Non-adsorbing macromolecules induce adhesion of diabetic red blood cells to the endothelium

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AIM: Abnormal adhesion of red blood cells (RBC) to endothelial cells (EC) has been linked to the pathophysiology of several diseases associated with vascular disorders. Various biochemical changes on the outer membrane of RBC as well as plasma protein levels, have been identified as being likely to play a key role, but the detailed interplay between plasma factors and cellular factors often remains unclear. In this work, we identified an alternative pathway by demonstrating that non-adsorbing macromolecules have a marked impact on the adhesion of diabetic RBC to EC.

METHOD: We suspended RBC from patients with Type II Diabetes Mellitus (T2DM), in solutions of dextran to mimic the impact of non-adsorbing macromolecules. Static and continuous flow adhesion assays were used to determine the adhesion behavior of T2DM RBC with EC and the results compared with those of normal controls.

RESULTS & CONCLUSION: We found that the presence of non-adsorbing molecules in T2DM promote an increase in T2DM RBC - EC adhesion. It is concluded that this adhesion-promoting effect originates from macromolecular depletion interaction and thereby presents an alternative mechanism by which plasma proteins could regulate cell-cell interactions. These findings should thus be of potential value not only for a detailed understanding of the pathophysiology of diabetes mellitus but also other diseases associated with vascular complications.