Contact Lenses and Allergies

Help stop the cries from red itchy eyes!

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There are more than 75 million contact lens wearers in the world and more than 31 million wearers in the United States alone. Each year 3.8 million patients join the contact lens market, but there are also more than 3 million dropouts. There are many reasons for contact lens dropouts, but the majority of these wearers drop out because of ocular discomfort and dryness. Specifically, out of the 3 million dropouts, approximately 51 percent were because of discomfort and 40 percent because of dryness. Ocular allergies cause many of these patients to discontinue contact lens wear either temporarily or permanently. Practice management studies have shown that patients who wear contact lenses are 60 percent more profitable in our offices over a 10-year period than just spectacle lens wearers alone. So how can we keep patients happy wearing contact lenses? This article will cover basic anatomy of the eye tissue affected by allergies, the cascade of events that occur during an allergic attack, different types of allergies, medications used to treat allergies, and helpful pearls of advice to keep patients happy with their contact lenses.

Anatomy:

First, conjunctivitis means inflammation of the conjunctiva. The conjunctiva can be split into two categories: palpebral and bulbar. The palpebral conjunctiva consists of the innermost tissue of the upper and lower lids and is the tissue that touches the surface of the eye. To examine the upper palpebral conjunctiva or tarcel plate, one must first evert the upper lid. The lower palpebral conjunctiva can be easily viewed by simply pulling down the outer skin of the cheek bone. The bulbar conjunctiva is defined as the thin membrane that covers the whites of the eyes.

Background:

Our immune system is very vital for protecting us against infection. Part of this immune process is the reaction to substances that our bodies consider foreign. These substances are called allergens. Allergic conjunctivitis is where a hypersensitivity or heightened reaction occurs to an allergen such as pollen, grass, mold, trees, dust mites, animal dander and many other environmental substances that irritate our conjunctiva. Hypersensitivity means that the body responds to a particular substance called an allergen in an exaggerated form that usually does not occur in normal circumstances. There are mainly two types of ocular allergic reactions or hypersensitivities that can occur in the eye.
Types of reactions:

**Type I Reactions:**

Type I reactions are categorized by acute onset of itching, redness, watering, and swelling. Type I is an immunoglobin IgE cell mediated response. Type I is diagnosed as perennial and seasonal allergic conjunctivitis. The reaction may be either localized, confined to the site of the allergen, or systemic, involving other tissues or the whole body. Symptoms vary from mild irritation to sudden death from anaphylactic shock (airways become blocked).

Type I hypersensitivities are mediated by immunoglobulin IgE in our immune system. Once IgE targets a substance, whether harmful or not, it classifies that substance as an antigen. When IgE targets that antigen, mast cells inside our body release special granules inside of them (degranulation). Mast cells are the primary cells involved. There are about 50 million mast cells in the human eye. About 90 percent of the 50 million mast cells are concentrated in the limbal bulbar conjunctiva (the conjunctiva just adjacent to the cornea) and upper lid. Mast cell degranulation releases chemicals into the bloodstream. These chemicals are histamine and leukotrienes, which are responsible for the allergic reaction. Histamine is the principal mediator of allergic conjunctivitis. When it is released into the tissue, it causes vasodilatation (increase in blood vessel size) and erythema (redness), increased vascular permeability (edema), increased secretion of mucous, and neural stimulation (itching - the hallmark of allergy)! See Figure 1.

![Figure 1](image-url)
**Type I Example: Hay Fever**

The most common ocular allergic reaction is known as seasonal allergic conjunctivitis (SAC) or hay fever. SAC typically occurs when pollen counts are high. SAC is a type I reaction. Predominant symptoms include itchy, watery eyes with a burning sensation. The conjunctiva tends to be variably injected and edematous. Lid swelling and increased papillae size of the upper palpebral conjunctiva may develop. Venous congestion may cause dark circles beneath the eyes. These patients rarely experience corneal involvement.

Perennial allergic conjunctivitis (PAC) is similar to SAC, but tends to be chronic and less severe. Airborne allergens associated with this disorder include animal dander, dust and feathers. The symptoms usually persist year round, but can occur seasonally.

**Type IV Reactions:**

Type IV hypersensitivity reactions often are called delayed type because the reaction takes two to three days to develop. Unlike the other types, it is not antibody mediated but rather is a type of T-cell-mediated response. Type IV reactions may result in chronic inflammatory conditions, such as fluid retention (chemosis), lid hyperemia or redness, conjunctival injection or redness, and even orbital swelling. Type IV is diagnosed as contact dermatitis (poison ivy rash) and atopic dermatitis (eczema) that can occur from a preservative response in glaucoma medications and other ocular skin creams.

**Type IV Example: Giant Papillary Conjunctivitis**

Giant Papillary Conjunctivitis (GPC) is a well-known complication of contact lens wear. Patients exhibit papillae or bumps 0.3 mm in diameter or larger on the upper tarsal conjunctiva. These bumps can be viewed by everting the upper lid of each eye. GPC is associated with symptoms of itching, contact lens intolerance, blurred vision, increased mucus and/or conjunctival injection. An important question to ask the patient is if they are complaining of increased lens movement.

GPC patients usually have either coated or deposit-laden contact lenses. Most likely it’s this altered contact lens surface that initiates the allergic reaction. But other contributing factors may be the lens material itself, trauma from the lens edge, or an abnormal lens-cornea-conjunctiva relationship. The one true cure for GPC is to discontinue contact lenses. However, there are steps the clinician can take to keep these patients wearing contact lenses. In moderate to severe cases, have the patient discontinue lens wear for three to four weeks, perhaps with topical medications. The patient may resume lens wear once the condition resolves.

**Type IV Example: Contact Lens Solutions Hypersensitivity Reactions**

Patients may experience an allergic reaction to cosmetics, lotions, ophthalmic medications and contact lens solutions. The conjunctiva can be hyperemic or red. Specifically, the palpebral conjunctiva, primarily the inferior, may show a follicular or papillary response.
Genetics:

Genetic predisposition is a key factor in whether a patient will develop ocular allergy. If one parent is allergic, a person is four times more likely to manifest allergy. If both parents are allergic, a person is 10 times more likely to manifest allergy.

Cascade of Events: Patient Experience

There are two phases to an allergic reaction: initial phase response and late phase response. The initial phase takes place within the first 15 minutes once in contact with the allergen and lasts two to four hours. During this time, mast cell degranulation takes place. Late phase occurs four hours after allergen contact and can last 12 to 24 hours. Let’s explain what a patient may go through in a day of allergies.

When a patient is exposed to these allergens, the immune system identifies these antigens and then attacks them. The response in the eye is nearly immediate. First, itching sets in. It can become persistent and extremely bothersome if exposure to the allergen is continued. The next symptom the patient will report is redness of the eyes. The redness can last somewhat longer than the itching, as the blood vessels of the eyes are slower to recover. The swelling of the eyes and eyelids comes to its peak later than the itching, as swelling is also caused by the blood vessels letting fluids out into the tissue around them. The slowest sign of ocular allergies to disappear is swelling because the body must resorb this excess fluid in tissues. Itching is the hallmark sign of allergies and can be considered the most uncomfortable symptom. But the swelling or edema and redness are most bothersome in terms of appearance to the patient. If the patient is wearing contacts, the allergen binds to the contact lens surface, developing a lens awareness that the patient didn’t notice before these events took place. Every time the patient blinks, the palpebral conjunctiva, more specifically the superior tarsal plate, is continually smeared with the allergen. Now the patient is very uncomfortable, wanting to scratch the red, swollen eyes. With red, itchy eyes, the patient searches for a medication to relieve the symptoms.

Medications Used for Allergies:

**Decongestants** – Decongestants are also called vasoconstrictors because they constrict blood vessels. Specifically, they constrict blood vessels in the nose to relieve a stuffy nose and the blood vessels in the eye to reduce redness. Vasoconstriction also reduces swelling because the blood flow is reduced to that area, thus less histamines can target that particular tissue. Patients can buy some decongestants without a prescription. The most common types are pseudoephedrine (Sudafed®) and phenylephrine (Neo-Synephrine®). A physical dependence can develop with extended use of the decongestants because the blood vessels can become dependent on the vasoconstrictor eye drops to stay small. When a patient discontinues the eye drops, the vessels actually get bigger than they were originally. This is called rebound hyperemia, and the result is more redness than at the start of the allergic reaction.
Decongestants make your blood vessels smaller, so you should not take a decongestant if you have heart disease, high blood pressure, glaucoma, thyroid disease, asthma, or diabetes. It is important to understand that decongestants may cause a rebound effect and do not treat the underlying cause.

**Antihistamines** – Antihistamines block the effect of histamine. Antihistamines help dry up a runny nose, but they also dry the surface of the eye out. Once the surface of the eye becomes dry it becomes easy for allergens to stick or bind to the surface, causing the allergic cascade of events to continue. Common antihistamine medicines are diphenhydramine (Benadryl®), chlorpheniramine (Chlor-Trimeton®), cetirizine (Zyrtec®), fexofenadine (Allegra®), loratadine (Claritin®), and desloratadine (Clarinex®). A common side effect of antihistamines is drowsiness. Some types are less likely than others to make you drowsy. Taking antihistamines with other medicines, such as antidepressants or sedatives, may cause problems. Read the labels carefully. Ask your provider or pharmacist if you have any questions. Once again, antihistamines do not treat the underlying cause.

**Mast cell stabilizers** – Mast cell stabilizers prevent mast cell degranulation, therefore eliminating the allergic response all together, but they may take several days to a week in order to achieve full efficacy. This will leave the patient still wanting a faster course of action to alleviate their immediate symptoms. There are very few side effects from mast cell stabilizers, and those side effects are very mild.

**NSAIDS** – Nonsteroidal anti-inflammatory drugs or NSAIDs inhibit the cyclo-oxygenase pathway and prevent the formation of prostaglandins. Because prostaglandins potentiate sensory neural response, inhibiting their formation reduces the sensation of pain and itching. Dosing can range from one to four drops per day depending upon the severity. Anyone who is allergic to aspirin or to other oral NSAIDs should not use these topical agents.

**Corticosteroids** - Corticosteroids inhibit both the early and late phases of inflammation by reducing vascular permeability, thus lessening associated edema. They inhibit the activity of phospholipase, which results in blocking the conversion of arachidonic acid into prostaglandin, and other allergy mediators. Thus, they reduce many of the signs and symptoms of long-term inflammation. Corticosteroids have many side effects such as increased intraocular pressure, cataracts, and altered glucose metabolism.

**Treatment:**
The first line of treatment for patients who suffer from allergies is avoidance of the allergen. Usually that cannot be avoided completely but sometimes can be isolated to very mild exposure. For very mild ocular allergies, a cold compress and artificial tear drops are recommended. Artificial tears can temporarily wash allergens from the eye and also moisten the surface of the eye so the allergen does not stick to the tissue or contact lens. These eye drops can be refrigerated to provide additional comfort and are safe and can be used as often as necessary. Some brands of artificial tear drops that can be used without contact lenses are Refresh Tears®,
Systane®, Bion® Tears, Tears Naturale®, and TheraTears. Instruct patients to wait 10 minutes before inserting their contact lenses when using these drops. Preservative-free artificial tears are recommended when the patient has a known allergy to a preservative. Some brands of artificial tears that can be used with contact lens wear are Blink-n-Clean®, Clerz®, and Refresh Contacts®.

When a patient encounters an allergen, usually the first reaction is to find an over-the-counter (OTC) eye drop at the nearest neighborhood pharmacy. OTC allergy drops help alleviate red, itchy eyes. These drops are commonly used for short-term relief of some eye allergy symptoms. However, they may not relieve all symptoms because most OTC eye drops are weak and must be used frequently (four to six times a day). Using four to six drops per day does not allow for a successful contact lens wearing schedule to be achieved. Usually OTC allergy drops either contain antihistamines, decongestants, or both. Prolonged use of some OTC eye drops may actually cause the condition to become worse. It can actually lead to increased swelling and redness that may last even after discontinuing the drops. This is called rebound hyperemia as described above in the decongestant drug mechanism of action. Another option is OTC oral antihistamines, which can be mildly effective in relieving the itching associated with eye allergies. However, these oral medications take longer to respond than topical medications and may also cause dry eyes and potentially may worsen the allergic response due to the decongestant ingredient they contain.

Doctor-prescribed medications such as prescription eye drops, over-the-counter eye drops, or orally prescribed medications are the best option when treating and monitoring eye allergies. The doctor is able to perform a careful case history of the patient’s lifestyle, carefully examine the ocular tissue using the slit lamp, and make any necessary referrals to an allergist when indicated. In most cases, the chief complaint is the most important information necessary to accurately treat the patient’s condition. If the patient complains of severe itching, redness, and watering, then a corticosteroid might be indicated for two to three days without wearing contact lenses to ease the allergic response. Once the patient’s ocular symptoms have subsided to a mild allergic state, then an antihistamine/ mast cell combination drop may be prescribed and contact lens wear may be resumed. Each patient’s treatment period will be different and catered to fit the patient’s exact symptoms and signs. Dosing for prescription eye drops can be as little as one drop daily, which is very convenient for contact lens wearers. These newer eye drops that are once- a-day and twice-a-day dosing contain both a mast cell stabilizer and an antihistamine. Pataday™ is a prescription eye drop that is indicated for once a day dosing and is very convenient for contact lens wearers. Patanol® (by prescription only) and Zaditor® (OTC) are both twice-a-day medications that can be used with contact lens wearers before and after their daily wearing schedule. All three of these medications are mast cell stabilizers and antihistamine combinations. This is an ideal combination when treating allergies because the antihistamine reduces the itching immediately and the mast cell stabilizer treats the underlying mast cell degranulation.
**Summary:**

Allergies can be very devastating to a contact lens patient. With the right treatment regimen and understanding of the patient’s goals for contact lens wear, a therapy can be started that will keep the patient happy. Doctor-prescribed allergy eye drops provide both short-term and long-term targeted relief of eye allergy symptoms, and they can be used to manage eye allergy symptoms in conjunction with oral medications that might be taken to manage more severe allergic reactions throughout the entire body. Contact lens wearers must understand if they are taking a medication that contains an antihistamine (oral or topical), it will dry out their eyes and make the contact lenses more uncomfortable. Supplementing a mast cell stabilizer/antihistamine combination allergy eye drop with an OTC lubrication eye drop for contact lenses will keep the ocular tissue and contact lens wet while continuing to wash out the allergen. Using these tips and understanding how each drug is used to treat allergies will allow patients to continue to have confidence in the practice and return for annual comprehensive exams and contact lens fittings.

**References**


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1. The principal chemical responsible for itchy, redness, and edema in an allergic reaction is:
   A) Leukotrienes
   B) Prostaglandins
   C) Cyclo-oxygenase
   D) Histamine

2. Decongestants:
   A) Clear up a stuffy nose
   B) Cause vasodilation of blood vessels
   C) Cause vasoconstriction of blood vessels
   D) Both A and C

3. The first line of defense when managing a patient with a history of allergies is:
   A) Steroids
   B) Antihistamines
C) Avoidance of allergen
D) Cool Compresses

4. The hallmark sign of allergies is:
   A) Dryness
   B) Itching
   C) Redness
   D) Watering

5. The immunoglobin responsible for Type I reactions is:
   A) IgM
   B) T-cell
   C) IgG
   D) IgE

6. A patient that uses an OTC decongestant to frequently may experience a __________ once the medication is discontinued:
   A) Rebound effect
   B) Withdrawl
   C) Paranoia
   D) Insomnia

7. Corticosteroids act by:
   A) Inhibiting protein synthesis
   B) Stabilizing the mast cell
   C) Interrupting DNA replication
   D) Inhibit activity of phosolipase

8. All medications treat allergy symptoms and not the underlying condition except:
   A) Corticosteroids
   B) Antihistamines
   C) Mast cell stabilizers
   D) NSAIDS
9. A medication that is convenient to use with contact lens wearers that requires only once a day eye drop dosing is:
   A) Zaditor
   B) Pataday
   C) Patanol
   D) Claritin

10. Artificial tears are nice to use when treating allergies because:
   A) Artificial tear drops wet the surface of the eye thus not allowing the allergen to bind to the ocular tissue as easy
   B) Artificial tear drops reduce the redness by causing vasoconstriction of the blood vessels
   C) Artificial tear drops reduce the itching by blocking the effect of histamine
   D) Artificial tear drops help stabilize the mast cell