ASSESSMENT OF CELL ADHESION BETWEEN COMPLEMENT MASP-1 INDUCED ENDOTHELIAL CELLS AND NEUTROPHILS

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The complement system and neutrophil granulocytes are substantially important components of the antibacterial and antifungal immune response. Endothelial cells, besides many other functions, also participate in antimicrobial immunity through their cytokine production and homing regulation by adhesion molecules. We previously demonstrated that complement mannan-binding lectin associated serine protease 1 (MASP-1) induced human umbilical vein endothelial cells (HUVEC) acquire an immune-regulatory phenotype, including altered cytokine production and enhanced expression of E-selectin adhesion molecule, as well as the regulation of neutrophil chemotaxis.

Therefore, we aimed to assess if endothelial cells induced by MASP-1 are able to bind neutrophils and to quantify the adhesion forces between them.

We used freshly prepared human umbilical vein endothelial cells and PLB-985 cell line as a model for neutrophils for our experiments. Plate-based adhesion test and a novel method for cell-cell adhesion force measurement, using computer controlled micropipette, were utilized to assess adhesion.

PLB-985 cells were able to adhere to E-selectin coated plates. PLB-985 cells adhered better to MASP-1 treated HUVECs than to non-treated ones in a dose dependent manner. This adhesion could be reduced if the dPLB-985 cells had been pre-incubated with soluble recombinant E-selectin. We successfully applied computer controlled micropipette to measure adhesion forces between endothelial cells and PLB-985 cells. Using this technique, we showed that dPLB-985 cells stayed attached at higher detaching forces on MASP-1 induced

HUVECs than to non-treated HUVECs. MASP-1 induced similar adhesion force enhancement as thrombin, whereas TNFalpha was superior in this respect.

Our results that complement MASP-1 can induce elevated adhesion force between neutrophils and endothelial cells may lead to boosted neutrophil functions. These findings support our hypothesis that complement lectin pathway activation, including MASP-1, through endothelial cells directly enhance the antimicrobial immune response by the recruitment of neutrophil granulocytes.