

Patient Guide to Tear Osmolarity Testing

What is tear osmolarity?

Osmolarity is a measure of how much salt is in a person's tears. The higher the salt content, the more toxic a person's tears are to their eye. If the salt concentration becomes so high it can damage the cells on the surface of the eye, we call that hyperosmolarity. For example, if over time, salt water comes in contact with metal, the metal becomes damaged and will eventually rust. If the salt concentration of your tears is too high, the salty tears may start to damage the cornea (the clear front surface that allows light to travel into the eye) and cause painful symptoms of irritation and dryness.¹⁻³

Testing tear osmolarity helps to understand the health of a person's eye. Tracking osmolarity over time can help your doctor determine how your eye is responding to different treatments,^{4,5} similar to how cholesterol and blood sugar are tracked by your primary care doctor. It is important to understand the impact osmolarity has on your eyes and what treatments help to improve your corneal health.

What is a normal osmolarity result?

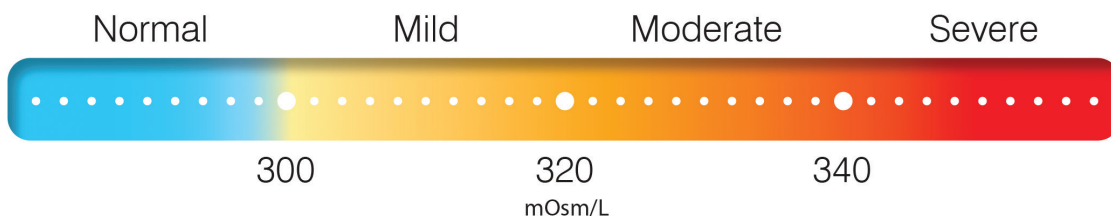
Your results are normal if the salt content of your tears is lower than 308 mOsm/L or if

the difference between the level in your left eye and the level in your right eye is less than 8.^{6,7} We measure osmolarity in milliosmoles per liter (or mOsm/L), which tells us how much salt is in a certain volume of your tears.⁸ For example, if your left eye reads 292 mOsm/L and your right eye reads 295 mOsm/L, your results are normal since both eyes have low salt and the difference between the two eyes is less than 8 (the difference is 3 mOsm/L).

When your osmolarity level is normal it means that the salt content in your tears is generally not at a level that would be toxic, cause damage your cornea or cause inflammation.^{3,9}

What happens next if I have normal results?

High osmolarity can explain some eye problems. But if you are experiencing eye symptoms and have normal osmolarity results, it is important to speak with your healthcare provider to see what may be causing pain or discomfort to your eyes. There are many different causes of discomfort on the front of the eye, including allergies, eyelid issues, and even infections. Getting to the root cause of discomfort will help you and your doctor find the right treatment plan.



What is an abnormal osmolarity reading?

Your results are considered abnormal if the osmolarity result is too high, which means there is a high salt content in your tears.¹ Generally, abnormal results are scores that are above 308 mOsm/L or if the difference between the level in your left eye and the level in your right eye is more than 8.^{6,7}

An abnormal osmolarity result can cause many different symptoms. Some symptoms may include a feeling of dryness, a feeling that something is constantly in your eye, blurry vision, fluctuating vision or eye irritation. Hyperosmolarity can damage corneal nerve cells,⁹ cause inflammation in your eye,³ and in more severe cases, cause the cells covering the surface of your eye to peel off, much like chapped lips.³

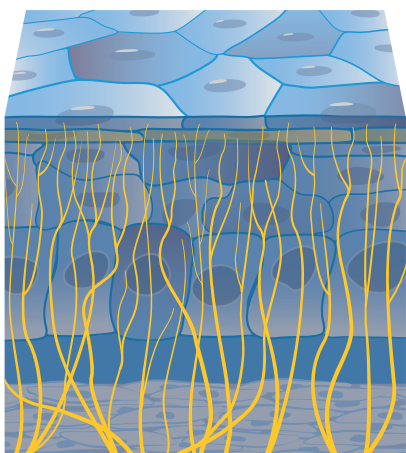
You can discuss your osmolarity results with your doctor to determine what treatment may be best for you. It may be especially important to lower osmolarity to ensure that the surface of your eye (the cornea) is in the healthiest shape prior to common surgeries such as cataract or refractive surgeries (such as, LASIK).

What happens next if I have abnormal results?

If you have abnormal osmolarity results, it is important to speak with your eye care provider and follow the prescribed treatment plan. If you are getting ready for eye surgery, abnormal osmolarity results may result in a delay in surgery until the eye is healthier. Your eye care provider will discuss treatment options with you.

Low Osmolarity

Healthy corneal cells



High Osmolarity

Damaged corneal cells

Epithelial cell death

Broken cell junctions (inflammation)

Nerve damage

Corneal epithelium

Bowman's layer

Stroma

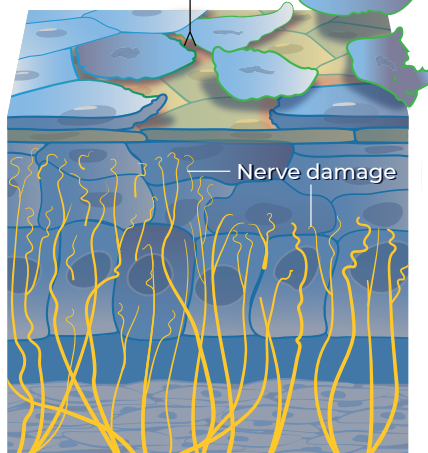


Illustration by Virginia Ferrante-Iqbal

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