



NANOS

Patient

Brochure

Dry Eye Syndrome

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Dry Eyes

Your doctor thinks you may have dry eyes. The tear film is a complex mixture of water and chemicals that moisturize and protect the eye. The tear film also acts as a focusing surface for the eye. People with abnormalities of the tear film are diagnosed with “dry eyes”, but some patients with “dry eyes” may not feel that their eyes are “dry”. Itching, burning, a scratchy sensation, a sensation that there is sand or grit in the eye, or intermittent blurring of the vision can all be symptoms of “dry eyes”. There are a number of treatments, medications, and procedures that can alleviate dry eye symptoms. Your doctor can help you determine which treatment is best for you.

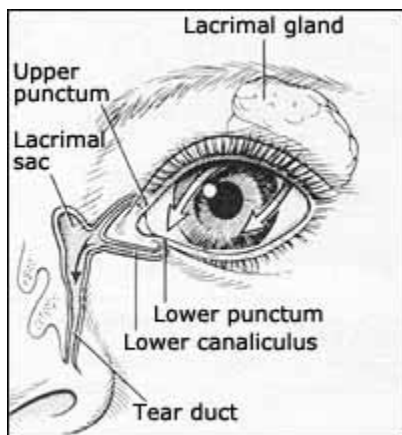
Tears are not just made of salt water. The tear film can be thought of as a three-layer sandwich. There’s “mucin” on the bottom, salt water in the middle, and a layer of “lipid” on the top. All three layers have to work properly to protect and moisturize your eye. A problem with any of these three layers can result in “dry eye syndrome.” What are these layers made of?

The mucin layer

The mucin layer contains mucous that forms a bond between the salt water and the front surface of the eye. The mucin layer stabilizes the tear film and prevents bacteria and debris from adhering to the eye.

The aqueous layer

The salt water, or aqueous layer, contains much more than salt and water. It also has proteins such as immunoglobulins, that help prevent infections, and lysozyme that digests harmful proteins secreted by bacteria.



This figure shows the relationship between the left eye, lacrimal gland, puncta, and lacrimal sac. The salt water component of the tear film is secreted by the lacrimal gland. It sits just above the eye, behind the eyelid, within the eye socket. Blinking of the eyelids brings the fresh tears down, onto the surface of the eye. The tears then drain through two holes, or “puncta”. The upper eyelid of each eye has a punctum and the lower eyelid of each eye has a punctum. The puncta are then connected by a tiny plumbing system that connects to the lacrimal sac, situated between the eye and the side of the nose. From there, the tears drain into the nose. That’s why when you cry, your nose runs.

The lipid layer

Lipids can be thought of as fats and oils. They help prevent evaporation of the tear film and increase spreadability of the tear film. Like mucins, they also work to stabilize the tear film on the surface of the eye. A healthy lipid layer also prevents mechanical irritation from the eyelids as you blink. All of these functions help to keep the tear film smooth and continuous, protecting the surface of the eye and ensuring an optically clear focusing surface for the eye.

Blinking and the Tear Film

Your eyelids can be thought of as the windshield wipers that spread the tear film evenly over the surface of the eye. Any problems with the eyelids can affect the tear film and prevent the tear film from functioning properly. Examples include conditions where the eyelids do not completely close. Scarring of the eyelids from injuries can also impair proper eyelid function.

Symptoms of Dry Eye

Patients with dry eyes may experience different symptoms, depending on which tear film layers are affected. Some people have a sensation that their eyes feel “dry”, but many do not have this sensation. Some people experience itching, scratchiness, burning, or a sensation that there’s something in their eye (“foreign body sensation”). Others have symptoms of visual blurring, or even double vision.

How can a problem with the tear film cause blurry or even double vision? The tear film is also an important focusing surface for the eye, sort of like a “water lens”. Any problem that makes the tear film uneven or unstable, can lead to problems with focusing. A common complaint of people with dry eye syndrome is that when they read, their vision is clear at first, but after reading for 10 or 20 minutes, their vision becomes blurry and they can no longer see clearly.

Why Are My Eyes Dry?

Because the tear film is complex, there are a number of different problems that can cause dry eye. Here are just a few examples.

Environmental causes

People who live in dry climates are more likely to be affected by dry eye. Low humidity causes more rapid evaporation of the tear film from the surface of the eye. Dust, dirt, and pollution may also make dry eye syndrome worse.

Hormonal causes

Women that have gone through menopause tend to have less tear secretion. Pregnant women tend to have more tear secretion. Women who have gone through menopause who are also taking hormone replacement (like estrogen) tend to have less tear secretion. The effect of estrogen replacement therapy on tear secretion is not completely understood.

Medications

Some medications can cause the eyes to be dry. Aside from hormone replacement therapy, antihistamines (like Benadryl, or diphenhydramine) and some antidepressants (like Elavil, or amitriptyline) can cause dry eye syndrome. You should always check with your doctor before discontinuing any prescription medication, even if you think it may be causing dry eye syndrome.

Eyelids and Blinking

People whose eyes do not close completely when they blink (for example, patients with Graves disease), or who blink infrequently (for example, patients with Parkinson disease), are more prone to dry eye syndrome. People who read a lot or work on the computer a lot are also more prone to dry eye syndrome. When we read or concentrate, we blink less frequently.

Treatment of dry eye

There are many different treatments for dry eyes and the appropriate treatment depends on identifying which component of the tear film is abnormal. For many patients using artificial tears is all that is needed. Other individuals may need surgery to correct an eyelid that is scarred or an eyelid that does not close properly.

Artificial tears

Artificial tears are available over-the-counter and do not require a physician's prescription. There are many different brands of artificial tears and types of artificial tears. Your physician can help you choose among them, but often people must experiment with different tears until they find one that works for them. Some tears are thicker than others. Some patients prefer thicker tears because they last longer. Other people don't like thicker tears because they momentarily blur their vision. For patients that need to use artificial tears frequently, physicians will sometimes recommend a preservative-free artificial tear solution.

Artificial tears ointment

Patients with severe dry eyes will sometimes need to use an ointment to protect their eye. Some patients just need to use an artificial tears ointment at bedtime. Ointment at bedtime is especially helpful for patients whose eyes don't close completely when they're asleep, or for patients who have more severe dry eye symptoms first thing in the morning.

Anti-Inflammatories

Physicians will sometimes prescribe anti-inflammatory eye drops for patients with more severe dry eyes. The most commonly prescribed medication for this condition is Restasis (cyclosporine).

Eyelid Soaks and Scrubs and Antibiotics

Some people have problems with the secretions from the glands that secrete oil into the tear film. The most common condition is acne rosacea. Patients may have insufficient

secretions, too many secretions, or secretions that are too thick. Your physician may prescribe a regimen of warm soaks and eyelid scrubs to address these problems. Sometimes an oral antibiotic, such as doxycycline, is helpful, especially in people with acne rosacea. These antibiotics thin the meibomian gland secretions and help stabilize the lipid layer of the tear film. Your doctor may prescribe one of these antibiotics even though you do not have an infection.

Punctal Plugs

People with dry eye problems will sometimes have one or both of the puncta (see the diagram of tear drainage above) closed to increase the amount of tears on the eye surface. The plugs must be inserted by a physician and can be temporary or permanent. Physicians may also use a cautery tool to permanently close the puncta if the condition persists

Surgery

Surgery is only necessary if patients have a scarred eyelid, if patients have eyelids that don't close completely, or if patients have an eyelid that is not positioned correctly.

Frequently Asked Questions

How can I have dry eyes when my eyes water all the time?

Excess watery tearing is a common symptom of dry eyes. This watering is due to reflex tearing that occurs in response to the irritation caused by alterations to the three layers of the tear film.

I use artificial tears, but they don't seem to be helping. Am I doing something wrong?

The selection of the treatment modality depends largely on the severity of the disease. Artificial tears alone may be sufficient for milder cases, whereas for more severe situations, the drops usually have to be used in conjunction with other treatments. In order for the artificial tears to be effective, they have to be used on a regular basis and several times a day while the person is awake.