

Acknowledgement

"If we knew what it was we were doing, it would not be called research, would it?" -Albert Einstein. For a better part of two years into my Ph.D. that was my state, at least with respect to my Ph.D. goals. I thought it was a shot in the dark but now as I am on the verge of submitting this thesis. I am delighted to see that the risk paid off. I really believe that imagination is more important than knowledge (The famous Biochemistry Dept. quote) as by taking imaginative risks in science, can one only realise something meaningful. "Somewhere, something incredible is waiting to be known"-Carl Sagan.

*I believe that first and foremost I should thank my **Parents**, for raising me to be what I am today, believing in me, giving me freedom and space to grow as I deemed fit. You have always supported me in every way possible. I dedicate this work, this thesis to you both **Mummy and Papa**.*

*The most important person without whom this was absolutely not possible is my Ph.D. Guide, **Prof. Sarita Gupta**. She is one of the most intriguing person I have encountered in my life who had more insight about me than myself. I thank her whole heartedly for providing me this opportunity. I remember being lost and confused. It was you who saw the potential in me and helped me to perceive or at least have a glimpse of my true potential. I express my sincere gratitude for the continuous support during my Ph.D. study and for providing the correct conditions and freedom to do research. You have been an inspiration and I thank you for your patience, motivation and trust.*

I thank God, for always giving me the opportunity to evolve and for constant blessings.

I thank and acknowledge CSIR-UGC Government of India, for extending financial support for my Ph.D. tenure as JRF and SRF.

*I am grateful to **Prof. Yogesh Singh**, Ex-Vice Chancellor, **Prof. Parimal Vyas**, current Vice Chancellor, **Prof. Nikhil Desai**, Ex-Dean and **Prof. A. C. Sharma**, current Dean, Faculty of Science, The Maharaja Sayajirao University of Baroda, Vadodara for giving me the*

opportunity to work in this premier University and providing all necessary facilities and encouragement for the completion of my thesis work. The **DBT-MSUB-ILSPARE** Facility for providing high end instrumentation facility.

It is my privilege to express heartfelt thanks and sincere gratitude to **Dr. Girish M. Shah** and **Rashmi Shah**, **CRCHEL**, Laval University, Quebec Canada for providing their valuable help in terms of gifting me plasmids, experimental planning, moral support and teachings in research aspect of my thesis work. I am immensely grateful to them. They have been a constant source of encouragement, help and inspiration to me.

I would like to thank my doctoral committee members, **Prof. G. Naresh Kumar**, whose love for recognizing scientific problems fascinates me. **Prof. Rasheedunnisa Begum**, who have always encouraged me during the course of my Ph.D. with her vast knowledge and **Prof. T. Bagchi**. Thank you for always giving valuable inputs and encouraging me in the course of my Ph.D.

I thank the Faculty members **Prof. Pushpa Robin**, **Dr. LaxmiPriya**, **Dr. Acharya**, **Dr. Rajesh Singh**, **Dr. Ravi Vijayvargia**, **Dr. Sanjeev Upadhyay**, **Prof. Ratnaprabha**, **Dr. Devesh Suthar** and **Dr. Phonerkar** in the Dept. of Biochemistry for always helping, encouraging and giving valuable inputs during my Ph.D. tenure.

I am highly grateful to the Non-teaching staff of my department **Pethe Sir**, **Akshita Ma'am**, **Ramesh Bhai Nare**, **Ramesh Kamle**, **Shailesh Bhai**, **Manish Bhai**, **Sandeep**, **Balwantbhai** and **Anilbhai**; a very special thanks to animal house staff **Ramesh Bhai Parmar**, **Vijay Bhai**, and **Narayan Bhai** for helping in animal experimentation and being constant source of encouragement and help. I thank **Nitish bhatt** for make sure that everything went smoothly in the project administratively.

Moving to my Lab, First let me thank my super seniors, seniors **Dr. Vihās Vasu**, **Dr. Jyoti**, **Dr. Laxmipriya**, **Dr. Chirayu Pandya**, **Dr. Niraj Bhatt**, **Dr. Sanket Soni** and **Dr. Prakash Pillai** with whom I

have interacted and learned. Thank you for continuous guidance and support.

My immediate seniors, I must say that I was blessed to have an incredibly great lab environment to work in with amazing seniors.

First and foremost **Dr. Nidheesh Dadheech**, he has been my mentor, taught me everything he knew. Thank you for being an elder brother to me and taking immense care about everything in and out of the lab. You have been an inspiration and someone I always look up to. Thank you for everything.

Dr. Akhilesh Prajapati is the most disciplined person I know. He again has taken care of me like an elder brother. Thank you for all your support and kindness.

Dr. Tushar Patel, my partner in crime, I think half of our tummy's volumes are to be blamed by our eating habits. We must have tasted everything in Baroda together small or big, price was never an issue insight of a tasty dish. Thank you for all your support in the lab and outside.

Dr. Muskaan Belani has always supported me and encouraged me through out my thesis. I sincerely look up to your tenacity of working and juggling between work and home. Thank you.

Ragitha (the fighter), I think among all the others I have the most respect for this girl. She has silently fought her way through out her thesis and it is her work ethics, hard work and sincerity that I think everyone in the lab looks upto. I thank you for always being helpful, kind and witty.

Mitul (Waako) has been like a younger brother, an awesome guy, always helpful, kind and hardworking. He has been a constant and strong pillar of support during my Ph.D. I thank you for everything.

Komal (Komali), has been someone whom I look upto for her astonishing ability to multitask. She has continuously helped and supported me. I thank her for being patient whenever we had long microscopy or flow cytometry sessions. Thank you for being there.

Gaurav (Kathewadi), well he is the perfect junior. If you want someone to join your lab after you, one could find anyone better than this guy. Thank you for always being so reliable and hard working. You are an unpolished diamond, smoothen your edges and you will realize your true potential.

Gurprít (Guru ki preeti), a very hard working and smart girl. Always ready to learn anything new. Always ready to help. Always smiling. Thank you for all your support.

I also thank Komal chavda and Aditya gupta whom I have interacted with in the lab, though shortly but have supported me none the less.

I thank you all, without you this thesis wouldn't have been possible.

All my dissertation students starting from Mrudula, Nitin, Dixit and Afroze whom I have taught and in doing so learned a great deal too. Thank you for your contributions.

I also thank Sukhbir, Nirali, Harsh, Dhruv, Divya, Abhilash, Shreya, Deep, Hemal, Kishan, Steffi and Darshan along with other dissertation students for supporting me, keeping the lab atmosphere lively and fun to work.

Now moving away from the lab, especial thanks to my two close friends, Dr. Rushikesh Joshi and Dr. Ujwal Trivedi. You guyz were the other legs of the tripod. Thank you for your constant support away from the lab. Be it be long work hours or any trouble you two were always there. I would always cherish our time spent together in this department. Thank you.

Ankita Joshi, for her ever helpful nature, Thank you. You have been a great friend. I thank Krishma for being an inspiration, someone who is sincere and hardworking. I would like to Thank Mrinal, Hemanta and Hemendra Sir for their kind support when they were with me.

Moving away from the department, First I would like to thank Dr. Sharad Gupta, an immense supporter, an awesome cook and a scientist doctor. I thank you for years of support during my Ph.D. You have always welcomed us with any query and helped us out in your full capacity.

The Vikram Sarabhai staff, Heena², Swapnali, Aditya, Pooja, Manoj, Mitesh and Pintu for helping whenever I was in need of your help. You have always been very understanding and cooperative.

My Brother, Suyash, he is an amazing individual. I couldn't have asked for anyone better. Always thinking about the wellbeing of the family, always supportive. Thank you for being there for me. This thesis wouldn't have been possible without you bro.

All my friends, Varun, Manasi, Moumita, Sid, Anindra, Maithili, Malti, Hrishikesh, Ali, Batul, Nirja, Viraj, Divya and most importantly Munira. Thank you for your constant love and support. Munira, Thank you for being there, completing me and understanding me.

I want to thank all my B.Sc. teachers at St. Xavier's College, Mumbai for teaching me how to love science and making it enjoyable. Especially, Dr. Vishwas, Dr. Sheela and Dr. Sachin telang.

I thank all my immediate family members who continue to support me in one form or another. All my friends whose names I have not taken here. Thank you.

Most of all I thank all my Mice, without them this was not a possibility in real sense. Thank you for your sacrifice.

June, 2017

Abhay Srivastava