Evaluation of Curcumin-Loaded Bacterial Cellulose Composite Films as Wound Dressings

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Outline

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Abstract

Skin is the outermost organ of the human body and is easily damaged by accidents. Therefore, variety of dressings have been developed to treat skin wounds to meet the growing need for clinical use. Bacterial cellulose (BC) produced by microorganism has received a growing interest as a biomaterial. Curcumin (C or Cur) has a wide range of physiological activities such as antibacterial properties, wound healing and anticancer. Thus, the aim of these studies is to fabricate curcumin-loaded bacterial cellulose (BC) composite films as potential wound dressings. The results showed that the curcumin-loaded BC/alginate/gelatin (BCAGG-C) composite films had uniform distribution of curcumin. The fluid absorptions were in the range of 100-700% which were comparable to those of commercial dressings (50-220%) and able to maintain integrity throughout the 48 hours of immersion. The release of curcumin was not observed in the testing medium. Water vapor transmission rate (WVTR) were 300-800 g/m^2/24 h. And the water contact angle and bioadhesion time decreased with the increase of curcumin. The films showed non-cytotoxicity to human keratinocytes (HaCaT) and human gingival fibroblasts (GF) but exhibited potent anticancer activity in oral cancer cells (CAL-27) and had substantial antibacterial activity. The BC-curcumin (BC-Cur) composite film had a good porous morphology which can improve the attachment and proliferation of NIH 3T3 cells. The wound healing ability is up to 64.25%, higher than silver sulfadiazine group. Histological studies showed healthy granulation tissues, fine re-epithelialization, vascularization, and resurfacing of wound bed. In conclusion, curcumin-loaded bacterial cellulose composite films had potential as wound dressings.

參考文獻

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