Direct measurement of molecular interaction between Lipopolysaccharide(LPS) and Immune protein(LBP,CD14)

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The importance of innate immunity in recognizing microbial pathogens and the response against them is now widely recognized. Especially CD14 and LPS binding protein (LBP) are known to play important roles in the pathway leading to the endotoxic shock caused by LPS of Gram negative bacteria cell membrane. We used atomic force microscopy (AFM) to explore the binding forces of immune protein(LBP, CD14) and Lipopolysaccharide(LPS). To detect single molecular recognition events[1], genetically engineered histidine-tagged immune protein was coupled onto AFM tips modified with self-assembled monolayers (SAMs) of nitrilotriacetic acid- and hydroxyl group terminated alkanethiols while LPS was supported by lipid bilayer on mica. LPS was immobilized to the model biomembrane including lipid bilayer prepared by Langmiur - Blodgett(LB) technique. With these probe and substrate, we have measured the adhesion force between CD14, LBP and LPS by changing the loading rate using AFM. Kinetic parameters obtained from the relation between the adhesion force and loading rate was used to characterize the binding behavior of these molecules. Additionally, the directly measured force will be used to explore the energy landscape of ligand-receptor unbinding.[2]

References

1. S.Allen, S.M. Rigby-Singleton, and P.O'Shea (2003), *Biochemical Society Transaction*, 31, 1052.
2. Evans,E., and Ritchie,K., (1997), *Biophys.J.*, 72, 1541.