

ARVO 2022

## View Abstract

**CONTROL ID:** 3713501**SUBMISSION ROLE:** Abstract Submission**AUTHORS**

**AUTHORS (LAST NAME, FIRST NAME):** Al-Nawaiseh, Sami<sup>1, 2</sup>; Burri, Christian<sup>6, 3</sup>; Schulz, André<sup>1, 4</sup>; Wakili, Philip<sup>1</sup>; Farese, Gerardo<sup>1</sup>; Kroetz, Christina<sup>5</sup>; Salzmann, Simon<sup>6</sup>; Ralf, Brinkmann<sup>7, 8</sup>; Gasparini, Sylvia J.<sup>9</sup>; Povazay, Boris<sup>6</sup>; Frenz, Martin<sup>3</sup>; Szurman, Peter<sup>1, 4</sup>; Ader, Marius<sup>9</sup>; Stanzel, Boris V.<sup>1, 4</sup>

**INSTITUTIONS (ALL):** 1. ophthalmology, Eye clinic sulzbach, Sulzbach, Saarland, Germany.

2. ophthalmology, University of Muenster, Münster, North Rhine-Westphalia, Germany.

3. Institute of Applied Physics, Universität Bern, Bern, Bern, Switzerland.

4. Klaus Heimann Eye Research Institute, Sulzbach, Saarland, Germany.

5. Fraunhofer IBMT, Sulzbach, Saarland, Germany.

6. Institute for Human Centered Engineering, Berner Fachhochschule, Bern, Bern, Switzerland.

7. Medical Laser Center Lübeck, Lübeck, Germany.

8. Institute of Biomedical Optics, Universität zu Lubeck Sektion Medizin, Lubeck, Schleswig-Holstein, Germany.

9. DFG Center for Regenerative Therapies Dresden, Technische Universität Dresden, Dresden, Sachsen, Germany.

**Commercial Relationships Disclosure:** Sami Al-Nawaiseh: Commercial Relationship(s);Code R (Recipient):Heidelberg Engineering | Christian Burri: Commercial Relationship(s);Code R (Recipient):Heidelberg Engineering | André Schulz: Commercial Relationship: Code N (No Commercial Relationship) | Philip Wakili: Commercial Relationship: Code N (No Commercial Relationship) | Gerardo Farese: Commercial Relationship: Code N (No Commercial Relationship) | Christina Kroetz: Commercial Relationship: Code N (No Commercial Relationship) | Simon Salzmann: Commercial Relationship: Code N (No Commercial Relationship) | Brinkmann Ralf: Commercial Relationship: Code N (No Commercial Relationship) | Sylvia Gasparini: Commercial Relationship: Code N (No Commercial Relationship) | Boris Povazay: Commercial Relationship: Code N (No Commercial Relationship) | Martin Frenz: Commercial Relationship: Code N (No Commercial Relationship) | Peter Szurman: Commercial Relationship(s);Code C (Consultant/Contractor):Geuder, Novartis, Bayer | Marius Ader: Commercial Relationship: Code N (No Commercial Relationship) | Boris Stanzel: Commercial Relationship(s);Code C (Consultant/Contractor):Geuder, Novartis, Apellis;Code F (Financial Support):Geuder, Catalent, Vitreq, Medone Surgical;Code R (Recipient):Bayer, Iridex, Heidelberg Engineering, Geuder

**Study Group:** (none)

**ABSTRACT**

**TITLE:** Short-term follow up after Large-Area RPE Removal by Microsecond Laser followed by hiPS-RPE suspension transplantation in rabbits

**ABSTRACT BODY:**

**Purpose:** Cell therapy is a promising treatment for retinal pigment epithelium (RPE)-associated eye diseases. Herein, microsecond laser irradiation targeting RPE cells was used for large-area RPE removal followed by subretinal injection of human induced pluripotent stem cell derived RPE (hiPS-RPE).

**Methods:** 19 immunosuppressed pigmented rabbits (Chinchilla bastard hybrid) underwent a large area RPE removal using an infrared reflectance (IR) confocal scanning laser ophthalmoscope (cSLO) with spectral-domain optical coherence tomography (SD-OCT) system (Heidelberg Engineering ) extended with a prototype laser (modified Merilas 532 shortpulse ophthalmic laser photocoagulator, Meridian Medical) (wavelength, 532 nm; pulse duration, 8 µs), followed by a 25G vitrectomy. Subsequently, a suspension of hiPS-RPE (1000 cells/µl) was grafted subretinally into the RPE laser lesion under real-time intraoperative OCT imaging (RESCAN 700, Zeiss) by manual injection via a 25/38G cannula connected to a 100µl Hamilton syringe. 5 rabbits served as a control with hiPS-RPE injected subretinally over healthy RPE. The rabbits were followed with in vivo multimodal retinal imaging at baseline after laser and then for 7 days including fluorescein (FA) and indocyanine angiography (ICGA), as well as SD-OCT (Spectralis®, Heidelberg Engineering).

**Results:** Baseline imaging of RPE laser wounds showed mild late phase FA/ICGA leakage, with normal outer retinal and choroidal reflectivity on OCT, without signs of coagulation. The size of the RPE wounds was

typically 10-12mm<sup>2</sup>. Real time iOCT showed a directed spread of the bleb retinal detachment (bRD) within the lasered zone, in contrast to a circular spread in controls. Subretinal injection ranged from 5-20µl, with lesser volumes/ larger bRD areas over lasered regions. At 7 days, implanted regions showed FA/ICGA leakage, blockage due to hyperpigmentation was observed mostly at the edges of the lasered zone; OCT showed hyperreflectivity of the outer retina with RPE irregularities. Control implantation sites showed hyperreflectivity in all retinal layers and a variably thickened RPE band suggesting clumping.

**Conclusions:** Microsecond laser irradiation to the RPE seems to accelerate the subretinal integration of hiPS-RPE, when compared to subretinal injection over intact RPE. Future work will address correlation of multimodal imaging and histology.

(No Image Selected)

**Layman Abstract (optional): Provide a 50-200 word description of your work that non-scientists can understand. Describe the big picture and the implications of your findings, not the study itself and the associated details.:** The results from this study hints that RPE cell suspension transplants implanted onto a laser lesion might integrate as a monolayer. Laser pretreatment with subsequent minimally invasive subretinal RPE injection may enhance technology adoption given a simplified procedure.

#### **DETAILS**

**PRESENTATION TYPE:** Poster Only

**CURRENT REVIEWING CODE:** 1420 Retina/RPE: Transplantation, clinical - RE

**CURRENT SECTION:** Retina

**Clinical Trial Registration (Abstract):** No

**Other Registry Site (Abstract):** (none)

**Registration Number (Abstract):** (none)

**Date Trial was Registered (MM/DD/YYYY) (Abstract):** (none)

**Date Trial Began (MM/DD/YYYY) (Abstract):** (none)

**Grant Support (Abstract):** No

**Support Detail (Abstract):** none

#### **TRAVEL GRANTS and AWARDS APPLICATIONS**

**AWARDS:**

---

© Clarivate Analytics | © ScholarOne, Inc., 2022. All Rights Reserved.

ScholarOne Abstracts and ScholarOne are registered trademarks of ScholarOne, Inc.

ScholarOne Abstracts Patents #7,257,767 and #7,263,655.

[@ScholarOneNews](#) | [System Requirements](#) | [Privacy Statement](#) | [Terms of Use](#)

Product version number 4.17.4 (Build 128), Build date Mon Jan 10 10:13:50 EST 2022. Server ip-10-236-27-165