# ETIOLOGY OF DRY EYE

# Introduction

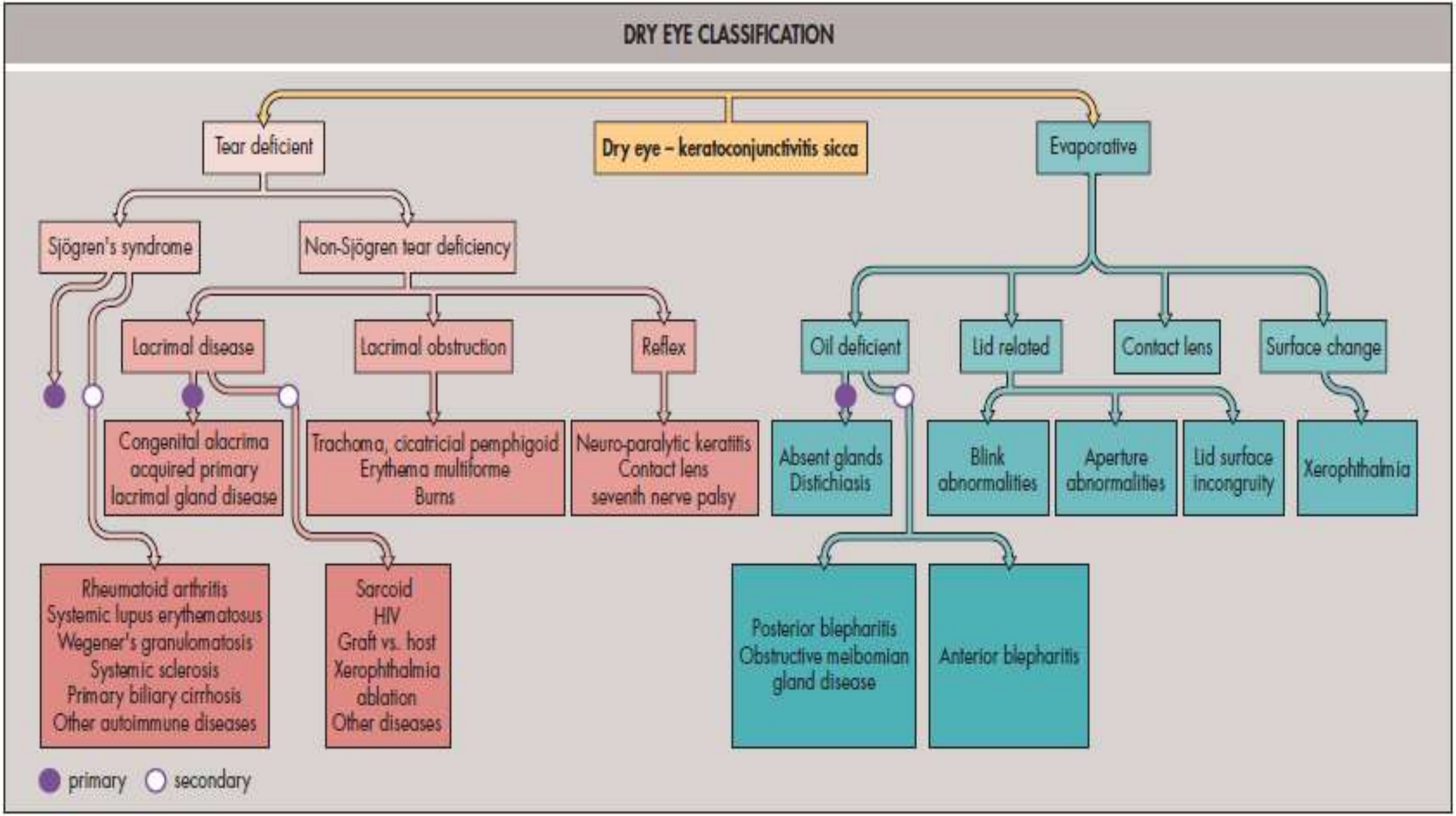
Dry eye disease (DED), also known as dry eye syndrome (DES) or keratoconjunctivitis sicca (KCS), is characterized by ocular irritation and visual disturbance resulting from alterations of the tear film and ocular surface.

# Classification

International Dry Eye Workshop (DEWS)

with a basic division into

- aqueous-deficient
- evaporative types


DRY EYE CLASSIFICATION
Dry eye – keratoconjunctivitis sicca
Tear deficient
Evaporative
Sjögren's syndrome
Non-Sjögren tear deficiency
Lacrimal disease
Lacrimal obstruction
Reflex
Oil deficient
Lid related
Contact lens
Surface change
Congenital alacrima
acquired primary
lacrimal gland disease
Trachoma, cicatricial pemphigoid
Erythema multiforme
Burns
Neuro-paralytic keratitis
Contact lens
seventh nerve palsy
Absent glands
Distichiasis
Blink
abnormalities
Aperture
abnormalities
Lid surface
incongruity
Xerophthalmia
Rheumatoid arthritis
Systemic lupus erythematosus
Wegener's granulomatosis
Systemic sclerosis
Primary biliary cirrhosis
Other autoimmune diseases
Sarcoid
HIV
Graft vs. host
Xerophthalmia
ablation
Other diseases
Posterior blepharitis
Obstructive meibomian
gland disease
Anterior blepharitis
primary
secondary

# *Aqueous-deficient*

- **Sjögren syndrome** dry eye
- **Non-Sjögren syndrome** dry eye.

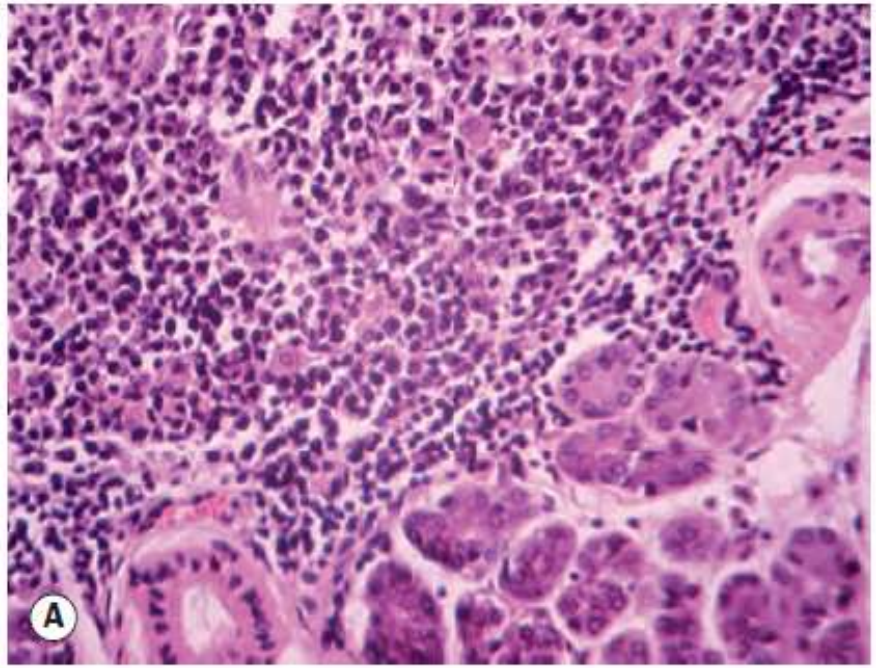
# **Sjögren syndrome** dry eye

autoimmune disorder

lymphocytic inflammation and destruction of lacrimal and salivary glands and other exocrine organs

classic clinical triad

- dry eyes
- dry mouth
- parotid gland enlargement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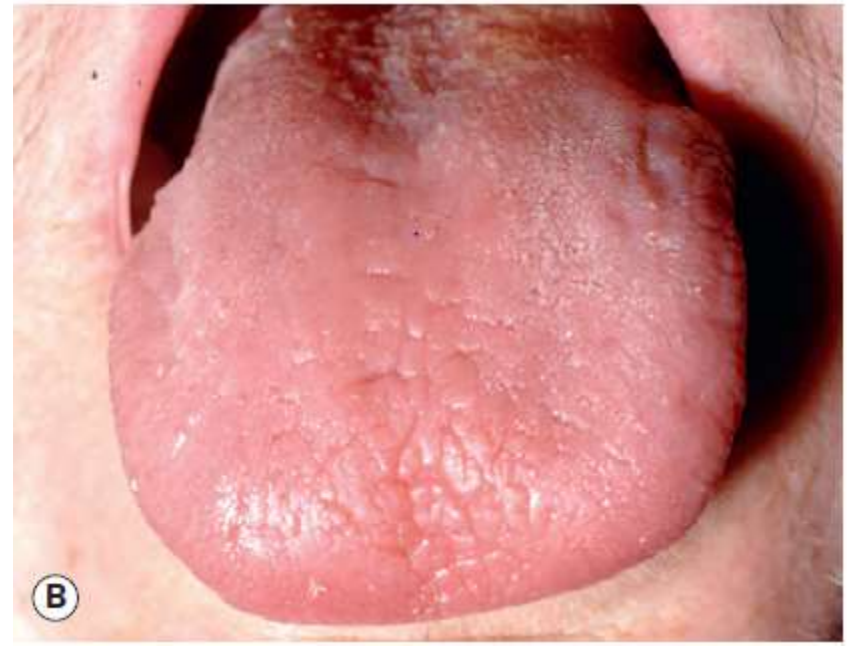
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- Primary
- Seconadary: associated with another disease, commonly rheumatoid arthritis or systemic lupus erythematosus.

# Revised American-European consensus diagnostic and classification criteria for Sjögren's syndrome

**Ocular symptoms**—daily dry eye symptoms for more than 3 months, ocular irritation, use of artificial tears more than three times per day.

**Oral symptoms**—daily dry mouth symptoms for more than 3 months, presence of swollen salivary glands, frequent drinking of liquids to aid in swallowing.

**Ocular signs**—Schirmer's test I (without anesthetic) ≤5 mm in 5 minutes, Rose Bengal score ≥4 according to the van Bijsterveld scoring system.

**Histopathology**—biopsy of minor salivary gland showing inflammation with lymphocytic foci.

**Oral signs**—reduced salivary flow ≤1.5 mL in 5 minutes, parotid sialography showing salivary duct dilation without obstruction, salivary scintigraphy showing signs of decreased saliva production.

**Autoantibodies**—presence of anti-Ro(SSA) antibody, presence of anti-La(SSB) antibody.

# Non-Sjögren syndrome dry eye.

- Lacrimal deficiency:

primary

secondary

- Lacrimal gland duct obstruction
- Reflex hyposecretion:

sensory (e.g. contact lens wear, diabetes, refractive surgery, neurotrophic keratitis)

motor block (e.g. seventh cranial nerve damage, systemic drugs).

# *Evaporative dry eye disease*

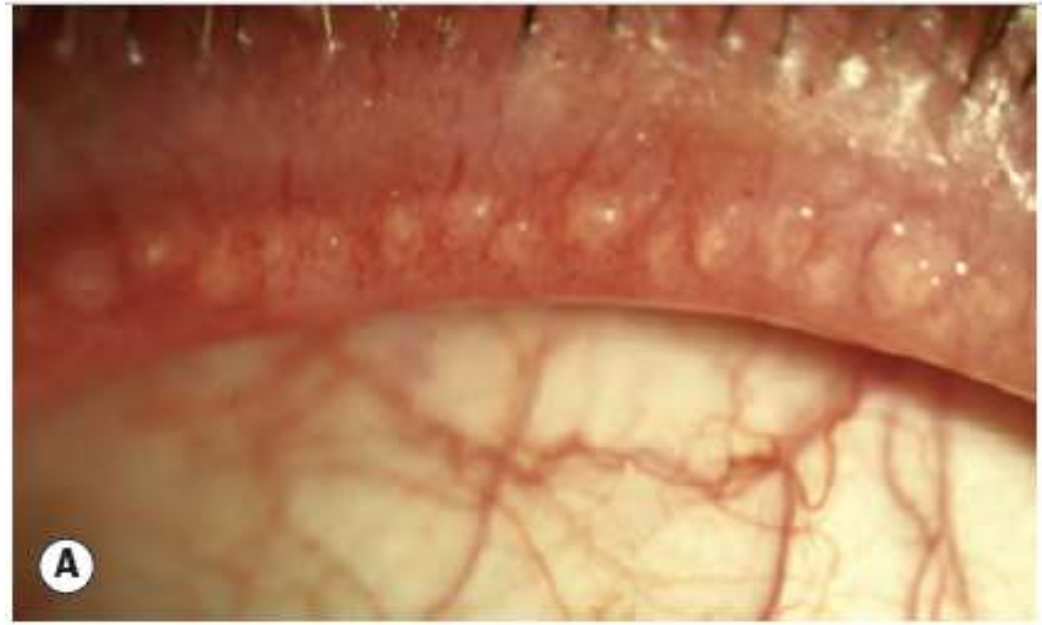
**Intrinsic**

Meibomian gland deficiency, e.g. posterior blepharitis, rosacea. ○

Disorders of lid aperture, e.g. excessive scleral show, lid retraction, proptosis, facial nerve palsy.

Exposure: Low blink rate, e.g. Parkinson disease, prolonged computer monitor use, reading, watching television.

Drug action, e.g. antihistamines, beta-blockers, antispasmodics, diuretics.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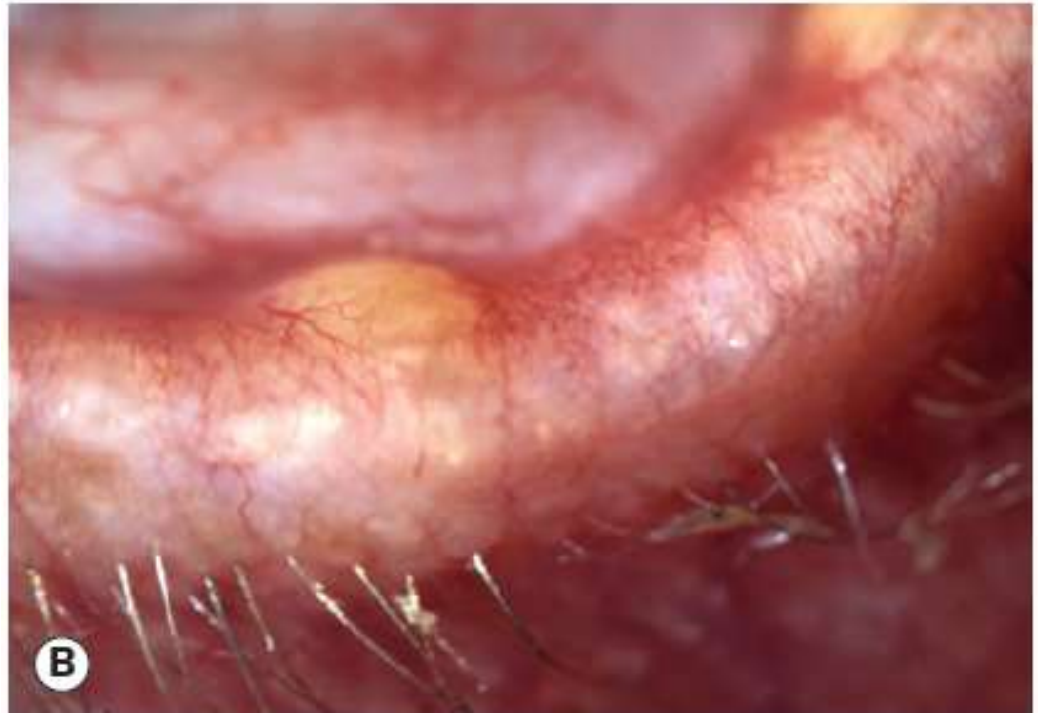
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## TABLE 4.23.1 Medications Associated With Dry Eye Disease

| Mechanism of Action | Class | Medications |
|---|---|---|
| Anticholinergic | Antimuscarinics | Tolterodine tartrate (Detrol)<br>Scopolamine |
| | Antihistamines (sedating compounds are associated with greater dryness) | Chlorpheniramine (Chlor-Trimeton)<br>Diphenhydramine (Benadryl)<br>Promethazine (Phenergan) |
| | Antiparkinsonian | Benzotropine (Cogentin)<br>Trihexyphenidyl (Artane) |
| | Antidepressants<br>MAO inhibitors | Amitriptyline (Elavil)<br>Nortriptyline (Pamelor)<br>Imipramines (Tofranil)<br>Doxepin (Sinequan)<br>Phenelzine |
| | Antipsychotics | Chlorpromazine (Thorazine)<br>Thioridazine (Mellaril)<br>Fluphenazine (Prolixin) |
| | Antimanics<br>Antiarrhythmics | Lithium<br>Disopyramide (Norpace)<br>Mexiletine (Mexitil) |
| Antiadrenergic | Alpha-agonists | Clonidine (Catapres)<br>Methyldopa (Aldomet) |
| | Beta-blockers | Propranolol (Inderal)<br>Metoprolol (Lopressor) |
| Diuretic | ThiaziDED | Hydrochlorothiazide |
| Other | Nonsteroidal anti-inflammatory drugs<br>Cannabinoids | Ibuprofen (Advil)<br>Naproxen (Naprosyn, Aleve)<br>Marijuana |

- **Extrinsic**

Vitamin A deficiency.

Topical drugs including the effect of preservatives.

Contact lens wear.

Ocular surface disease such as allergic conjunctivitis.