

Development of dressings for moist wound healing in situ gellable through the reaction triggered by plasma glucose

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Moist wound healing is an approach to wound care under moistened condition given by dressings. The approach is effective for rapid healing with reduced scarring. The motivation of our project is to develop a novel wound dressing for moist wound healing. Our strategies to use the molecules contained in exudate as a trigger of in situ hydrogelation for covering wounds for giving moistened condition. In this report we investigated the feasibility of a horseradish peroxidase (HRP)-catalyzed hydrogelation system for aqueous solutions of polymers using an alginate derivative bearing phenolic hydroxyl moieties (Alg-Ph). We tried to supply the H_2O_2 necessary for the HRP-catalyzed reaction through glucose oxidase (GOx)-catalyzed oxidation of glucose contained in serum. The possibility of the system was demonstrated by the hydrogelation of the mixture solution of Alg-Ph, HRP, GOx on the nonwoven mats containing human serum. The time required for gelation of the Alg-Ph solution containing HRP and GOx was variable within 1 min by changing the contents of enzymes at 4.6 mM glucose. In addition, the resultant hydrogel had an antimicrobial property. These results indicate the great potential of the glucose-triggered hydrogelation system for moist wound healing.