



Aviation Careers May Hinge on Vision Protection

Many activities at work and at home can pose a threat to eye safety. But awareness and a few simple guidelines can keep pilots from endangering their vision.

by

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Good eyesight is vital for pilots, and preserving visual acuity should be paramount for professional flight crews.

Simple preventive measures can promote lifelong healthy vision, support career longevity and enhance the quality of life for pilots. Two important guidelines to follow are to sleep an average of seven to eight hours a day (this helps rest the eye and rejuvenate the cornea), and to keep eye-glass and/or contact lens prescriptions current.

Many pilots have been victims of a penetrating eye injury. The basic shape of the eye and its components are shown in Figure 1 (page 2).

In 1926, famed aviator Wiley Post was injured in the eye while working as an oil well roughneck near Holdenville, Oklahoma, U.S. A spike, struck by a sledgehammer, dislodged a small fragment of iron that penetrated the 27-year-old Post's left eye and lens. The injury required the removal of the entire left eye. The removal was necessary because of a condition known as "sympathetic ophthalmia." Antibodies

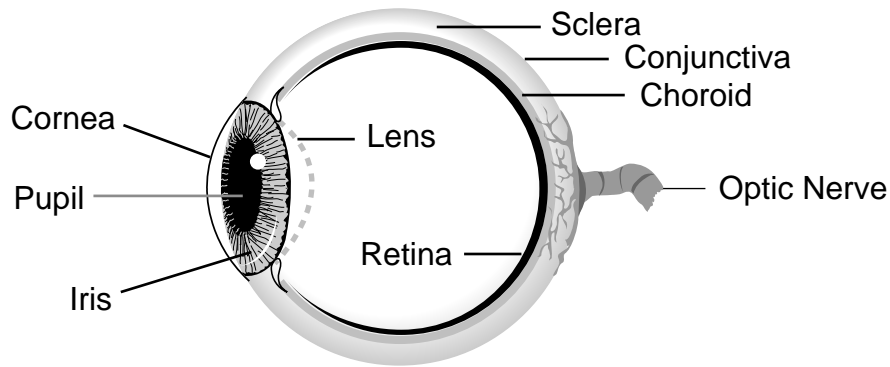
had been generated because of the injury to the left lens tissue, and those antibodies attacked the healthy lens tissue of the right eye, causing the right eye to cloud. Once the left eye was removed, the right lens gradually returned to normal.

But the loss of his left eye did not keep Post from accomplishing two record-setting around-the-world flights (in 1931 and 1933), nor did it prevent him from making subsequent pioneering stratospheric flights in 1934 and 1935 in a pressure suit of his own design. One can be certain, however, that Post would have preferred to have had the use of both of his eyes.

At the time of Post's accident, the use of safety goggles was not widespread. Awareness about the potential for eye damage has increased considerably since that time.

Accordingly, pilots should consider wearing eye protection when engaged in home workshop hobbies, while playing sports with high eye-injury risks such as

The Human Eye



The human eye collects electromagnetic energy within the sensitivity range of the retinal cells. The energy is then reformulated as visual patterns.

Source: Stanley R. Mohler, M.D.

Figure 1

handball and while doing yard work. The use of power saws, power mowers, hedge clippers, hammers and drills without eye protection increases the risk of injury from flying fragments.

Sunlight Can Also Damage Vision

A cataract belt stretching across the southern United States, for example, has been documented. Exposure of the unprotected eye to sunlight, by habitually not wearing sunglasses outdoors, has been linked directly to eye lens damage.

The lens is a living tissue. Light energy passes through it and is focused. Some photons of light are trapped in the transparent lens protein. After years of trapping electromagnetic energy, the lens protein increasingly becomes altered. This protein alteration results in such a disruption of the lens cells that light is no longer transmitted normally. The cells begin to cloud and let less light energy through, resulting in cataract formation.

Once a cataract starts, it tends to worsen at an increasing rate. As the lens becomes less transparent, it absorbs even more light energy and thus progresses toward nontransparency at a increasing rate.

Short wavelengths of light have the greatest energy. Blue light and near-ultraviolet light, which have very short

wavelengths, possess the highest and most detrimental energies reaching the lens. Wearing sunglasses, particularly those with a yellowish tint, will substantially block these injurious light energies.¹

The retina is the eye's "antenna detection system" for different frequencies of visual electromagnetic light energy. Focusing excessive light energy through the lens on the retina overheats and "cooks" the retina. People who have stared at the sun for any period of time have experienced solar scotomas (blind spots) because of the alteration of retinal cell protein and the subsequent cellular death. Wearing proper sunglasses protects the retina from absorbing, and being injured by, excessive solar energy. Anyone involved in acetylene or electric arc welding must also wear suitable energy-absorbing protective eye gear to protect the retina.

Once a cataract starts, it tends to worsen at an increasing rate.

The white of the eye, or conjunctiva, serves as the lubricated coating of the eyeball; the conjunctiva is necessary for the eye to move in its socket and for eyelid movement. If sand or dust particles, microscopic debris or certain pollens contact the eye (especially by wind or blowing air), tissue "hypersensitivity" reactions can develop as a local protection against these intruders.

The eye can tolerate a few of these incidents each year, coating the "intruders" with cells that are later shed from the outer eye. This healing process occurs mainly during sleep, and some researchers contend that recovery of the

cornea and the white of the eye from daily physical injuries caused by these tiny particles is one of the major reasons for sleep. The material collects as a crust, and is usually located in the inner area of the eyes where tears drain.

Repeated exposures over a period of years will lead to chronic inflammation of the conjunctiva, and may actually stimulate conjunctival overgrowth from the side of the face, seen as a progressive pinkish-white colored tissue that encroaches upon the cornea. This overgrowth looks like a small wing; thus the Greek name for wing, "pterygium," is used to describe the overgrowth of tissue across the cornea.

This condition was very common in farmers because of their chronic exposure to dust, sand and other tiny materials before the use of enclosed tractor cabs became widespread. Enclosed cabs have reduced the frequency of this condition considerably. People who spend long periods of time in the desert are also prone to develop a pterygium because of the dry air, exposure to blowing sand, dust and wind, and the effects of bright sunlight. Wearing eye protection, even eyeglasses alone, diminishes the possibility of this type of injury. Contact lens users should wear plain eyeglasses over the eyes while wearing contact lenses. This is an important protective procedure because foreign particles are frequently trapped under contact lenses. A surgical procedure is available to treat the pterygium and will save vision in the eye if employed early enough.

Some Sports Require Eye Protection

Participation in sports is one way for pilots to keep physically fit, but certain precautions may be necessary, depending on the sport, to prevent eye injuries. Protective eye wear should be worn when playing handball. Keep alert when flying objects are in play. Sunglasses, or other protective eye wear, provide wind-blast protection while skiing or biking. Protective eye wear while swimming may be useful, particularly in water heavily treated with chemicals or in water containing large amounts of silt or other suspended materials.

Infections Can Be Dangerous

Proper hygiene is important in minimizing the risk of developing eye infections. Hand cleanliness is important because everyone rubs his or her eyes periodically. If an eye itches, burns or feels as if something is trapped under the eyelid, reflex eye rubbing is almost inevitable. Hands that are reasonably clean will decrease the chances of transmitting infectious material to the eye.

Be especially careful when working with caustic substances such as paint thinners, solvents, industrial-grade acids, lye and various pressurized aerosols. It is important to have plenty of fresh water nearby to immediately wash eyes contaminated with foreign chemicals. An aerosol oil spray container, for example, can be held pointing toward the eye and accidentally discharged. An accidental splash while pouring acid concentrates into a swimming pool may throw caustic material into the eye. Wearing sunglasses or protective eye wear is an important safety precaution. Contact lens wearers can wear glasses or sunglasses that do not have a refractive correction, but help protect the eye in the event of a chemical splash.

Beware of Tobacco Products

Safety-minded pilots avoid tobacco products and incendiaries, except when using matches or lighters for campfires, cookouts and related activities. Under these latter circumstances, proper precautions should be exercised.

Pilots have suffered serious injuries after chunks of burning, broken match heads became lodged in their eyes. Temporary pain and blindness frequently occurred for several minutes or longer, with full recovery sometimes taking days to weeks. Pilots have also suffered serious corneal injuries from the burning ashes of cigarettes, pipes and cigars (and from burning fragments from cigar wrappers). Windy conditions increase these risks. Avoidance of these products and situations is the best prevention for these kinds of eye injuries.

Cigarette smoking has also been linked to cataract formation, another good reason not to smoke.²

Awareness Offers Best Protection

It is important for pilots to be aware of the potential for serious eye injuries that can threaten their careers.

Awareness is enhanced by mental alertness. Thus, anything that diminishes alertness can set the stage for an accident. Lack of sleep is a major cause of diminished alertness, as are long workdays and mental preoccupation (e.g., worry and stress).

The effects of alcohol, during the time that alcohol is in the blood (and in the brain) and later, if there is a hangover, cause diminished alertness. Sedatives also lead to diminished alertness.

Pilots should avoid situations that pose risks for the eyes during these times.◆

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