Contact Lenses 2

by

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- A soft lens may be defined as a contact lens made from a hydrophilic (“water loving”) material and with a diameter larger than the cornea (semiscleral design).

- Soft lenses are the most popular contact lens wear modality, accounting for some 88% of lens wearers.

Advantages:

- Soft lenses are immediately comfortable ,
- adaptation time is short owing .
  why ?? Upper lid, edge left , movement.
- Soft lenses are suitable for long or short wearing times and variable wearing schedules.
- These lenses are relatively inexpensive, which makes them suitable for planned-replacement systems.
- Lenses can often be dispensed from an inventory.
- Apparent eye color can be changed with soft lenses.

- Soft lenses cause minimal central corneal distortion, so spectacle blur is rare.
- The large optic zone makes for minimal flare.
- There is less foreign body trapping than with GP lenses.
- Soft lenses are good for sporting activities, since they are rarely dislodged.
- They are a good option when a spheric refractive error is associated with a toric cornea.

Limitations :

- They have a relatively short life, since they are fragile and subject to rapid accumulation of surface deposits.
- Ongoing lens care takes a significant amount of time—at least 5 minutes per day in daily wear.
- Lens cleaning and disinfection are essential.
- The results of noncompliance with care systems may be devastating.
- They may be inadequate for correcting low astigmatism., residual ?
- It is difficult to verify soft lens parameters.

- Hydrogel soft lenses offer only limited oxygen transmissibility.

- As a result, they may present difficulties with extended wear or when used to correct high ametropia or astigmatism.

- Compared with GP lenses, soft lenses have limited post-lens tear exchange.
  Large diameter , no edge lift , less movement.

- Hydrophilic materials tend to dehydrate on-eye, which may cause symptoms.
  Contraindicated for drye yes .

- In extended wear, soft lenses may cause inflammatory complications, such as papillary conjunctivitis or keratitis.

Soft Lens Modalities

Conventional daily wear

- 6 to 12 months
- a lens that is worn until change is necessary due to deteriorating lens performance, lens loss, or lens damage.
- Planned or frequent replacement systems >> conventional daily wear lenses with a prescribed replacement interval.
- Common replacement intervals are annual, semi-annual, and quarterly.
- Conventional care and maintenance systems are used.

advantages

- custom-fitted in a wide range of spheric, toric, and multifocal designs in materials of low, medium, or high water content.
- The widest variety of parameters is available.
- Conventional daily wear lenses may be the only option for patients who require complex, expensive lenses.

Disadvantages

- require complex care systems that include protein-remover tablets.

- higher overall rate of adverse reactions than disposable lenses.
  using planned-replacement lenses helps >> avoid the effects of lens deterioration and encourages compliance

- lathe-cutting >> the most labor-intensive and hence the most expensive (per lens) of the available methods,

- High Dk materials are not available for conventional daily wear lenses

Two approaches to selecting a replacement interval :

- patient-dependent replacement interval >> monitoring the patient in the first few weeks or months of lens wear >> The replacement frequency of soft lenses is often determined by the ratio of cost-to-benefit.

- fixed-replacement interval >> depends on lens material

- If the new lens feels much better than the one it replaced, it was supplied too late.

Hydrogel disposable lenses

- were first considered in 1980,
- inexpensive, disposable lens that could be replaced weekly to biweekly would be a beneficial modality for many patients.
- disposable lenses reduce the amount of lens maintenance required >> thereby reducing the cost and compliance burden on the patient.
- A wide variety of disposable lenses are now available

Two-week/monthly disposable hydrogel lenses

- molding technology >> low cost >> permit disposing of lenses rather than protein-cleaning them.

- innovative multiple packaging of lenses, which allows convenient replacement schedules, since the patient not in need return to the practitioner for every new pair of lenses.

- Disposable lenses have the advantage of the patient always having spare lenses.

Daily disposable lenses

- lenses do not need to be cleaned or disinfected each night.
- There is no care system, and a lens storage case is no longer required.
- (FDA) defines disposable, in terms of contact lenses, as using once, which may mean 1 week of extended wear or 1 day of daily wear.
- Daily disposable lenses appear to reduce or eliminate many of the problems that may occur with conventional soft lenses, as well as providing maximum convenience for the patient.

Disposable lenses have major advantages over conventional and planned-replacement lenses :

- Physiologic advantages >> Reduced deposits >> can be made thinner >> higher O2 and comfort
- Compliance
- No enzymatic protein-remover
- No cleaning or disinfecting solutions or lens storage case is required for daily disposable lenses

Disposable lenses have certain potential disadvantages

- Quantity of manufacturing is affected >> large number is needed >> fewer parameters
- Lens-parameter repeatability
- no warranty on individual lense

Silicone-hydrogel extended wear disposable lenses

- intended primarily for extended wear
- silicone is hydrophobic >> surface modified by a plasma batch process >> increase wettability.
- Lens cost is slightly higher >> clean and disinfect the lenses only occasionally or not at all >> minimizing the cost of lens maintenance.
- lubricating drops may need to be instilled by the patient on waking each morning.

The second generation silicone-hydrogel disposable lenses

- Introduced in 2004 >> daily wear.
- These lenses have a lower silicone content and correspondingly higher water content >> reduce the need for surface modification >> reduce manufacturing costs.
- Their oxygen transmissibility is still much higher than traditional hydrogel lenses, without the tendency to dehydration associated with high water content materials.

Soft lens fitting and evaluation

Optimal lens fit

- can be evaluated in terms of a number of parameters.
- Comfort and vision are most important to the patient
- Comfort of a soft lens is considered ideal >> little or no awareness of the lens presence.
  - Excessive awareness >> presence of a foreign body, excessive lens movement or poor centration.
  - no sensation at all >> lens adherence.
  - Lens defects can be reported as a foreign body sensation;
  - incompatible care solutions may be reported as stinging on lens insertion.

Stable vision

- relates to the correct lens vertex power .
- good lens centration and movement
- good prelens tear film stability (greater-than-normal interblink interval).

Lens movement

- it promotes post-lens tear film exchange and mixing.
- Movement is quantified as the vertical change in lens position before and after a normal blink.
- Lens movement of less than 0.1 mm can be considered inadequate
- movement of more than 1.0 mm is excessive.
- Lathed lenses that fit well show about 0.3 mm of movement.
- It is easy to overestimate lens movement when viewing with a slit lamp.
- A handy guide is to remember that a 14.0-mm lens on a 12.0-mm cornea has moved 1.0 mm if the lens edge traverses the limbus.

push-up test

- indicator of lens mobility that is independent of the patient's eyelid blink dynamics.
- The examiner pushes the lens superiorly by manipulating the patient's inferior eyelid margin.
- A lens that fits well can be moved easily by using the push-up test.

Centration of a soft lens

- is assessed as optimal if the lens edge shows uniform and symmetric overlap onto the sclera in all meridians.
- if the lens is decentered, such as with the push-up test, it should regain optimal centration in less than one second.

Lag on upgaze and version movement

- is readily evaluated by observing the change in lens centration in eye positions other than primary gaze.
- A normal amount of lag could be 0.3 to 0.7 mm.
- Excessive lag is associated with poor centration
- zero lag occurs if there is lens adherence.

Wetting of the lens

- on the anterior surface is of vital importance for comfort and vision.
- specular reflection of the slit-lamp light source on the tear film surface.
- The tear film should not thin or dry out during the normal interblink interval but should remain complete for that time.

Tear exchange and the post-lens tear film

- evaluated clinically using observation in specular illumination with the biomicroscope.
- High magnification (30× or more), a wide angle of observation (more than 60 degrees), and a narrow slit beam (0.1 mm) are needed.
- An optimal lens fit requires an aqueous postlens tear film, which is observed as amorphous or nonpatterned in specular reflection.
- Patterned or colored postlens tear film appearances are taken to indicate reduced tear exchange.

Keratometer mires

- can be examined on the anterior lens surface to detect any lens distortion on the eye.
- Any mire irregularity would be considered abnormal.

Steep

- Vision >> clear after blink
- Mires >> clear after blink
- Ironing effect

Flat

- Vision >> blurred after blink
- Mires >> distorted after blink
- Excessive movement

Selection of a lens for fitting requires the choice of parameters

- Back optic zone radius BOZR
- Back optic zone diameter BOZD
- Total diameter TD
- Back vertex power BVP
- Oxygen transmissibility Dk/t

BOZR

- usually selected as 0.6 to 0.8 mm flatter than the average corneal curvature measured with keratometry.
- If a lens BOZR is too flat for the cornea, lens centration may be poor.
- If the lens BOZR is too steep, the lens may not conform properly to the eye during wear.
- Aspheric back curves are used in some soft lenses.
- available in flat (FL) and steep (ST) curvatures.
- The lens curvature is slightly flatter peripherally than centrally to more closely match the average corneal shape.
- For such lenses, the manufacturer usually has recommendations as to which lens curvature to trial-fit in the first instance.

Total diameter (TD)

- usually selected as about 2.0 mm greater than the patient's horizontal visible iris diameter.
- A lens that is too large will tend to show low amounts of movement and may have inadequate tear exchange.
- A lens that is too small may move excessively, show poor centration, and be less comfortable to wear.

Oxygen transmissibility (Dk/t)

- directly proportional to the oxygen permeability of the lens material
- inversely related to the lens average thickness
- Under open-eye conditions, or daily wear, lenses of moderate Dk/t are usually suitable
- Under closed-eye conditions, or extended wear, a high Dk/t lens is required

Back vertex power

- affects lens thickness profile and average thickness.
- Consequently, many lens attributes are affected, including Dk/t, fitting, and handling.
- Contact lens power differs significantly from spectacle lens power for powers greater than 4.00 D.
    - The required contact lens power is needed to be calculated

Lens thickness

- The majority of current lenses are made as thin as practical to maximize oxygen transmissibility.

- Too thin
  - difficult for the patient to handle them
  - have a shorter life.
  - thinner post-lens tear film >> have less movement with blinks.
  - If a lens is excessively thin, the result can be desiccation staining of the cornea.

- As a guide, low-water-content lenses may have a center thickness as low as 0.04 to 0.06 mm,

- mid-water-content lenses 0.07 to 0.09 mm

- high-water-content lenses 0.10 to 0.14 mm.

Choosing soft lenses for patients

Some of the key issues that need to be considered are:

- What refractive error correction is required?
- Is a steep or flat fitting required?
  - a corneal curvature steeper than 44.00D (7.67 mm) usually needs a steep-fitting lens
- Selection of lens type/modality.
- Is there dry eye or a patient history suggestive of a tear film anomaly?

Tear film and blinking

- have an effect on fitting.

- Lens movement can be affected by interactions between the lens and upper lid :

  - depend on the lubricative properties of the prelens tear film
  - the surface quality of both lens and lid
  - and the nature of the blink.

- the post-lens tear film appears to influence lens movement.
  - hypotonic solutions can thin the post-lens tear film and cause lens adherence

Lens settling

- postinsertion equilibration process.
- The tear film squeezed out by the initial blinking >> reduction in lens movement.
- Reflex tearing on lens insertion may also affect lens movement, leading to a transitory reduction

lens movement

- immediately on insertion is not usually representative of normal movement.
- Evaluating movement after 5 minutes >> predicts movement after 8 hours of wear .

Eye closure

- can also affect lens movement.

- eye closure as short as 15 minutes >> thinning of the post-lens tear film >> reduce lens movement to near zero.

Air movement

- at the anterior surface of the lens >> post-lens tear film thinning >> reduction in lens movement.

water flow conductivity

- The flow conductivity is a function of the material pore size and lens thickness.
- high-water-content materials have increased values.

lens verification and inspection

- Lens integrity checked using a projection microscope, or a slit lamp when the lens is on the eye.
  - Check for edge defects,
  - Central defects, etc.

- A variety of electronic-mechanical gauges or pachymeter >> measure soft lens thickness

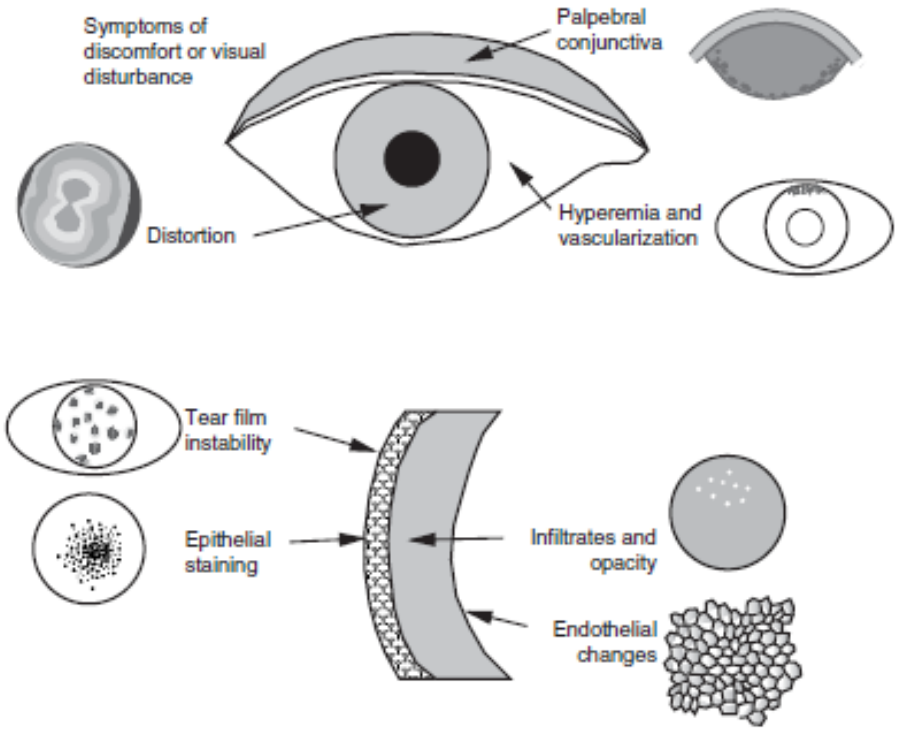
- It is impractical for the practitioner to verify each disposable lens, but the patient can check each new lens before inserting it.

Fitting by physiology

- is the term used by Efron and Holden to designate the role of lens design and fitting in ocular complications in lens wear.

- Some ocular complications of contact lens wear observed at follow-up visits can be viewed as an indication for changing lens design for a given mode of wear.

- Such ocular changes fall into eight categories of signs and symptoms :



Hypoxia and hypercapnia

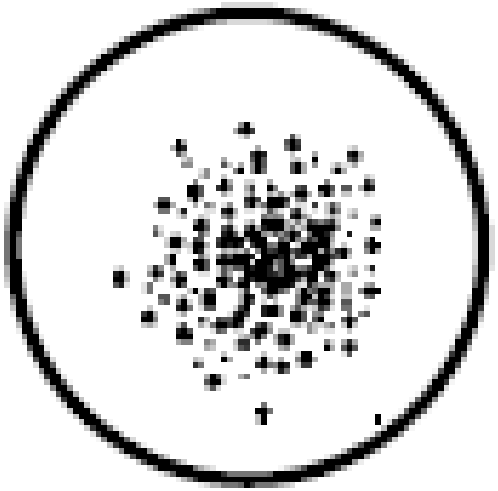
- Normally there is a flow of oxygen into the anterior corneal surface and an efflux of carbon dioxide
- When the eyelid is closed during sleep, the palpebral vascular supply becomes the site of gas exchange.
- Hypoxia and hypercapnia >> indication for contact lens refitting.

Reduced epithelial aerobic metabolism

- reduction in mitotic cell activity,
- loosening of tight junctions,
- decreases in numbers of hemidesmosomes
- separation of corneal epithelial cells.
- The surface cells may become more fragile and there may be a slight epithelial thinning.
- clinical manifestation of hypoxic changes >> fluorescein staining.

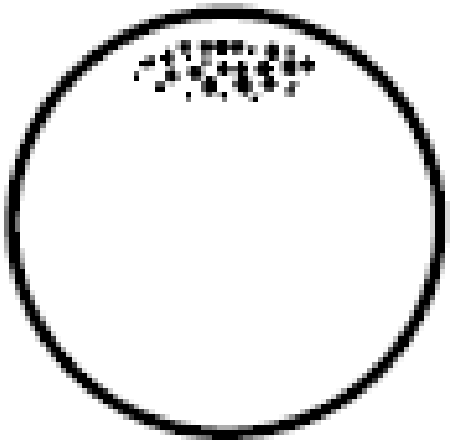
Signs of reduced epithelial aerobic metabolism

- Superficial punctate keratitis (SPK)
  - Premature shedding of small groups of surface cells
  - disruption of the ocular surface mucous layer.
  - asymptomatic because the injury threshold of the cornea is less than the touch threshold.



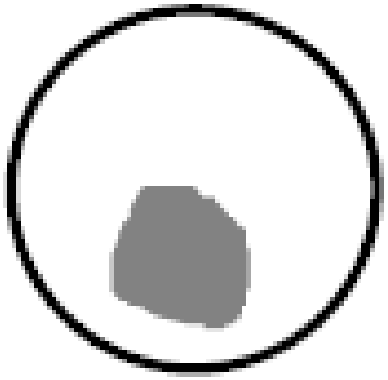
Superficial punctate

- Superior arcuate staining
  - staining in a horizontal linear pattern close to the superior limbus.
  - This sign is more likely in patients with tight or low-positioning upper lids
  - reduced oxygen availability to the superior region of the cornea
  - Even in daily contact lens wear, the superior cornea is in “extended wear” if covered by the upper lid.



Superior/Tight lid

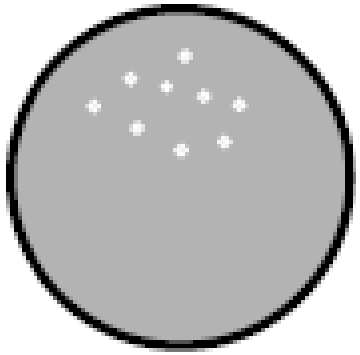
- Epithelial abrasion
  - severe central fluorescein staining resulting.
  - If the lens has become adherent to an epithelium already weakened by hypoxia, the abrasion will have sharply demarcated edges and may be several millimeters in diameter.
  - These are acute conditions >> significant discomfort or pain.
  - The lesion is not usually infected >> stromal infiltration is not present.



Confluent

- Microcysts and vacuoles

  - translucent cysts in the epithelium, 0.01 to 0.1 mm in diameter
  - retroillumination will show the cystic formations
  - Microcysts are smaller and less regular in shape than vacuoles, but the functional distinction is uncertain.
  - It takes 6 to 8 weeks of extended wear with hydrogel lenses before microcysts appear.
  - One clue to the presence of microcysts or vacuoles may be scattered punctate fluorescein staining.



Microcysts and vacuoles

Management

- significant epithelial staining >> 24-hour discontinuation of lens wear.
- Mild staining >> reducing wearing time (e.g.,to less than 10 hours per day) or ceasing extended wear.
- If the staining is chronic, even if slight, modification of lens parameters to increase Dk/t is advisable.
- Superior arcuate staining may require an improvement to peripheral lens Dk/t, whereas central staining may indicate the need to improve central corneal oxygenation.

Unlike ocular changes with other causes, ocular changes related to hypoxia and hypercapnia tend to affect only the cornea, and there are few associated symptoms.

Stromal edema

- arises within hours of the onset of hypoxia.
- The degree being related to the severity of the hypoxia.
- hypoxia-related increase in anaerobic metabolism via the Embden-Meyerhof biochemical pathway of the epithelial cells >> accumulation of lactate in the stroma >> An inflow of water into the stroma (edema).

Corneal thickness

- is not simple to measure clinically.
- The edema response begins within half an hour of lens insertion and generally peaks within 3 hours.
- In daily wear lenses typically ranges from 1.5% to 5.0%.
- With extended wear of hydrogel lenses overnight edema averages 10% to 12%.
- corneal thickness measurements can also be influenced by reflex hypotonic tearing or by a physical thinning of the stroma in long-term wear.
- Also, there is marked individual variability in the degree of corneal swelling response.

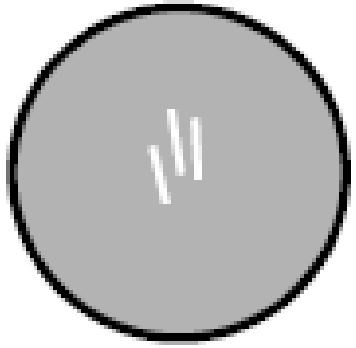
Corneal distortion

- a result of poor GP lens fitting or wear of low Dk/t GP lenses or PMMA lenses.
- is an uncommon complication of hydrogel lens wear,
- Such distortion is known as “spectacle blur”or “corneal warpage”and is manifested as a change in the spectacle refraction and central corneal curvature.

Distortion-irregular

Stromal striae

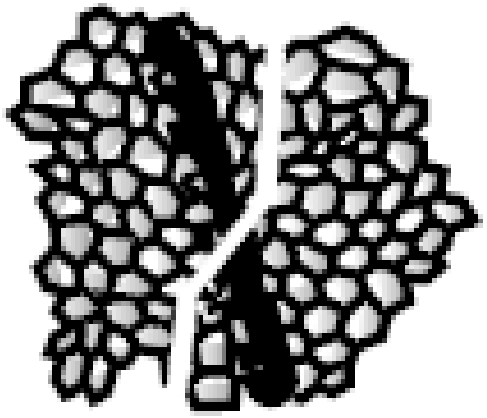
- fine, white vertical lines in the posterior stroma of the cornea, if stromal edema of 6% or higher is present.
- Thus, striae are not present with most current-generation daily-wear hydrogel lenses for myopia .
- striae remain a useful diagnostic indicator of corneal edema for plus-powered hydrogel lenses, such as those prescribed for monovision
- extended-wear lenses.



Striae (edema)

stromal folds

- appear as dark lines in the endothelial specular reflection
- They appear when stromal edema exceeds 10%
- rarely occur with daily wear of GP or hydrogel contact lenses.
- With extended wear of hydrogel lenses posterior folds can be apparent on eye opening.



Endothelial folds

Management

- if stromal edema is noted at follow-up examination, increasing lens Dk/t to at least 15 for daily wear and at least 34 for extended wear is recommended.

- In the case of plus-powered hydrogel lenses, this may require a change to high-water-content material or a GP lens design.

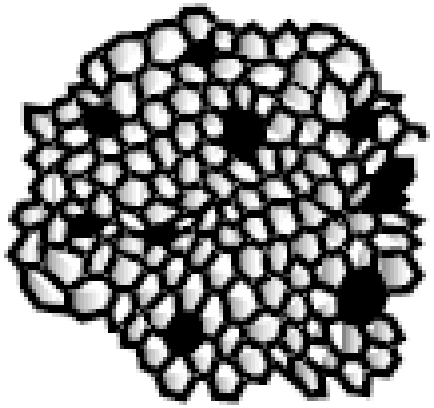
- If a change to lens fitting is not desired, then other strategies may also be useful, such as reducing wearing hours per day or inserting lenses later after eye opening in the morning.

Stromal acidosis

- can arise from hypercapnia as well as hypoxia.
- Respiratory acidosis can occur when a gas-impermeable lens prevents carbon dioxide efflux from the corneal stroma (hypercapnia).
- Metabolic acidosis can occur if there is a decrease in the pH of the stroma due to accumulation of stromal lactate.
- Under open-eye conditions, human stromal pH rises about 2%, and it may decrease as much as 5% during wear of an oxygen-impermeable contact lens.
- This condition is a relatively uncommon indication for lens refitting.

endothelial edema

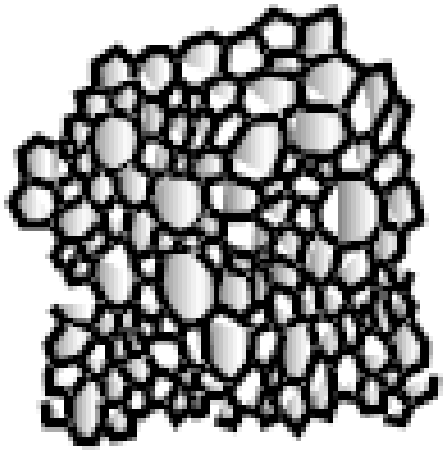
- appears as circumscribed defects in the endothelial specular reflection.
- It has also been termed **“blebs,”** “events,” and “pseudoguttata.”
- Application of a contact lens to the unadapted eye can cause a sudden-onset but transient endothelial edema response.
- It occurs within 10 minutes of lens insertion, peaks after approximately half an hour, and may last for several hours.
- The initial bleb response to contact lens wear does not result in cell loss, and a change in lens fitting is not required.



Blebs (endothelial edema)

Endothelial polymegethism

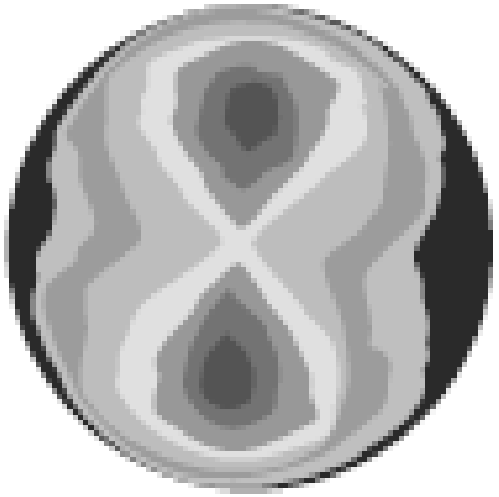
- is a greater-than-normal variation of cell size in the corneal endothelial mosaic, observed with the biomicroscope or the clinical specular microscope.
- It is graded by the coefficient of variation of cell area.
- A normal endothelium has a coefficient of approximately 25%, but it may be as high as 46% in a patient who has had 20 years of oxygen-impermeable daily lens wear or 5 years of hydrogel extended wear.



Polymegethism

Corneal exhaustion syndrome

- condition associated with the presence of marked endothelial polymegethism.
- Patients with high refractive errors and extended wear who have worn lenses for 10 years.
- Other signs are intolerance to lens wear and blurred, fluctuating vision due to fluctuations in refractive error.



Exhaustion syndrome

Corneal hypoesthesia

- is not easy to measure quantitatively in the clinical situation.
- One technique is based on using a fine nylon thread of adjustable length and stimulating a peripheral corneal location.
- Low-Dk/t hydrogel or GP lenses are most commonly implicated.
- Affected patients are naturally asymptomatic, so corneal hypoesthesia is an uncommon indication for lens refitting.

Management

- Polymegethism, corneal exhaustion syndrome, or corneal hypoesthesia is an indicator of the need to refit with a lens of moderate to high Dk/t

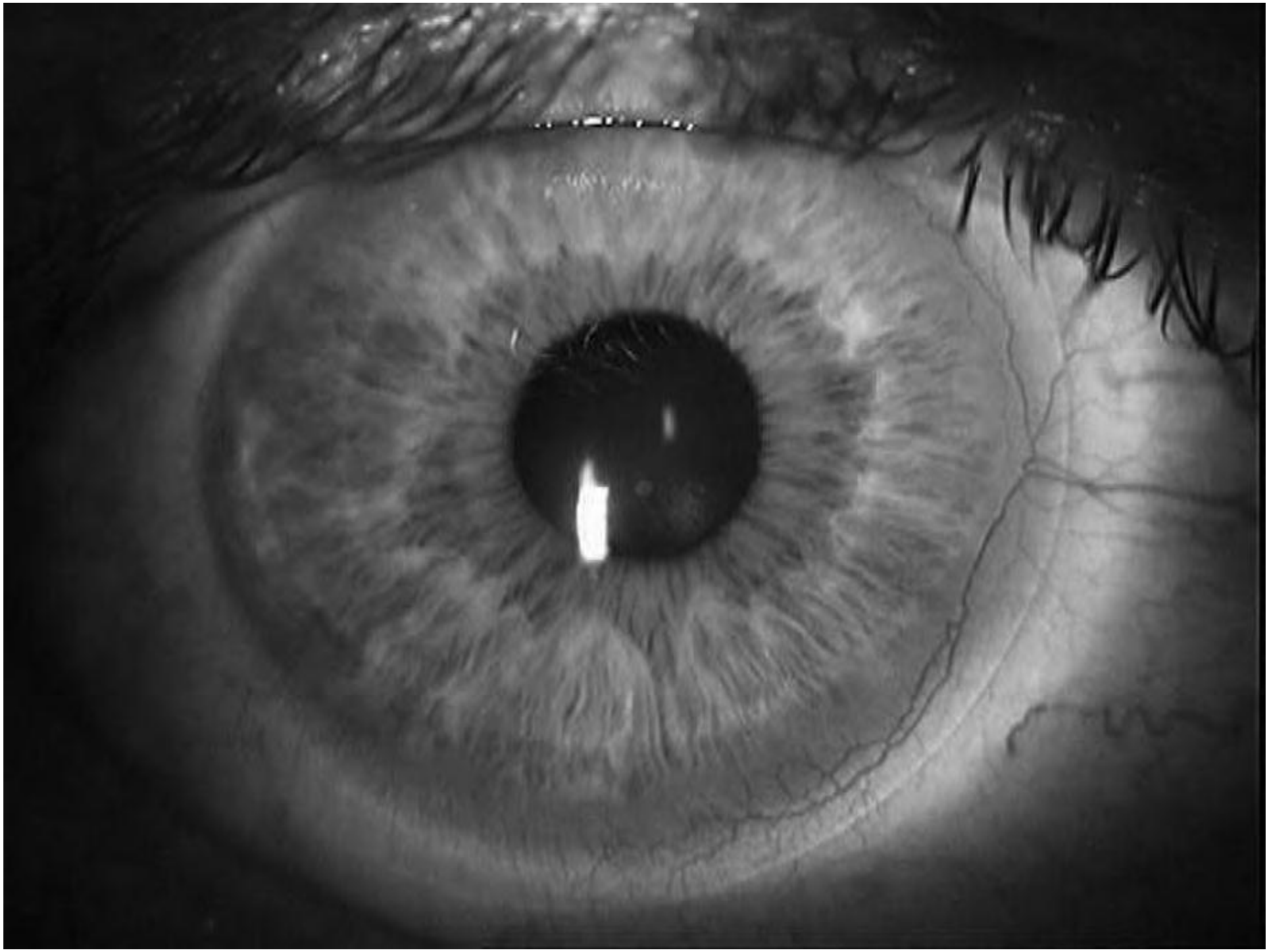
- cease extended wear.

Hyperemia and vascularization

- The normal limbus >>
  - a vascular transition zone
  - Containing blood vessels, whereas the cornea itself is avascular.
  - It is approximately 1 mm in width,
  - wider in the vertical meridian, particularly superiorly.

Limbal hyperemia

- is a dilation of existing limbal capillaries.
- It is a common chronic bilateral complication of hydrogel contact lens wear,
- patients are usually asymptomatic.
- Causes :
  - Low-water content hydrogel
  - Midwater hydrogel lenses with a thick periphery
  - long wearing times or overnight wear
  - a “tight” or immobile hydrogel lens .
- Limbal hyperemia, fluorescein staining, and the presence of microcysts have been found to be the best biomicroscopic indicators of corneal hypoxia in hydrogel extended wear



Superficial vascularization

- is penetration of blood vessels into the superficial cornea
- continuous with the limbal vessels.
- The superior limbus is most susceptible.
- Stark and Martin defined vascularization as vessel penetration greater than 1.5 mm.
- It is uncommon in hydrogel lens daily wear, but a higher prevalence has been noted for aphakic or therapeutic hydrogel extended wear.
- Corneal vascularization is of concern because it makes the cornea more susceptible to inflammation or hemorrhage.
- Because vascularization can develop in the absence of symptoms, routine follow-up examinations are the only means of detecting this condition.

Deep stromal vascularization

- is the rarest of the vascular changes associated with contact lens wear, but it is also potentially the most serious.

- Vision can be profoundly affected in some cases owing to associated opacities.

- Risk factors include
  - chronic hypoxia and stromal edema,
  - previous surgery for aphakia
  - corneal disease, injury or infection,
  - extended wear of low-Dk/t lenses
  - toxic solution preservatives.

An intracorneal hemorrhage

- at the subepithelial level is an uncommon sequelae to superficial corneal vascularization.
- It has been most often related to aphakic hydrogel lenses.

An intrastromal opacity

- associated with vascularization is also a rare complication of lens wear
- threaten vision.
- If related to corneal exhaustion syndrome, an opacity will be deep stromal, but avascular.

Management :

- Mild limbal hyperemia requires no management and is an unavoidable part of hydrogel lens wear.
- Marked hyperemia or any vascularization requires lens refitting to improve peripheral corneal oxygenation.
- Patients may be refitted with silicone hydrogel or GP lenses
- may need to reduce wearing time
- cease extended wear.
- Deep stromal vascularization is a most serious complication, and immediate cessation of lens wear, rather than lens refitting, is indicated.

Infection

- **Infection** is the most serious, but also one of the rarest, complications of contact lens wear.

- It can occur in all types of lens wear but has been most commonly associated with cosmetic extended wear.

- Even in extended wear, 99.9% of contact lens wearers do not contract a corneal infection.

A number of ocular defense mechanisms exist to help prevent infection.

- Blinking and tear flow are among the front-line defenses.
- Mucous strands are rolled across the cornea by blinking, and these tend to trap bacteria.
- Desquamation of epithelial cells is a regular occurrence, which helps remove bacteria that may have adhered.
- Tear film antibacterial factors act toward lysing bacteria. These include lysozyme, lactoferrin, transferrin, ceruloplasmin, beta-lysin, and cellular immune factors.
- The acquired immune system of the eye consists of immunoglobulin A, secretory IgA, and the complement system.
- The natural immune system consists of macrophages, neutrophils, and natural killer cells.

Bacterial corneal infection may produce any of several signs.

- The presence of corneal pain of more than a transitory nature in a contact lens wearer is a warning sign of the possibility of a corneal infection.
- The pain may be exacerbated by lens removal and accompanied by redness, discharge, or decreased vision.
- Infective ulceration is characterized by an epithelial defect with an underlying stromal excavation and infiltrate.
- These findings may be considered pathognomonic for corneal infection until proved otherwise.
- An infective ulcer is typically unilateral and the ulcer is likely to be central or midperipheral.
- Other possible associated signs are surrounding epithelial, stromal, and endothelial edema; stromal thinning; necrosis of the infiltrate; mucopurulent discharge; keratic precipitates; and an anterior chamber reaction.
- In terms of management, symptoms or signs are indications for immediate ophthalmic evaluation and lens wear should immediately be ceased

Acanthamoeba corneal infection is a rare but particularly devastating cause of infection.

- Severe ocular pain, out of proportion to the manifest clinical signs, is a hallmark sign of infection.
- Early in the disease process, signs are frequently nonspecific and limited to an epitheliopathy or neurokeratitis.
- Later evidence of infection may include stromal infiltration in a ring pattern and scleritis.
- The infection tends to have a waxing and waning course.
- In terms of management, where possible, corneal scrapings are vital for confirmation of diagnosis.
- Early diagnosis is correlated with success in treatment, possibly because fewer Acanthamoeba cysts are present in the cornea early in the course of the disease

Bacterial immunologic reactions

- There are several sources of bacterial contamination.
- Bacteria may be harbored in the lid margins or in biofilm on the lens surfaces and produce substances toxic to the cornea.
- Signs of blepharitis or meibomianitis may indicate that the lid margin is the source of organisms, such as *Staphylococcus*, that can secrete exotoxins.
- These conditions interrelate with general ophthalmologic conditions such as marginal keratitis, catarrhal ulcers, and blepharitis.
- A source of particular note is the contact lens case.
- Patients need to clean and dry their case daily, and replace their case regularly to avoid the accumulation of biofilm that harbor bacteria.

- Bacterial reactions may present in two forms: either acute inflammation reactions or low-grade, sterile, peripheral ulcers.

- Bulbar hyperemia or a marked engorgement of the blood vessels over the entire bulbar conjunctiva is indicative of an acute inflammatory reaction.

- If the inflammatory response is less severe, the hyperemia may be adjacent to the corneal inflammatory response.

- Peripheral corneal infiltrates are focal white accumulations approximately 0.5 to 2.0 mm in diameter and located in the corneal epithelium or anterior stroma.
- The associated epithelium usually shows minimal fluorescein staining and no ulceration.
- Minor infiltrates may be asymptomatic or associated with a mild foreign-body sensation.
- Infiltrates in the immobile lens syndrome are usually associated with acute pain, however.
- A more gradual onset of inflammation over a period of contact lens wear may lead to breakdown of the overlying epithelium and subsequent ulceration, although the infiltrate remains sterile.
- Such infiltrates have been termed marginal keratitis, sterile ulcers, catarrhal lesions, marginal infiltrates, or sterile infiltration.
- Keratic precipitates are often present in an acute inflammatory reaction.

- Sterile peripheral infiltrates must be differentiated from infectious ulceration.
- Infectious infiltrates tend to be associated with significant pain, epithelial defect, discharge, anterior chamber reaction and a central location (the PEDAL mnemonic).
- If in doubt, treat as infectious

- Lens-fitting technique can be used to minimize the risk of infection.
- Ensure adequate movement and post-lens tear flow.
- This helps clear bacteria, maintain a normal rate of epithelial desquamation, replenish the mucin layer, and circulate tear film antibacterial factors and nutrients for the epithelium.
- Ensure adequate corneal oxygenation via a lens with moderate Dk/t (daily wear) or high Dk/t (extended wear) to minimize epithelial defects and other metabolic alterations that increase susceptibility to bacterial adherence.
- Minimize exposure of the eye to microbial contamination by patient education on hygiene, avoiding the use of homemade saline or tap water, and attention to compliance with lens care systems.

- Other risk factors for Acanthamoeba infection are the contamination of lenses or solutions through contact with swimming pools, hot tubs, and freshwater ponds.
- Clean the lens case daily and replace it regularly.
- Disposable lenses do not appear to alter the risk of infection when allowance is made for factors such as compliance with cleaning and disinfection systems.
- Regular lens replacement does appear to reduce the incidence of inflammatory reactions, however.
- Minimize extended wear, since infections and inflammatory reactions are less common in daily wear.