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E-BABE-3D printing as potential tool for intracorneal lenses

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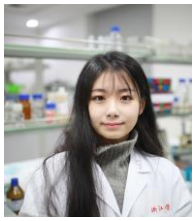

Abstract

The cornea is an important component of the eye, and its health is closely related to its function. As a bio-lens, the cornea has a smooth surface and a certain curvature to ensure its optical property. The purpose of this article is to propose a liquid-phase printing strategy to construct intracorneal lenses based on natural corneal geometric property utilizing integrated 3D printer, in order to obtain intracorneal lenses with high surface quality and high transparency.

An integrated 3D-cornea-bioprinting system introduced in our previous work was used to fabricate curved intracorneal lenses with liquid-phase Gelma. In vitro cell culture revealed that the lenses could provide a suitable scaffold for the survival and proliferation of corneal keratocytes, and has little effect on the specific secretion of cells. In vivo experiments showed that there was no neovascularization in the cornea. The 3D printed intracorneal lenses were well adhered to the autologous tissue, and the thickness was consistent. There was no obvious signs of degradation, no obvious inflammation, immune rejection and stromal haze in 2 months. The intracorneal lenses as well as natural tissue maintain good transparency.

The intracorneal lenses with better surface quality could be manufactured compared with traditional mold casting method. At the same time, the manufacturing cycle is short and repeatable, and the programmable printing process can quickly build the corresponding intracorneal lenses according to individual needs. The method has been proved to be a potential corneal equivalent in future clinical application.

Biography

Qian Xue is a PhD candidate in Zhejiang University and a visiting student in Oxford University now. She has published 6 papers in journals.

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