

**37<sup>th</sup>** International  
Congress  
of the Hellenic Society  
of Intraocular Implant  
and Refractive Surgery

www.hsiorscongress.gr  
Megaron Athens International Conference Centre

**2-4**  
March  
2023

HSIOIRS

# The therapeutic use of bandage contact lenses

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## Financial disclosure

S Plainis is co-owner / manager of contact-lenses.gr  
(distributor of Menicon products in Greece)



# Medical Contact Lenses (CLs)

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Medical CLs are any type of CL for treating an underlying disease state or complicated refractive status (*CLEAR report, CLAE, 2021*)

1. **Therapeutic or Bandage CLs** are used for the treatment of ocular discomfort or to promote cornea healing after surgery or when the cornea is being treated for an underlying disease or to protect the cornea from the mechanical interaction with the lids.

2. **Rehabilitative CLs** are prescribed for conditions in which visual function is not adequate with spectacles because of high, irregular, or asymmetric (corneal) refractive error. Occlusive lenses that improve function or cosmesis after trauma, surgery, also fall into this category.

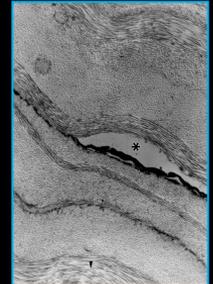


# Hydrogel vs. Silicone-hydrogel (SiHy) CLs

-Daily wear soft and rigid CLs are classified as **Class II medical devices** (moderate to high risk), while **CLs for overnight wear**, are **Class III medical devices**.

-Conventional **hydrogel** CLs lack the ability to transmit enough  $O_2$ , to avoid corneal hypoxia and oedema during overnight wear

-**SiHy** lenses show ~3-4x higher  $O_2$  permeability.



-**New generation SiHy** are preferable since they show advanced wetting, elasticity, and surface properties

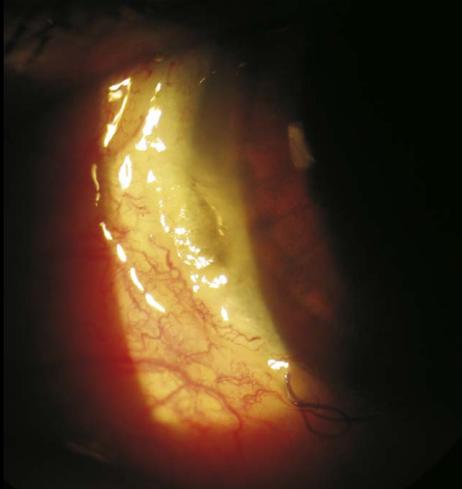
TABLE 1. GENERATIONS OF SILICONE HYDROGEL LENSES		
First Generation	Second Generation	Third Generation
Lotrafilcon A (Dk = 140) Balafilcon A (Dk = 91)	Galyfilcon A (Dk = 60) Senofilcon A (Dk = 103)	Comfilcon A (Dk = 128) Asmafilcon A (Dk = 126) Enfilcon A (Dk = 100) Samfilcon A (Dk = 163)
Low water content (24%–36%)	Higher water content (38%–47%)	Higher water content (40%–48%)
High modulus (1–15 Mpa)	Lower modulus (0.43–0.73 Mpa)	Lower modulus (0.50 to 0.75 Mpa)
Plasma surface treatment	Internal wetting agent (PVP)	Nanogloss surface treatment or naturally wettable backbone
30-day continuous wear	6-day extended wear	6-day extended wear
Abbreviations: Dk = oxygen permeability; Mpa = megapascal; PVP = polyvinylpyrrolidone		

-Although, **only SiHy CLs** currently carry therapeutic indications (FDA approval) for overnight wear) hydrogel CLs are still used as bandage lenses !

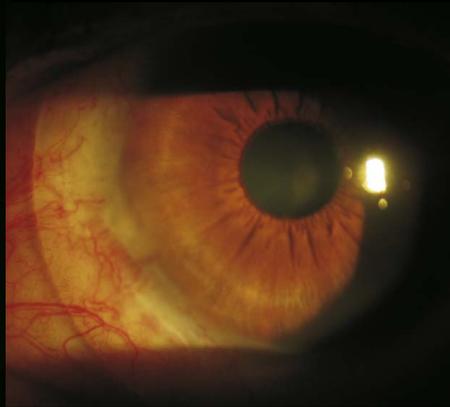
# Large diameter CLs for therapeutic use

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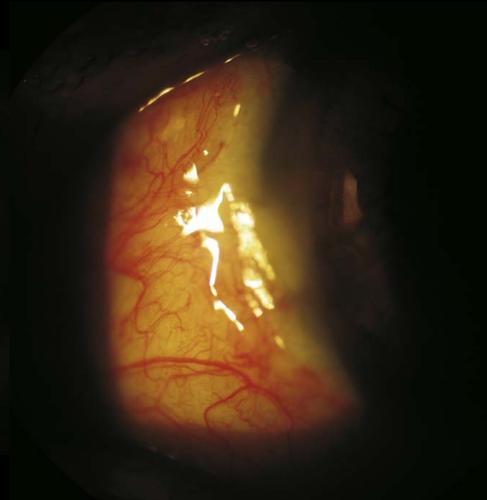
Treatment of corneal dellen (post-pterygium surgery) with a large diameter (18.00mm) soft hydrogel CL.



*Corneal thinning  
at limbus*



*1<sup>st</sup> day with a 16 mm CL wear*



*Following CL  
removal*

*Kymionis et al. CLAE (2011)*

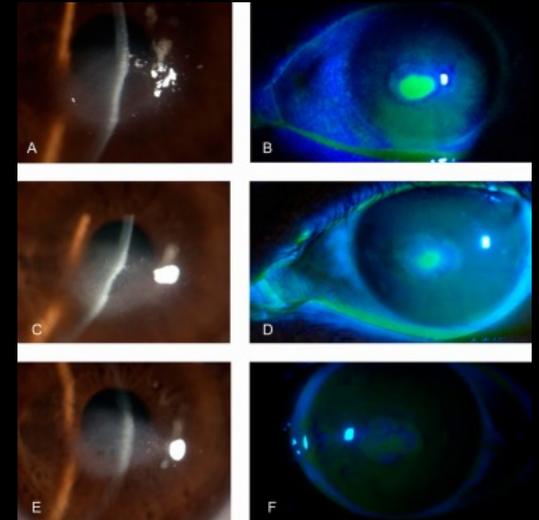
# Bandage CLs in Persistent Epithelial Defects (PEDs)

PEDs may result from both ocular and systemic diseases, such as dry eye, corneal epithelial stem cell deficiency, neurotrophic keratopathy, and diabetes. PEDs could lead to stromal degradation and thinning.

Treatment approaches include artificial tears, punctal plugs, eye patching, autologous serum eye drops, amniotic membrane graft, and limbal stem cell transplantation.

The combination of an RGTA (Cacicol20) with a SiHy BCL (premiO, Menicon) seems to be an effective treatment for PED.

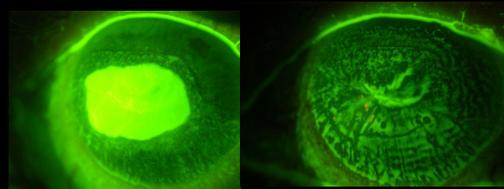
The use of scleral lenses for PED may be an ideal treatment modality, since they also provide visual correction.



*Image courtesy of Lynette Johns*

*Kymionis et al., Cornea (2014)*

Image of a resolved PED after five days of extended wear with a scleral lens and prophylactic antibiotic. Note the epithelial bullae present.



# Bandage CLs following keratorefractive procedures

BCLs are standard part of post-op regimen following surface ablation to attenuate post-op pain, diminish corneal haze, provide the regenerating epithelium protection from blinking stress, and promote re-epithelialisation. They also protect the epithelial flap and reduce any risk of flap repositioning in LASEK.

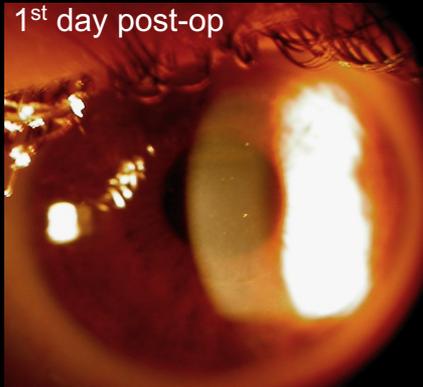
Newer-generation SiHy, in comparison to hydrogel CLs (and first-generation SiHy) have shown better comfort and faster epithelial healing.

**Table 1**

Summary of prospective published studies (all case control or cohort studies) comparing the efficacy of various silicone hydrogel contact lenses after PRK.

Author, Year	Study design	Number of patients (n)	Materials compared	Study outcomes
Grentzelos et al., 2009 [88]	Randomised, Contralateral	44	Lotrafilcon A Lotrafilcon B	No differences in re-epithelialisation
Razmjoo et al., 2012 [84]	Randomised, Contralateral	44	Senofilcon A Lotrafilcon A	Pain and discomfort lowest with senofilcon A, no difference in epithelial healing
Plaka et al., 2013 [89]	Non-randomised Contralateral	47	Lotrafilcon B Asmofilcon A	Faster epithelial healing with asmofilcon in first 3 days; no other differences noted
Taylor et al., 2014 [90]	Randomised, Contralateral	45	Balafilcon A Lotrafilcon A	Pain levels highest with balafilcon A > lotrafilcon A > senofilcon A
Mukherjee et al., 2015 [91]	Randomised, Contralateral	24	Comfilcon A Senofilcon A	A reduction in pain with wear of the senofilcon A lens; no difference in epithelial healing
Eliacik et al., 2015 [92]	Randomised, Contralateral	21	Lotrafilcon B Comfilcon A	No difference in overall healing rate, size of epithelial defect through postop day 3 and discomfort were both reduced with comfilcon A
Mohammadpour et al., 2015 [93]	Randomised, Contralateral	60	Balafilcon A Lotrafilcon A	Less pain with lotrafilcon A; Foreign body sensation with balafilcon A
Mohammadpour et., 2018 [94]	Randomised, Contralateral	60	Lotrafilcon B Comfilcon A	No differences in pain or ocular discomfort
Yuksele et al., 2019 [95]	Randomised, Contralateral	34	Samfilcon A Lotrafilcon B	Some differences in healing and pain on postop day 2; no differences between lens types by postop day 3
Duru et al., 2020 [96]	Randomised, Contralateral	43	Senofilcon A Lotrafilcon B	Less pain and tearing over first 48 h postop with senofilcon A, no difference in epithelial healing
Bagherian et al., 2020 [97]	Randomised, Contralateral	45	Both generations of balafilcon A	No difference in epithelial healing, second generation lenses tended to have increased deposits
Duru et al., 2020 [98]	Randomised, Contralateral	37	Balafilcon A Samfilcon A	Better comfort with samfilcon A, no differences in epithelial healing

# Bandage CLs: epithelial healing following PRK

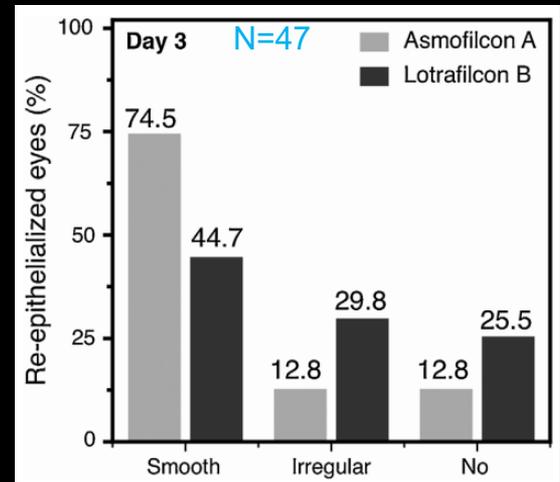


Defect size  
 $A = \pi[(a+b)]^2$



New generation SiHy lenses with **advanced surface treatment** show enhanced wound healing post-operatively.

*Grentzelos et al. (2009)*  
*Plaka et al. (2013)*



# Discussion

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- Following refractive surgical procedures, **new generation SIHy** materials with high  $O_2$  transmissibility, low modulus and surface treatments enhance wound healing and epithelial cell reproduction, while they offer advantages in terms of pain and discomfort.
- Plasma surface treatment possibly preserves the original surface quality of the polymer aimed at reducing dryness symptoms and lipid deposition during CL wear.
- **Longer** postoperative lens wear is associated with **fewer** complications.
- Lens fitting (ie diameter, base curve, sagittal height) also seems to be important for achieving optimal pain control and epithelial healing.
- ...while conventional soft lens fitting following surface ablation is not always ideal: **(cornea following myopic PRK becomes flatter and oblate (from prolate), following hypermetropic PRK is more oblate)**