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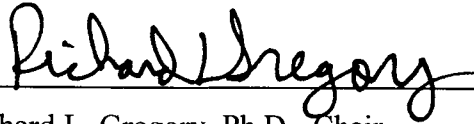
IDENTIFICATION OF THE SURFACE-ASSOCIATE PROTEINS AND FUNCTIONS  
OF ENOLASE OF *STREPTOCOCCUS MUTANS*

Jingping Ge

Submitted to the faculty of the University Graduate School  
in partial fulfillment of the requirements  
for the degree  
Doctor of Philosophy of Science  
in the Department of Pathology and Laboratory Medicine  
Indiana University

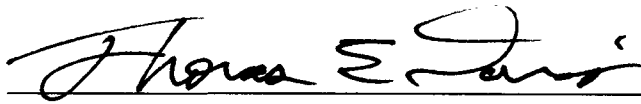
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Accepted by the Faculty of Indiana University, in partial fulfillment of the requirements for the degree of Doctor of Philosophy.



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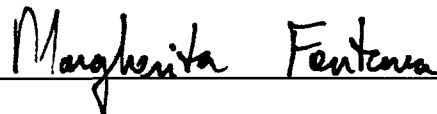
Richard L. Gregory, Ph.D. -Chair



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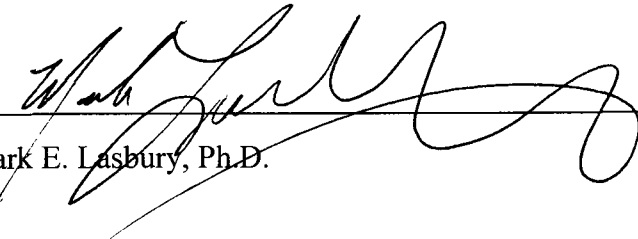
Doctoral  
Committee



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Date: April 27, 2005



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## ABSTRACT

Jingping Ge

### IDENTIFICATION OF THE SURFACE-ASSOCIATE PROTEINS AND FUNCTIONS OF ENOLASE OF *STREPTOCOCCUS MUTANS*

*Streptococcus mutans* is a gram positive bacterium, which can cause dental cavities and bacterial endocarditis. Surface-associated proteins may play an important role in bacterial adherence and cell metabolism in pathophysiological processes. In this study, the surface-associated proteins of *S. mutans* were separated by electrophoresis and identified by mass spectrometry. A total of 42 surface-associated proteins were identified, and the pIs of those proteins were in the range of 3 to 10. The putative functions of *S. mutans* surface-associated proteins were adhesion factors, catalytic enzymes, transporters, and hypothetical proteins. Enolase, a critical enzyme in the glycolytic pathway, was confirmed as a surface-associated protein, and the interactions of enolase with human plasminogen and salivary mucins were demonstrated using transmission electron microscopy, ELISA, and Western blotting. These interactions may facilitate *S. mutans* attachment, clearance, or breach of the bloodstream barrier in bacterial endocarditis. The crucial amino acids for these binding activities of enolase to plasminogen and salivary mucins were studied by site-mutagenesis. It was demonstrated that the last two C-terminal lysine residues of enolase were crucial for plasminogen-binding activity, but the binding domain of enolase to salivary mucin II needs further study.

Richard L. Gregory, Ph.D. -Chair

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