Jasper THERAPEUTICS INC.

Enabling Cures with Hematopoietic Stem Cell Transplants

NASDAQ: JSPR

January 2022

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Jasper Highlights

Science: targeting the central role of stem cells to cure a growing number of fatal diseases has resulted in two transformational pipeline programs

Program 1: First in class phase 1/2 anti-CD117 antibody conditioning agent, targeting stem cell survival signal, clinical data in multiple indications, 2022 pivotal trial initiation planned

Program 2: Novel mRNA hematopoietic stem cell engineering platform, first generation mRNA engineered stem cell grafts to increase cure rates, in vitro POC established, in vivo POC in 2021 and potential IND in 2022

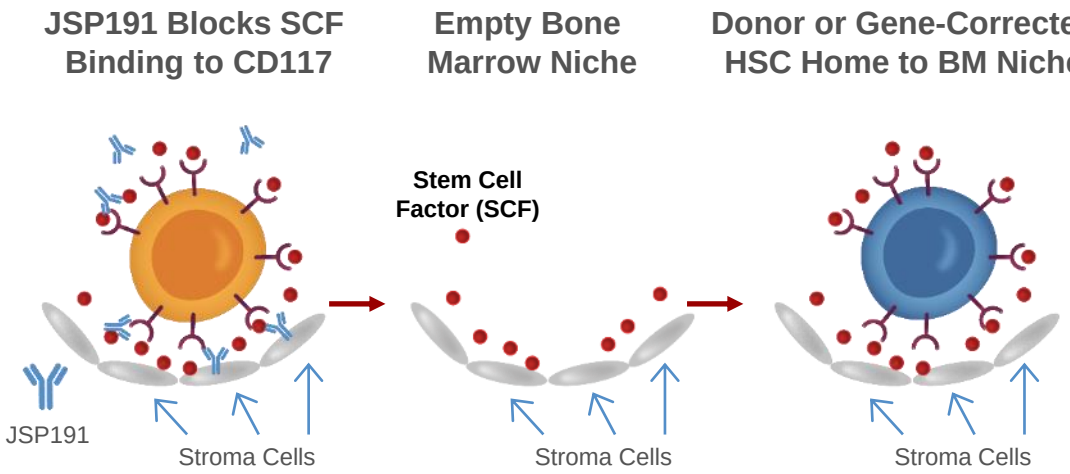
Proven team: deep expertise in hematopoietic stem cell transplant and track record in drug development

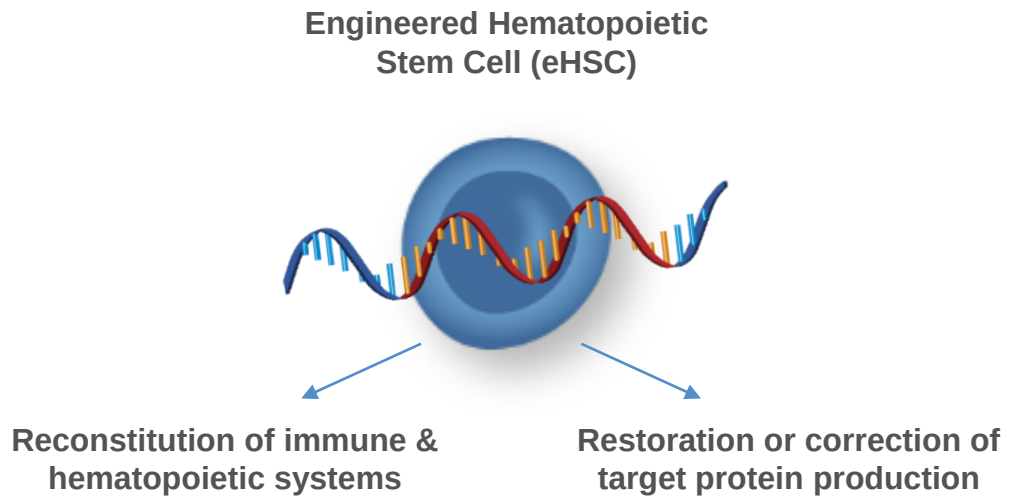
External Validation: corporate and academic partnerships and leading investors

Jasper's First in Class Antibody Based Conditioning Agent and mRNA Engineered Stem Cell Grafts Address The Major Limitations of Hematopoietic Cell Transplant

HCT conditioning agents are genotoxic, limiting HCT safety and efficacy

Current Allogeneic and Gene-Therapy grafts associated with graft failure, relapse, GvHD, low protein production





JSP191 is a targeted SCF receptor (CD117) antibody

Jasper mRNA engineered stem cells designed to increase HSC survival and cure rates of Allogeneic and Gene-Therapy grafts

Jasper's Expanding Pipeline
Partnerships Retain 100% of Commercial Rights

INDICATION	RESEARCH	PRECLINICAL	CLINICAL	R&D SPONSOR
JSP191 CONDITIONING				
Sponsored Studies				
AML/MDS				Jasper Phase 1 results
SCID				Jasper Phase 1 results
Autoimmune				Jasper
Gene Therapy – Sickle Cell				ARUVANT
Gene Therapy – Gaucher Type 1				AVROBIO
Gene Therapy – X-SCID				GRAPHITE BIO
Investigator Sponsored Studies				
Fanconi Anemia				STANFORD UNIVERSITY
Sickle Cell Disease				NIH National Heart, Lung, and Blood Institute
Chronic Granulomatous Disease				NIH National Institute of Allergy and Infectious Diseases
GATA2 MDS				NIH NATIONAL CANCER INSTITUTE
JASPER eHSC PLATFORM				
Thalassemias				Jasper
Sickle Cell Disease				Jasper
Autoimmune Diseases				Jasper

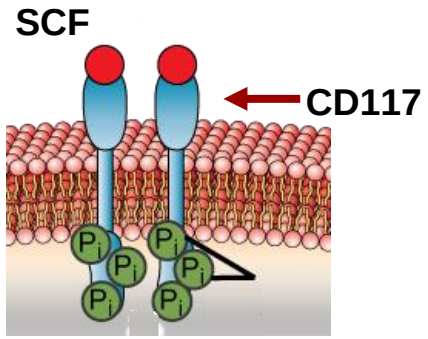
Jasper maintains full worldwide rights to develop and commercialize JSP191 and eHSCs in all indications.

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

JSP191 Uniquely Blocks Stem Cell Factor Receptor (CD117) Signaling Leading to Non-Toxic Stem Cell Depletion and Combination Synergies

Stem Cell Factor (SCF)

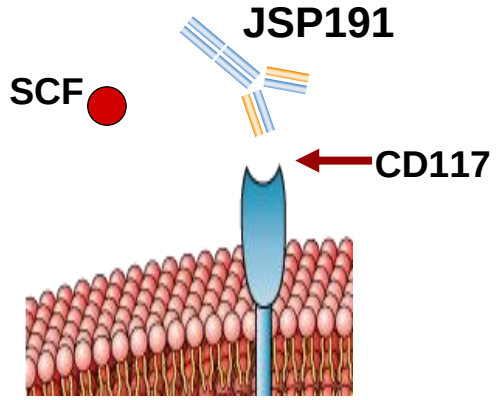
Binds to CD117



SCF / CD117 interaction required for stem cell survival

JSP191

Blocks SCF Binding to CD117



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

JSP191 is a mAb that binds to CD117 (c-Kit) resulting in the inhibition of stem cell factor signaling leading to depletion of stem cells in the bone marrow

- JSP191 SCF signal inhibition can sensitize stem cells for synergistic combination therapy (radiation, CD47, 5-azacytidine[1])

Only JSP191 is aglycosylated and designed to remove all effector cell function and mast cell activation

- No mast cell related anaphylaxis
- No reported treatment related SAEs

No toxic payload that may lead to depletion of other cells expressing CD117

- CD117 also expressed on mast cells, germ cells, Cajal (GI) cells, melanocytes

[1] Bankova et al. Blood 2020; 136 (Supplement 1): 23–24.

JSP191's First Clinical POC in Ultra Orphan Indication, Severe Combined Immunodeficiency (SCID)

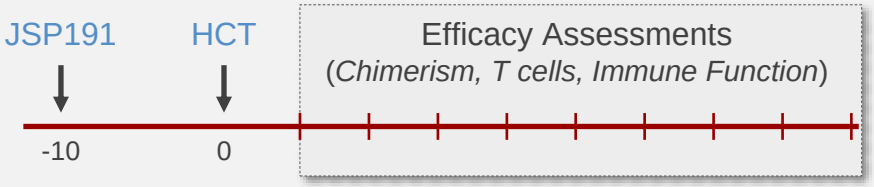
SCID is a lethal genetic immune disorder. HCT is the only proven cure, without it most infants die before the age of two years.

Jasper SCID Clinical Trial

Single Arm Trial Design

SCID patients

- Re-transplant
- Newly diagnosed (infants)



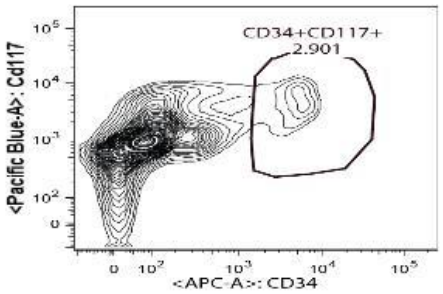
JSP191 Safe and Well Tolerated

- 12 re-transplant patients (*ages 3 – 37 years old*)
- 2 newly diagnosed/first transplant (*ages 3 and 6 months old*)
- No treatment related SAE
- FDA amendment to transition 191 to outpatient therapy

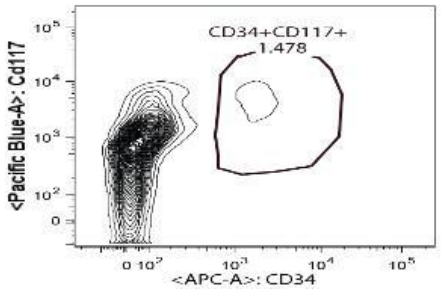
Representative Re-Transplanted Patient

Stem Cell Depletion

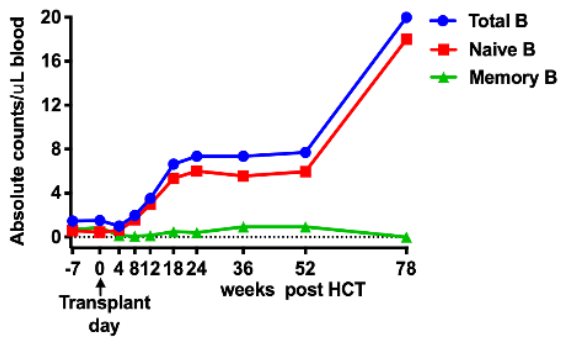
CD34$^+$ cells Before JSP191

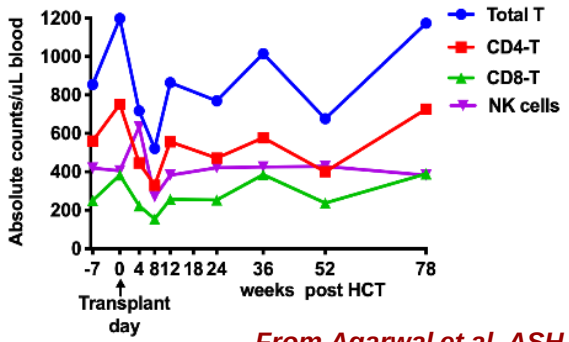


CD34$^+$ cells After JSP191



Immune Cell Reconstitution



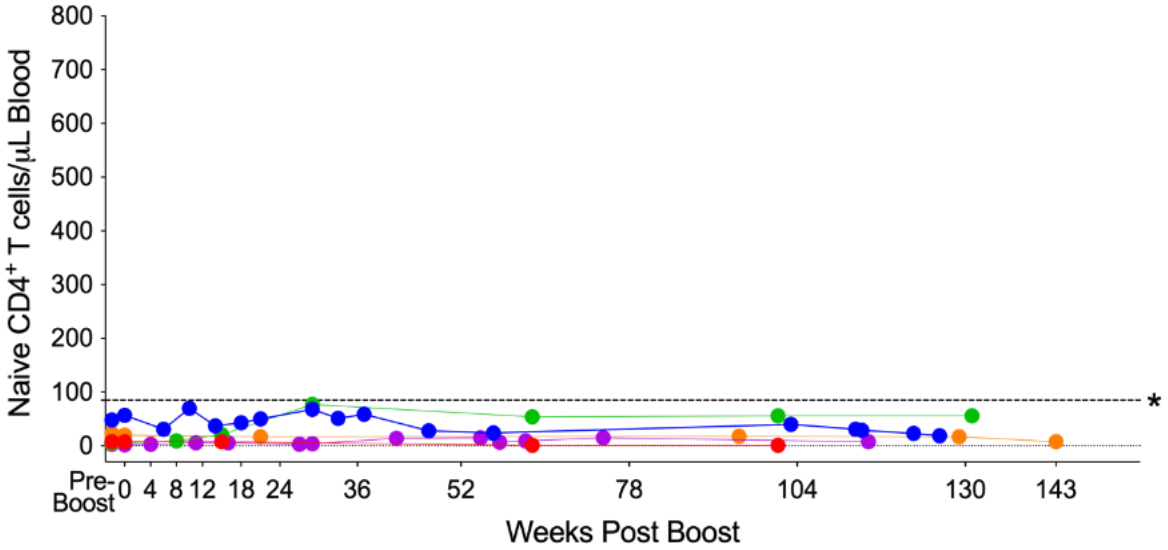


From Agarwal et al, ASH 2019

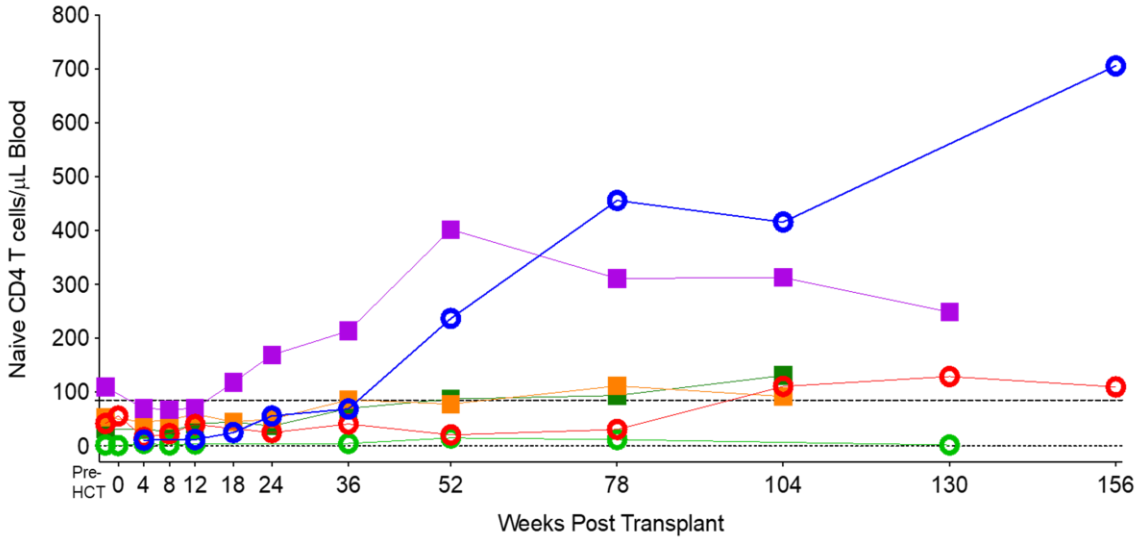
JSP191 Conditioning in SCID Clinical Studies to Date Demonstrates Durable Naive T-cell Production and Immune System Reconstitution

Naïve CD4 T cell production post- cell infusion

No Conditioning (Matched Historical Control)



JSP191 Conditioning



*Expected Level for Clinical Benefit

JSP191 MDS/AML Phase 1A Study: (n=6): MRD Positive Transplant Patients Not Eligible for Full Myeloablative Conditioning

Phase 1a Study

MRD positive MDS/AML patients (n=6) not eligible for standard myeloablative regimens (HCT-CI > 2)

JSP191 0.6mg/kg in combination with low dose radiation and fludarabine prior to stem cell transplant

Assessment of Activity:

- Neutrophil engraftment
- CD15+ chimerism
- MRD status

2021 ASCO® ANNUAL MEETING

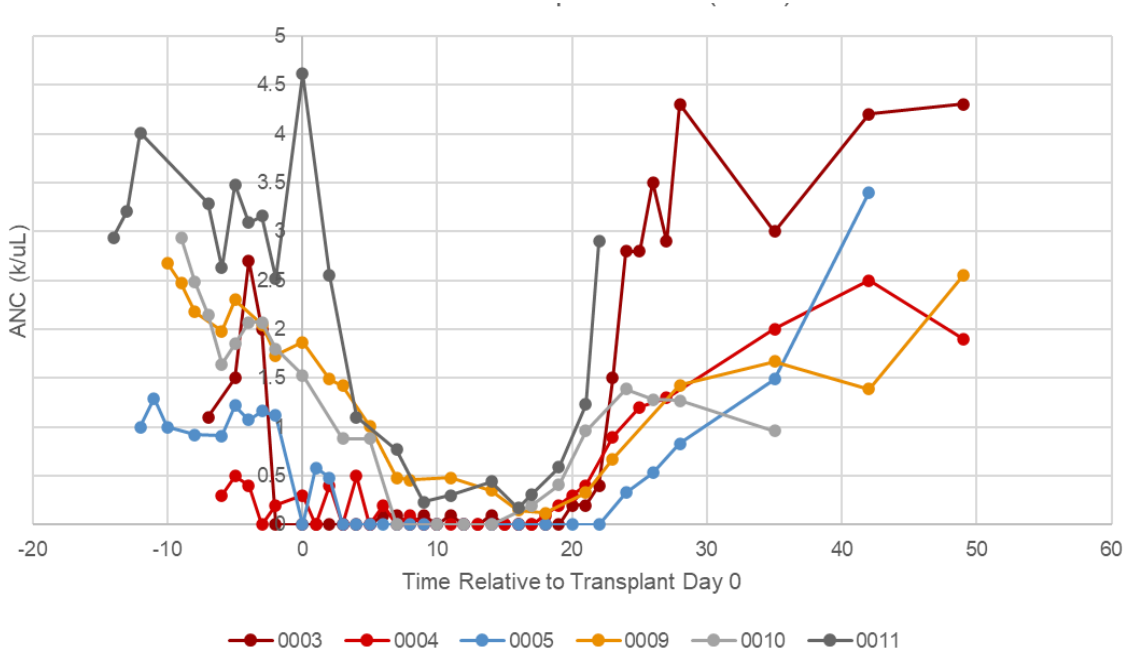
EQUITY: EVERY PATIENT. EVERY DAY. EVERYWHERE.

ClinicalTrials.gov NCT04429191

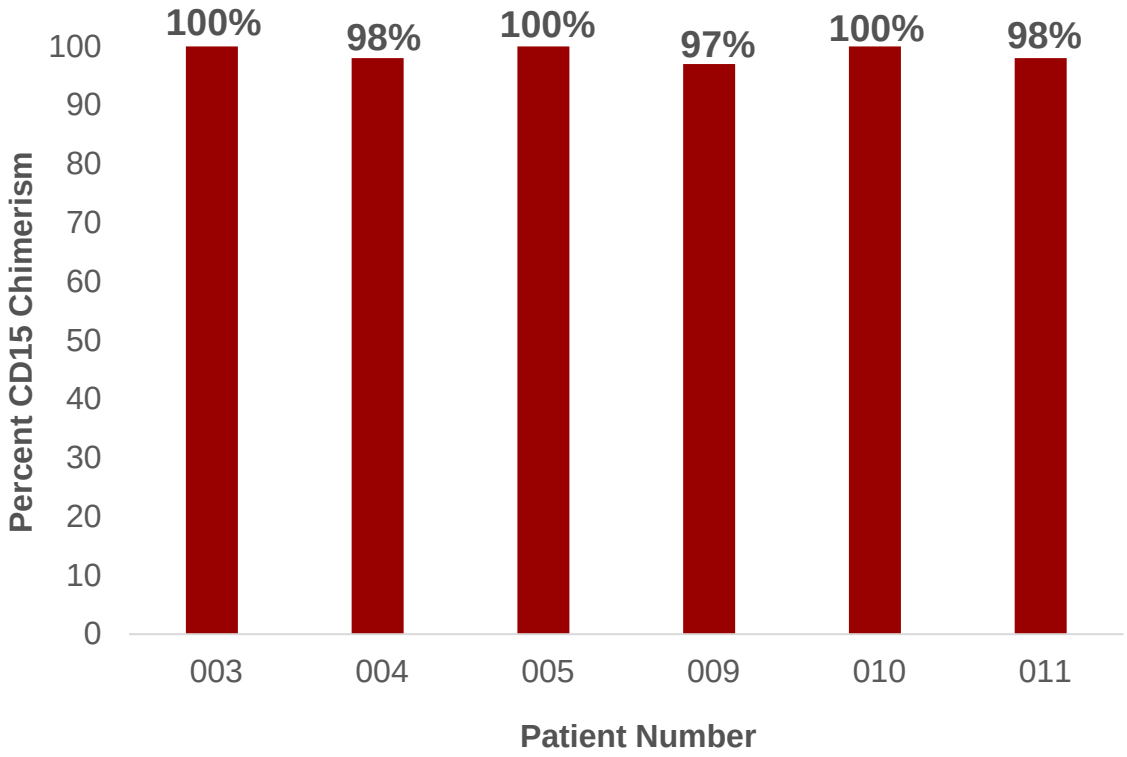
JSP191 MDS/AML: 100% Donor Cell Engraftment with >95% Myeloid Chimerism in Six of Six Patients

2021 ASCO ANNUAL MEETING
EQUITY: EVERY PATIENT. EVERY DAY. EVERYWHERE.

Absolute Neutrophil Count (k/uL)



Percent Myeloid Chimerism 90 days post-Transplant



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JSP191 Conditioning Leads to Successful Transplant and Conversion to MRD Negative Status/ MRD Reduction in Six of Six AML & MDS Patients

MRD Positive AML/MDS Patients Not Eligible for Standard Myeloablative Regimens (HCT-CI >2)

Age / Sex	Diagnosis	MRD Status at Baseline	MRD Status at Day 90
74yr F	AML	Positive	**Negative**
70yr M	MDS	Positive	**Negative**
68yr M	MDS	Positive	**Negative**
74yr M	MDS	Positive	**Negative**
65yr M	AML	Positive	**Negative**
69yr M	AML	Positive	Reduced

JSP191 MDS/AML Phase I Results: Safety and Tolerability Established

JSP191 with 200 cGy TBI plus 30 mg/m^2 x 3 days fludarabine
Patient ages 65-74 yrs
3 AML + 3 MDS patients

2021 ASCO ANNUAL MEETING
EQUITY: EVERY PATIENT. EVERY DAY. EVERYWHERE.

- Protocol allows for outpatient conditioning
- No infusion reactions
- No treatment related toxicities
- No evidence of grade 2-4 acute GVHD
- One subject with grade 1 acute skin GVHD diagnosed TD+80 (resolved)
- One subject with cGVHD diagnosed TD+159

JSP191 MDS/AML Ongoing Phase 1b Expansion Study: Patients in Remission Plus Patients With Active Disease (n=24-40), Top line data Q1 2022

MRD Positive MDS/AML Patients Not Eligible for Standard Myeloablative Regimens (HCT-CI >2)

Initial data expected to be reported Q1 2022 at academic medical conference

AML <5% blasts
n=6-10

MDS <5% blasts
n=6-10

MDS 5%-10% blasts
n=6-10

AML not in CR or MDS >10% blasts
n=6-10

⇨ **JSP191 0.6mg/kg**
+ Fludarabine
+ 300 cGy TBI
\+ HSC Transplant ⇨

Days 28, 56, 90, 180, 365

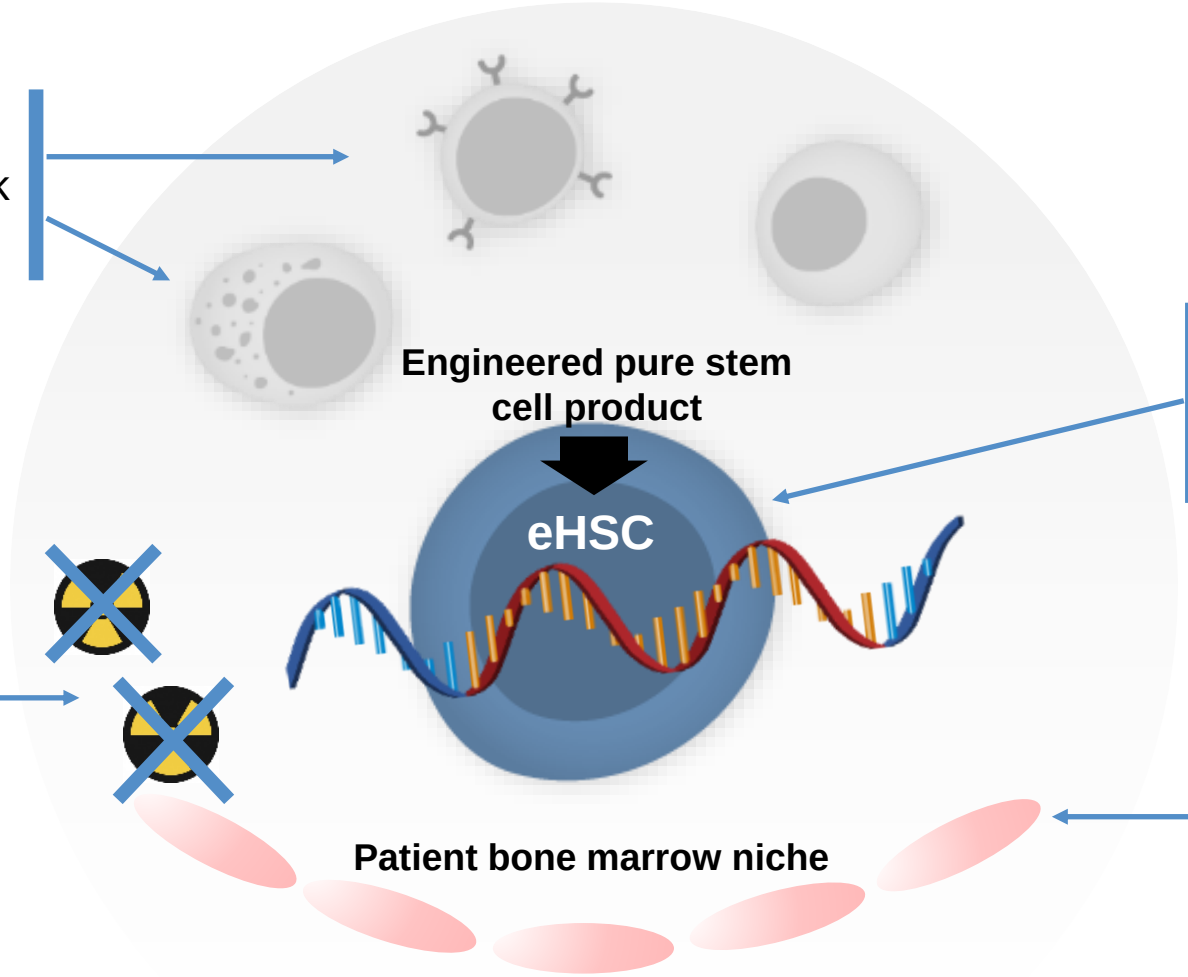
Assessment

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

ClinicalTrials.gov NCT04429191

Jasper RNA Engineered Stem Cell Grafts have Potential to Transform Allogeneic and Gene Therapy Transplant

Removes need for donor immune cells, eliminating risk of GVHD



Expands potential for off the shelf transplants

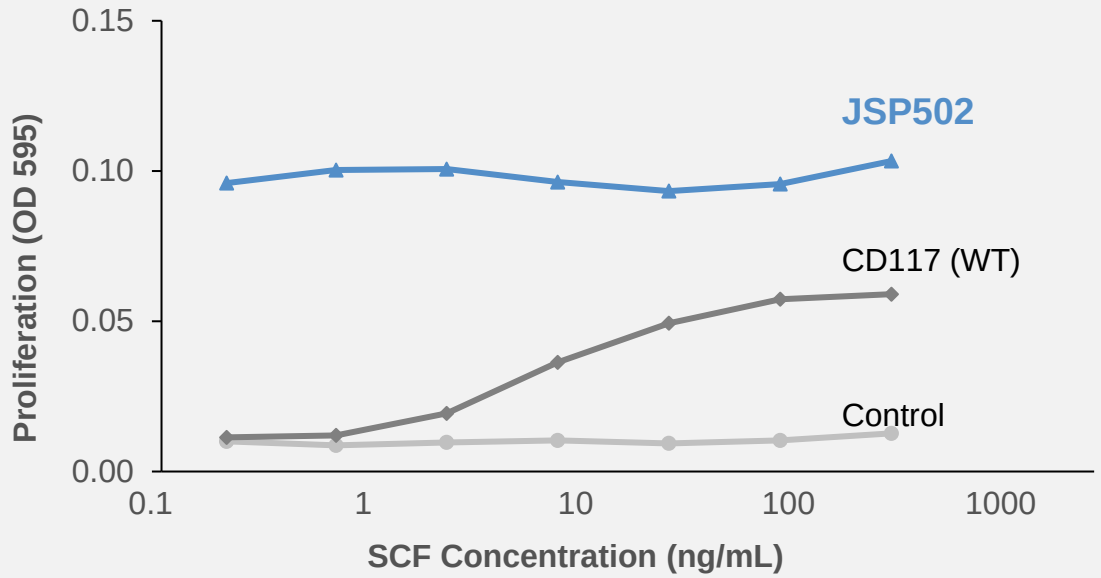
Reduces / eliminates need for toxic conditioning

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

Further modifications in development can go beyond these properties

Proof of Concept: JSP502 Engineered HSCs Can Proliferate Independent of Stem Cell Factor

JSP502 Reprograms Cells to SCF Independence and Faster Growth than CD117 Dependent Cells



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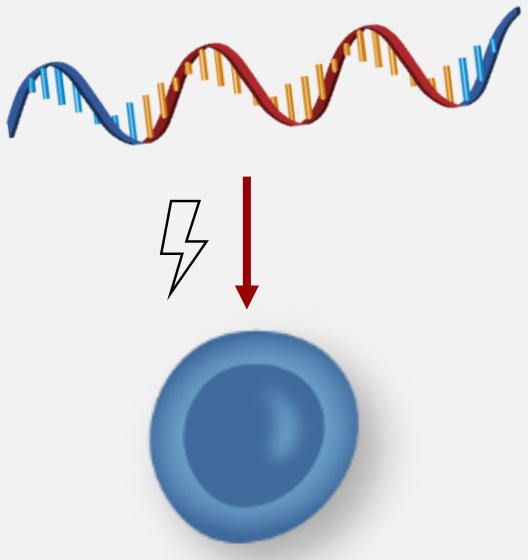
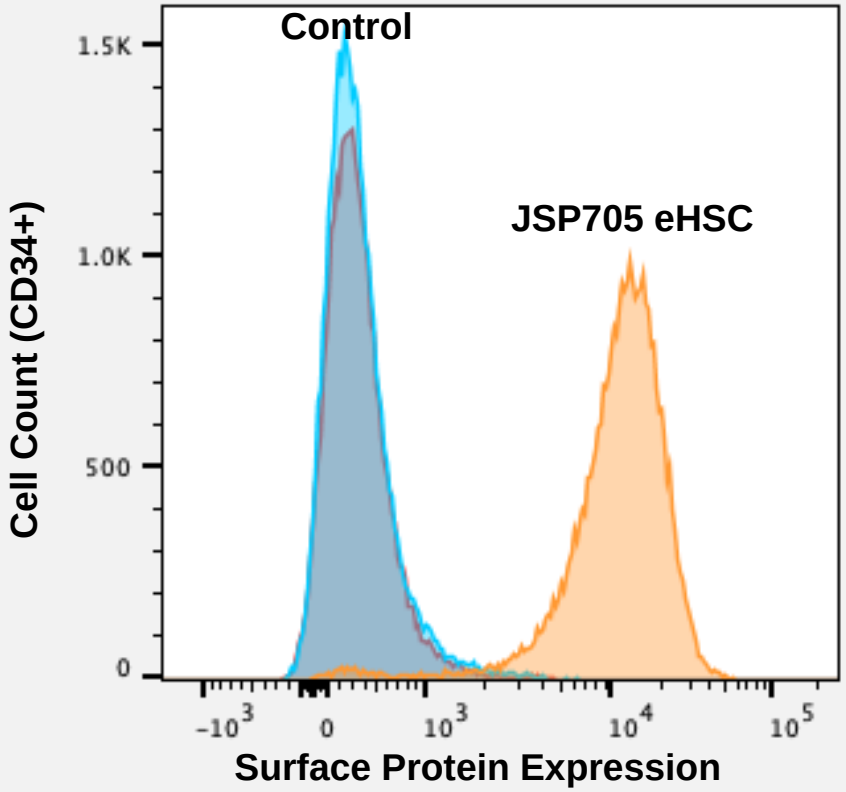
Proof of Concept: JSP705 Can Increase CXCR4 Surface Protein Expression in Human CD34+ Cells

mRNA Insertion

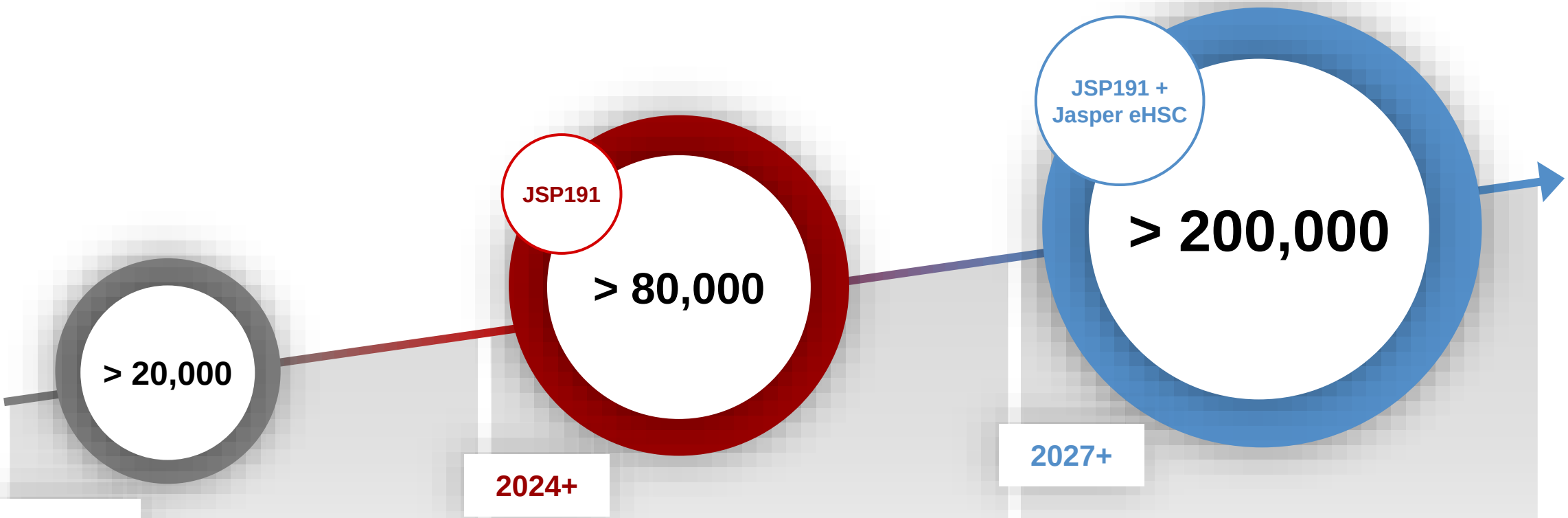


Jasper mRNA inserted into CD34+ cells via electroporation

JSP705 mRNA in CD34+ Cells



Jasper's Success Can Lead to a Replacement of Old Standard Modalities and Significantly Expand Potential Cures to Hundreds of Thousands of Patients



2021+

- Today we have cures, yet patient population is limited
- Highly toxic conditioning
- Graft failures & GvHD

2024+

- Targeting safer, more effective outpatient conditioning with JSP191
- Expanded allogeneic and autologous transplant population

2027+

- Jasper RNA engineering to further expand the use of curative stem cell & gene therapies
- Potentially routine cure for hundreds of thousands of patients

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