

## Dry Eye Syndrome

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### What Is Dry Eye Syndrome?

To help keep your eyes comfortable and your vision optimal, a normal, thin film of tears coats your eyes. Three main layers make up this tear film:

- The innermost layer is the thinnest. It is a layer of mucin (or mucus). This very thin layer of mucus is produced by the cells in the conjunctiva (the clear skin that lines the eye). The mucus helps the overlying watery layer to spread evenly over the eye.
- The middle (or aqueous) layer is the largest and the thickest. This layer is essentially a very dilute saltwater solution. The lacrimal glands under the upper lids and the accessory tear glands produce this watery layer. This layer's function is to keep the eye moist and comfortable, as well as to help flush out any dust, debris, or foreign objects that may get into the eye. Defects of the aqueous layer are the most common cause of dry eye syndrome, also referred to as keratoconjunctivitis sicca (KCS).
- The most superficial layer is a very thin layer of lipids (fats or oils). These lipids are produced by the meibomian glands and the glands of Zeis (oil glands in the eyelids). The main function of this lipid layer is to help decrease evaporation of the watery layer beneath it.

Dry eye syndrome (DES) is a common condition of the tear film, affecting a significant percentage of the population, especially those older than 40 years of age. DES can affect any race and is more common in women than in men.

### What Are Causes of Dry Eye Syndrome?

Dry eye syndrome is a common disorder of the normal tear film that results from one of the following:

- Decreased tear production
- Excessive tear evaporation
- An abnormality in the production of mucus or lipids normally found in the tear layer

Aqueous (watery) tear deficiency is caused by either poor production of watery tears or excessive evaporation of the watery tear layer.

- Poor production of tears by the tear glands may be a result of age, hormonal changes, or various health conditions like autoimmune diseases such as primary Sjogren syndrome, rheumatoid arthritis, or lupus.
- Evaporative loss of the watery tear layer is usually a result of an insufficient overlying lipid layer.
- Some medications, such as antihistamines, antidepressants, beta-blockers, and oral contraceptives, may decrease tear production.

If blinking is decreased or if the eyelids cannot be closed, the eyes may dry out because of tear evaporation.

- When you read, watch TV, or perform a task that requires close attention with your eyes, you may not blink as often. This decreased blinking allows excessive evaporation of the tears.
- Certain health conditions, such as stroke or Bell's palsy, make it difficult to close your eyes on your own. As a result, your eyes may become dry from tear evaporation.

Abnormal production of mucin by the conjunctiva may occur.

- This can result from chemical (alkali) burns to the eye or as a result of different health conditions, such as Stevens-Johnson syndrome and cicatricial pemphigoid.
- This abnormal production of mucin leads to poor spreading of the tears over the surface of the eye. The surface of the eye can dry out and even become damaged, even though more than enough watery tears may be present.

Insufficient lipid layers are the result of meibomian gland dysfunction, as with rosacea or as a result of taking oral isotretinoin medication.

- Meibomian glands are the oil glands in the eyelids that produce the lipid layer.
- If the oil glands become blocked or if the oil is too thick, there may not be enough oil to cover the watery tear layer to prevent its evaporation.
- Also, if an infection is present along the eyelids or the eyelashes, called blepharitis, the bacteria may breakdown the oil so there may not be enough oil.

#### What Are Signs and Symptoms of Dry Eye Syndrome?

If you have DES, you may also experience the following symptoms:

- Dry, gritty/scratchy, or filmy feeling in the eyes
- Burning or itching in the eyes
- Redness of the eyes
- Blurred vision
- A sensation of having a foreign body in the eyes
- Light sensitivity

Symptoms seem to worsen in dry climates, in windy conditions, with higher temperatures, with lower humidity, with prolonged use of your eyes (for example, reading, watching TV), and toward the end of the day.

Sometimes a symptom of DES may actually be intermittent excessive tearing with DES. When your eye becomes slightly dry and irritated, it may initiate reflex tearing with production of a large amount of tears all at once to try to get moist and comfortable again. Unfortunately, your eye can only handle so many tears at any one time; the rest pour over your eyelids and down your cheeks. Those tears that pour down your cheeks do not help your eyes and are wasted. A short time later, your eyes will become slightly dry and irritated again, and the whole process may repeat itself.

#### When Should Someone Seek Medical Care for Dry Eye Syndrome?

If you routinely experience any of the following symptoms, you should probably see your ophthalmologist (a medical doctor who specializes in eye care and surgery):

- eye pain,
- excessive tearing,
- dry, gritty/scratchy, or filmy feeling in the eyes,
- burning or itching of the eyes,
- redness of the eyes,
- blurred vision,
- a sensation of having a foreign body in the eyes, or
- light sensitivity.

#### What Questions Should People Ask Their Doctor About Dry Eye Syndrome?

- Is there a specific cause for my dry eyes?
- What is the most effective treatment for my dry eyes?
- Is there anything I can do to decrease the need for eyedrops or artificial tears?

#### What Exams and Tests Diagnose Dry Eye Syndrome?

During your eye examination, your health care professional will most likely be able to diagnose dry eye syndrome just from hearing your complaints regarding your eyes. As part of your eye examination, the doctor may also perform the following tests.

- The front of your eyes are examined using a special microscope, called a slit lamp microscope.
  - The amount and thickness of the tear film are inspected.
  - The stability of the tear film is assessed by checking the tear break-up time.
  - The conjunctiva is examined to determine if it is too dry.
  - The cornea is checked to see if it has dried out or become damaged.
- Different dyes may be used during your eye examination.

- Fluorescein is a yellow dye that stains the cornea where the epithelial (surface) cells have been worn away because of the lack of an adequate protective tear film.
- Rose Bengal is a red dye that stains the cornea and the conjunctiva where the cells are dead or dying as well as where healthy cells are inadequately protected by the tear film.
- Lissamon Green is a green dye which likewise can help differentiate between normal and abnormal surface cells of the cornea and conjunctiva.
- Schirmer tests measure the amount of tears produced by your eyes. Your ophthalmologist places the end of a thin strip of filter paper just inside the lower eyelid. After a minute, the filter paper is removed and the amount of wetting is measured. Less wetting of the filter paper is more indicative of DES.
- The osmolarity (salt content) of the tears may be measured. This is a newer test which has been developed to aid in the diagnosis of DES.
- If autoimmune diseases are suspected as a cause of DES, blood tests may be performed. These blood tests check for the presence of different autoantibodies that may be associated with DES.
- Rarely a biopsy of the salivary glands may be performed. Certain disease processes affect both the salivary glands, which produce saliva in your mouth, and the lacrimal glands, which produce tears.

### Are There Home Remedies for Dry Eye Syndrome?

To help alleviate your symptoms from DES, you may want to try these self-help tips at home.

- A humidifier puts more moisture in the air. With more moisture in the air, your tears evaporate more slowly, keeping your eyes more comfortable. Both furnaces in the winter and air conditioning in the summer decrease the humidity in the air.
- Excessive air movement dries out your eyes. Avoid having excessive air movement by decreasing the speed of ceiling fans and/or oscillating fans.
- Large amounts of dust or other particulate matter in the air may worsen the symptoms of dry eye. In those situations, an air filter may be helpful.
- Hot compresses and eyelid scrubs/massage with baby shampoo help by providing a thicker, more stable lipid layer. This is especially helpful if you have meibomian gland dysfunction, rosacea, or blepharitis. The heat warms up the oil in the oil glands, making it flow more easily; the massaging action helps get the oil out of the glands. The cleansing action decreases the number of bacteria that break down the oil.
- Artificial tears and lubricating eye drops and gels (available over the counter) help provide more moisture and lubrication for the surface of your eye. They are typically used about four times a day, but they can be used as often as needed. Preservative-free solutions are recommended if you wish to use artificial tears more than six times a day. There is no single over-the-counter drop that is best for everyone. Each individual will determine which drop provides the most relief from symptoms. Some drops may have a longer effect than others.
- Lubricating eye ointments are much thicker than eye drops and gels. Because ointments are so thick, they last much longer than eye drops and gels. However, because of their thickness, ointments may blur your vision if used during the day. Therefore, they are typically used to lubricate the eyes overnight while you are asleep.
- If you notice your eyes are dry mainly while you are reading or watching TV, taking frequent breaks to allow your eyes to rest and become moist and comfortable again is helpful. Closing your eyes for 10 seconds every five to 10 minutes will increase your comfort, as will blinking more frequently.

### What Are Medical Treatment Options for Dry Eye Syndrome?

Although no cure exists for DES, many types of treatment are available. Treatment is dependent on the severity of DES; you may only require a humidifier or occasional eyedrops, or you may require surgery to help treat DES.

Over-the-counter lubricating eyedrops, commonly referred to as artificial tears, may help relieve your dry eyes. Some examples of these products include 20/20 Tears, Celluvisc, Comfort Tears, Dry Eyes, Murine, Refresh, and Tears Naturale. Your ophthalmologist may also prescribe medications to help with DES.

### What Medications Treat Dry Eyes?

Certain types of prescription medications may help with DES.

- Eye lubricants may be prescribed, including eye inserts. Cellulose is contained in the insert and acts to stabilize and thicken the film of tears over the eyes and to prolong the time the tear film works. The artificial tear insert must be properly inserted, otherwise corneal abrasion may occur.
- Cyclosporine A 0.5% (Restasis) helps decrease any inflammation on the surface of your eye. This inflammation is thought to decrease the ability of

your eyes to maintain a healthy tear film. Used twice a day, cyclosporine 0.5% helps you make healthier tears on your own.

- Corticosteroid drops (Lotemax, Alrex, FML, Vexol), either alone or used in conjunction with Cyclosporine, reduce signs and symptoms of dry eye. Although the FDA has not yet approved this group of drops for the treatment of DES, they are being successfully used by many ophthalmologists. Corticosteroid drops, if used in excess, may have some health side effects, but new formulations with fewer side effects have become available. Like all medications, these should only be used under your doctor's supervision and according to her or his instructions.
- Nonsteroidal anti-inflammatory drops (Voltaren, Acular, Nevanac, Xibrom) likewise reduce the inflammation associated with DES.
- Antibiotics are used if you have blepharitis or meibomian gland dysfunction.
  - Antibiotic ophthalmic ointments, such as erythromycin and bacitracin, among others, are used at night for about seven to 10 days to decrease the number of bacteria that break down the lipid layer of your tear film. These ointments also lubricate your eyes overnight.
  - Oral antibiotics, particularly tetracycline and doxycycline, not only help to decrease the number of bacteria but also help to make the oil more fluid so it flows out of the oil glands more easily. This is often used if you have rosacea. There are many people who have rosacea of the eyelids and do not have the typical changes of rosacea on the rest of the face.

#### When Is Surgery Appropriate for Dry Eye Syndrome?

Different minor surgical procedures may help in the medical treatment of DES.

- Near the inner corner of each eyelid are small openings, called punctae, that are the beginning of the normal tear drainage system. A procedure known as punctal occlusion can help by decreasing the normal drainage of your tears off the eye and down the tear drainage system, into the back of your nose, and down your throat. This occlusion is usually a very simple office procedure and only takes a few minutes.
  - Different punctal plugs or lacrimal canalicular plugs can be placed at or just inside these openings to block the normal drainage of tears down the tear drainage system. Just like a stopper that you put in the drain of a sink to keep the water from flowing down the drain, these plugs keep the tears that you have from flowing down the tear drainage system. Therefore, your eyes stay more moist and comfortable, even if you have fewer tears. These plugs can usually be removed very easily, if necessary.
  - Sometimes, in severe cases of DES, these openings are permanently closed, usually by cautery (burning) or laser. This accomplishes the same thing as the plugs, but it is very difficult, if not impossible, to reverse.
- If you have difficulty closing your eyes for any reason, your eye may dry out because of tear evaporation.
  - Lateral tarsorrhaphy is a procedure during which the lateral (outside) one-third of your eyelids are sewn together to decrease the ability of your eye to open widely and to help your eye close more easily.
  - If stroke or nerve damage keeps your eyelids from closing properly, a small gold weight may be implanted into your upper eyelid to help it close.

#### Other Therapy

Sometimes, people sleep with their eyes slightly open. If you do sleep this way, you might want to actually tape your eyes shut at night.

Moisture chambers are plastic shields (similar to swim goggles) that help keep the eyes from drying out by decreasing the evaporation of tears off the eye. The moisture chambers may be used just at night if you sleep with your eyes slightly open, or they may be used all day, if necessary.

#### Follow-up

If you have mild DES, you may only need annual follow-up examinations with your ophthalmologist.

If you have more serious DES, more frequent follow-up appointments are required, based on the severity of your disease.

#### Is It Possible to Prevent Dry Eyes?

DES cannot be prevented. If you develop DES, you can help decrease its effects through some of the self-care suggestions listed above.

#### What Is the Prognosis for Dry Eye Syndrome?

Most people with DES have nothing to worry about more than an annoying inconvenience. Although your symptoms might make activities of daily living (for example, reading, watching TV, driving) difficult for you, no long-term vision loss is to be expected. Sever DES may cause more serious complications.

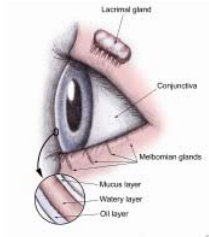
#### Dry Eye Syndrome Support Groups and Counseling

Support groups and counseling for people with DES are available through various organizations specializing in eye care.

#### Where Can People Get More Information About Dry Eye Syndrome?

American Academy of Ophthalmology  
655 Beach Street  
Box 7424  
San Francisco, CA 94120  
415-561-8500

#### Dry Eye Syndrome Picture



Dry eye syndrome is a common disorder of the tear film, which is made up of three layers, consisting of mucus, a very dilute saltwater solution, and fats or oils.

Medically reviewed by William Baer, MD; Board Certified Ophthalmology

#### REFERENCE:

"Dry eyes"  
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