An active peptide of dermatopontin affects fibrinogen structure and its biological function

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Objective: We previously found that an extracellular matrix protein dermatopontin (DP) interacted with fibrin and modified the fibril structure and the biological function. And the interaction sites were DP-4 peptide and D domain, respectively. In this study, we investigated if DP-4 peptide, an active site of DP, can substitute the function of DP.

Methods: The interaction between proteins was examined by solid-phase assay. The kinetics of protein mixture was monitored and the pellet was observed by transmission electron microscopy. Cell adhesion assay was done using human umbilical vein endothelia cells (HUVECs).

Result: Fibrinogen solution immediately became turbid and insoluble when DP-4 was added, and formed straight, short fibrils without thrombin. But the final turbidity of fibrin formed in the presence of DP-4 peptide was similar to that formed devoid of DP-4 peptide. The minimal active sequence of DP-4 peptide was narrowed down to 7 amino acid. In the presence of DP-4 peptide, fibrinogen demonstrated an enhanced adhesion of HUVECs.

Discussion: DP-4 affected fibrinogen structure, but DP did not. Thus, although the DP-4 peptide is a functional peptide of DP, it can not substitute the parental protein activity. On the other hand, in addition to the polymerization of fibrinogen, the peptide enhanced the cell adhesion to fibrinogen that was not clear in the case of DP and fibrin. Although the biological function of fibrinogen polymer is not clear, these findings suggest a possibility that the polymer is used as a novel devise for closing the wound.