

# Blind Faith

## **Artificial Corneas Incorporating New Polymers Bring Hope to Millions**

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Blindness is perhaps the most debilitating of handicaps, affecting more than 10 million people worldwide. Corneal transplants can help certain patients, but donor corneas are in short supply, forcing many patients to wait more than 20 years. In addition, patients with damaged or diseased corneas are often ineligible for a transplant, as their condition will begin to damage the donor cornea within months.

To overcome the problems of supply shortage and recipient ineligibility, researchers have been trying to perfect artificial corneas for many years. The first artificial corneas started showing up in the 1960s, but they were largely unsuccessful in giving the patient long-term vision. Proteins easily invaded the polymers from which they were made, clouding the cornea to uselessness in less than three years.

### **Two Universities Develop New Polymers**

Last year, several independent research groups released exciting new polymers that will allow patients to regain their eyesight after years of frustration and waiting. Two are particularly worth noting.

One came from a group at the Fraunhofer Institute in Potsdam, Germany, where scientists created a polymer that absorbs no water and allows no cells to grow on it. The polymer is coated with a protein that allows it to be anchored on the natural part of the cornea without allowing other types of proteins to attach.

A polymer developed at Stanford University in California is based on a new material that works on the opposite principle as the one at Fraunhofer: it holds a water content of 80 percent! This strong, stretchy material is completely biocompatible and can be sutured into place during surgery. The key advantage, however, is that the hydrogel polymer is permeable to nutrients, allowing the cornea to be regularly nourished.

### **A Vision Correction Alternative**

Cornea replacement may soon become an alternative for vision correction, as well as vision restoration. Rather than reducing the thickness of the cornea by up to 30 percent through laser surgery, patients may opt to replace the cornea with a full thickness artificial one. Surgical vision correction may be a viable option for large numbers of patients, providing a straightforward way to correct astigmatism, cataracts, and other conditions at the same time. Perhaps, we will even be able to get "built-in" reading glasses while still having perfect distance vision.

Within the year, manufacturers expect to begin marketing these new artificial corneas for the blind. The organ transplant market is estimated at \$5 billion in the United States, with an average annual growth rate of 5 percent. About 78 percent of the organs transplanted are kidneys and livers. However, with the future expansion of this market into surgical vision correction, already at almost \$10 billion, companies entering this market will see a much larger opportunity.