

by soft contact lenses. On the other hand, hard contact lenses and RGP lenses require a greater adjustment period for the wearer and are more easily dislodged from the eye. Soft contact lenses have a shorter adaptation period and may be worn comfortably for longer periods. They do not dislodge as easily or fall out of the eye as readily as the hard lenses. However, they have a shorter life span than hard or RGP lenses, and the wearer must ensure that the lenses do not dry out.

Color Additives to Contact Lenses

Contact lens manufacturers produce clear and colored lenses. The use of color additives in medical devices, including contact lenses, is regulated by the U.S. Food and Drug Administration (FDA) through authority granted by the Medical Device Amendments of 1976. Color additives that come into direct contact with the body for a significant period must be demonstrated to be safe for consumer use. This includes the color additives used in contact lenses. The FDA permits the use of a specific color additive in contact lenses only after reviewing and approving a manufacturer's official *Color Additive Petition*. The petition must contain the requisite chemical, safety, manufacturing, packaging, and product labeling information for FDA review. Many colored contact lenses are prepared as a reaction product, formed by chemically bonding a dye, such as Color Index Reactive Red 180 (Ciba Vision) to the vinyl alcohol–methyl methacrylate copolymeric lens material.

Care of Contact Lenses

It is important that contact lenses receive appropriate care to retain their shape and optical characteristics and for safe use. Wearers should be instructed in the techniques for insertion and removal of the lenses in methods of cleaning, disinfecting, and storage.

With the exception of disposable soft contact lenses, all soft lenses require a routine care program that includes (a) cleaning to loosen and remove lipid and protein deposits, (b) rinsing to remove the cleaning

solution and material loosened by cleaning, and (c) disinfection to kill microorganisms. If the lenses are not maintained at proper intervals, they are prone to deposit buildup, discoloration, and microbial contamination. The moist, porous surface of the hydrophilic lens provides an attractive medium for the growth of bacteria, fungi, and viruses. Thus, disinfection is essential to prevent eye infections and microbial damage to the lens material.

Hard contact lenses require a routine care program that includes (a) cleaning to remove debris and deposits from the lens, (b) soaking the lens in a storage disinfecting solution while not in use, and (c) wetting the lenses to decrease their hydrophobic characteristics.

To achieve the care needs of contact lenses, the following types of solutions are used: (a) cleaning solutions, (b) soaking solutions, (c) wetting solutions, and (d) mixed-purpose solutions.

Products for Soft Contact Lenses

Cleaners

Because of their porous composition, soft lenses tend to accumulate proteinaceous material that forms a film on the lens, decreasing clarity and serving as a potential medium for microbial growth. The two main categories of cleaners are *surfactants*, which emulsify accumulated oils, lipids, and inorganic compounds, and *enzymatic cleaners*, which break down and remove protein deposits. Surfactant agents are used in a mechanical washing device, by placing several drops of the solution on the lens surface and gently rubbing the lens with the thumb and forefinger, or by placing the lens in the palm of the hand and rubbing gently with a fingertip (about a 20- to 30-second procedure). The ingredients in these cleaners usually include a nonionic detergent, wetting agent, chelating agent, buffers, and preservatives. Enzymatic cleaning is accomplished by soaking the lenses in a solution prepared from enzyme tablets. This procedure is recommended at least once a week or twice a month in conjunction with regular surfactant cleansing. The enzyme