of this lens by Shearing, Jerry Pierce, and Robert Sinskey allowed ECCE with PCIOL implantation to become the standard for modern cataract surgery.

Thomas Mazzocco is generally given credit for developing the foldable IOL (Fig 7-21). His plate-style lens design influenced the design of modern phakic refractive IOLs (see BCSC Section 13, Refractive Surgery). Foldable versions of the Shearing-style lens soon followed (Fig 7-22). The obvious advantage of the foldable-lens design is that it allows implantation of the IOL through a small incision. The availability of a small-incision lens influenced many ECCE surgeons’ decision to adopt phacoemulsification as their primary technique.

Currently, most IOLs are manufactured from either silicone or acrylic materials. Although both silicone and acrylic are suitable for the majority of patients, silicone IOLs have caused problems in patients who undergo subsequent vitrectomy with silicone oil injection. When cataract surgery is to be performed in a patient who is likely to later require vitreoretinal surgery (e.g., a patient with high myopia, proliferative diabetic retinopathy, retinal detachment in the fellow eye, uveitis, or any disease process that may lead to vitreous hemorrhage), an IOL material other than silicone is preferred.

IOL optic geometry has evolved from the earlier plano-convex models to the newer biconvex design. Numerous changes in the shape of the posterior IOL surface and edge design were advanced to reduce late opacification of the posterior lens capsule and to facilitate laser capsulotomy (Fig 7-23). Aspheric platforms to minimize spherical aberrations from the cornea have also been introduced.

Other lens modifications include the incorporation of UV-absorbing chromophores into the IOL material to protect the retina from UV radiation. Blue-blocking IOLs attenuate blue-wavelength light (400–460 nm). Proponents of these IOLs contend that they protect the eye, particularly the macula, from blue-light exposure; however, opponents claim that there is no evidence of benefit from blue-blocking IOLs, and they are concerned that these lenses might create problems with scotopic vision.

Most recently, next-generation or “premium” IOLs have been developed with the goal of addressing presbyopia and astigmatism without the aid of spectacles. These specialized
designs include multifocal, accommodating, toric, and phakic IOLs. Toric IOLs are discussed in the section Modification of Preexisting Astigmatism, later in this chapter.


**Multifocal IOLs**

The original concept of the multifocal IOL was based on the principle that the pupil tends to constrict for near tasks; thus, the central portion of the lens was designed for near vision and the outer portion for distance vision. A drawback of the original design was that distance correction was not optimal when bright light constricted the pupil. Present versions of these lenses address this problem by having alternating zones for near and distance correction. A combination of geometric optics and diffraction optics can also achieve a multifocal effect. Multiple multifocal lenses have been approved for use in the United States (Fig 7-24).

The advantage of these lenses is an increased range of focus with reduced dependence on spectacles. Disadvantages include a reduction in contrast sensitivity and best-corrected visual acuity (also called *corrected distance visual acuity*) and the presence of glare and halos (see also BCSC Section 3, *Clinical Optics*). The cataract surgeon should spend a sufficient amount of “chair time” counseling patients receiving multifocal IOLs about the intended postoperative visual outcome and limitations; use of a specialized consent process is recommended. Multifocal IOLs require accurate biometry and IOL power calculations.