 patient enrollment
Gene Therapy – Gaucher Type 1	AVROBIO				• 2H 2022 first patient enrollment
Gene Therapy – X-SCID	GRAPHITE BIO				• 2H 2022 first collaboration data
Jasper mRNA Stem Cell Graft Platform					
Thalassemias, Sickle Cell Disease	Jasper Therapeutics Inc.				• 2022 in vivo proof of concept • 2023 first IND filing
Autoimmune Diseases					

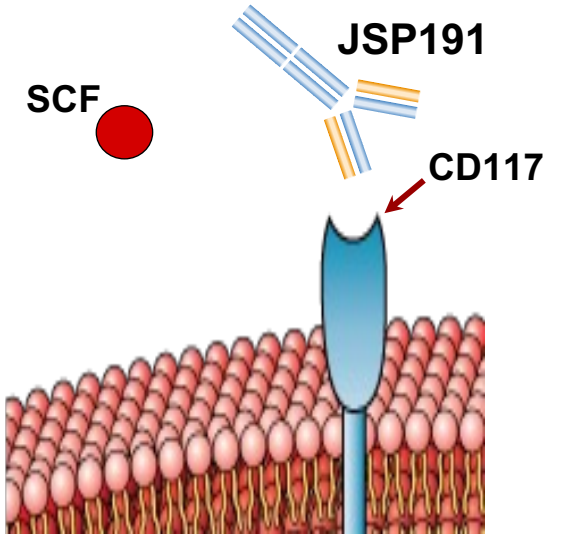
Jasper maintains full worldwide rights to develop and commercialize JSP191 and mRNA stem cell platform in all indications

JSP191 is an investigative drug and is not approved for any indication

JSP191 is designed to specifically block Stem Cell Factor receptor signaling while minimizing effects on mast, germ or Cajal (GI) cells

JSP191

Blocks SCF Binding to CD117



Inhibition of Stem Cell Survival Signal leads to stem cell depletion in bone marrow

JSP191 designed to directly block Stem Cell Factor (SCF) from binding to the CD117 (Stem Cell Factor) Receptor with high affinity and avidity

- Aglycoslyated IgG1 antibody that inhibits SCF receptor binding site
- Kd < 5pM affinity to human c-Kit Fc dimer with IC50 ~ 70pM
- No Fc mediated ADCC or complement mediated cytotoxicity to reduce risk of adverse effects on germ, mast and Cajal (GI) cells that also express CD117
- GMP production at commercial scale, validation ongoing

JSP191 preclinical and clinical results show significant potential to improve the efficacy of stem cell transplant and expand to direct therapeutic treatment

- SCID: JSP191 single agent for successful transplant in high risk patients who have previously failed transplant
- AML / MDS: JSP191 in combination with standard of care low dose radiation + fludarabine to improve efficacy for older patients not eligible for full myeloablative conditioning
- Multiple additional JSP191 clinical transplant studies ongoing in various populations with different combinations
- Study of JSP191 as a disease modifying therapeutic in LR-MDS starting in 2022

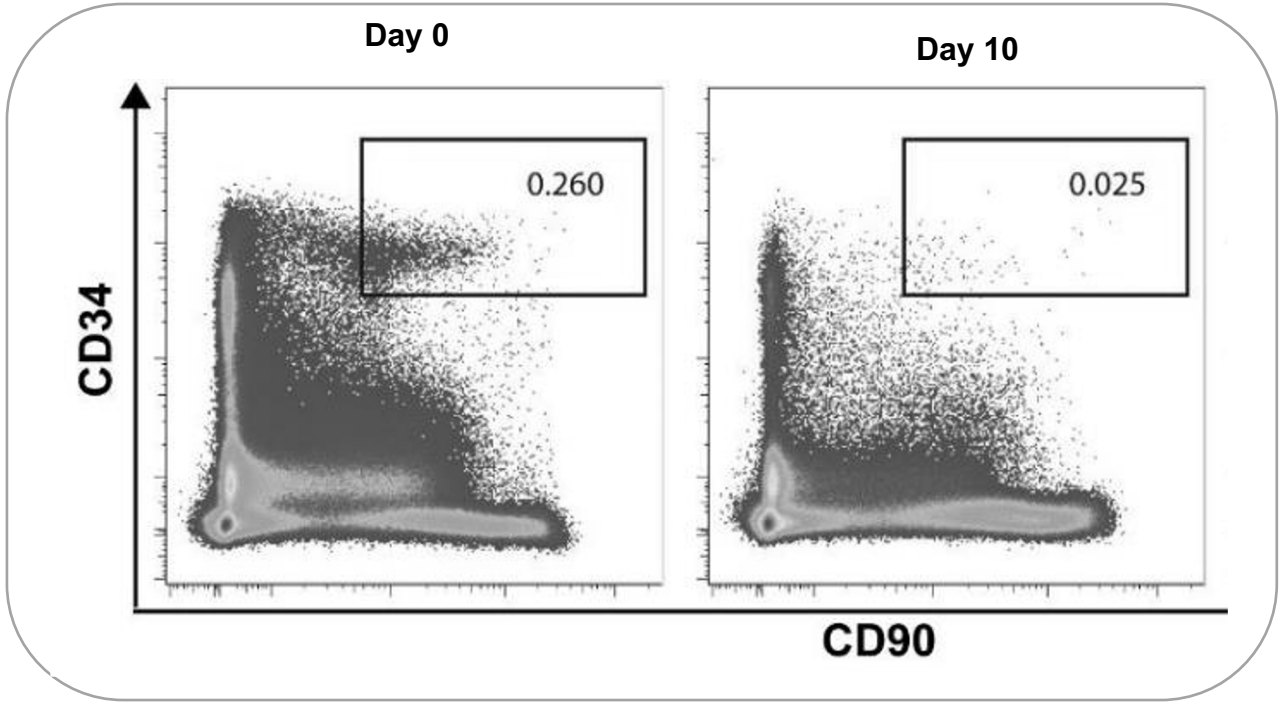
SCF: Stem Cell Factor

[1] Xue X, et al *Blood. 2010; 116(24):5419-5422.*
[2] Bankova AK, Pang WW, Velasco BJ, Long-Boyle JR, Shizuru JA. *Blood Adv*. 2021;5(19):3900-3912.

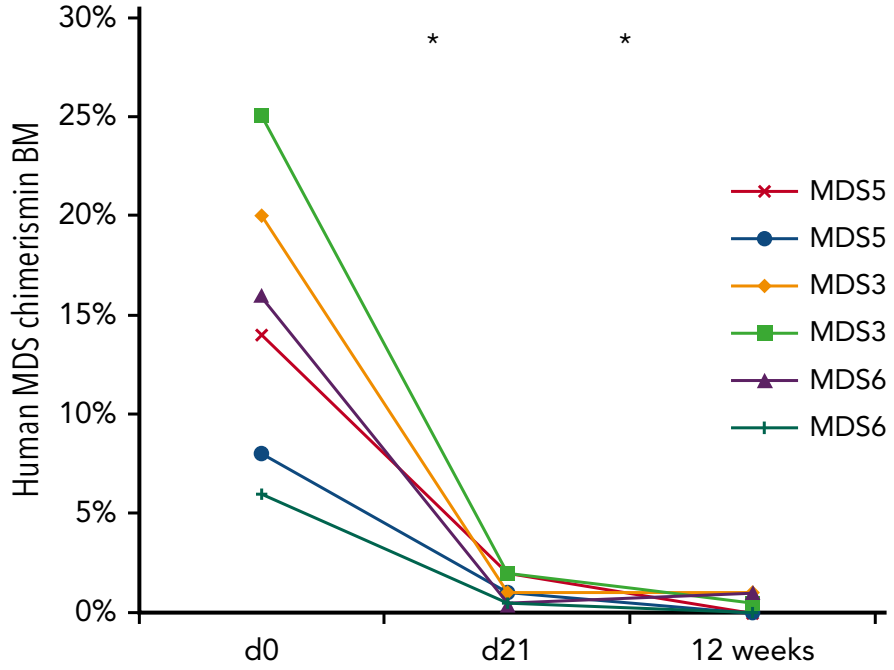
JSP191 directly blocks key hematopoietic stem cell survival signal leading to depletion of healthy and diseased cells

JSP191 depletion of healthy stem cells in non-human primates[1]

96% depletion of hematopoietic stem cells in NHPs at 1.0 mg/kg



JSP191 depletion of MDS stem cells in xenograft mouse[2]



MDS cells are depleted and stay depleted

[1] Kwon HS, et al Blood. 2019; 133(19):2104-2108
[2] Xue X, et al *Blood. 2010; 116(24):5419-5422.*

Jasper THERAPEUTICS INC.

SCID

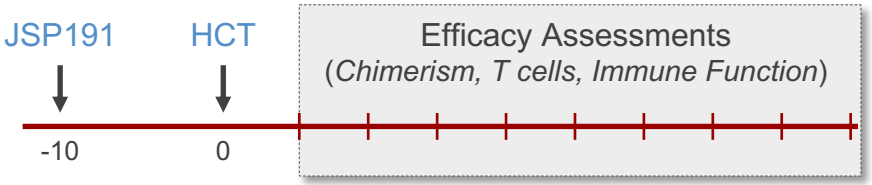
Study NCT02963064: JSP191 single agent conditioning for ultra orphan SCID patients who have failed prior curative transplant

JSP191 in SCID granted rare pediatric disease designation and may be eligible for Priority Review Voucher

Single Arm Trial Design

SCID patients

- Re-transplant
- Newly diagnosed (infants)



Study Endpoints

- Safety
- Donor stem cell engraftment
- Production of naïve CD4+ T cells
- Clinical benefit (Use of IVIG, infection, vaccine response)

- SCID is a lethal genetic immune disorder that can be cured with a hematopoietic cell transplant
- Due to the toxicity of current conditioning agents, patients who fail transplant are not eligible for a repeat procedure
- Patients who fail transplant have poor clinical status and must rely on lifelong immune therapy
- 15 re-transplant patients dosed and 3 newly diagnosed

Agarwal R, et al. Clinical Immunology Society Annual Meeting (CIS); 2022 Mar 31-Apr 3; Charlotte, NC

SCID: Durable clinical benefit in JSP191 conditioned patients with no conditioning-related toxicity

T-B-NK+ SCID Re-Transplant Subjects

JSP191 dose	Genotype	Follow-up	Outcomes
0.1 mg/kg	Artemis	Wk 208	• Off IVIG, Ab response to vaccination
	Artemis	Wk 208	• IVIG reduced, Chronic norovirus enteritis resolved, Chronic URI resolved
0.3 mg/kg	PRKDC	Wk 156	• Continues on IVIG, Chronic URI resolved
	RAG1	Wk 156	• Off IVIG, Ab response to vaccination
	RAG1	Wk 104	• Continues on IVIG, Improvement in chronic URI
0.6 mg/kg	RAG1	Wk 78	• Continues on IVIG, Improvement in chronic URI
	RAG1	Wk 52	• IVIG/SCIG dependent, Generating naïve B cells
	Artemis	Wk 12	• IVIG dependent, Generating naïve B cells
1.0 mg/kg	Artemis	Wk 104	• Off Study at 140 weeks – Deceased
	Artemis	Wk 104	• Continues on IVIG, Persistent Chronic URI, Improvement in chronic norovirus enteritis

Key clinical measures

1. Clinical parameters of infection
2. Dependence on exogenous immunoglobulin
3. Response to vaccination

SCID: Severe Combined Immunodeficiency; IVIG: Intravenous Immunoglobulin; URI: Upper Respiratory Infection

Agarwal R, et al. Clinical Immunology Society Annual Meeting (CIS); 2022 Mar 31-Apr 3; Charlotte, NC

Potential near-term BLA and PRV opportunity for JSP191 in SCID

Severe Combined Immunodeficiency (SCID) is a lethal genetic immune disorder where HCT is the only proven cure

Potential FDA filing strategy

Ultra orphan, high unmet need population

- SCID patients who failed primary transplant do not have the option for a second transplant with current toxic conditioning agents

Focus on current clinical data

- JSP191 safety and efficacy in 10 SCID re-transplant T-B- patients

Additional supportive clinical data that can be generated

- Historical clinical data of patients currently in the JSP191 SCID study
- Natural history study of SCID patients who have failed their first transplant

JSP191 may be eligible for Priority Review Voucher (PRV) with SCID approval

JSP191 has been granted Rare Pediatric Disease Designation in SCID

Jasper THERAPEUTICS INC.

SCID: Severe Combined Immunodeficiency

Jasper THERAPEUTICS INC.

AML/MDS

Study NCT04429191: JSP191+Flu/TBI in AML/ MDS patients ineligible for myeloablative conditioning

- Due to toxicity concerns, 45% of AML/ MDS patients receive reduced intensity (RIC) or non-myeloablative (NMA) conditioning[1]
- Busulfan & melphalan RIC regimens still have substantial toxicity with 25+ day average hospitalizations[2] and 20%+ 100-day transplant related mortality[3]

Goal: Create a safe and substantially more effective regimen by adding JSP191 on to current NMA (Flu/TBI)

JSP191 Ph1b Study

Inclusion:

- MDS
- AML in CR
- AML Relapse / Refractory
- Age ≥60 or HCT ≥3

AML in CR: n=11
MDS: n=13
Age: 62-79

Experimental arm:

JSP191 0.6 mg/kg
+ **Flu** 30 mg/m^2 x 3 days
+ **TBI** 200-300 cGy
+ HCT

Assessment:

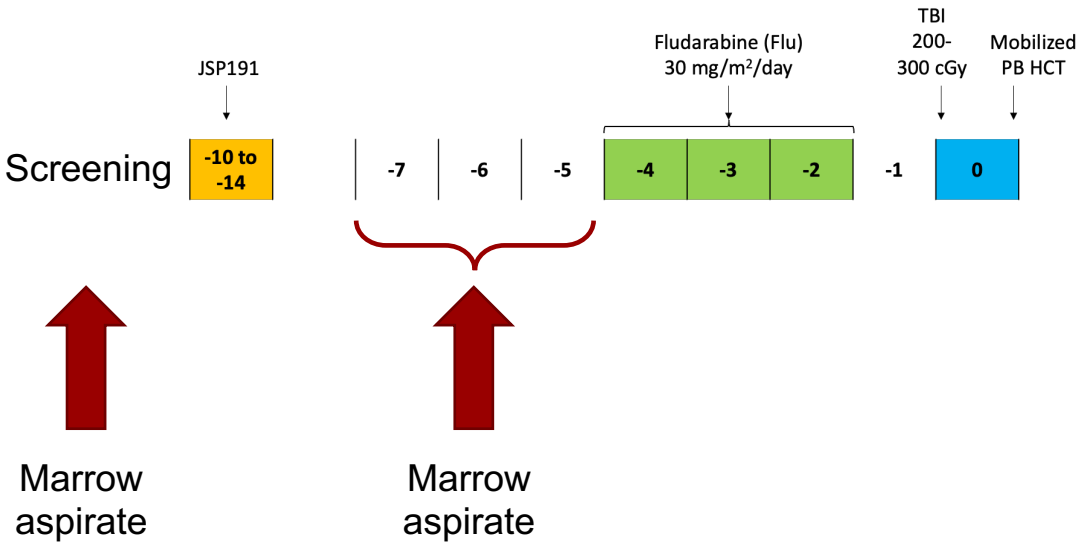
- Neutrophil engraftment
- Donor chimerism
- Disease resolution
- Relapse
- Graft vs Host Disease

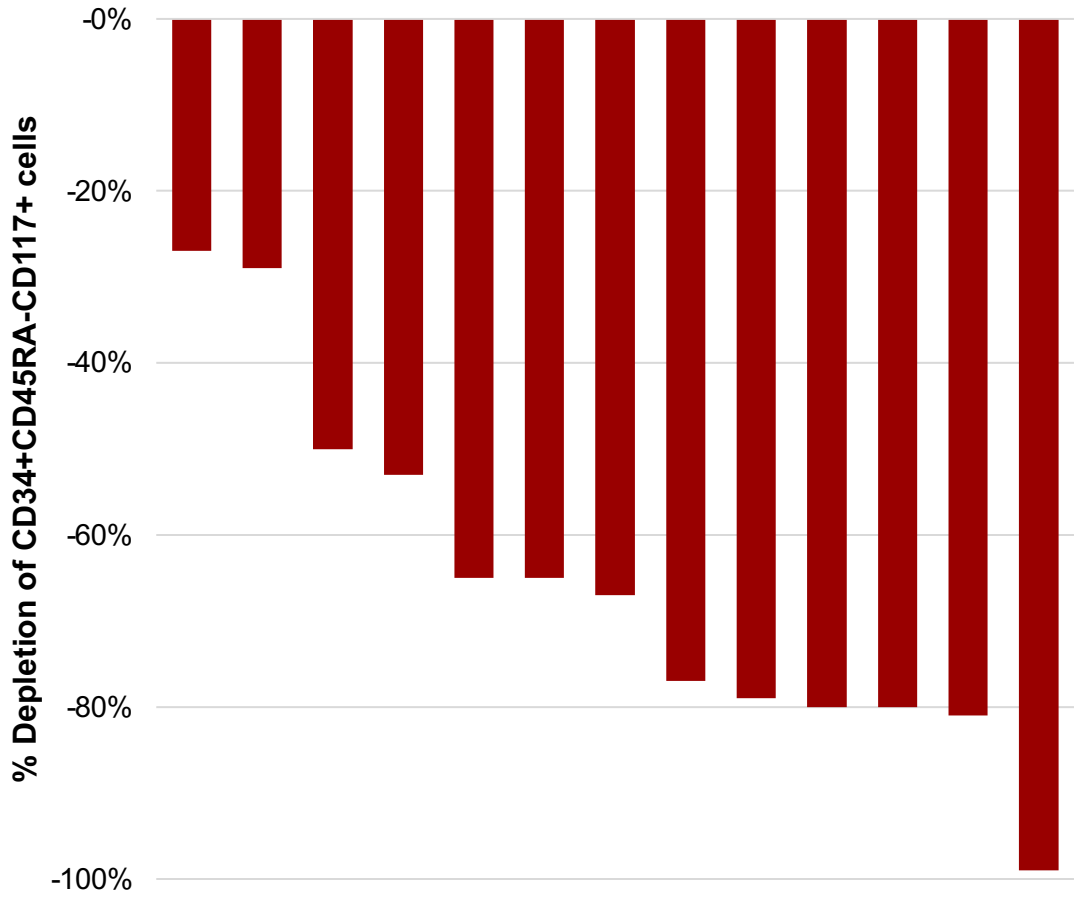
Presented as late-breaking oral presentation at the 2022 Transplant & Cellular Therapy (TCT) conference

[1] CIBMTR Final 2021 Transplant Center-Specific Survival Report, 2021
[2] Broder MS, et al. Am Health Drug Benefits. 2017;10(7):366-374.
[3] Oran B, et al. Transplantation and Cellular Therapy. 2021; 921.e1-921.e10.
ClinicalTrials.gov NCT04429191

AML/ MDS Study NCT04429191: Single agent JSP191 depletes diseased stem & progenitor cells in bone marrow in 5 to 7 days

Marrow aspirates collected at screening and prior to administration of Flu/TBI
(prior to projected maximum JSP191 effect)





Jasper THERAPEUTICS INC.

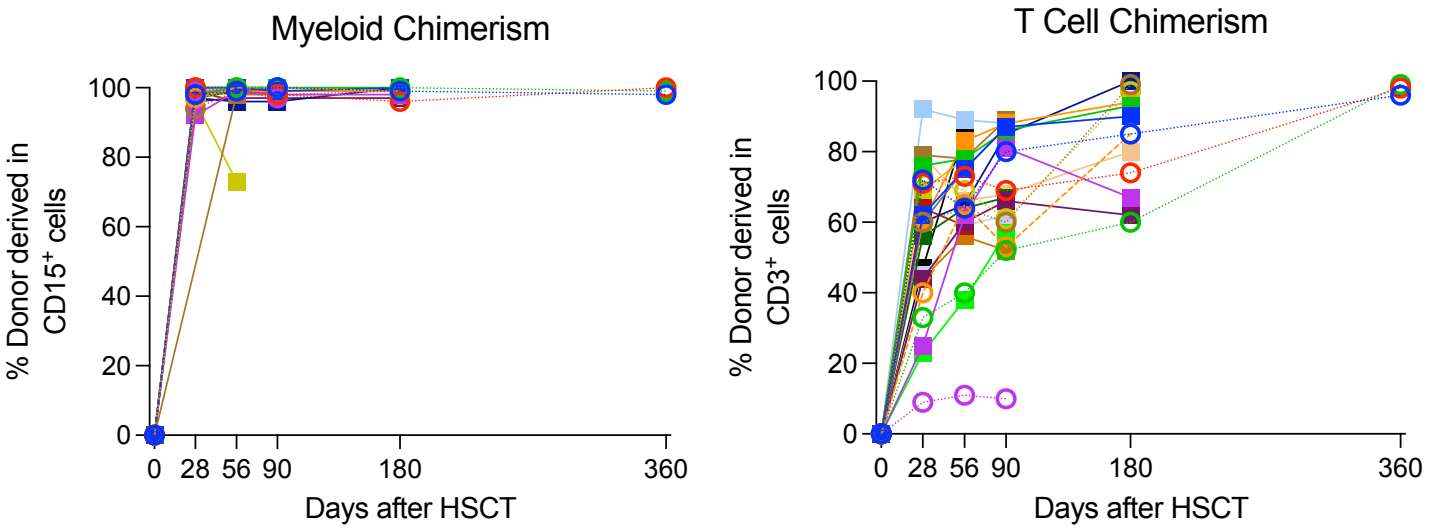
Muffly L et al. Tandem Meetings Transplantation and Cellular Therapy (TCT) 2022 April 23-26; Salt Lake City, UT

JSP191 is an investigative drug and is not approved for any indication

AML/ MDS Study NCT04429191 : JSP191 based conditioning demonstrates complete donor cell takeover of the bone marrow and elimination of detectable cancer in older patients

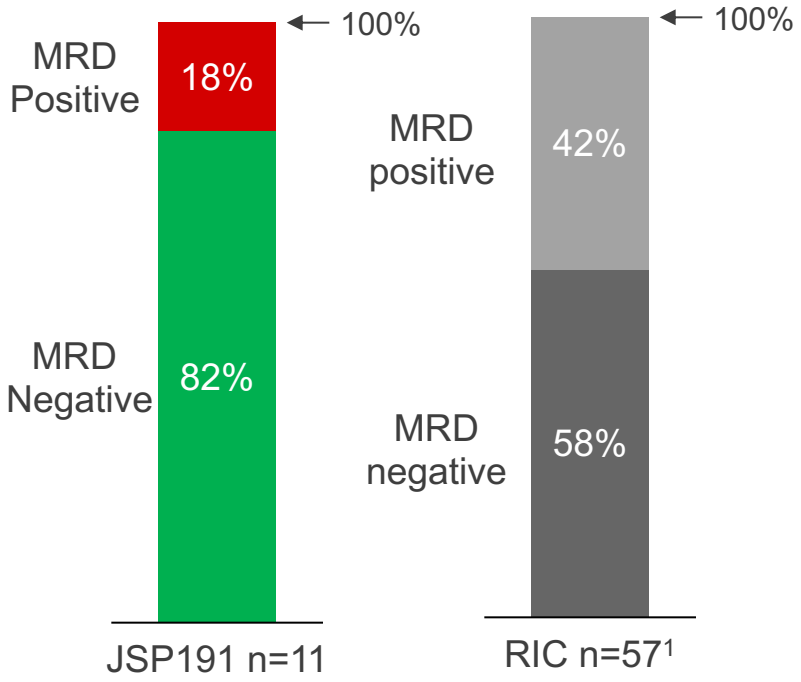
Donor cell takeover of the bone marrow

Median donor chimerism (300 cGy TBI)



Post transplant elimination of detectable cancer in baseline MRD positive patients

Measurable residual disease (by flow cytometry)



RIC: Reduced Intensity Conditioning

[1] Paras G, Morsink LM, Othus M, et al. Conditioning intensity and peritransplant flow cytometric MRD dynamics in adult AML. Blood. 2022;139(11):1694-1706

AML/ MDS Study NCT04429191: No JSP19 related SAEs, no 100-day transplant related mortality and proof of concept for outpatient stem cell transplant

Clinical Safety

- No JSP191 related SAEs
- No significant JSP191 infusion reactions
- One subject with refractory late onset grade 3 acute GI GVHD
- One subject with secondary graft failure
- No 100-day transplant-related mortality
- No significant mucositis, hypersensitivity, hepatotoxicity, or other organ damage

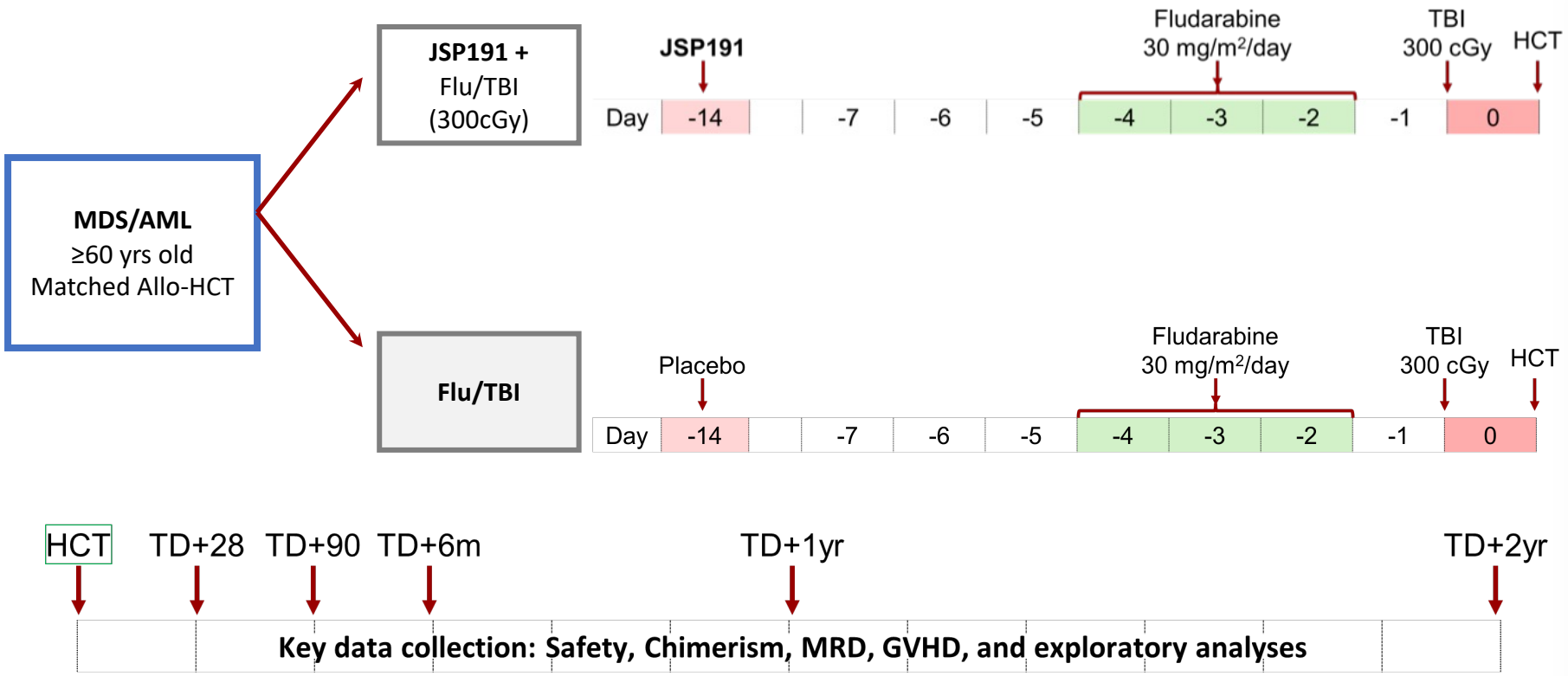
Clinical Setting

- Protocol allows for outpatient conditioning
- 11 patients given outpatient JSP191 along with outpatient transplant

SAE: Serious Adverse Event; GI-GVHD: Gastrointestinal Graft vs. Host Disease

ClinicalTrials.gov NCT04429191

Proposed registrational study of JSP191 in MDS/AML – Randomized, double-blind, placebo-controlled, event-driven trial



Endpoints

Primary

- AML: Event Free Survival (relapse or death, event driven)
- MDS: CR, Durable CR

Secondary

- OS, NRM, graft failure, engraftment
- GVHD and TRM
- MRD

Additional

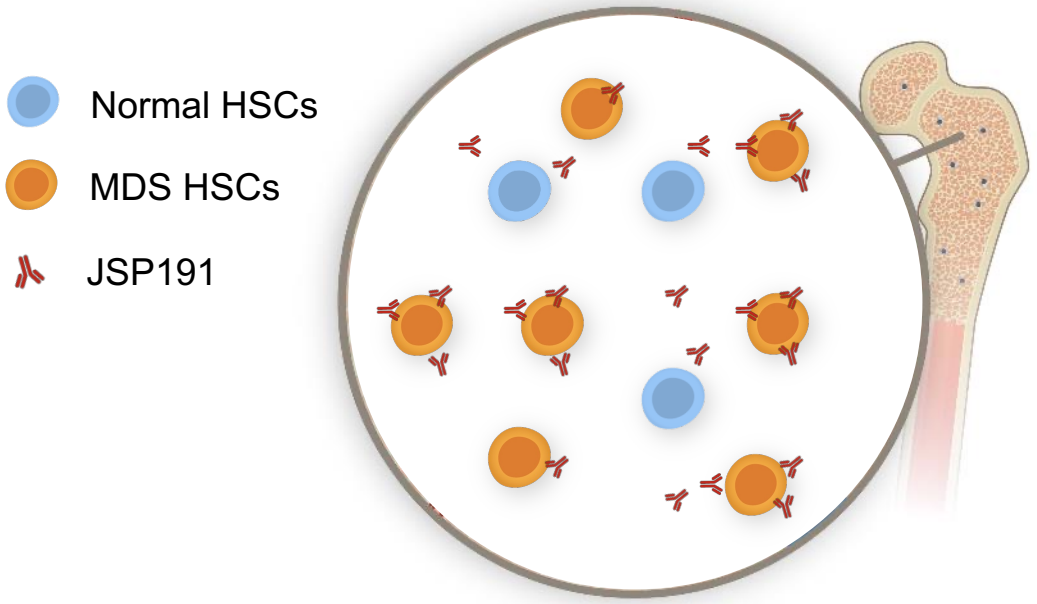
- Chimerism
- Depletion of HSCs

MDS/AML: Myelodysplastic syndromes/ Acute Myeloid Leukemia; CR: Complete Response; OS: Overall Survival, NRM: Non-Relapse Mortality; TRM: Transplant-Related Mortality; HCT: Hematopoietic Cell Transplantation : GVHD: Gastrointestinal Graft vs. Host Disease Hematopoietic Cell Transplantation; MRD: Measurable Residual Disease

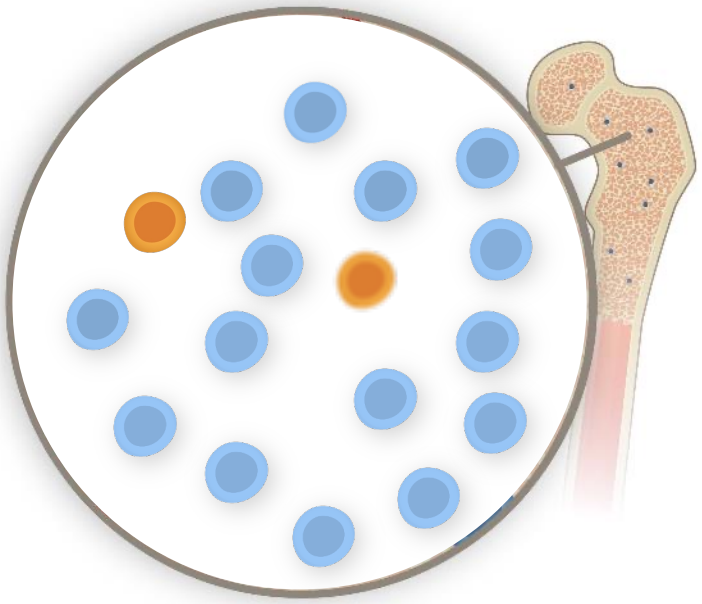
LR-MDS Therapeutic

JSP191's ability to directly deplete cancerous stem cells may be leveraged as a disease-modifying therapeutic in lower-risk MDS

JSP191 administered in a LR-MDS patient



Shift of HSCs towards normal hematopoiesis



LR-MDS patients are currently managed with supportive therapies, including transfusion and erythropoietin-stimulating agents meant to address symptoms but not the underlying disease…

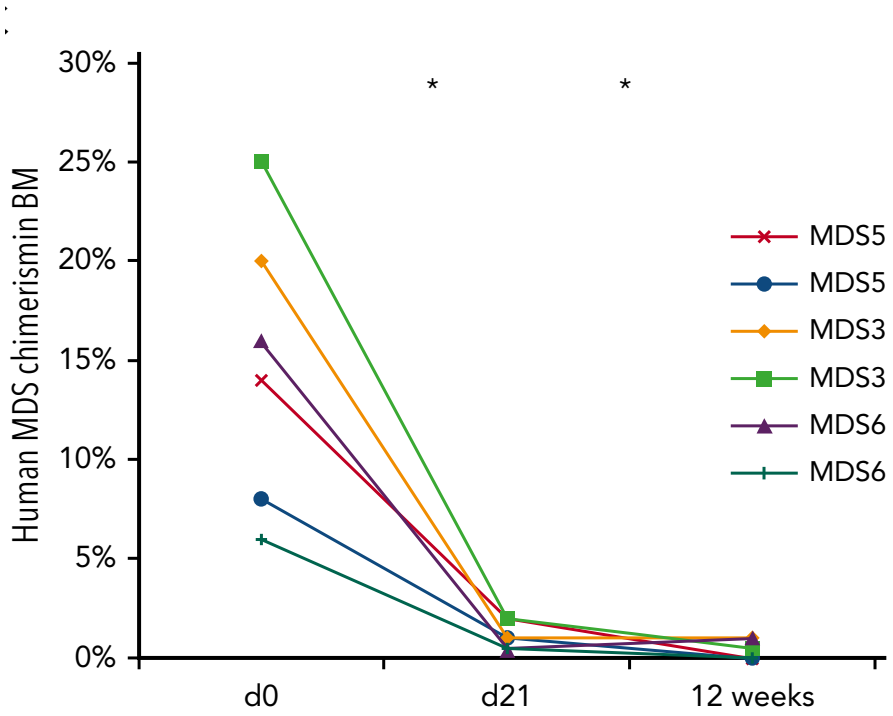
" There is a tremendous unmet need for new treatments for MDS; rates of relapse are high, and many patients are not eligible for existing approved therapies..."

- Platzbecker et al., 2021 Leukemia

LR-MDS: Low-Risk Myelodysplastic syndromes; HCT: Hematopoietic Cell Transplantation

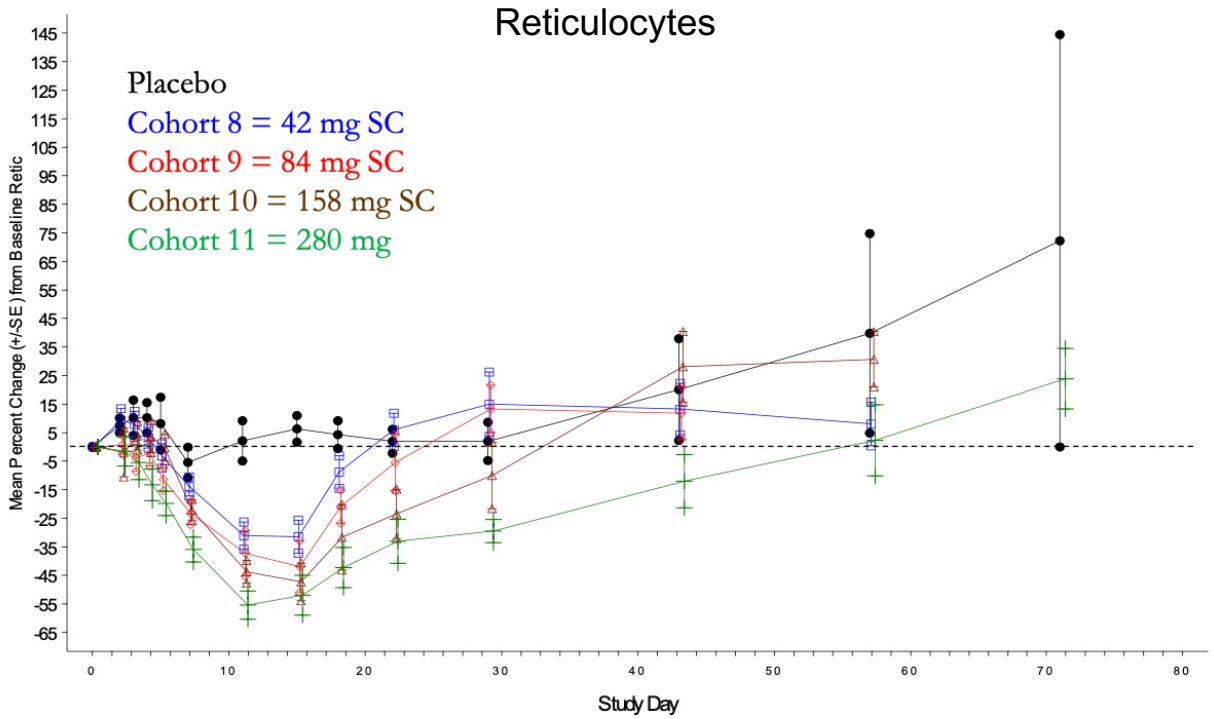
JSP191 depletion may enable healthy HSCs to take over the bone marrow niche and restore functional hematopoiesis

JSP191 depletion of MDS cells[1]



MDS cells are depleted and stay depleted

JSP191 depletion and rebound of healthy HSCs[2]



Healthy HSCs are depleted, recover and expand

[1] Kwon et al, *Blood* 2019
[2] Amgen Phase I healthy volunteer data (unpublished)

LR-MDS Study: Study of JSP191 as second line therapy in subjects with lower-risk myelodysplastic syndrome (LR-MDS)

LR-MDS patients

- Low to intermediate risk MDS (IPSS-R)
- Hgb < 9 g/Dl, platelets <50,000/mm^3 OR ANC <0.5 x 10^9 /L

Single Arm Trial Design

Key Assessments

- Safety
- Transfusion independence
- Hematologic improvement (hemoglobin, platelets, neutrophils)
- ORR (per 2006 IWG response criteria)
- Change in cellular population in blood and marrow

- MDS is a heterogeneous disorder of the bone marrow and hematopoietic stem cells that typically occurs in older patients and can progress to AML
- Low to intermediate risk MDS patients are not eligible for transplant and have few therapeutic options other than erythropoiesis-stimulating agents (ESAs) which do not affect the diseased stem cells
- LR-MDS patients refractory to ESAs are dependent on routine transfusions which are associated with poor survival
- JSP191 will be studied as second line therapy in low to intermediate risk MDS patients first in a dose escalation phase (0.1 to 1.5 mg / kg, up to n=6 per cohort) and then dose expansion phase (up to 20 additional subjects)

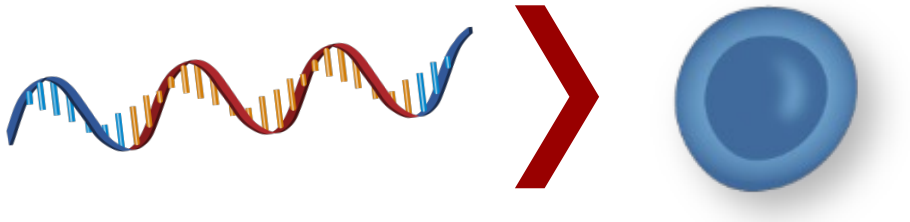
Jasper THERAPEUTICS INC.

mRNA Cellular Programming

mRNA-based cell therapy reprograms HSCs with a transient advantage during the peri-engraftment period without requiring permanent DNA change

mRNA-based cell engineering

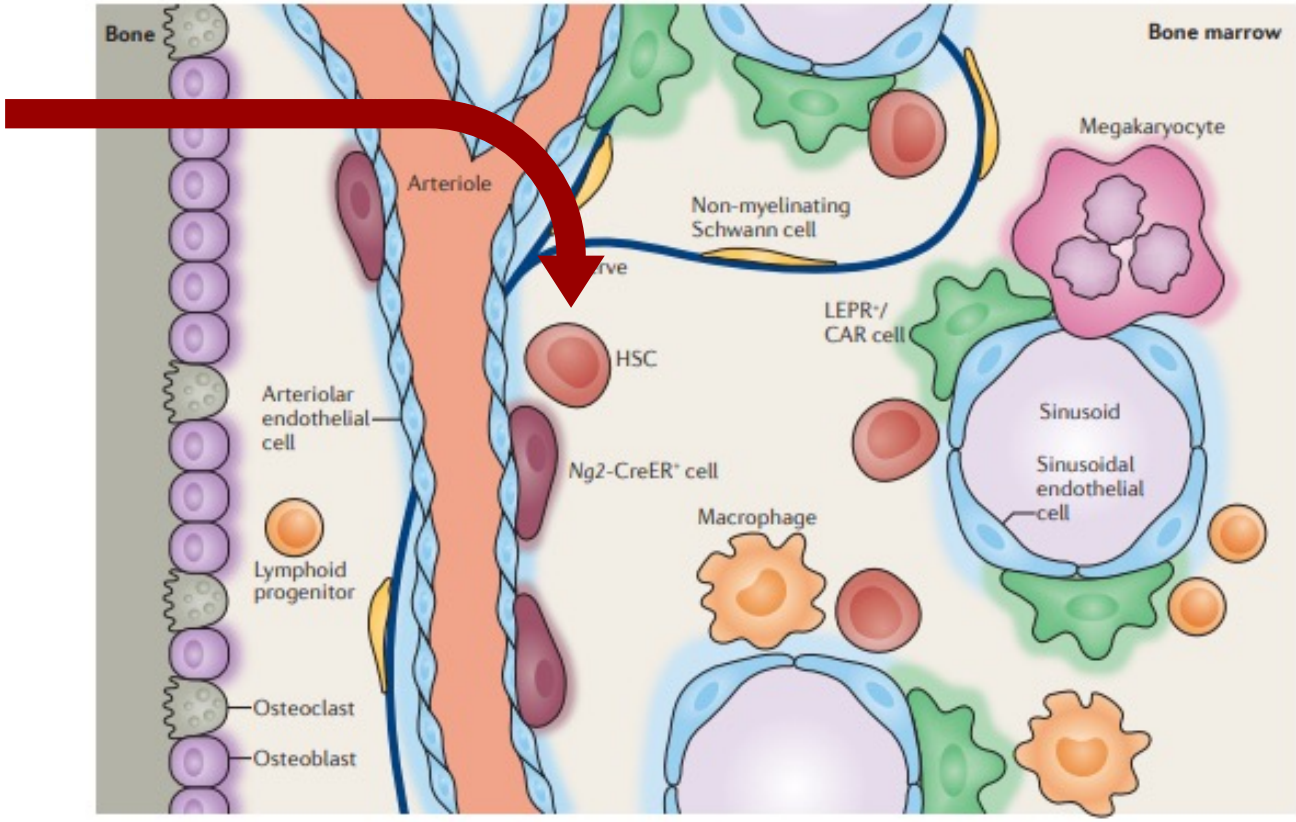
Healthy donor or gene-corrected HSC



Potential Jasper mRNA platform benefits

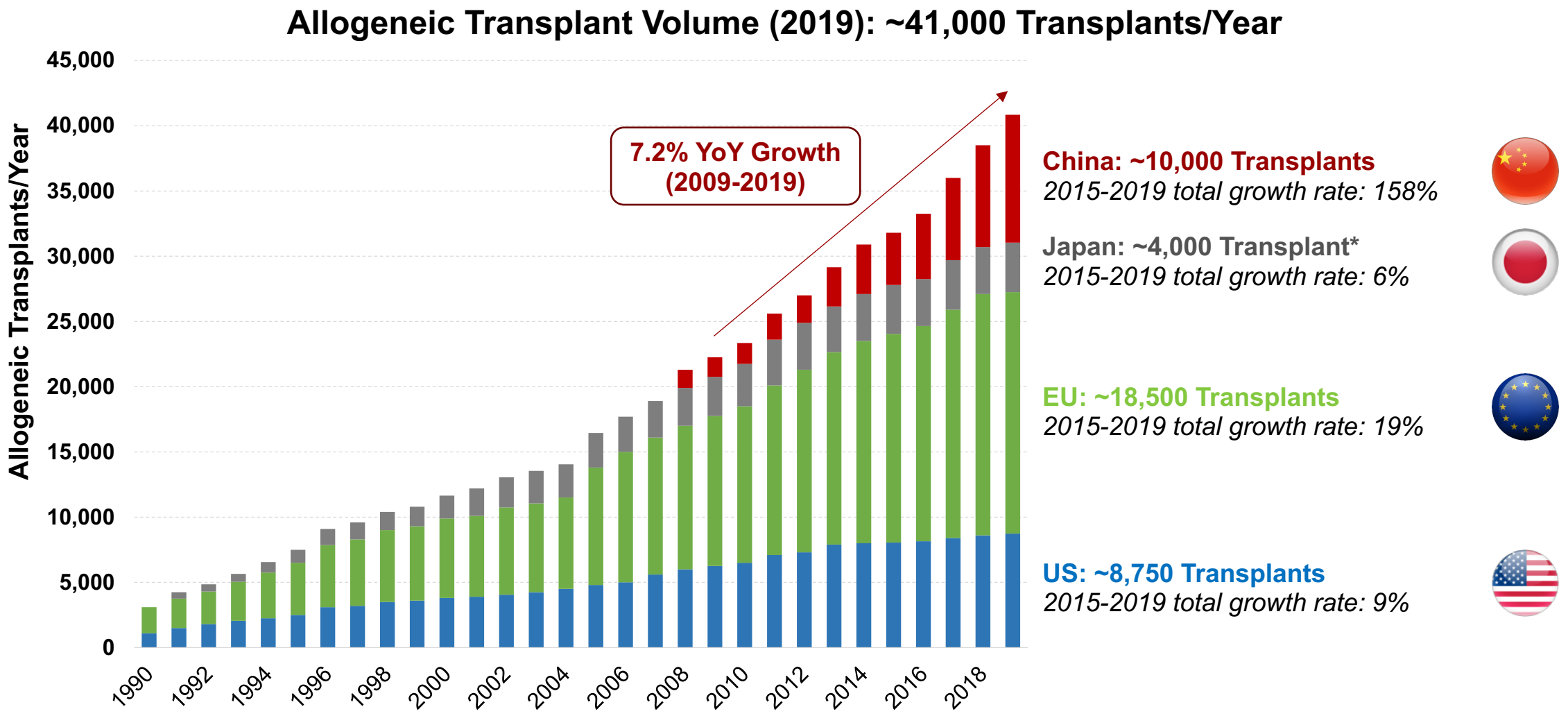
- Improved homing to bone marrow
- Improved engraftment
- Immune evasion
- Potential for pure CD34+ stem cell grafts

Engraftment in the bone marrow niche



Sean Morrison, Nat Rev Immunol. (2017)

JSP191 potential to significantly accelerate the use of transplant in major markets



[1] Center for International Blood & Marrow Transplant Research (CIBMTR) US Summary Slides 2021; [2] European Society of Blood and Marrow Transplantations (EBMT) 2021 Transplant Activity Survey; [3] Asia-Pacific Blood and Marrow Transplantation Group (APBMT) Activity Survey 2020; [4] Japanese Data Center for Hematopoietic Cell Transplantation (JDCHCT) Nationwide Survey 2021 Summary Slide; [5] Xu L, et al. Nature (2021) 56:2940–2947.

The registrational study for JSP191 will start in AML/MDS, the largest indications for allogeneic transplant

	Allo-HCT	Incidence	
	AML, MDS	AML	MDS
US	4,400	21,500	38,500
EU~~5~~	9,250	22,000	38,000
China	4,400	32,000	60,500
Japan	2,000	9,500	18,000
Total	**20,050**	**85,000**	**155,000**

Today

Expansion Opportunity With Safer Conditioning

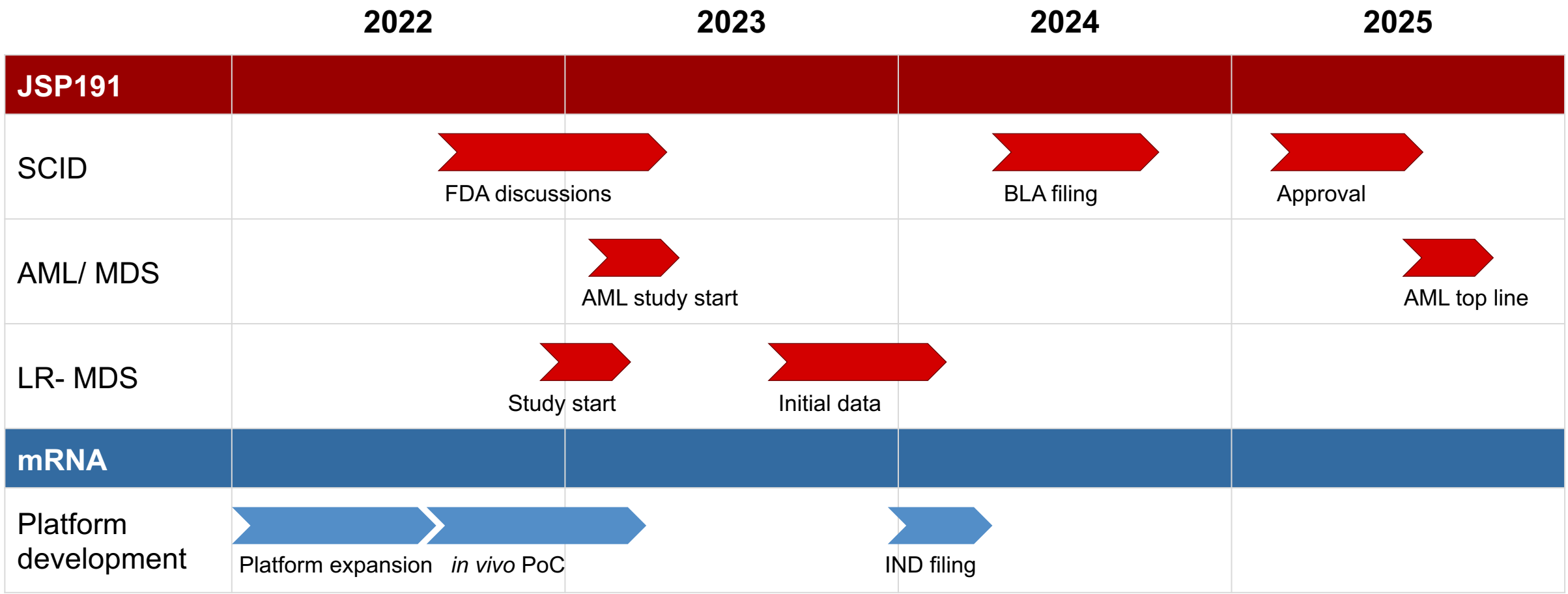
30% of patients not currently transplanted may be newly eligible with approval of JSP191

Based on Jasper internal market research of US high-volume AML and MDS allogeneic transplant physicians when showed the JSP191 target product profile

[1] Center for International Blood & Marrow Transplant Research (CIBMTR) US Summary Slides 2021
[2] European Society of Blood and Marrow Transplantations (EBMT) 2021 Transplant Activity Survey
[3] Asia-Pacific Blood and Marrow Transplantation Group (APBMT) Activity Survey 2020
[4] Xu L, et al. Nature (2021) 56:2940–2947; GlobalData.

Jasper THERAPEUTICS INC.

Projected program timelines



JSP191 is an investigative drug and is not approved for any indication

Anticipated upcoming milestones

JSP191

- Pivotal AML/ MDS study launch (US & EU)
- Proof of concept LR-MDS therapeutic study
- CMC validation activities including manufacturing BLA qualification lots

mRNA Stem Cell Editing Platform

- Additional *in vivo* proof of concept experiments
- Manufacturing and toxicology to support IND

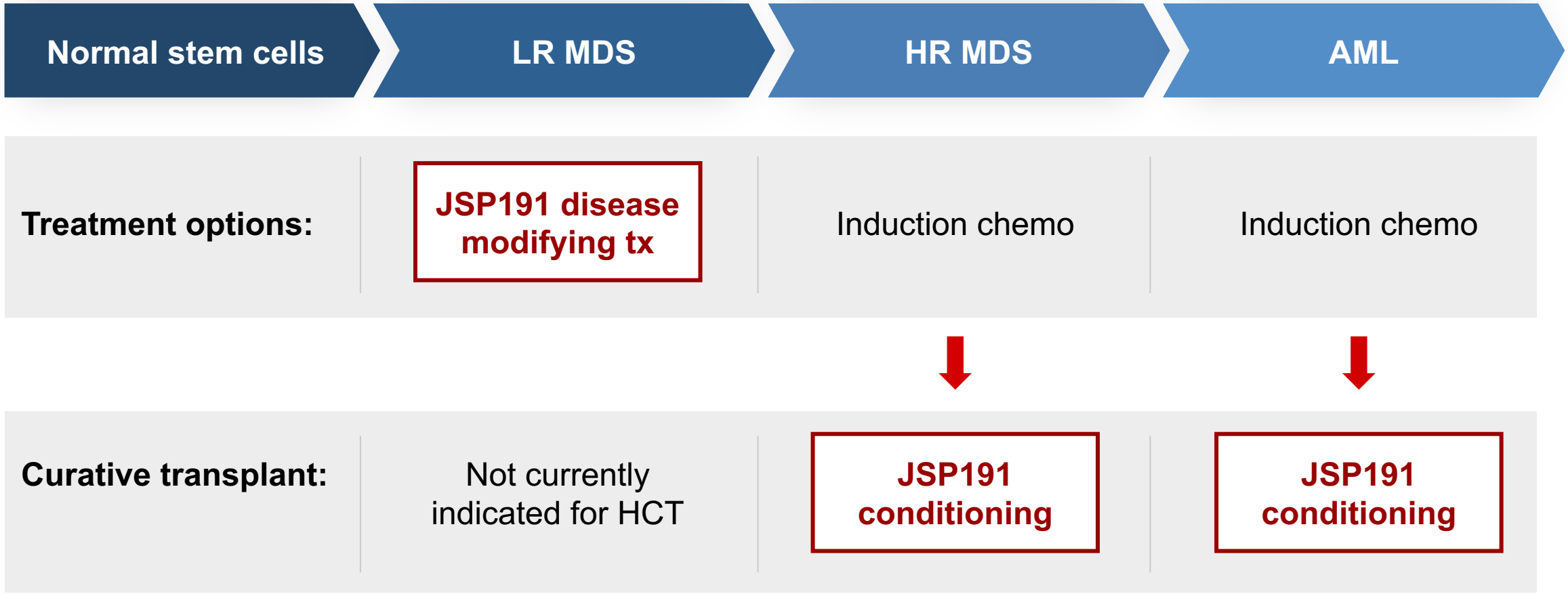
Jasper THERAPEUTICS INC.

Transforming the Field of Hematopoietic Stem Cell Therapies

Nasdaq: JSPR

August 2022

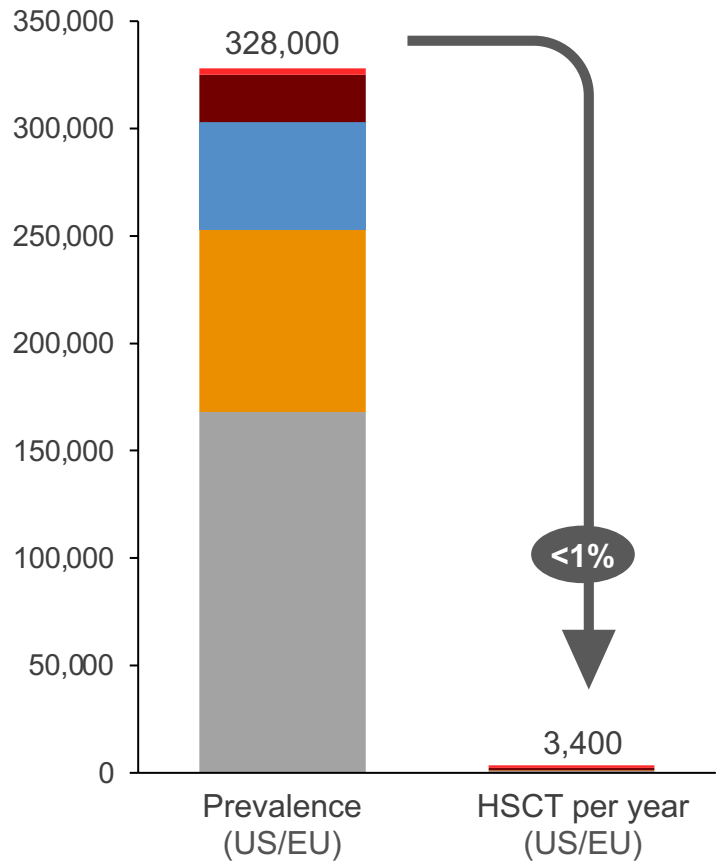
JSP191 depletes diseased HSCs across the progression of MDS/AML patients



MDS/AML: Myelodysplastic syndromes/ Acute Myeloid LeukemiaHSC: Hematopoietic stem cells; LR-MDS: Low-Risk Myelodysplastic syndromes; HR-MDS: High-Risk Myelodysplastic syndromes

Currently less than 1% of patients receive potentially curative HCT in non-malignant diseases

Non-malignant diseases that could be treated with hematopoietic stem cell transplantation



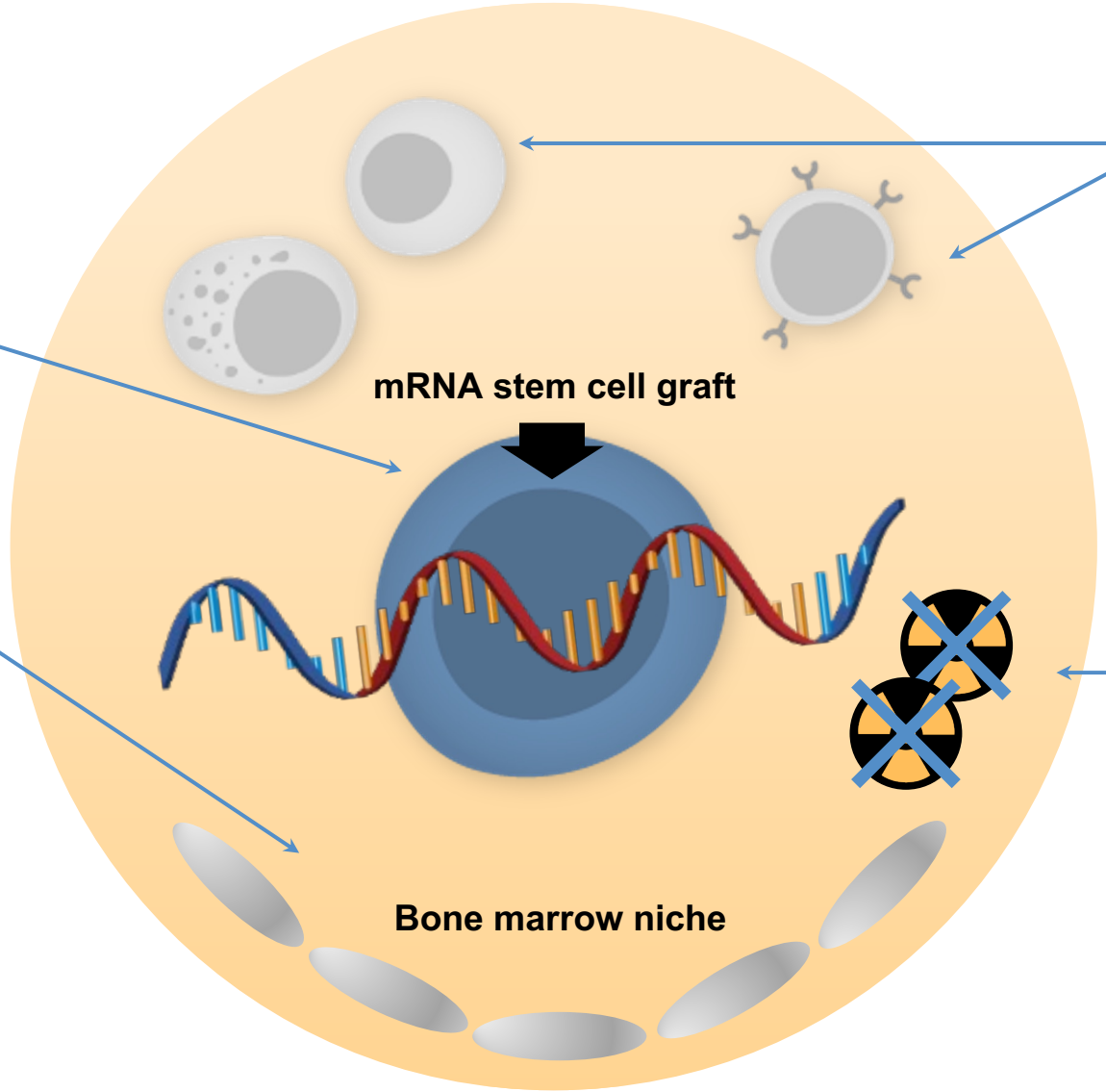
Primary immuno-deficiencies	SCID, Chronic Granulomatous Disease, Wiskott-Aldrich syndrome, Leukocyte Adhesion Deficiency, Hemophagocytic Lymphohistiocytosis
Bone marrow failures	Fanconi Anemia, Diamond Blackfan Anemia, Shwachman Diamond Syndrome, Paroxysmal Nocturnal Hemoglobinuria, Congenital Amegakaryocytic Thrombocytopenia, Aplastic Anemia
Metabolic disorders	Gaucher Disease, Fabry Disease, Cystinosis, Pompe Disease, Adrenoleukedystrophy, Mucopolysaccharidosis I-IV, Metachromatic Leukodystrophy
Bleeding disorders	Hemophilia A, Hemophilia B, von Willebrand Disease, Bernard-Soulier Syndrome
Hemoglobin-opathies	Sickle Cell Disease, Beta Thalassemia

HCT: Hematopoietic Cell Transplantation

Jasper mRNA technology can shift the paradigm for stem cell transplant and gene therapy

Expands potential for off the shelf transplants

Improves engraftment leading to higher percentages of therapeutic transplants / more effective gene therapies



Removes need for donor immune cells, eliminating risk of GVHD

Reduces / eliminates need for toxic conditioning

Jasper THERAPEUTICS INC.