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The future of cell therapy.



OpRegen® Program Update 2021 ARVO Annual Meeting

May 3, 2021

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"We aim to pioneer a new branch of medicine, based on transplanting specific cell types into the body"

Business Overview

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Lineage Technology Platform – Allogeneic Cell Transplants

- The Lineage Platform starts
 with a frozen vial of self-renewing stem cells
- These pluripotent cells can become *any* cell type in the body
- Lineage's proprietary processes create only the cell type which is desired
- No alterations are made to the cell's DNA
- Commercial-scale production occurs from a single vial of cells





Pipeline and Validating Partnerships

Clinical Programs	Financial Support Received	Phase 1	Phase 2a	Next Steps
OpRegen[®] (RPE Cells) Dry AMD with Geographic Atrophy (GA)	רשות החדשנות Israel Innovation Authority \$16M			Enrollment completed
OPC1 (Oligodendrocytes) Spinal Cord Injury (SCI)	CRUFORNIAY / TEM CELL ROENCY \$14M			Data collected; planning for Phase 2b/3
VAC2 (Dendritic Cells) Non-Small Cell Lung Cancer (NSCLC)	CANCER RESEARCH UK \$10M			1 patient left to enroll



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OpRegen[®]: **RPE Cell Transplants to Treat Dry AMD**

Dry AMD Can Lead Rapidly to Blindness





Multi-Billion Dollar Market Opportunity in the U.S.

Age-related Macular Degeneration (AMD) (all forms) afflicts ~11 million people in the United States

Type of AMD	% of AMD Cases	FDA Approved Therapies
Wet AMD	10 – 15%	Lucentis & Eylea (\$10 Billion in annual sales)
Dry AMD	85 – 90%	None





Sources: (1) Bright Focus Foundation. Macular Degeneration Facts & Statistics: Bright Focus Foundation. <u>http://www.brightfocus.org/macular/about/understanding/facts.html</u>; (2) JM Seddon, Epidemiology of age-related macular degeneration. (AP Schachat, S Ryan eds.) Retina, 3rd ed. St. Louis, MO: Mosby; 2001;1039-50; (3) 2018 product sales summary based on publicly reported revenue figures for Lucentis and Eylea.

Lineage Approach – OpRegen, an RPE Cell Transplant

- Dry AMD involves the loss of retina cells, creating an area of geographic atrophy (GA), which causes impaired vision and blindness
- OpRegen is an injection of RPE cells beneath the retina, to replace lost retinal cells, recover function, and preserve or improve vision



Post-Transplant

Pre-Transplant



Dry AMD Competitive Landscape

Only cell therapy or gene therapy can offer infrequent dosing -and-

Only Lineage has shown clinical evidence of retinal restoration

Cell Therapy

- Lineage Cell (Ph1/2)
- Astellas (Ph1/2)*
- Regen. Patch (Ph1/2)
- jCyte/Santen (Preclinical)

*Via acquisition of Ocata Therapeutics for \$379M

Oxidative Stress Approaches

- Alkeus (Ph3), Vitamin A "dimers"
- Allegro (Ph2), integrins
- Stealth Bio (Ph2), mitochondria
- Boehringer (Ph1), inflammasome



Complement Inhibition/ Anti-Inflammatory MOA • Apellis (Ph3)

- Iveric (Ph3)
- Roche (Ph2)
- Annexon (Ph 2)
- NGM (Ph1)
- Biogen (Preclinical)
- ONL Therapeutics (Preclinical)

Gene Therapy

- Gyroscope (Ph1/2)
- Hemera/Janssen (Ph1)
- Novartis (Preclinical)⁺

†Via acquisition of VedereBio for \$280M

Commercial-Scale Manufacturing Capabilities

- OpRegen consists of >99% pure RPE cells
 - Uses NIH-approved line was established >20 years ago
 - Extensive characterization and karyotyping performed on each batch
 - No genetic modifications are made to the cells
- Immediate-use "thaw and inject" formulation
 - No dose preparation is required
 - From frozen cells to injection device in 5 minutes
- Current production scale is 5 billion cells per 3-liter bioreactor
 - Equal to 2,500 clinical doses/batch
 - Further scale-up can be performed in larger or parallel reactors





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Phase I/IIa Clinical Trial of Transplanted Allogeneic Retinal Pigmented Epithelium (RPE, OpRegen) Cells in Advanced Dry Age-Related Macular Degeneration (AMD): Interim Results

2021 ARVO Annual Meeting Data Summary

Ongoing Phase 1/2a Clinical Trial of OpRegen for Dry AMD





Primary Objective

 To evaluate the safety and tolerability of subretinally transplanted hESC - derived RPE cells (OpRegen) in patients with advanced dry age-related macular degeneration (AMD) and geographic atrophy (GA)

Secondary Objective

 To evaluate survival and possible effects of OpRegen treatment by assessing changes in retinal structure and function

Exploratory Objective

 Evaluate safety in Cohort 4 participants who receive a subretinal injection of OpRegen "thaw and inject" (TAI) preparation using the Orbit[™] Subretinal Delivery System (Orbit SDS)*



Phase I/IIa Clinical Trial Design, Population, Management

Parameter	Cohorts 1-3 (legally blind) n = 12 of 12 planned (<i>complet</i> e)	Cohort 4 (better BCVA) n = 12 of 12 planned <i>(complete)</i>	
Phase / design	Phase I-IIa; staggered design; IND (NCT02	286089)	
Duration	Screening up to 8 Weeks; short term F/U – 1 year; long term F/U – 4 years		
Management	Central reading/central labs/Independent DSMB/Advisory Committees		
Treated disease	Advanced Dry AMD and GA		
Subretinal Dose (delivered via PPV and retinotomy {n = 17} or SDS {n = 7})	Cohort 1: 50K cells Cohorts 2-3: up to 200K cells	Up to 200K cells	
BCVA	≤ 20/200	≤ 20/64 and ≥ 20/250	
GA size – Central Reading assessment	\geq 1.25mm ² and \leq 17 mm ²	\geq 4 mm ² and \leq 11 mm ²	
Historical Growth of GA	N/A	SQRT per year of > 0.25 mm	
Cataract status	Not defined	Pseudophakic or phakic w/ Orbit SDS	
Significant concomitant diseases exclusion (systemic / ocular)	Defined <i>a priori</i>		
Immunosuppression	PO tacrolimus from 1 week prior to Sx until 6 weeks post-op PO mycophenolate from 1 week prior to Sx to at least 3 months post-op		



Phase I/IIa Clinical Trial Status and Baseline Characteristics

	Cohorts 1 - 3 (legally blind) Recruitment complete (n = 12		Cohort 4 (better VA) Recruitment complete (n = 12)		
	Pars plana vitrectomy (PPV) and retinotomy	PPV and retinotomy (n = 5)	Orbit SDS (n = 7)		
n (%) subjects dropout	2 (17%) (2 medical illness)	1 (12.5%) (Withdrawal of consent/COVID)	0		
Age: mean (SD / min - max), yrs	78.3 (± 8.2 / 64.8 - 92.2)	78.1 (± 2.8 / 74.6 - 81.0)	74.2 (± 10.4 / 60.9 - 88.5)		
ETDRS BCVA: mean (SD / min - max)	23.7 (± 11.7 / 0 - 39) letters [24 letters ≈ 20/400]	49.6 (± 3.8 / 45 - 54) letters [50 letters ≈ 20/100]	41.4 (± 8.9 / 28 - 55) letters [41 letters ≈ 20/160]		
GA area: mean (SD / min - max)	12.7 (± 6.7 / 6 - 30) mm²	6.2 (± 2.8 / 1.4 - 8) mm²	8.2 (± 2.9 / 4 - 11) mm²		
Post-op cumulative F/U period	45 years	9.7 years	6.9 years		
Mean F/U (days)	1369 days (SE ± 159)	711 days (SE ± 204)	361 days (SE ± 74)		



Phase I/IIa Clinical Trial Primary Endpoint Overview

- In Cohort 1-3 patients (legally blind at baseline), visual acuity (VA) reductions occurred as expected due to progressive GA;
- In Cohort 4 patients (smaller areas of GA and higher baseline BCVA), improved or sustained BCVA has been observed in 10/12 (83%) patients as of their last visit prior to this update (range of -7 to +19 ETDRS letters);
- OpRegen continues to be well-tolerated in all treated patients (N = 24)
- No acute or delayed inflammation and no sustained increased intraocular pressure (IOP) have been observed;
- While all patients reported at least one adverse event (AE), the majority of AEs were mild (87%);
- AEs in Eye Related Disorders System (n = 165 events):
 - n = 136 in PPV treated patients (n = 17 patients; 54.7 years F/U),
 - n = 29 in Orbit SDS treated patients (n = 7 patients; 6.9 years F/U).



Phase I/IIa Clinical Trial Primary Endpoint: Systemic and ocular safety and tolerability (*continued*)

AE Term		PPV / Retinotomy Treated (n = 17)	Orbit SDS Treated (n = 7)	
Conjunctival Hemorrhage		9 / 17	6 / 7	
Limited Subretinal Hemorrhage		1 / 17 (asymptomatic & auto resolved)	4 / 7 (asymptomatic & auto resolved)	
Any form of Macular Fibrosis (ERM)		15 / 17	1/7	
Subretinal Pigmer	ntation	10 / 17 (potentially a positive finding)	2 / 7 (potentially a positive finding)	
Subretinal Fluid, persisting >24h		4 / 17 (all resorbed within 72h)	4 / 7 (2 of 4 resorbed <72h) One (1) patient had persistent SRF for 3 months until complete resorption without treatment	
CNV		1 / 17 (began >2 yrs post-procedure) – continues to undergo regular anti-VEGF therapy and is responsive	3 / 7 - One (1) Type 2 CNV – 6M post-op at choroidal puncture site, successfully treated with single administration of an anti-VEGF, 2 others at area of GA occurred <6M post-op and have received one anti-VEGF, appear responsive	
Lamellar or macular hole		2 / 17 (associated with ERM)	1 / 7 (resolved without treatment or sequelae)	
Retinoschisis		2 / 17 (associated with ERM)	1/7	
Retinal tear		2/17	0/7	
Dcular SAEs PPV Treated (n = 17) - 5 events in 4 patients			Orbit SDS Treated (n = 7)	
ERM	3/17, clinically significant, severe ERM requiring surgical peel, all su		iccessful	0/7
Retinal Detachment	ent 2/17 (2 weeks post-procedure; not related to the study medication/RPE cells; considered to be related to surgical procedure/PPV and/or due to peripheral 0 / 7 retinal tear/hole, 1 RD was successfully repaired, 1 failed to recover)			0 / 7



Case Study (Patient #18) – 9 Months Post-op



OpRegen TAI / Orbit SDS Treated

 Area of transplant and
 evidence of continued presence of RPE cells 9M post-transplant



Case Study (Patient #18) – Subretinal Fluid, Resolved w/o Intervention





Case Study (Patient #18) – Subretinal Fluid, Resolved w/o Intervention





Case Study (Patient #18) – CNV 6 months post-operative

New area of CNV, not in area of needle penetration, noted at 6M post-op, anti-VEGF therapy initiated; patient appears responsive as of last study visit





Case Study (Patient #16) – Mild Subretinal Hemorrhage, Resolved





Case Study (Patient #16)— Type 2 CNV Successfully Treated with anti-VEGF



9M post-op - formation of fibrosis with early de-pigmentation in the area of Orbit SDS needle penetration, which had expanded at 1-year post-op with SRF



On FA, the lesion filling begins in the arteriovenous and venous stage, with max staining at late stage – also suggesting choroidal pathology – Type 2 CNV





Case Study (Patient #16)— Type 2 CNV Successfully Treated with anti-VEGF



- Subsequent recheck approximately 21M post-OpRegen (7 months post-anti-VEGF) show no evidence of recurrence or fluid and no clinical indication for additional anti-VEGF
- There appears to be some area of asymptomatic scarring, likely at site of needle penetration, most clearly visible via FAF



Case Study (Patient #24) – Subretinal hemorrhage



- Long procedure with surgical access problems
- Subretinal hemorrhage noted 1 day post-op
- Auto-resolved 3 months post-op
- Without intervention
- No adverse sequelae



Case Study (Patient #22) – Auto-resolving Incomplete Macular Hole



Incomplete macular hole with hyaloid & ILM bridge



Case Study (Patient #22) – Potential New CNV





Case Study (Patient #22) Vision in Treated Eye Drastically Improved

BCVA Changes (via Orbit SDS) Treated vs. Fellow Eye



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Cohort 4 Clinical Efficacy Assessments BCVA and GA

N = 12 Better VA (≤ 20/64 and ≥ 20/250) n = 3 PPV, old OpRegen formulation n = 2 PPV, OpRegen "Thaw and Inject" n = 7 Orbit SDS, OpRegen "Thaw and Inject"

Improvements in Visual Acuity Observed

Cohort 4 BCVA – Individual Changes in Number of ETDRS Letters Read from Baseline





Improvements in Visual Acuity Observed





A Trend Towards Slower Atrophy Growth Observed

Individual Changes in Cohort 4 GA (mm²)





A Trend Towards Slower Atrophy Growth Observed

Mean Change in Cohort 4 GA (mm²) – Treated and Fellow Eye



Individual Responder with Durable Improvements

BCVA and GA (mm²) Changes for Patient #14 Treated vs. Fellow Eye





Reading Speed Appears Improved in Treated Eyes

Cohort 4 Reading Speed (MNRead) – Individual Changes in All Eyes with Post-Baseline Assessment



---Pt. #13 (4 - #1)--Pt. #16 (4 - #4) *--Pt. #17 (4 - #5) *--Pt. #18 (4 - #6) *

Time Post-Implantation (months) * – OpRegen TAI/Orbit SDS



Positive Patient-Reported Outcomes (Quality of Life Questionnaire)

- National Eye Institute (NEI) Visual Function Questionnaire (VFQ-25)
- 25 vision-related questions reported across 11 constructs
- Improvement occurred in 9 of 11 categories and remained unchanged in one category in Cohort 4 patients

	Category	N (%) Change from Screening to Year 1 (n=5 available to date)
1.	General Vision	4/5 (80%) patients reported improvement
2.	Ocular Pain	2/5 (40%) patients reported improvement
3.	Near Activities	5/5 (100%) patients reported improvement
4.	Distance Activities	3/5 (60%) patients reported improvement
5.	Vision Specific: Social Functioning	3/5 (60%) patients reported improvement
6.	Vision Specific: Mental Health	5/5 (100%) patients reported improvement
7.	Vision Specific: Role Difficulties	4/5 (80%) patients reported improvement
8.	Vision Specific: Dependency	3/5 (60%) patients reported improvement
9.	Driving	0/5 (0%) patients reported improvement (only 2 subjects were driving at screening)
10.	Color Vision	0/5 (0%) no change from screening (all patients previously reported highest possible score, no improvement possible)
11.	Peripheral Vision	2/5 (40%) patients reported improvement



Previously Reported Study Observations Continue

- OpRegen continues to be well-tolerated in all treated patients (N = 24);
 - Even in 2 patients with less immunosuppression (COVID or other health conditions)
- Sustained subretinal pigmentation continues to suggest OpRegen durability;
- Improved anatomy and function in some patients continues to be observed:
 - Reduction in drusen
 - Restoration of photoreceptor and RPE layers in some patients.
 - Localized slowing of GA progression in treated areas and a trend towards slower GA growth in treated versus fellow eyes continue to be observed.
 - Better visual acuity, VFQ-25 scores, and reading speed have been observed in some early Cohort patients and most Cohort 4 patients.
- Earlier intervention in less severely affected patients and more central placement of the transplanted OpRegen cells may increase likelihood of a clinically beneficial effect;



Study Conclusions and Discussion

- Post-treatment surgical interventions occurred in four cases (5 events in 4 patients);
 - Three epiretinal membranes (ERM) were surgically peeled. Mild to moderate ERM were observed in an additional 12 of 17 PPV operated patients. Most ERMs were clinically insignificant.
 - Retinal detachment (RD) was observed in 2 out of 17 patients receiving cells via PPV and retinotomy, neither of which appears to be attributable to OpRegen or any study related medications:
 - The first case of RD, in a Cohort 3 patient, was an unsuccessful repair of a post-surgical retinal tear; visual acuity did not regain baseline levels;
 - The second case of RD, in a Cohort 4 patient, was successfully repaired; post-surgical visual acuity has remained higher than baseline.
- No Orbit SDS patient has required reoperation to date; multiple devices were utilized in 5 out of 7 patients;
- CNV was observed in 3 out of 7 patients receiving OpRegen via the Orbit SDS, all of whom received treatment with an approved anti-VEGF;



Study Conclusions and Discussion (continued)

- OpRegen TAI formulation delivered was utilized in 7 Orbit SDS and 2 PPVtreated patients;
- Slow resorption of subretinal fluid, without sequelae, was observed in Orbit SDS / TAI treated patients;
- Enrollment is complete, follow-up is ongoing;
- Ongoing assessments of clinical benefit are utilizing detailed OCT analyses in addition to standard FAF measurements;
- Due to the slow progressive nature of dry AMD with GA, patients will be followed for further evaluation of reductions in growth rate of GA.



Promising Results (ARVO 2021 Summary)

- 83% of all Cohort 4 patients (the intended commercial population) have experienced increased BCVA
- Visual acuity continues to decline in the majority (83%) of untreated eyes
- Positive interim patient-reported outcomes reported on NEI Visual Function Questionnaire
- OpRegen cell transplant has been well tolerated with no cases of rejection
- Immunosuppressive regimen has been reduced from 1 year to ~90 days
- A trend towards slower GA growth has continued
- Encouraging findings across unrelated assessments; various patients have exhibited evidence for one or more of:
 - 1. Reduced growth of geographic atrophy
 - 2. Improved visual acuity, reading speed, and/or retina structure
 - 3. Reductions in waste material (drusen)
 - 4. Stable engraftment of cells (5+ years and counting)
 - 5. Previously reported evidence of retinal restoration has persisted to month 35 (continuing to monitor)

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OpRegen – **Positioned for Commercial Success**

OpRegen has been designed to capture a more than billion-dollar opportunity:

- Transplanting RPE cells may provide benefits other approaches cannot
- Market opportunity is not limited to monogenic deficiencies (e.g. gene therapy)
- Treatment to date has been well-tolerated
- Some patients have exhibited clinically meaningful improvements in clinicallyrelevant metrics such as visual acuity, GA growth, and reading speed
- Potential for recurring revenues, but with multiple treatments years apart
- May have application in other retinal diseases (example: Stargardt's Disease)
- Issued patents cover aspects of production, characterization, and formulation
- Fast Track designation from FDA
- Exclusive option to evaluate alternate delivery device
- Opportunities for strategic partnerships for late-stage development



Our Goal is to Provide Life-Changing Cell Therapies to Patients

Lineage Cell Therapeutics: Bringing the Promises of Cell Therapy into Clinical Reality











3 clinical-stage programs with billion-dollar potential and partnership opportunities World class in-house process development and GMP manufacturing One of the largest patent portfolios in cell therapy Funded well into 2023 with cost-efficient business model Leader in the emerging field of regenerative medicine



The Patients Are Our Inspiration. View their stories at lineagecell.com/media/#patients

OPC1 SCiStar Study Participants





Lucas Lindner

"There's no reason to not look forward in the same way now that I had before all of this happened. I'm looking forward to driving again... it's a bright future."



Kris Boesen

"I couldn't drink, couldn't feed myself, couldn't text or pretty much do anything, I was basically just existing. I wasn't living my life, I was existing."



Jake Javier "Even though it's a completely different perspective, I can still lead that way. I can just try to be the best I can and to persevere the best I can." Diablo Magazine, Feb. 16, 2017

The Millions Worldwide Suffering from Dry AMD **Vision Loss**

"Macular degeneration is a very frustrating condition which can greatly affect your day-to-day life."







Courtesy of CIRM, American Macular Degeneration Foundation, and Macular Society