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Biocompatibility Assessment of Blue Light-Activated Methacrylated Hyaluronic Acid Hydrogel with L929 Fibroblast Cell Line

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Abstract

Objectives: To evaluate the biocompatibility of blue light-activated methacrylated hyaluronic acid (BL-MeHA) hydrogel using the L929 cell line.

Methods: Biocompatibility was assessed using three different assays. In the indirect cytotoxicity assay, L929 cells were cultured in conditioned media that had been exposed to BL-MeHA for 24 hours, followed by an MTT assay to evaluate cell viability. In the 2D culture assay, L929 cells were seeded on top of the BL-MeHA hydrogel, and cell viability was measured on days 1, 3, 5, and 12 using the resazurin assay. For the encapsulation culture assay, L929 cells were embedded within the BL-MeHA hydrogel, and viability was similarly assessed on days 1, 3, 5, and 12 using the resazurin assay. Additionally, L929 cell morphology was examined using scanning electron microscopy (SEM).

Results: The indirect cytotoxicity assay demonstrated that L929 cells remained viable when cultured with the BL-MeHA extract. In both the 2D and encapsulation culture assays, L929 cells initially exhibited slower growth compared to the control group but reached comparable levels by day 12. Notably, there was no significant difference in cell viability between BL-MeHA samples cured for 60 and 90 seconds.

Conclusions: The BL-MeHA hydrogel exhibited no cytotoxic effects on L929 cells, indicating good biocompatibility. These findings support its potential use as a scaffold for future applications in cell encapsulation or drug delivery for soft tissue engineering.

Keywords: cell viability, hyaluronic acid, hydrogel, L929 cell