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Eye Drops Linked to Antibiotic-Resistant Bacterial Infection

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STORY AT-A-GLANCE

- January 20, 2023, the CDC announced an investigation into a multistate cluster of infections from May 17, 2022, to January 19, 2023, caused by Carbapenem-resistant Pseudomonas aeruginosa associated with artificial tears
- The infection was identified in 50 patients across 11 states, causing one death and at least three people to go blind in one eye
- Antibiotic resistance has been rising since the discovery of penicillin and now contributes to 4.95 million deaths worldwide each year; without change, consumption of antibiotics is estimated to increase by 200% by 2030
- Dry eye can be temporary from environmental factors like dry air or exposure to smoke, or it can be chronic. Data show optimizing vitamin D and omega-3 levels and using curcumin can all help ameliorate the symptoms of dry eye

Aging may be inevitable, but many age-related problems do not need to be. For example, your vision is largely dependent on your lifestyle. Your eyes, like many other organ systems, require appropriate nutrients throughout the years to ensure you maintain good eyesight and lower the potential of dry eye.

In late January 2023, a brand of eye drops marketed for dry eyes was connected to drug-resistant bacterial infections.[1] Eye lubricant drops are marketed to support your tears. Your eyes need tears to keep them wet, smooth and to help focus light so you can see clearly. Your body uses tears to protect the eye from infections and foreign body irritations, like dust and dirt.

There are three different layers of fluid in your tears. Each layer is produced differently and performs a different function. The outer layer is an oily surface that keeps the watery layer from drying too quickly. It also makes the surface of the eyes smooth. The middle layer is watery and helps nourish the eye tissue and keep the eyes moist. The innermost layer of fluid is mucus.

This helps the watery layer stick to the surface of the eye and remain in place. Together these three layers are called the tear film. Inside the tear film are factors that help suppress inflammation in the eye, promote wound healing and defend against infection.[2]

You also have three different types of tears. Basil tears are the type just described that always stay in your eyes to help lubricate them and protect your cornea. Reflex tears are produced when an irritant is in your eye, such as a foreign body. These tears are released in large amounts to help flush out the foreign body and fight bacteria.

Finally, you produce emotional tears in response to sadness, joy and fear. According to the American Academy of Ophthalmology,[3] some scientists propose emotional tears contain hormones that are not found in other types of tears. They hypothesize the stress hormones released in emotional tears may help regulate the body.

EzriCare Artificial Tears Linked to Infection

January 20, 2023, the CDC[4] announced they were investigating a multistate cluster of infections caused by Carbapenem-resistant Pseudomonas aeruginosa that appeared to be associated with EzriCare Artificial Tears. The CDC stated they had identified 56 isolates from 50 patients across 11 states from May 17, 2022, to January 19, 2023.

The common exposure among the patients was the use of EzriCare Artificial Tears, which is a preservative-free product sold in a multidose bottle. The bacteria were isolated from several areas of the body, including cultures of the cornea, sputum, urine, blood and rectal swabs. January 24, 2023, EzriCare[5] announced they had not received consumer complaints or reports of adverse events.

At that point, they also claimed to have "not received communication from any regulatory agency providing any outcomes or details to EzriCare about the ongoing investigation."[6] February 1, 2023, the company announced they received notice of the investigation, had stopped distribution and began contacting customers to advise them to discontinue use.

According to EzriCare, the artificial tears product is manufactured by Global Pharma Healthcare Pvt Limited in India and imported by ARU Pharma Inc. EzriCare places its label on the bottles and markets them to their customers. The company's understanding is that the same product is also marketed under other brand names.

According to the CDC, as of January 20, 2023, there has been one death when pseudomonas entered the bloodstream. According to Fox News,[7] there were 11 reported cases of eye infections and at least three people who became blind in one eye from the infection.

According to the CDC,[8] pseudomonas aeruginosa is one type of pseudomonas that causes hospital-acquired infections. It is commonly found in the soil and water. Pseudomonas aeruginosa has become multidrug resistant and in 2017 caused an estimated 32,600 hospital-acquired infections and an estimated 2,700 deaths.

Antibacterial Resistance on the Rise

Interestingly, the first clinical use of antibiotics was Pyocyanase,[9] which was extracted from pseudomonas aeruginosa and used in hospitals in the 1890s. Not long after the introduction of penicillin, doctors began noticing antibiotic resistance in bacteria that had once quickly succumbed to treatment. And the problem continues to grow.

In 2013, the CDC[10] published the first Antibiotic Resistant Threats Report to highlight the danger of antimicrobial resistance and underscore the threat to human health. The 2022 report found much of the progress had been lost, in large part to the overuse of antibiotics during the COVID-19 viral pandemic.

Antibiotic-resistant pathogens are conservatively estimated to cause at least 2.8 million infections annually in the U.S.[11] and lead to 35,000 deaths each year. Globally, data from a study[12] published in February 2022, show there are 4.95 million deaths associated with antibiotic-resistant infection and 1.27 million directly attributable to them.

Even as the challenge of antibiotic resistance was better understood, global consumption of the drugs rose by 65% between 2000 and 2015,[13] driven by low- and middle-income countries where the drugs are often available without a prescription, which increases the risk for potential abuse. Antibiotics are routinely used to promote growth in livestock,[14] and use accounts for about 80% of all antibiotics.[15]

The danger associated with giving livestock antibiotics is that it changes their gut microbiome, which is in part how they promote unnatural growth in the animal. However, some of those gut bacteria become antibiotic resistant. These can either be passed into the environment through the animal's manure or may contaminate the meat during slaughter or processing.

The problems with antibiotic resistance need to be addressed through public policy. Yet, our individual choices influence personal risk. You can help lower your risk of contracting and or spreading a drug-resistant infection using some of the following strategies.

- **Practice infection prevention,** with a focus on naturally strengthening your immune system. Foundational strategies include avoiding sugars, processed foods and grains, stress reduction and optimizing your sleep and vitamin D level. Adding in traditionally fermented and cultured foods helps optimize your microbiome. Properly wash your hands with warm water and plain soap, to prevent the spread of bacteria.

- **Limit your exposure to antibiotics —** Keep in mind that antibiotics do not work for viral infections. Avoid antibiotics in food by purchasing organic or biodynamic grass fed meats and animal products and organically grown fruits and vegetables. Avoid antibacterial soaps, hand sanitizers and wipes, as these promote antibiotic resistance by allowing the strongest bacteria to survive and thrive in your home.

- **Take commonsense precautions in the kitchen —** Kitchens are notorious breeding grounds for disease-causing bacteria. To avoid cross-contamination between foods in your kitchen, adhere to the following recommendations:
    - Use a designated cutting board, preferably wood, not plastic, for raw meat and poultry, and never use this board for other food preparation. Color coding your cutting boards is a simple way to distinguish between them.
    - Sanitize your cutting board with hot water and detergent. For an inexpensive, safe and effective kitchen counter and cutting board sanitizer, use 3% hydrogen peroxide and vinegar. Keep each liquid in a separate spray bottle, and then spray the surface with one, followed by the other, and wipe off.
    - Coconut oil can also be used to clean, treat and sanitize your wooden cutting boards. It's loaded with lauric acid with potent antimicrobial actions. The fats will also help condition the wood.

What Is 'Dry Eye'?

Another step to lowering your risk of infection is to reduce your dependence on over-the-counter products, such as artificial tears. Artificial tears or eye lubricants are used to help ease the symptoms of dry eye syndrome. This happens when the eye is unable to produce enough tears to maintain a healthy eye environment. The incidence of dry eye increases with age and may be related to hormonal changes.[16]

Other environmental factors that trigger temporary symptoms of dry eye include wearing contact lenses, a dry indoor environment, smoking or secondhand smoke exposure, or cold and allergy medications. In some cases, chronic dry eye may be caused by a nutritional deficiency, or damage to the tear gland. The most common cause of tear gland damage is Sjögren's Syndrome, which is a systemic autoimmune, rheumatic disease that affects the whole body.

Symptoms of dry eye include blurred vision, sensitivity to light, burning, itching or redness in the eye, or a scratchy feeling. Depending on the type or cause of the

condition, an ophthalmologist may prescribe over-the-counter eye drops, prescription medications, tear duct plugs or surgery.

The American Optometric Association[17] recommends several steps to prevent temporary dry eye. This includes blinking regularly when you're staring at a computer screen for a long time, wearing sunglasses to reduce exposure to the sun and dry winds and increasing the humidity at work and home. Dehydration and a lack of sleep can also contribute to temporary symptoms of dry eye.

Tips to Treat Dry Eye Naturally

While it may seem easier to grab a bottle of artificial tears, the long-term solution is to make slight changes in your lifestyle habits and nutritional intake to help offset the condition. Your tears are made in part with water, so it makes sense to stay hydrated. Dehydration also leads to you feeling **tired, grumpy and sick**, and **accelerates biological aging**.

It's not necessary to count how many glasses of water you drink each day. Two indicators you need fluid are your thirst and the color of your urine. Thirst helps ensure your needs are met on a day-to-day basis. The color of your urine can also be used as a guide. While your urine color can be influenced by medication or supplements, overall, if it's a deep dark yellow, you are likely not drinking enough water.

Adequate hydration is indicated by pale, straw-colored or light-yellow urine. Most healthy individuals urinate on average seven to eight times each day. If you aren't urinating at least every two to three hours while you're awake, it may indicate that you're not drinking enough.

Optimizing your vitamin D levels also protects against dry eye syndromes. A 2015 study[18] called it “more than an incidental association” and concluded that dry eye and impaired tear function in patients with a vitamin D deficiency indicate it plays a protective role.

As I've discussed in the past optimizing vitamin D levels affects many bodily systems including reducing your risk of infectious disease,[19] cardiovascular disease[20] and autoimmune diseases[21] to name just three.

Regular sensible sun exposure is the best way to optimize your vitamin D status, but many need an oral vitamin D3 supplement during the winter months. The only way to gauge whether you need a supplement and how much to take, is to test your vitamin D level, ideally twice a year. This is particularly important if you're pregnant, planning to become pregnant, or if you have cancer.

The optimal level is between 60 nanograms per milliliter (ng/mL) and 80 ng/mL with 40 ng/mL being a low cutoff point for sufficiency to prevent a wide range of diseases. GrassrootsHealth[22] makes testing easy by offering an inexpensive vitamin D3 testing kit and an online vitamin D3 calculator you can use to estimate the dosage once you know your current serum level.

Another nutritional supplement that is effective in preventing and supporting eye health is omega-3 fatty acids. This is a recommendation from the American Optometric Association[23] and a survey[24] of 206 optometrists in Australia and New Zealand. In that survey, 78% recommended omega-3-rich foods or supplements for dry eye disease and 79% said they recommended their patients consume omega-3 fats to improve their eye health.

Although fish oil is a well-known source, it has several drawbacks, including the lack of phospholipids. Omega-3 fats DHA and EPA are water insoluble and thus must be packaged into lipoprotein vehicles such as phospholipids. This is primarily why krill oil bioavailability is so much higher than fish oil since the DHA and EPA in fish oil are bound to triglycerides. Marine sources high in omega-3 and low in environmental pollutants include:

- Wild Alaskan salmon
- Small fatty, cold-water fish such as herring, sardines and anchovies
- Fish roe

- **Krill oil**

Finally, data also show that **curcumin** has a beneficial effect on several ocular diseases, including dry eye syndrome. In a 2014 paper,[25] the researchers noted the beneficial effects on dry eye as did researchers in 2019[26] and 2020.[27]

It is a potent antioxidant[28] and boosts the function of your own antioxidant enzymes.[29] Overall, curcumin appears to be powerful, cost-effective and has a low toxicity profile. As such, it could be a valuable supplement. It is also worth noting the beneficial impact on pathways that help reverse insulin resistance, metabolic syndrome and obesity.[30,31]

I believe curcumin is a valuable nutritional addition worthy of consideration for all-around good health since inflammation drives so many different disease processes.

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