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Opinion Article

The Causation and Pathophysiology of Cataracts

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ABOUT THE STUDY

A cataract is a hazy spot in the eye's lens that causes visual loss. Cataracts usually grow gradually and might damage one or both eyes. Fading colors, hazy or double vision, color fringing surrounding light, difficulties with bright lights, and difficulty seeing at night are all symptoms which may cause difficulty in driving, reading, or recognizing faces. Cataract-related visual loss may also raise the risk of falling and depression. Cataracts are most usually caused by ageing, although they can also be caused by trauma or radiation exposure, be present from birth, or develop after eye surgery for other reasons. Diabetes, long-term use of corticosteroid medicine, tobacco usage, prolonged sun exposure, and alcohol are all risk factors. The underlying mechanism involves the buildup of clumps of protein or yellow-brown pigment in the lens, which limits light transmission to the retina at the rear of the eye.

Causes

Age: The most common cause of cataracts is aging. Lens proteins denature and degrade over time, which is increased by disorders such as diabetes and hypertension.

Toxins, radiation, and UV light, among other environmental variables, have cumulative effects that are affected by the loss of protective and restorative mechanisms caused by changes in gene expression and chemical processes within the eye. Oxidative stress is a major pathogenic factor in cataract development. Senile cataracts are related with a reduction in the lens's antioxidant capability. An increase in oxidative stress or a decrease in the lens's capacity to remove reactive oxygen species can cause the lens to become more opaque.

Trauma: The lens fibers enlarge, thicken, and whiten as a result of blunt trauma. While the swelling usually goes away with time, the white color may remain. The capsule in which the lens rests can be destroyed by severe physical trauma or injuries that damage the eye. This damage causes fluid from other areas of the eye to enter the lens quickly, causing swelling and subsequently whitening, preventing light from reaching the retina at the rear of the eye. Cataracts can form in 0.7 to 8.0% of instances after electrical accidents. Sharp trauma can also cause star or petal-shaped cataracts.

Radiation: Cataracts can develop as a result of several types of radiation exposure. X-rays, one form of ionizing radiation, may damage the DNA of lens cells. Ultraviolet light, notably UVB, is also believed to produce cataracts, and some data suggests that wearing sunglasses at a young age helps decrease their development later in life.

Diagnosis

Cataracts might be total or partial, stable or progressing, hard or soft. Nuclear sclerosis, cortical, and posterior sub capsular cataracts are the most common histological kinds of age-related cataracts.

The most frequent type of cataract is nuclear sclerosis, which affects the core or 'nuclear' region of the lens. This gradually hardens, or becomes 'sclerotic,' due to condensation on the lens nucleus and brown pigment deposition within the lens. It is known as a brunescent cataract in its advanced phases.

An increase in sclerosis may cause a rise in the refractive index of the lens in the early stages. This creates a myopic shift, which reduces hyperopia and allows presbyopic people to focus at close range without the use of reading glasses. This is known as second sight, and it is only temporary.

Cortical cataracts occur when the lens cortex becomes opaque. These occur when changes in the fluid contained in the lens's border produce fissuring. When examined through an ophthalmoscope or equivalent magnification instrument, these cataracts resemble white spokes of a wheel. At night, symptoms commonly include brightness and light scattering.

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