

ACKNOWLEDGEMENTS

For the successful completion of this work, I would like to express my deepest gratitude and appreciation to whom I am indebted as the following:

Professor Dr. Wanpen Chaicumpa, Faculty of Allied Health Sciences, Thammasat University, Rangsit campus, Pathum-thani, Thailand, my advisor, for her supervision, innumerable guidance, kindness, understanding, insight and resources which facilitated the speedy completion of this study. Without her virtues, this study would not have been accomplished.

Associate Professor Dr. Pramuan Tapchaisri, Dean of Faculty of Allied Health Sciences, Thammasat University, Rangsit campus, Pathum-thani, Thailand, my co-advisor, for his kindness, suggestion, and innumerable helps throughout this study.

Associate Professor Dr. Manas Chongsa-nguan, Head, Department of Microbiology and Immunology, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand, for his kind acceptance to be my external thesis examiner and to give consultation about immunofluorescence assay.

Dr. Pongsri Tongtawe, Faculty of Allied Health Sciences, Thammasat University, Rangsit campus, Pathum-thani, Thailand, my co-advisor, for her kindness, supervision and instruction on ELISPOT technique, vibriocidal antibody assay, and toxin purification throughout this study.

Assistant Professor Dr. Urai Chaisri, Department of Pathology, Faculty of Tropical Medicine, Mahidol University, Bangkok, Thailand, my co-advisor, for her kind supervision and innumerable helps during my study.

Mrs. Yuwaporn Sakolvaree, Ph. D. candidate (Biomedical Sciences), Faculty of Allied Health Sciences, Thammasat University, Rangsit campus, Pathum-thani, Thailand, for her advise on LPS preparation, and her kindness in many ways.

To all of my seniors, juniors and friends, for their friendship, understanding, invaluable assistance, and their cheers.

To the entire staff of the Faculty of Allied Health Sciences, Thammasat University, Rangsit campus, Pathum-thani, Thailand, for their helps during my study.

Ultimately, I thank my family for their love, encouragements, and supports.