Hypersensitivity Reactions of the Ocular Surface
Firstly: What is a Hypersensitivity Reaction?
Firstly: What is a **Hypersensitivity Reaction? of the Ocular Surface**
An exaggerated version of a normal immune response—ie, too much of a good thing
How many Hypersensitivity Reactions of the Ocular Surface are there?
How many **Hypersensitivity Reactions of the Ocular Surface** are there?

<table>
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Firstly:
How many Hypersensitivity Reactions of the Ocular Surface are there?

Four? But I seem to recall from med school that there are five hypersensitivity reactions. What gives?
How many **Hypersensitivity Reactions of the Ocular Surface** are there?

Type I  Type II  Type III  Type IV  Type V?

*Four? But I seem to recall from med school that there are **five** hypersensitivity reactions. What gives?*

*There is a fifth, but it plays no role regarding the ocular surface.*
### Hypersensitivity Reactions of the Ocular Surface

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Before proceeding further, it should be noted that the conceptualization of 4 (or 5) distinct hypersensitivity reactions is considered **outdated** by modern immunologists. In truth, most clinical conditions represent a blend of the proposed hypersensitivity mechanisms. That said, this framework for categorizing hypersensitivity reactions persists in the literature, and thus familiarity with it remains an obligation of ophthalmos-in-training.
**Hypersensitivity Reactions of the Ocular Surface**

**Type I**

Type II

Type III

Type IV

**Type I reactions involve...**  [One word that captures the nature of this rxn]

Type II reactions involve...

Type III reactions involve...

Type IV reactions involve...
Hypersensitivity Reactions of the Ocular Surface

Type I reactions involve... Anaphylaxis
Type II reactions involve...
Type III reactions involve...
Type IV reactions involve...
Hypersensitivity Reactions of the Ocular Surface

Type I

Type II

Type III

Type IV

Anaphylaxis

Type I reactions involve... Anaphylaxis

Type II reactions involve...

Type III reactions involve...

Type IV reactions involve...

Briefly, how does an anaphylactic reaction proceed?
Hypersensitivity Reactions of the Ocular Surface

**Type I reactions involve...** Anaphylaxis
Type II reactions involve...
Type III reactions involve...
Type IV reactions involve...

*Briefly, how does an anaphylactic reaction proceed?*

The binding of... + its abb. Ig... receptors on... causes the cells to...
Type I reactions involve... Anaphylaxis
Type II reactions involve...
Type III reactions involve...
Type IV reactions involve...

Briefly, how does an anaphylactic reaction proceed?
The binding of antigen (Ag) to IgE receptors on mast cells causes the cells to degranulate
Hypersensitivity Reactions of the Ocular Surface

**Type I** reactions involve...

- **Anaphylaxis**

**Type II** reactions involve...

**Type III** reactions involve...

- Immune-complex reactions

**Type IV** reactions involve...

**Briefly, how does an anaphylactic reaction proceed?**

The binding of **antigen (Ag)** to **IgE** receptors on **mast cells** causes the cells to **degranulate**, with the subsequent release of and other pre-formed inflammatory mediators.
Hypersensitivity Reactions of the Ocular Surface

Anaphylaxis
Type I

Type II
Type III
Type IV

Type I reactions involve... Anaphylaxis
Type II reactions involve...
Type III reactions involve...
Type IV reactions involve...

Briefly, how does an anaphylactic reaction proceed?
The binding of antigen (Ag) to IgE receptors on mast cells causes the cells to degranulate, with the subsequent release of histamine and other pre-formed inflammatory mediators.
**Hypersensitivity Reactions of the Ocular Surface**

**Type I** reactions involve...

*Anaphylaxis*

**Type II** reactions involve...

**Type III** reactions involve...

**Type IV** reactions involve...

Briefly, how does an anaphylactic reaction proceed?

The binding of antigen (Ag) to IgE receptors on mast cells causes the cells to **degranulate**, with the subsequent release of **histamine** and other pre-formed inflammatory mediators.

*Sounds fast. How long does it take to become clinically apparent?*
**Hypersensitivity Reactions of the Ocular Surface**

**Type I** reactions involve...
Anaphylaxis

**Type II** reactions involve...

**Type III** reactions involve...
Immune-complex reactions

**Type IV** reactions involve...

**Briefly, how does an anaphylactic reaction proceed?**
The binding of antigen (Ag) to IgE receptors on mast cells causes the cells to degranulate, with the subsequent release of histamine and other pre-formed inflammatory mediators.

*Sounds fast. How long does it take to become clinically apparent?*
Only minutes (which is why this reaction is often referred to as immediate hypersensitivity)
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

Type I reactions involve... Anaphylaxis

Type II reactions involve... [Two words capturing this rxn]

Type III reactions involve...

Type IV reactions involve...
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

Type I reactions involve…
Anaphylaxis

Type II reactions involve…
Cytotoxic antibodies

Type III reactions involve…
Immune-complex reactions

Type IV reactions involve…
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

Type I reactions involve...
- Anaphylaxis

Type II reactions involve...
- Cytotoxic antibodies

Type III reactions involve...
- Immune-complex reactions

Type IV reactions involve...

Is the antibody (Ab) involved in Type II reactions IgE, as it is in Type I?
Hypersensitivity Reactions of the Ocular Surface

Type I
Type II
Type III
Type IV

Type I reactions involve...
Type II reactions involve...
Type III reactions involve...
Type IV reactions involve...

Is the antibody (Ab) involved in Type II reactions IgE, as it is in Type I?
No, it is IgG and/or IgM
Hypersensitivity Reactions of the Ocular Surface

Type I reactions involve...
Anaphylaxis

Type II reactions involve...
Cytotoxic antibodies

Type III reactions involve...
Immune-complex reactions

Is the antibody (Ab) involved in Type II reactions IgE, as it is in Type I?
No, it is IgG and/or IgM

How does a Type II reaction proceed?
**Hypersensitivity Reactions of the Ocular Surface**

- **Type I** reactions involve...
  - Anaphylaxis

- **Type II** reactions involve...
  - Cytotoxic antibodies

- **Type III** reactions involve...
  - Immune-complex reactions

- **Type IV** reactions involve...

**Is the antibody (Ab) involved in Type II reactions IgE, as it is in Type I?**
No, it is IgG and/or IgM

**How does a Type II reaction proceed?**
Antibodies bind to antigens located on cell membranes. These cell-membrane bound Ag-Ab complexes prompt complement-system attacks on the cell.
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

Type I reactions involve...
Anaphylaxis

Type II reactions involve...
Cytotoxic antibodies

Type III reactions involve...
Immune-complex reactions

Type IV reactions involve...
[Three words for this one]
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

Type I reactions involve...
- Anaphylaxis

Type II reactions involve...
- Cytotoxic antibodies

Type III reactions involve...
- Immune-complex reactions

Type IV reactions involve...
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

- **Type I** reactions involve Anaphylaxis
- **Type II** reactions involve Cytotoxic antibodies
- **Type III** reactions involve Immune-complex reactions
- **Type IV** reactions involve Immune-complex reactions

Is the antibody involved in Type III IgE a la Type I, or IgG and IgM as in Type II?
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

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Is the antibody involved in Type III IgE a la Type I, or IgG and IgM as in Type II? IgG and/or IgM
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

- **Type I** reactions involve...
  - Anaphylaxis

- **Type II** reactions involve...
  - Cytotoxic antibodies

- **Type III** reactions involve
  - Immune-complex reactions

- **Type IV** reactions involve...

**Is the antibody involved in Type III IgE a la Type I, or IgG and IgM as in Type II?**

- IgG and/or IgM

**How does a Type III reaction proceed?**
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

**Type I reactions involve...** Anaphylaxis

**Type II reactions involve...** Cytotoxic antibodies

**Type III reactions involve...** Immune-complex reactions

**Type IV reactions involve...** Immune-complex reactions

Is the antibody involved in Type III IgE a la Type I, or IgG and IgM as in Type II?

IgG and/or IgM

How does a Type III reaction proceed?

Antibodies bind to antigens circulating in the bloodstream. The resulting Ab-Ag complexes get deposited somewhere (often on the lining of a blood vessel).
Is the antibody involved in Type III IgE a la Type I, or IgG and IgM as in Type II?
IgG and/or IgM

How does a Type III reaction proceed?
Antibodies bind to antigens circulating in the bloodstream. The resulting Ab-Ag complexes get deposited somewhere (often on the lining of a blood vessel). Once ensconced in tissue, the Ab-Ag complexes precipitate attacks on the tissue by PMNs.
Types II and III are easily confused with one another. *Note the key differences*: --In Type II, Ab attach to *cell-bound* Ag, whereas in Type III they attach to *circulating* Ag, and --
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

Type I reactions involve...
Anaphylaxis

Type II reactions involve...
Cytotoxic antibodies

Type III reactions involve...
Immune-complex reactions

Type IV reactions involve...

Types II and III are easily confused with one another. Note the key differences:
--In Type II, Ab attach to \textit{cell-bound} Ag, whereas in Type III they attach to \textit{circulating} Ag, and
--In Type II, the damage is caused by \textit{complement}, whereas in Type III it is caused by \textit{PMNs}
Hypersensitivity Reactions of the Ocular Surface

Anaphylaxis

Type I reactions involve... Anaphylaxis

Cytotoxic Ab

Type II reactions involve... Cytotoxic antibodies

Immune-complex reactions

Type III reactions involve... Immune-complex reactions

Type IV reactions involve... [Three words again]
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

- **Type I** reactions involve Anaphylaxis
- **Type II** reactions involve Cytotoxic antibodies
- **Type III** reactions involve Immune-complex reactions
- **Type IV** reactions involve Cell-mediated reactions
Hypersensitivity Reactions of the Ocular Surface

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- **Type I reactions** involve...Anaphylaxis
- **Type II reactions** involve...Cytotoxic antibodies
- **Type III reactions** involve...Immune-complex reactions
- **Type IV reactions** involve...Cell-mediated reactions

‘Cell-mediated reaction’…Which sort of immune cell is doing the mediating?
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

- **Type I** reactions involve...
  - Anaphylaxis
- **Type II** reactions involve...
  - Cytotoxic antibodies
- **Type III** reactions involve...
  - Immune-complex reactions
- **Type IV** reactions involve...
  - Cell-mediated reactions

‘Cell-mediated reaction’…Which sort of immune cell is doing the mediating?
T-helper cells
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

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Type I reactions involve...Anaphylaxis
Type II reactions involve...Cytotoxic antibodies
Type III reactions involve...Immune-complex reactions
Type IV reactions involve...Cell-mediated reactions

‘Cell-mediated reaction’…Which sort of immune cell is doing the mediating?
T-helper cells

In what way are T-helper cells mediating the reaction?
**Hypersensitivity Reactions of the Ocular Surface**

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- **Type I reactions involve...** Anaphylaxis
- **Type II reactions involve...** Cytotoxic antibodies
- **Type III reactions involve...** Immune-complex reactions
- **Type IV reactions involve...** Cell-mediated reactions

‘Cell-mediated reaction’...Which sort of immune cell is doing the mediating? T-helper cells

_In what way are T-helper cells mediating the reaction?_ In Type IV reactions, T-helpers interact with antigens, thereby becoming activated.
Hypersensitivity Reactions of the Ocular Surface

Anaphylaxis  Cytotoxic Ab  Immune-complex reactions  Cell-mediated reactions

Type I  Type II  Type III  Type IV

Type I reactions involve...Anaphylaxis
Type II reactions involve...Cytotoxic antibodies
Type III reactions involve...Immune-complex reactions
Type IV reactions involve...Cell-mediated reactions

‘Cell-mediated reaction’...Which sort of immune cell is doing the mediating? T-helper cells

In what way are T-helper cells mediating the reaction? In Type IV reactions, T-helpers interact with antigens, thereby becoming activated. Once activated, the T-helpers release chemotactic factors that recruit and activate macrophages.
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up:

Type I reactions involve...
Anaphylaxis

Type II reactions involve...
Cytotoxic antibodies

Type III reactions involve...
Immune-complex reactions

Type IV reactions involve...
Cell-mediated reactions

‘Cell-mediated reaction’...Which sort of immune cell is doing the mediating?
T-helper cells

In what way are T-helper cells mediating the reaction?
In Type IV reactions, T-helpers interact with antigens, thereby becoming activated. Once activated, the T-helpers release chemotactic factors that recruit and activate macrophages.

That’s a convoluted process. How long does it take to become clinically apparent?
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up

Type I reactions involve...
Anaphylaxis

Type II reactions involve...
Cytotoxic antibodies

Type III reactions involve...
Immune-complex reactions

Type IV reactions involve...
Cell-mediated reactions

‘Cell-mediated reaction’…Which sort of immune cell is doing the mediating?
T-helper cells

In what way are T-helper cells mediating the reaction?
In Type IV reactions, T-helpers interact with antigens, thereby becoming activated. Once activated, the T-helpers release chemotactic factors that recruit and activate macrophages.

That’s a convoluted process. How long does it take to become clinically apparent? 24-72 hours, which is why this reaction is often referred to as delayed hypersensitivity.
Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there? Divvy 'em up

**Type I reactions involve...** Anaphylaxis

**Type II reactions involve...** Cytotoxic antibodies

**Type III reactions involve...** Immune-complex reactions

**Type IV reactions involve...** Cell-mediated reactions

‘Cell-mediated reaction’...Which sort of immune cell is doing the mediating? T-helper cells

In what way are T-helper cells mediating the reaction? In Type IV reactions, T-helpers interact with antigens, thereby becoming activated. Once activated, the T-helpers release chemotactic factors that recruit and activate macrophages.

That’s a convoluted process. How long does it take to become clinically apparent? 24-72 hours, which is why this reaction is often referred to as **delayed hypersensitivity**.
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**Type I reactions involve...** Anaphylaxis  
**Type II reactions involve...** Cytotoxic antibodies  
**Type III reactions involve...** Immune-complex reactions  
**Type IV reactions involve...** Delayed hypersensitivity

‘Cell-mediated reaction’...Which sort of immune cell is doing the mediating?  
T-helper cells

*In what way are T-helper cells mediating the reaction?*  
In Type IV reactions, T-helpers interact with antigens, thereby becoming activated. Once activated, the T-helpers release chemotactic factors that recruit and activate macrophages.

That’s a convoluted process. How long does it take to become clinically apparent?  
24-72 hours, which is why this reaction is often referred to as *delayed hypersensitivity*.

*Note that if you remember Type IV as ‘delayed hypersensitivity’... the four forms can be remembered with the mnemonic ACID*
### Hypersensitivity Reactions of the Ocular Surface

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**Work down the list assigning each term to the form of hypersensitivity with which it is most closely associated**

- Histamine release
- Cicatricial pemphigoid
- Mast-cell degranulation
- Vasculitis
- Atropine
- Contact dermatitis
- Chemosis
- PK rejection
- SLE
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis
### Hypersensitivity Reactions of the Ocular Surface

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- **Type I**
  - Topical anesthetics

- **Type II**
  - Neomycin
  - Anaphylaxis
  - IgE
  - Histamine release
  - Cicatricial pemphigoid
  - Mast-cell degranulation
  - Vasculitis
  - Atropine
  - Contact dermatitis
  - Chemosis
  - PK rejection
  - SLE
  - Red exccematous periorbital skin
  - Peripheral ulcerative keratitis
  - Involves complement
  - Phlyctenulosis

**Next**
Hypersensitivity Reactions of the Ocular Surface

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**Anaphylaxis**
- Topical anesthetics
- Neomycin

**Cytotoxic Ab**
- Topical anesthetics
- Neomycin

**Immune-complex reactions**
- Anaphylaxis
- IgE
- Histamine release
- Cicatricial pemphigoid
- Mast-cell degranulation
- Vasculitis
- Atropine
- Contact dermatitis
- Chemosis
- PK rejection
- SLE
- Red exccematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis

**Cell-mediated reactions**
- Neomycin

Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there? Divvy 'em up.
Hypersensitivity Reactions of the Ocular Surface

Divvy 'em up

Anaphylaxis

Type I
- Topical anesthetics
- Anaphylaxis

Cytotoxic Ab

Type II

Immune-complex reactions

Type III
- IgE
  - Histamine release
  - Cicatricial pemphigoid
  - Mast-cell degranulation
    - Vasculitis
    - Atropine
  - Contact dermatitis
  - Chemosis
  - PK rejection
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  - Red excematous periorbital skin
  - Peripheral ulcerative keratitis
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Cell-mediated reactions

Type IV
- Neomycin
Hypersensitivity Reactions of the Ocular Surface

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**Histamine release**
- Cicatricial pemphigoid
- Mast-cell degranulation
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**Cicatricial pemphigoid**

- Mast-cell degranulation
- Vasculitis
- Atropine
- Contact dermatitis
- Chemosis
- PK rejection
- SLE
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
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Cicatricial pemphigoid *is now referred to by what name in the BCSC Cornea book?*

- Atropine
- Contact dermatitis
- Chemosis
- PK rejection
- SLE
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis
**Hypersensitivity Reactions of the Ocular Surface**

*Divvy 'em up*

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**Cicatricial pemphigoid is now referred to by what name in the BCSC Cornea book?**

*Mucous membrane pemphigoid (MMP)*

- Atropine
- Contact dermatitis
- Chemosis
- PK rejection
- SLE
- Red excematus periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis
### Hypersensitivity Reactions of the Ocular Surface

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Hypersensitivity Reactions of the Ocular Surface

Divvy 'em up

**Anaphylaxis**

*Type I*
- Topical anesthetics
  - Anaphylaxis
  - IgE
  - Histamine release
- Cicatricial pemphigoid
- Mast-cell degranulation

**Cytotoxic Ab**

*Type II*

**Immune-complex reactions**

*Type III*

**Cell-mediated reactions**

*Type IV*
- Neomycin

**Vasculitis**
- Atropine
- Contact dermatitis
- Chemosis
- PK rejection
- SLE
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis
Hypersensitivity Reactions of the Ocular Surface

Divvy ‘em up

**Anaphylaxis**
- Topical anesthetics
- Anaphylaxis
- IgE
- Histamine release
- Cicatricial pemphigoid
- Mast-cell degranulation

**Cytotoxic Ab**
- Type I
- Type II

**Immune-complex reactions**
- Type III
- Type IV

**Cell-mediated reactions**
- Neomycin

**Atropine**
- Contact dermatitis
- Chemosis
- PK rejection
- SLE
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
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- Phlyctenulosis
Hypersensitivity Reactions of the Ocular Surface

**Divvy ‘em up**

- **Anaphylaxis**
  - **Type I**
    - Topical anesthetics
    - Anaphylaxis
    - IgE
    - Histamine release
    - Mast-cell degranulation
  - **Type II**
    - Cytotoxic Ab
      - Topical anesthetics
    - Chemosis
    - PK rejection
    - SLE
    - Red excematous periorbital skin
    - Peripheral ulcerative keratitis
    - Involves complement
    - Phlyctenulosis
  - **Type III**
    - Immune-complex
      - Involves complement
      - Phlyctenulosis
  - **Type IV**
    - Cell-mediated reactions
      - Neomycin
      - Atropine
      - SLE
      - Red excematous periorbital skin
      - Peripheral ulcerative keratitis
      - Involves complement
      - Phlyctenulosis

**Contact dermatitis**

- Chemosis
- PK rejection
- SLE
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis
Hypersensitivity Reactions of the Ocular Surface

Divvy 'em up

Anaphylaxis

- **Type I**
  - Topical anesthetics
  - Anaphylaxis
  - IgE
  - Histamine release

- **Type II**
  - Cytotoxic Ab

- **Type III**
  - Immune-complex reactions
  - Cicatricial pemphigoid
  - Mast-cell degranulation

- **Type IV**
  - Cell-mediated reactions
  - Neomycin
  - Atropine
  - Chemosis
    - PK rejection
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    - Red excematous periorbital skin
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- **Anaphylaxis**
  - Topical anesthetics
  - Neomycin
  - Penetrating keratoplasty (PK = Penetrating keratoplasty; ie a corneal transplant)
- **Cytotoxic Ab**
  - Type I
  - Type II
  - Type III
  - Type IV
  - IgE
  - Histamine release
  - Mast-cell degranulation
  - Peripheral ulcerative keratitis
  - Involves complement
  - Phlyctenulosis
  - SLE
  - Red excematous periorbital skin
  - Chemosis
- **Immune-complex reactions**
  - Cyclosporine
  - Cicatricial pemphigoid
  - Atropine
  - Contact dermatitis
- **Cell-mediated reactions**
  - Neomycin
  - Vasculitis
  - Phlyctenulosis
Hypersensitivity Reactions of the Ocular Surface

Divvy ‘em up

**Anaphylaxis**
- Type I
  - Topical anesthetics
  - Anaphylaxis
  - IgE
  - Histamine release
  - Mast-cell degranulation

- Type II
  - Cytotoxic Ab

**Immune-complex reactions**
- Type III
  - Cicatricial pemphigoid
  - Histamine release

**Cell-mediated reactions**
- Type IV
  - Neomycin
  - Atropine
  - Contact dermatitis
  - PK rejection

- Chemosis

**SLE**
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis
Hypersensitivity Reactions of the Ocular Surface

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| **Type II** |             |                          |                        |
| Topical anesthetics |             |                          |                        |
| Anaphylaxis | IgE         |                          |                        |
| Histamine release |             |                          |                        |
| Mast-cell degranulation |             |                          |                        |
| Chemosis    |             |                          |                        |

| **Type III** |             |                          |                        |
| Cicatricial pemphigoid |             |                          |                        |
| Mast-cell degranulation |             |                          |                        |
| Chemosis    |             |                          |                        |

| **Type IV** |             |                          |                        |
| Neomycin    |             |                          |                        |
| Atropine    | Contact dermatitis |                          |                        |
| PK rejection |             |                          |                        |

**Red excematous periorbital skin**
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis

**TYPE I** - Type I Hypersensitivity Reactions
- Anaphylaxis
- Topical anesthetics
- Neomycin

**TYPE II** - Type II Hypersensitivity Reactions
- Cytotoxic Ab
- IgE
- Histamine release

**TYPE III** - Type III Hypersensitivity Reactions
- Immune-complex reactions
- Mast-cell degranulation

**TYPE IV** - Type IV Hypersensitivity Reactions
- Cell-mediated reactions
- Neomycin
- Atropine
- Contact dermatitis
- PK rejection

**Common signs and symptoms**
- Red excematous periorbital skin
- Peripheral ulcerative keratitis
- Involves complement
- Phlyctenulosis

**SLE**

Firstly: How many hypersensitivity reactions of the ocular surface are there? Divvy 'em up.
Hypersensitivity Reactions of the Ocular Surface

Divvy ‘em up

**Anaphylaxis**

*Type I*
- Topical anesthetics
  - Anaphylaxis
  - IgE
- Histamine release
- Mast-cell degranulation

*Type II*
- Cytotoxic Ab
- Neomycin

*Type III*
- Immune-complex reaction
- Cicatricial pemphigoid
- Chemosis
- Red ecematous periorbital skin

*Type IV*
- Cell-mediated reaction
- Vasculitis
- Atropine
- Contact dermatitis
- PK rejection
- SLE

Peripheral ulcerative keratitis
- Involves complement
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Hypersensitivity Reactions of the Ocular Surface

Divvy 'em up

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**Cytotoxic Ab**
- Type II
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**Immune-complex reactions**
- Type III
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**Cell-mediated reactions**
- Type IV
  - PK rejection
  - SLE
  - Neomycin
  - Contact dermatitis
  - Atropine
  - PK rejection
  - Red excematous periorbital skin
  - Peripheral ulcerative keratitis
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Firstly: How many Hypersensitivity Reactions of the Ocular Surface are there?

Divvy 'em up
Hypersensitivity Reactions of the Ocular Surface

Divvy 'em up

Anaphylaxis

- **Type I**
  - Topical anesthetics
  - Anaphylaxis
  - IgE
  - Histamine release

- **Type II**
  - Cytotoxic Ab
  - Topical anesthetics
  - IgE
  - Histamine release

Immune-complex reactions

- **Type III**
  - Cicatricial pemphigoid
  - Mast-cell degranulation

- **Type IV**
  - Neomycin
  - Atropine
  - Contact dermatitis
  - PK rejection
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  - Red exematous periorbital skin
  - Peripheral ulcerative keratitis
  - Phlyctenulosis

Cell-mediated reactions
Hypersensitivity Reactions of the Ocular Surface

Divvy ‘em up

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Anaphylaxis
Topical anesthetics
Anaphylaxis
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Mast-cell degranulation
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