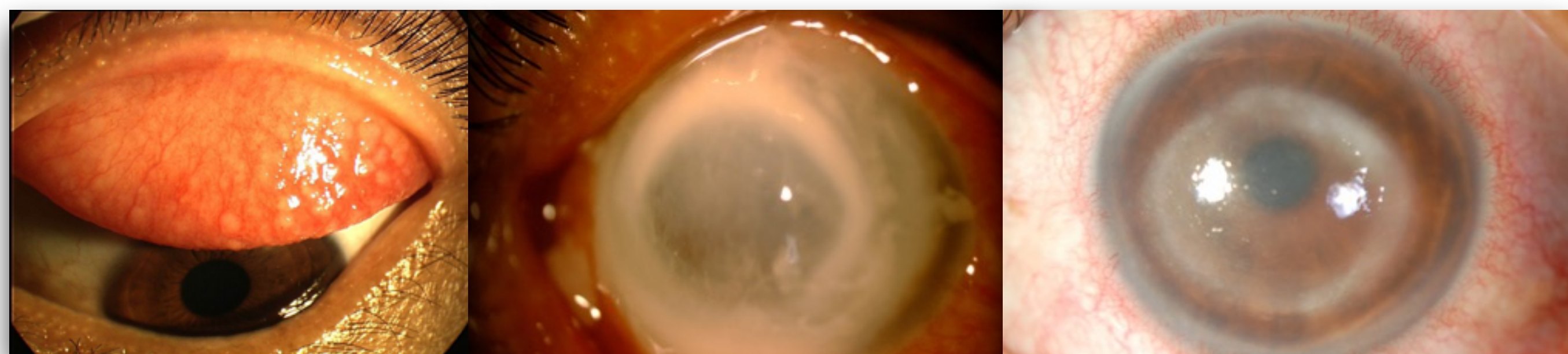




# Eye Infection

## Emphasis on Conjunctival and Corneal Infections



Vilavun Puangsricharn MD

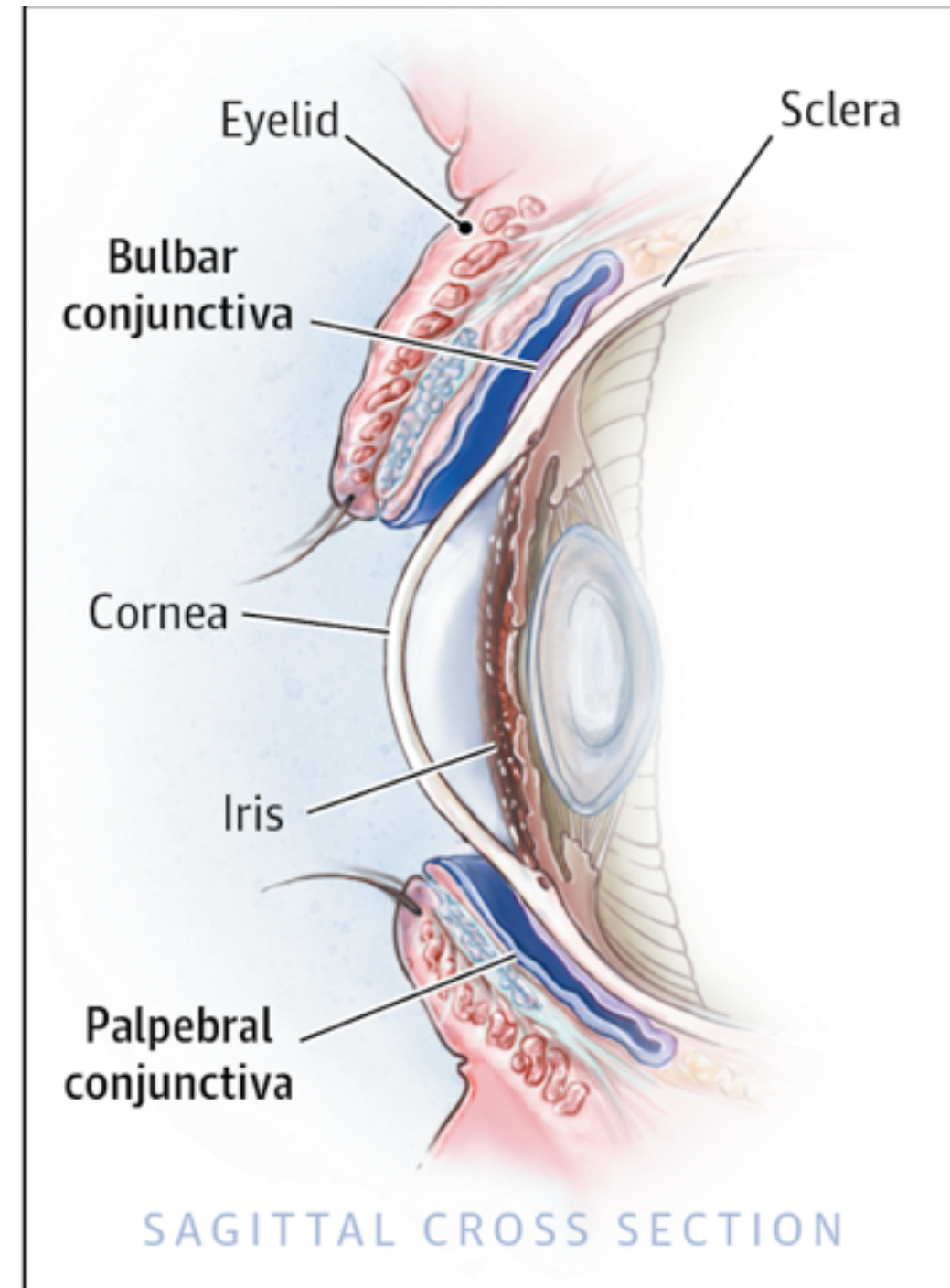
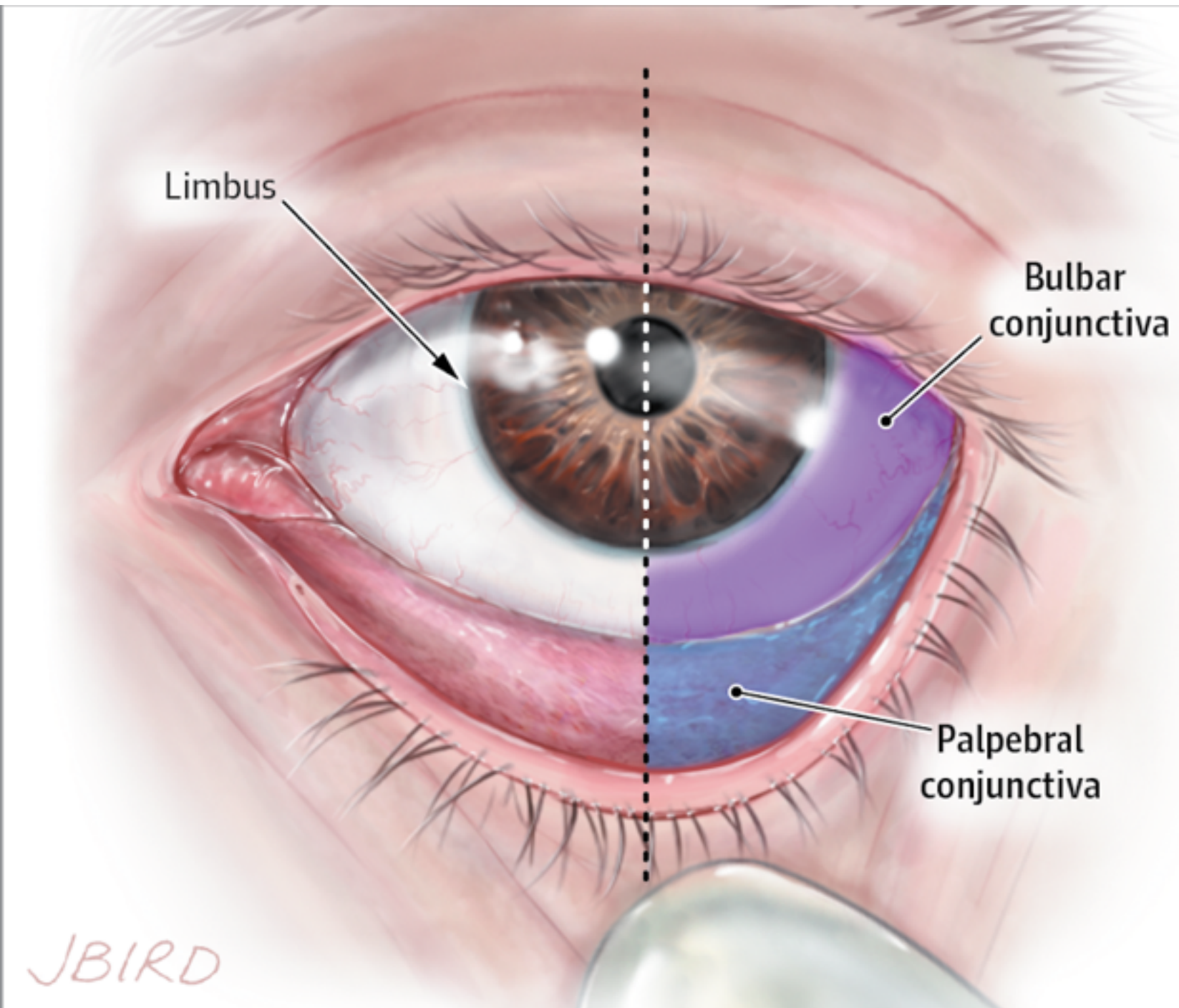
Cornea Service, Department of Ophthalmology  
Faculty of Medicine, Chulalongkorn University

*"Pearls & Pitfalls in Infectious Diseases"*

การอบรมระยะสั้นประจำปี 2559 สมาคมโรคติดต่อแห่งประเทศไทย

17 March 2016 Swisotel Le Concorde, Bangkok

# Anatomy of Conjunctiva and Cornea





# Conjunctivitis

2013

## PREFERRED PRACTICE PATTERN®



## Conjunctivitis

 **AMERICAN ACADEMY  
OF OPHTHALMOLOGY**  
*The Eye M.D. Association*



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Author Manuscript

JAMA. Author manuscript; available

Azari A JAMA 2013

Published in final edited form as:

JAMA. 2013 October 23; 310(16): 1721–1729. doi:10.1001/jama.2013.280318.

## Conjunctivitis:

### A Systematic Review of Diagnosis and Treatment

Amir A. Azari, MD and Neal P. Barney, MD

Department of Ophthalmology and Visual Sciences, University of Wisconsin, Madison.

## Abstract

**IMPORTANCE**—Conjunctivitis is a common problem.

**OBJECTIVE**—To examine the diagnosis, management, and treatment of conjunctivitis, including various antibiotics and alternatives to antibiotic use in infectious conjunctivitis and use of antihistamines and mast cell stabilizers in allergic conjunctivitis.

**EVIDENCE REVIEW**—A search of the literature published through March 2013, using PubMed, the ISI Web of Knowledge database, and the Cochrane Library was performed. Eligible articles were selected after review of titles, abstracts, and references.

**FINDINGS**—Viral conjunctivitis is the most common overall cause of infectious conjunctivitis and usually does not require treatment; the signs and symptoms at presentation are variable. Bacterial conjunctivitis is the second most common cause of infectious conjunctivitis, with most uncomplicated cases resolving in 1 to 2 weeks. Matting and adherence of the eyelids on waking, lack of itching, and absence of a history of conjunctivitis are the strongest factors associated with bacterial conjunctivitis. Topical antibiotics decrease the duration of bacterial conjunctivitis and allow earlier return to school or work. Conjunctivitis secondary to sexually transmitted diseases such as chlamydia and gonorrhea requires systemic treatment in addition to topical antibiotic therapy. Allergic conjunctivitis is encountered in up to 40% of the population, but only a small proportion of these individuals seek medical help; itching is the most consistent sign in allergic conjunctivitis, and treatment consists of topical antihistamines and mast cell inhibitors.

**CONCLUSIONS AND RELEVANCE**—The majority of cases in bacterial conjunctivitis are self-limiting and no treatment is necessary in uncomplicated cases. However, conjunctivitis caused by gonorrhea or chlamydia and conjunctivitis in contact lens wearers should be treated with antibiotics. Treatment for viral conjunctivitis is supportive. Treatment with antihistamines and mast cell stabilizers alleviates the symptoms of allergic conjunctivitis.

Conjunctiva is a thin, translucent membrane lining the anterior part of the sclera and inside of the eyelids. It has 2 parts, bulbar and palpebral. The bulbar portion begins at the edge of the cornea and covers the visible part of the sclera; the palpebral part lines the inside of the

# The Importance of Conjunctivitis

Conjunctivitis = Inflammation of conjunctiva

- Affects 6 million people/year in USA
- Majority of cases (70%) are treated by primary care physician
- Viral conjunctivitis is the most common, in adult population
- Bacterial conjunctivitis is the second, majority in children



# Conjunctivitis

## Clues for diagnosis

- Discharge
- Unilateral or bilateral
- Onset, duration
- Recent exposure to individual with red eye
- Contact lens?
- Eye drop

## Laboratory Investigation

Only for

- severe purulent discharge
- chronic conjunctivitis
- cases suspicious for gonococcal or chlamydial infection

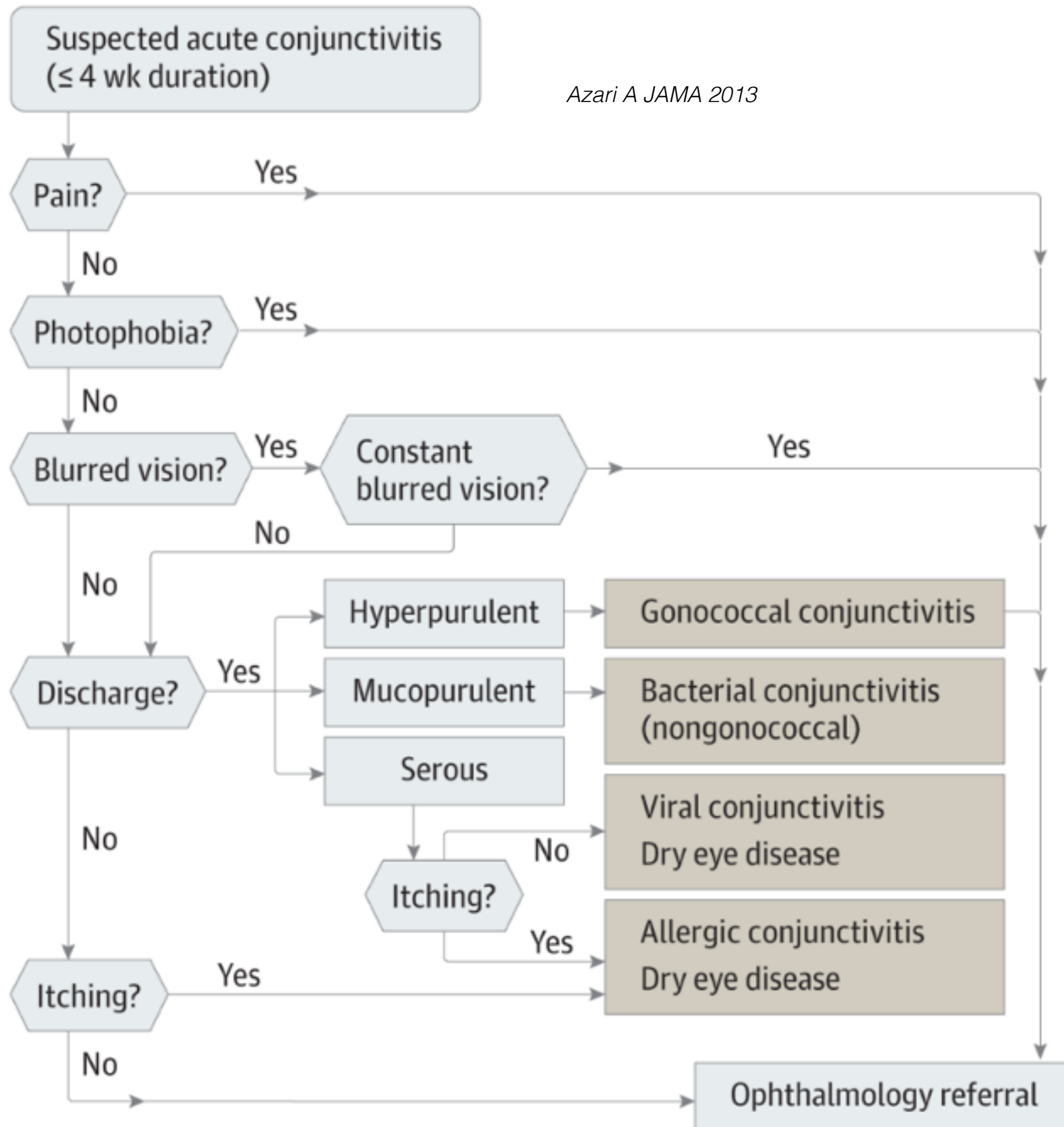
# Differential diagnosis of conjunctivitis

Referral Guidelines – OPTHALMOLOGY - NHS Oxfordshire 2010

	<b>Bacterial</b>	<b>Viral</b>	<b>Chlamydial</b>	<b>Allergic</b>
Symptoms	Sore, swollen sticky/matted eye on waking, photophobic	Feels unwell. Watery, sticky, gritty, sometimes subconjunctival haemorrhage H/O upper respiratory tract infection	Sore and slightly itchy	Very itchy and sore H/O upper respiratory tract infection
Unilateral/ bilateral	Can be both	Bilateral	Bilateral or unilateral	Bilateral
Discharge	Acute – purulent (yellow) Mild – mucopurulent (sticky yellow)	Serous (watery)	Mucoid (stringy white)	Mucoid
Papillae/ follicles	Papillae	Follicles and papillae	Large follicles in the fornices	Papillae Thickened lids
Pre-auricular nodes	Palpable	Palpable and tender	Palpable and non-tender	Sometimes present
Timing	Acute or chronic	Acute	Chronic	Acute

# Algorithm for Clinical Approach of acute conjunctivitis

*Azari A JAMA 2013*



## Refer if

### Suspected

- Chlamydial
- GC
- Neonatal

Painful, decrease vision



# Type of Conjunctivitis

## Papillary

bacterial  
allergic

## Giant papillary

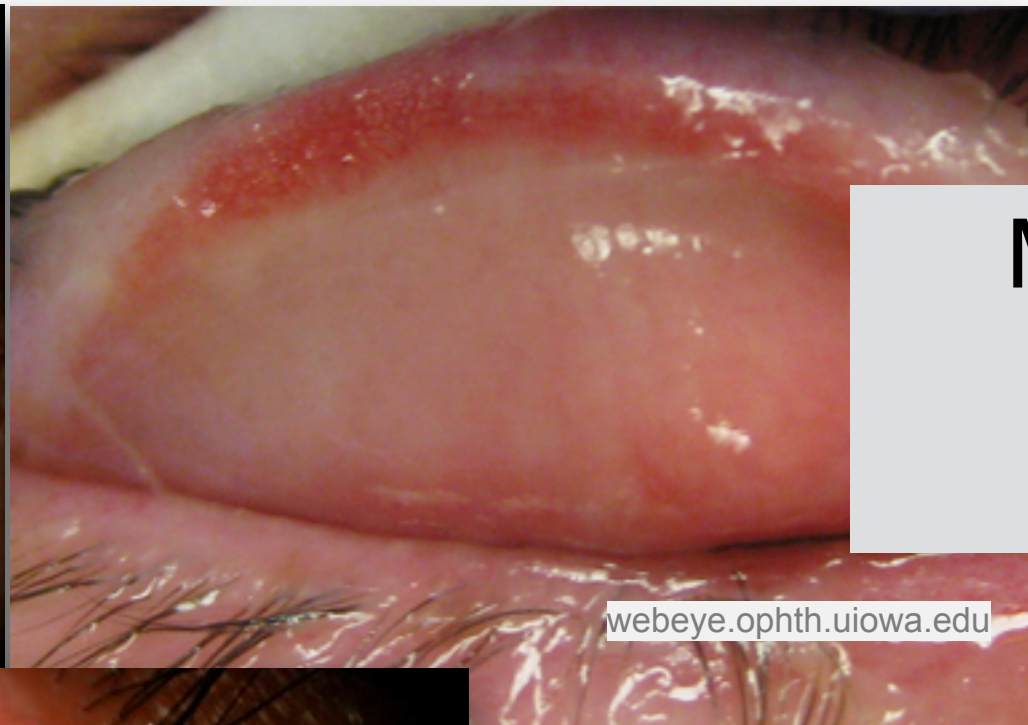
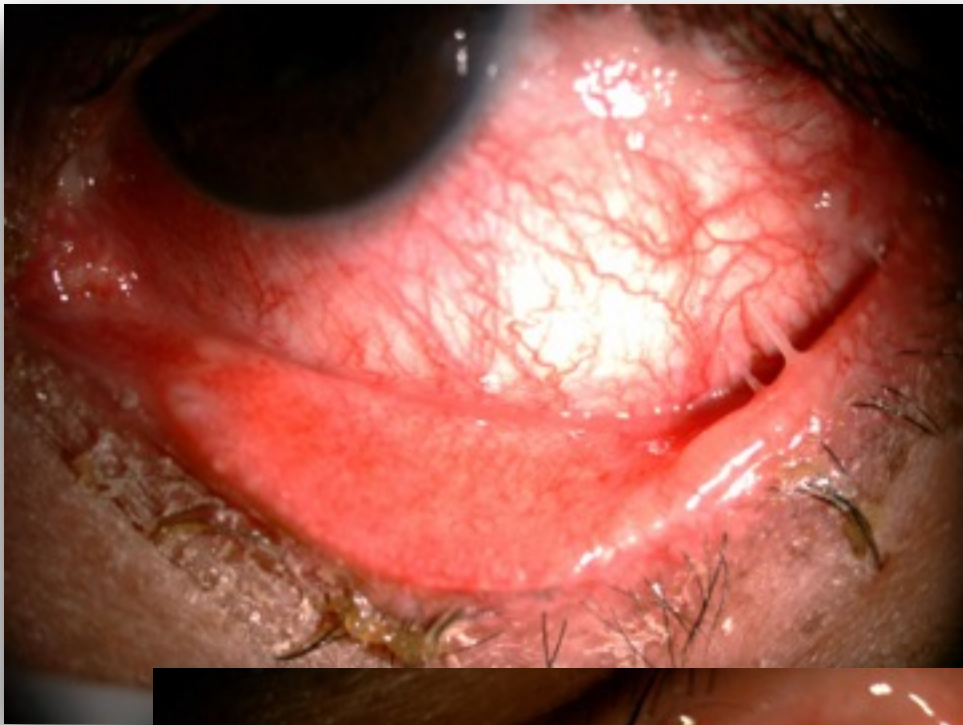
contact lens, eye prosthesis

## Follicular

viral  
allergy

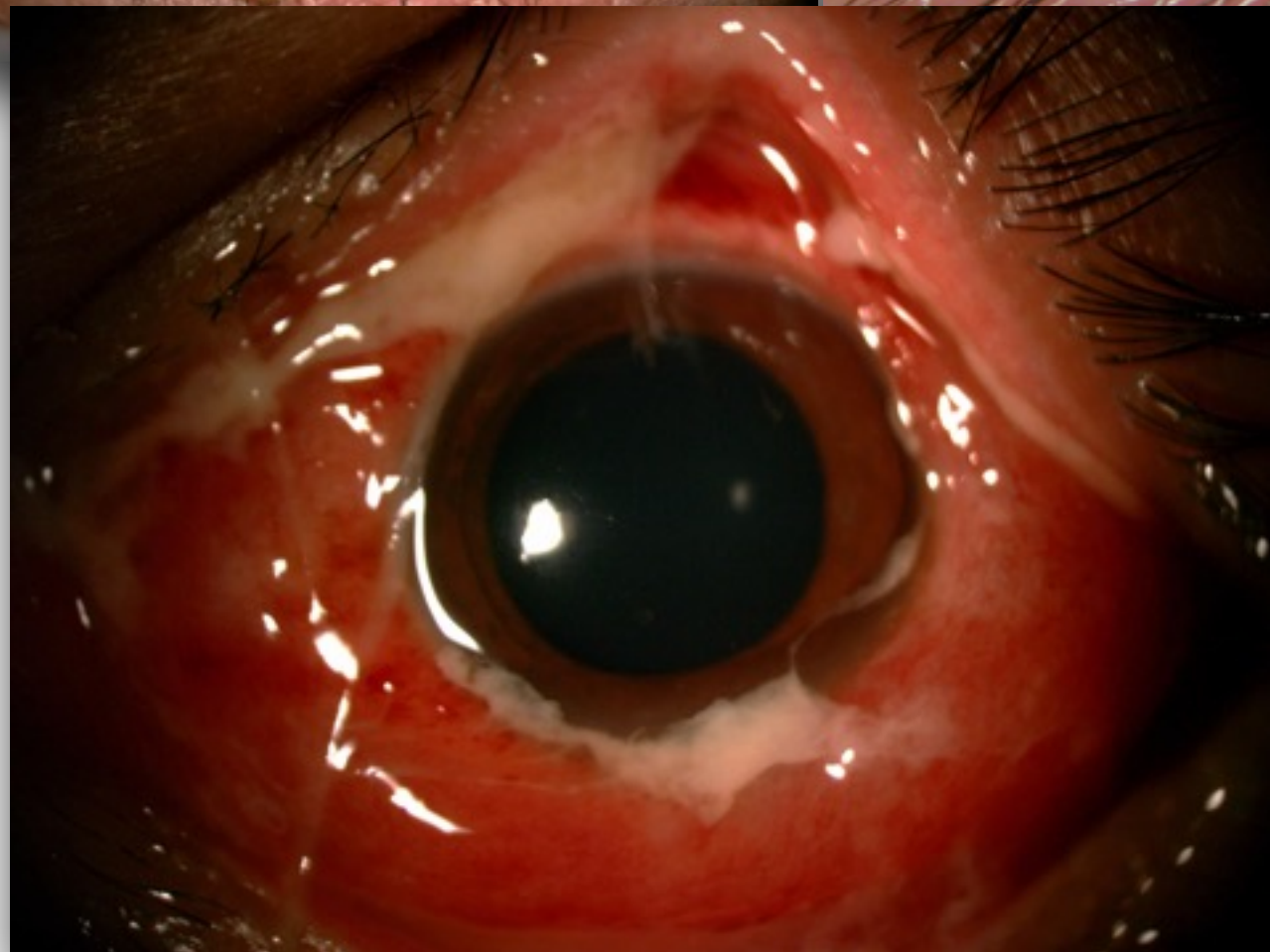


# Type of Conjunctivitis



## Membranous

bacteria  
HSV  
SJS



**Hyperpurulent  
conjunctivitis**  
GC conjunctivitis

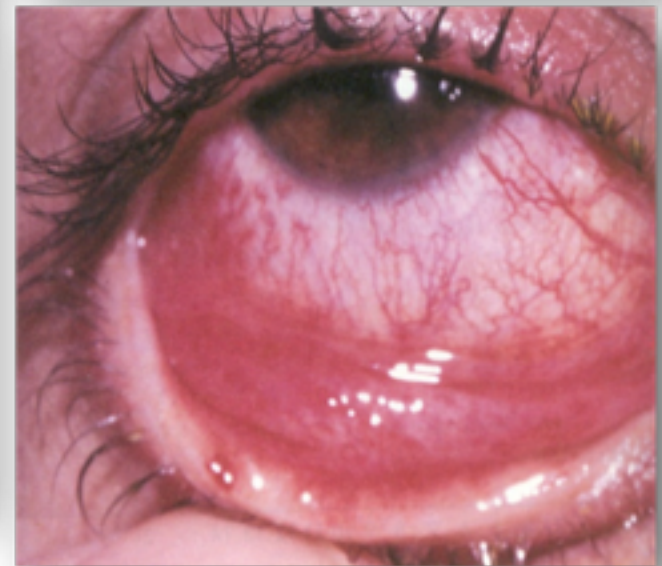
# Viral Conjunctivitis

- Most common cause of acute conjunctivitis
- Adenovirus are most common (65-90% of cases)
- Common presentations: acute, watery discharge, bilateral, mostly associated with common cold, lymphadenopathy (50%)
- Rapid Ag testing for adenovirus has 89% sensitivity and 94% specificity



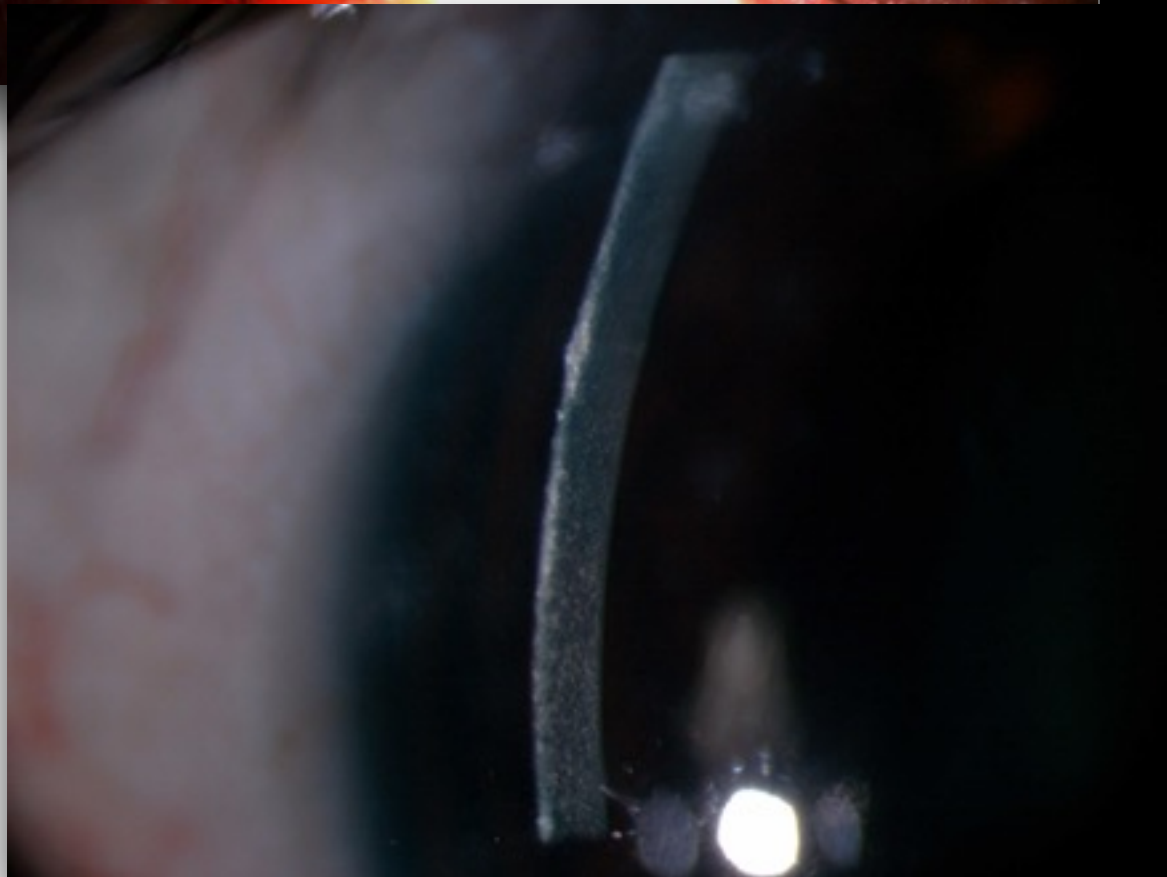
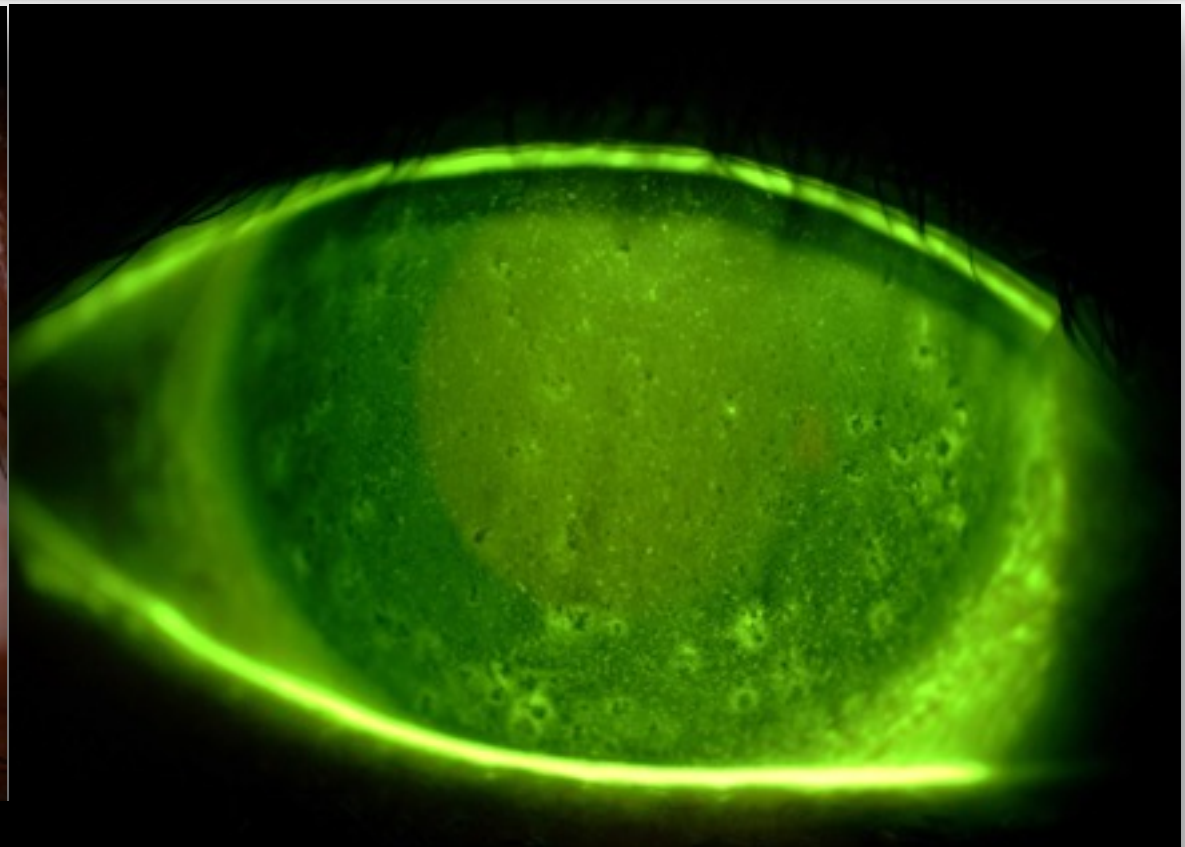
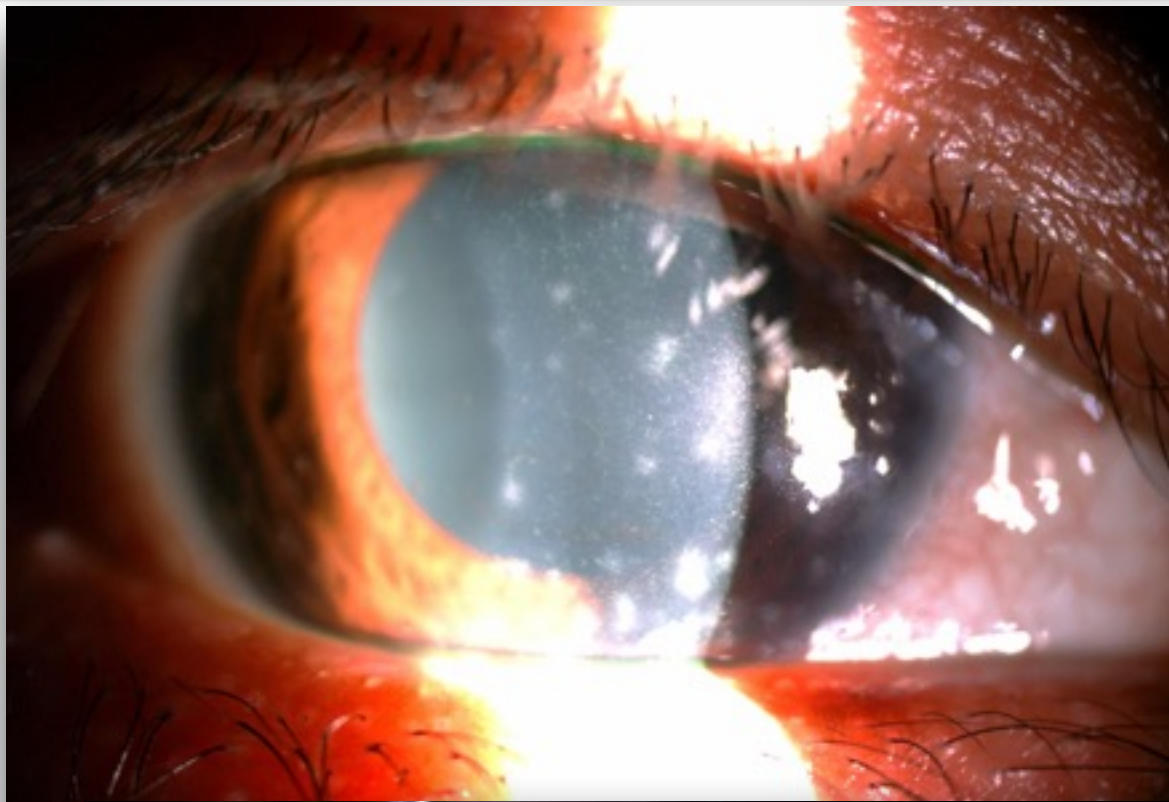


# Pharyngoconjunctival fever (PCF)



- Adenovirus type 3
- Incubation period 5-6 days
- Bilateral red eyes
- Irritation & tearing, epiphora, conjunctival hyperemia
- Associated systemic manifestations
  - fever
  - myalgia, malaise, GI disturbance
  - pharyngitis

# Epidemic keratoconjunctivitis (EKC)



- Adenovirus 8, 19, 37
- Incubation period 3-14 days
- Highly contagious, spreading through contact
- Corneal involvement follow conjunctivitis
  - sub-epithelial opacities
  - later, confluent, involve deeper layer
  - may need years to resolve



# Acute hemorrhagic conjunctivitis (AHC)



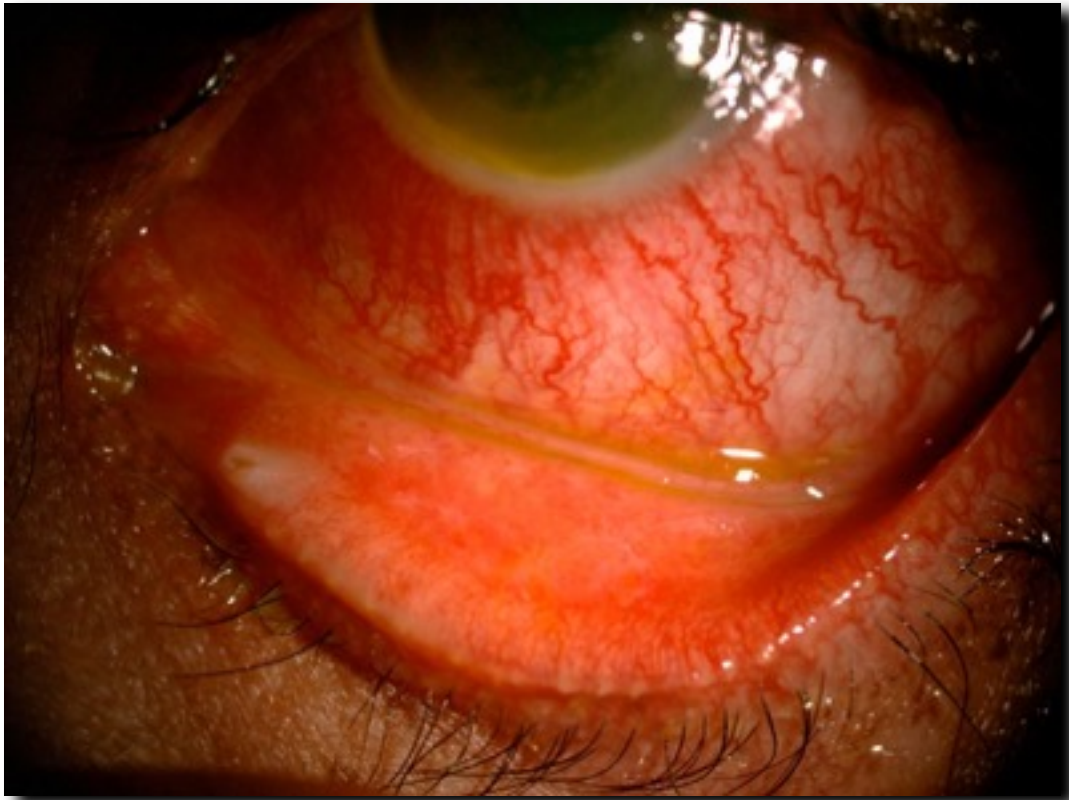
- Enterovirus 70, coxsackievirus A24 variant, Adenovirus 11
- Acute eye pain, swelling, tearing
- Conjunctival hemorrhages



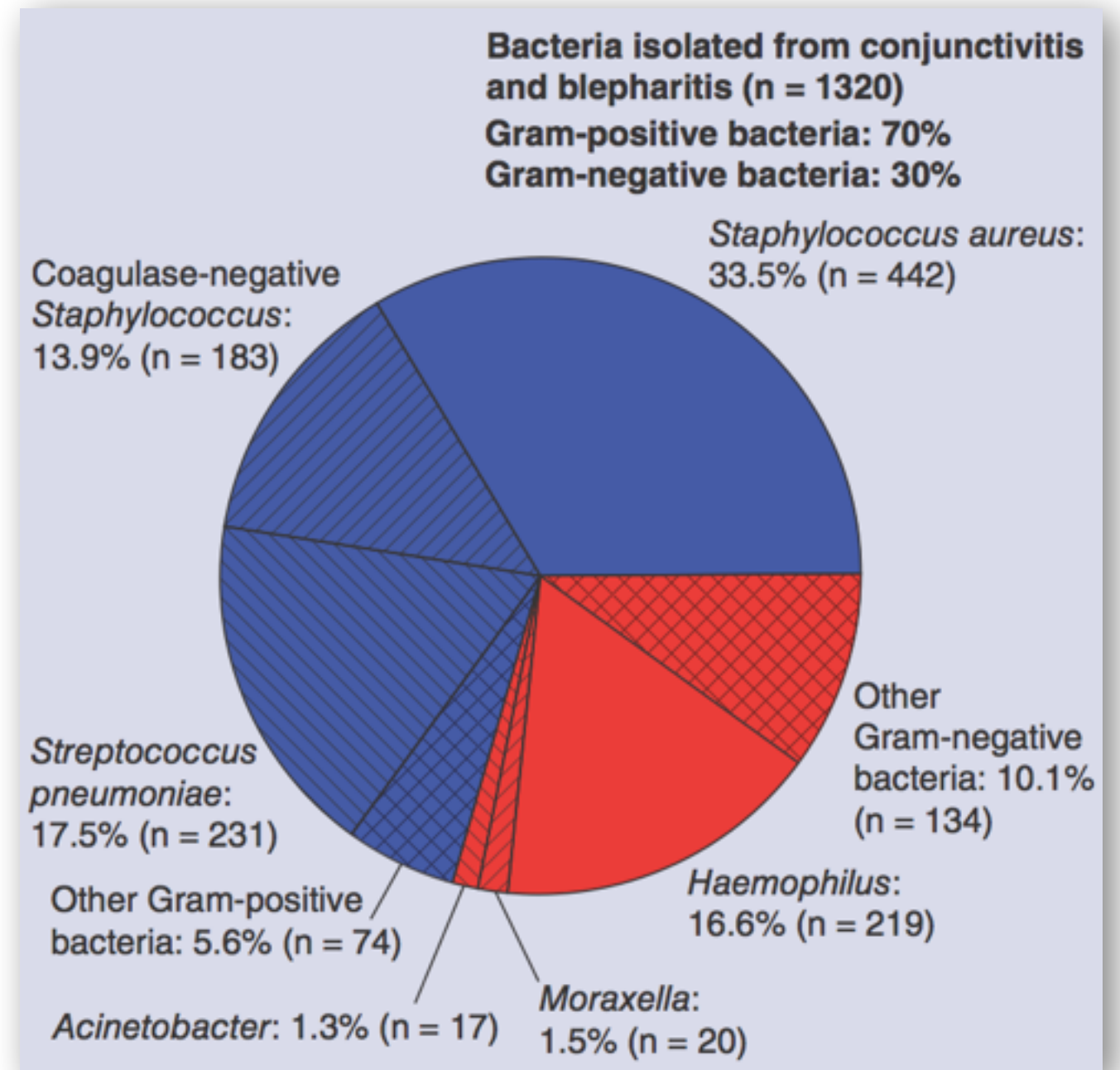
# Treatment of viral conjunctivitis

1. Supportive treatment: tears, topical anti-histamine, cold compression
2. No need for antibiotic or antiviral treatment
3. Steroids eye drop?
  - may decrease inflammation in severe cases
  - causes prolong viral shedding (animal)
4. Membrane removal in membranous conjunctivitis
- 5. Prevent spreading of the infection to community**

# Bacterial Conjunctivitis



## Common organisms



# Why should we treat a bacterial conjunctivitis?

## Antibiotics versus placebo for acute bacterial conjunctivitis (Review)

Sheikh A, Hurwitz B, van Schayck CP, McLean S, Nurmatov U



This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in 2012, Issue 9

<http://www.thecochranelibrary.com>



Antibiotics versus placebo for acute bacterial conjunctivitis (Review)  
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## Antibiotics versus placebo for acute bacterial conjunctivitis

Acute bacterial conjunctivitis is an infective condition in which one or both eyes become red and inflamed. The condition is not normally serious and in most cases resolves spontaneously. People with acute conjunctivitis are often given antibiotics, usually as eye drops or ointment, to speed recovery. The benefits of antibiotics to the sufferer of conjunctivitis have been questioned. We found 11 randomised controlled trial (RCTs) from different parts of the world which recruited a total of 3673 participants overall. We judged two of the trials to be of high quality, and we graded the remainder as poor quality.

**This updated review provides clearer evidence that use of antibiotic eye drops can speed up the resolution of symptoms and infection, and that they are unlikely to be associated with any serious side effects.**



# Conjunctivitis

## A Systematic Review of Diagnosis and Treatment

Amir A. Azari, MD; Neal P. Barney, MD

JAMA. 2013;310(16):1721-1729

Table 2. Ophthalmic Therapies for Conjunctivitis

Category	Epidemiology	Type of Discharge	Cause	Treatment
Acute bacterial conjunctivitis	135 case per 10 000 population in US <sup>3</sup> 18.3%-57% of all acute conjunctivitis <sup>7-9,12,13</sup>	Mucopurulent	<i>S aureus</i> , <i>S epidermidis</i> , <i>H influenzae</i> , <i>S pneumoniae</i> , <i>S viridans</i> , <i>Moraxella</i> spp	Aminoglycosides
				Gentamicin Ointment: 4 ×/d for 1 wk Solution: 1-2 drops 4 ×/d for 1 wk
				Tobramycin ointment: 3 ×/d for 1 wk
				Fluoroquinolones
				Besifloxacin: 1 drop 3 ×/d for 1 wk
				Ciprofloxacin ointment: 3 ×/d for 1 wk Solution: 1-2 drops 4 ×/d for 1 wk
				Gatifloxacin: 3 ×/d for 1 week
				Levofloxacin: 1-2 drops 4 ×/d for 1 wk
				Moxifloxacin: 3 ×/d for 1 wk
				Ofloxacin: 1-2 drops 4 ×/d for 1 wk
				Macrolides
				Azithromycin: 2 ×/d for 2 d; then 1 drop daily for 5 d
				Erythromycin: 4 ×/d for 1 wk
				Sulfonamides
				Sulfacetamide ointment: 4 ×/d and at bedtime for 1 wk Solution: 1-2 drops every 2-3 h for 1 wk
				Combination drops
				Trimethoprim/polymyxin B: 1 or 2 drops 4 ×/d for 1 wk

# Which ATB is the best?

Clinical Ophthalmology 2010;4:1451-1457

Table 3 (Continued)

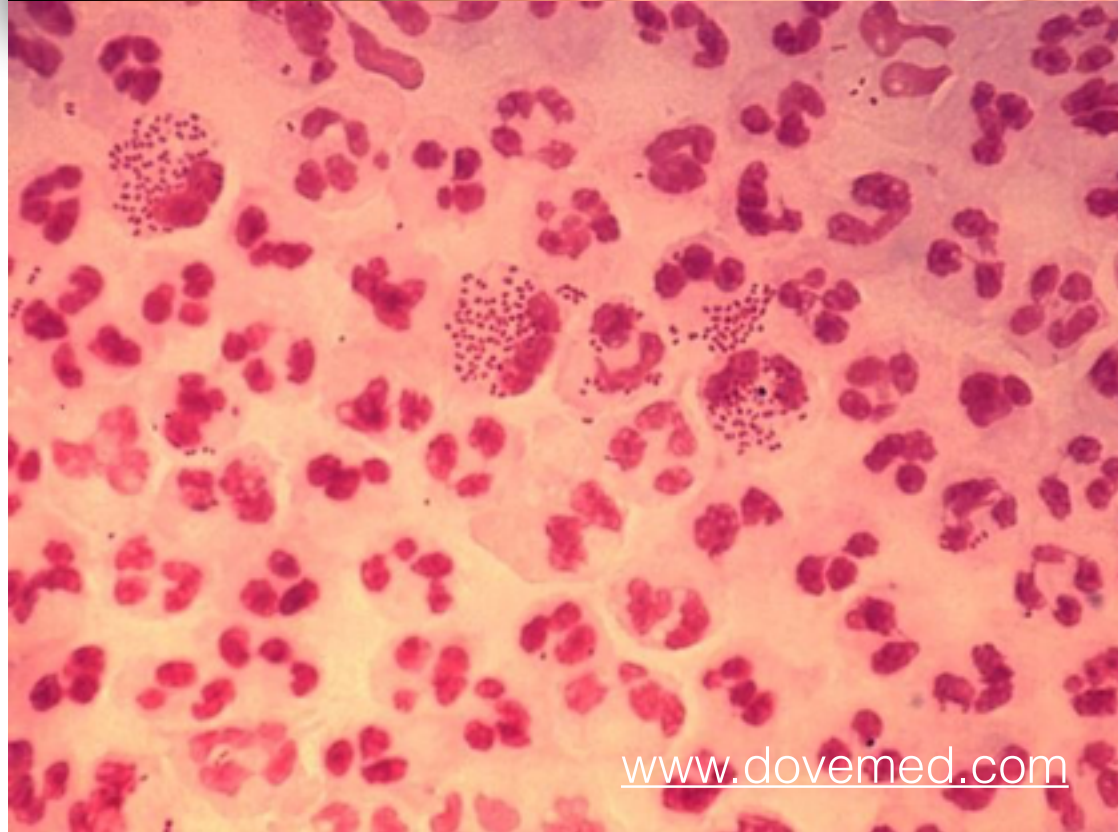
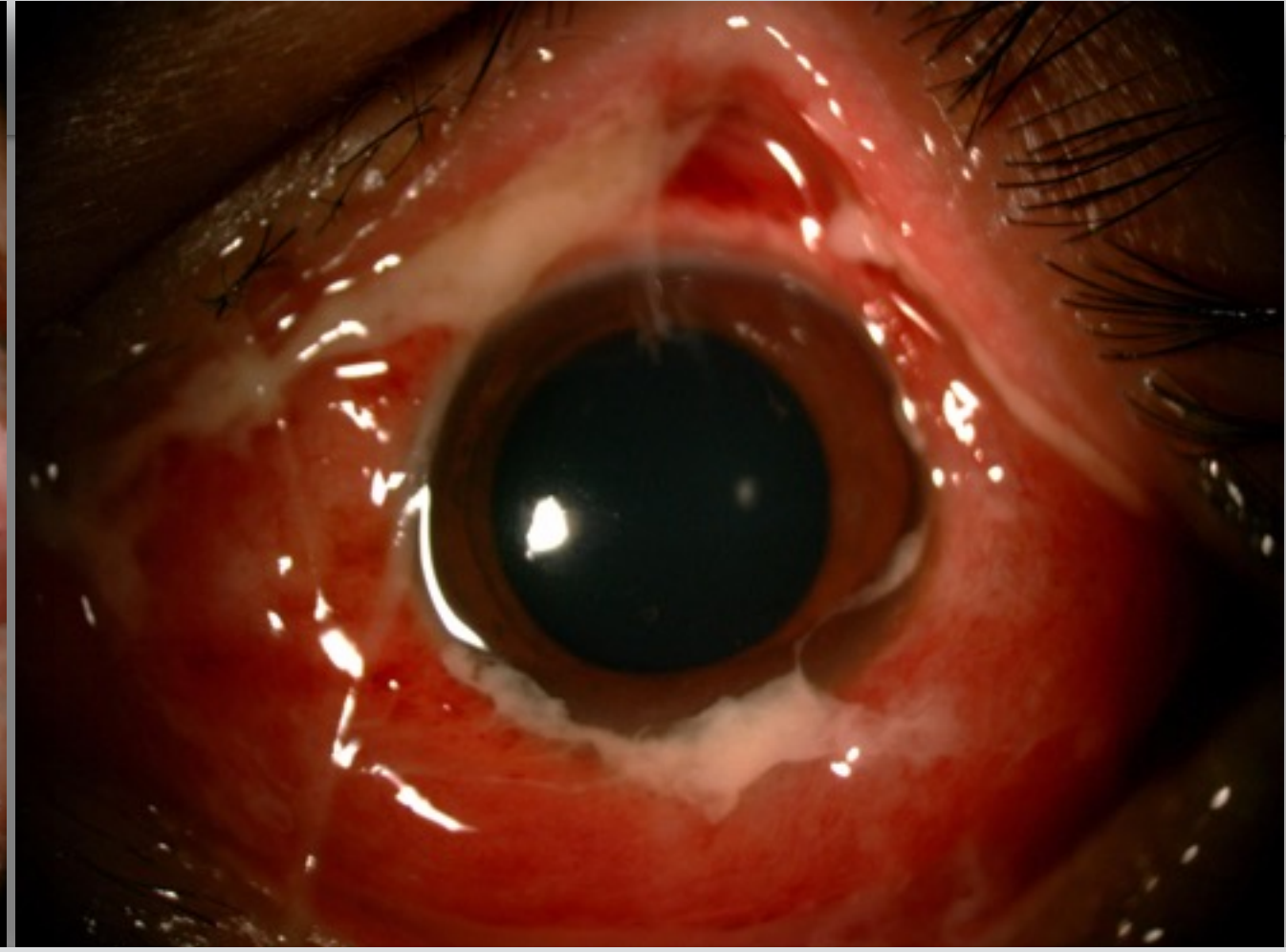
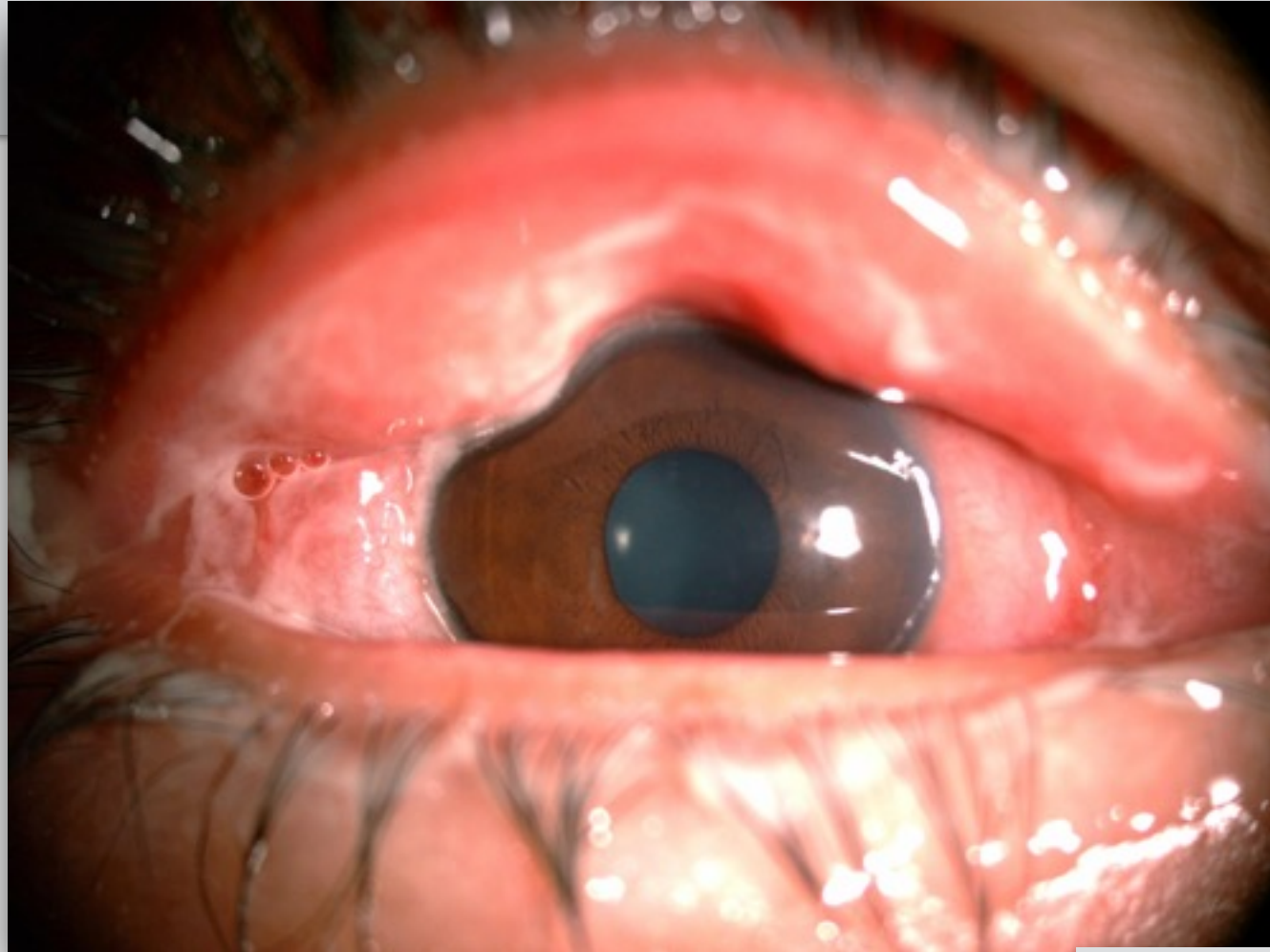
Author	Number of randomized patients	Interventions	Outcome measures	Results
Granet et al <sup>22</sup>	84 eyes of 56 patients	Polymyxin/trimethoprim QID versus 0.5% moxifloxacin TID	Relief of signs and symptoms	Faster clinical resolution with moxifloxacin
Gwon <sup>23</sup>	345	0.3% ofloxacin versus 0.3% tobramycin	Clinical resolution and bacterial eradication	Similar efficacy between the two treatments, more rapid symptom relief with ofloxacin
Isenberg et al <sup>24</sup>	459 total, 124 culture-positive for bacteria	1.25% povidone-iodine versus neomycin-B-gramicidin		
Jackson et al <sup>25</sup>	484	1% fusidic acid versus 0.3% tobramycin		
Kernt et al <sup>26</sup>	276	Enhanced-viscosity tobramycin BID versus tobramycin QID		
Lichtenstein et al <sup>11</sup>	167	0.5% levofloxacin versus 0.3% ofloxacin (versus placebo)		
Malminiemi et al <sup>27</sup>	45	0.3% lomefloxacin versus 1% fusidic acid		
McDonald et al <sup>28</sup>	1161	0.6% besifloxacin versus 0.3% moxifloxacin	and bacterial eradication	two groups; higher rate of eye irritation with moxifloxacin
Milazzo et al <sup>29</sup>	45	0.3% netilmicin versus 0.3% tobramycin	Clinical resolution and bacterial eradication	No difference in clinical resolution, better microbiologic outcome with netilmicin
Miller et al <sup>30</sup>	246	Norfloxacin versus chloramphenicol	Clinical resolution and bacterial eradication	No difference between the two groups
Normann et al <sup>31</sup>	456 newborns	1% fusidic acid versus 0.5% chloramphenicol	Clinical resolution and compliance	No difference in efficacy but better compliance with fusidic acid
Papa et al <sup>32</sup>	209	Netilmicin versus gentamicin	Clinical resolution and bacterial eradication	Greater efficacy rate with netilmicin

## Conclusions

Bacterial conjunctivitis often resolves on its own, but the current evidence suggests that topical antibiotics help accelerate recovery from this self-limiting disease. Topical antibiotics used for treatment of bacterial conjunctivitis have similar efficacy rates. The treatment regimen does not affect recovery from bacterial conjunctivitis. Patients may prefer a simpler regimen.



# Gonococcal conjunctivitis



[www.dovemed.com](http://www.dovemed.com)

- Hyperacute conjunctivitis, incubation period 24 hrs
- Manifest as ophthalmia neonatorum or adult type
- Severe inflammation, chemosis, purulent discharge

## **Acute treatment to prevent corneal perforation**

- Ceftriaxone 1gm IM (single dose for conjunctivitis)
- Ceftriaxone 1gm IV bid for 3 days (in keratitis)

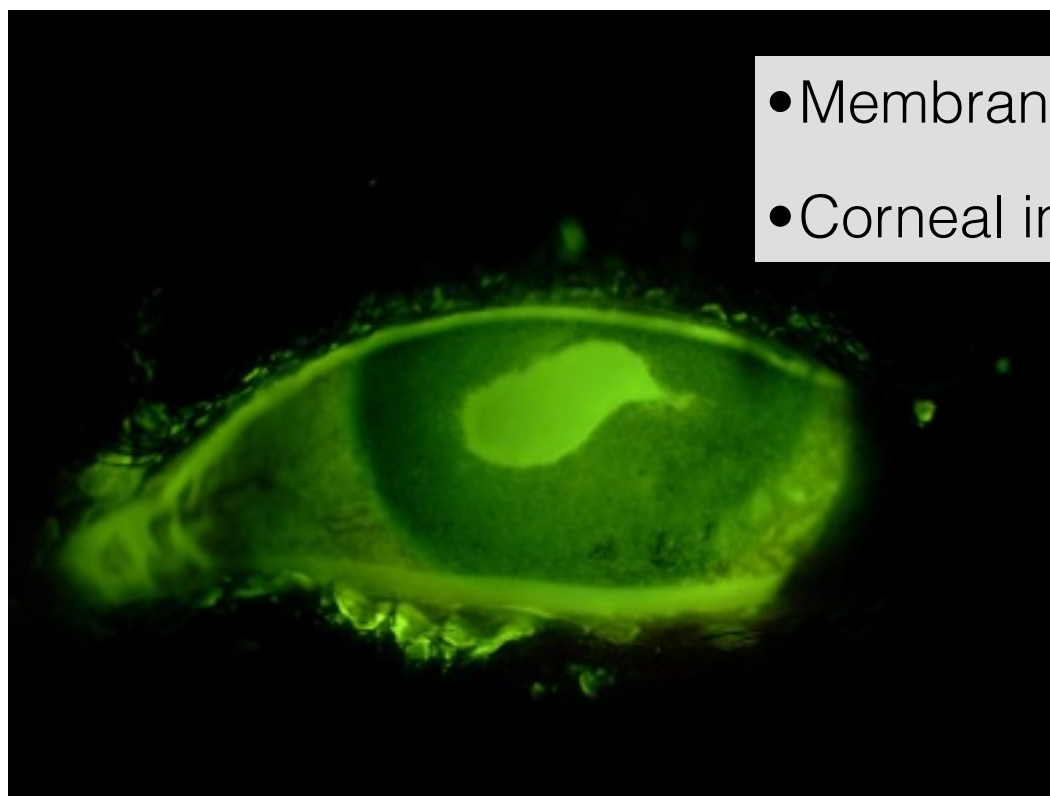
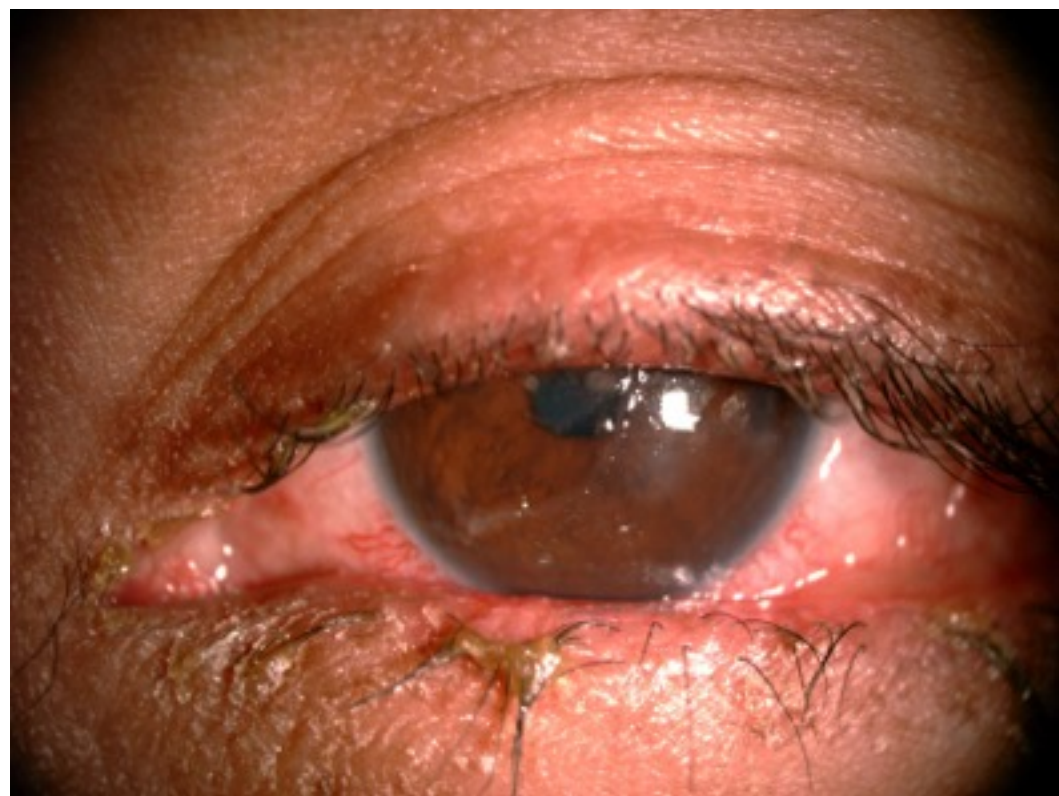
## **Treat chlamydial co-infection**

- Azithromycin 1gm oral or doxycycline 100mg oral x7 days

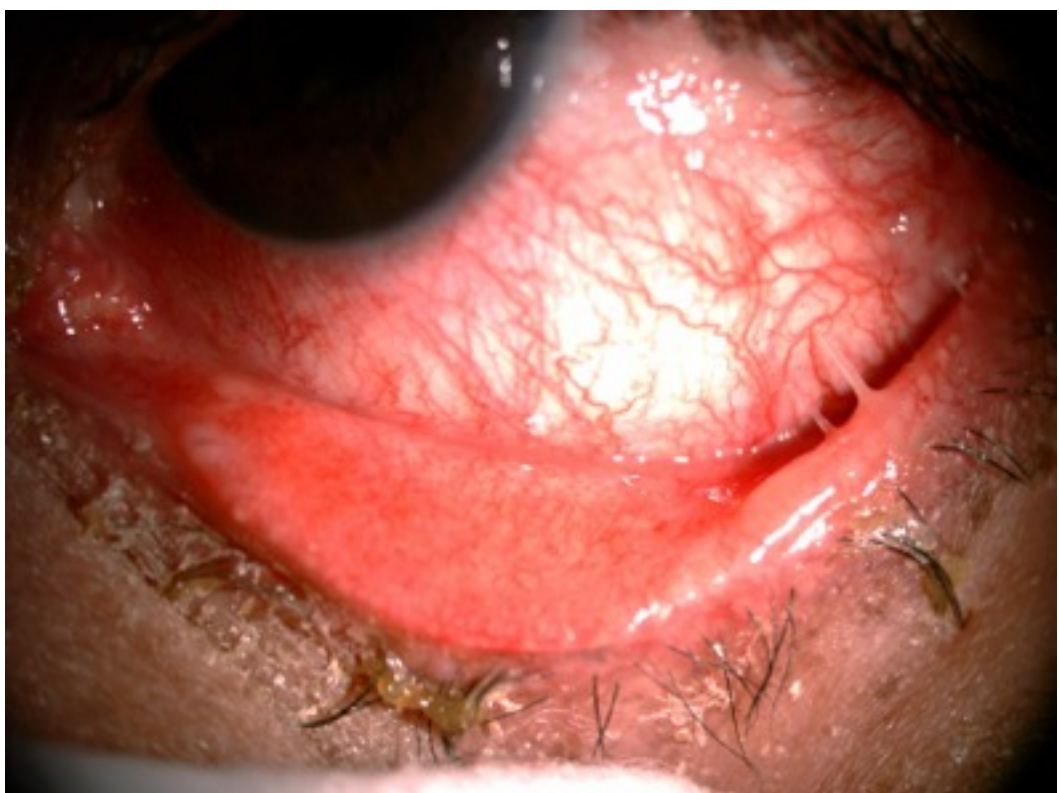
## **Treat sexual partner**



# Diphtherial Conjunctivitis



- Membranous conjunctivitis
- Corneal involvement





# Chlamydial conjunctivitis



## **Ophthalmia neonatorum**

- Manifest in 7-10 days
- Most common cause
- No follicular reactions
- Treatment
  - erythromycin base or ethylsuccinate 50 mg/kg/d x 14 days



## **Adult form**

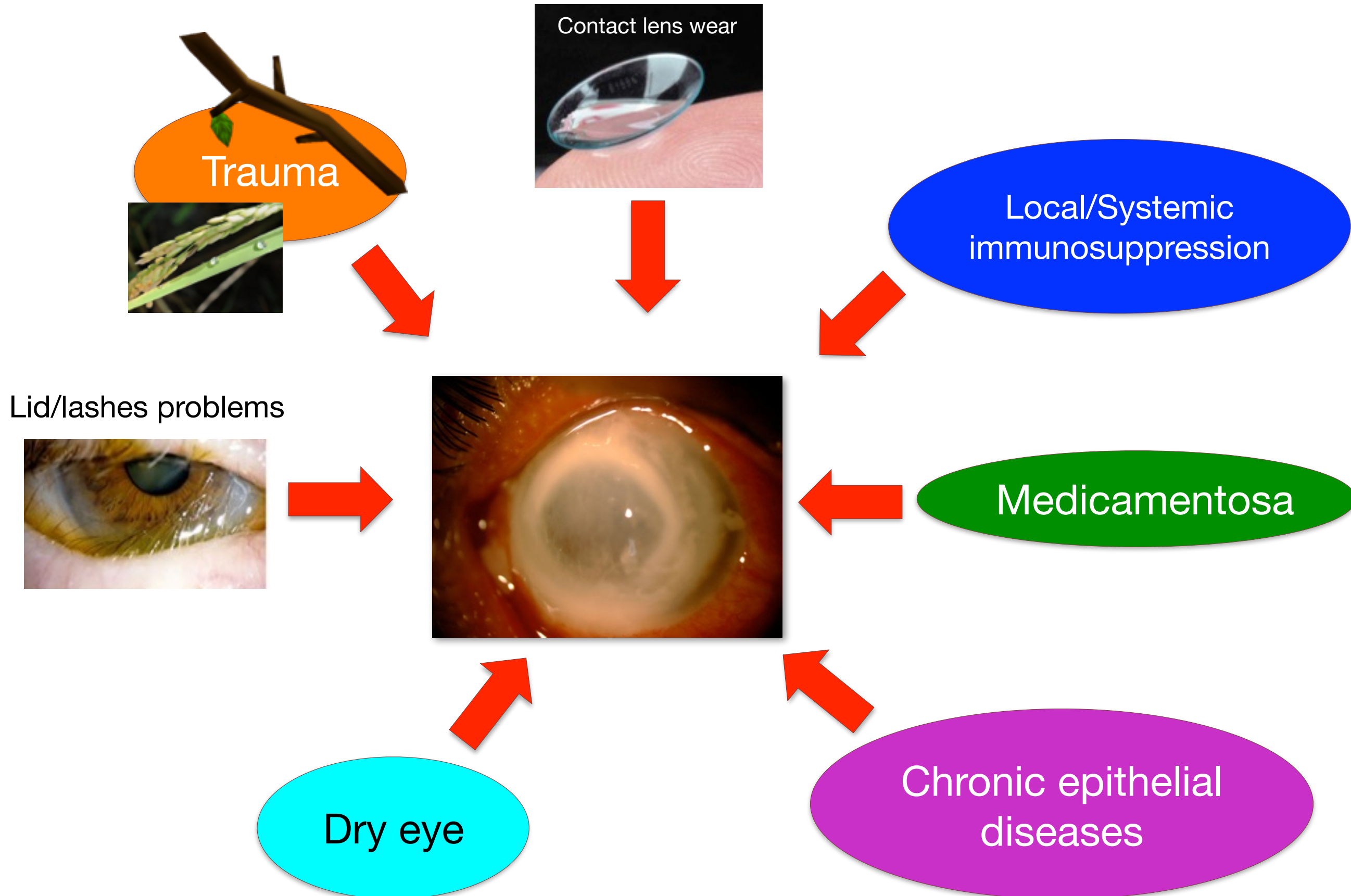
- Chronic, last for months
- Unilateral, mucopurulent discharge, follicular reaction with pre-auricular lymphadenopathy
- Concurrent genital chlamydial infection
- Treatment
  - systemic-azithromycin 1gm single dose or doxycycline 100mg bid x 7days
  - topical azithromycin?



# Keratitis



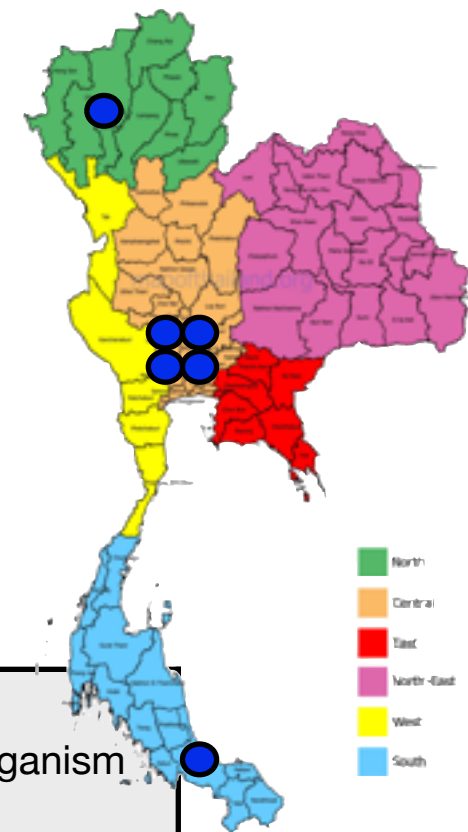
# Predisposing Factors to Infectious Keratitis





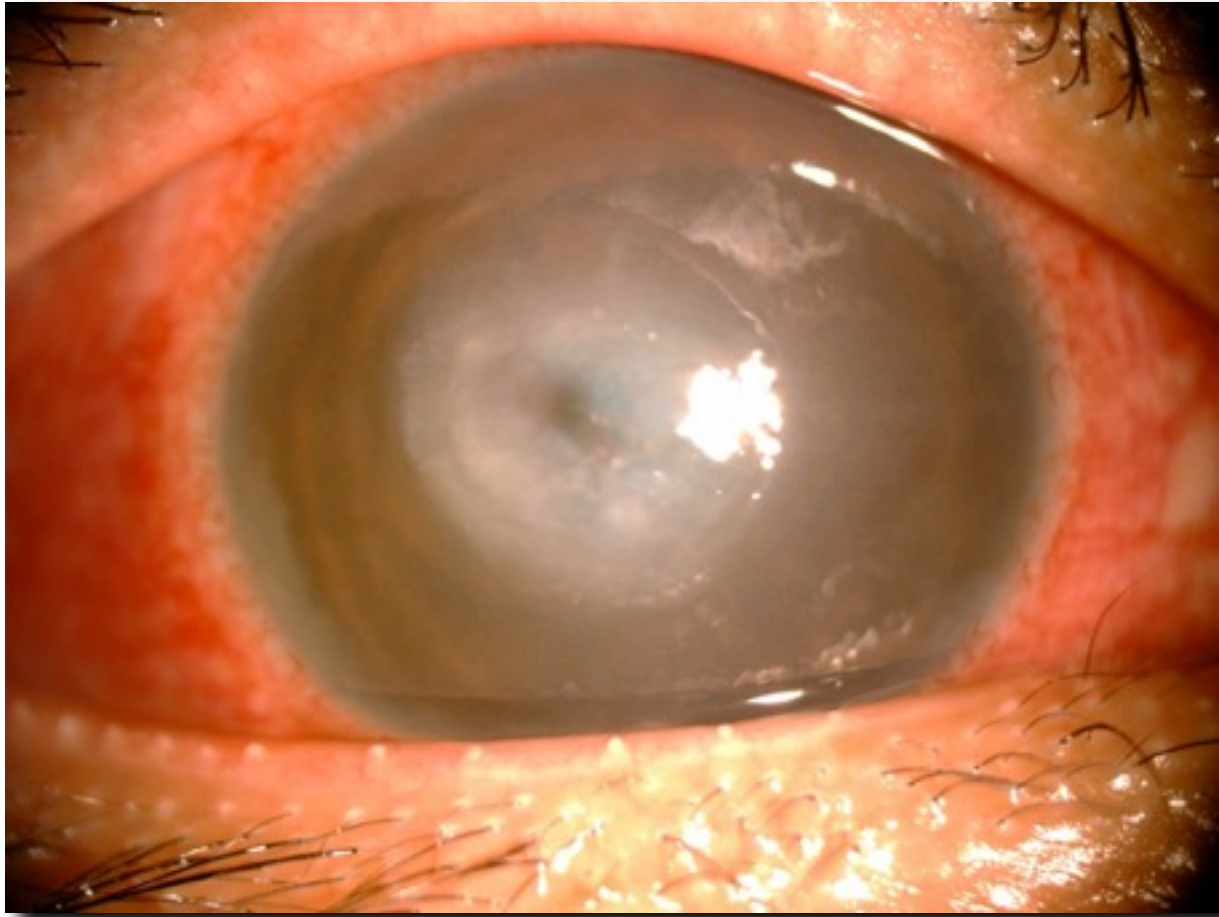
# Thai Infectious Keratitis Reviews

Bacteria > Fungus ~ 2-6 times



Study	N	Risk factors	Bacterial:fungus	Dominant organism
Siriraj <i>Kosirakwong 1992</i>	105	Trauma	2:1	<i>P. aeruginosa</i>
Chulalongkorn <i>Boonprasart 2002</i>	391	Trauma	2.7:1	<i>P. aeruginosa</i>
Pramongkut <i>Lekskul 2004</i>	81	Trauma	6:1	<i>P. aeruginosa</i>
Ramathibodi <i>Sirikul 2008</i>	127	Trauma	2.3:1	<i>P. aeruginosa</i>
Prince of Songkhla <i>Kananokanthapong 1994</i>	81	NA	2.5:1	<i>P. aeruginosa</i> & <i>S. Pneumoniae</i>
Chiang Mai <i>Tananuvat 2004</i> <i>Tananuvat 2012</i>	214 305	Trauma	3:2 1:1.2	<i>P. aeruginosa</i> <i>Fusarium</i>

# Bacterial Keratitis



2013

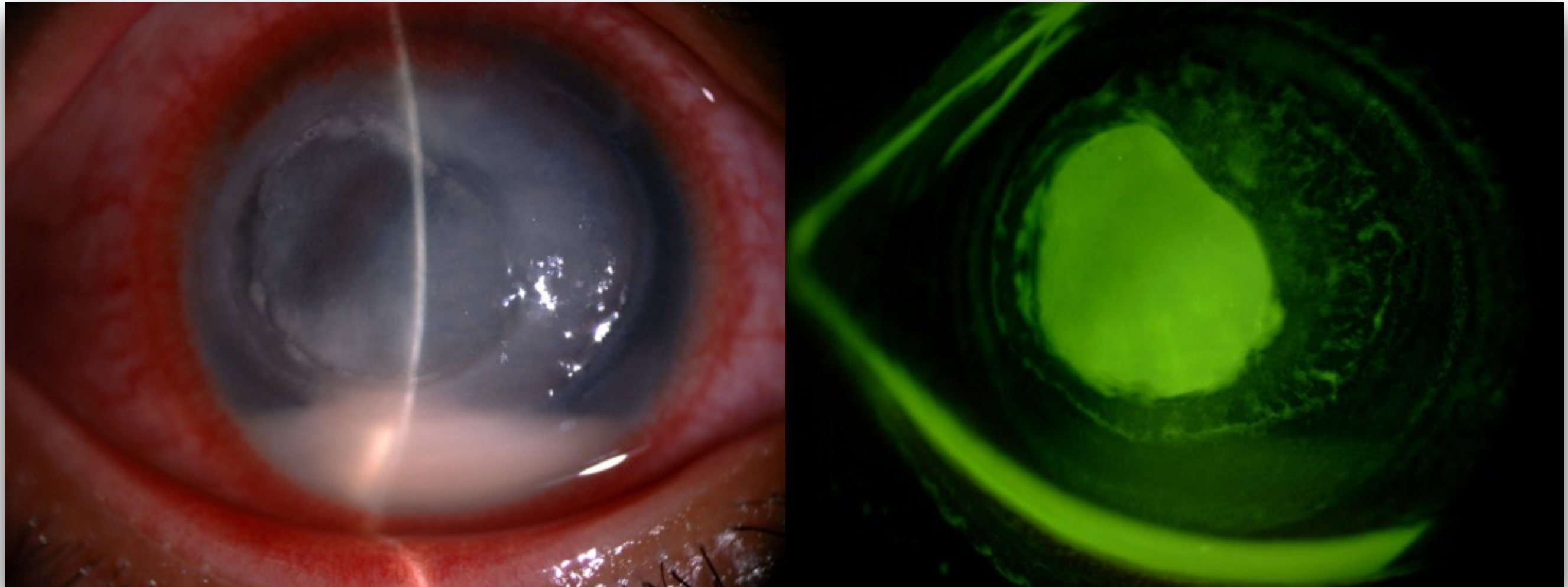
PREFERRED PRACTICE PATTERN®



**Bacterial  
Keratitis**

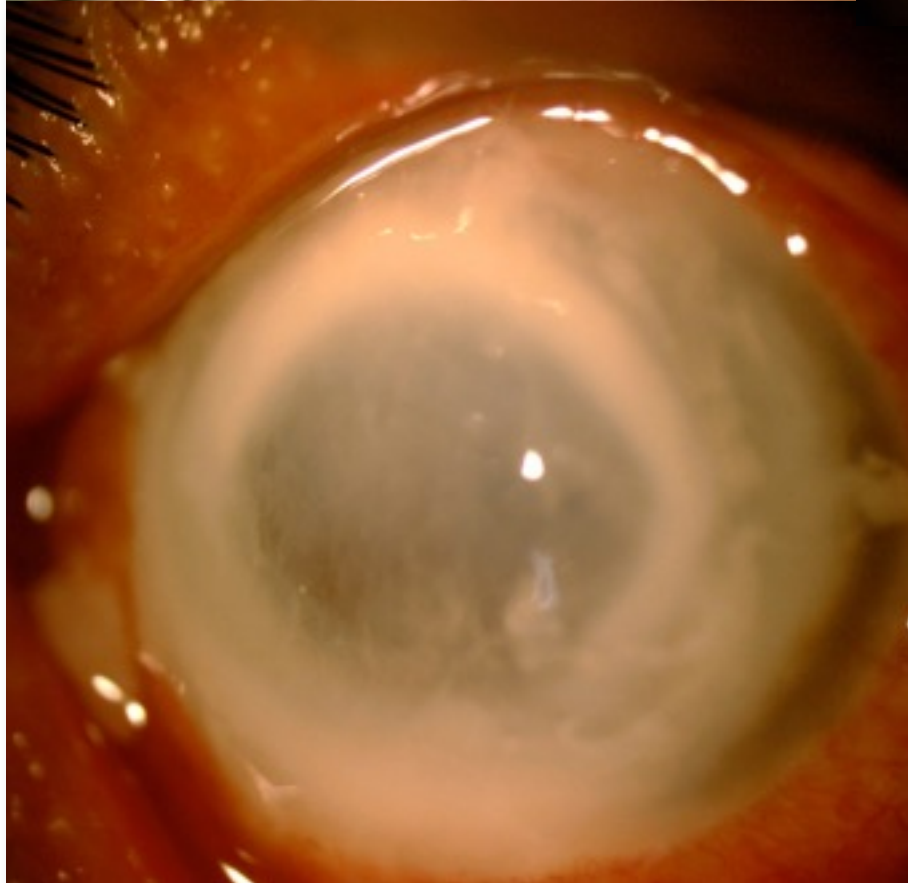
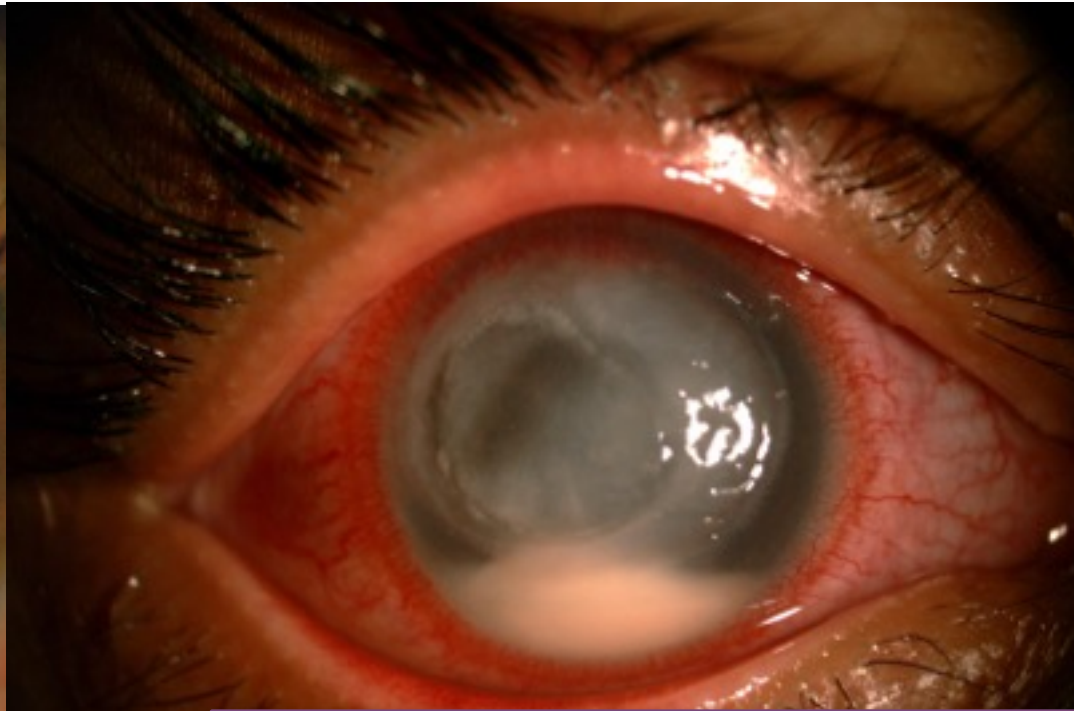


# Pseudomonas keratitis

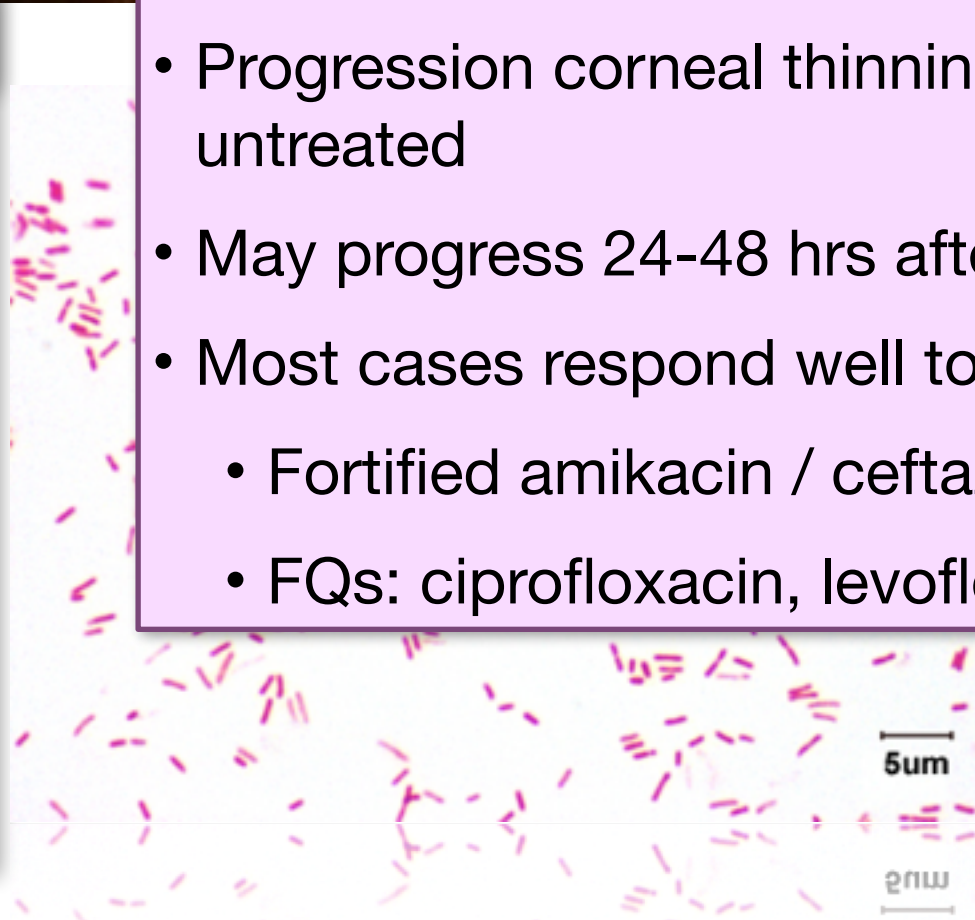


- Rapid (1 day) onset
- Most are CL wearers with poor hygiene
- Central, suppurative infiltrate
- “Ground glass” appearance
- Rapid progression

# Pseudomonas Keratitis

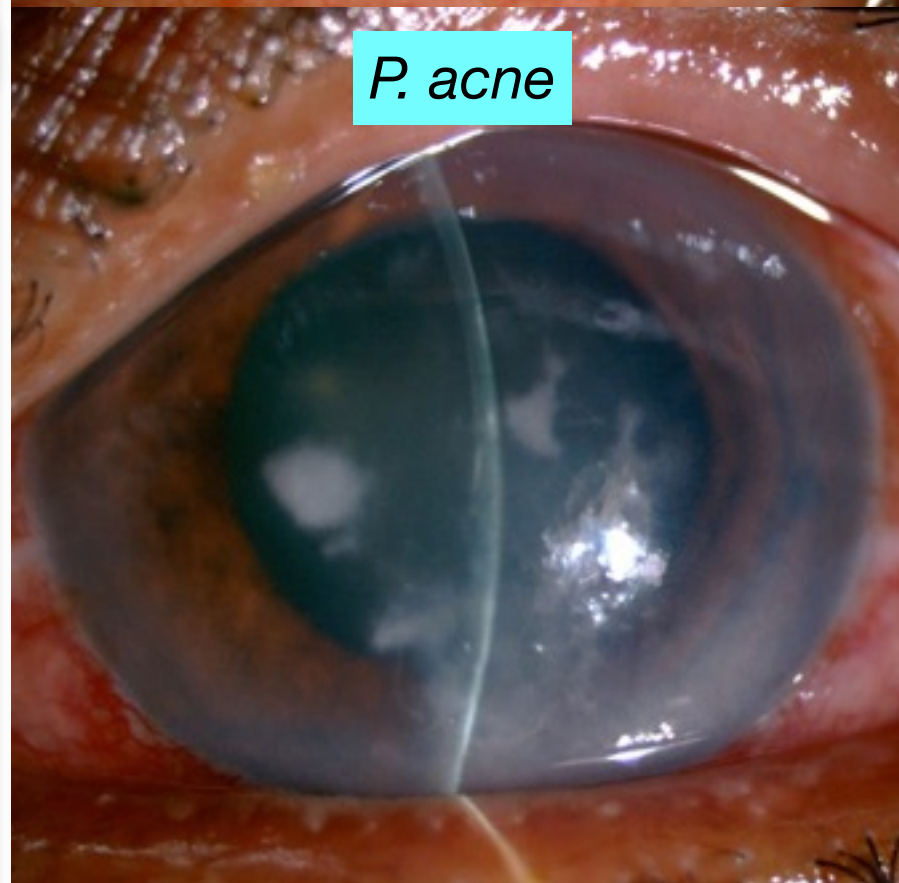
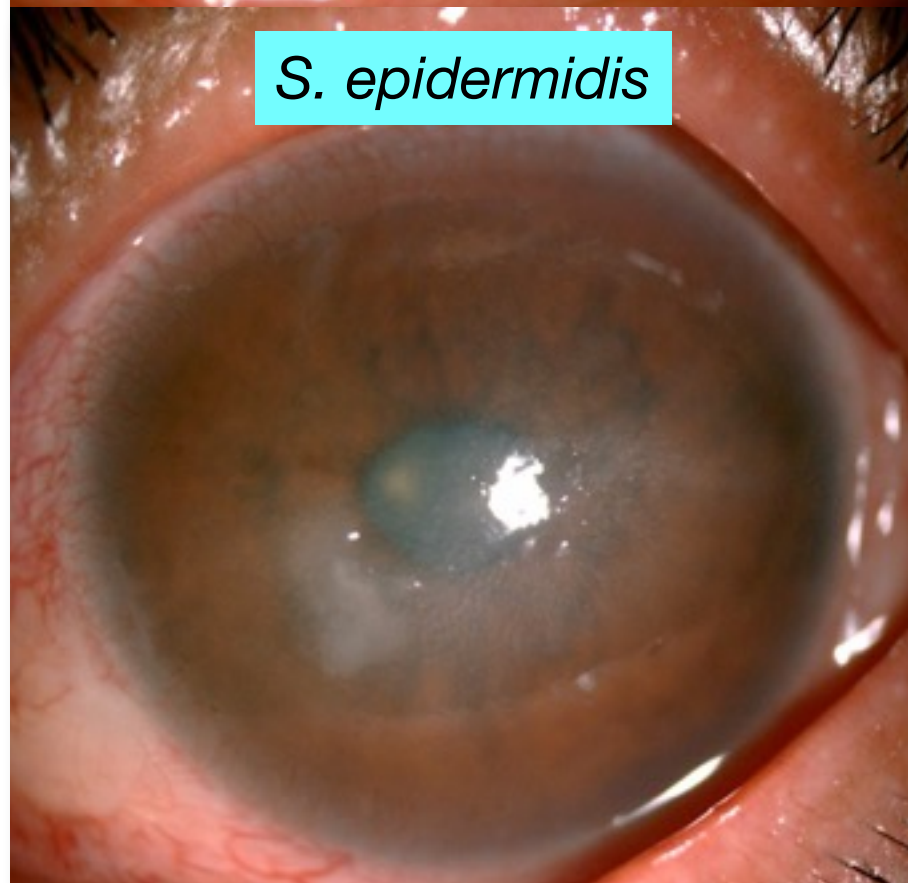
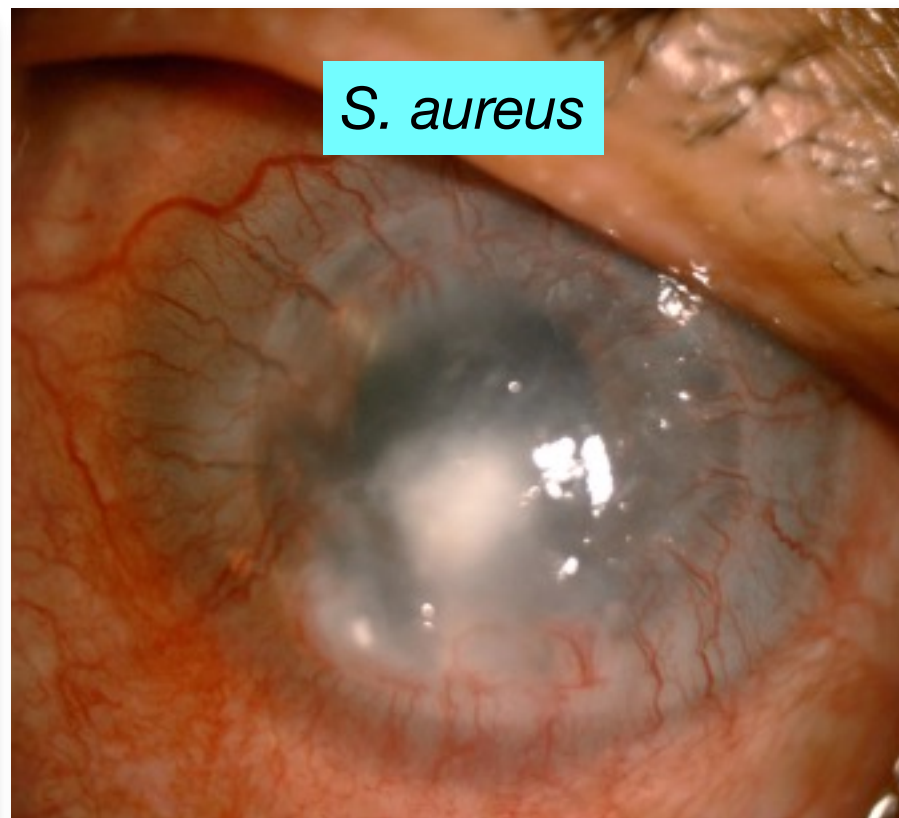
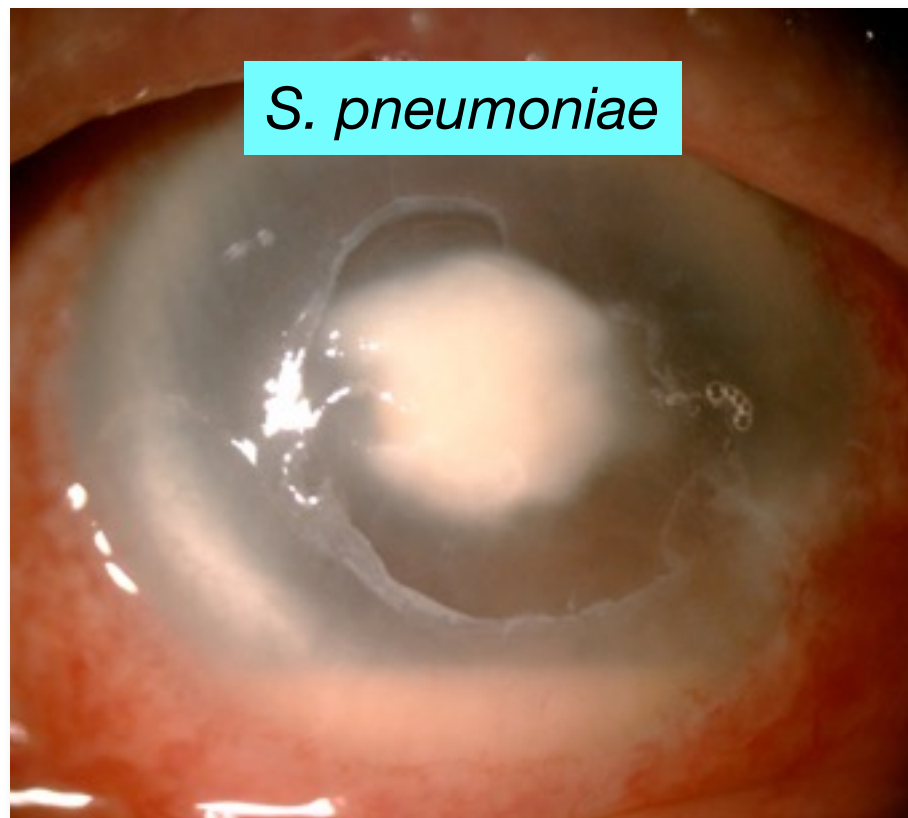


- “Ring Infiltrate”
- Progression corneal thinning & perforation if untreated
- May progress 24-48 hrs after initiation of treatment
- Most cases respond well to topical treatment
  - Fortified amikacin / ceftazidime
  - FQs: ciprofloxacin, levofloxacin





# Gram positive keratitis



*Staphylococci*



*Streptococci*

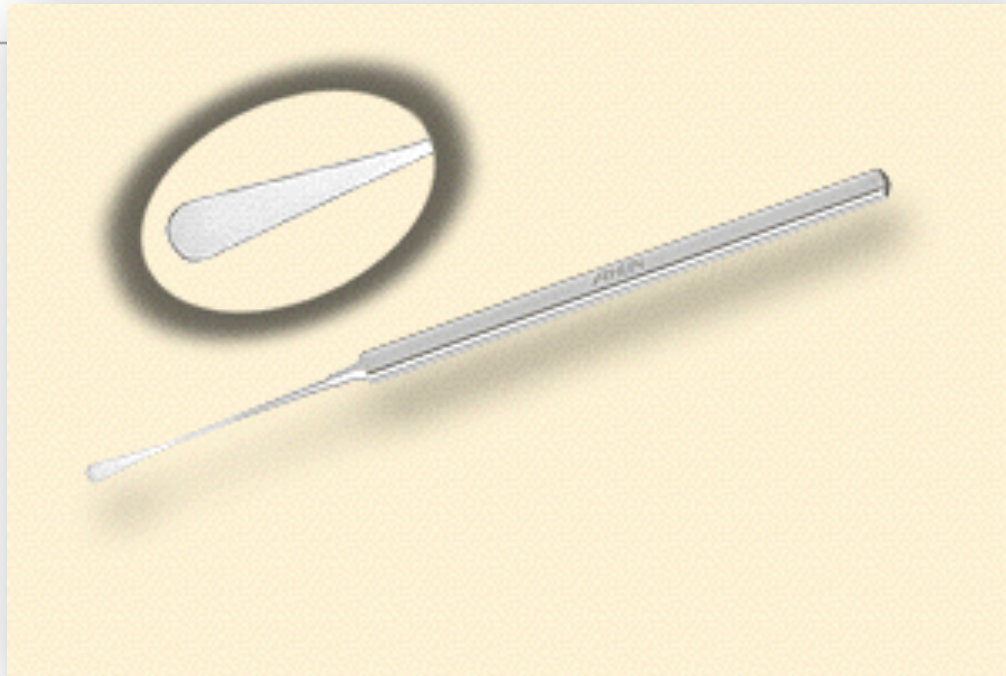


- Few days onset
- Associated with stitch abscess

- Focal, discrete infiltrate
- Single, central lesion
- Round, oval shape



# Smear for Gram staining, KOH and culture



# Treatment Guideline

Initial Treatment  
Topical broad spectrum ATB

Severe

Central  
>2mm with suppurative  
infiltration  
deep stromal

Loading dose (q 5-15 min) for  
the first 30-60 min

Followed by frequent  
application (q 30 min-1 hr)

Less Severe

Less frequent dose

# Choices of ATB

**TABLE 3 ANTIBIOTIC THERAPY FOR BACTERIAL KERATITIS**

Organism	Antibiotic	Topical Concentration	Subconjunctival Dose
No organism identified or multiple types of organisms	Cefazolin	50 mg/ml	100 mg in 0.5 ml
	with Tobramycin or gentamicin	9–14 mg/ml	20 mg in 0.5 ml
	or Fluoroquinolones*	Various†	
Gram-positive cocci	Cefazolin	50 mg/ml	100 mg in 0.5 ml
	Vancomycin‡	15–50 mg/ml	25 mg in 0.5 ml
	Bacitracin‡	10,000 IU	
	Fluoroquinolones*	Various†	
Gram-negative rods	Tobramycin or gentamicin	9–14 mg/ml	20 mg in 0.5 ml
	Ceftazidime	50 mg/ml	100 mg in 0.5 ml
	Fluoroquinolones	Various†	
Gram-negative cocci§	Ceftriaxone	50 mg/ml	100 mg in 0.5 ml
	Ceftazidime	50 mg/ml	100 mg in 0.5 ml
	Fluoroquinolones	Various†	
Nontuberculous mycobacteria	Amikacin	20–40 mg/ml	20 mg in 0.5 ml
	Clarithromycin	10 mg/ml	
	Azithromycin	10 mg/ml	
	Fluoroquinolones	Various†	
Nocardia	Sulfacetamide	100 mg/ml	
	Amikacin	20–40 mg/ml	20 mg in 0.5 ml
	Trimethoprim/sulfamethoxazole:		
	trimethoprim	16 mg/ml	
	sulfamethoxazole	80 mg/ml	



# Fungal Keratitis

- Fungal keratitis is quite common among tropical countries
- Prevalence varies from 10% to 50% of all microbial keratitis reported
- Risk factors are:
  - trauma from vegetative materials
  - topical medications (steroids and others)
  - corneal surgery (PK, LASIK, RK)
  - chronic keratitis (HSV, HZV, vernal/allergic conjunctivitis)

# Epidemiology of Fungal Keratitis

Microbial keratitis reports	Fungal keratitis	Organism	Most common predisposing factor
<b>Bangkok, THA</b> <i>Boonpasart et al</i> <i>J Med Assoc Thai 2002;85(Suppl. 1):S217-230</i>	11.6%	Fusarium spp.	trauma
<b>Bangkok, THA</b> <i>Sirikul et al</i> <i>Cornea 2008;27:283-287</i>	38%	Fusarium spp.	trauma
<b>Chieng Mai, THA</b> <i>Tananuvat et al</i> <i>J Med Assoc Thai 2012;95(Suppl.4):S8-17</i>	46.3%	Fusarium spp.	trauma
<b>India</b>	East India 67% South India 34.4%	East India - Aspergillus spp Hyderabad - Fusarium spp South India - Fusarium	trauma

# Epidemiology of Fungal Keratitis

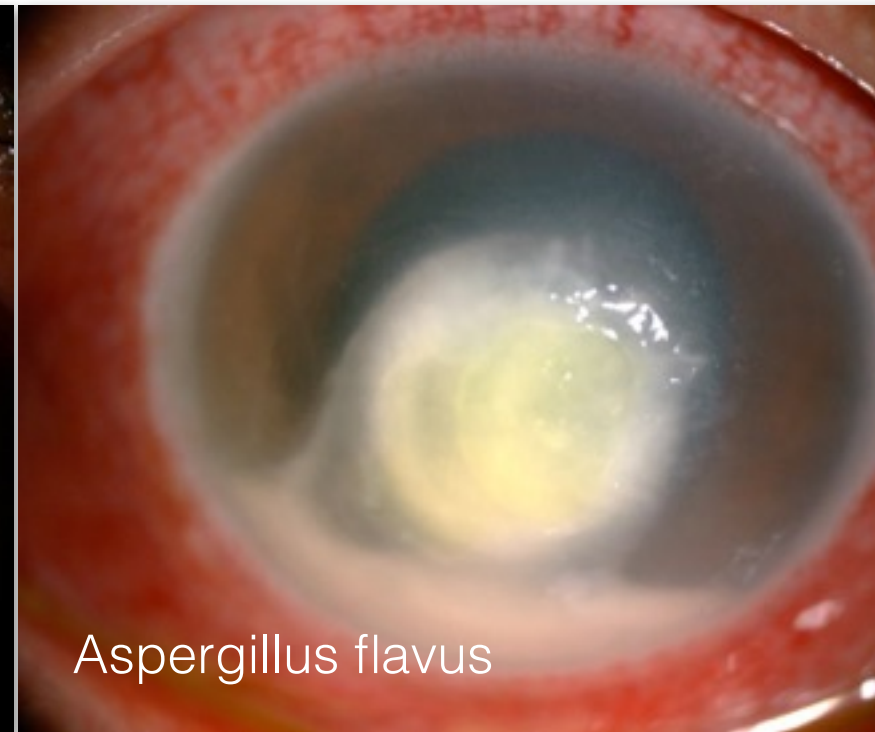
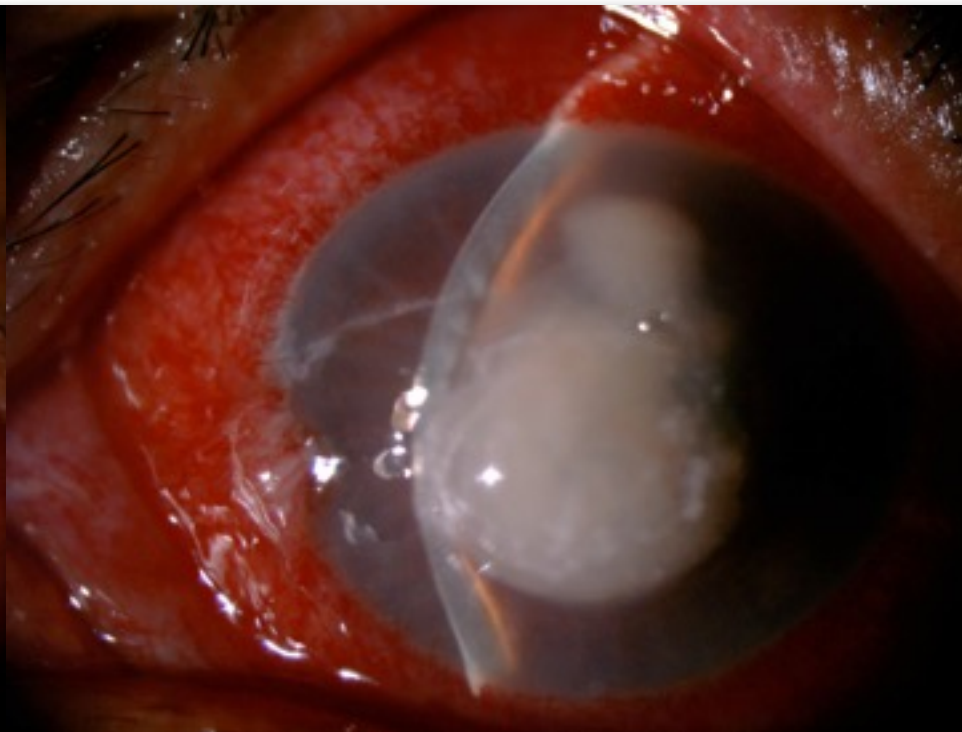
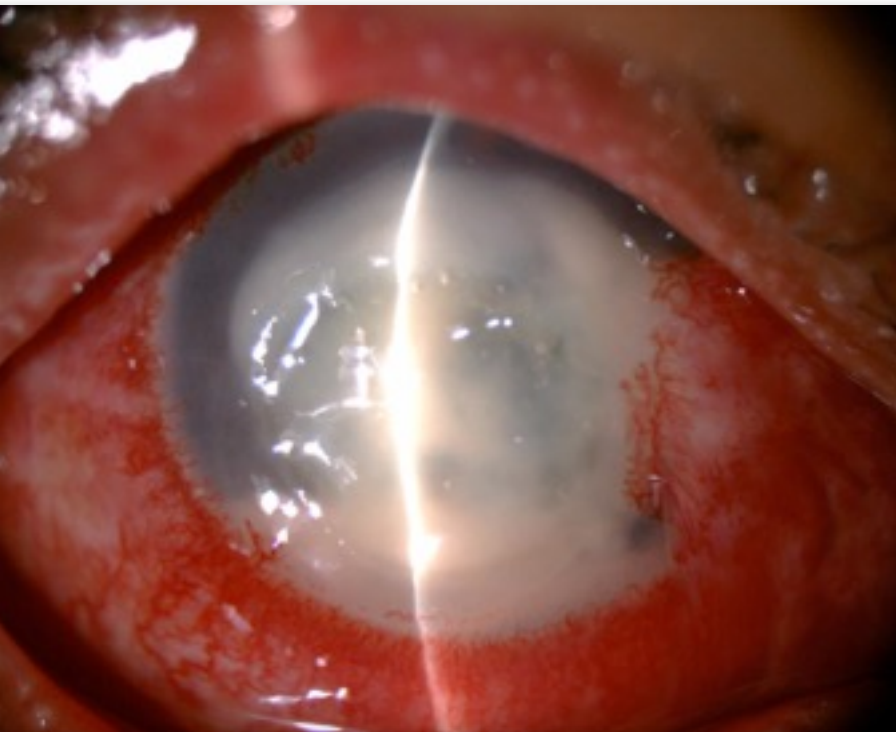
Microbial keratitis reports	Fungal keratitis	Organism	Most common predisposing factor
<b>Malaysia</b> <i>Norina et al</i> <i>Singapore Med J 2008;49(1):67-71</i>	13.8%	Fusarium spp.	trauma
<b>Singapore</b> <i>Wong et al</i> <i>Int Ophthalmol 1997;21(3):127-30</i>	?	Fusarium spp.	trauma
<b>Hong Kong</b>	less common fungal/bacterial = 1/17	Fusarium spp.	trauma previous OSD
<b>Vietnam</b> <i>Nguyen DT, Nguyen H</i> <i>Rev Int Trach Pathol Ocul Trop Subtrop Sante Publique 1990;67:203-6</i>	?	Aspergillus	

Fusarium spp. is the most common fungal pathogen

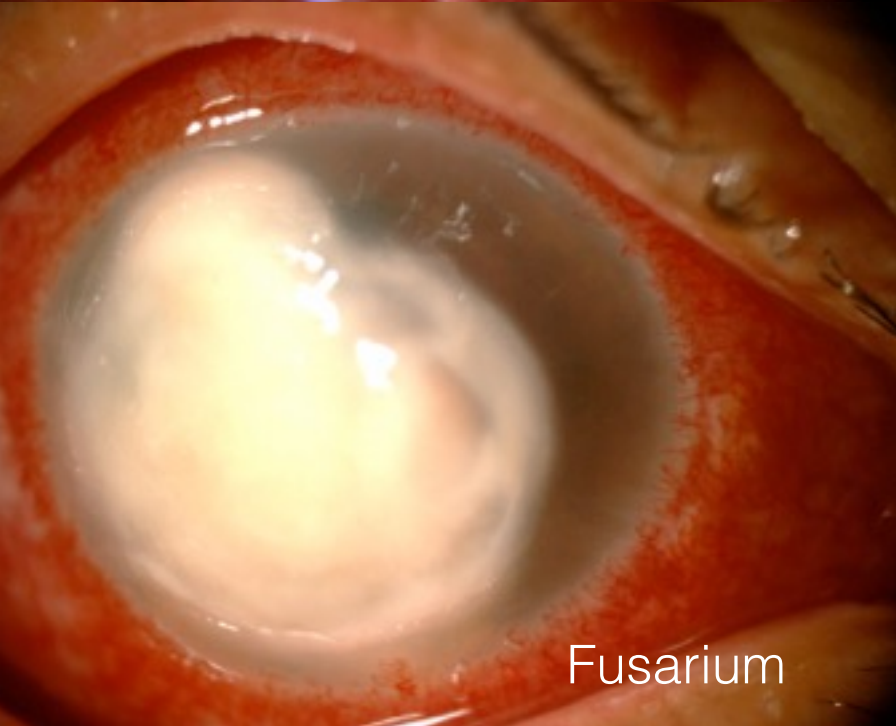
Trauma is the most common risk factors  
Fungal K from CL wears is rare



# Fungal Keratitis



*Aspergillus flavus*



*Fusarium*



*Cladosporium*

- Deep, feathery border with satellite lesions
- Epithelial defect often smaller than infiltrate
- Posterior exudate
- “Pigmented lesion”

# Laboratory Diagnosis for Fungus

- **Conventional**

- Smear & culture
- Tissue histopathology

10% KOH preparation - sensitivity 72-91%

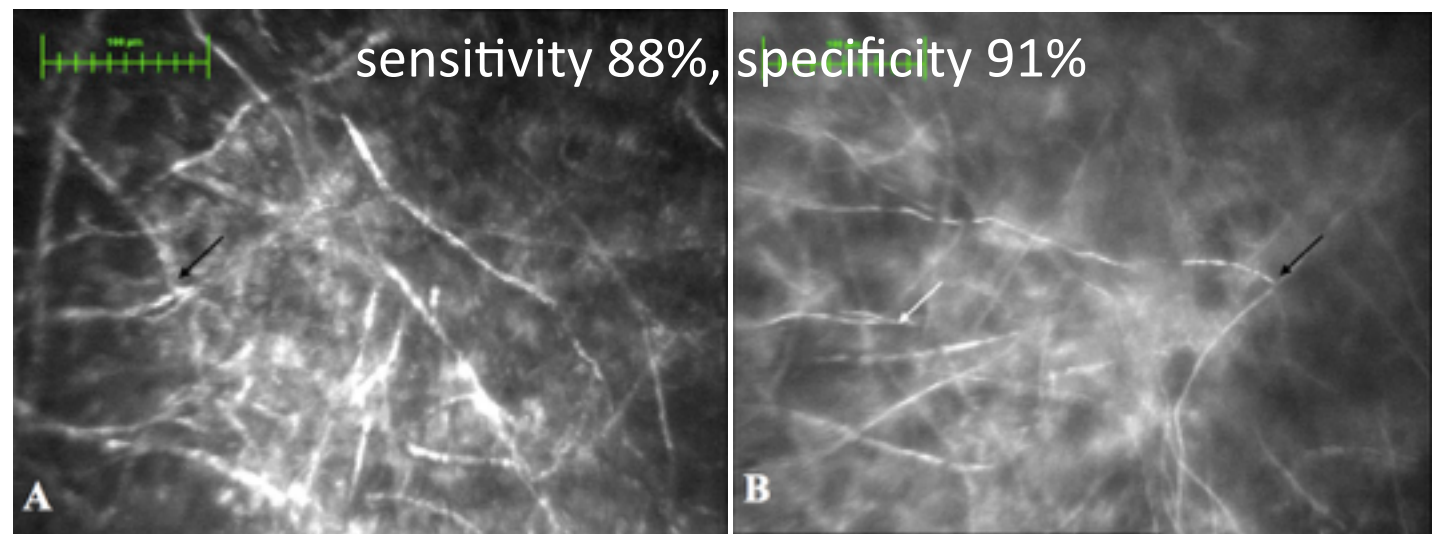
Gram stain, Giemsa stain

Specific stain:

GMS, PAS, calcofluor white, Acridine orange

Blood agar, SBD-most sensitive

- **Confocal microscopy**



- **Molecular method (PCR)**

use as adjunctive, not as replacement for the diagnosis



# Treatment for Fungal Keratitis

## Azoles

- Imidazole
  - Ketoconazole
  - Clotrimazole
  - Miconazole
  - etc
- Triazole
  - Fluconazole
  - Itraconazole
  - Voriconazole
  - Posaconazole
  - etc
- Thiazoles
  - Abafungin

## Polyene

- Amphotericin B
- Natamycin
- Nystatin
- Hamycin
- Filipin
- Candicidin
- Rimocidin

## Echinocandins

- Caspofungin
- Anidulafungin
- Micafungin

## Allylamines

- Terbinafine
- Amorolfine
- Naftifine
- Butenafine

## Others

- Flucytosine
- Griseofulvin
- etc

Cochrane systematic review 2012 (FlorCruz et al)

“No evidence that any drug, or combinations, is more effective in management of fungal keratitis”

# Reasons for poor treatment response in fungal keratitis?

Delayed diagnosis and treatment

Previous treatment with steroids

Only 1 commercially available anti-fungal eye drop

Poor corneal penetration; large molecule

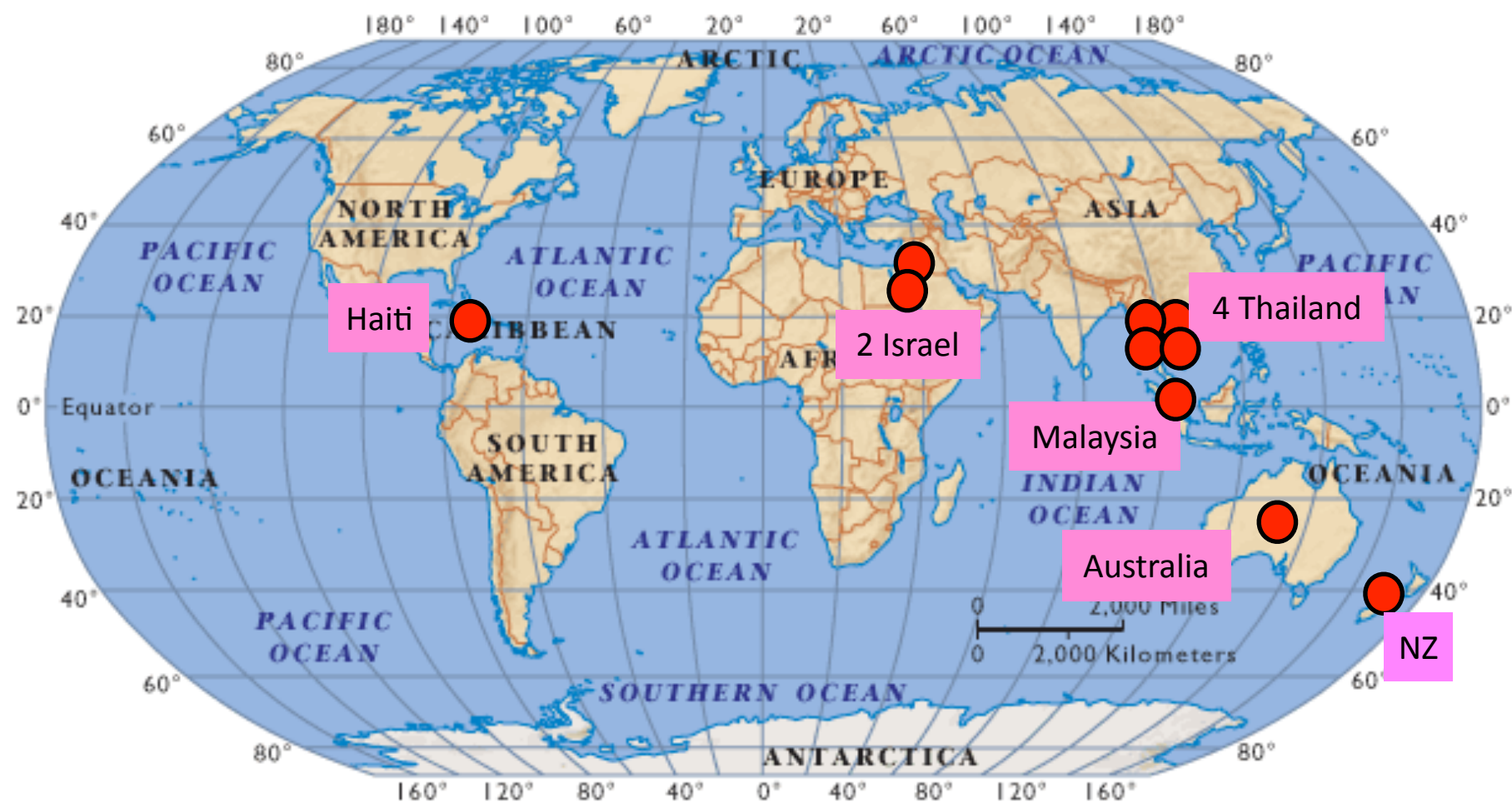


# Other specific keratitis



# Pythium Keratitis

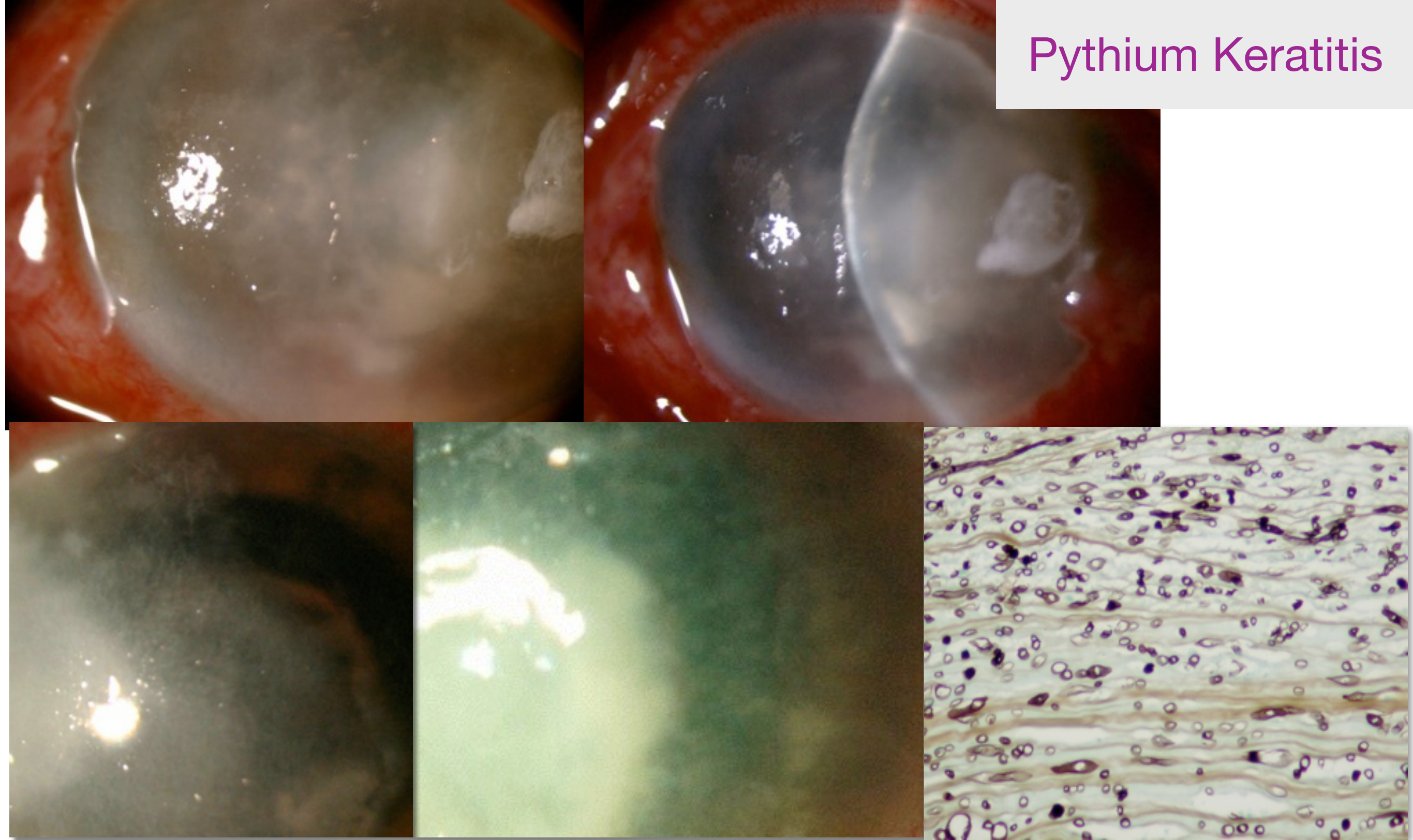
- First report from **Thailand** in 1988 (*Kunawisarut S Thai J Ophthalmology 1988;2:70-73*)
- From 1993: 10 case series reports in MEDLINE (“Pythium Keratitis”)
- Now at least 34 humans reported from Thailand



Virgile R Cornea 1993  
Imwithaya P. Postgrad Med J 1994  
Murdoch D. Aust New Zealand J Ophthalmol 1997  
Vanittanakorn N. J Clin Microbiol 2004  
Krajaejun T Clin Infect Dis 2006

Lekhanont K. Cornea 2009  
Badenoch P. Clin Exp Ophthalmol 2009  
Tanhehco TY Eye Contact Lens 2011  
Thanathanee O Cornea 2012  
Reinprayoon U J Clin Microbiol 2013

# Pythium Keratitis



- Most prevalence in southeast Asia, especially THAILAND “Ecological Preference”
- History of trauma and exposure to water: reservoir, pond, stagnant water
- Rapid progression (less than a week)
- “Patchy & reticular infiltration”



# Pythium Keratitis - Treatment

<b>1. Conventional antifungal agents</b> <ul style="list-style-type: none"><li>•polyene - amphotericin B</li><li>•azoles - fluconazole, ketoconazole</li></ul>	<b>non-responsive</b> because pythium lacks ergosterol in its cytoplasmic membrane which is the drug target
<b>2. New antifungal agents</b> <ul style="list-style-type: none"><li>•allylamines - terbinafine</li><li>•caspofungin glycan synthesis</li></ul>	<ul style="list-style-type: none"><li>•Combinations may be effective <i>in vitro</i><ul style="list-style-type: none"><li>•<b>terbinafine + itraconazole/voriconazole</b></li><li>•<b>terbinafine + caspofungin/fluconazole/amphotericin B</b></li></ul></li><li>•Less effective <i>in vivo</i></li></ul>
<b>3. Immunotherapy</b>	<b>vaccination</b> using pythium antigen is promising
<b>4. Therapeutic keratoplasty</b>	<ul style="list-style-type: none"><li>•very promising if performed in the early stage</li></ul>



# Primary Herpes Conjunctivitis



- Conjunctivitis
- Preauricular lymphadenopathy
- Dendritic keratitis
- Lid vesicles

*Sethuraman U Clin Pediatrics*

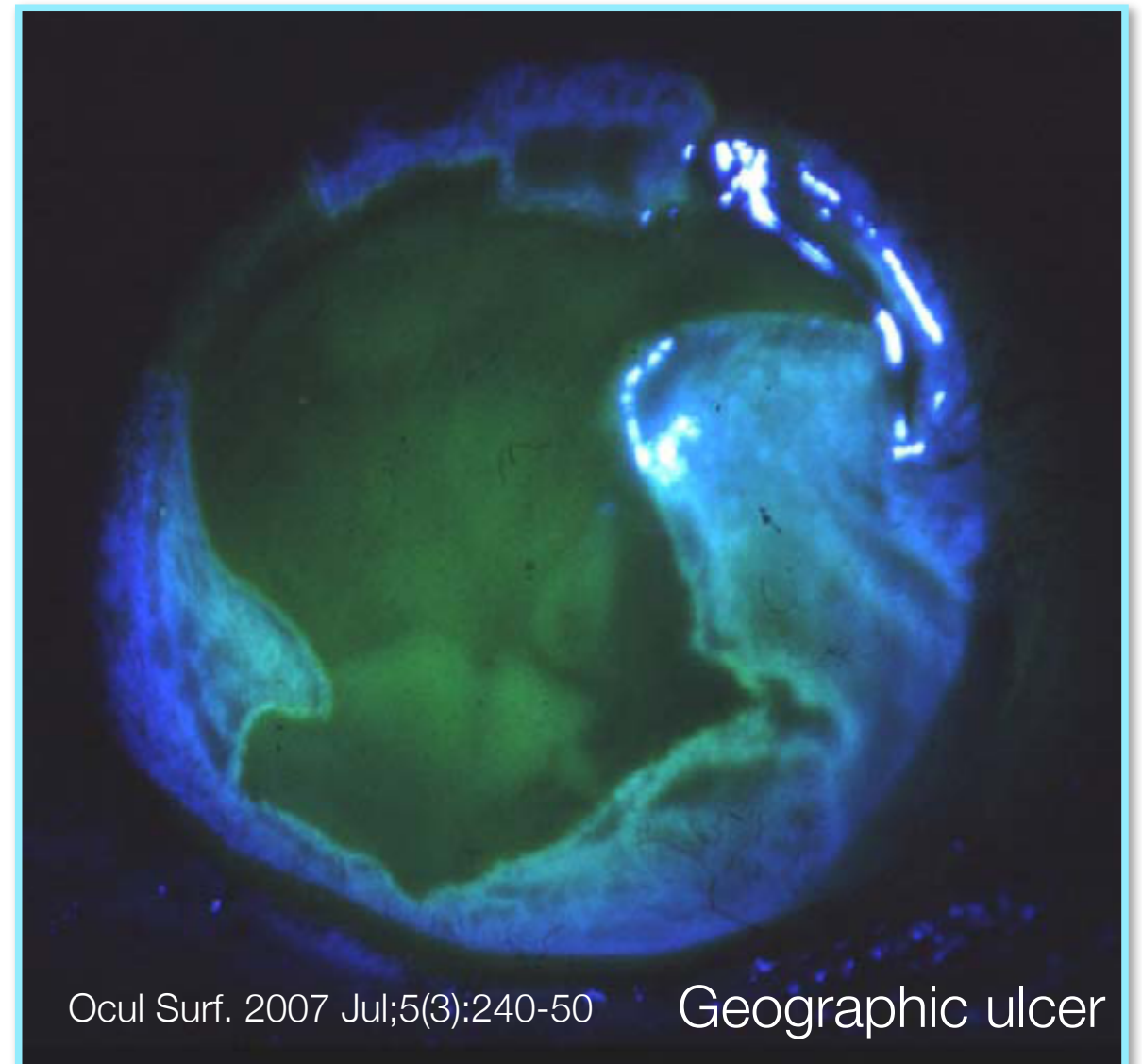
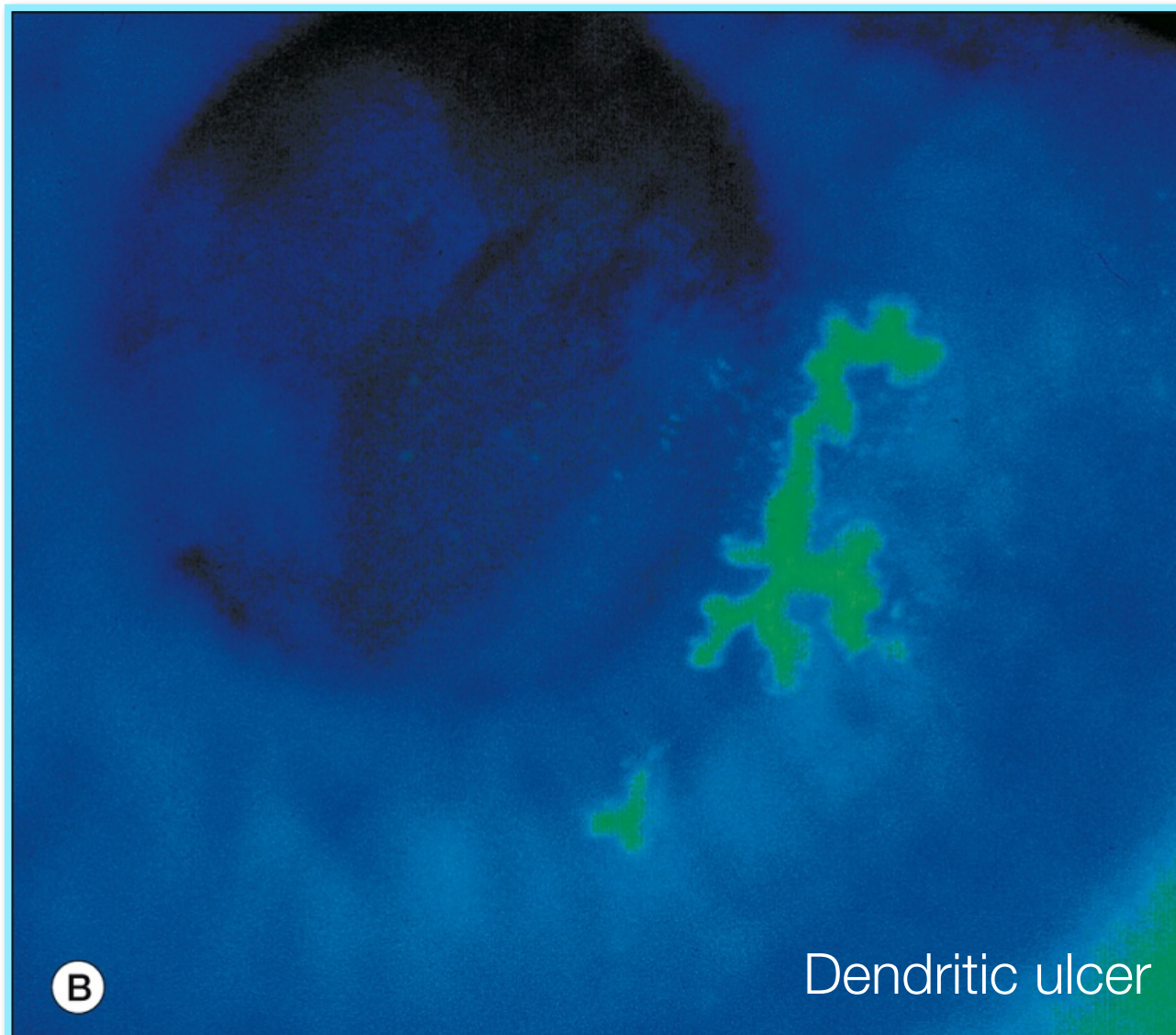
# HSV Keratitis - Secondary Infection

## HSV Corneal involvement

Epithelial involvement - dendritic ulcers, geographic ulcers

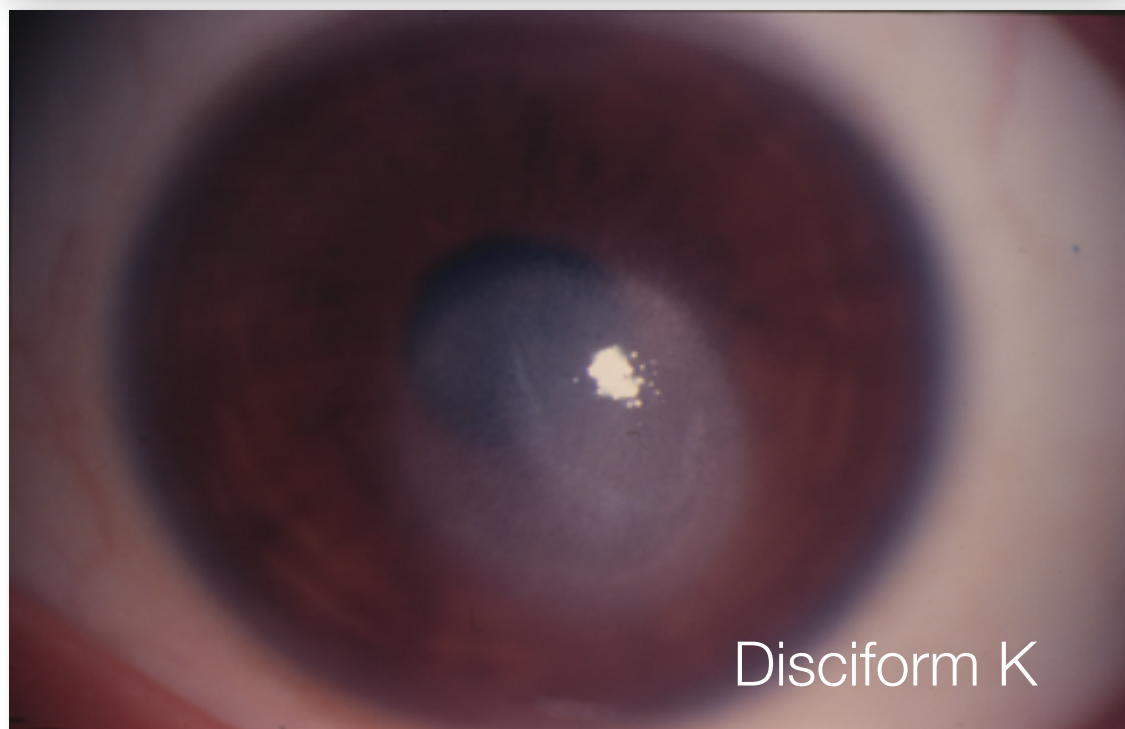
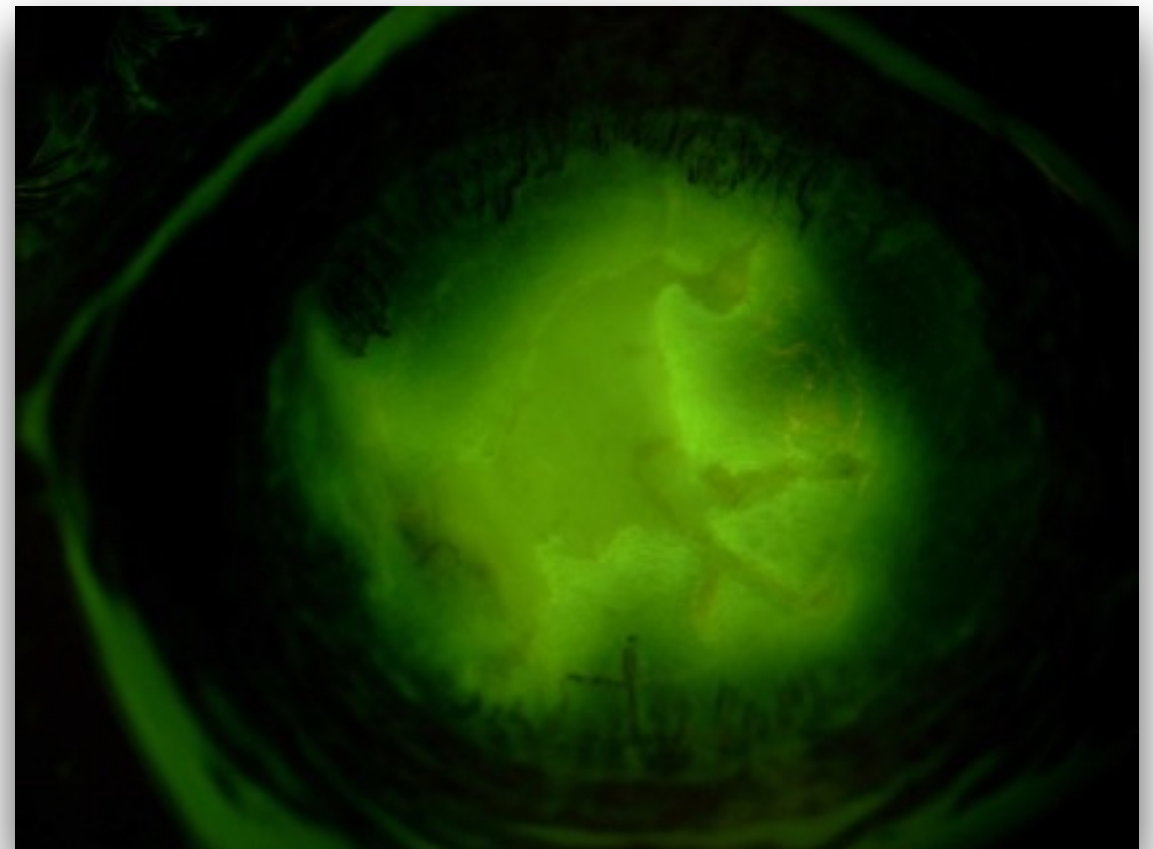
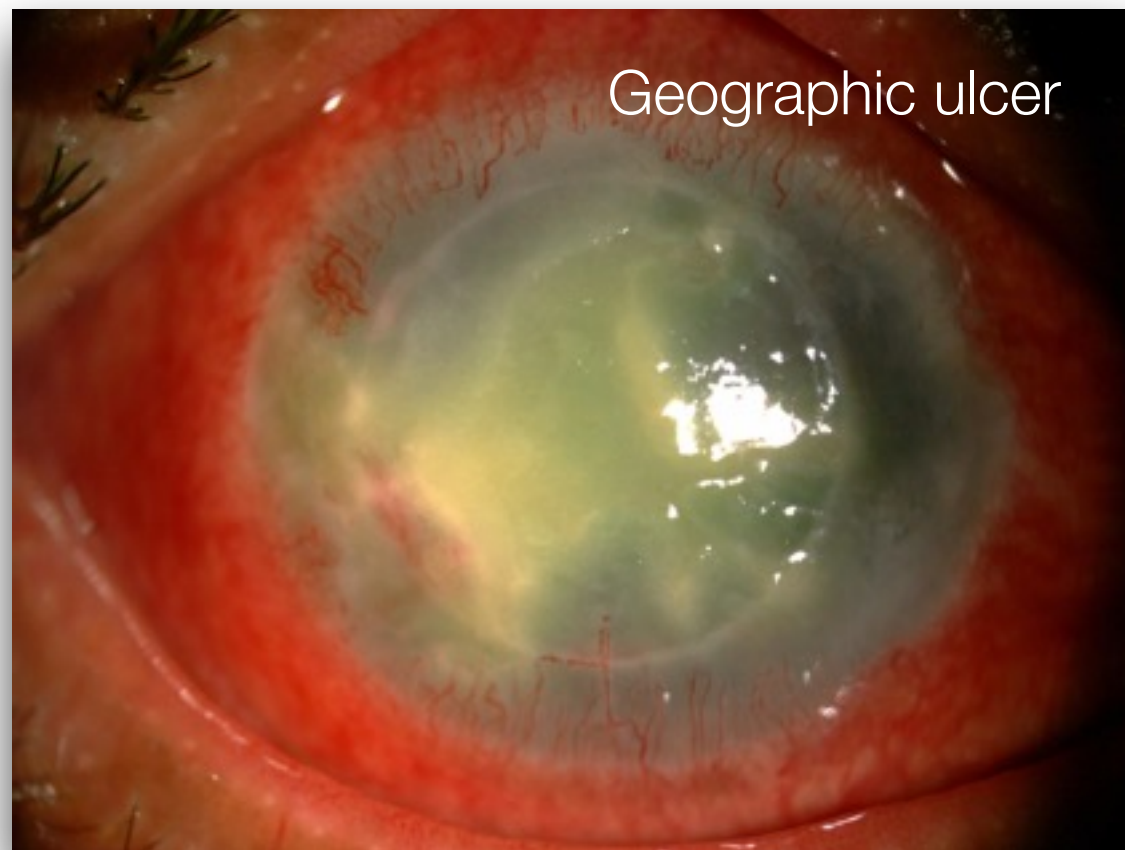
Stroma - stromal keratitis, disciform keratitis

Endothelium - endotheliitis





# HSV Keratitis - Secondary Infection



## Treatment

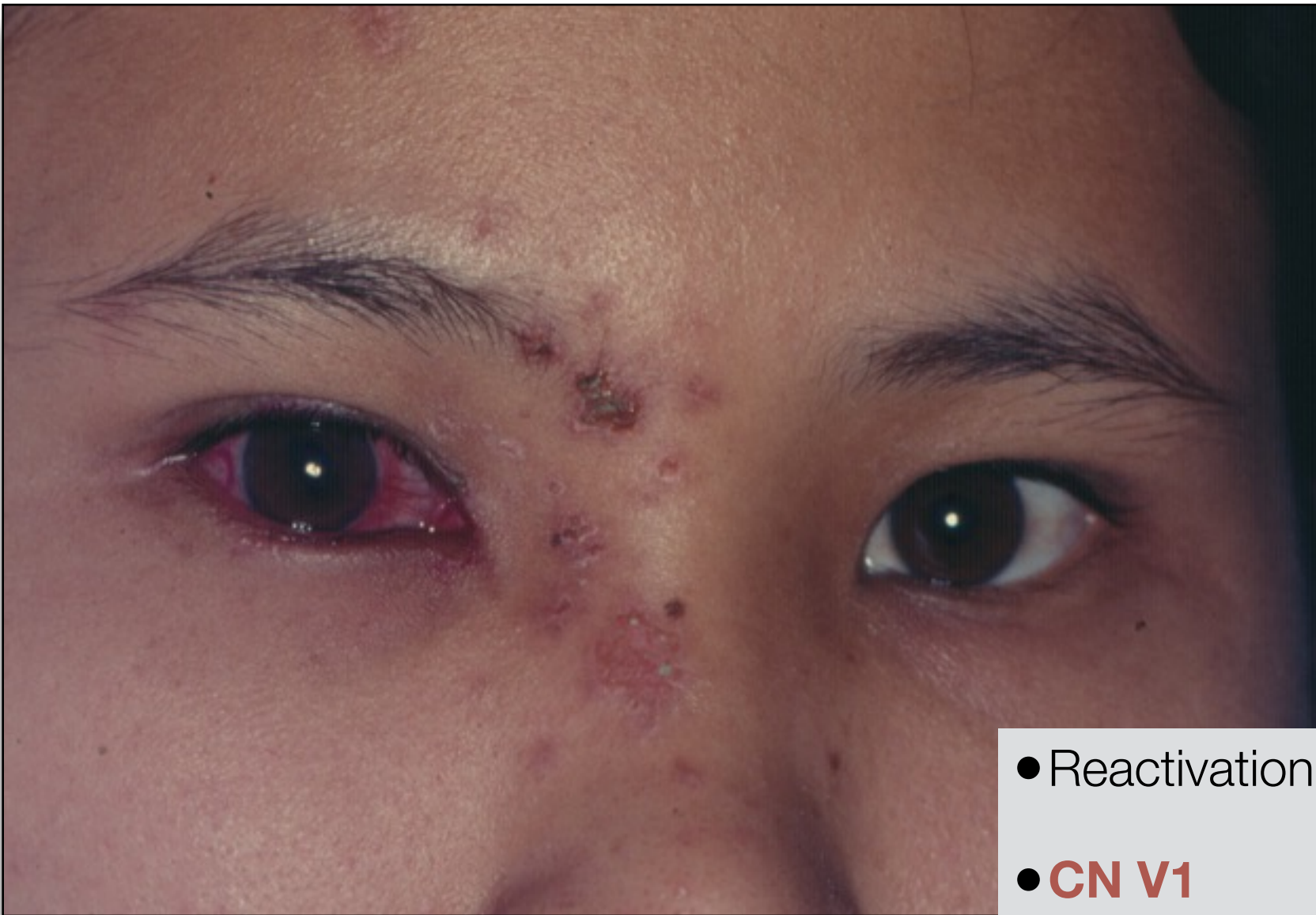
### Active viral infection

- Acyclovir 400mg x 5 /d
- Acyclovir eye ointment 5 times/d

- Topical steroids only combined in immune-mediated type

# HZV Keratitis / Conjunctivitis

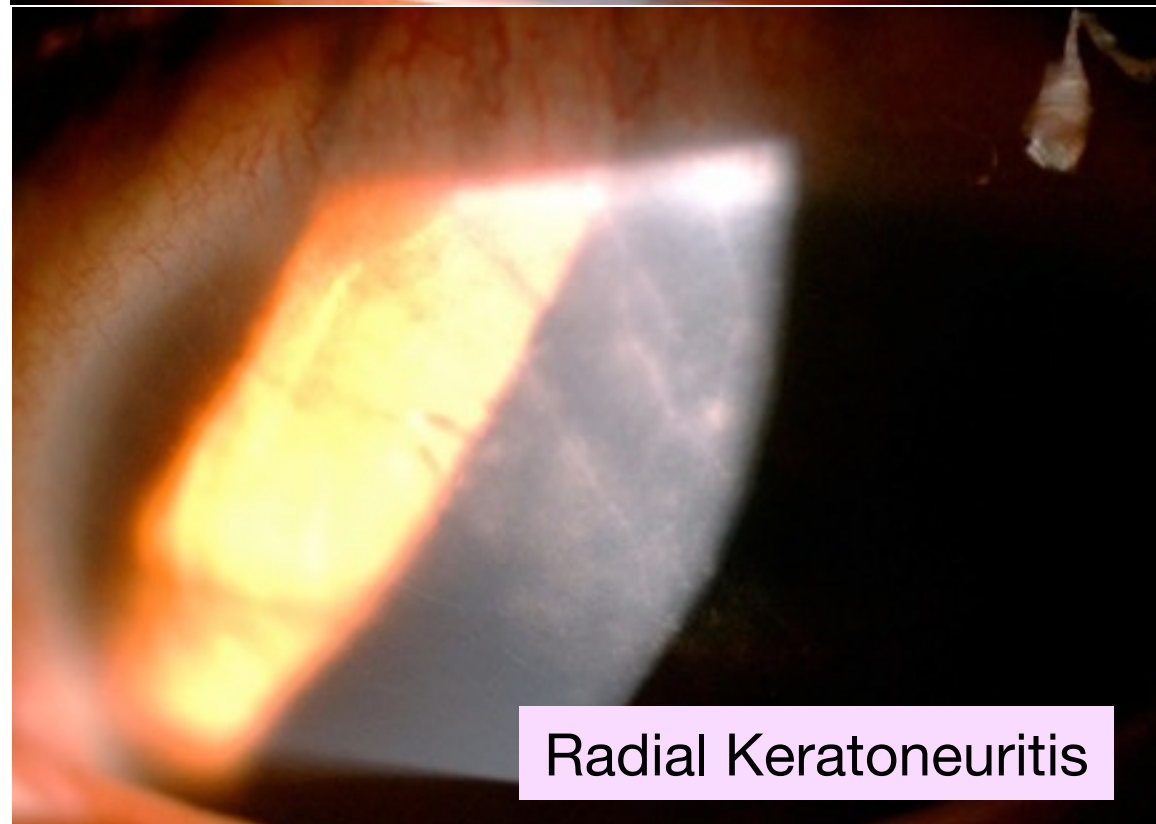
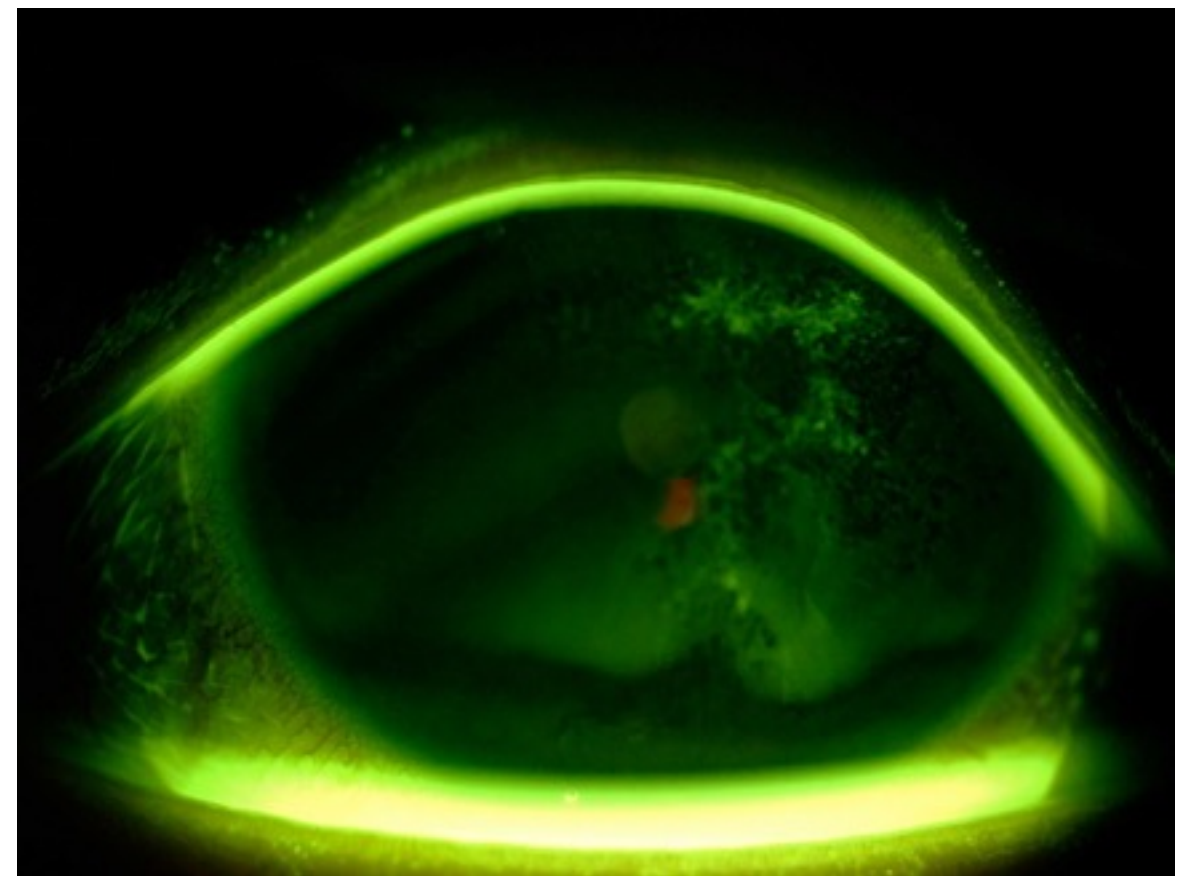
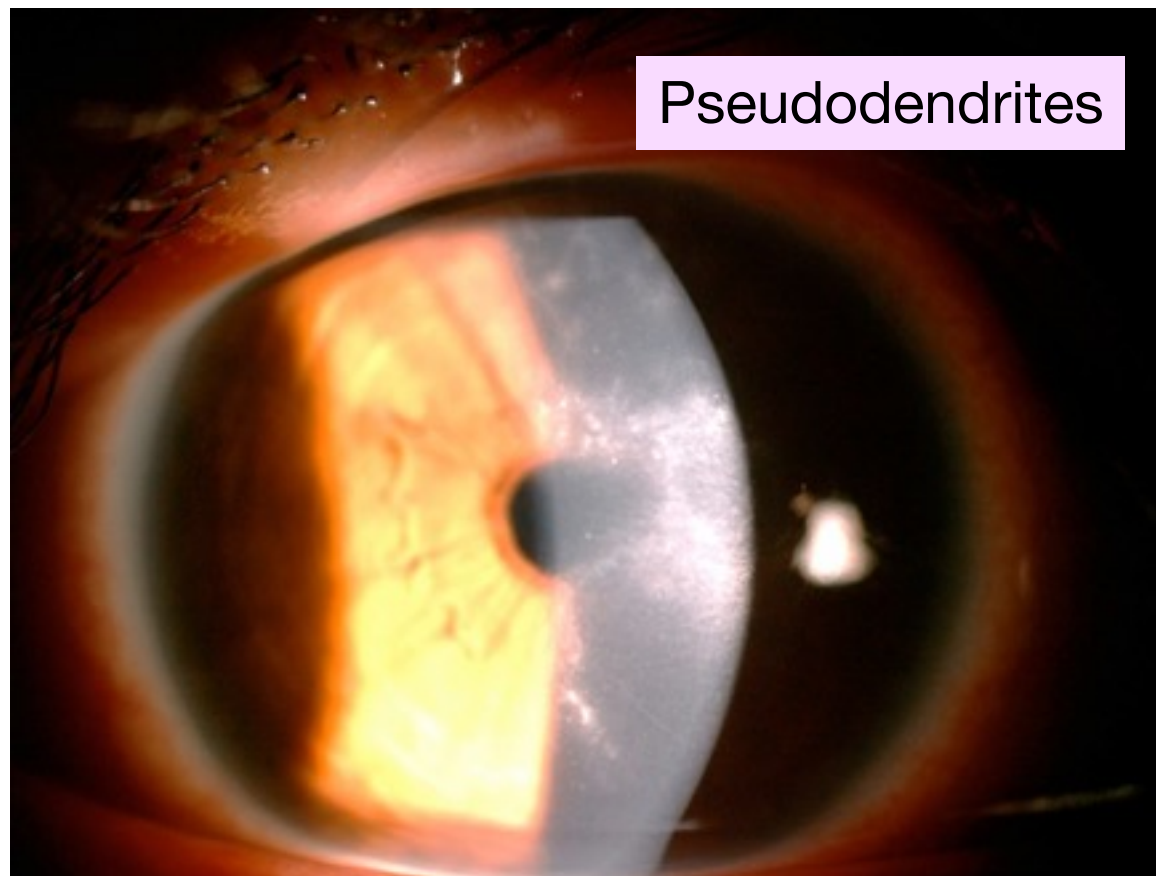
## Secondary infection



- Reactivation of the existing HZV
- **CN V1**
- Hutchinson sign - nasociliary branch involvement
- Treatment
  - Acyclovir 800mg x 5/day

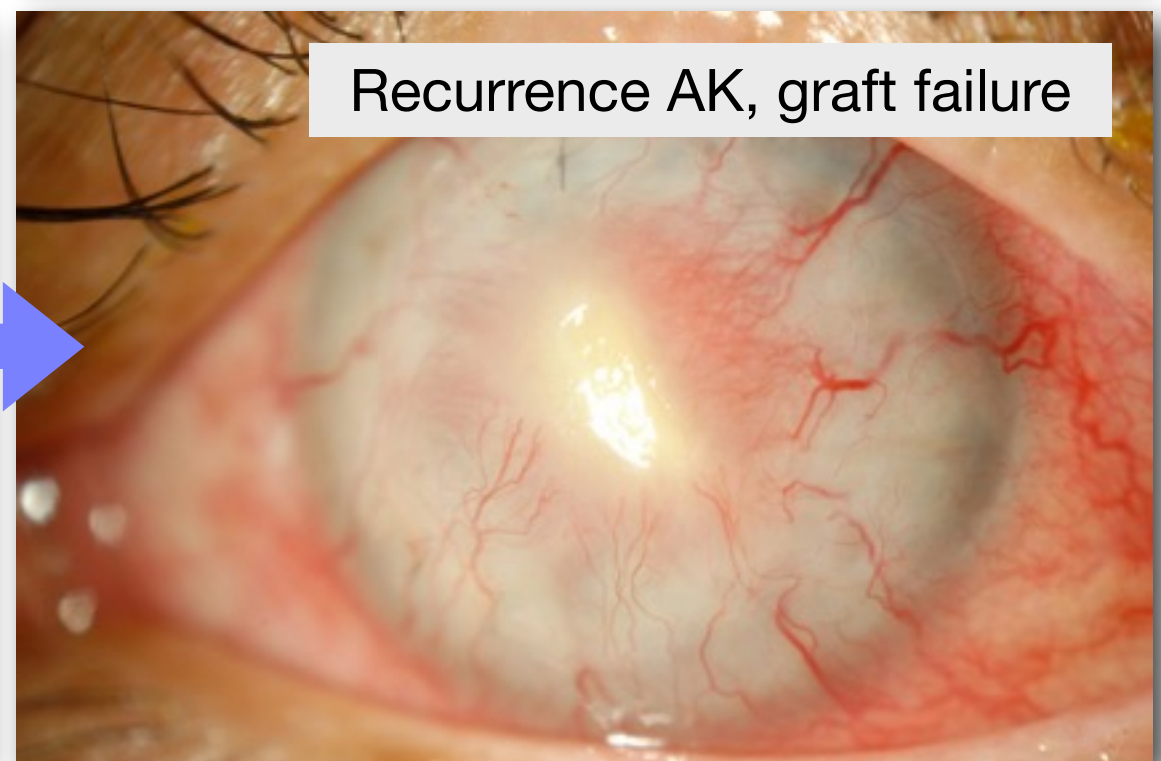
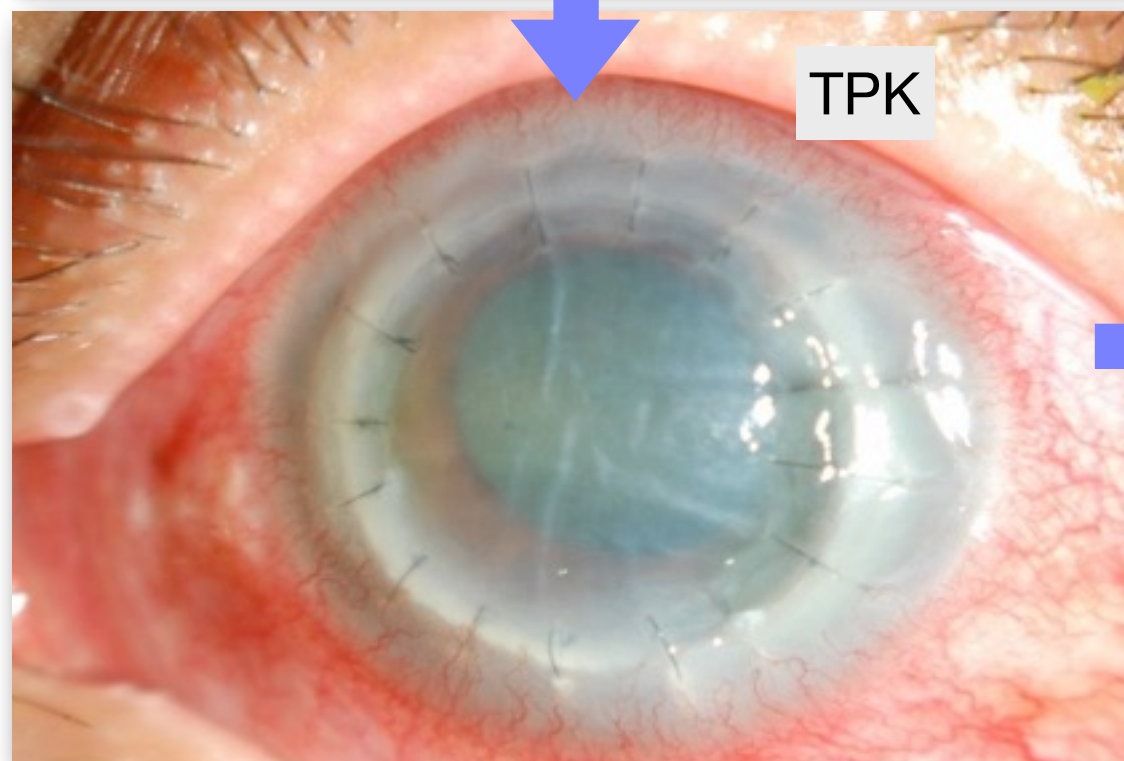
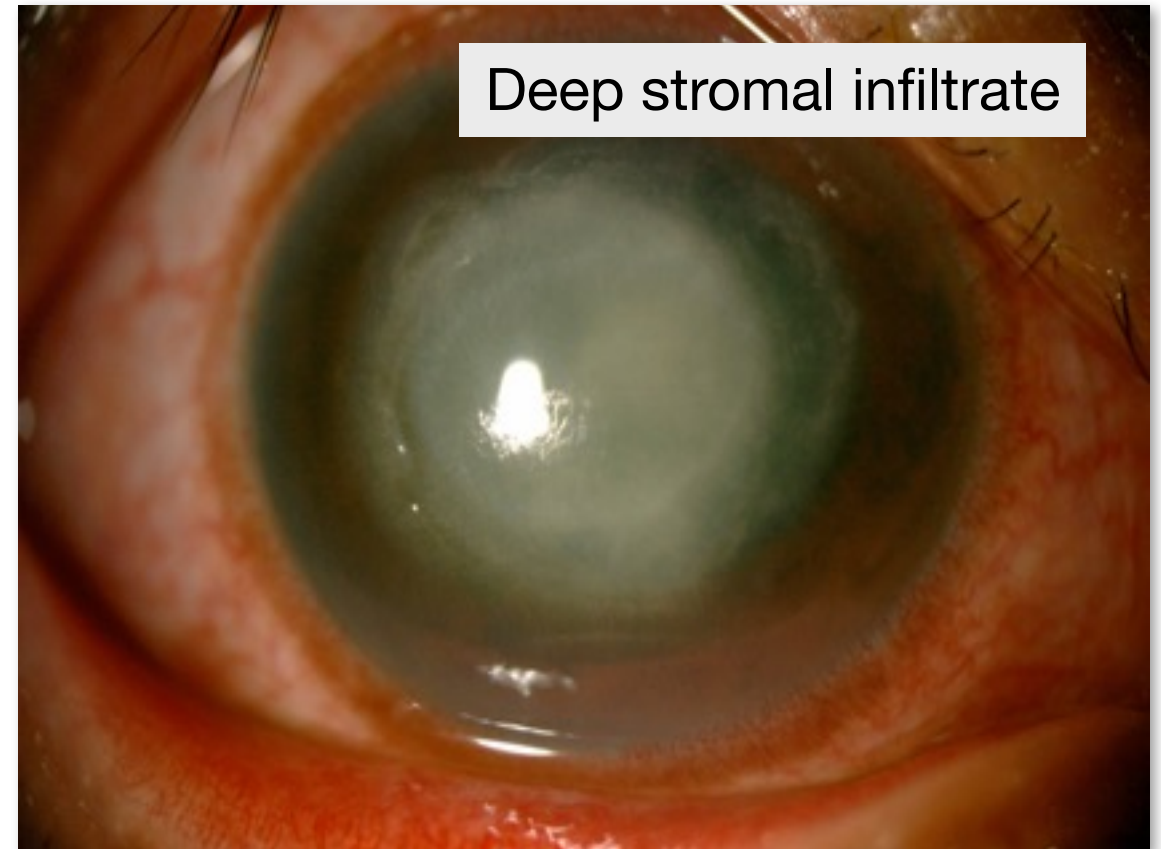
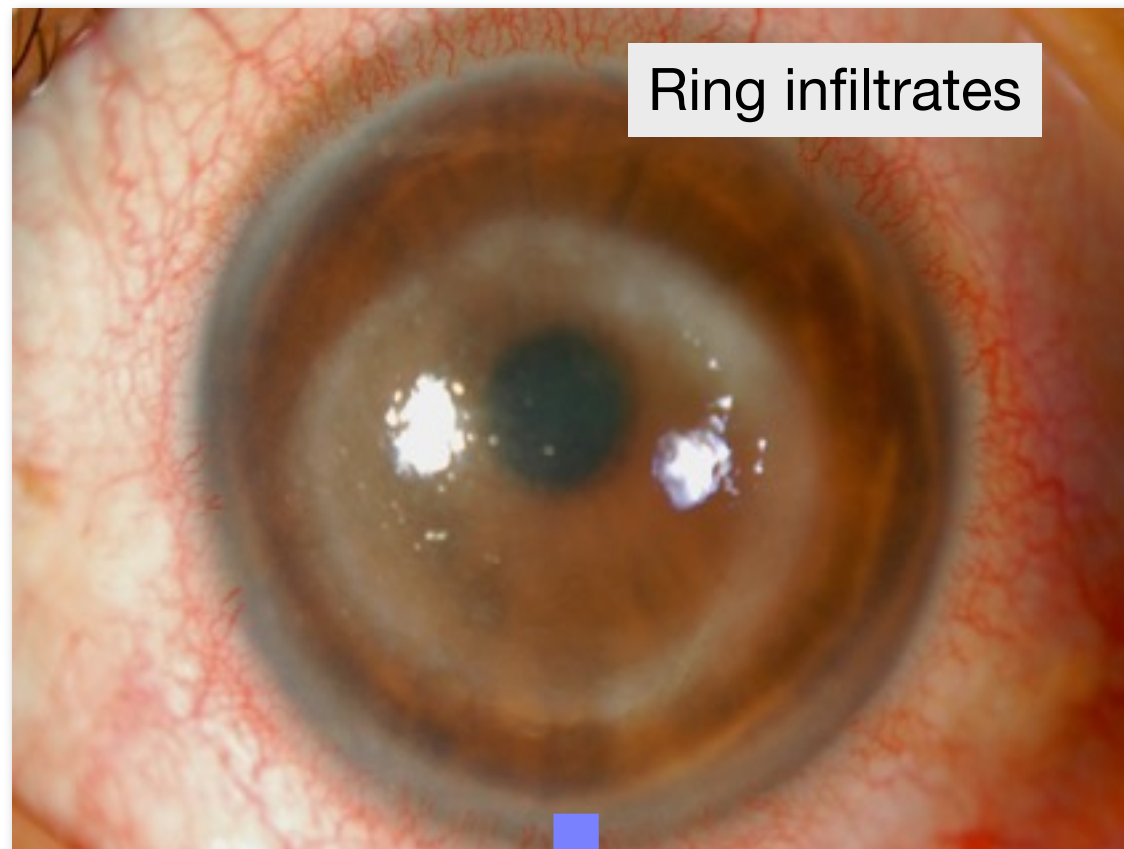


# Early Acanthamoeba Keratitis



- Insidious onset
- History of wearing CL with exposure to water
- Often miss diagnosed and treated as HSV keratitis
- “Pain out of proportion to lesion”

# Late Acanthamoeba Keratitis





# AK Treatment

## Medical Treatment - amoebicidal

### 1. Biguanides

- PHMB (polyhexmethylene biguanide) -.02 - 0.06%
- Chlorhexidine 0.02-0.2%

**AND**

### 2. Diamidines

- Propamidine isethionate 0.1% (Brolene)
- Hexamidine 0.1% (Desomedine) *faster amoebicidal effect against both trophozoites & cysts in vitro*

### 3. Triazoles - adjunctive in refractory cases

1. Voriconazole (topical 1% or oral 200 mg bid)

*Perrine D Antimicrob Agents Chemother 1995;39:339 –342*

*Bang S Am J Ophthalmol 2010;149(1):66–69*

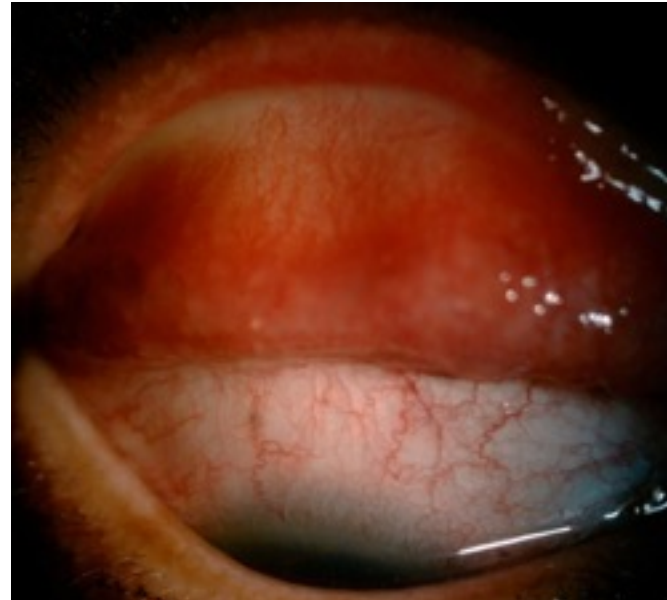
*Tu E et al Cornea 2010;29(9):1066-1068*



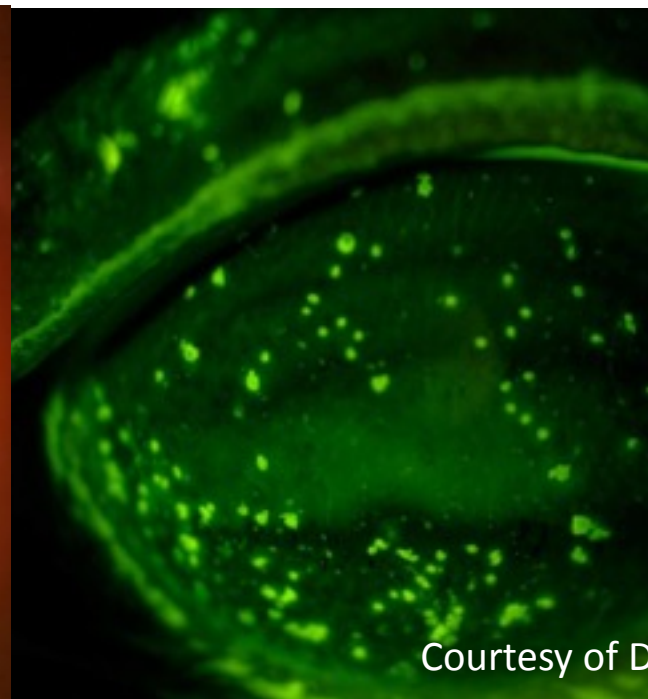
# Microsporidial keratoconjunctivitis

## Epithelial type

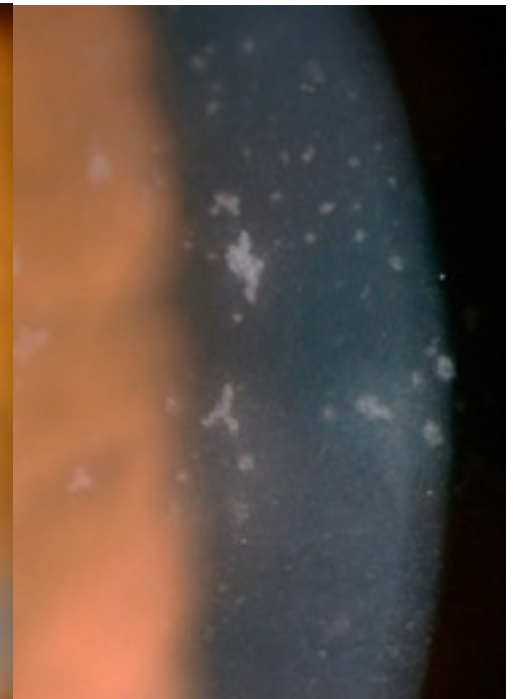
- “Red eye”
- may mimic adenoviral conjunctivitis
- Immunocompetent, *M. Vitaformae* (mostly)
- Mixed follicular-papillary injection
- Preauricular lymphadenopathy
- Typical diffuse, coarse punctate keratopathy, different forms
- Self-limited



Courtesy of Dr. Usanee Reinprayoon



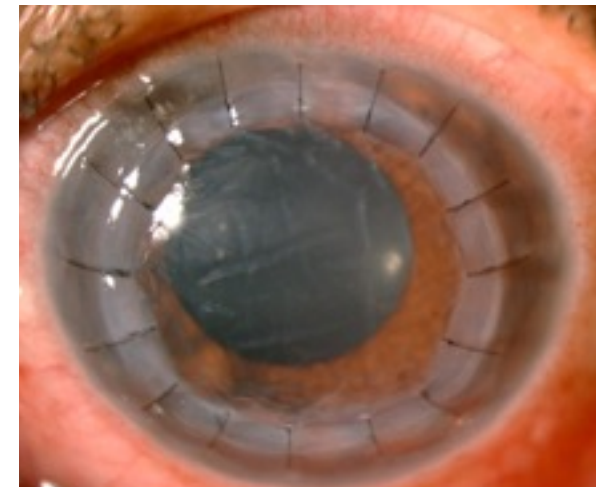
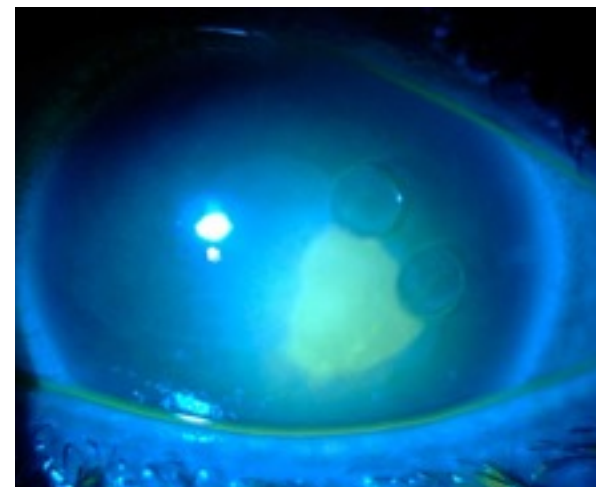
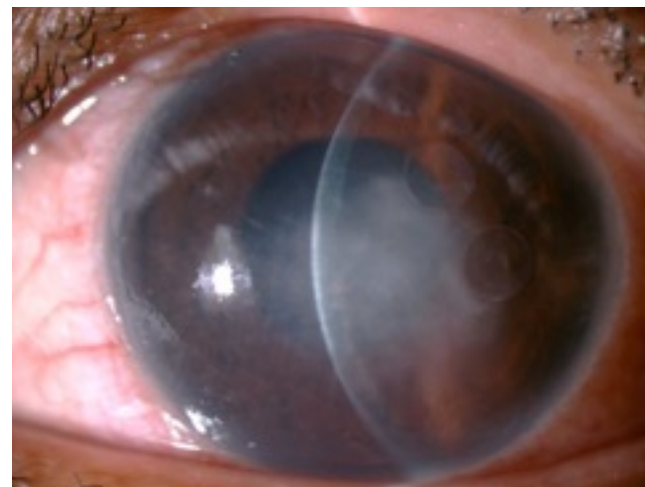
Courtesy of Dr. Usanee Reinprayoon



# Microsporidial keratoconjunctivitis

## Stromal type

- No definite risk factors
- Most are in immunocompetent
- Organisms: *Vitaforma corneae* (most), *Trachipleistophora hominis*, *Trachipleistophora anthropopthera* (1 from Pariyakanok et al)
- May presents like herpes disciform keratitis with recurrent stromal infiltration and uveitis
- Not response to medical treatment
- Most need surgical intervention, LK or PK



Courtesy of Dr. Usanee Reinprayoon

# Treatment

No treatment -self-limiting disease

## Medical treatment - Effective

Oral albendazole 200 mg bid

Oral itraconazole 100 mg, bid/tid

Topical 0.1 % propamidine isethionate 6/day x 3 wks

Topical fumagillin (Fumidil B 70µg/ml) q 1 hr x 7 d

Topical fluoroquinolones (2<sup>nd</sup> to 4<sup>th</sup> gen) *Fan et al Am J Ophthalmol 2012, in press*

## Surgical treatment

Corneal swabbing (can be repeated)

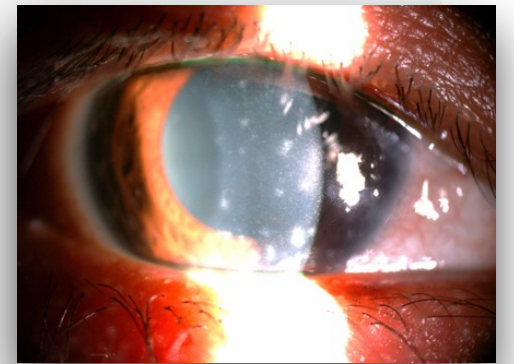
Penetrating keratoplasty (only in retracted stromal cases)



# Conclusion - Conjunctivitis

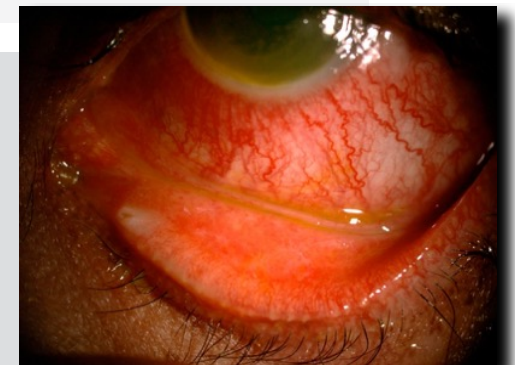
- **Viral conjunctivitis**

- Most common, highly contagious disease
- 3 common entities are: PCF, EKC, AHC
- Self-limiting diseases, treatment is symptomatic
- Patient education is important to prevent spreading of infection into family and community



- **Bacterial conjunctivitis**

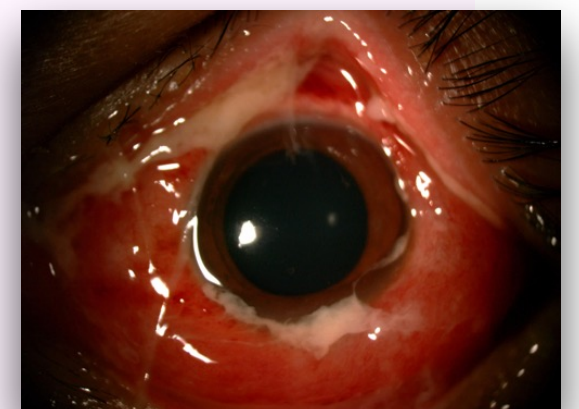
- Mostly will resolve by its own
- Antibiotics will speed up resolution of symptoms and infection
- Each ATB has similar efficacy rate



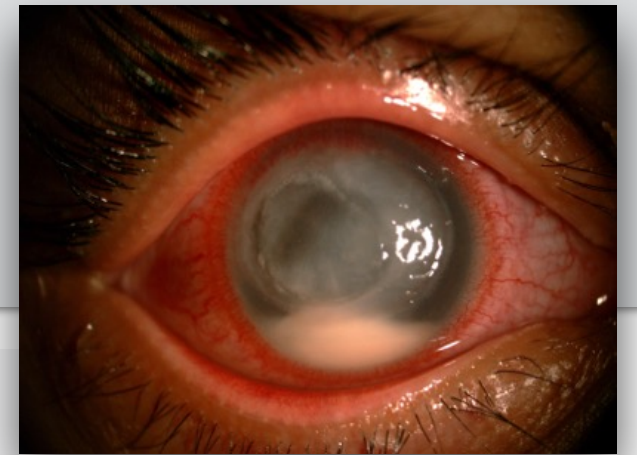
## Referral in:

chronic, painful, decreasing vision

Supected chlamydial or GC infections, neonatal conjunctivitis



# Conclusion - Keratitis



History taking of precipitation factors is important

- In Thailand, most common is trauma, followed by CL wear

Most common organisms are bacteria, respond well to treatment

- *P. aeruginosa*, and gram +ve bacteria

Fungal keratitis are second most common

- *Fusarium spp.* predominates
- Most respond poorly to treatment

Emerging infections with clinical significance are:

- Microsporidial keratitis
- *Acanthamoeba* keratitis
- *Pythium* keratitis

Early recognition and prompt referral to ophthalmologist is mandated