Acute/Hyperacute Conjunctivitis

*What is* Conjunctivitis?
**What is Conjunctivitis?**

Like any other -*itis*, it is an inflammatory condition involving the tissue of interest (in this case, the conj)
We can divvy conjunctivitis many ways, including in terms of: The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

*The nature of the inflammatory response*
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

The Cornea book emphasizes four causes of non-infectious conjunctivitis—what are they?
We can divvy conjunctivitis many ways, including in terms of:

*The nature of the inflammatory response*

- Infectious
  - Allergic: This is a class of condition, not a specific dz
  - Ligneous: This is a specific dz
  - SJS/TEN: This is two closely-related specific dzs
  - MMP: This is a specific dz

*The Cornea book emphasizes four causes of noninfectious conjunctivitis—what are they?*
We can divvy conjunctivitis many ways, including in terms of: The nature of the inflammatory response.
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

Allergic

What are the four forms of allergic conjunctivitis?

-- **Seasonal** allergic conjunctivitis (SAC)
-- **Perennial** allergic conjunctivitis (PAC)
-- **Vernal** keratoconjunctivitis (VKC)
-- **Atopic** keratoconjunctivitis (AKC)

How should you group these four in your mind?
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

Allergic

What are the four forms of allergic conjunctivitis?
--Seasonal allergic conjunctivitis (SAC)
--Perennial allergic conjunctivitis (PAC)
--Vernal keratoconjunctivitis (VKC)
--Atopic keratoconjunctivitis (AKC)

How should you group these four in your mind?
- two of them constitute one group;
- other two constitute a different, distinct group.
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

Allergic

What are the four forms of allergic conjunctivitis?

--Seasonal allergic conjunctivitis (SAC)
--Perennial allergic conjunctivitis (PAC)
--Vernal keratoconjunctivitis (VKC)
--Atopic keratoconjunctivitis (AKC)

How should you group these four in your mind?

SAC and PAC constitute one group; VKC and AKC constitute a different, distinct group
Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Noninfectious:
- Allergic

Infectious:
- Infectious
- Allergic
- Ligneous
- SJS/TEN
- MMP

What are the four forms of allergic conjunctivitis?
- **Seasonal** allergic conjunctivitis (SAC)
- **Perennial** allergic conjunctivitis (PAC)
- **Vernal** keratoconjunctivitis (VKC)
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How should you group these four in your mind?
SAC and PAC constitute one group; VKC and AKC constitute a different, distinct group

See slide-set K36 to review these

See slide-set K6 to review these
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

Noninfectious

- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious

What is the cardinal clinical sign of ligneous conjunctivitis?

The presence of a firm yellow pseudomembrane on the conjunctiva.

What arboreal descriptor is used to describe the degree of firmness of the pseudomembrane?

'Woody' (ligneous means 'consisting of or resembling wood' in Latin)

Is ligneous conjunctivitis common, or rare?

Rare

With what clotting abnormality is it associated?

Plasminogen deficiency
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious

Acute/Hyperacute Conjunctivitis

What is the cardinal clinical sign of ligneous conjunctivitis? The presence of a firm yellow pseudomembrane on the conjunctiva.

Ligneous firm vs soft color membrane vs pseudomembrane

With what clotting abnormality is it associated? Plasminogen deficiency.
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

**Conjunctivitis**

**Noninfectious**
- Allergic
- Ligneous
- SJS/TEN
- MMP

**Infectious**

- Acute/Hyperacute Conjunctivitis

**What is the cardinal clinical sign of ligneous conjunctivitis?**

The presence of a firm yellow pseudomembrane on the conj

**Is ligneous conjunctivitis common, or rare?**

Rare

**With what clotting abnormality is it associated?**

Plasminogen deficiency
Firm yellowish lesions of the eyelids characteristic of ligneous conjunctivitis
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious

Acute/Hyperacute Conjunctivitis

What is the cardinal clinical sign of ligneous conjunctivitis?
The presence of a firm yellow pseudomembrane on the conj

What’s the difference between a membrane and a pseudomembrane?

A membrane is adherent to the conj, a pseudo isn’t

How can you tell whether it’s actually adhering?
A membrane bleeds when peeled; a pseudomembrane doesn’t

Is ligneous conjunctivitis common, or rare?
Rare

With what clotting abnormality is it associated?
Plasminogen deficiency

Ligneous
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

- Infectious
- Noninfectious

- Allergic
- SJS/TEN
- MMP
- Ligneous

What is the cardinal clinical sign of ligneous conjunctivitis? The presence of a firm yellow pseudomembrane on the conjunctiva.

What’s the difference between a membrane and a pseudomembrane? A membrane is adherent to the conjunctiva, a pseudo isn’t.

Acute/Hyperacute Conjunctivitis

- Infectious
- Noninfectious
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious

Acute/Hyperacute Conjunctivitis

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The nature of the inflammatory response

Conjunctivitis

Noninfectious
- Allergic
- Ligneous
- SJS/TEN
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The nature of the inflammatory response

- Infectious
- Noninfectious
  - Allergic
  - Infectious
  - SJS/TEN
  - MMP
  - Ligneous

**Conjunctivitis**

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The presence of a firm yellow pseudomembrane on the conjunctiva.

What's the difference between a membrane and a pseudomembrane?
A membrane is adherent to the conjunctiva, a pseudo isn't.

How can you tell whether it's actually adhering?
A membrane bleeds when peeled; a pseudomembrane doesn't.
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

- Infectious
- Noninfectious
  - Allergic
  - SJS/TEN
  - MMP
  - Ligneous
    - What is the cardinal clinical sign of ligneous conjunctivitis? The presence of a firm yellow pseudomembrane on the conj
    - What arboreal term is used to describe the degree of firmness of the pseudomembrane? 'Woody' (ligneous means 'consisting of or resembling wood' in Latin)

**Acute/Hyperacute Conjunctivitis**
Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

Allergic

SJS/TEN

MMP

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Ligneous

Plasminogen deficiency

Rare
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

**Conjunctivitis**

- **Noninfectious**
  - Allergic
  - Ligneous
  - SJS/TEN
  - MMP

- **Infectious**

What is the cardinal clinical sign of ligneous conjunctivitis?
The presence of a firm *yellow* pseudomembrane on the conj

What arboreal term is used to describe the degree of firmness of the pseudomembrane?
‘Woody’ (*ligneous* means ‘consisting of or resembling wood’ in Latin)

*Is ligneous conjunctivitis common, or rare?*
We can divvy conjunctivitis many ways, including in terms of:
The **nature** of the inflammatory response

**Conjunctivitis**

**Noninfectious**
- Allergic
- Ligneous
- SJS/TEN
- MMP

**Infectious**

**Acute/Hyperacute Conjunctivitis**

*What is the cardinal clinical sign of ligneous conjunctivitis?*
The presence of a firm **yellow** pseudomembrane on the conj

*What arboreal term is used to describe the degree of firmness of the pseudomembrane?*
‘Woody’ (**ligneous** means ‘consisting of or resembling wood’ in Latin)

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Rare
Conjunctivitis

Noninfectious

- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious

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We can divvy conjunctivitis many ways, including in terms of:
The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

- **Infectious**
- **Noninfectious**
  - Allergic
  - Ligneous
  - SJS/TEN
  - MMP

**Ligneous Conjunctivitis**

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What arboreal term is used to describe the degree of firmness of the pseudomembrane?
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Plasminogen deficiency

**Acute/Hyperacute Conjunctivitis**
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

Acute/Hyperacute Conjunctivitis

Infectious

Noninfectious

What do SJS and TEN stand for in this context?

SJS:

TEN:

SJS/TEN

A

L

M

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
Conjunctivitis

Noninfectious

*What do SJS and TEN stand for in this context?*

**SJS**: Stevens-Johnson syndrome

**TEN**: Toxic epidermal necrolysis

In just a few words, how would you describe the pathophysiology of SJS/TEN?

*In just a few words, how would you describe the pathophysiology of SJS/TEN?*

A hypersensitivity reaction, usually to a drug or infectious agent

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The **nature** of the inflammatory response

---

**SJS/TEN**

In just a few words, how would you describe the pathophysiology of SJS/TEN?

It is an **acute** inflammatory reaction of the **long word** and **two words**.
Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Acute/Hyperacute Conjunctivitis

Noninfectious

Infectious

What do SJS and TEN stand for in this context?

SJS: Stevens-Johnson syndrome

TEN: Toxic epidermal necrolysis

In just a few words, how would you describe the pathophysiology of SJS/TEN?

It is an acute inflammatory vesiculobullous reaction of the skin and mucous membranes

SJS/TEN
Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Noninfectious

Infectious

What do SJS and TEN stand for in this context?

SJS: Stevens-Johnson syndrome

TEN: Toxic epidermal necrolysis

In just a few words, how would you describe the pathophysiology of SJS/TEN?

It is an acute inflammatory vesiculobullous reaction of the skin and mucus membranes.

How do SJS and TEN differ? What distinguishes one form the other?

A hypersensitivity reaction, usually to a drug or infectious agent.
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

What do SJS and TEN stand for in this context?

SJS: Stevens-Johnson syndrome

TEN: Toxic epidermal necrolysis

In just a few words, how would you describe the pathophysiology of SJS/TEN?

It is an acute inflammatory vesiculobullous reaction of the skin and mucus membranes.

How do SJS and TEN differ? What distinguishes one form the other?

It’s a matter of degree—TEN involves significantly more body surface area than does SJS.
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious → Infectious

What do SJS and TEN stand for in this context?

**SJS**: Stevens-Johnson syndrome

**TEN**: Toxic epidermal necrolysis

In just a few words, how would you describe the pathophysiology of SJS/TEN?

It is an acute inflammatory vesiculobullous reaction of the skin and mucus membranes.

How do SJS and TEN differ? What distinguishes one form the other?

It’s a matter of degree—TEN involves significantly more body surface area than does SJS.
Acute/Hyperacute Conjunctivitis

SJS

TEN
SJS/TEN. Early, severe involvement of the conjunctiva, right eye
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

What do SJS and TEN stand for in this context?

SJS: Stevens-Johnson syndrome
TEN: Toxic epidermal necrolysis

In just a few words, how would you describe the pathophysiology of SJS/TEN?

It is an acute inflammatory vesiculobullous reaction of the skin and mucus membranes

How do SJS and TEN differ? What distinguishes one from the other?

It’s a matter of degree—TEN involves significantly more body surface area than does SJS

What is the pathogenesis of the acute inflammatory vesiculobullous reaction?
Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
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**The nature** of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The nature** of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of: The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

- Infectious
  - Acute/Hyperacute Conjunctivitis

- Noninfectious
  - Infectious
    - Infectious
      - Infectious
    - Noninfectious
      - Infectious

What do SJS and TEN stand for in this context?
- **SJS**: Stevens-Johnson syndrome
- **TEN**: Toxic epidermal necrolysis

In just a few words, how would you describe the pathophysiology of SJS/TEN?
- SJS/TEN: An acute inflammatory vesiculobullous reaction of the skin and mucus membranes

How do SJS and TEN differ? What distinguishes one from the other?
- It’s a matter of degree—TEN involves significantly more body surface area than does SJS

What is the pathogenesis of the acute inflammatory vesiculobullous reaction?
- A hypersensitivity reaction, usually to a drug or infectious agent

Which four drugs/drug classes are most commonly implicated?
- **NSAIDs**
- **Anticonvulsants**
- **Sulfonamides**
- **Allopurinol**

Within 8 weeks of the start of drug use
We can divvy conjunctivitis many ways, including in terms of: The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

What do SJS and TEN stand for in this context?

SJS: Stevens-Johnson syndrome
TEN: Toxic epidermal necrolysis

Which infectious agent is most commonly implicated in SJS/TEN?

A hypersensitivity reaction, usually to a drug or infectious agent

A matter of degree—TEN involves significantly more body surface area than does SJS

What is the pathogenesis of the acute inflammatory vesiculobullous reaction?

A hypersensitivity reaction, usually to a drug or infectious agent

Which infectious agent is most commonly implicated in SJS/TEN?

Depends on who you ask. Per both EyeWiki and UpToDate, Mycoplasma pneumoniae is by far the most common cause (EyeWiki attributes almost 90% of non-drug-induced cases to it). However, in the most recent version of the BCSC Cornea/External Disease book, Mycoplasma pneumoniae isn’t even mentioned as a cause—HSV, strep and adeno are. On the other hand, the Peds book states that infection-related cases are usually secondary to “Mycoplasma species or herpes simplex virus.” (Of course, this difference could be because Mycoplasma pneumoniae is a more common cause in kids.) At any rate, caveat emptor.
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

- **Noninfectious**
- **Infectious**

What do SJS and TEN stand for in this context?

**SJS:** Stevens-Johnson syndrome

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Which infectious agent is most commonly implicated in SJS/TEN?

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A hypersensitivity reaction, usually to a drug or infectious agent.

How do SJS and TEN differ? What distinguishes one form the other?

It’s a matter of degree—TEN involves significantly more body surface area than does SJS.

What is the pathogenesis of the acute inflammatory vesiculobullous reaction?

A hypersensitivity reaction, usually to a drug or infectious agent.
Conjunctivitis

Conjunctivitis

Noninfectious

Infectious

What do SJS and TEN stand for in this context?

SJS: Stevens-Johnson syndrome

TEN: Toxic epidermal necrolysis

Which infectious agent is most commonly implicated in SJS/TEN?

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A hypersensitivity reaction, usually to a drug or infectious agent.

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The **nature** of the inflammatory response

**Conjunctivitis**

- **Noninfectious**
  - **Acute/Hyperacute Conjunctivitis**
  - **Ligneous**

- **Infectious**
  - **Infectious**
  - **Allergic**
  - **MMP**

**What do SJS and TEN stand for in this context?**
- **SJS**: Stevens-Johnson syndrome
- **TEN**: Toxic epidermal necrolysis

**Which infectious agent is most commonly implicated in SJS/TEN?**
Depends on who you ask. Per both *EyeWiki* and *UpToDate*, *Mycoplasma pneumoniae* is by far the most common cause (*EyeWiki* attributes almost 90% of non-drug-induced cases to it).

However, in the most recent version of the *BCSC* *Cornea/External Disease* book, *M pneumoniae* isn’t even mentioned as a cause—HSV, strep and adeno are. On the other hand, the *Peds* book states that infection-related cases are usually secondary to "Mycoplasma species or herpes simplex virus." (Of course, this difference could be because *M pneumoniae* is a more common cause in *kids.*) **Caveat emptor.**

A hypersensitivity reaction, usually to a **drug** or **infectious agent**

For more on SJS/TEN, see slide-set K8
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious
- Allergic
- Ligneous
- SJS
- MMP

Infectious
- Viral
- Bacterial

What does MMP stand for in this context?
Mucus membrane pemphigoid

MMP is an auto immune condition, in contrast, SJS/TEN is an immune condition—a hypersensitivity reaction.
Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

**Acute/Hyperacute Conjunctivitis**

---

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The **nature** of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

Conjunctivitis

- **Noninfectious**
  - Allergic
  - Ligneous
  - SJS/TEN

- **Infectious**
  - Viral
  - Bacterial

**MMP**

*What does MMP stand for in this context?*
Mucus membrane pemphigoid

*By what other name—less preferred, but frequently used—is it known?*
Ocular cicatricial pemphigoid, OCP

*In just a few words, what is the clinical manifestation of MMP?*
It is a chronic cicatrizing conjunctivitis

SJS/TEN is an immune condition—a hypersensitivity reaction. In contrast, MMP is an autoimmune condition.
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious
- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious
- Viral
- Bacterial

What does MMP stand for in this context?
Mucus membrane pemphigoid

By what other name—less preferred, but frequently used—is it known?
Ocular cicatricial pemphigoid, OCP

In just a few words, what is the clinical manifestation of MMP?
It is acute vs chronic conjunctivitis
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious
- Allergic
- Ligneous
- SJS
- MMP

Infectious
- Viral
- Bacterial

What does MMP stand for in this context?
Mucus membrane pemphigoid

By what other name—less preferred, but frequently used—is it known?
Ocular cicatricial pemphigoid, OCP

In just a few words, what is the clinical manifestation of MMP?
It is a chronic cicatrizing conjunctivitis
MMP: Subepithelial fibrosis, symblepharon, and shortening of the inferior fornix
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

- Allergic
- Ligneous
- SJS/TEN

Infectious

- Viral
- Bacterial

What does MMP stand for in this context?
Mucus membrane pemphigoid

By what other name—less preferred, but frequently used—is it known?
Ocular cicatricial pemphigoid, OCP

In just a few words, what is the clinical manifestation of MMP?
It is a chronic cicatrizing conjunctivitis

Other than timeframe of presentation (ie, acute vs chronic), in what fundamental way does MMP differ from SJS/TEN?
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

- Infectious
  - Viral
  - Bacterial
- Noninfectious
  - Allergic
  - Ligneous
  - SJS/TEN
  - MMP

**What does MMP stand for in this context?**
Mucus membrane pemphigoid

**By what other name—less preferred, but frequently used—is it known?**
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**In just a few words, what is the clinical manifestation of MMP?**
It is a chronic cicatrizng conjunctivitis

**Other than timeframe of presentation (ie, acute vs chronic), in what fundamental way does MMP differ from SJS/TEN?**
SJS/TEN is an immune condition—a hypersensitivity reaction
We can divvy conjunctivitis many ways, including in terms of:

The **nature** of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious
- Allergic
- Ligneous
- SJS
- MMP

Infectious
- Viral
- Bacterial

What does MMP stand for in this context?
Mucus membrane pemphigoid
By what other name—less preferred, but frequently used—is it known?
Ocular cicatricial pemphigoid, OCP
In just a few words, what is the clinical manifestation of MMP?
It is a chronic cicatrizing conjunctivitis
Other than timeframe of presentation (ie, acute vs chronic), in what fundamental way does MMP differ from SJS/TEN?
SJS/TEN is an immune condition—a hypersensitivity reaction. In contrast, MMP is an autoimmune condition.

For more on MMP, see slide-set K29
Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

**Acute/Hyperacute Conjunctivitis**

Noninfectious
- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious
- ?
- ?
- ?
- ?

*The Cornea book emphasizes four classes of organism implicated in infectious conjunctivitis—what are they?*
We can divvy conjunctivitis many ways, including in terms of: The nature of the inflammatory response

The Cornea book emphasizes four classes of organism implicated in infectious conjunctivitis—what are they?
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious
- Allergic
- Ligneous
- SJS/TEN
- MMP

Infectious
- Viral
- Bacterial

Acute/Hyperacute Conjunctivitis

What is the typical course for bacterial conjunctivitis?
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

Infectious

Viral
Bacterial
Fungal
Allergic
Ligneous
SJS/TEN
MMP

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

Noninfectious

When you hear ‘parasitic conjunctivitis,’ what bug should come to mind?

Microsporidia

Broadly speaking, what are protozoa?

They are unicellular eukaryotes capable of some form of motility. Protozoa feed on organic material, and many are parasites. The term protozoa is considered outdated by modern biologists, but it persists in the ophthalmic literature.

What group of individuals is at particular risk for Microsporidia conjunctivitis?

AIDS pts

What is the classic presentation of Microsporidia conjunctivitis?

Bilateral irritation, photophobia, decreased vision, and conjunctival injection
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

- **Viral**
- **Bacterial**
- **Fungal**
- **Allergic**
- **Ligneous**
- **SJS/TEN**
- **MMP**

**Acute/Hyperacute Conjunctivitis**

**Conjunctivitis**

- **Noninfectious**
- **Infectious**

When you hear ‘parasitic conjunctivitis,’ what bug should come to mind? **Microsporidia**

- **Protozoa** are unicellular eukaryotes capable of some form of motility. Protozoa feed on organic material, and many are parasites. The term **protozoa** is considered outdated by modern biologists, but it persists in the ophthalmic literature.

What group of individuals is at particular risk for **Microsporidia** conjunctivitis? **AIDS pts**

What is the classic presentation of **Microsporidia** conjunctivitis? Bilateral irritation, photophobia, decreased vision, and conjunctival injection.
We can divvy conjunctivitis many ways, including in terms of: The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
Conjunctivitis can be categorized in various ways, including:

- The nature of the inflammatory response
  - Viral
  - Bacterial
  - Fungal
  - Allergic
  - Ligneous
  - SJS/TEN
  - MMP

Noninfectious

- Acute/Hyperacute Conjunctivitis

When you hear ‘parasitic conjunctivitis,’ what bug should come to mind?

*Microsporidia*

What sort of bug is *Microsporidia*?

A protozoan

Broadly speaking, what are protozoa?

Parasitic

We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response

Conjunctivitis

- Acute/Hyperacute

Noninfectious
- Ligneous
- SJS/TEN
- MMP

Infectious
- Viral
- Bacterial
- Fungal

When you hear ‘parasitic conjunctivitis,’ what bug should come to mind? 

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We can divvy conjunctivitis many ways, including in terms of:

The **nature** of the inflammatory response

---

**Conjunctivitis**

- **Noninfectious**
- **Infectious**
  - Viral
  - Bacterial
  - Fungal
  - Allergic
  - Ligneous
  - SJS/TEN
  - MMP

**Acute/Hyperacute Conjunctivitis**

When you hear ‘parasitic conjunctivitis,’ what bug should come to mind? *Microsporidia*

What sort of bug is *Microsporidia*?

A protozoan

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AIDS pts

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The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The nature of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The nature of the inflammatory response**

Conjunctivitis

- Acute/Hyperacute Conjunctivitis

Noninfectious

Infectious

When you hear ‘parasitic conjunctivitis,’ what bug should come to mind?

*Microsporidia*

**What sort of bug is Microsporidia?**
A protozoan

Broadly speaking, what are protozoa?
They are unicellular eukaryotes capable of some form of motility. Protozoa feed on organic material, and many are parasites. The term *protozoa* is considered outdated by modern biologists, but it persists in the ophthalmic literature.

**What group of individuals is at particular risk for Microsporidia conjunctivitis?**
AIDS pts

**What is the classic presentation of Microsporidia conjunctivitis?**
Bilateral irritation, photophobia, decreased vision, and conjunctival injection
Acute/Hyperacute Conjunctivitis

*Microsporidia* keratoconjunctivitis
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response.
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
What does a papillary reaction look like clinically?
Flattened nodules—sort of a cobblestone appearance

We can divvy conjunctivitis many ways, including in terms of:
The **histology** of the inflammatory response
Acute/Hyperacute Conjunctivitis

We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response

**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

Papillary

Follicular

What does a papillary reaction look like clinically?
Flattened nodules—sort of a cobblestone appearance

What does it look like histologically?
We can divvy conjunctivitis many ways, including in terms of: The **histology** of the inflammatory response

**Acute/Hyperacute Conjunctivitis**

**Conjunctivitis**

**Papillary**

What does a papillary reaction look like clinically?
Flattened nodules—sort of a cobblestone appearance

What does it look like histologically?
Each nodule contains a vascular core surrounded by mast cells, eos, and other inflammatory cells
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response
“The conj epithelium (*blue line*) extends over fine projections of blood vessels (*red*) and fibrous tissue, and the stroma contains eosinophils (*pink circles*), lymphocytes, and plasma cells (*blue circles*).”

 Conj papilla per the *Path* book
“The conj epithelium (*blue line*) extends over fine projections of blood vessels (*red*) and fibrous tissue, and the stroma contains eosinophils (*pink circles*), lymphocytes, and plasma cells (*blue circles*).”

“Cross-sectional diagram of a conjunctival papilla with a central vascular tuft surrounded by acute and chronic leukocytes.”
Papillary conjunctivitis. A, Clinical photograph. Papillae efface the normal palpebral conjunctival surface and form a confluent cobblestone pattern. B, Low-magnification photo-micrograph shows the characteristic closely packed, flat-topped papillae with central fibrovascular cores (arrows). The normal meibomian glands (M) of the tarsus are also shown.
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
Acute/Hyperacute Conjunctivitis

Follicles (note this is the lower lid viewed from above)
Follicular conjunctivitis. **A**, Inflammation of the right eye from glaucoma medication. **B**, Right eye showing follicular conjunctivitis in the inferior fornix.
Conjunctivitis

Papillary

Follicular

We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response

What does a papillary reaction look like clinically?
Flattened nodules—sort of a cobblestone appearance

What does a follicular reaction look like clinically?
Dome-shaped nodules

What does it look like histologically?
Each nodule contains a vascular core surrounded by mast cells, eos, and other inflammatory cells
Conjunctivitis

Papillary

Follicular

Acute/Hyper acute Conjunctivitis

What does a papillary reaction look like clinically?
Flattened nodules—sort of a cobblestone appearance

What does it look like histologically?
Each nodule contains a vascular core surrounded by mast cells, eos, and other inflammatory cells

What does a follicular reaction look like clinically?
Dome-shaped nodules

What does it look like histologically?
Each nodule contains a lymphoid follicle

We can divvy conjunctivitis many ways, including in terms of:
The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response

---

**Conjunctivitis**

- **Papillary**
  - What does a papillary reaction look like clinically?
    - Flattened nodules—sort of a cobblestone appearance
  - What does it look like histologically?
    - Each nodule contains a vascular core surrounded by mast cells, eos, and other inflammatory cells

- **Follicular**
  - What does a follicular reaction look like clinically?
    - Dome-shaped nodules
  - What does it look like histologically?
    - Each nodule contains a lymphoid follicle

---

**Acute/Hyperacute Conjunctivitis**
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response

What does a papillary reaction look like clinically?
Flattened nodules—sort of a cobblestone appearance

What does a follicular reaction look like clinically?
Dome-shaped nodules

What does it look like histologically?
Each nodule contains a vascular core surrounded by mast cells, eos, and other inflammatory cells

What does it look like histologically?
Each nodule contains a lymphoid follicle consisting of a center and its surrounding
Conjunctivitis

- Papillary
- Follicular

**Acute/Hyperacute Conjunctivitis**

*What does a papillary reaction look like clinically?*
Flattened nodules—sort of a cobblestone appearance

*What does a follicular reaction look like clinically?*
Dome-shaped nodules

*What does it look like histologically?*
Each nodule contains a vascular core surrounded by mast cells, eos, and other inflammatory cells

*What does it look like histologically?*
Each nodule contains a lymphoid follicle consisting of a germinal center and its surrounding corona

*We can divvy conjunctivitis many ways, including in terms of:*
**The histology** of the inflammatory response
"Cross-section of a conjunctival follicle with mononuclear cells obscuring conjunctival blood vessels."

Conj follicle per the *Cornea* book
“The conj epithelium (blue line) overlies lymphoid follicles in the superficial stroma that have a paler germinal center surrounded by a darker corona (central pale blue surrounded by purple). The surrounding stroma contains lymphocytes and plasma cells (small blue circles).”

“Cross-section of a conjunctival follicle with mononuclear cells obscuring conjunctival blood vessels.”

Conj follicle per the **Cornea** book

Conj follicle per the **Path** book

Acute/Hyperacute Conjunctivitis
Follicular conjunctivitis. A, Clinical photograph showing follicles, which occur only in the fornix. B, High-magnification photomicrograph shows a lymphoid follicle and the boundary between the germinal center and the mantle zone (arrowheads). Note the paler, relatively larger, immature lymphocytes in the germinal center compared with the darker, small, mature lymphocytes in the corona.
We can divvy conjunctivitis many ways, including in terms of:

*The histology* of the inflammatory response

There’s a third histology we must address. You are very familiar with it, but perhaps not in the context of conjunctivitis. What is it?
We can divvy conjunctivitis many ways, including in terms of: The **histology** of the inflammatory response

There’s a third histology we must address. You are very familiar with it, but perhaps not in the context of conjunctivitis. What is it? **Granulomatous** conjunctivitis
We can divvy conjunctivitis many ways, including in terms of:

The **histology** of the inflammatory response

---

**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

- Papillary
- Follicular

**Granulomatous**

*What is a granuloma?*

*There’s a third histology we must address. You are very familiar with it, but perhaps not in the context of conjunctivitis. What is it?*

**Granulomatous** conjunctivitis
We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The **histology** of the inflammatory response

---

**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

- Papillary
- Follicular
- Granulomatous

*There’s a third histology we must address. You are very familiar with it, but perhaps not in the context of conjunctivitis. What is it?*  
**Granulomatous** conjunctivitis

*Is granulomatous conjunctivitis a commonly-encountered clinical entity?*
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response

There’s a third histology we must address. You are very familiar with it, but perhaps not in the context of conjunctivitis. What is it?

Granulomatous conjunctivitis

Is granulomatous conjunctivitis a commonly-encountered clinical entity? No, it is vastly less common than its papillary and follicular cousins.
There’s a third histology we must address. You are very familiar with it, but perhaps not in the context of conjunctivitis. What is it?

**Granulomatous** conjunctivitis

Is granulomatous conjunctivitis a commonly-encountered clinical entity?
No, it is vastly less common than its papillary and follicular cousins

Granulomatous dz is divvied into two subtypes—what are they?
Caseating and noncaseating

Clinically speaking, does granulomatous conjunctivitis look more like papillary conjunctivitis, or follicular conjunctivitis?

We can divvy conjunctivitis many ways, including in terms of:
The **histology** of the inflammatory response
There’s a third histology we must address. You are very familiar with it, but perhaps not in the context of conjunctivitis. What is it? Granulomatous conjunctivitis

Is granulomatous conjunctivitis a commonly-encountered clinical entity? No, it is vastly less common than its papillary and follicular cousins

Granulomatous dz is divvied into two subtypes—what are they? Caseating and noncaseating

Clinically speaking, does granulomatous conjunctivitis look more like papillary conjunctivitis, or follicular conjunctivitis? Follicular

We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
Acute/Hyperacute Conjunctivitis

Granulomatous conjunctivitis looking all follicular
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of: 

**The histology of the inflammatory response**

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**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

- Papillary
- Follicular

Granulomatous

- Caseating
- Noncaseating

*What does it mean to say a granuloma is ‘caseating’?*

It means the center in necrotic

---

We can divvy conjunctivitis many ways, including in terms of: 

**The histology of the inflammatory response**
A well-formed granuloma containing epithelioid macrophages, with a rim of lymphocytes and several giant cells can be seen.
A well-formed granuloma containing epithelioid macrophages, with a rim of lymphocytes and several giant cells can be seen. Centrally, caseous necrosis is apparent as amorphous pink material. (What you’re looking for on a test Q to make a caseating/noncaseating call.)

**Acute/Hyperacute Conjunctivitis**
Noncaseating granuloma. **Note the absence of central amorphous material.**
We can divvy conjunctivitis many ways, including in terms of:

The **histology** of the inflammatory response

- Acute/Hyperacute Conjunctivitis

Conjunctivitis

- Papillary
- Follicular

Granulomatous

- Caseating
- Noncaseating

**What does it mean to say a granuloma is ‘caseating’?**
It means the center in necrotic

**What is the classic cause of caseating granulomatous conjunctivitis?**

Parinaud oculoglandular syndrome (POS)
Acute/Hyperacute Conjunctivitis

Conjunctivitis

- Papillary
- Follicular

Granulomatous

- Caseating
- Noncaseating

Parinaud oculoglandular syndrome

What does it mean to say a granuloma is 'caseating'?
It means the center in necrotic

What is the classic cause of caseating granulomatous conjunctivitis?
Infection, esp Parinaud oculoglandular syndrome (POS)

We can divvy conjunctivitis many ways, including in terms of:
The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response

- Papillary
- Follicular

**Acute/Hyperacute Conjunctivitis**

Granulomatous conjunctivitis is one of two hallmarks of POS.

What is the classic cause of caseating granulomatous conjunctivitis?

**Parinaud oculoglandular syndrome (POS)**

What is the classic cause of caseating granulomatous conjunctivitis?

**Parinaud oculoglandular syndrome (POS)**
We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response

A unilateral granulomatous conjunctivitis is one of two hallmarks of POS. What is the other?

What is the classic cause of caseating granulomatous conjunctivitis?

Parinaud oculoglandular syndrome (POS)

What is the classic cause of Parinaud oculoglandular syndrome (POS)?

Bartonella henselae

What is the other classic ocular manifestation of Bartonella?

Neuroretinitis

What is the classic macular manifestation of Bartonella neuroretinitis?

Exudate that takes on a star shape
We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response

---

**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

- Papillary
- Follicular

*Unilateral granulomatous conjunctivitis is one of two hallmarks of POS. What is the other?*
Preauricular and/or submandibular lymphadenopathy ipsilateral to the affected eye

*What is the classic cause of caseating granulomatous conjunctivitis?*
Parinaud oculoglandular syndrome (POS)

*What bug is the classic cause of POS?*
Bartonella henselae

*What is the other classic ocular manifestation of Bartonella?*
Neuroretinitis

*What is the classic macular manifestation of Bartonella neuroretinitis?*
Exudate that takes on a star shape
Conjunctivitis

Papillary

Follicular

**Acute/Hyperacute Conjunctivitis**

We can divvy conjunctivitis many ways, including in terms of: **The histology** of the inflammatory response

A unilateral granulomatous conjunctivitis is one of two hallmarks of POS. What is the other? Preauricular and/or submandibular lymphadenopathy ipsilateral to the affected eye

What bug is the classic cause of POS?

Parinaud oculoglandular syndrome (POS)

What is the classic cause of caseating granulomatous conjunctivitis?

**Parinaud oculoglandular syndrome (POS)**

What does it mean to say a granuloma is ‘caseating’? It means the center in necrotic

What is the classic cause of caseating granulomatous conjunctivitis?

Parinaud oculoglandular syndrome (POS)
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response

A unilateral granulomatous conjunctivitis is one of two hallmarks of POS. What is the other? Preauricular and/or submandibular lymphadenopathy ipsilateral to the affected eye.

What bug is the classic cause of POS? Bartonella henslea.

What is the other classic ocular manifestation of Bartonella?

What is the classic cause of caseating granulomatous conjunctivitis?

Parinaud oculoglandular syndrome (POS)
We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response

---

A unilateral granulomatous conjunctivitis is one of two hallmarks of POS.

**What is the other?**
Preauricular and/or submandibular lymphadenopathy ipsilateral to the affected eye

What bug is the classic cause of POS?
*Bartonella henslæ*

**What is the other classic ocular manifestation of Bartonella?**
Neuroretinitis

**What is the classic cause of caseating granulomatous conjunctivitis?**
**Parinaud oculoglandular syndrome (POS)**
We can divvy conjunctivitis many ways, including in terms of:

The **histology** of the inflammatory response

A unilateral **granulomatous conjunctivitis** is one of two hallmarks of POS.

**What is the other?**
Preauricular and/or submandibular lymphadenopathy ipsilateral to the affected eye

**What bug is the classic cause of POS?**
*Bartonella henselae*

**What is the other classic ocular manifestation of Bartonella?**
Neuroretinitis

**What is the classic macular manifestation of Bartonella neuroretinitis?**

**Parinaud oculoglandular syndrome (POS)**
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response.
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response
Parinaud oculoglandular syndrome: Optic disc edema and a macular star
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response.
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response

Papillary

Conjunctivitis

Follicular

A unilateral granulomatous conjunctivitis is one of two hallmarks of POS. What is the other?

Preauricular and/or submandibular lymphadenopathy ipsilateral to the affected eye.

What is the mechanism by which the pt acquires a Bartonella infection?

A cat scratch

POS and neuroretinitis are both subtypes of what condition?

Bartonella neuroretinitis

What is the classic macular manifestation of Bartonella neuroretinitis?

Exudate that takes on a star shape

What is the classic cause of caseating granulomatous conjunctivitis?

Parinaud oculoglandular syndrome (POS)
We can divvy conjunctivitis many ways, including in terms of:

The histology of the inflammatory response

- Papillary
- Follicular

A unilateral granulomatous conjunctivitis is one of two hallmarks of POS. What is the other? Preauricular and/or submandibular lymphadenopathy ipsilateral to the affected eye.

What is the mechanism by which the pt acquires a Bartonella infection? A cat scratch

POS and neuroretinitis are both subtypes of what condition? Cat scratch disease

What is the classic macular manifestation of Bartonella neuroretinitis? Exudate that takes on a star shape

What is the classic cause of caseating granulomatous conjunctivitis? Parinaud oculoglandular syndrome (POS)
We can divvy conjunctivitis many ways, including in terms of: The histology of the inflammatory response.

What is the classic cause of noncaseating granulomatous conjunctivitis?
We can divvy conjunctivitis many ways, including in terms of:

**The histology** of the inflammatory response

What is the classic cause of **non**caseating granulomatous conjunctivitis?
Sarcoidosis
Sarcoidosis. A, Clinical photograph shows granulomas (*arrows*) of the conjunctiva in a patient with sarcoidosis. B, Histology shows a noncaseating granuloma with pale-staining histiocytes, including a multinucleated giant cell (*arrowhead*). Note the small cuff of lymphocytes and plasma cells.
If you’re shown a noncaseating conj granuloma, think *sarcoid*
Acute/Hyperacute Conjunctivitis

If you’re shown a **non**caseating conj granuloma, think **sarcoid**

But if you’re shown a **caseating** conj granuloma, think **infection** (esp POS)
We can divvy conjunctivitis many ways, including in terms of:

The age of the pt
We can divvy conjunctivitis many ways, including in terms of:

The age of the pt

Note: This part changed again
We can divvy conjunctivitis many ways, including in terms of: The age of the pt
We can divvy conjunctivitis many ways, including in terms of: The age of the pt

Acute/Hyperacute Conjunctivitis

Conjunctivitis

Child

Adult

Ophthalmia neonatorum

What is the most common sort of conjunctivitis in kids? Bacterial, specifically \textit{H flu} and \textit{Strep pneumo}

What is the most common sort of conjunctivitis in adults? Viral, specifically \textit{adeno} and \textit{HSV}
We can divvy conjunctivitis many ways, including in terms of: The age of the pt.
We can divvy conjunctivitis many ways, including in terms of:

**The age of the pt**
We can divvy conjunctivitis many ways, including in terms of: **The age of the pt**

**Acute/Hyperacute Conjunctivitis**

Conjunctivitis

- Child
- Adult

**Ophthalmia neonatorum**

**What is the most common sort of conjunctivitis in kids?**
Bacterial, specifically *H flu* and *Strep pneumo*

**What is the most common sort of conjunctivitis in adults?**
Viral, specifically ____ and ____
We can divvy conjunctivitis many ways, including in terms of: 
**The age of the pt**

**Conjunctivitis**

- **Child**
  - **Ophthalmia neonatorum**

- **Adult**

**Acute/Hyperacute Conjunctivitis**

*What is the most common sort of conjunctivitis in kids?*
Bacterial, specifically *H flu* and *Strep pneumo*

*What is the most common sort of conjunctivitis in adults?*
Viral, specifically *adeno* and *HSV*
We can divvy conjunctivitis many ways, including in terms of:
The **age** of the pt

**Acute/Hyperacute Conjunctivitis**

- **Conjunctivitis**
  - **Child**
  - **Adult**
  - **Ophthalmia neonatorum**

*What is the most common sort of conjunctivitis in kids?*
Bacterial, specifically *H. flu* and *Strep pneumo*

*What is the most common sort of conjunctivitis in adults?*
Viral, specifically *adeno* and *HSV*

*To what does the term ophthalmia neonatorum refer?*
We can divvy conjunctivitis many ways, including in terms of:

**The age of the pt**
We can divvy conjunctivitis many ways, including in terms of:

The **nature** of the response
We can divvy conjunctivitis many ways, including in terms of: The nature of the response
In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?
In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?

**Course of onset**

**Severity**
In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?

What constitutes an acute vs hyperacute course of onset?
Acute/Hyperacute Conjunctivitis

Conjunctivitis

Acute  Hyperacute

In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?

Hours to days  Course of onset  <24 hrs

What constitutes an acute vs hyperacute course of onset?
In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?

**Severity**

*To what does severity refer here?*
Conjunctivitis

Acute/Hyperacute Conjunctivitis

In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?

- Hours to days: Acute (more than a day) vs. Hyperacute (<24 hrs)
- Course of onset: Acute (days) vs. Hyperacute (hours)

Severity

To what does severity refer here? To the amount of purulent discharge and the extent of conj chemosis.
In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?

- **Course of onset**: <24 hrs
- **Severity**: ?

What constitutes acute vs hyperacute severity?
In terms of presentation, what two factors differentiate between acute and hyperacute conjunctivitis?

**Course of onset**
- Hours to days
- <24 hrs

**Severity**
- ‘Moderate to severe’
- ‘Very severe’

What constitutes acute vs hyperacute severity?
Acute bacterial conjunctivitis
Acute/Hyperacute Conjunctivitis

Hyperacute bacterial conjunctivitis
Conjunctivitis

**Acute**

<table>
<thead>
<tr>
<th>Bugs:</th>
<th>#1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>specific bug</td>
</tr>
<tr>
<td>2)</td>
<td>ditto</td>
</tr>
<tr>
<td>3)</td>
<td>ditto ditto</td>
</tr>
</tbody>
</table>

**Hyperacute**

- *S pneumo*: #1
- *S aureus*: Less severe
- *H flu*: Acute / Hyperacute Conjunctivitis

Acute / Hyperacute Conjunctivitis
Conjunctivitis

Acute

Hyperacute

**Bugs:**
1) *S pneumoniae*: #1
2) *S aureus*: Less severe
3) *H flu*

**Acute/Hyperacute Conjunctivitis**
Conjunctivitis

**Acute**

- **Bugs:**
  1) *S pneumo*: #1
  2) *S aureus*: Less severe
  3) *H flu*

  --?
  --?

**Hyperacute**

*Who is at risk for H flu conjunctivitis?*
**Conjunctivitis**

**Bugs:**
1) *S pneuma*: #1
2) *S aureus*: Less severe
3) *H flu*
   - Kids with [two words]
   - Adults with [two words]

*Who is at risk for H flu conjunctivitis?*
Conjunctivitis

Acute

Hyperacute

**Bugs:**
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

Who is at risk for *H flu* conjunctivitis?
Bugs:
1) *S. pneumo*: #1
2) *S. aureus*: Less severe
3) *H. flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

Who is at risk for *H. flu* conjunctivitis?

**Cultures/stains needed?**
-- yes/no/maybe so
Conjunctivitis

Acute

Bugs:
1) *S. pneumo*: #1
2) *S. aureus*: Less severe
3) *H. flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

Who is at risk for *H. flu* conjunctivitis?

* Cultures/stains needed?
  --*No*, unless:
    1) 
    2) 
    3)
Conjunctivitis

Acute

Bugs:
1) **S pneumo**: #1
2) **S aureus**: Less severe
3) **H flu**
   --Kids with **otitis media**
   --Adults with **chronic lung dz**

Who is at risk for H flu conjunctivitis?

Cultures/stains needed?
--**No**, unless:
   1) **debilitated**
   2) **immunocompromised**
   3) **unresponsive to treatment**

Hyperacute
Conjunctivitis

**Bugs:**
1) *S. pneumo*: #1
2) *S. aureus*: Less severe
3) *H. flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

Who is at risk for *H. flu* conjunctivitis?

**Cultures/stains needed?**
--**No**, unless:
   1) *debilitated*
   2) *immunocompromised*
   3) *unresponsive to treatment*

**Treatment:**
--**Polytrim** (has good *H. flu* coverage)
Conjunctivitis

**Acute**

**Bugs:**
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

*Who is at risk for *H flu* conjunctivitis?*

**Cultures/stains needed?**
--*No*, unless:
   1) *debilitated*
   2) *immunocompromised*
   3) *unresponsive to treatment*

**Treatment:**
--*Polytrim* (has good *H flu* coverage)
Conjunctivitis

Acute

1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

Who is at risk for *H flu* conjunctivitis?

Cultures/stains needed?
--No, unless:
   1) *debilitated*
   2) *immunocompromised*
   3) *unresponsive to treatment*

Treatment:
--*Polytrim* (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
   (to prevent *otitis/pharyngitis dz/dz*)
Conjunctivitis

**Acute/Hyperacute Conjunctivitis**

**Bugs:**
1) *S. pneumoniae*: #1
2) *S. aureus*: Less severe
3) *H. influenzae* 
   --Kids with otitis media
   --Adults with chronic lung dz

Who is at risk for *H. influenzae* conjunctivitis?

**Cultures/stains needed?**
--*No*, unless:
   1) debilitated
   2) immunocompromised
   3) unresponsive to treatment

**Treatment:**
--Polytrim (has good *H. influenzae* coverage)
--Consider PO abx if *H. influenzae* in kids
 (to prevent otitis/pharyngitis)
Conjunctivitis

**Acute/Hyperacute Conjunctivitis**

**Conjunctivitis**

**Acute**

**Hyperacute**

**Bugs:**
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung* dz

**Cultures/stains needed?**
--**No**, unless:
   1) *debilitated*
   2) *immunocompromised*
   3) *unresponsive to treatment*

**Treatment:**
--**Polytrim** (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
   (to prevent *otitis/pharyngitis*)
Acute/Hyperacute Conjunctivitis

Conjunctivitis

Acute

Bugs:
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung* dz

Hyperacute

Bugs:
1) *N gonorrhea*
2) *N menigitidis* (much less common)

Cultures/stains needed?
--No, unless:
   1) debilitated
   2) immunocompromised
   3) unresponsive to treatment

Treatment:
--Polytrim (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
   (to prevent *otitis/pharyngitis*)
Conjunctivitis

**Acute/Hyperacute Conjunctivitis**

**Bugs:**
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with **otitis media**
   --Adults with **chronic lung dz**

**Cultures/stains needed?**
--**No**, unless:
  1) **debilitated**
  2) **immunocompromised**
  3) **unresponsive to treatment**

**Treatment:**
--**Polytrim** (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
  (to prevent **otitis/pharyngitis**)

**Bugs:**
1) *N gonorrhea*
2) *N menigitidis* (much less common)

**Cultures/stains needed?**
--?
Conjunctivitis

**Acute/Hyperacute Conjunctivitis**

**Acute**

*Bugs:*
1) *S pneumoniae*: #1
2) *S aureus*: Less severe
3) *H influenzae*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

**Cultures/stains needed?**
--No, unless:
1) *debilitated*
2) *immunocompromised*
3) *unresponsive to treatment*

**Treatment:**
--*Polytrim* (has good *H influenzae* coverage)
--Consider PO abx if *H influenzae* in kids
   (to prevent *otitis/pharyngitis*)

**Hyperacute**

*Bugs:*
1) *N gonorrhea*
2) *N meningitidis* (much less common)

**Cultures/stains needed?**
--Yes
Acute/Hyperacute Conjunctivitis

Conjunctivitis

Acute

**Bugs:**
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

**Cultures/stains needed?**
--**No**, unless:
   1) *debilitated*
   2) *immunocompromised*
   3) *unresponsive to treatment*

**Treatment:**
--**Polytrim** (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
   (to prevent *otitis/pharyngitis*)

Hyperacute

**Bugs:**
1) *N gonorrhea*
2) *N meningitidis* (much less common)

**Cultures/stains needed?**
--**Yes**

**Treatment:**
--*If no corneal involvement:*

---

Inpt or Outpt? Med + route?
**Conjunctivitis**

**Acute/Hyperacute Conjunctivitis**

**Bugs:**
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung* dz

**Cultures/stains needed?**
--**No**, unless:
   1) *debilitated*
   2) *immunocompromised*
   3) *unresponsive to treatment*

**Treatment:**
--*Polytrim* (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
   (to prevent *otitis/pharyngitis*)

**Bugs:**
1) *N gonorrhea*
2) *N menigitidis* (much less common)

**Cultures/stains needed?**
--**Yes**

**Treatment:**
--If no corneal involvement:
   Outpatient w/ 1g Rocephin IM x 1
Conjunctivitis

**Acute/Hyperacute Conjunctivitis**

**Bugs:**
1. *S. pneumo*: #1
2. *S. aureus*: Less severe
3. *H. flu*
   - Kids with **otitis media**
   - Adults with **chronic lung dz**

**Cultures/stains needed?**
-- **No**, unless:
   1. **debilitated**
   2. **immunocompromised**
   3. **unresponsive to treatment**

**Treatment:**
-- **Polytrim** (has good *H. flu* coverage)
-- Consider PO abx if *H. flu* in kids
   (to prevent **otitis/pharyngitis**)

**Bugs:**
1. *N. gonorrhea*
2. *N. menigitidis* (much less common)

**Cultures/stains needed?**
-- **Yes**

**Treatment:**
-- If no corneal involvement:
   **Outpatient w/ 1g Rocephin IM x 1**
-- If with corneal involvement:
   **Inpt or Outpt? Med + route?**
Conjunctivitis

**Acute/Hyperacute Conjunctivitis**

**Bugs:**
1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with **otitis media**
   --Adults with **chronic lung dz**

**Cultures/stains needed?**
--**No**, unless:
   1) **debilitated**
   2) **immunocompromised**
   3) **unresponsive to treatment**

**Treatment:**
--**Polytrim** (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
  (to prevent **otitis/pharyngitis**)

**Hyperacute**

**Bugs:**
1) *N gonorrhea*
2) *N menigitidis* (much less common)

**Cultures/stains needed?**
--**Yes**

**Treatment:**
--If no corneal involvement:
  Outpatient w/ 1g Rocephin IM x 1
--If with corneal involvement:
  Inpatient, 1g Rocephin IV q12° x 3d
Acute/Hyperacute Conjunctivitis

Conjunctivitis

Acute

Bugs:
1) *S pneumoniae*: #1
2) *S aureus*: Less severe
3) *H flu*
   --Kids with *otitis media*
   --Adults with *chronic lung dz*

Cultures/stains needed?
--No, unless:
   1) debilitated
   2) immunocompromised
   3) unresponsive to treatment

Treatment:
--Polytrim (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids
   (to prevent *otitis/pharyngitis*)

Hyperacute

Bugs:
1) *N gonorrhea*
2) *N menigitidis* (much less common)

Cultures/stains needed?
--Yes

Treatment:
--If no corneal involvement:
   Outpatient w/ 1g Rocephin IM x 1
--If with corneal involvement:
   Inpatient, 1g Rocephin IV q12h x 3d

When ulcerative keratitis develops in gonococcal conjunctivitis, where is the ulcer likely to be located?

*In the corneal periphery*, ie, they develop PUK
Acute/Hyperacute Conjunctivitis

Conjunctivitis

Acute

Bugs:
1) *S. pneumoniae*: #1
2) *S. aureus*: Less severe
3) *H. influenzae*
   --Kids with otitis media
   --Adults with chronic lung dz

Cultures/stains needed?
--No, unless:
1) debilitated
2) immunocompromised
3) unresponsive to treatment

Treatment:
--Polytrim (has good *H. influenzae* coverage)
--Consider PO abx if *H. influenzae* in kids
   (to prevent otitis/pharyngitis)

Hyperacute

Bugs:
1) *N. gonorrhoeae*
2) *N. menigitidis* (much less common)

Cultures/stains needed?
--Yes

Treatment:
--If no corneal involvement:
   Outpatient w/ 1g Rocephin IM x 1
--If with corneal involvement:
   Inpatient, 1g Rocephin IV q12h x 3d

When ulcerative keratitis develops in gonococcal conjunctivitis, where is the ulcer likely to be located?

In the corneal periphery, ie, they develop PUK
**Conjunctivitis**

**Acute/Hyperacute Conjunctivitis**

**Bugs:**
1. *S pneumo*
2. *S aureus*: Less severe
3. *H flu* — Kids with otitis media — Adults with chronic lung dz

**Cultures/stains needed?**
-- No, unless:
1. debilitated
2. immunocompromised
3. unresponsive to treatment

**Treatment:**
-- Polytrim (has good *H flu* coverage)
-- Consider PO abx if *H flu* in kids (to prevent otitis/pharyngitis)

---

**Bugs:**
1. *N gonorrhea*
2. *N menigitidis* (much less common)

**Cultures/stains needed?**
-- Yes

**Treatment:**
-- If no corneal involvement:
  Outpatient w/ 1g Rocephin IM x 1
-- If with corneal involvement:
  Inpatient, 1g Rocephin IV q12o x 3d

---

*But gonococcus is a venereal disease. How does it get in the eye?*
Conjunctivitis

Acute

Bugs: 1) S pneumo : #1
2) S aureus: Less severe
3) H flu --Kids with otitis media --Adults with chronic lung dz

Treatment:
--Polytrim (has good H flu coverage)
--Consider PO abx if H flu in kids (to prevent otitis/pharyngitis)

Hyperacute

Bugs:
1) N gonorrhea
2) N menigitidis (much less common)

Cultures/stains needed?
--Yes

Treatment:
--If no corneal involvement:
  Outpatient w/ 1g Rocephin IM x 1
--If with corneal involvement:
  Inpatient, 1g Rocephin IV q12o x 3d

But gonococcus is a venereal disease. How does it get in the eye? Seriously?

OK then, if we're talking STDs here, should we be concerned about other 'love bugs'?

Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.

What implication does this have for managing GC conjunctivitis?
In addition to Rocephin for the GC, they should receive an empirical dose of PO zithromycin.
Conjunctivitis

Acute

Bugs:
1) *S. pneumo*
2) *S. aureus*: Less severe
3) *H. flu*

--Kids with otitis media
--Adults with chronic lung dz

Treatment:
--Polytrim (has good *H. flu* coverage)
--Consider PO abx if *H. flu* in kids
(to prevent otitis/pharyngitis)

Hyperacute

Bugs:
1) *N. gonorrhea*
2) *N. menigitidis* (much less common)

Cultures/stains needed?
--Yes

Treatment:
--If no corneal involvement:
Outpatient w/ 1g Rocephin IM x 1
--If with corneal involvement:
Inpatient, 1g Rocephin IV q12° x 3d
**Acute/Hyperacute Conjunctivitis**

**Conjunctivitis**

[Diagram showing branches for Acute and Hyperacute]

**Bugs:**

1. *S. pneumo*
2. *S. aureus*: Less severe
3. *H. flu*
   - Kids with otitis media
   - Adults with chronic lung dz

**Treatment:**

- **Polytrim** (has good *H. flu* coverage)
- Consider PO abx if *H. flu* in kids (to prevent otitis/pharyngitis)

**Acute Hyperacute Conjunctivitis**

**Bugs:**

1. *N. gonorrhea*
2. *N. menigitidis* (much less common)

**Cultures/stains needed?**

--Yes

**Treatment:**

--If no corneal involvement:
   **Outpatient** w/ 1g Rocephin IM x 1
--If with corneal involvement:
   **Inpatient**, 1g Rocephin IV q12h x 3d

**But gonococcus is a venereal disease. How does it get in the eye?**

**OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’?**

Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent infection.

**OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’?**

Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent infection.
**Conjunctivitis**

**Acute**
- Bugs: 1) *S. pneumo* 2) *S. aureus* 3) *H. flu*
- Treatment:
  - Polytrim (has good *H. flu* coverage)
  - Consider PO abx if *H. flu* in kids (to prevent otitis/pharyngitis)

**Hyperacute**
- Bugs: 1) *N. gonorrhoea* 2) *N. menigitidis* (much less common)
- Cultures/stains needed?  
  --Yes
- Treatment:
  --If no corneal involvement:  
    Outpatient w/ 1g Rocephin IM x 1
  --If with corneal involvement:
    Inpatient, 1g Rocephin IV q12° x 3d

---

**Acute/Hyperacute Conjunctivitis**

---

But gonococcus is a venereal disease. How does it get in the eye? Seriously?

OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’? Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.
Conjunctivitis

Acute

1) *S pneumo*: #1
2) *S aureus*: Less severe
3) *H flu* --Kids with otitis media--Adults with chronic lung dz

Treatment:
--Polytrim (has good *H flu* coverage)
--Consider PO abx if *H flu* in kids (to prevent otitis/pharyngitis)

Hyperacute

Bugs:
1) *N gonorrhea*
2) *N menigitidis* (much less common)

Cultures/stains needed?
--Yes

Treatment:
--If no corneal involvement:
  Outpatient w/ 1g Rocephin IM x 1
--If with corneal involvement:
  Inpatient, 1g Rocephin IV q12h x 3d

But gonococcus is a venereal disease. How does it get in the eye?
Seriously?

OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’?
Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.

What implication does this have for managing GC conjunctivitis?
Acute/Hyperacute Conjunctivitis

Conjunctivitis

Acute

Hyperacute

**Bugs:**

1) \( S\) pneumo
2) \( S\) aureus: Less severe
3) \( H\) flu
   --Kids with otitis media
   --Adults with chronic lung dz

**Treatment:**

--Polytrim (has good \( H\) flu coverage)
--Consider PO abx if \( H\) flu in kids
(to prevent otitis/pharyngitis)

**Acute/Hyperacute Conjunctivitis**

**Bugs:**

1) \( N\) gonorrhea
2) \( N\) menigitidis (much less common)

**Cultures/stains needed?**

--Yes

**Treatment:**

--If no corneal involvement:
   Outpatient w/ 1g Rocephin IM x 1

--If with corneal involvement:
   Inpatient, 1g Rocephin IV q12° x 3d
   (plus \( H\) flu PO ‘just in case’)

*But gonococcus is a venereal disease. How does it get in the eye? Seriously?*

*OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’? Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.*

*What implication does this have for managing GC conjunctivitis? In addition to Rocephin for the GC, they should receive an empirical dose of PO*
**Acute/Hyperacute Conjunctivitis**

**Conjunctivitis**

**Acute**

**Hyperacute**

**Bugs:**
1) *S pneumo*
2) *S aureus*: Less severe
3) *H flu* — Kids with otitis media — Adults with chronic lung dz

**Treatment:**
-- Polytrim (has good *H flu* coverage)
-- Consider PO abx if *H flu* in kids (to prevent otitis/pharyngitis)

**But gonococcus is a venereal disease. How does it get in the eye?**
Seriously?

**OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’?**
Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.

**Acute/Hyperacute Conjunctivitis**

**Bugs:**
1) *N gonorrhea*
2) *N menigitidis* (much less common)

**Cultures/stains needed?**
-- Yes

**Treatment:**
-- If no corneal involvement:
  **Outpatient w/ 1g Rocephin IM x 1**
-- If with corneal involvement:
  **Inpatient, 1g Rocephin IV q12° x 3d**
  (plus azithromycin PO ‘just in case’)

**What implication does this have for managing GC conjunctivitis?**
In addition to Rocephin for the GC, they should receive an empirical dose of PO zithromycin

**But gonococcus is a venereal disease. How does it get in the eye?**
Seriously?
**Acute/Hyperacute Conjunctivitis**

**Conjunctivitis**

**Bugs:**

1) *S. pneumo*  
2) *S. aureus*: Less severe  
3) *H. flu*

---Kids with otitis media  
---Adults with chronic lung dz

**Treatment:**

--Polytrim (has good *H. flu* coverage)  
--Consider PO abx if *H. flu* in kids  
(to prevent otitis/pharyngitis)

---Kids with otitis media  
---Adults with chronic lung dz

**Bugs:**

1) *N. gonorrhea*

**But gonococcus is a venereal disease. How does it get in the eye?**  
Seriously?

**OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’?**

Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.

**What implication does this have for managing GC conjunctivitis?**

In addition to Rocephin for the GC, they should receive an empirical dose of PO zithromycin (plus azithromycin PO ‘just in case’)

---Kids with otitis media  
---Adults with chronic lung dz

**In addition to antibiotics, what therapeutic maneuver should be performed?**

**Bugs:**

1) *N. gonorrhea*

**2) N. menigitidis** (much less common)

**Cultures/stains needed?**

--Yes

**Treatment:**

--If no corneal involvement:

Outpatient w/ 1g Rocephin IM x 1

--If with corneal involvement:

Inpatient, 1g Rocephin IV q12o x 3d

OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’?

Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.

**What implication does this have for managing GC conjunctivitis?**

In addition to Rocephin for the GC, they should receive an empirical dose of PO zithromycin

---Polytrim (has good *H. flu* coverage)  
---Consider PO abx if *H. flu* in kids (to prevent otitis/pharyngitis)

**In addition to antibiotics, what therapeutic maneuver should be performed?**
Conjunctivitis

Acute

Hyperacute

**Bugs:**

1) *S. pneumo* : #1
2) *S. aureus* : Less severe
3) *H. flu* --Kids with otitis media --Adults with chronic lung dz

**Treatment:**

-- Polytrim (has good *H. flu* coverage)
-- Consider PO abx if *H. flu* in kids (to prevent otitis/pharyngitis)

---

**Acute/Hyperacute Conjunctivitis**

**Bugs:**

1) *N. gonorrhoea*
2) *N. meningitidis* (much less common)

**Cultures/stains needed?**

-- Yes

**Treatment:**

-- If no corneal involvement:
  - Outpatient w/ 1g Rocephin IM x 1
-- If with corneal involvement:
  - Inpatient, 1g Rocephin IV q12h x 3d
  (plus azithromycin PO ‘just in case’)

**But gonococcus is a venereal disease. How does it get in the eye?**
Seriously?

**OK then, if we’re talking STDs here, should we be concerned about other ‘love bugs’?**
Yes—about 1/3 of pts with GC conjunctivitis will have a concurrent Chlamydial infection.

**What implication does this have for managing GC conjunctivitis?**
In addition to Rocephin for the GC, they should receive an empirical dose of PO zithromycin

-- Polytrim (has good *H. flu* coverage)
-- Consider PO abx if *H. flu* in kids (to prevent otitis/pharyngitis)

**In addition to antibiotics, what therapeutic maneuver should be performed?**
Copious irrigation with normal saline to remove inflammatory debris, cells, and proteases from the ocular surface