February 23, 2017

CIRM 2.0

CALIFORNIA'S STEM CELL AGENCY

Clinical Program Review
Agenda Item #13

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Vice President of Therapeutics

MISSION

CIRM's Mission

Accelerate stem cell treatments to patients with unmet medical needs.

Clinical Trials
Program funding at a glance

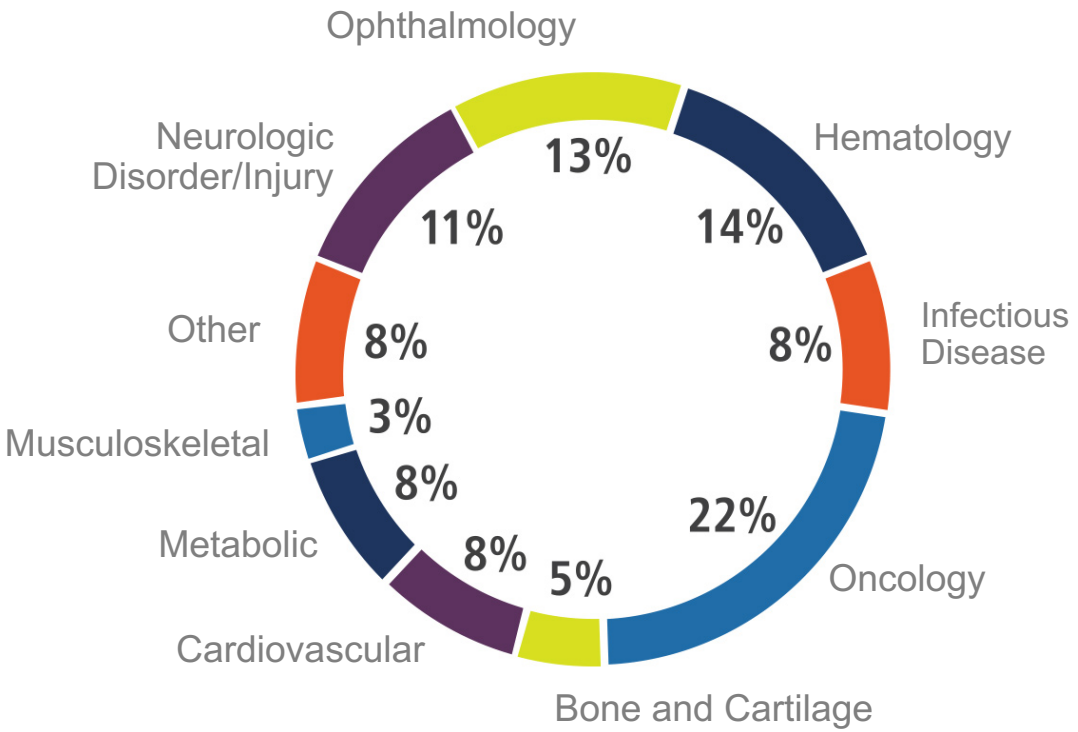
Beyond CIRM 2.0 now it's personal

All In All Out | Every Moment Counts

Clinical Trials
Program funding at a glance

Beyond CIRM 2.0 — California's Stem Cell Agency — now it's personal

Awards by Therapeutic Areas



Phase 1	19
Phase 2	4
Phase 3	3
Total	**27**

All In All Out | Every Moment Counts

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Clinical Portfolio Review

Ophthalmology

Clinical Trials

Ophthalmology Program Status

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Indication	Investigator / Organization	Phase	Status	Targeted Enrollment
Age- Related Macular Degeneration	**Humayun / USC**	**Phase 1/2a**	**Enrolling**	**20**
Retinitis Pigmentosa	**Klassen / UC Irvine**	**Phase 1/2a**	**Enrolled**	**28**
Retinitis Pigmentosa	**Klassen / jCyte**	**Phase 2b**	**Launching**	**Coming soon**

Clinical Trials

Ophthalmology Project Overview

Phase 1/2a Safety Assessment of CPCB-RPE1, hESC-derived RPE cell coated Parylene Membrane Implants in patients with Advanced Dry Age Related Macular Degeneration

Investigator:
Mark Humayun, MD, PhD

Institution: USC

Award: $17.1 Million

Phase 1/2a Trial:
Age-Related Macular Degeneration

Clinical Trials

Ophthalmology Project Overview

Phase 1/2a Safety Assessment of CPCB-RPE1, hESC-derived RPE cell coated Parylene Membrane Implants in patients with Advanced Dry Age Related Macular Degeneration

Investigator: Mark Humayun, MD, PhD
Institution: USC

Rationale

- *Dry AMD is a progressive disease that results in geographic atrophy and central vision loss*
- *Incidence of 1 in 1,359 for dry AMD in the US*
- *Cell replacement treatment that mimics the native "healthy" state of RPE cells on Bruch's membrane*

Design

- *Phase 1/2a open label trial*
- *Cohort 1: significant central vision loss and acuity ≤20/400*
- *Cohort 2: less advanced with acuity between 20/100 and 20/400*
- *Subretinal injection of 100,000 RPE cells on bio stable membrane*

Clinical Trials

Ophthalmology Project Overview

Phase 1/2a Safety Assessment of CPCB-RPE1, hESC-derived RPE cell coated Parylene Membrane Implants in patients with Advanced Dry Age Related Macular Degeneration

Investigator: Mark Humayun, MD, PhD
Institution: USC

Goal

- *Primary: Test safety & tolerability of sub-retinal delivery of RPE cells delivered on a bio stable membrane*
- *Secondary :*
  - ✓ *Visual Acuity*
  - ✓ *Visual Field*
  - ✓ *Photoreceptor Electrical Responses*

Status

- *Currently enrolling*
- *Project award end 7/31/18*

Clinical Trials

Ophthalmology Project Overview

Beyond CIRM 2.0 CALIFORNIA'S STEM CELL AGENCY now it's personal

Retinal progenitor cells for the treatment of Retinitis Pigmentosa (RP)

Investigator:
Henry Klassen, MD, PhD

Sponsor: UC Irvine

Award: $17.1 Million

Phase 1/2a Trial:
Retinitis Pigmentosa

Clinical Trials

Ophthalmology Project Overview

Beyond CIRM 2.0 — California's Stem Cell Agency — now it's personal

Retinal progenitor cells for the treatment of Retinitis Pigmentosa (RP)

Investigator: Henry Klassen, MD, PhD
Institution: UC Irvine

Rationale

- *Retinitis Pitmentosa (RP) is a severe form of blindness that runs in families with an Incidence of 1:4000*
- *Good target for stem cell therapy due to the defined loss of specific cells*
- *Proposed mechanism: Rescue the light sensing photoreceptors*

Design

- *Phase 1/2a*
- *Open-label, single-arm study*
- *Intravitreal injection of human retinal progenitor cells in worst seeing eye*
- *Ascending dose (0.5-3M cells) in 2 cohorts*

Clinical Trials

Ophthalmology Project Overview

Beyond CIRM 2.0 — California's Stem Cell Agency — now it's personal

Retinal progenitor cells for the treatment of Retinitis Pigmentosa (RP)

Investigator: Henry Klassen, MD, PhD
Institution: UC Irvine

Goal

- *Primary: Safety and Tolerability*
- *Secondary:*
  - ✓ *Visual Acuity*
  - ✓ *Visual Field*
  - ✓ *Fluorescein angiography*
  - ✓ *Optical coherence tomography*

Status

- *Phase 1/2a trial completed enrollment & dosing*
- *Project award end 12/31/17*
- *Basis for a Phase 2 Clinical Trial*

Clinical Trials

Ophthalmology Project Overview

Phase 2b Clinical Study of Safety & Efficacy of intravitreal injection of retinal progenitor cells (jcell) for treatment of Retinitis Pigmentosa

jCyte™

Investigator:
Henry Klassen, MD, PhD

Sponsor: jCyte

Award: $8.3 Million

Phase 2b Trial:
Retinitis Pigmentosa

Clinical Trials

Ophthalmology Project Overview

Phase 2b Clinical Study of Safety & Efficacy of intravitreal injection of retinal progenitor cells (jcell) for treatment of Retinitis Pigmentosa

Investigator: Henry Klassen, MD, PhD
Sponsor: jCyte

Rationale

- *Follow-on study based on Phase 1/2a clinical trial*
- *Continue to assess safety and establish efficacy*

Design

- *Phase 2b*
- *Single Dose*
- *Randomized 1:1*
- *Placebo-controlled with crossover option after 12 month follow-up of treated group*

Clinical Trials

Ophthalmology Project Overview

Phase 2b Clinical Study of Safety & Efficacy of intravitreal injection of retinal progenitor cells (jcell) for treatment of Retinitis Pigmentosa

Investigator: Henry Klassen, MD, PhD
Sponsor: jCyte

Goal

- *Improvement in visual function at 12 months*
- *Ocular Function Evaluation*
  - ✓ *Low vision tests for severe vision loss*
  - ✓ *Mobility test- visual fields, acuity, contrast sensitivity & dim light vision*

Status

- *Launching soon*

VISION

Rosie Barrero

- Mother of twin girls and son
- Diagnosed with RP at age 26
- Blind in both eyes at treatment
- Left eye injected September of 2015
- Visual acuity has improved to enable reading

VISION

"My dream was to see my kids. I always saw them with my heart but now I can see them with my eyes. Seeing their faces... is truly a miracle."

Rocco Baldelli