CORNEA AND ANTERIOR SEGMENT

Tissue Engineering for Corneal Transplantation: Developing a Bioengineered Cornea

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It is estimated that 45 million people are suffering from corneal visual impairment. Ten million people are unilaterally or bilaterally blind from corneal opacification. Yet, fewer than 150,000 corneal transplant surgeries are performed annually worldwide. Corneal blindness arises from a wide variety of causes, from mechanical, chemical, and radiation injury to microbial infections and corneal degenerative diseases. The use of human cadaver donor corneas has been limited by its often low quality, risk of disease transfer, immunological rejection, limited storage life, and low availability in low-income countries. Artificial corneas are rarely used due to high costs and biocompatibility issues. Cornea tissue bioengineering provides an equivalent to allograft donor tissue where it is not available and in countries and cultures where there is little or no success with eye banking. It also marked by reduced immune rejection and improved optical quality postcorneal transplant. Recombinant Type III human collagen cornea has been developed and has shown 100% biocompatibility in a clinical trial.[1] It has shown good host-to-graft integration with corneal nerves reinnervation of the bioengineered graft. It also allowed epithelial cell migration over the anterior surface of the material with no or minimal inflammation. In addition, it has a long shelf life. The bioengineered cornea is likely to help reduce the huge global burden of corneal blindness, especially in low-income countries.

REFERENCE

1. Fagerholm P, Lagali NS, Ong JA, Merrett K, Jackson WB, Polarek JW, *et al.* Stable corneal regeneration four years after implantation of a cell-free recombinant human collagen scaffold. Biomaterials 2014;35:2420-7.