

Don't forget the conjunctiva.....

Angela McNamee
 FBDO(Hons)CL, Cert.Ed., BSc(Hons), MCOptom, FBCLA

Overview

- Basic anatomy & histology
- Lubricating & maintaining healthy surface
- Enabling/predicting successful CL wear
- Defending the ocular surface
- Indicating general health conditions
- Repairing, replenishing, replacing

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Basic anatomy

- Thin, transparent mucous membrane
- Palpebral
 - Lining the inner surface of the lids, from lid margins to fornices
- Bulbar
 - Covering the sclera from fornices to limbus
- Plica semilunaris
- Caruncle



Histology

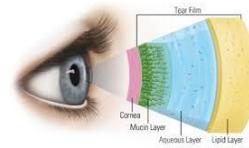
- Superficial epithelial layer
 - Contains mucin-secreting goblet cells
- Deeper, connective tissue stroma
 - Superficial adenoid layer
 - Contains lymphatic vessels and lymphocytes
 - Deeper fibrous layer
 - Contains most of the blood vessels and nerves
 - Accessory lacrimal glands of Krause & Wolfring
 - Vast numbers of mast cells

The ageing conjunctiva

- Fewer epithelial cell layers
- Less collagen in stroma
- Fewer goblet cells
- Less transparent
- More yellow
- BVs more tortuous
- Looser attachment to sclera

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Traditional tear film model



Mucins.....

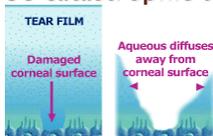
- Help to stabilise the tear film
- Ensure aqueous adheres to ocular surface
- “Sticky” mucins make epithelium wettable (not hydrophobic)
- Clear dirt, debris, allergens & pathogens
-and prevent allergens & pathogens from entering corneal epithelium

Newer tear film model

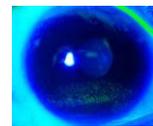
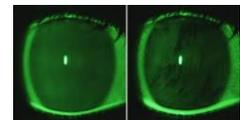
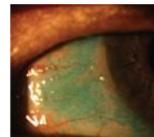


- Conjunctival goblet cells secrete soluble mucin
- Corneal & conjunctival epithelial cells secrete membrane-adherent (sticky) mucin
- Ageing, CL wear, poor nutrition can all deplete goblet cell numbers

Reduction of conjunctival mucins can be catastrophic to the tear film



- Aqueous can't adhere and its content reduces
- Tears increase in osmolarity (highly concentrated)
- Osmosis draws water from the ocular surface
- Conjunctival epithelium dries (staining)
- Corneal epithelium loses wettability (reduced tear breakup time, staining)



It gets worse.....!

- Hyperosmolarity provokes inflammation in the conjunctiva....
- ..further reducing goblets cells and mucin
- Aqueous can't adhere to epithelial surface...
-so tears become even more concentrated
- Further inflammation ensues.....
- ...provoking further damage to the conjunctiva and to the lacrimal gland and meibomian glands
- It's a vicious circle..... that begins with an unhealthy conjunctiva

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"Do my eyes look white?"



Conjunctival hyperaemia [redness]: an indicator of distress

- Hypoxia
 - Limbal hyperaemia
- Infection
 - Bulbar/limbal hyperaemia



- Allergy
 - Bulbar /palpebral /limbal hyperaemia
- Desiccation
 - Temporal/nasal hyperaemia



CL-induced acute red eye [CLARE]

- Associated with overnight wear
- Severe discomfort
- Generalised hyperaemia
- Corneal infiltrates & staining
- Linked with gram -ve bacterial contamination of CLs



Conjunctival staining

- Temporal (or nasal)
 - Dryness
- Lid wiper
 - Lid wiper epitheliopathy
- Inferior bulbar (more commonly corneal)
 - lagophthalmos



Other CL-related signs

- Conjunctival epithelial flaps
- Lid parallel conjunctival folds



...and another CL-related conjunctival sign

- Papillary conjunctivitis



- which leads us to....

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The most immunologically active tissue of the ocular surface

- Mucins
 - Trap and clear allergens & pathogens
- Epithelial cell tight junctions
 - Present a mechanical barrier
- Mast cells
 - Abundant in conjunctiva
 - Degranulate in response to allergens
 - Releasing histamine and heparin
- Lymphocytes
 - Abundant in adenoid layer of stroma
 - Group together to form follicles
 - In viral & allergic conditions

Some allergic eye conditions

- Seasonal allergic conjunctivitis (SAC)
 - eg grass, tree pollens
- Perennial allergic conjunctivitis (PAC)
 - eg dust mites, pet dander

Both cause: itching, tearing, redness, swelling, papillae



Chemosis



Retention cyst

....and some more serious ones

- Atopic keratoconjunctivitis (AKC)
 - Family history of eczema, asthma, hayfever
 - Associated with keratoconus
 - Vernal keratoconjunctivitis (VKC)
 - Rare in UK
- Both can cause: severe itching; redness; swelling; mucous discharge; giant papillae; corneal scarring
- Contact ocular allergy (COA)
 - Antibiotics; antivirals; anaesthetics; timolol; BAK
 - Redness; swelling; follicles; punctate keratitis

Tranta's dots in VKC

- White blood cells and epithelial cell debris



....and some more familiar ones

- Contact lens associated papillary conjunctivitis (CLAPC)
 - 0.3 to 1mm papillae; mucous discharge
 - Allergy to deposits/solutions?
 - Change to daily disposables
- Giant papillary conjunctivitis (GPC)
 - > 1mm papillae; mucous discharge
 - Common finding in allergic conjunctivitis

Follicles or papillae?

- Papillae
 - Allergic conjunctivitis or mechanical reaction
 - Flattened "cobblestones"
 - Central, dilated vessel
- Follicles
 - Viral or chlamydial conjunctivitis
 - Contact ocular allergy
 - Dome-shaped nodule
 - Paler, no central vessel



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Subconjunctival haemorrhage

- Conjunctival or episcleral vessel breaks
- Blood spreads into sub-conjunctival space
- Local trauma, eg vigorous eye rubbing
- Coughing, sneezing, vomiting, straining



Subconjunctival haemorrhage

- Repeat occurrences :
 - Can indicate hypertension, diabetes
 - May be linked to central retinal vein occlusion and stroke
 - Are more likely if taking:
 - Warfarin, aspirin
 - Fish oils, vitamin E



Anaemia

- Inspecting lower tarsal conjunctiva
 - Indicates haemoglobin levels in the blood



Normal: redder anteriorly (just behind lid margin)



Anaemic: uniform pale colour

Liver disease

- Bilirubin
 - Yellow pigment
 - Formed from haemoglobin when red blood cells are broken down and replaced
- Healthy liver
 - Bilirubin processed and excreted as bile
- Diseased liver
 - Bilirubin accumulates in bloodstream & tissues



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Stem cells

- Essential for replenishment & maintenance of “renewable” tissues:
 - Blood, skin, gut, muscle, cornea
- Unique ability to self-renew or differentiate

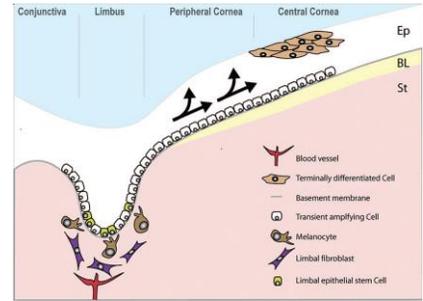
Types of stem cells

- Embryonic stem cells (ESCs)
 - Grown in lab using cells from early embryo
 - Unlimited potential to produce all types of cells
- Tissue stem cells
 - Found in our bodies throughout life
 - Produce only their own type of cell
 - Include blood, skin, bone marrow and limbal cells
- Induced pluripotent stem cells (iPSCs)
 - Like ESCs, but made in lab from adult specialised cells
 - Reprogrammed to behave like stem cells
 - Newer technology
 - iPSCs made from human cord blood recently used to repair mouse retina

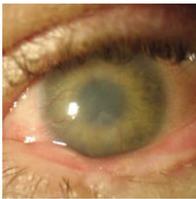
Limbal stem cells

- From conjunctival palisades of Vogt
- Responsible for reproducing corneal cells
 - Natural replenishment plus replacement of damaged cells
- May be destroyed by disease or injury
 - Thermal, chemical or surgical injury
 - Microbial infection
 - Contact lens complications
- Resulting in:
 - Neovascularisation, chronic inflammation, pain, scarring, loss of vision

Limbal stem cells produce corneal epithelium

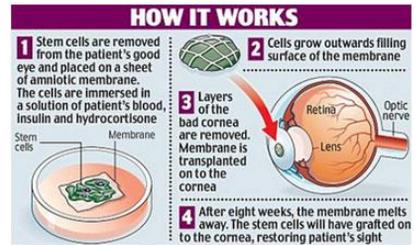


Stevens Johnson Syndrome

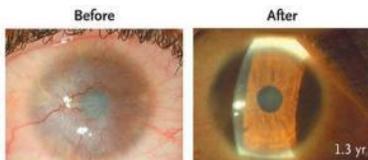


- One cause of limbal stem cell deficiency
- Acute reaction to eg antibiotics
- Destroys goblet cells

Limbal stem cell graft



Treatment of acid burn



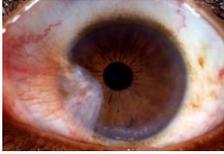
- Only the epithelium was affected

Treatment of alkali burn

- Stroma also affected
- Keratoplasty done after stem cell graft
- Grafted stem cells successfully covered donor cornea

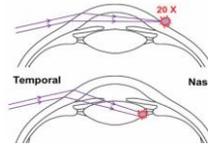


Pterygium



- Fibrovascular growth
- UV exposure and age-related
- Surgery (if/when required):
 - Autograft
 - Amniotic membrane graft
 - Can be sutureless

Peripheral light focussing



- Pterygium more common nasally
- Cortical cataract also often begins in inferior nasal area

Pterygium removal



Before surgery



1 week after graft



2 weeks after graft

For refs/further reading: Dispensing Optics Sep 2012

dispensing optics

Don't forget the conjunctiva

By Angela McNamee

Comprehensive covered Contact lens practice, contact lenses, ocular abnormalities, ocular examination for optometrists
Target groups Contact lens generalists, dispensing opticians, optometrists

Originally believed to reside in the outer (anterior) mesoderm, conjunctivitis, the conjunctiva has long been known as just their 'overlying membrane', being the epithelium lining of the sclera. This covering, the conjunctiva, is a thin, moist, and translucent membrane that is highly vascularised and contains a rich population of immune cells, including mast cells, eosinophils, and neutrophils. The article discusses some of its essential functions, such as its role in tear production and its role in the immune response.

Subtyping and establishing a healthy ocular

Healthy conjunctiva is essential to maintaining a healthy eye. The conjunctiva is highly responsive to environmental factors such as dryness, irritation, and infection. The article discusses some of the common causes of conjunctivitis and offers advice on how to prevent and treat it.

A brief anatomy of the conjunctiva

The conjunctiva is a thin, moist membrane which, in the adult conjunctiva, lines the inner surface of the eyelids, from the lid margin anteriorly, to the limbus, where it joins the sclera posteriorly. It is highly vascularised and contains a rich population of immune cells. The conjunctiva is highly responsive to environmental factors such as dryness, irritation, and infection.