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Artificial Cornea Made From Silica Composite

Technology No. z09049

IP Status: Issued US Patent; **Application #:** 13/577,572

Corneal Prosthesis Provides Superior Mechanical Strength, Biocompatibility and Optical Properties

The World Health Organization (WHO) reports that corneal blindness affects more than 10 million people worldwide. Despite the increased prevalence, only 100,000 people receive corneal transplants each year through a process called keratoprosthesis. This shortfall is due to inadequate supply of donor corneas along with the unsuitability of some patients to receive a corneal graft due to abnormal formation of blood vessels of the cornea resulting in transplant rejection. An artificial cornea based on a composite collagen/silica platform has been developed and preliminary studies have shown the corneal prosthesis has quicker healing in vitro with superior mechanical strength, biocompatibility and optical properties as compared to those that could be obtained by the current methods.

Effective Corneal Transplant with Silica Composite Artificial Cornea

The innovation is a silica-based composite artificial cornea. The material composition is composed of naturally occurring silica and collagen. These biocompatible materials allow for easy integration of the device into the eye, a key component in terms of limiting rejection, which can be seen with transplants and synthetics. Additionally, the silica is both transparent and strong, and when combined with naturally occurring collagen, the materials marry together well to form a composite that is strong without being too brittle. The material is molded to match the curvature of a natural cornea to ensure proper fit and seating in the eye.

BENEFITS OF SILICA COMPOSITE ARTIFICIAL CORNEA:

- Based on collagen/silica platform: Enables rapid healing after keratoprosthesis with superior mechanical strength, excellent biocompatibility and favorable optical properties.

- Effective bio integration into surrounding tissues: Potential for less post corneal transplant complications like host tissue melting, spontaneous rejection and eye infection

Researchers: Alptekin Aksan, PhD, Associate Professor, Mechanical Engineering, School of Science and Engineering Dr. Aksan’s research interests include celluar biophysics, biothermodynamics and hybrid biomaterials.
Allison Hubel, PhD, Mayhugh Associate Professor, Mechanical Engineering, School of Science and Engineering For more than 15 years, Dr. Hubel has been involved in studying both basic science and translational issue behind cell and tissue preservation.

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