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Functional improvement of hemostatic scaffold by addition of recombinant batroxobin

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Uncontrolled hemorrhaging is the leading preventable cause of infectious complications in accidents, surgical procedures and battle fields. It indicates that excessive blood bleeding could ultimately be correlated with life. Therefore, topical hemostats and sealants are required that they can assist the effective treating arrest bleeding and stabilize the casualty. In many types of hemostatic agents, collagen and chitosan play an important role for clot formation and platelet activation and aggregation in blood coagulation. Additionally, chitosan adheres to red blood cell in blood coagulation. However, some studies have been reported natural substances were not adequately quick to hemostasis within relevant time. Thus, this study focused on recombinant batroxobin (rBat), from cDNA expressed in Pichia pastoris. In the hemostat dressing, rBat functions as fibrinogen to convert enzymes, plasminogen activators, prothrombin activators, factor X activators, or hemorrhagins such as thrombin. rBat interacts with proteins in the blood coagulation cascade and acts specifically on the fibrinolytic pathway. In contrast to thrombin, batroxobin splits off only the fibrinopeptide α-chain, leaving the β-chain of fibrinogen unaffected. In addition, the rBat, thrombin-like enzyme components, does not influence other hemostatic factors or cells. Therefore, in this study, we fabricated a novel collagen and chitosan hemostatic scaffold containing rBat using freeze-dry method. Because each of the materials used in the scaffold involve different hemostatic mechanisms within the coagulation cascade, the scaffold was predicted to be effective at controlling bleeding. Also, incorporation of rBat was predicted to provide a synergetic effect to natural substances for induce rapid hemostasis. Experiments performed here in vitro studies to evaluate respective hemostatic mechanism confirm the efficacy of this novel hemostatic scaffold. For animal experiments, we used a Sprague-Dawley (SD) rat initial hemorrhage model. In conclusion, the scaffold dressing should be a definite improve control of excessive hemorrhage.

Speaker Biography

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