ACKNOWLEDGEMENTS

Man is the highest creation of “GOD” who provides strong mental support, so first of all I wish to express my deep sense of gratitude and thanks to “GOD”.

I would like to express my great appreciation and gratitude to my supervisor and mentor, Prof. B. C. Das, Dr. B. R. Ambedkar Center for Biomedical Research University of Delhi (North Campus), Delhi, who taught me like a teacher, inspired me like a friend and in numerous ways tolerated me like a parent. His constant motivation, concrete suggestions and deep involvement throughout the course of the present study were as exemplary as the complete independence he gave me for doing things in my own way. He came forward as an unwavering and strong support during the adverse moments and took the best care with great generosity. Each passing day, during the Ph.D tenure strengthened my belief that with no person, except him, could I have completed my work. I consider myself fortunate to work with such an enthusiastic and kind hearted person like him.

I would like to begin by thanking my Co-supervisor, Dr. Suresh Hedau, Scintist C, ICPO (ICMR) for his never-failing patience, optimism, and advocacy. Thank you for creating a learning environment that provides supportive guidance whenever needed but also the independence to help me develop my skills as a scientist. I would especially like to thank my doctoral committee members- Prof. Daman Saluja and Prof. M. M. Chaturvedi for their guidance, advice, and insight regarding my Ph.D. You have each been instrumental in shaping this document and my doctorate career. I truly appreciate the time and thought that each of you has put into helping me make this Ph.D. the best that it can be. I’d also like to acknowledge Dr. Geeta Kadayaprath, Senior consultant, Max Cancer Center, Max Superspeciality Hospital, New Delhi for her collaboration and providing tissue specimens for this research. Further, I thank Dr. Urmi Mukherjee, Senior Consultant, Histopathology Department, Max Superspeciality Hospital, New
Delhi for providing tissue blocks and histopathological informations of the breast cancer patients included in the study and helping me in the interpretation of immunohistochemical data. I am also thankful to Dr. Geetanjali Bugnait, Surgeon, DDU Hospital, New Delhi for her moral support.

I extend my sincere thanks to Prof. K. Natarajan, Director, ACBR, University of Delhi, for providing me all the required facilities and support in carrying out the experiments at the centre for the successful accomplishment of this work.

I would also like to extend my heartfelt thanks to the Faculty members of ACBR; Prof. Vani Brahmachari, Prof. Daman Saluja, Dr. Anju Katyal and Dr. Madhu Chopra, Dr. Ajay Kumar Yadav, Dr. L. R. Singh, Dr. Manisha Yadav and Dr. Kamna Shrivastava for broadening my knowledge in science during the course work. I would also like to acknowledge Dr. Harish Batra, Dr. Vineet, Dr. Masooq Ali, Leena and Jyoti for their help and moral support from time to time.

I would like to extend my heartfelt thanks to Dr Alok C. Bharti, Dr. Mausumi Bharadwaj and Dr. Suresh Kumar for broadening my knowledge and intricacies in biomedical research during the Ph.D. work.

I would like to thank my family—my papa S. P. Singh HCP, P.S.-Greater Noida, my mom, sisters (Reena, Poonam & Pooja), brothers (Lokesh & Shanu) and nephew (Manshu) and niece (Khushi & Vidushi)—for their love, encouragement, and for attempting to understand the science that I spend my days pursuing. Here I must not only acknowledge the family that has watched me grow through the years and nurtured my abilities, but also the family I have recently joined—that of RathI Family. Thank you for celebrating my successes as your own and for welcoming me into your hearts as well as your family! I feel truly blessed to have such fantastic in-laws! I must thank to Gaurav and a new comer into the family-Laxmi. God bless both of you!
I also want to thank Mr. B.D. Uniyal, SHO, SI O.P Sharma, Mr. Bhim Singh, Mr. Veer Singh, Mr. Yadavender Singh, Mr. Chain singh, Mr. L.D. Pushp, Mr. Rajiv, Mr. Jagga, Anita Madam, Dr. Uma Kailash, Dr. Sanjay Gupta, Mr. Kunjoomon, Nathani Madam, Mr. Joshi and the administrative staff of ICPO (ICMR).

I also want to thank many past and present lab members who have taught me not only about science, but also about life. To my current labmates—Dr. Harsimrut Kuar, Abhishek, Gauri, Kirti, Parama, Nasreen, Gaurav, Shilpi, Prabhat, Anoop, Akansha,—thank you for helping me face the ups and downs of Ph.D. research with humor and determination. I am truly grateful for having had the chance to work with you and call you my friends. To my senior labmates- Dr. Prishla Varghese, Dr. Alok Mishra, Dr. Bhupesh K Prusty, Dr. Neeraj Jain, Dr. Rakesh Duhan, Dr. Shirish Shukla, Dr. Showkat Hussain and Dr. Sutapa Mahata -I want to thank you for paving the way and showing me the light at the beginning of the tunnel.

I am thankful to ACBR administration specially Mr. B.C. Pandey, Dr. Kishan Kumar, Ashok sir, Mr. Netarpal, Mr. Vijay, Ms. Nisha & Kavita Mam for their support at the most important stage of this degree.

The lighter moments and also ‘the scientific discussions’ over the cups of coffees shared by my friends Dr. Ujjawal Sharma, Dr. Priya Vrat Arya, Dr. Subodh, Pushkar, Sanjeev, Sandy, Kapil, Panky, Kittu, Swati, Sharad and Gaurav proved to be a source of unwavering support, constant encouragement and an impetus to strive for perfection.

It would not have been possible to write this thesis without the help and support of the kind people around me, to only some of whom it is possible to give particular mention here.
I express my heartfelt emotional and sincere thanks to my students; Gauri, Alka Diwakar, Rohit Shrivastava, Ankur, Tapas Tripathy, Aparajita Verma, Sandhya and all summer trainees.

My sincere gratitude is due to Banani mam, for her constant support, faith and boundless care throughout the time. I always enjoyed the company of two passionate personalities, Ankan and Arpan.

Most of all I want to express my love and deepest gratitude to my best friend and loving wife, Garima. Thank you for taking a leap of faith, uprooting your life, and following me seven years ago! You have been beyond supportive and knowing that I can always count on you has gotten me through every tough time and has made even the smallest victory that much sweeter. This is every bit your accomplishment as it is mine. Thank you for embarking on this adventure with me! I love you very much!

Last but not the least; my sincere thanks are due to the Indian Council of Medical Research (ICMR), Department of Science & Technology (DST) and Department of Biotechnology (DBT) for providing Fellowship during the tenure of my study.

More than anyone, I wish to acknowledge the support and willingness of all the participants of this study, their families and all those who volunteered with their samples.

Umesh Kumar