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Characterization of Phosphoglycerate Kinase on the Surface of Group B Streptococcus

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Background: The glycolytic enzyme phosphoglycerate kinase (PGK) has been identified on the surface of group B streptococcus (GBS), suggesting it may play a role in GBS virulence. Previous reports indicate that PGK is able to bind the eukaryotic protein plasminogen, leading to the hypothesis that PGK may be involved in recruiting plasminogen to the GBS surface to contribute to virulence. Recruitment of plasminogen and the subsequent conversion to plasmin is a common mechanism used by bacterial pathogens to degrade fibrin clots as well as extracellular matrix and basement membrane proteins. The objective of this work was to determine if GBS-PGK would also bind various eukaryotic proteins including plasminogen

Methods: Binding of recombinant GBS-PGK (rGBS-PGK) to plasmin, plasminogen, fibrin, fibrinogen, laminin and fibronectin was determined using an ELISA. Recruitment of plasminogen to the surface of GBS grown in the absence or presence of rGBS-PGK was assayed using western blots.

Results: ELISA results demonstrate that rGBS-PGK would strongly bind plasminogen and fibrin. Weaker binding to plasmin, fibrinogen and fibronectin by rGBS-PGK was observed. Interaction between rGBS-PGK and laminin was not seen. Growth of GBS in the presence of rGBS-PGK resulted in increased levels of PGK on the bacterial surface as well as increased recruitment of plasminogen when the bacteria were incubated for 1 hour with 10µg/ml plasminogen.

Conclusions: Our results show that rGBS-PGK binds to plasminogen suggesting involvement in recruitment of plasminogen to the bacterial surface. The interaction of rGBS-PGK with fibrin and the extracellular matrix protein fibronectin may indicate an additional role for surface expressed PGK in GBS virulence. After recruitment of plasminogen to the surface of GBS and the subsequent activation by host plasminogen activators, surface expressed PGK may adhere the bacteria to plasmin sensitive proteins contributing to the breakdown of fibrin clots as well as the extracellular matrix.

Keywords: Group B Streptococcus, Phosphoglycerate Kinase, Plasminogen, Fibrin