“Dry eye Diseases”

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WHY?

Dry eye

- Dry eye is a multifactorial disease of the tear film and ocular surface, that results in
  - Symptoms of discomfort
  - Visual disturbance
  - Tear film instability
  - Potential damage to ocular surface

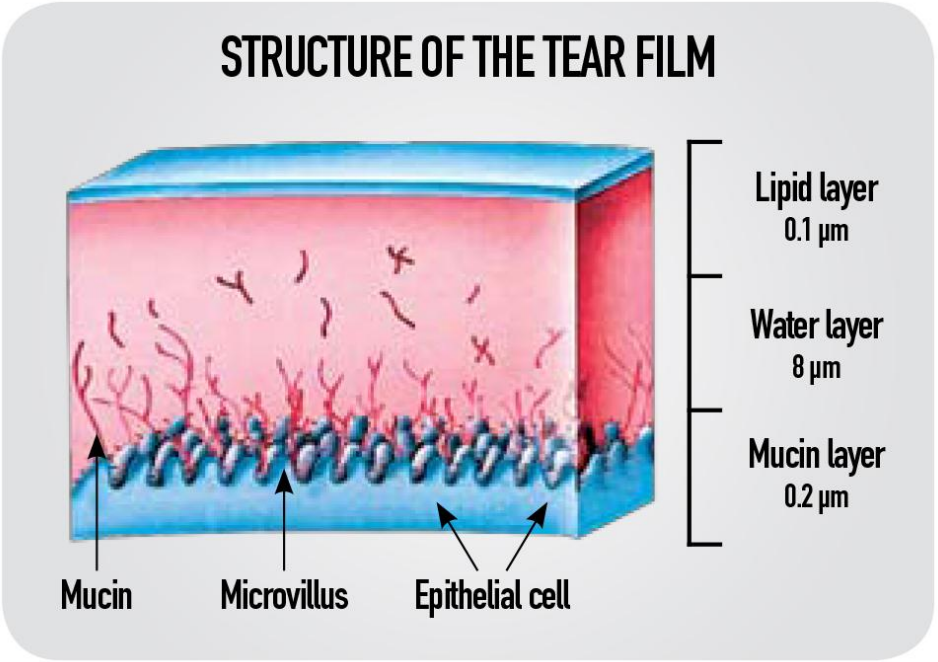
  It is accompanied by increase osmolarity of the tear film and inflammation of ocular surface

Epidemiology

- Effects 5–50% of population worldwide

- More common in:
  - Elderly
  - Females
  - Computer users
  - Increasing due to: Screen exposure (>6 hours) , Air pollution

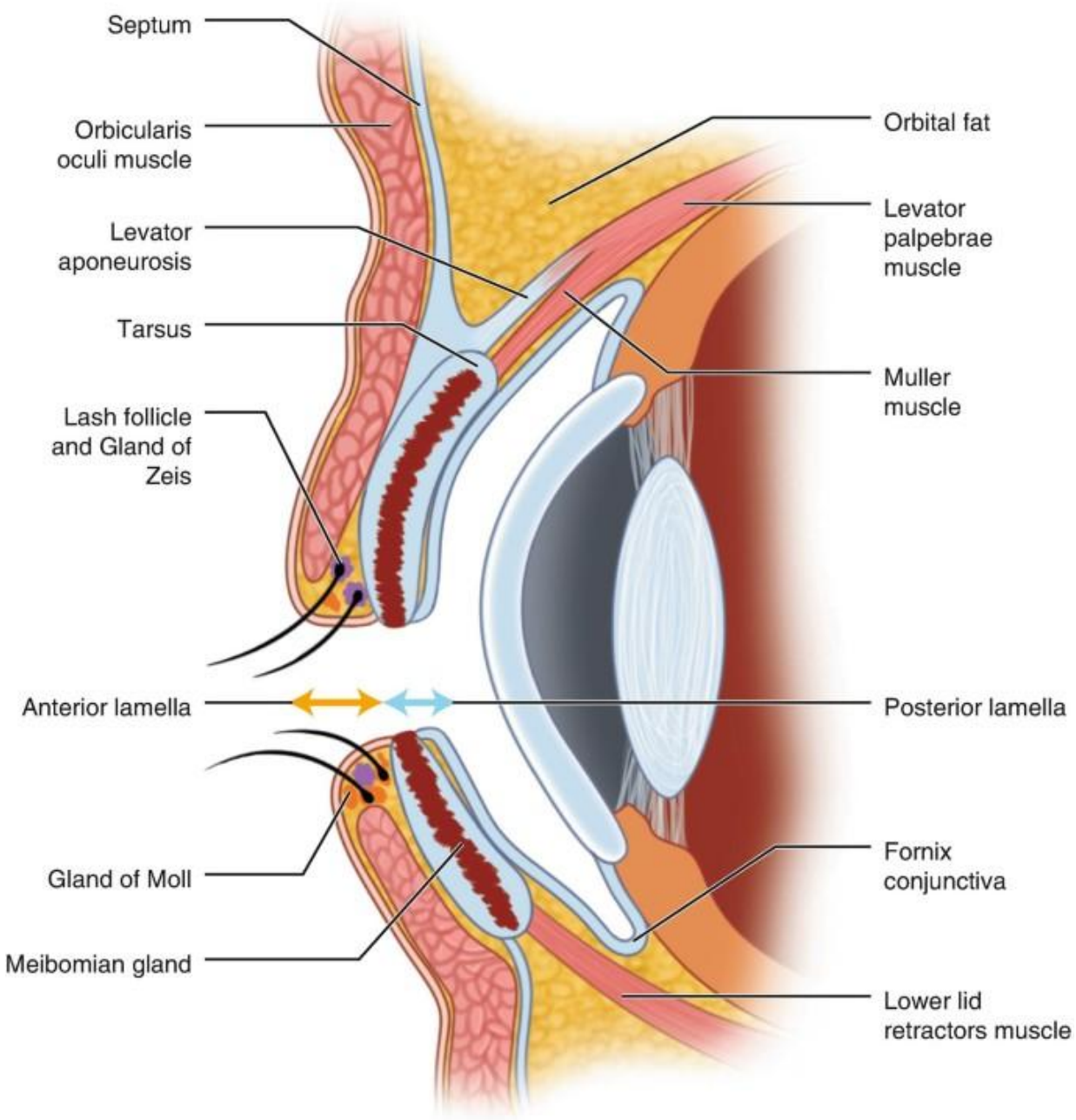
Physiology of tear film



- The tear film has three constituents
  1. Lipid layer secreted by the Meibomian gland
  2. Aqueous layer secreted by lacrimal glands (main and accessory)
  3. Mucous layer secreted by conjunctival goblet cells

Lipid Layer

- Outer lipid layer is composed of polar phase (phospholipids0 and non polar phase (cholesterol esters and triglycerides)
- Lid movement during blinking release lipids from glands



- Functions:
  - Prevents evaporation of aqueous layer
  - Acts as surfactant allowing spread of tear film

Aqueous layer

- 95% secretion from main lacrimal gland
- 5% from accessory lacrimal gland of Krause and Wolfring
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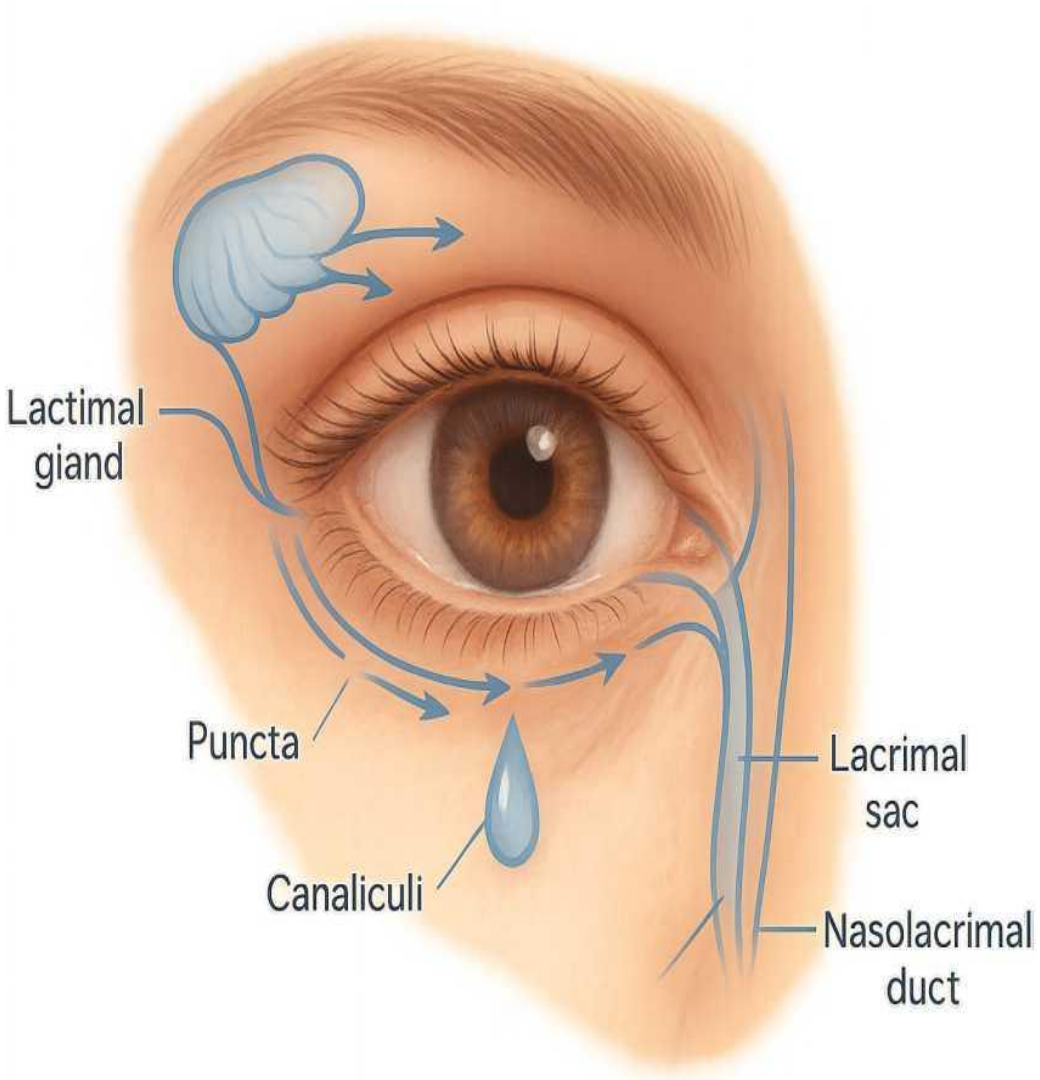
- Basic and reflex component (Vth cranial nerve)



- **Composition**

1. Water, electrolytes
2. Dissolved mucins, proteins
3. Lacrimal gland derived growth factor
4. Pro inflammatory interleukins and cytokines, IgA , Lysozymes, Lactoferrin

Mucous layer

- Mucins are high molecular weight glycoproteins

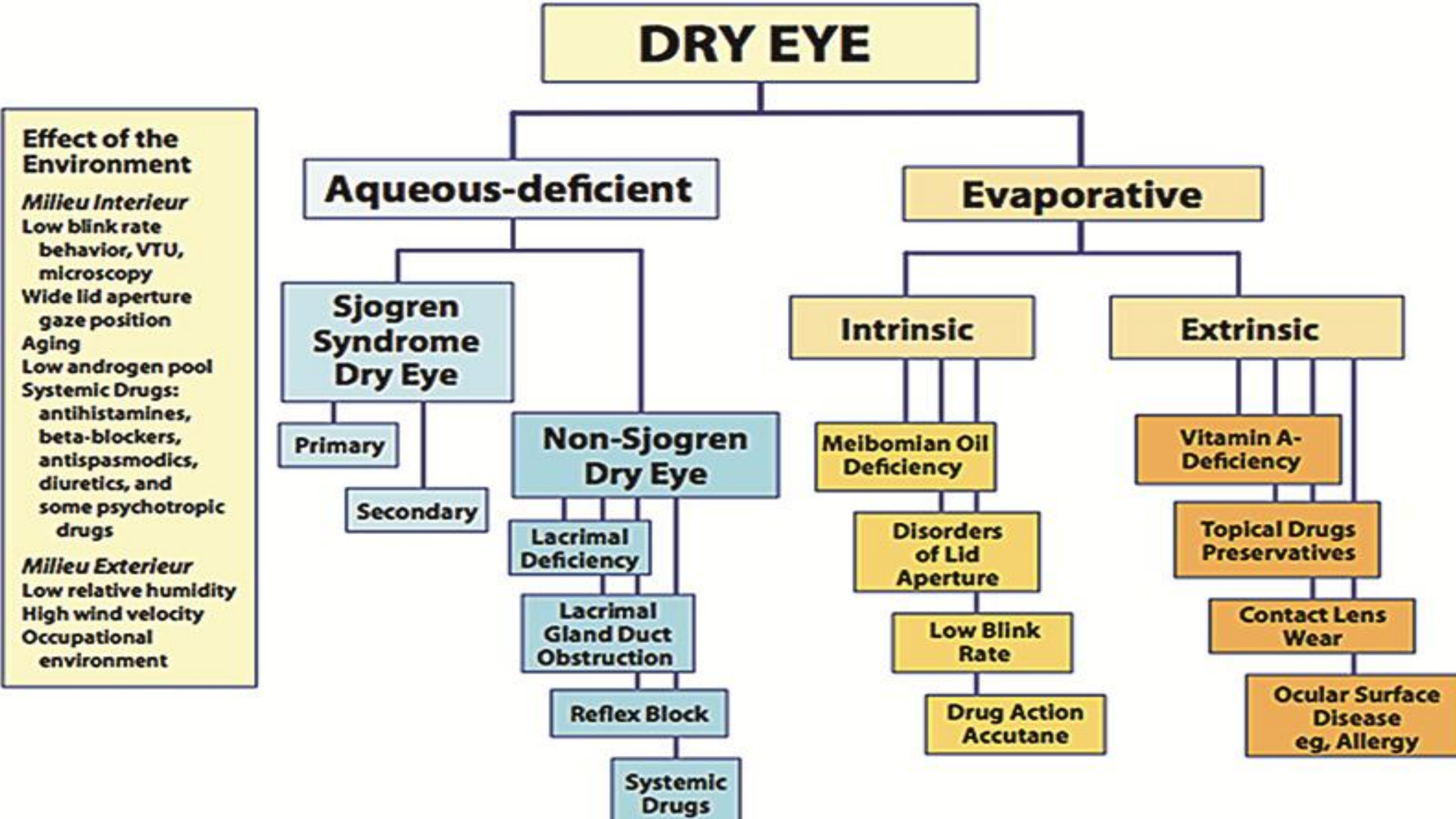
- Functions:
  - Lubrication
  - Permits wetting by converting corneal epithelium from hydrophobic to hydrophilic surface

Classification

- The classification of dry eye usually applied is that of the 2007 international Dry Eye Workshop (DEWS) ,with a basic division into

  - Aqueous deficit

  - Evaporative types


DRY EYE
Aqueous-deficient
Evaporative
Sjogren Syndrome Dry Eye
Primary
Secondary
Non-Sjogren Dry Eye
Lacrimal Deficiency
Lacrimal Gland Duct Obstruction
Reflex Block
Systemic Drugs
Intrinsic
Meibomian Oil Deficiency
Disorders of Lid Aperture
Low Blink Rate
Drug Action Accutane
Extrinsic
Vitamin A-Deficiency
Topical Drugs Preservatives
Contact Lens Wear
Ocular Surface Disease eg, Allergy
Effect of the Environment
Milieu Interieur
Low blink rate behavior, VTU, microscopy
Wide lid aperture gaze position
Aging
Low androgen pool
Systemic Drugs: antihistamines, beta-blockers, antispasmodics, diuretics, and some psychotropic drugs
Milieu Exterieur
Low relative humidity
High wind velocity
Occupational environment

Aqueous deficit dry

- Aqueous deficit dry eye aka keratoconjunctivitis sicca
- Now this KCS can be Primary as seen in Sjogren's Syndrome
- Or it can be Non-Sjogren's Syndrome

- Sjogren's Syndrome is an Autoimmune Inflammatory Condition characterizes by Leucocytic infiltration and destruction of Lacrimal ,salivary or other exocrine glands

- Primary Sjogren’s Syndrome =xerostomia+ dry eye+ parotid gland enlargement

- Secondary Sjogren's Syndrome = xerostomia +dry eye + rheumatic arthritis/SLE

- Non-Sjogren's syndrome dry eye

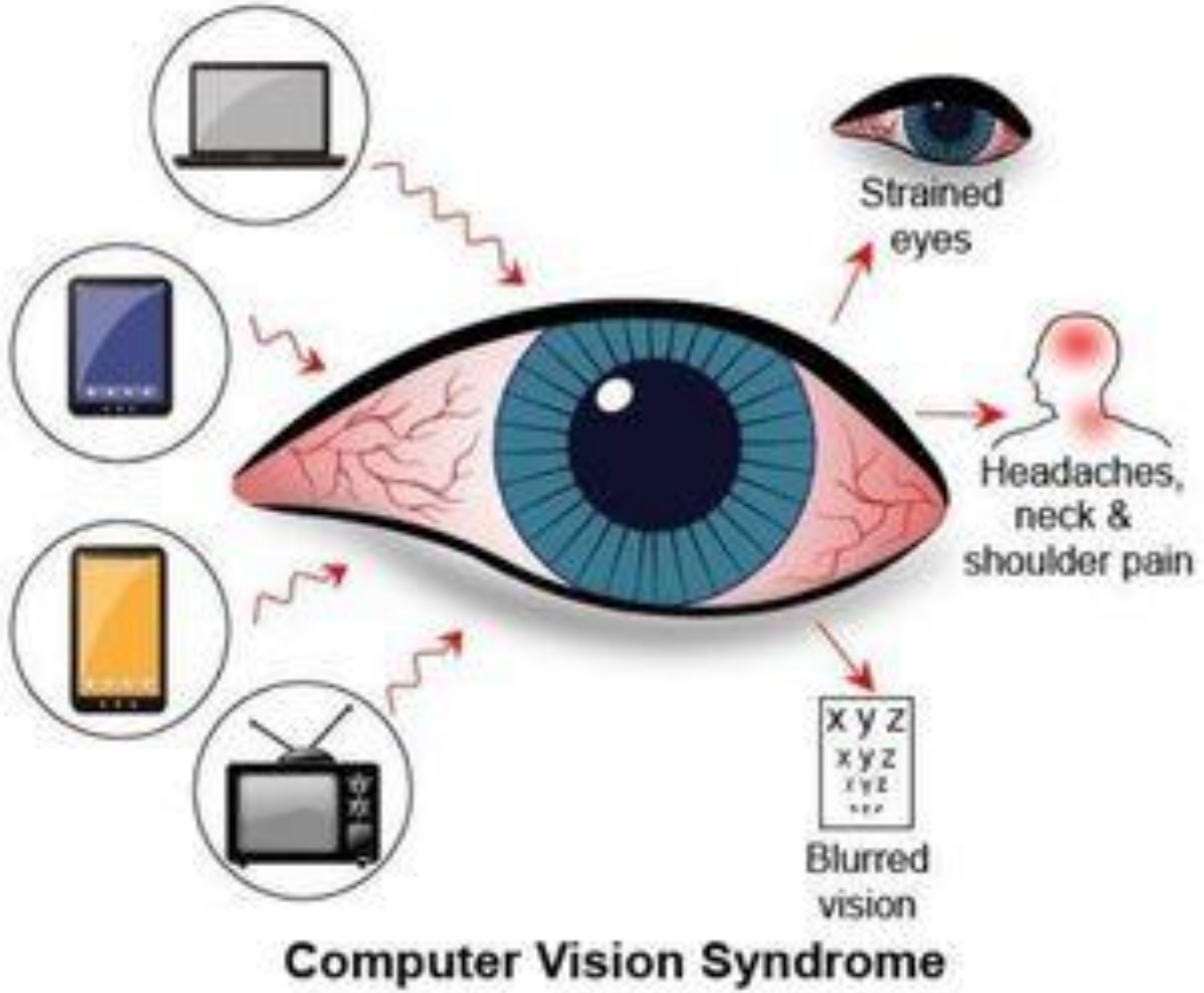
  - Lacrimal deficiency- congenital alacrimia, congenital absence of lacrimal gland, inflammatory of lacrimal gland, AIDS, age related hyposecretion
  - Lacrimal gland duct obstruction-SJS, Trachoma, Sarcoidosis infiltration
  - Reflex hyposecretion-motor block(systemic drugs, 7^{th} cranial nerve damage) or Sensory block (diabetes, contact lens wear, refractive surgery)

- Evaporative dry eye 

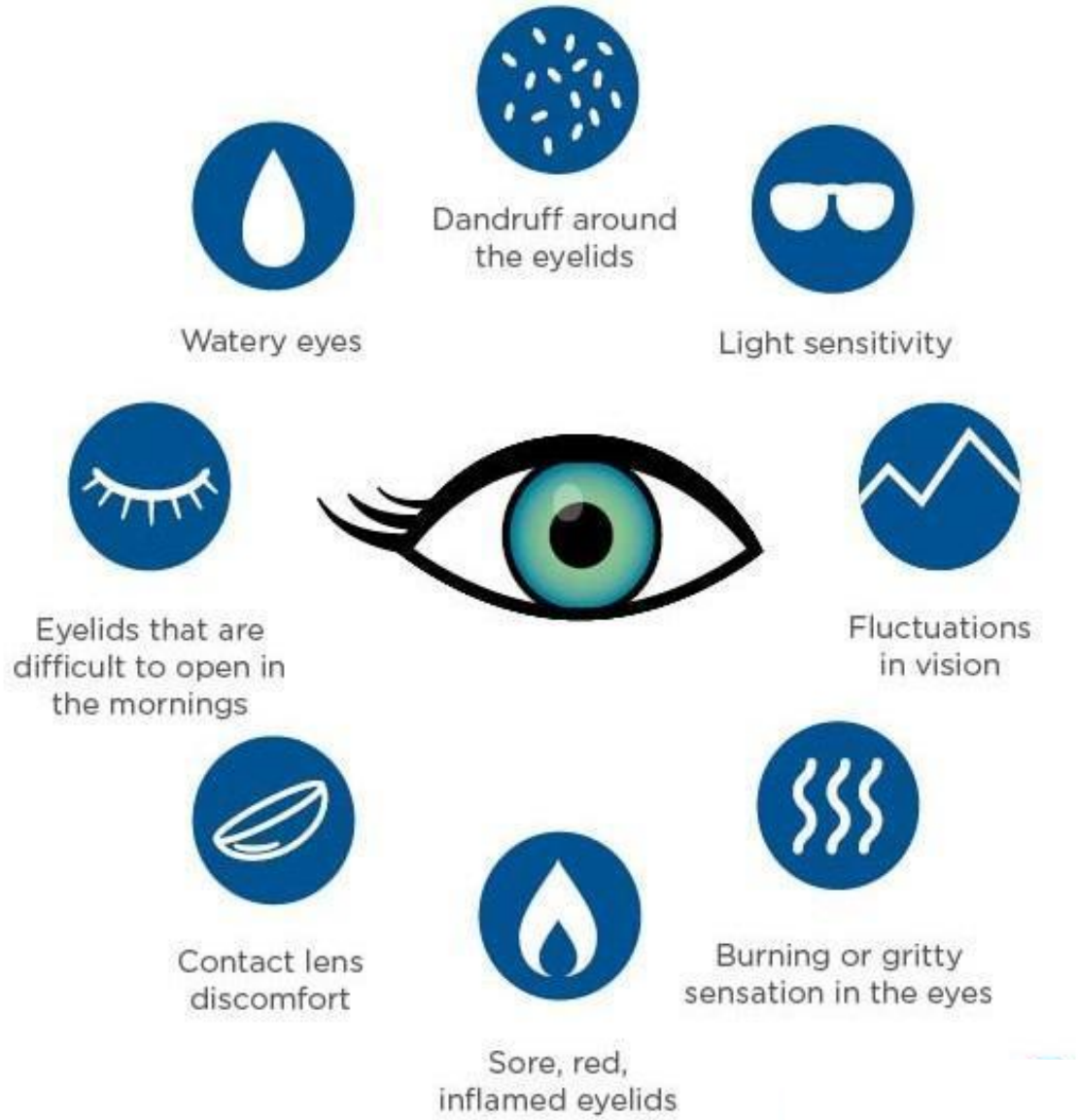
- **Intrinsic cause :**
  - ❑Meibomian gland deficiency
  - ❑Disorders of lid aperture
  - ❑Low blink rate : prolonged reading , computer vision syndrome
  - ❑Drugs : beta blockers, antihistamines, diuretics, anticholinergics, antidepressant , antispasmodics

- **Extrinsic cause**
  - ❑Vitamin A deficiency
  - ❑Preserved topical drugs
  - ❑Contact lens wear
  - ❑Allergic conjunctivitis

Computer vision syndrome or Digital eye strain



Symptoms :


Dandruff around the eyelids
Watery eyes
Light sensitivity
Eyelids that are difficult to open in the mornings
Fluctuations in vision
Contact lens discomfort
Burning or gritty sensation in the eyes
Sore, red, inflamed eyelids

Signs of dry eye disease

1. Lids : Posterior seborrheic blepharitis with meibomian gland dysfunction is often present

2.Conjunctiva:

- Redness
- Staining with rose bangal and lissamine green
- Keratinization
- Conjunctivochalasis

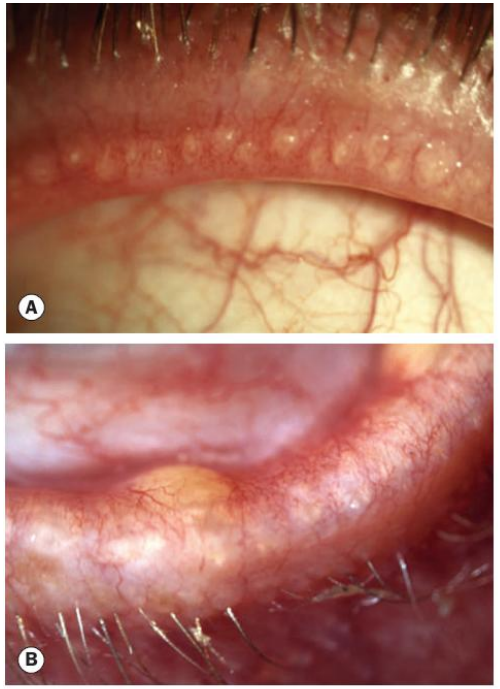


Fig. 5.3 Posterior blepharitis in dry eye. **(A)** Oil globules at meibomian gland orifices; **(B)** inflamed meibomian gland

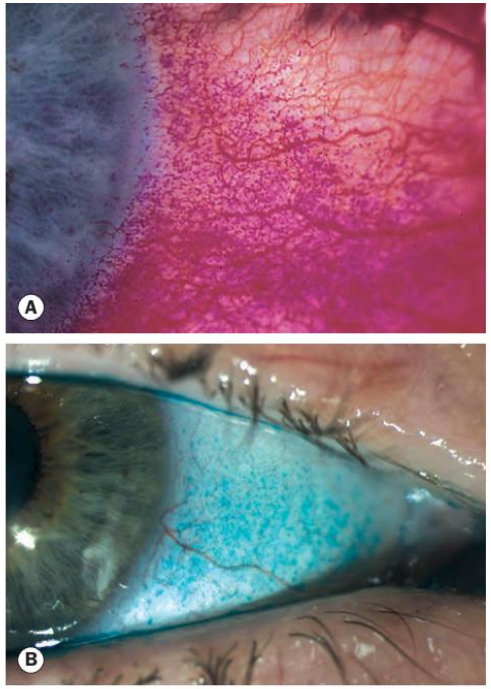
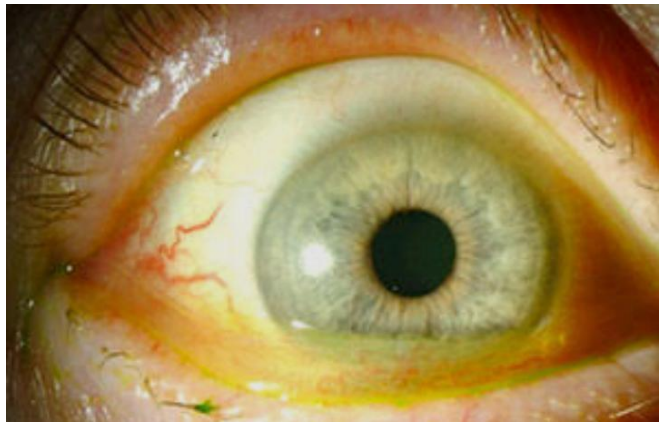


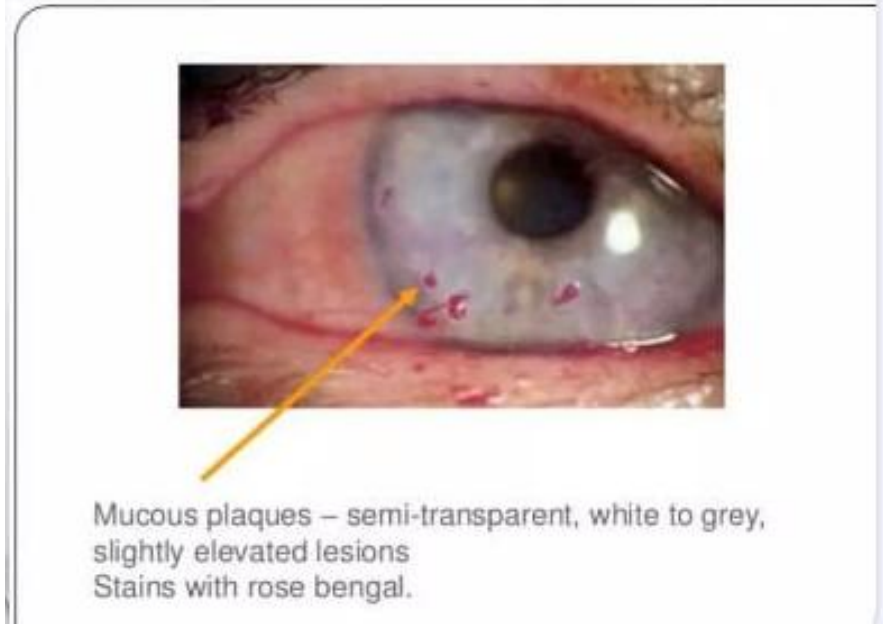
Fig. 5.4 Conjunctival staining in dry eye. **(A)** Rose Bengal; **(B)** lissamine green



3. Tear film : it becomes thin or absent

4. Cornea:

- Punctate epithelial erosion
- Filaments consists of strands of mucus and debris
- Mucous plaque



Complications

- Can be vision threatening
- Include epithelial breakdown
- Melting
- Perforation
- Occasionally bacterial keratitis

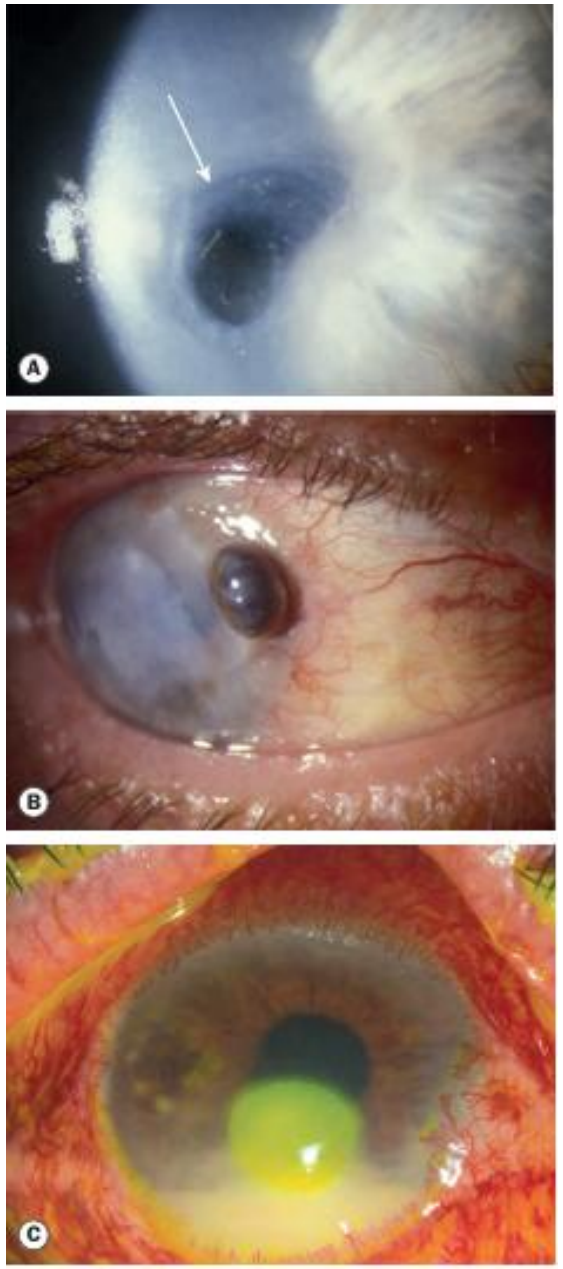
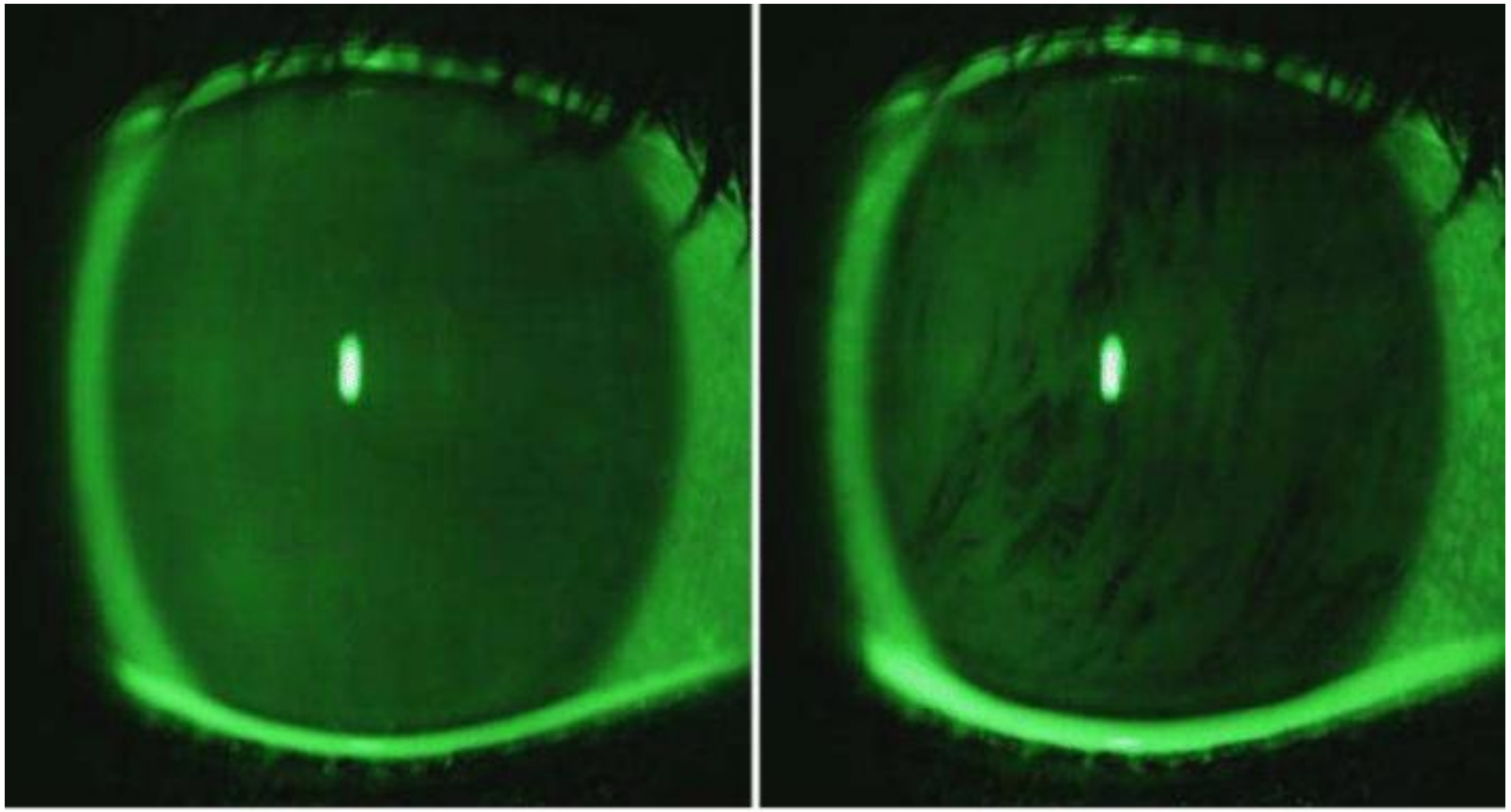


Fig. 5.7 Severe corneal complications of dry eye. **(A)** Melting (arrow); **(B)** perforation with iris plugging; **(C)** bacterial infection
(Courtesy of S Tuft – fig. B; T Carmichael – fig. C)

Investigations:

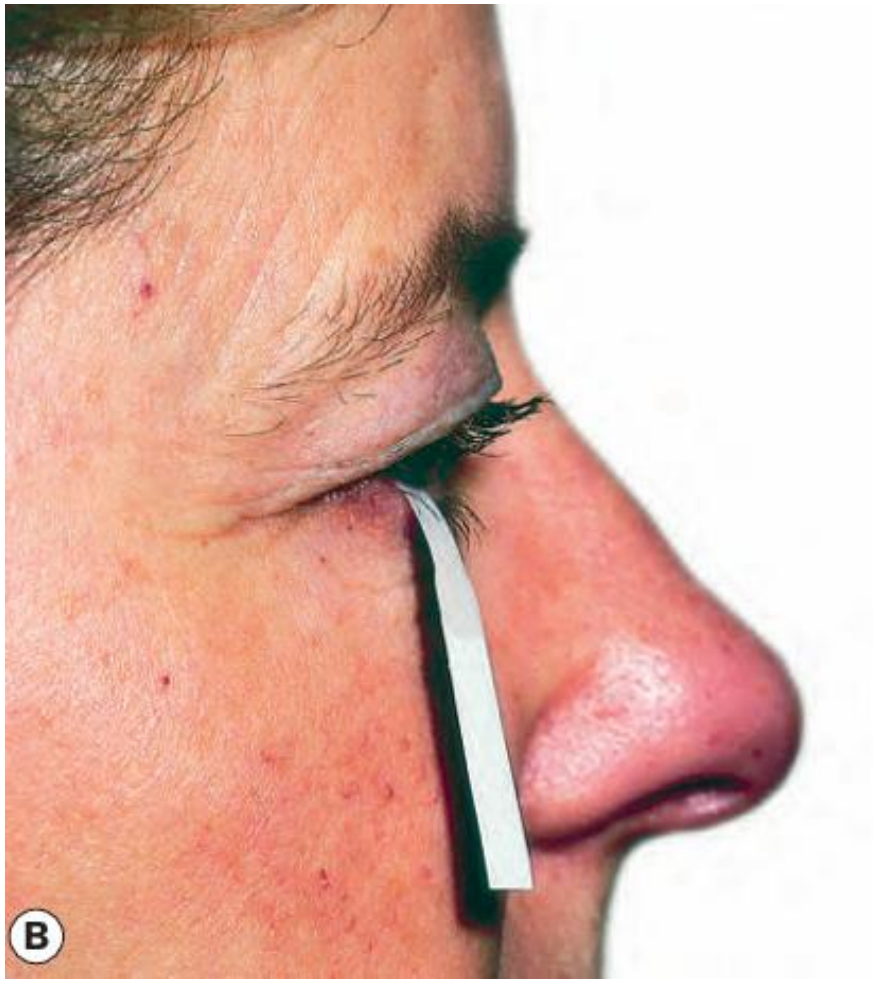
- **Tear film break up time:**
- Abnormal in both aqueous tear deficiency and mebomian gland dysfunction
- Measured as follow –
  1. Fluorescein strip instilled in lower fornix
  2. Patient asks to blink several times
  3. Examine under slit lamp with cobalt blue filter , black spot or lines appear indicating formation of dry area
  4. TRUBT is the time interval between the last blink and appearance of the first randomly distributed dry spot
  5. A TRUBT of less than 10 sec is suspicious of DED

TRUBT



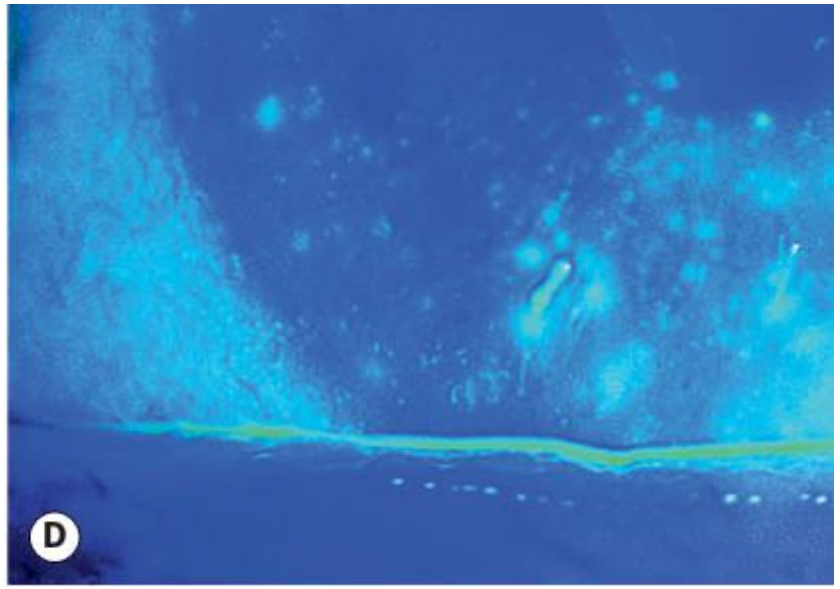
SCHIRMER'S TEST

- Filter paper is folded 5mm one end and inserted at the junction of the middle and outer third of the lower lid
- Patient is asked to keep the eyes gently closed
- After 5 min the filter paper is removed and the amount of wetting from the fold is measured
- Less than 10 mm of wetting after 5min without anesthesia or
- Less than 6mm of wetting with anesthesia is considered abnormal

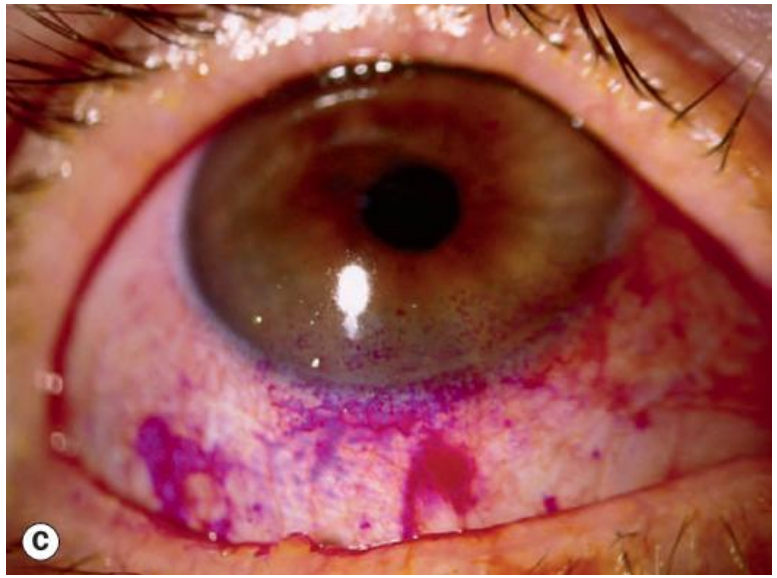


Ocular surface staining

- Fluorescein stain



- Rose Bangal staining

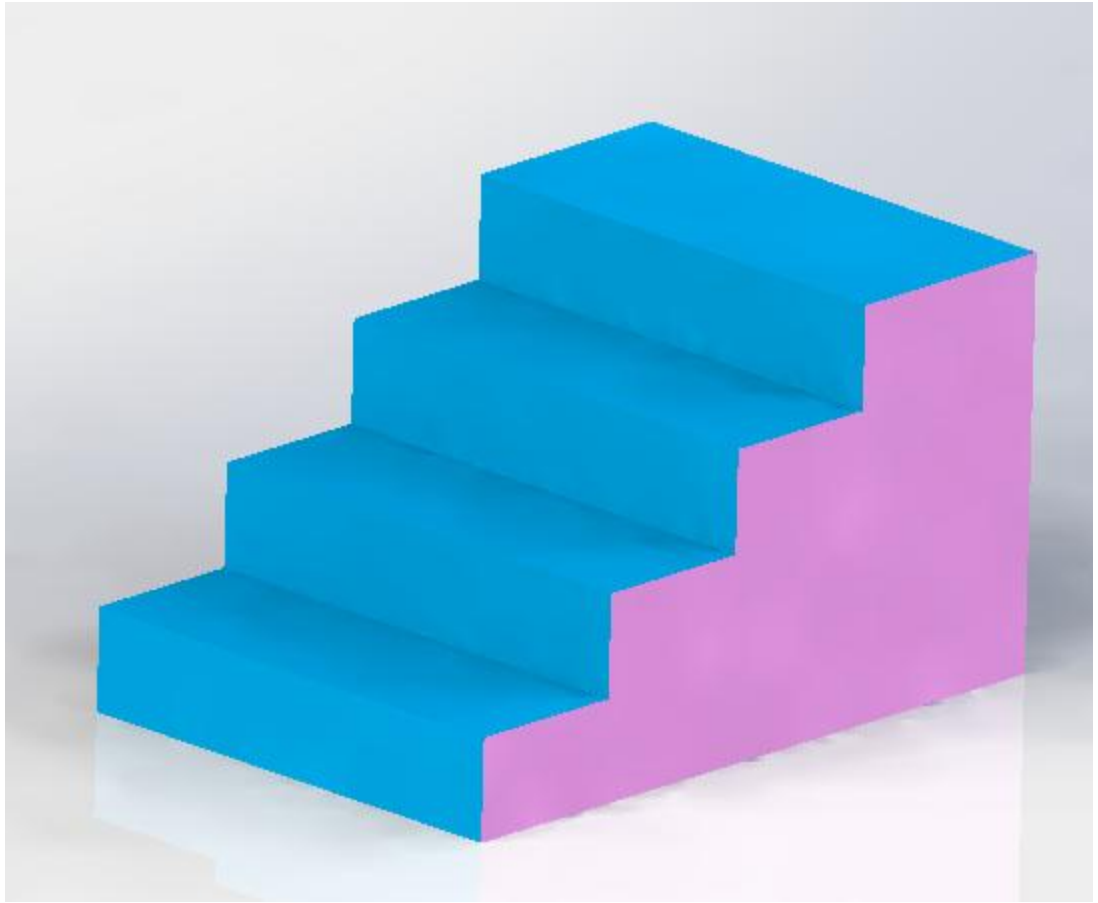


Other investigations

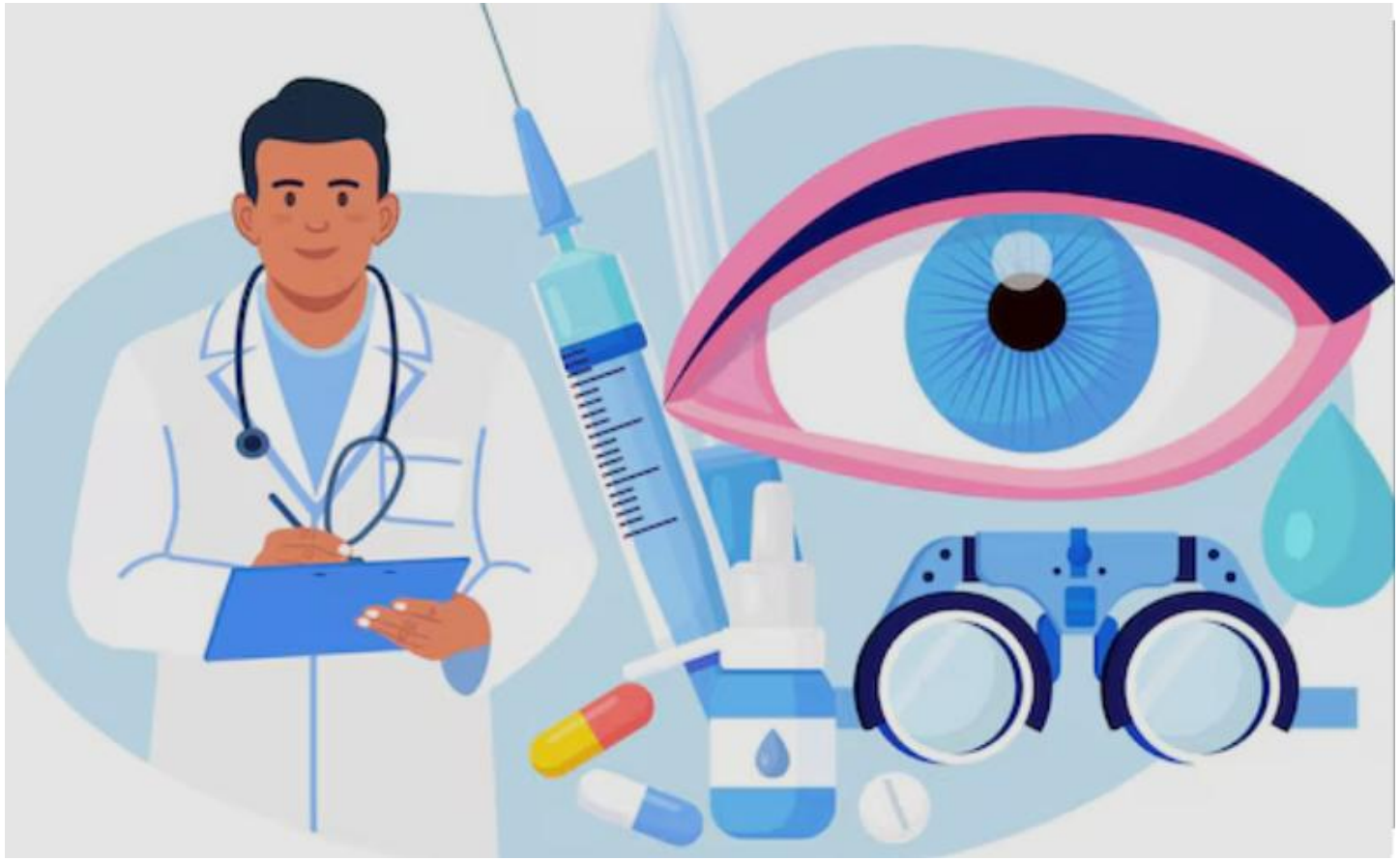
- Fluorescein clearance test
- Tear film osmolarity measurement
- Tear constituent measurement
- Tear meniscometry
- Impression cytology

DEWS provided a graded approach for the management of DED

Four Levels



TREATMENT OF DRD



LEVEL:1

1. Lifestyle review regarding importance of blinking whilst reading , watching television, or using a computer screen , management of contact lens wear
2. Orientation of screens below eye level minimalizes eyelid aperture
3. Increase environmental humidity
4. Lubricant eye drop instillation
5. Discontinue of toxic/preserved topical medication, systemic medication review to exclude contributory factors

6.Artificial tear substitute including gels and ointments

7.Eyelid therapy: Basic measures such as warm compression at least once at bedtime , lid hygiene for blepharitis

8. Nocturnal lagophthalmos can be addressed by taping the lids closed at bedtime

LEVEL:2

- Non-preserved tear substitutes are categorized as level 2 treatment
- Anti-inflammatory agents such as topical steroid
- Tetracyclines
- Punctal plugs
- Secretagogues e.g. pilocarpine
- Moisture chamber spectacles and spectacle side shields

LEVEL:3

- Serum eye drop: autologous or umbilical cord serum
- Contact lenses
- Permanent punctal occlusion

LEVEL:4

- Systemic anti-inflammatory agents

- Surgery
  - Eyelid surgery ,such as tarsorrhaphy
  - Salivary gland auto-transplantation
  - Mucous membrane or amniotic membrane transplantation for corneal complications

Tear Substitutes

- Simple formulation aiming on replacement of the aqueous phase
- However, they cannot mimic the complex components and structure
- Require periodic delivery
- There are no mucus substitutions

Drops and gels:

1. Cellulose derivatives are appropriate for mild cases e.g. Hypermellose, methylcellulose
2. Carbomer gels
3. Polyvinyl alcohol
4. Others: Sodium hyaluronate and povidone, glycerin, polypropylene alcohol
5. Diquafosol :newer agent ; topical secretagogue

Ointments

- Petrolatum (paraffin) mineral oil

- Eyelid sprays: containing liposome based agent

- Artificial tear inserts emplaced once or twice daily for extended release duration treatment

- Mucolytic agents : Acetylcysteine 5% drops for filaments and mucous plaques

Other miscellaneous options

- Botulinum toxin injection
- Oral cholinergic agonists
-
- Submandibular gland transplantation
- Serum/autologous blood eye drops

Prevention :

- Regular eye breaks (20–20–20 rule)
- Adequate hydration (Drink plenty of water and vitamin C containing food)
- Proper lid hygiene
- Early diagnosis & treatment

THE 20-20-20 RULE

CVS (COMPUTER VISION SYNDROME)

EVERY 20 MINUTES

20 FT

LOOK AT SOMETHING 20 FEET AWAY

FOR 20 SECONDS

Conclusion

- Conclusion Dry eye disease is common but underdiagnosed
- Early recognition improves quality of life
- Awareness is essential for primary care doctors

THANK **YOU**!