

**This Thesis is Dedicated to My Parents
and My Thesis Advisory Committee**

ACKNOWLEDGEMENTS

I would like to express my deepest and sincere gratitude to my advisor, Associate Professor Dr. Wannapa Ishida for her kindness in providing an opportunity to be her advisee. I am also appreciated for her valuable supervision, suggestions, encouragement, supporting, guidance and criticism throughout the course of my study. I would like to express my greatest appreciation and sincere gratitude to my co-advisor, Associate Professor Dr. Wilaiwan Khrisanapant and Dr. Danai Tiwawech for valuable advices, kindness useful comments and suggestions. Moreover, I would like to thanks Dr.Sitakan Natphopsuk for her helpful suggestions.

Additionally, I would like to thanks the National Cancer Institute of Thailand for supporting my laboratory research, Department of Physiology, Faculty of Medicine and Srinagarind Hospital, Khon Kaen University and Khon Kaen Hospital, Khon Kaen, Thailand for co-operation in this study.

This study was supported by the Khon Kaen University's Graduate Research Fund Academic Year 2014, number: 57211111, Invitation Research Grant (I58111), Faculty of Medicine, Khon Kaen University, the HPV & EBV and Carcinogenesis Research Group, Khon Kaen University and the Graduate Research Fund Academic Year 2015, National Research Council of Thailand.

Most of all, I am deeply indebted to all subjects who have been donated blood specimens for this investigation. Finally, I would like to express my sincere gratitude and appreciation to my dear parents who gave me a chance to study and strongly supported me.

Sophida Phuthong