

CAST-Eye Bank Special Session II: Advances in Corneal Transplantation in the Past Decade

Protectively Decellularized Porcine Cornea versus Human Donor Cornea for Lamellar Transplantation

Wei-Yun SHI

Corneal disease is currently the second leading cause of blindness in China. Among all corneal diseases, corneal infection ranks first, followed by trauma and congenital diseases. The main challenges faced by corneal blind patients in China to restore vision are the shortage of donor corneas, as well as a limited number of doctors capable of performing corneal transplantation.

To address the shortage of donor corneas, two approaches have been pursued. Firstly, the promotion of lamellar keratoplasty (LKP) corneal transplantation aims to reduce postoperative immune rejection. Additionally, bioengineered corneas, specifically acellular porcine corneal stroma used in LKP, have been developed. This bioengineered cornea, which has been approved by the SFDA in China, is the world's first artificial cornea derived from animal sources to replace human donor corneas.

Decellularized porcine cornea stroma maintains its transparency and stromal fiber structure. In our study, we applied decellularized porcine corneas in the treatment of various corneal blindness, including fungal keratitis, herpes simplex virus keratitis, bacterial keratitis, corneal degeneration, and trauma. The results demonstrated good biocompatibility. Five days after surgery, the epithelium regenerated. No evident immune rejection was observed within one year after decellularized porcine cornea transplantation. Clinical outcomes have shown that acellular corneas possess biological and optical properties comparable to human donor corneas.