CONDITION

Fuchs dystrophy

Fuchs dystrophy is a progressive condition in which the cornea swells and becomes cloudy as its inner cells are lost.

WHAT IT IS
Progressive loss of corneal fluid-pumping cells

BODY SYSTEM
Eyes

MAIN SYMPTOMS
Blurred morning vision, glare, halos, eye discomfort

WHAT CAUSES IT
Usually inherited; sometimes no family history

HOW IT IS DIAGNOSED
Slit-lamp examination, corneal thickness, and cell imaging

MAIN TREATMENT
Symptom relief and corneal surgery

CAN IT BE CURED?
Sometimes - surgery can restore corneal clarity

IS IT AN EMERGENCY?
Sometimes - sudden pain or rapid vision loss

LONG-TERM OUTLOOK
Usually slow progression; surgery often restores useful vision

Overview

Fuchs dystrophy affects the cornea, the clear window at the front of the eye. It usually affects both eyes, although one may be worse.

The cornea's innermost layer, called the endothelium, pumps out excess fluid to keep the cornea clear. In Fuchs dystrophy, endothelial cells gradually decrease and do not grow back effectively. Fluid then collects within the cornea, causing swelling, cloudiness, blurred vision, glare and halos.

Small bumps called guttae often form on the cornea's inner surface. Guttae alone do not always cause symptoms or mean that vision will worsen. Problems usually develop when too few healthy endothelial cells remain to control fluid.

The condition generally progresses over years. Mild cases may only need monitoring, while advanced swelling can be treated by replacing the unhealthy inner corneal layer.

Symptoms

Early Fuchs dystrophy may cause no symptoms and may be found during a routine eye examination or cataract assessment.

Symptoms can include:

Morning blurring occurs because less water evaporates from the eye while the eyelids are closed, allowing fluid to build up overnight. Vision may clear during the day, but this can take longer as the condition advances.

Severe swelling may produce fluid-filled surface blisters called epithelial bullae. If one breaks, it can cause sharp pain, watering and light sensitivity. Repeated swelling can lead to scarring and more constant poor vision.

Flashing lights, new floaters or loss of side vision are not typical of Fuchs dystrophy and should be assessed promptly.

- Blurred or misty vision, especially after waking
- Glare or halos around lights
- Difficulty seeing in dim light or driving at night
- Reduced contrast, making objects look washed out
- Vision that changes during the day
- A gritty, aching or burning feeling

Causes and risk factors

Fuchs dystrophy often runs in families, but its inheritance is complex. Not everyone with a related genetic change develops significant symptoms, and some people have no known family history.

The common form develops gradually in adulthood. A rare early-onset form begins sooner and may involve different genetic changes.

Endothelial cells naturally become fewer with age, and Fuchs dystrophy accelerates this loss. The condition is diagnosed more often in women, but it can affect anyone.

Eye surgery, particularly cataract surgery, places additional stress on endothelial cells. It does

not cause inherited Fuchs dystrophy, but it may reveal or worsen swelling in an eye with limited endothelial function.

Not everyone with guttae has symptomatic Fuchs dystrophy. Diagnosis depends on their pattern, the presence of swelling, vision changes and test results.

Diagnosis

An optometrist or ophthalmologist examines the cornea with a slit lamp. This microscope may reveal guttae, swelling, surface blisters or scarring.

Other tests may include:

No single cell count or thickness measurement determines treatment. Your symptoms, changes over time, cataracts and other eye conditions also matter.

Genetic testing is not usually required. It may be considered for unusual early-onset disease or specialist genetic assessment.

- Visual acuity testing: measures how clearly you see at different distances
- Pachymetry: measures corneal thickness, which may increase with swelling
- Specular or confocal microscopy: assesses endothelial cell number, size and shape
- Corneal imaging: maps the cornea and may detect subtle fluid-related changes

Treatment and management

Treatment depends on how much Fuchs dystrophy affects vision and comfort. Guttae without significant swelling may require only periodic examinations.

Hypertonic sodium chloride drops or ointment can draw fluid from the corneal surface and may reduce morning blur or discomfort. They do not replace endothelial cells or stop progression and can sting, so discuss their suitability with an eye-care professional.

Glasses may correct a focusing error but cannot remove cloudiness caused by swelling. A professionally fitted soft bandage contact lens may protect the surface if blisters are painful. Monitoring is essential because contact lenses can increase infection risk.

Persistent poor vision or pain may require surgery. Modern procedures usually replace only the damaged inner layers:

DMEK often provides clear vision and has a low rejection risk, but the most suitable procedure depends on the eye and other conditions. After either operation, an air or gas bubble holds the

graft in place. Follow positioning instructions carefully. Another bubble procedure may be needed if the graft partly detaches.

Full-thickness corneal transplantation is less common but may be necessary when there is substantial scarring or damage to several corneal layers.

In selected eyes with healthy cells around the corneal edge, a surgeon may remove the abnormal central membrane without adding donor tissue. This is not suitable for everyone or available in all centres.

If you have a cataract, cataract and corneal surgery may be performed together or separately. Careful planning is important because cataract surgery can stress a weakened endothelium.

- Descemet membrane endothelial keratoplasty, or DMEK: transplants a very thin layer containing healthy donor endothelial cells
- Descemet stripping automated endothelial keratoplasty, or DSAEK: transplants endothelial cells with a thin layer of supporting tissue

Complications

Ongoing swelling can cause cloudiness, painful blisters and scarring that interfere with reading, work, driving and recognising faces.

A broken blister creates an opening in the corneal surface. Infection is uncommon, but increasing redness, discharge, pain or light sensitivity requires prompt assessment.

Possible complications of corneal surgery include:

Rejection may respond to treatment when recognised early. New redness, light sensitivity, pain or reduced vision after a transplant requires urgent contact with the transplant team.

Donor endothelial cells can decrease over time, and a graft may eventually fail. Further treatment or another transplant may be possible.

- Partial graft detachment
- Graft rejection or failure
- Infection
- Raised pressure inside the eye
- Cataract development or progression
- Astigmatism or a continuing need for glasses

Prevention

Fuchs dystrophy cannot currently be prevented. Diet, supplements and eye exercises cannot stop an inherited tendency or restore lost endothelial cells.

Protecting the eyes from injury and attending planned examinations can help preserve vision and identify changes early. Tell clinicians planning cataract or other eye surgery if you have Fuchs dystrophy or a family history of corneal disease.

Relatives do not automatically need genetic testing. A routine eye examination can check for early changes, especially if they have morning blur or are preparing for eye surgery.

Living with it and what to expect

Fuchs dystrophy usually changes over years rather than days. Some people remain mildly affected, while others develop persistent swelling and blurred vision. One examination cannot predict the exact course.

Vision may initially be blurred only in the morning, then take longer to clear or remain hazy all day. Glare and reduced contrast can become troublesome before an eye chart shows a major change.

Follow-up may include vision tests, corneal measurements and discussion of daily activities. Attend routine reviews even if vision seems stable, particularly before cataract surgery.

Brighter, even lighting can make reading easier. Anti-reflective spectacle coatings or sunglasses may reduce glare but do not treat swelling. Do not drive if your vision falls below local licensing standards or glare makes driving unsafe.

Many people never need a transplant. When surgery is necessary, endothelial keratoplasty often restores useful vision, although recovery takes time and follow-up remains important. Glasses may still be required, and cataracts, glaucoma or retinal disease can affect the final result.

When to get medical help

Arrange a routine eye appointment for gradually increasing morning blur, halos, glare or changing vision. Continue planned monitoring if Fuchs dystrophy has already been diagnosed.

Seek urgent, same-day eye care for:

Seek emergency care for sudden major vision loss, severe eye pain with headache or nausea, a

chemical splash, or a significant eye injury. These are not typical of slowly progressing Fuchs dystrophy and may indicate another urgent problem.

- New pain, redness or marked sensitivity to light
- A sudden increase in discomfort or watering
- Rapidly worsening or newly cloudy vision
- Eye discharge
- Possible graft-rejection symptoms after corneal surgery

Common questions

Will Fuchs dystrophy make me blind?

Advanced swelling can severely reduce vision, but treatment often restores corneal clarity. The outcome also depends on the health of the retina, optic nerve and other eye structures.

Why is my vision worse when I wake up?

Closed eyelids reduce evaporation overnight, so fluid remains in the cornea. The weakened endothelial layer cannot remove it efficiently. Increased evaporation after waking may gradually clear the cornea.

Does everyone with Fuchs dystrophy need a corneal transplant?

No. Mild cases may only need monitoring and symptom relief. Surgery is generally considered when swelling causes persistent poor vision, pain or difficulty with important activities.

Can cataract surgery make Fuchs dystrophy worse?

Yes. Cataract surgery temporarily stresses the endothelium and causes some cell loss. Many people with mild disease still have surgery without needing a transplant, but measurements help assess the risk. Cataract and corneal surgery can sometimes be combined.

Is Fuchs dystrophy inherited?

It often runs in families, but inheritance is not straightforward. Some relatives have mild changes without symptoms, while others develop the condition despite having no known family history.

Can Fuchs dystrophy come back after a transplant?

Donor cells do not carry your inherited corneal changes, so the original process does not usually recur in the same way. However, a graft can detach, be rejected or fail as donor cells are lost. Long-term follow-up remains important.

Sources

- National Eye Institute. Fuchs' Dystrophy .
- American Academy of Ophthalmology. What Is Fuchs' Dystrophy?
- Mayo Clinic. Fuchs' dystrophy: Diagnosis and treatment .
- Matthaei M, Hribek A, Clahsen T, Bachmann B, Cursiefen C, Jun AS. Fuchs Endothelial Corneal Dystrophy: Clinical, Genetic, Pathophysiologic, and Therapeutic Aspects . Annual Review of Vision Science. 2019;5:151-175.
- Nanda GG, Alone DP. Review: Current understanding of the pathogenesis of Fuchs' endothelial corneal dystrophy . Molecular Vision. 2019;25:295-310.
- Ali M, Raghunathan V, Li JY, Murphy CJ, Thomasy SM. Biomechanical relationships between the corneal endothelium and Descemet's membrane . Experimental Eye Research. 2016;152:57-70.