Allergic Eye Disease

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External eye infections are the commonest reason for referral to primary eye health clinics.

Allergic eye disease is the commonest reason for chronic red eyes not responsive to antibiotics.
Simple Differential Diagnosis

If it itches it is allergy

If it burns it is dry eye

If the eyelids are stuck together in the morning it is infection
Ocular allergic diseases

- Ocular allergies affect approximately 15–20% of the population worldwide

- 90% of allergic disorders seen by an allergist have an ocular component

- 93% of hay fever sufferers have ocular symptoms
The surface of the eye is the most obviously exposed mucous membrane of the body.

The conjunctival surface is accessible to allergens and is the site of allergic reactions.
Stem Cell
  ↓
Prelymphocyte
  ↓
Lymphocyte
  ↓
Thymus
  ↓
T Lymphocytes
  ↓
Helper T cells Th
  ↓
Suppressor T cells Ts
  ↓
Cytotoxic T cells Tc
  ↓
Lymphokine producing cells Tdh

B lymphocytes
  ↓
Plasmacell
  ↓
IgG, IgA, IgM, IgD, IgE antibodies
Classification of ocular allergy

- **Ocular urticaria** / Acute allergic conjunctivitis (AAC)
- **Allergic conjunctivitis**
  - seasonal (SAC) and perennial (PAC)
- **Vernal keratoconjunctivitis** (VKC)
- **Atopic keratoconjunctivitis** (AKC)
- **Giant papillary conjunctivitis** (GPC)
  (associated with contact lens wear)
Ocular Urticaria
Acute Allergic Conjunctivitis

Caused by a sudden big dose of air borne or hand borne allergen
Acute allergic conjunctivitis
Seasonal/perennial allergic conjunctivitis

- Hyperemia
- Eyelid swelling
- Chemosis
- Papillary reaction
Allergic Rhinoconjunctivitis

Allergens react with IgE antibodies bound to conjunctival mast cells
<table>
<thead>
<tr>
<th>Seasonal</th>
<th>Perennial</th>
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<tr>
<td>• Occurs in spring, autumn, or both</td>
<td>• Year round with more pronounced periods</td>
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<tr>
<td>• Grass, tree pollen,</td>
<td>• Animal dander, dust mites, mould, spores</td>
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<tr>
<td>• Early- and late-phase IgE reactions</td>
<td>• History of other atopic diseases</td>
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<td></td>
<td>• Early- and late-phase IgE reactions</td>
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# Signs and symptoms of allergic conjunctivitis

<table>
<thead>
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<th>Seasonal</th>
<th>Perennial</th>
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<tr>
<td>● Itching (ocular and periocular)</td>
<td>● Similar to seasonal allergic conjunctivitis</td>
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<tr>
<td>● Redness</td>
<td>● Milder than seasonal allergic conjunctivitis</td>
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<tr>
<td>● Burning</td>
<td>● More constant than seasonal allergic conjunctivitis</td>
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<tr>
<td>● Excessive tearing</td>
<td>● Seasonal exacerbations</td>
</tr>
<tr>
<td>● Stringy white mucus</td>
<td></td>
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<tr>
<td>● Rhinitis</td>
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</table>
Type I hypersensitivity reaction

- Acute or seasonal allergic conjunctivitis is a type I hypersensitivity reaction

- The sequence of events involved in a type I hypersensitivity reaction can be divided into three phases
  - Sensitization phase
  - Activation phase (early allergic response)
  - Late allergic response
Allergic sensitization

Allergen in tears (1st exposure) → Conjunctival epithelium

Antigen-presenting cell

Major Histocompatibility Complex

IL-4
IL-13

T lymphocyte

B lymphocyte

IL-5
IL-6

Plasma cell

IgE antibodies

Sensitized mast cell

From Lichtenstein LM. Allergy and the immune system. Scientific Am. 1993; 269: 117-124
The early allergic response

- Activated mast cell
  - Preformed: Histamine, Heparin, Chymase, Tryptase
  - Newly synthesized: Leukotrienes, Prostaglandins, Cytokines, PAF

- Blood vessel
  - ECF-A
  - Histamine releasing factor

- Conjunctival epithelium
  - Allergen in tears (2nd exposure)

From Lichtenstein LM. Allergy and the immune system. Scientific Am. 1993; 269: 117-124
The late allergic response

From Lichtenstein LM. Allergy and the immune system. Scientific Am. 1993; 269: 117-124
Management options for allergic conjunctivitis

- Simple non pharmacological remedies
- Oral Antihistamines
- Topical pharmacological treatment
Simple Non-Pharmacological Remedies

• Allergen avoidance
  – Pet control
  – Use air conditioning
  – Avoid outdoor activities during high pollen periods

• Cold compresses

• Lubricating eye drops
Treatment Options for Allergic Conjunctivitis

Oral Antihistamines

- loratadine (Clarityne 10mg)
- fexofenadine (Telfast 120mg)
- cetirizine (Zyrtec 10mg)
Topical Pharmacological Treatment of Allergic Conjunctivitis

- Vasoconstrictors
- Antihistamines
- Mast cell stabilisers
- Non – steroidal anti-inflammatory drugs
- Corticosteroids
Topical Antihistamines and Vasoconstrictors

Vasoconstrictors alone,
phenylephrine, naphazoline oxymetazoline, tetryzoline
(Oxylin, Prefrin, Safyr Bleu)

Antihistamines with Vasoconstrictors

Antazoline / naphazoline (Antistin-Privine)
Tetryzoline / Antazoline (Spersallerg)
Longer Acting Antihistamines

Emedastine (Emedine)

Levocabastine (Livostin ED)

Convenient twice a day dosage
Mast Cell Stabilisers

Sodium Cromoglycate (Opticrom, Cromohexal, Stop-Allerg, Vividrin)

4 times a day dosage
Long term benefit, not immediate relief
Stings
Mast Cell Stabiliser with Antihistamine Effect

Olopatadine (Patanol)

Convenient 2x day dosage
Immediate relief of itch
Mast cell Stabiliser with Antihistamine and Anti- eosinophil effects

Ketotifen (Zaditen)

Convenient 2x day dosage
Non-steroidal Anti-inflammatory Drugs

Diclofenac (Voltaren)
Flurbiprofen (Ocufen)
Ketorolac (Acular)

Anti-prostaglandin effect
3 or 4 x a day dosage
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  (associated with contact lens wear)
Vernal conjunctivitis and atopic conjunctivitis differ from simple allergic conjunctivitis because they involve

- a cell mediated immune reaction
- much more severe signs
- have sight threatening complications.
Epidemiology of Vernal Keratoconjunctivitis

Pre-pubescent boys in warm dry climates

10% of all eye patients in East Jerusalem
  O’Shea 2000

0.5 – 1.0% of all patients in eye clinics worldwide
  Beigelmann 1950
Vernal Keratoconjunctivitis

• Severe bilateral chronic recurrent ocular inflammation
• Intense itch
• Copious lardaceous stringy discharge
• Starts pre-school
• Burns out 10-14 years later
• Usually lasts from September until Easter in Cape Town
• Maybe the only allergic manifestation
Vernal Keratoconjunctivitis (Spring catarrh)

Limbal Type (black patients)

Palpebral Type (white patients)
Limbal Type Vernal Conjunctivitis
Limbal Type Vernal Conjunctivitis
Limbal Type Vernal Conjunctivitis

- Mucoid nodule
- Tranta's dots
Resolved limbal infiltration

Inactive limbal infiltration

Resolved limbal infiltration
Tarsal papillae (cobblestones) in white (palpebral) type vernal conjunctivitis
Palpebral Type Vernal Conjunctivitis

Diffuse papillary hypertrophy on the upper tarsus
Corneal Complications in Vernal Conjunctivitis

Punctate Keratitis
Corneal Complications in Vernal Conjunctivitis

Epithelial macroerosion
Corneal Complication in Vernal Conjunctivitis

Plaque formation (Shield Ulcer)
Corneal Complications in Vernal Conjunctivitis

Permanent subepithelial scarring
The Aetiology of Vernal Conjunctivitis

- Only 50% have +ve skin tests
- IgE raised in serum but not in tears
- A complex non IgE dependent pathological mechanism involving Th2 immune lymphocytes
The aetiology of Vernal Keratoconjunctivitis

A Th2 driven mechanism

Multitude of cells and mediators detected

eosinophilic mediators

Arachidonic acid derived mediators – prostaglandins, leukotrienes

Substance P (a neuropeptide) raised

increased oestrogen and progesterone receptors
Atopic keratoconjunctivitis

Affects young patients with atopic dermatitis

Eyelids are red thickened. Macerated and fissured.
Atopic keratoconjunctivitis

- Palpebral eczema associated with dermatitis
- Corneal neovascularization with oedema
Atopic Conjunctivitis

Infiltration of tarsal conjunctiva causing featureless appearance
Atopic Conjunctivitis

Often progresses to tarsal papillae (cobblestones)
Corneal complications in atopic conjunctivitis

- Punctate epithelialopathy
- Plaque formation
- Corneal scarring
- Corneal vascularisation
Giant papillary Conjunctivitis

The upper tarsal conjunciva in giant papillary conjunctivitis
Different cell types infiltrate the conjunctiva

<table>
<thead>
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<tr>
<td>Mast cells</td>
<td>T cells</td>
<td>Mast cells</td>
<td>Eosinophils</td>
<td>Eosinophils</td>
<td>Neutrophils</td>
</tr>
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Treatment of Vernal Keratoconjunctivitis

Mast cell Stabilising Eye drops

+/-

Steroid Eyedrops
The Old Gold Standard

G. Cromoglycate  QID

+  

G. Fluoromethalone  QID

+/-

Oc. Dexamethazone nocte
The New Approach

G. Ketotifen bd  +  G. Fluoromethalone bd

OR

G. Olopatidine  +  G. Fluoromethalone bd

+  

Oc. Dexamethozone nocte
Treatment of Vernal Keratoconjunctivitis in the Future

Inhibition of the Th2 immune cell response

Tacrolimus more promising than cyclosporine