

ACKNOWLEDGMENTS

The thesis is the result of many experiences I have encountered at Indian Institute of Technology (Banaras Hindu University) from remarkable individuals who I also wish to acknowledge. First and foremost I wish to thank my supervisor, **Prof. Ranjana Patnaik**, School of Biomedical Engineering. I was a novice in the field of Cerebral Ischemia and Neuroprotection when I started my Ph.D. She has taught me, both consciously and unconsciously, how a good research work can be planned, executed and reported. I thankful to all her contributions of time, and ideas in animal handling, surgery, method development, assay optimization, data analysis and understanding of neurodegeneration pathways. The enthusiasm and positive attitude towards the work and life were contagious and motivational for me during tough times in the Ph.D. pursuit. She has given the moral support and the freedom I needed to work.

Further, I am very thankful to **Prof. Neeraj Sharma**, Coordinator, School of Biomedical Engineering for encouraging my research and for allowing me to grow as a research scientist. Your advice on both research as well as on my career have been priceless.

I would also like to thank my Research Progress Evaluation Committee members, **Dr. Shiru Sharma**, Associate Professor, School of Biomedical Engineering and **Dr. Abha Mishra**, Associate Professor, School of Biochemical Engineering for serving as my committee members even at hardship and for being my major advisors. Their comments and suggestions during my work progress presentation improved the quality of research work.

My sincere thanks to all Professors of the School of Biomedical Engineering for their advice and motivation. I would also like thankful to office staff, School of Biomedical

Engineering, who have been supportive in every way. I express my gratitude to Director, Deans, and Registrars for their direct and indirect support. I gratefully acknowledge the funding sources Ministry of Human Resources and Development, Government of India that made my Ph.D. work possible. For this thesis, I would like to thank anonymous reviewers for their valuable time to read the thesis and their suggestions.

A special thanks to Prof. Surya P. Singh, Department of Biochemistry, Institute of Science, Banaras Hindu University and Prof. Sairam Krishnamurthy, Department of Pharmaceutical Engineering and Technology, IIT (BHU), Varanasi for their direct and indirect support. I am sincerely indebted to Prof. Durg Vijay Rai, former Vice-Chancellor, Shobhit University, Saharanpur and Prof. Lalit Mohan Aggarwal, Dept. of Radiotherapy & Radiation Medicine, Institute of Medical Sciences Banaras Hindu University, Varanasi for his endless support and blessings.

I am very thankful to Mr. Pankaj Paliwal for his help and supports provided for learning basics of animal handling and surgical procedures. I am also thankful to Uvanesh K for his consistent supports for brain impedance measurement and its modelling.

I would especially like to thank my current group members Ms. Sumedha Mukherjee, Ms. Bhawna Vermani, Dr. Amit Kumar Tripathi, Mr. Hareram Birla and Saumitra Sen Singh. There are my seniors, mentor in many ways Dr. Nishant Kr. Singh, C. K. Balavigneswaran and Chandan Kumar motivated and helped me all the time. A special group is not yet mentioned because they deserve extra attention are my dear juniors. I praise the enormous amount of help from Alok Prakash, Chiranjeev Sagar, Romel Bhattacharjee, Taresh Sarvesh Sravan and Alok Tiwari. I also recognize the support from Chandra Kant Singh Tekam, Ajay Sahi, Sumit Tripathi and Ravi Pratap Singh.

My time at IIT (BHU) was made enjoyable in large part due to the friends that became a part of my life. I am grateful for the time spent with friends Munendra Singh, Kiran Y. Vajanthri, Shailendra Singh, and Pankaj Paliwal and thankful for providing consistent support and encouragement.

I would like to thank my family for all their love, encouragement and trust. For my parents Shri Brajnandan Pandey and Smt. Shanti Devi who supported me in all my pursuits and for showing faith in me and giving me liberty to choose what I desired. I salute you all for the selfless love, care, pain and sacrifice you did to shape my life. Although you hardly understood what I researched on, you were willing to support any decision I made. I would never be able to pay back the love and affection showered upon by my parents. My thanks to dear brother Shishir Kumar Pandey and bhabhi Ratanshila kumari for their support and valuable prayers. I thank my sons Devyansh, Sangyan and daughters Shubhra, Chandana and Divy for abiding my ignorance and the patience they showed during my Ph.D studies. My heart felt regard goes to my sisters, father in law, mother in law, brother in law and sister in law for their love and moral support. There are no words to express my gratitude for all the selfless efforts they made.

I thank with love to Kumari Shyamali my wife. She has been my best friend and great companion, loved, supported, encouraged, entertained, and helped me get through this agonizing period in the most positive way.

Finally, I thank the Almighty for giving me the strength and patience to work through all these years so that today I can stand proudly with my head held high.

Thank you.

GAURAV KUMAR