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Biomaterial made from fish scales for short-term closure of defects affecting the entire thickness of the cornea

Submission date 19/04/2022	**Recruitment status** No longer recruiting	[_] Prospectively registered [_] Protocol
Registration date 25/07/2022	**Overall study status** Completed	[_] Statistical analysis plan [_] Results
Last Edited 25/07/2022	**Condition category** Eye Diseases	[_] Individual participant data [_] Record updated in last year

Plain English summary of protocol

Background and study aims

There are many diseases of the cornea (clear, protective outer layer of the eye) that can lead to corneal a hole (perforation). Since in this situation there is direct access germs can penetrate the interior of the eye through such a defect and cause severe destruction. Furthermore, the liquid that fills the inside flows out through the defect, which causes the pressure inside the eye to drop. If the pressure in the eye is very low, destructive bleedings inside the eye can occur. These consequences of a penetrating corneal perforation often result in permanent visual impairment. For this reason, penetrating corneal perforations are treated as emergencies. The perforations can be closed with corneal tissue from deceased persons, but such tissue is not available at short notice in most regions of the world. A novel product called ologen™ Biocornea is used to temporarily close such corneal perforations until corneal tissue from deceased persons is available. This product is made from fish scales of a tilapia fish species. Fish scales are a by-product of this very frequently processed edible fish. The fish scales consist of a similar basic substance to the human cornea, collagen. The Biocornea is used to close the defect for a maximum of 72 hours until human corneal tissue for replacement is available. The aim of the study is to investigate whether ologen™ Biocornea can be used to close corneal defects sufficiently without causing additional damage to the eye.

Who can participate?

Patients eligible to participate in the trial had to present in an emergency situation with a corneal hole in need of human donor tissue for closure of the defect.
For inclusion in the study, only one eye could be affected by a corneal defect.

What does the study involve?

The study involves closure of the defect with ologen™ Biocornea for a maximum of 72 hours until Replacement with human donor cornea.

What are the possible benefits and risks of participating?

The benefits are immediate closure of the corneal defect lowering the risks of intraocular infection and bleeding.

Where is the study run from?
The study was run by the company Aeon Astron Europe B.V. (Leiden, Netherlands) as the sponsor and took place at the University eye clinics in Cologne and Bochum (Germany).

When is the study starting and how long is it expected to run for?
June 2014 to May 2020.

Who is funding the study?
This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under Grant Agreement No. 667400-2.

Who is the main contact?
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Contact information

Type(s)
Public

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Additional identifiers

Clinical Trials Information System (CTIS)
Nil known

Protocol serial number
Eudamed: CIV-15-03-013305; Sponsor's Protocol Code Number P-01-2014-11-001

Study information

Scientific Title
Fish scale based ologen™ Biocornea for the emergency management of corneal perforations

Study objectives
ologen™ Biocornea is a transparent collagen scaffold that is composed of type I collagen originating from fish scales. It is designed for the emergency surgery of corneal perforation and functions as a temporary protective barrier to seal the wound and maintain the integrity of the anterior chamber for a maximum of 72 hours.

Ethics approval required
Old ethics approval format

Ethics approval(s)
Approved 10/07/2015, Ethics Committee of the Medical Faculty of the University of Cologne (Gleueler Str. 269, 50935 Köln, Germany; +49 221 478 4262; ek-med@uni-koeln.de), ref: 15-112

Study design
Prospective uncontrolled interventional multicenter pilot study

Primary study design
Interventional

Study type(s)
Treatment

Health condition(s) or problem(s) studied
Closure of perforated corneal ulceration or laceration

Interventions
ologen™ Biocornea was applied with the aim to close the corneal wound when the patients fulfilled all inclusion criteria and none of the exclusion criteria. The device was implanted in the operation room under standard operating aseptic conditions. An unstable anterior chamber was filled by either air or viscoelastic through a peripheral paracentesis. Prolapsed non-necrotic iris tissue was repositioned into the anterior chamber. Obvious necrotic prolapsed tissue was removed. Thereafter, the device was applied to the recipient's cornea aligning the centre of the ologen™ Biocornea with the corneal defect. The ologen™ Biocornea was then fixed onto the cornea by intrastromal 10-0 nylon single sutures.

Intervention Type
Device

Phase
Not Applicable

Drug/device/biological/vaccine name(s)
ologen™ Biocornea

Primary outcome(s)
1. Severe inflammatory anterior chamber reaction measured using slit lamp examination at days 1, 2, 3, 4 (exam before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.
2. Ocular hypotony measured by palpation of the eye at days 0 (screening), 1, 2, 3, 4 (exam before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.
3. Suprachoroidal hemorrhage measured using ultrasound examination at days 1, 2, 3, 4 (exam

before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.
4. Choroidal detachment measured using ultrasound examination at days 1, 2, 3, 4 (exam before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.
5. Flat anterior chamber measured using slit lamp examination at days 1, 2, 3, 4 (exam before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.
6. Endophthalmitis measured using ultrasound examination at days 1, 2, 3, 4 (exam before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.
7. Wound leakage measured using the Seidel test at days 1, 2, 3, 4 (exam before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.

Key secondary outcome(s))
AEs and potential side effects caused by the implantation of ologen™ Biocornea indicating inflammation or any other type of immune response measured using slit lamp examination at days 1, 2, 3, 4 (exam before removal of ologen™ Biocornea and penetrating keratoplasty) and 5.

Completion date
05/05/2020

Eligibility

Key inclusion criteria
1. Age ≥18 years
2. Perforated corneal ulceration/laceration
3. Leaking corneal defects with indication for corneal transplantation due to:
3.1 Perforating corneal ulceration, or
3.2 Perforating corneal trauma with loss of corneal tissue making primary wound closure by corneal suturing impossible
4. Only one eye is affected by corneal ulceration / perforation / laceration. The non-affected eye has the potency of a minimum visual acuity of 0.63 (20/32).
5. No human donor cornea nor “0-cornea” is available
6. Subject must be able and willing to cooperate with the CIP
7. Subject must be able and willing to complete postoperative follow-up requirements
8. Subject must be able to understand and read the German language. In case reading is difficult (eye trauma) qualified staff will read out the ICF.
9. Subject or witness has signed the ICF

Participant type(s)
Patient

Healthy volunteers allowed
No

Age group
Adult

Lower age limit
18 years

Sex
All

Total final enrolment
7

Key exclusion criteria
1. Known hypersensitivity to fish collagen
2. Pregnant or breast-feeding women.
3. Subject is participating in any other clinical trial or research project with an investigational medicinal product or a medical device or has participated in any other trial within 30 days prior to the last visit of that study and day 0 of this study.
4. Patients with severe general health conditions (multiple trauma, acute life-threatening diseases, high risk for general anesthesia)
5. Subject is dependent on the sponsor or investigators in a familiar or financial manner

Date of first enrolment
15/04/2016

Date of final enrolment
17/07/2019

Locations

Countries of recruitment
Germany

Study participating centre
University of Cologne, Faculty of Medicine and University Hospital Cologne, Department of Ophthalmology
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Sponsor information

Organisation
Aeon Astron Europe B.V.

Funder(s)

Funder type
Government

Funder Name
Horizon 2020

Alternative Name(s)
EU Framework Programme for Research and Innovation, Horizon 2020 - Research and Innovation Framework Programme, European Union Framework Programme for Research and Innovation

Funding Body Type
Government organisation

Funding Body Subtype
National government

Location

Results and Publications

Individual participant data (IPD) sharing plan
The data sets generated and/or analysed as part of the study are stored in a repository that is not publicly accessible on a server at the University of Cologne and are made available on request for e.g. scientific purposes after consultation with our ethics committee.

IPD sharing plan summary
Stored in non-publicly available repository, Available on request

Study outputs

Output type	Details	Date created	Date added	Peer reviewed?	Patient-facing?
Study website	Study website	11/11/2025	11/11/2025	No	Yes