



Contact Lenses

much more than perfect vision

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Much more than perfect Vision

- Therapeutic contact lenses
- Smart contact lenses
- Myopia Management

Therapeutic contact lenses



Therapeutic contact lenses

- Tx contact lenses offers protection of the weak cornea from negativ Influences
 - They accelerate wound healing and support the stabilisation process
 - They offer protection from foreign body sensation and pain
 - The range of materials and geometries possible today is enormous
- Interdisciplinary co-management with the treating ophthalmologist is of **benefit for both sides**

Cases from our Portfolio

Dystrophies

Epithelium Basalmembran Dystrophy EBMD

Lattice Dystrophy

Multifactorial Syndrome

Status post congenital Cataract and secondary Glaucoma

Infections

Adeno Virus (Kerato-Conjunctivitis Epidemica)

Syphilis

Auto-immun Disease

Lyell Syndrom / Stevens-Johnson Syndrom

Epidermolysis Bullosa EB (Butterfly Children)

Graft vs Host Disease GvHD

Exposition Keratitis

Facialis Paresis

Nocturnal Lagophthalmus

Status post Trauma

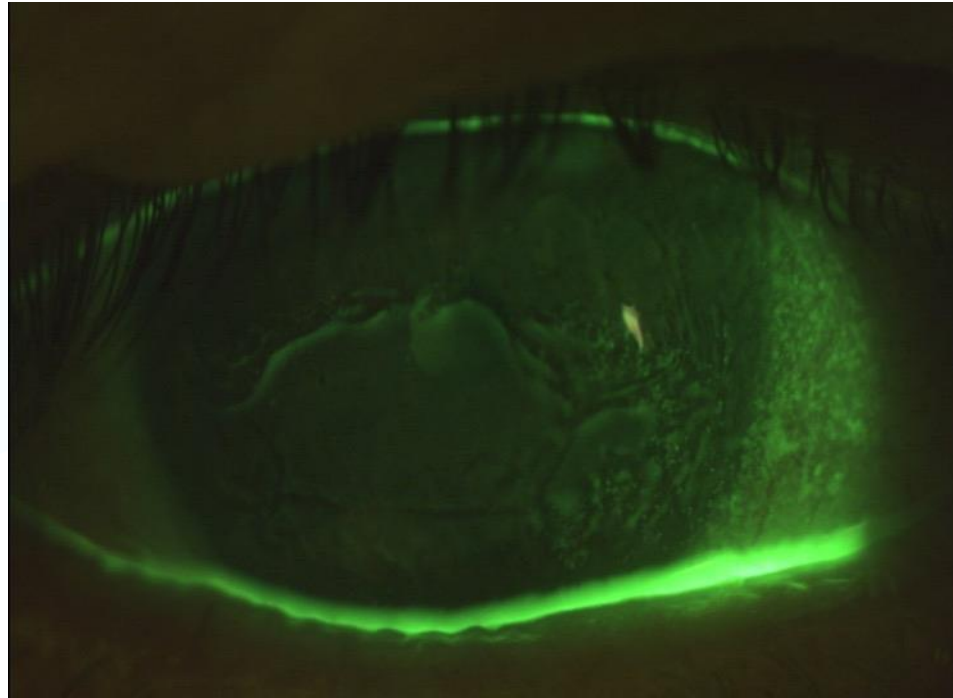
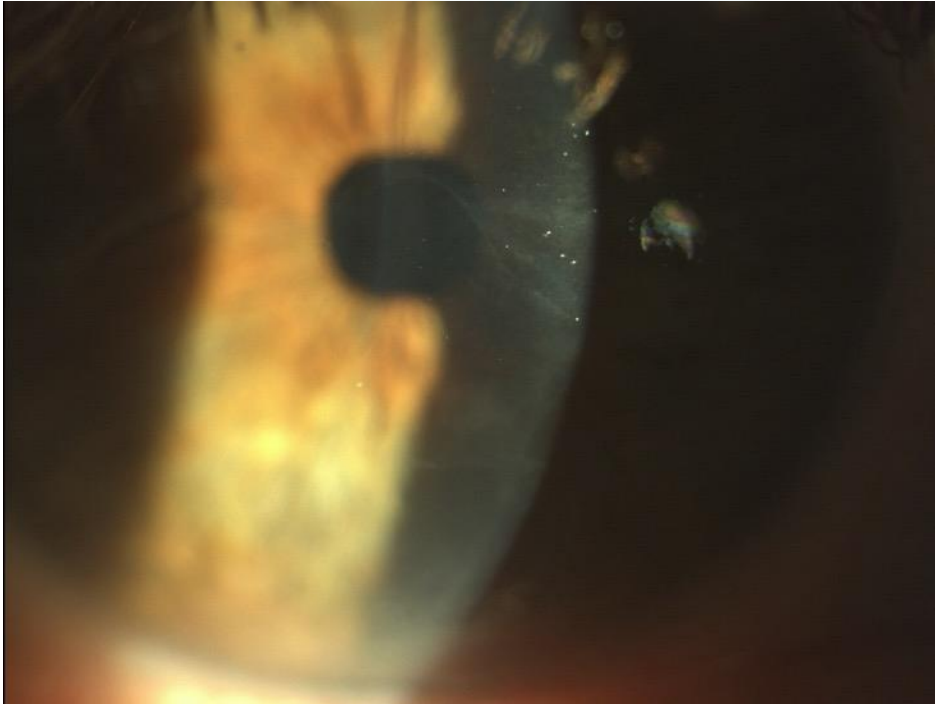
Recurrence Erosion

Scarring / Aniridie

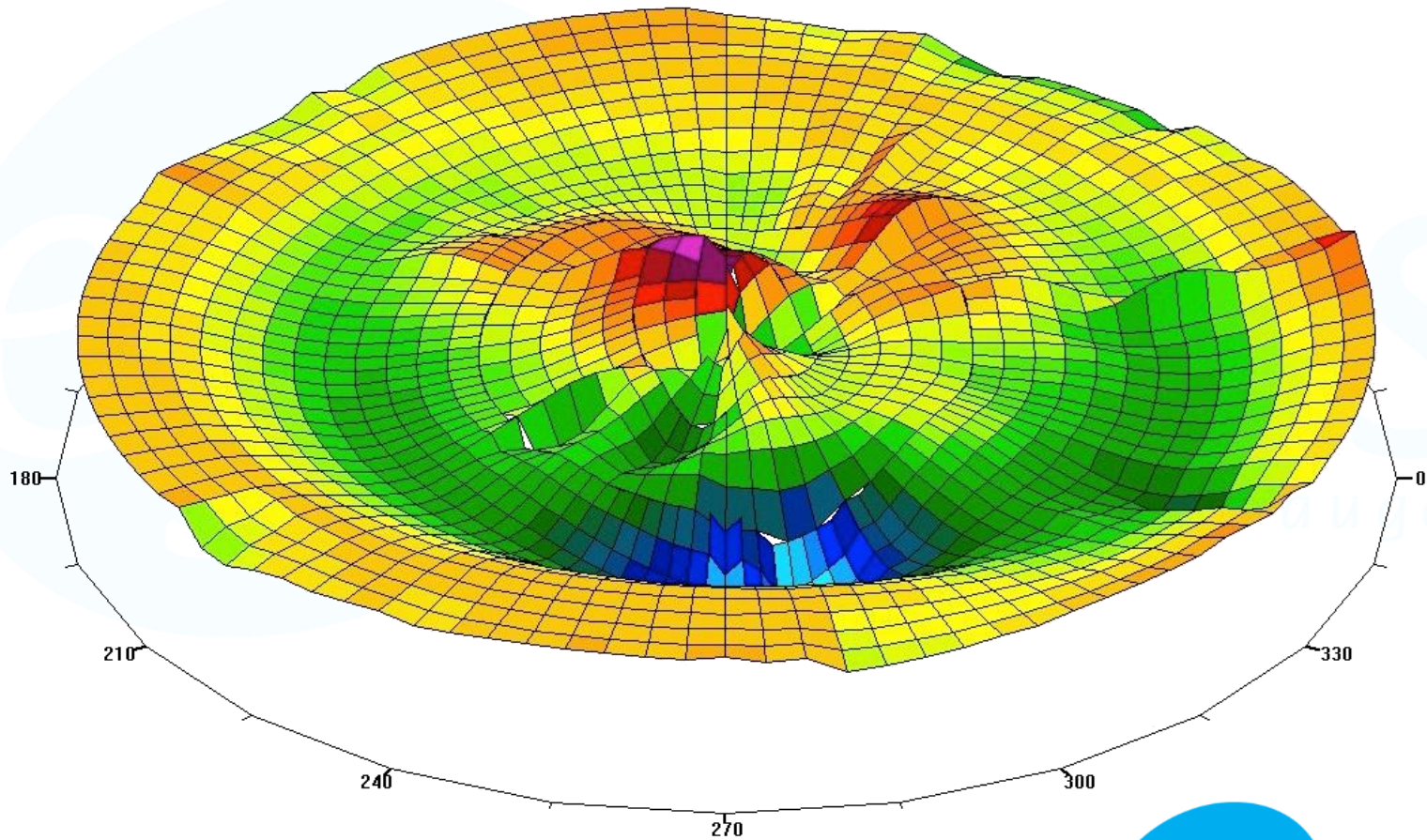
Epithel-Basalmembran-Dystrophy

- Patient EA, 68, male, caucasian, retired graphic artist
- Anamnese
 - OD Amblyopia?
 - For about 10 years, repeated eye-pain OU (mostly in the morning, sand feeling) and decreasing visual acuity OD>OS
 - Ophthalmological examinations so far "okay", 2 weeks ago Dx EBMD
 - Refraction:
+2.50 -8.50 170 Vacc 0.63 / +2.50 -4.50 22 Vacc 1.0
Addition +2.25 40cm

EBMD – objective findings



EBMD – Topography

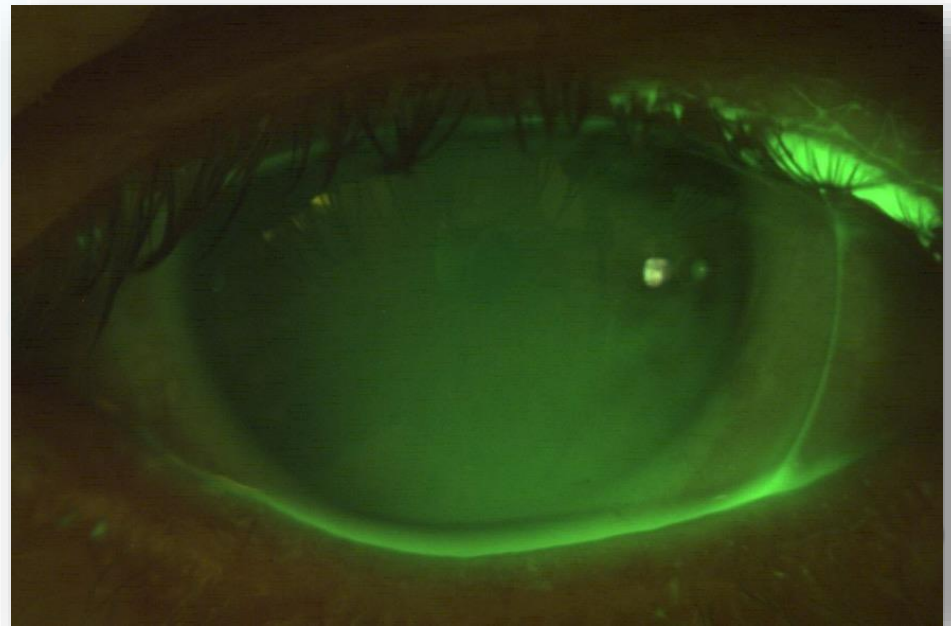


EBMD - Plan

- overcome recurrent erosions with therapeutic contact lenses
 - Accelerate wound healing
 - Minimize recurrent erosions
 - Visual rehabilitation
- contact lenses:
 - Front-toric scleral lens (dynamic stabilization)

EBMD - Results

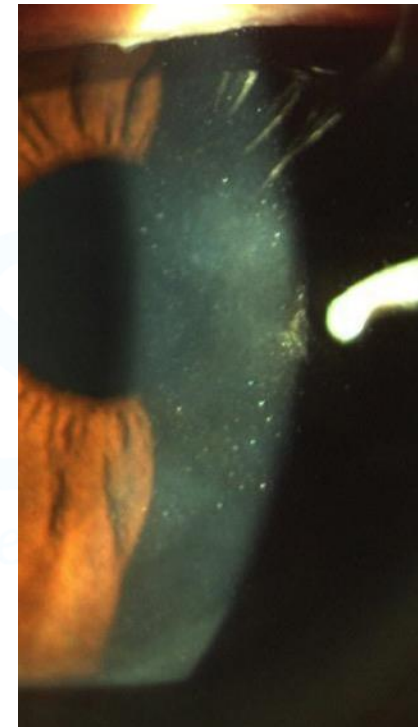
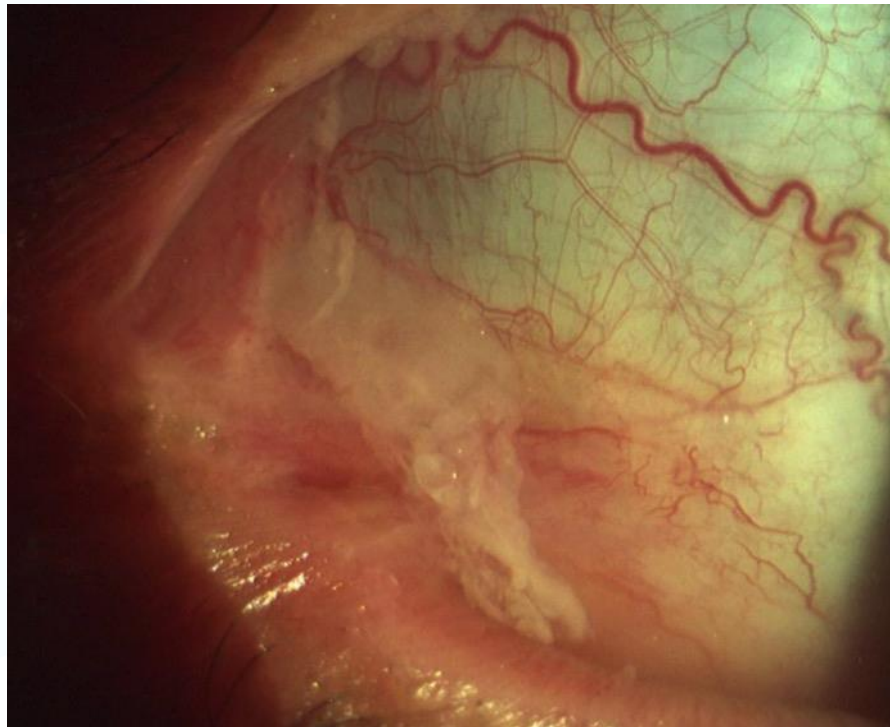
- No recurrent erosion with pain for 4 years!!
 - no fluo positive areas observed
 - EBMD still visible
- Vacc 1.0 OU,
Distance **and** Near!
 - Presbyopia corrected
by monovision



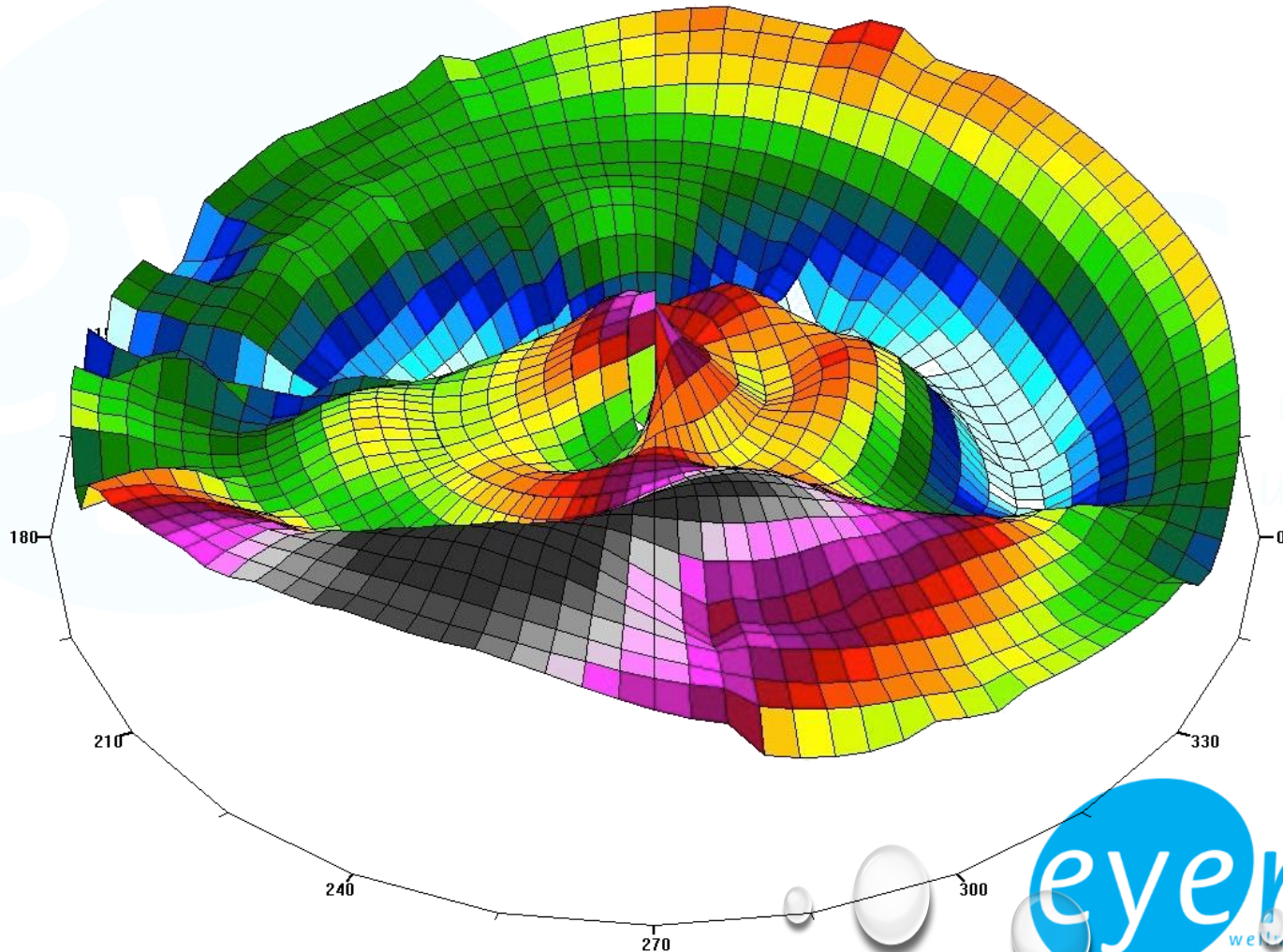
Auto-immune Disease

- Patient MZ, 26, female, caucasian, business woman
- Anamnese
 - Epidermolysis Bullosa - Dystrophica EB (butterfly children)
 - Extreme photophobia and hyperemia OU, frequent pain, visual problems, symblepharon formation
 - Ophthalmologist every 1-2 months (surgery and eyelash epilation)

EB – findings



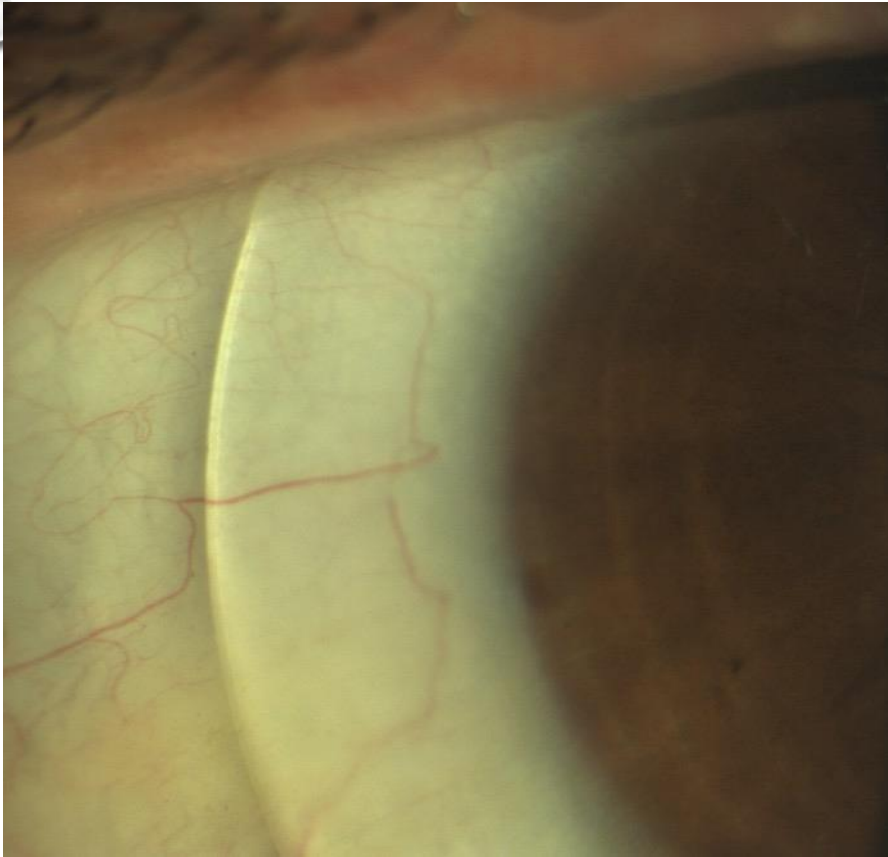
EB – Topography



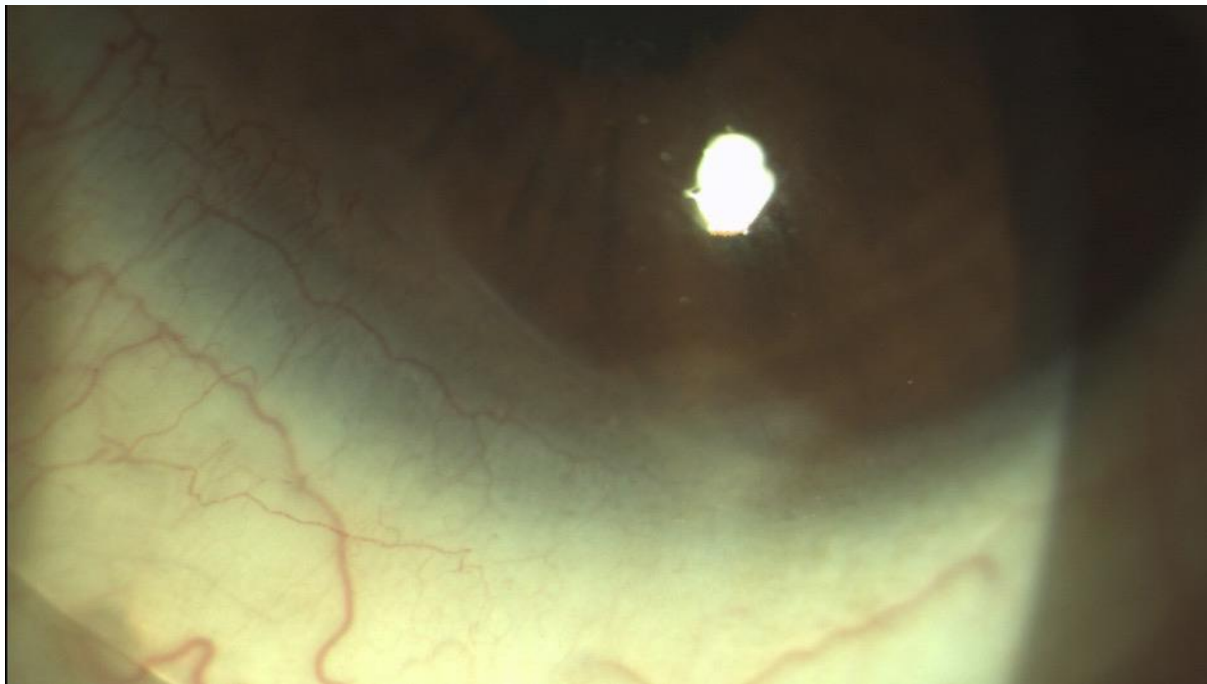
EB - Plan

- overcome recurrent erosions with therapeutic contact lenses
 - Accelerate wound healing
 - Minimize recurrent erosions
 - slow down symblepharon neoplasm
- contact lenses CW:
 - 2006 – 2012 toric SiHy Senoflicon A 1W CW
 - since 2012 Bitoric Scleral lenses

EB - Results



Status after 9 years



Status after 9 years

EB - Results

- Approximately 1x per year nasal symblepharon removal by ophthalmologist
- Eyelashes epilation could be stopped
- No more photophobia or pain
- Vacc 1.00-2 OU



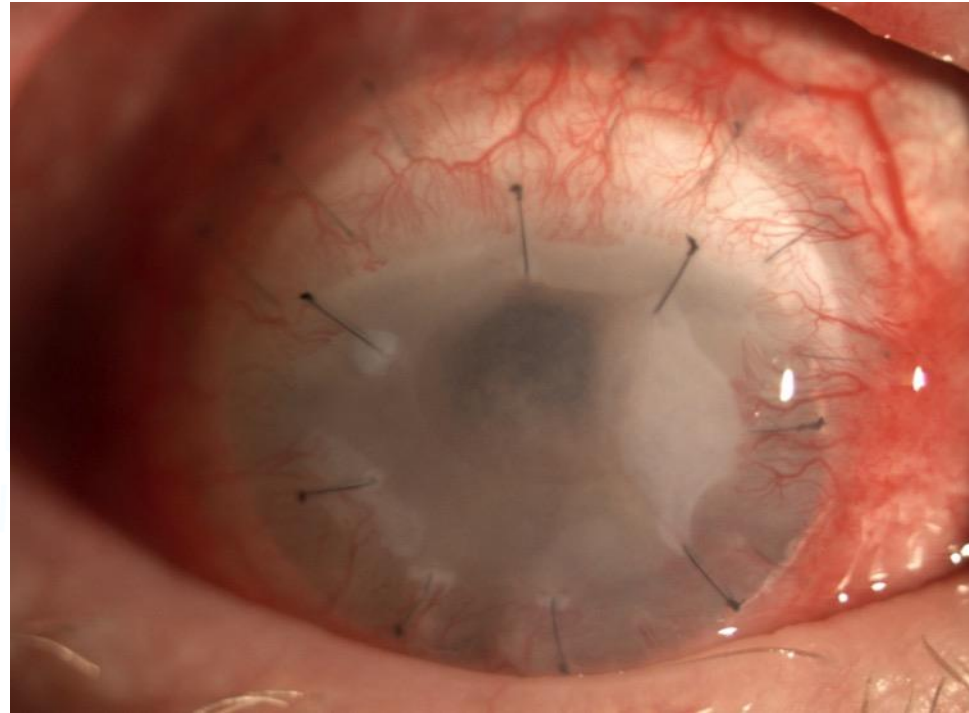
Auto-immun Disease

- Patient MH, 47, female, caucasian
- Anamnese
 - Lyell Syndrom / Stevens – Johnson Syndrom
 - Extreme photophobia and hyperemia, severe pain, light-dark perception
 - Status after several keratoplasties, including amnioma membrane

Lyell Syndrom – findings



2002

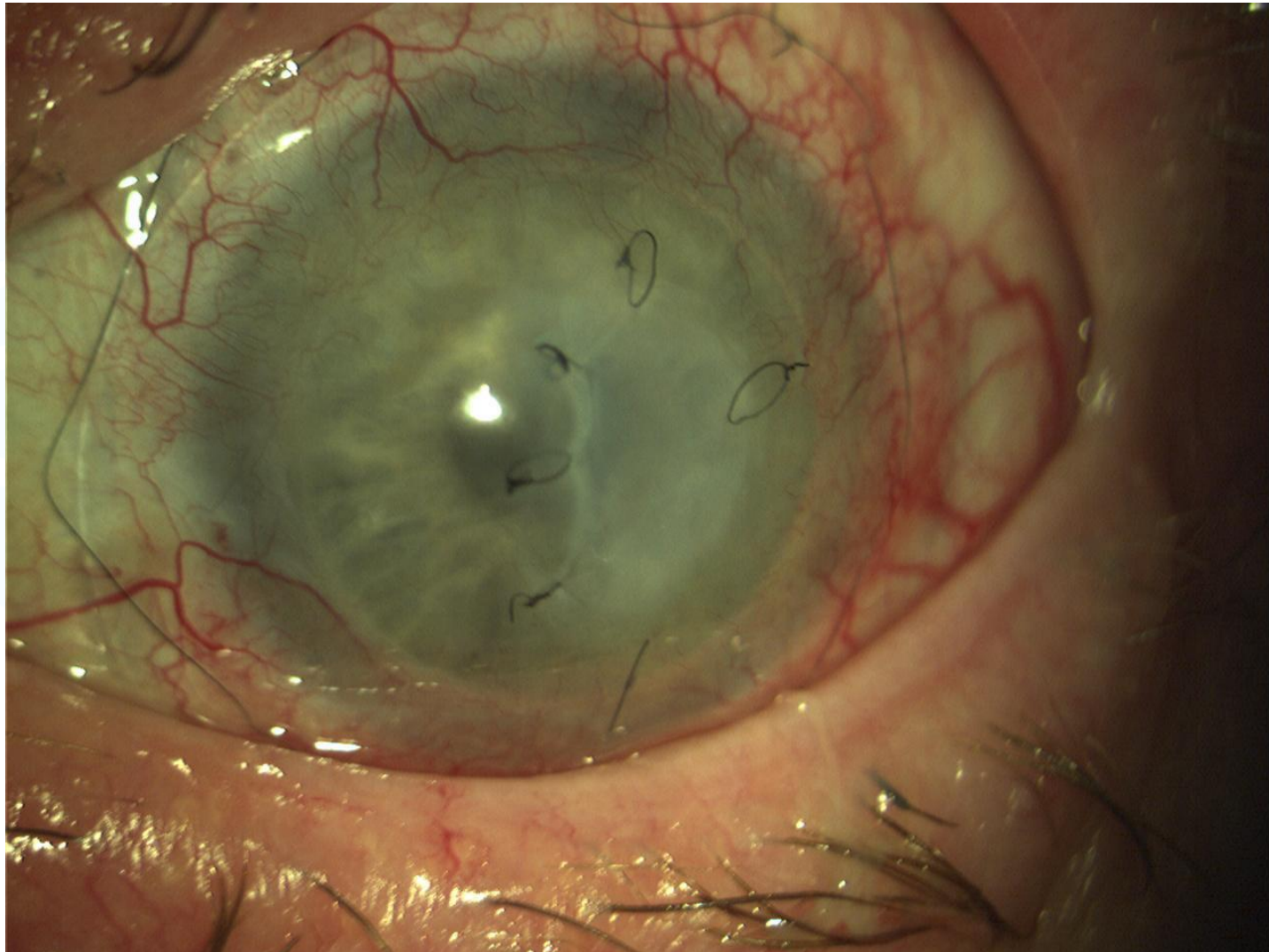


2014 (Amniom Mebrane)

Lyell Syndrom – Plan

- Large bandage lens
 - Accelerate wound healing
 - Protection of the membrane
 - Covering the threads for mechanical relief
- Contact lens supply CW:
 - High watercontent hydrogel contact lens Ø 17.00

Lyell Syndrom - Results

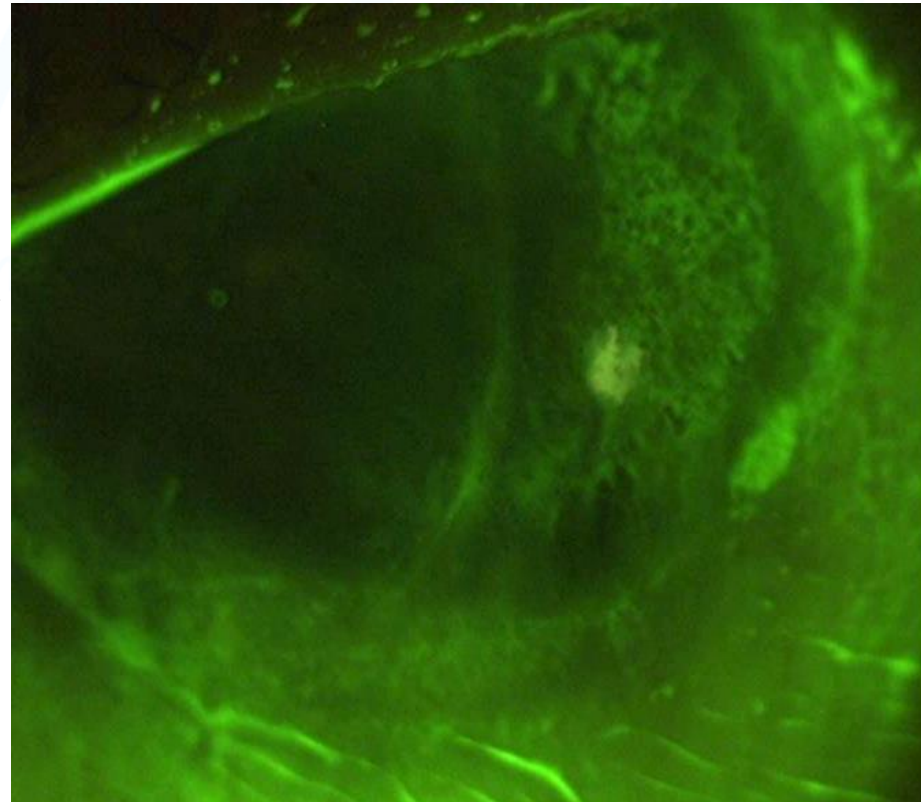


Lyell Syndrom - Results

- significantly reduced photophobia, hyperemia and pain
- The need for new transplants could not be prevented, but perhaps slightly delayed
- no visual improvement

Status after Trauma

- Patient DS, 54, male, business owner and passionate rally! driver
 - Status after trauma (car accident) with aniridia, aphakia and cornea involvement
 - severe sicca symptoms and photophobia OD>OS
 - Visual acuity OD significantly reduced and monocular double images



Objective findings



extreme Photophobia OD

Plan

- Bridging the entire cornea with a therapeutic contact lens
 - Reduce sicca symptoms
- Visual rehabilitation
- Artificial pupil for reduction of photophobia
- Contact lens:
 - Scleral lens including iris print with clear pupil

Results



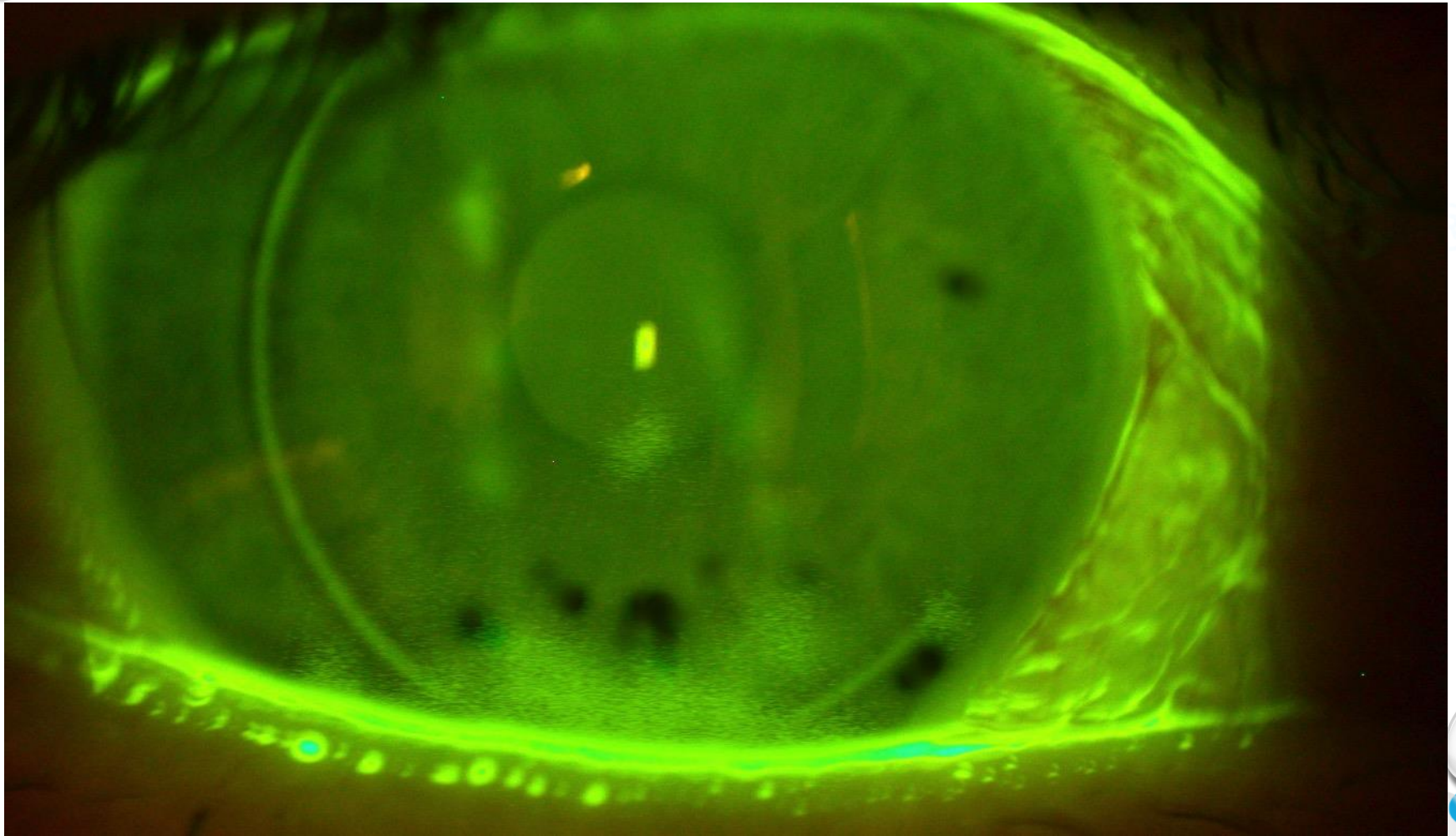
Results

- Sicca symptoms completely eliminated
- Hyperemia reduced from grade 2-3 to grade 1
- Photophobia significantly reduced and only disturbing on bright days
- Vacc OD 0.63, without monocular double images!

Sicca Symptomatology

- Patient MP, 33, caucasian, male
- Anamnese
 - Status after LASIK (Switzerland) 3 years ago
 - Dry eyes when wearing contact lenses was the main reason for LASIK
 - Since LASIK, increased Sicca symptoms, especially in the morning, drops every 2 hours artificial tears

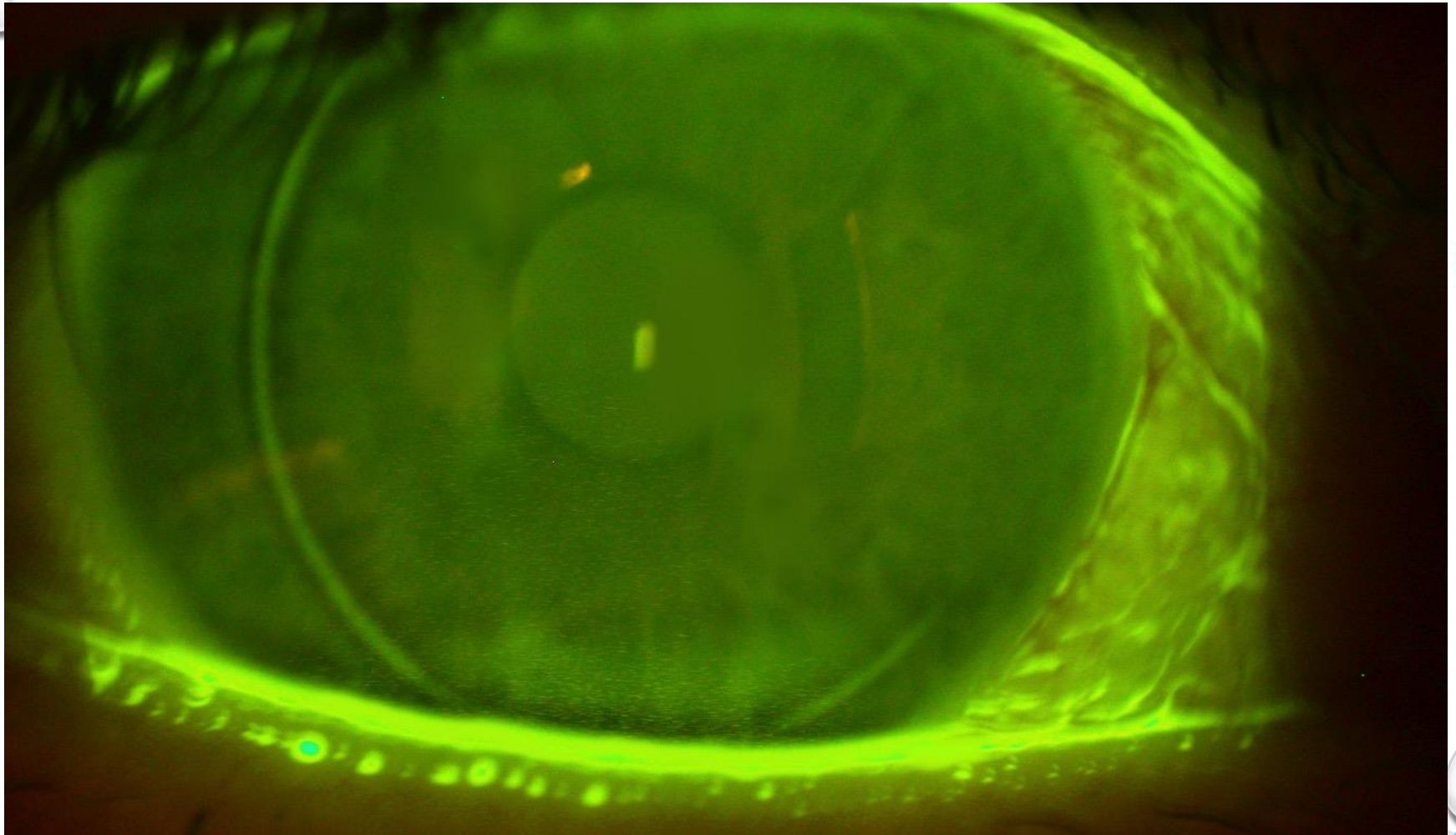
Sicca– Objective findings



Sicca – Analysis and Plan

- Inferior staining grade 3 and BUT only 2 seconds
 - Since the biggest problems occur in the morning, an evaporative sicca is unlikely
 - A nocturnal lagophthalmus could be the cause
- Therapeutic contact lenses only at night
 - To protect cornea from drying out overnight
 - Plano SiHy exchange lens Lotrafilcon A

Sicca – Results

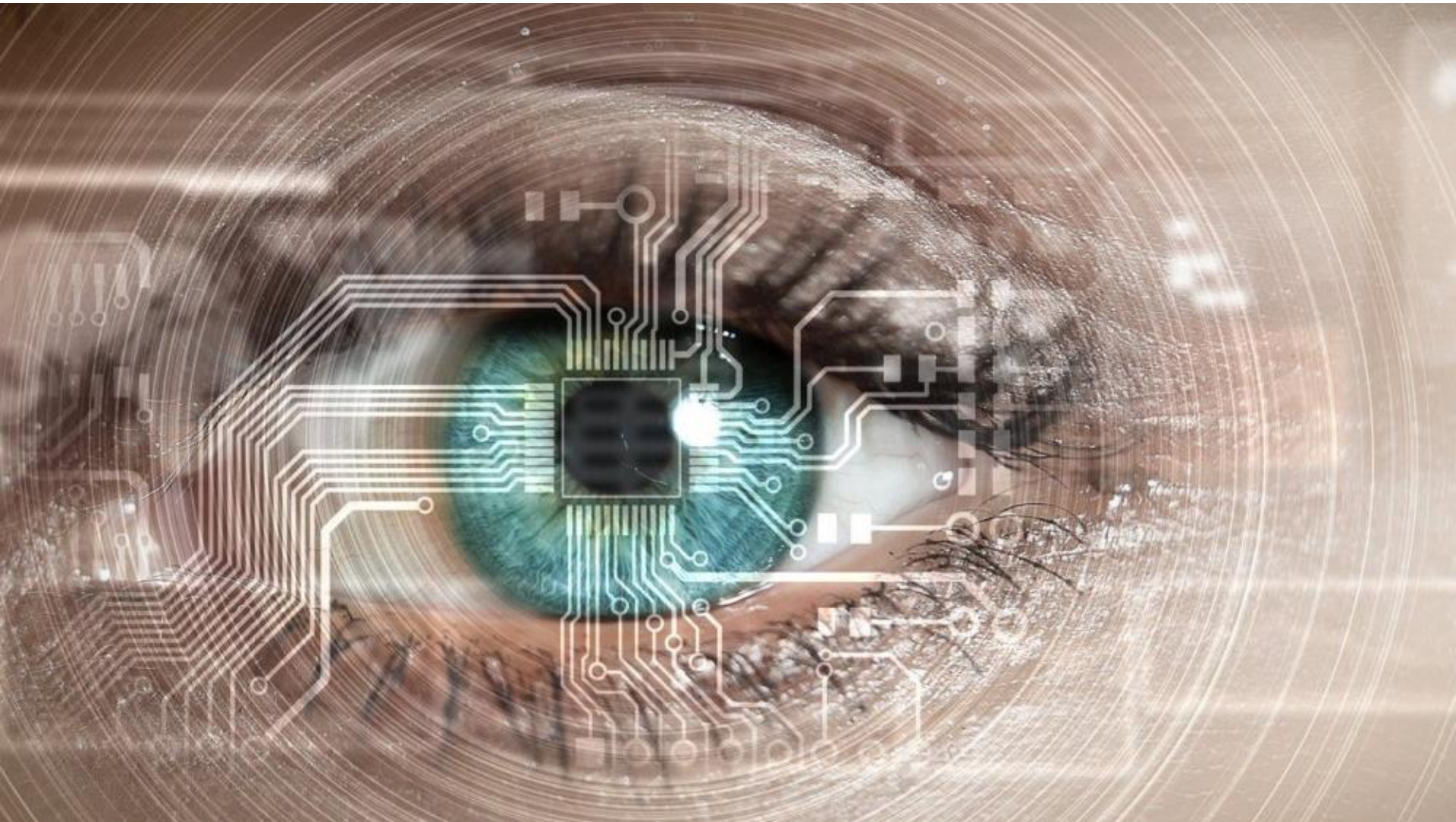


Status after 6 Month

Sicca - Results

- Sicca symptoms significantly reduced
- Wetting solutions only sporadic used
- It may be assumed that the previous failure of contact lenses and the resulting LASIK is to a large extent due to nocturnal lagophthalmus

Smart contact lenses

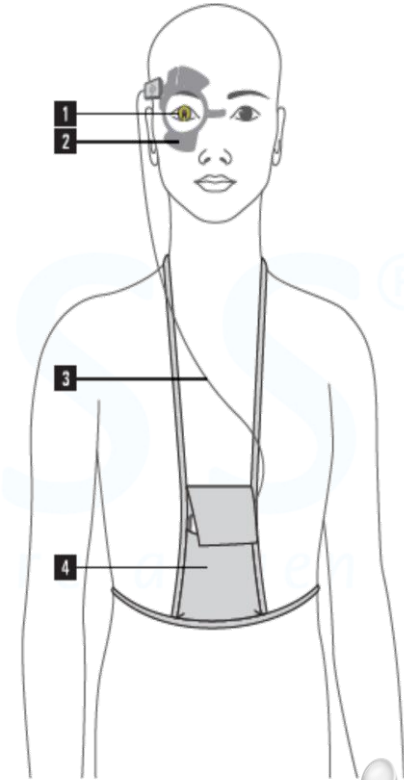
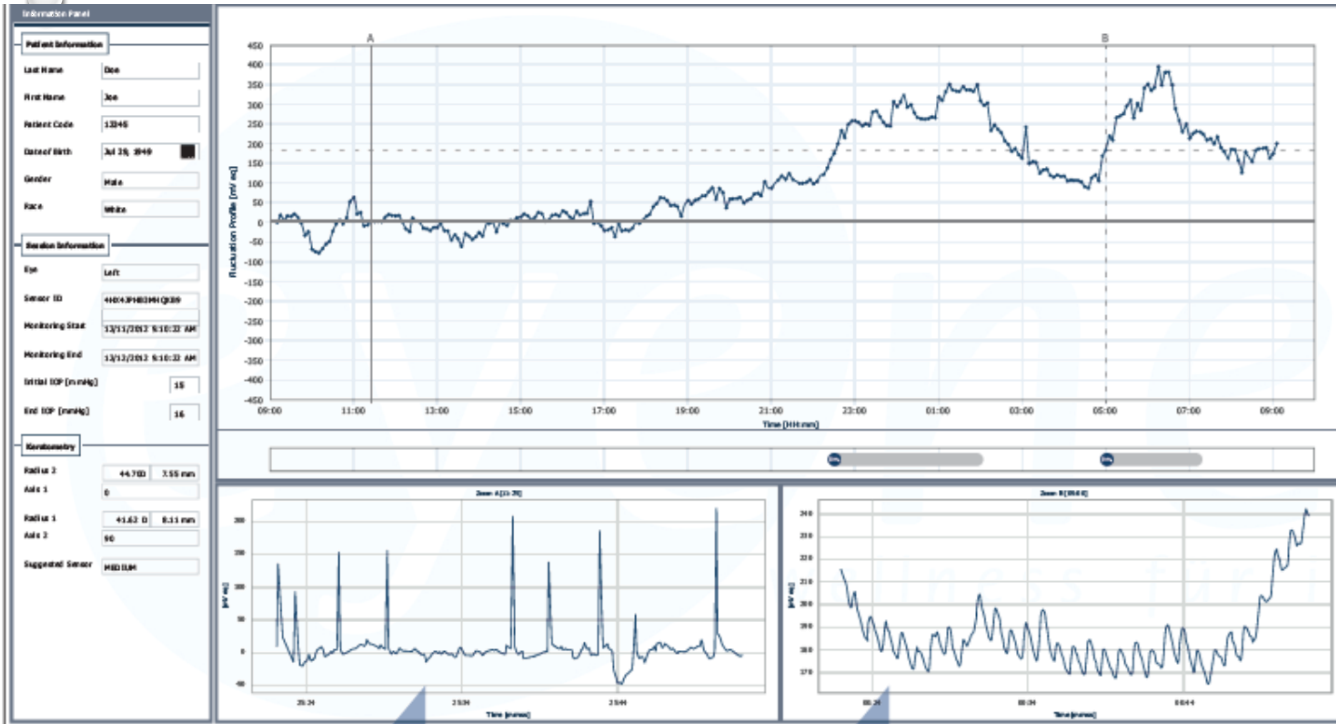


Triggerfish™ (Sensimed)

- 24h monitoring of the intraocular pressure
- Participation in development 2008
- currently involved in further development with other manufacturers



Triggerfish™



Example of a detailed view of eye blinks during 30 seconds.

Example of a detailed view of the ocular pulsation during 30 seconds.

The software enables practitioners to visualize and analyze the 24-hour patient profile.

Google / Novartis

- contact lens to measure glucose levels in the tears
 - 2014 announced and planned to be on the market 2020
 - backboned because tears have proved not as reliable in measuring glucose levels in humans compared to extracting blood (former CSO of J&J's LifeScan John Smith)

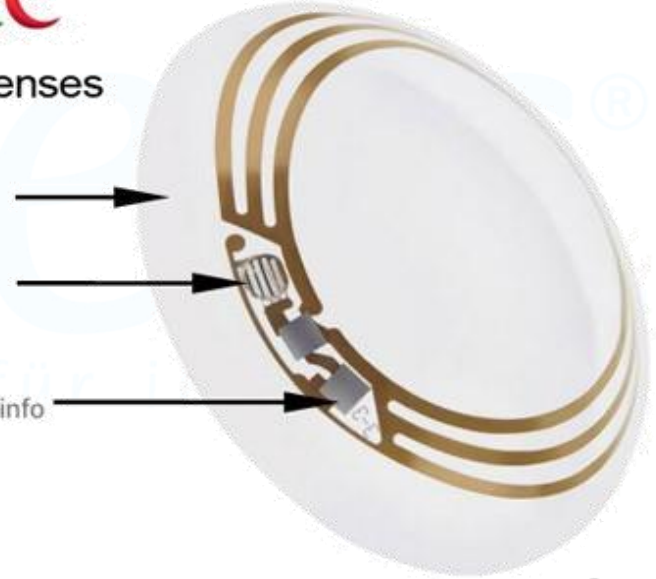
Google

Smart Contact Lenses

Soft contact lens
encapsulates electronics

Sensor
detects glucose in tears

Chip & antenna
receives power and sends info



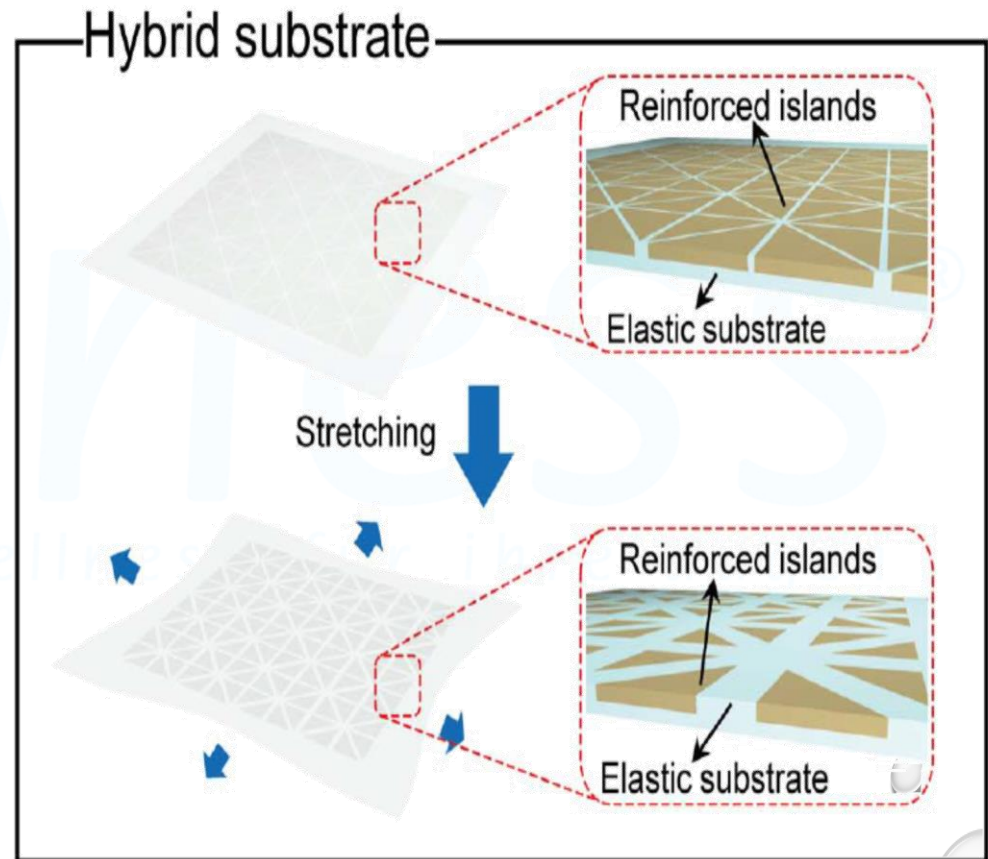
eyeness®
wellness für ihre augen

UNIST, South Korea

(Ulsan National Institute of Science and Technology)

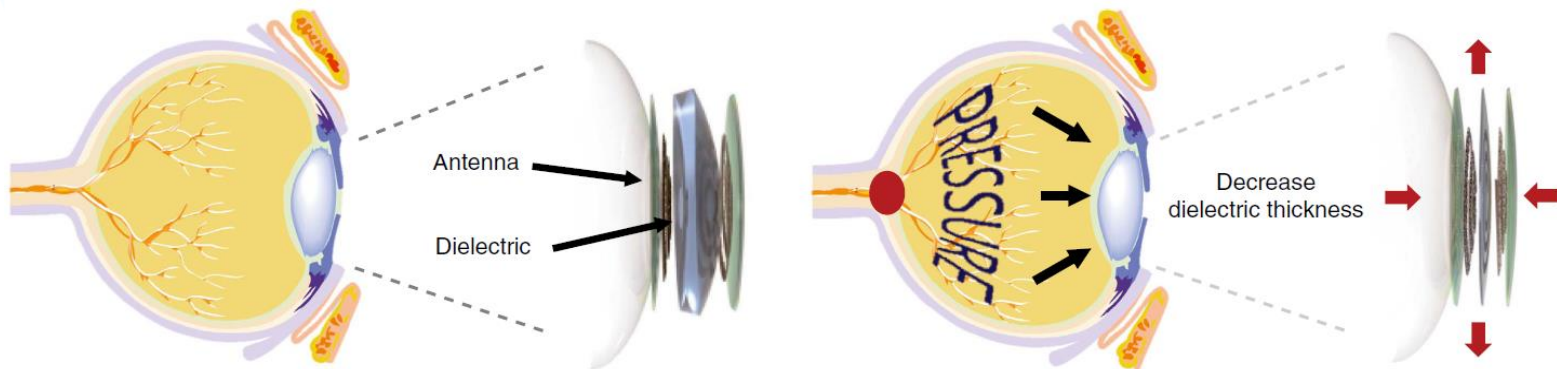
- New approach

- transparent nanomaterial
- mesh-like structures enable high stretchability for curved soft lenses with no buckling
- integrated display pixels allow access to real-time sensing data



UNIST, South Korea

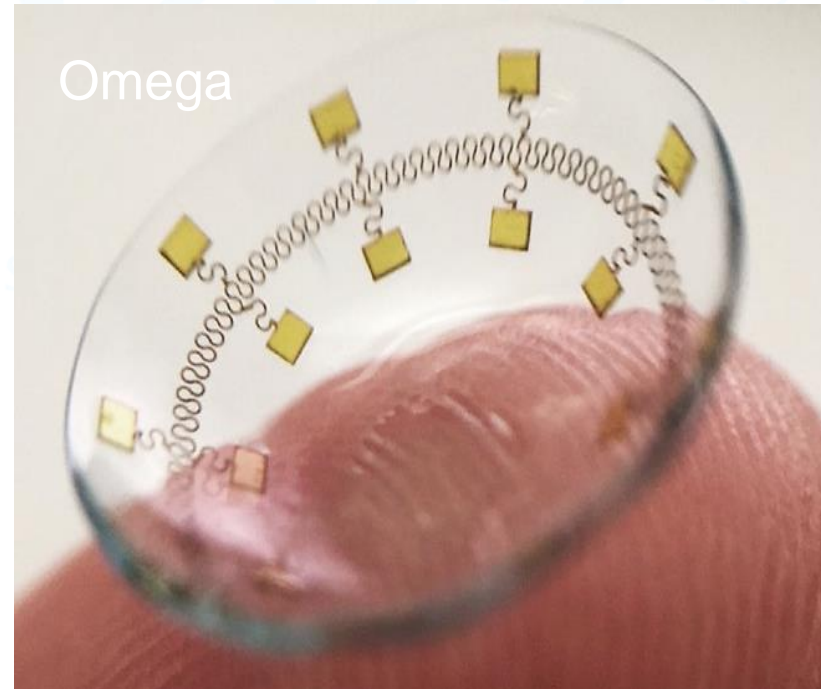
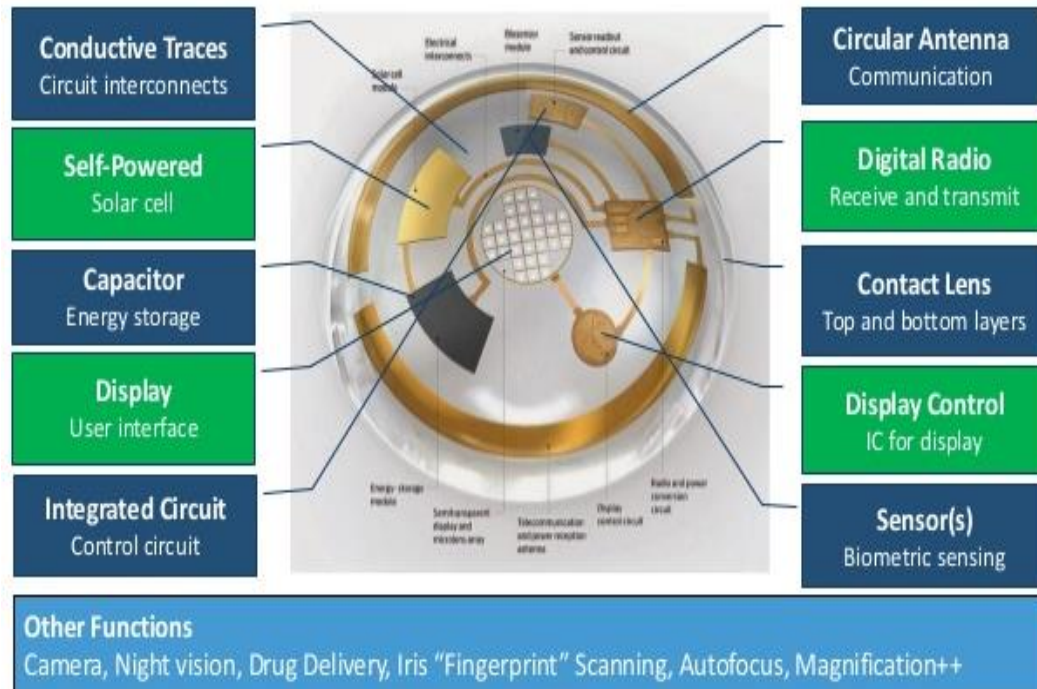
- (Ulsan National Institute of Science and Technology)
- measure glucose levels in the tears and IOP



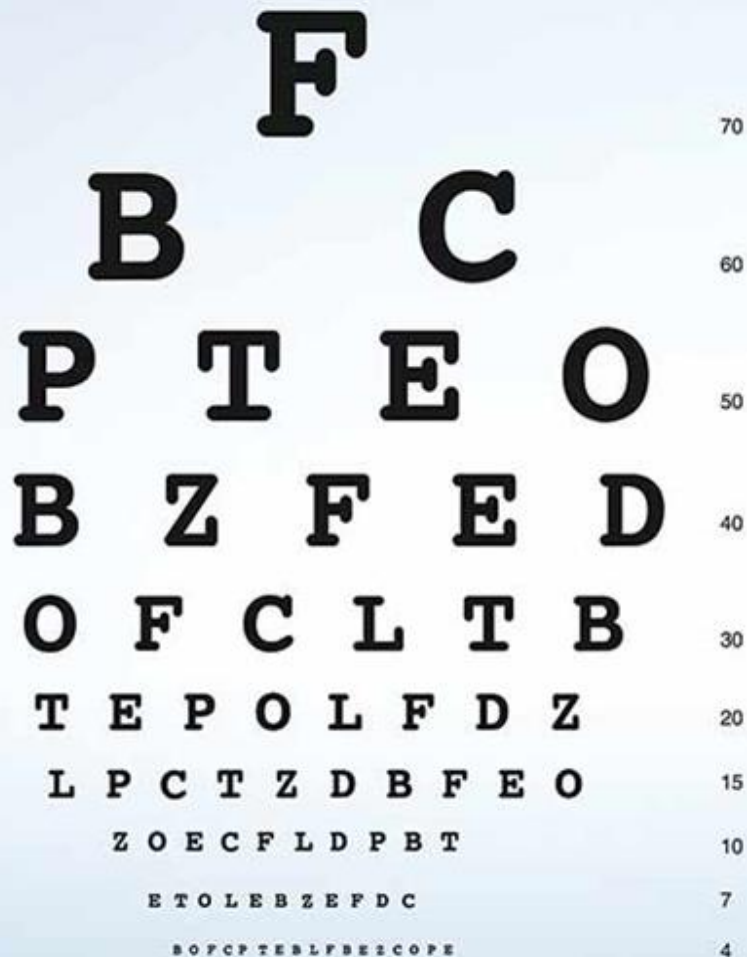
- Kim et al. Wearable smart sensor systems Nat. Commun. 8, 14997 doi: 10.1038 (2017)
- Park et al. Soft, smart contact lenses with integrations of wireless circuits, glucose sensors, and displays Sci. Adv. 2018;4

Apple (EPGLMed) / Sony

- Recording of videos, photos, control of mobile devices, autofocus (presbyopia) etc.



Myopia Management



Myopia Management


- Relationship between reduction of myopia progression and development of high myopia (over -6.0D)

Reducing myopia progression by	Reduction in frequency of high myopia
33%	73%
50%	90%

- Brennan (CLAE 2012)

Myopia Management

	Cataract (PSCC)	Retinal detachment	Myopic Maculopathy
-1.00 to -3.00	2.1	3.1	2.2
-3.00 to -6.00	3.1	9.0	9.7
-6.00 to -8.00	5.5	21.5	40.6



Younan et al 2002, Ogawa & Tanaka 1988, Vongphanit et al 2002 in Flitcroft 2012.

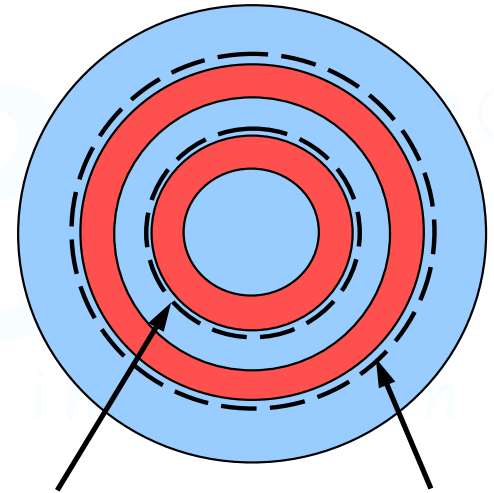
- Risk Ratio, Kate Gifford 2016

Myopia Management

Method	Reduction in axial length grow
Atropine	30% - 77%
Monovision	48%
RGP or Hydrogels	0% - 5%
Spectacles (PAL, Bifocal)	12% - 55%
Spectacle MyoVision (Refractive Radial Gradient)	0% - 29%
Multifocal Hydrogel (DualFocus, Proclear D, Biofinity D)	29% - 69%
Orthokeratology	32% - 100%

DualFocus (miSight, Cooper)

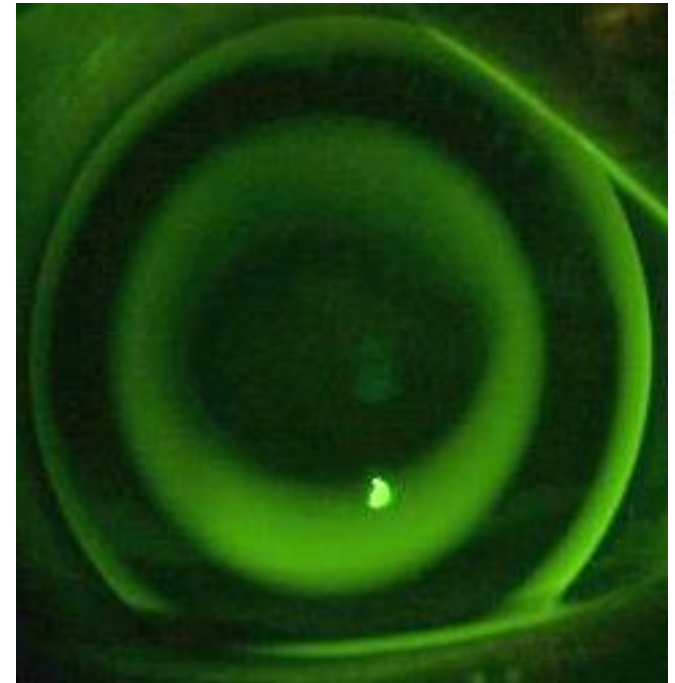
- The only approved daily disposable lens for myopia management
- Established 2017
 - (since 2013 conventional, multifocal KL)
- Power -1.0 to -6.0D
 - no cylinders possible
- Advantages are:
 - higher efficiency (evidence based)
 - security profile



Photopic Mesopic
Child's pupil

Orthokeratology

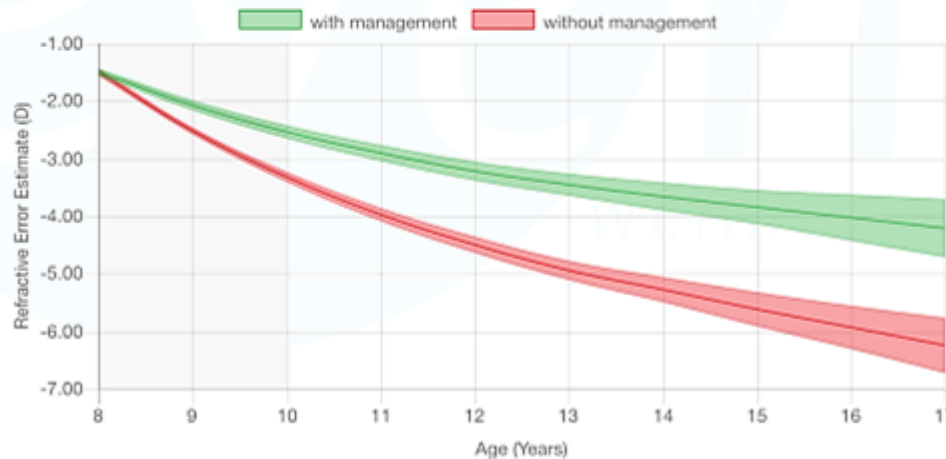
- Established 2003 with Falco, Switzerland
- Power -0.5 to -8.0D
 - Cylinders up to -4.5D possible
- Advantages are the higher efficiency (evidence based), our long-time experience and the large range of correction options



Guidance for Treatment



Child's Age (Years): 8
Refractive Error (D): -1.50
Myopia Management Option: Orthokeratology
Control Rate (%): 30 to 56 (43%)
Peer Reviewed:



Myopia Management Option:

Orthokeratology

Percentage reduction in progression of myopia compared to standard correction e.g. single vision spectacles.

43%

If treated with **Orthokeratology** that provides 43% control, then the level of myopia at 17 may be:

-4.20D

If myopia control treatment is not commenced immediately, the final level of your child's myopia at 17 may be:

-6.24D

<https://calculator.brienholdenvision.org>





www.eyeness.ch/news/downloads