

Ramalingam Bethunaickan Ph.D

BIOGRAPHICAL SKETCH

NAME Ramalingam Bethunaickan	POSITION TITLE Scientist 'D'/DBT-Ramalingaswami Fellow		
eRA COMMONS USER NAME RBETHUN			
EDUCATION/TRAINING (<i>Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.</i>)			
INSTITUTION AND LOCATION	DEGREE (if applicable)	YEAR(s)	FIELD OF STUDY
Bharadhasan University, Tiruchirapalli, India	B Sc.	1994	Zoology
University of Madras, Guindy, Chennai, India	M Sc.	1996	Special Zoology
Tuberculosis Research Centre, Chennai, India	Ph. D.	2003	Bio Medical sciences (Immunology)

A. Personal Statement

My interests for the past 16 years have been in the field of Molecular Immunology, particularly Innate Immune function. I have received my master degree in Zoology from University of Madras and obtained my Ph.D. in Biomedical Science from Tuberculosis Research Center. During my Ph.D. studies, I have worked on understanding the cellular and humoral host immune system in the infectious disease of Tuberculosis, along with cloning, expression and characterizing the secreted, cell wall and cytosolic proteins of *Mycobacterium tuberculosis H37Rv*. For the Post-Doctoral training, I had the opportunity to work with the Dr. Camille Locht and Dr. Alain Baulard from Institute Pasteur de Lille, France, towards identification of mycobacterial genes specifically expressed within macrophages by IVET and GFP. Besides, investigated sub-genomic scale of identification and characterization of proteins involved in the cell wall structure and maintenance of mycobacteria towards discovery of novel drug targets through BACTH (Bacterial Two Hybrid System). Later moved on to Department of Medicine, Columbia University, New York, USA and carried out in-depth analysis of inflammatory molecules in the kidneys of mice with lupus nephritis among different murine models in Dr. Anne Davidson's laboratory. Further, I could explore the physiological pathways broadly shared between murine and human SLE nephritis that will be relevant to diagnosis and treatment for lupus patients. From these studies, the key role played by the renal macrophages/dendritic cells and the activation of renal endothelium in the pathogenesis of lupus nephritis could be established. Currently, moved to Department of Immunology, National Institute of Research in Tuberculosis (ICMR), Chennai and working as Scientist-D & DBT-Ramalingaswami Fellow, working towards understanding the molecular analysis of monocyte subsets in humans infected with *Mycobacterium tuberculosis*. I have been recognized as a Supervisor and Guide for PhD studies from University of Madras and have trained, supervised graduate students, rotation students and new Rheumatology Fellows and extremely knowledgeable about good laboratory practice.

B. Positions Honors

RESEARCH AND PROFESSIONAL EXPERIENCE

- June 2015- Till Date : Scientist 'D'/DBT Ramalingaswami Fellow, Department of Immunology, NIRT (ICMR), Chetput, Chennai-India.
- Dec 2013 - May 2015 : Assistant Investigator, Feinstein Institute for Medical Research, Manhasset, New York, USA.
- Feb 2007- Dec 2013 : Research Scientist, Feinstein Institute for Medical Research, Manhasset, New York, USA.
- Sep 2005 - Feb 2007 : Post Doctoral Research Scientist, Columbia University, New York, USA.
- May 2003 - Feb 2005 : Post Doctorant, Institute Pasteur de Lille, France.

PRIZES / AWARDS

- 2014 "Ramalingaswami Re-entry Fellowship" from DBT, Ministry of Science and Technology, Government of India.
- 2010 Senior key personnel, NIH- R01 DK085241-01
- 2006 New York SLE Foundation basic research Fellowship Grant Award from July 2006-June 2009 For 'Mechanism of remission in Lupus Nephritis'.
- 2003 CEFIPRA/IFCPAR Post-Doctoral Fellowship for two years in France.
- 2001 EGIDE Fellowship for International studies in France during Ph.D.
- 1999 CSIR Senior Research Fellowship from Government of India.
- 1996 Junior Research Fellowship / National Eligibility Test (JRF-NET) Examination conducted by Council of Scientific and Industrial Research (CSIR) Government of India (A national level examination for awarding research Fellowship/Lecturership).
- 1994 Jawaharlal Nehru Memorial Fund Prize for Science and Technology.
- 1994 Prof. (Tmt.) Susheela Clements Endowment Prize GOLD MEDAL in recognition of Performance in B.Sc., for obtaining FIRST RANK in Bharathidasan University.
- 1994 General proficiency in B.Sc.

PROFESSIONAL SOCIETY MEMBERSHIP

- Life Member, Indian Immunology Society, 1999 - present
- New York Academy of Sciences 2010 – present
- FOCIS , member, since Jan-2014 - present

C. Publications:

1. Moideen K, Kumar N P, Nair D, Banurekha V V, **Bethunaickan R**, Babu S. Heightened systemic levels of neutrophil and eosinophil granular Proteins in pulmonary tuberculosis and reversal following treatment. Accepted – April-2018. *Infection and Immunity*.
2. Dhamotharan P, Ayyanar S, **Bethunaickan R**, Palanichamy R, Subbiah R. Tannic acid modulates fibroblast proliferation and differentiation in response to pro-fibrotic stimuli". *J. of Cellular Biochem.* 2018
3. Harishankar M, Ravikrishnan H, Ravishankar A, Hanna LE, Swaminathan S, Selvaraj P and **Bethunaickan R**. IL-10 promoter-592 polymorphism may influence resistance to HIV infection in South Indian population. *Curr HIV Res.* 2018. PMID: 29468971
4. Gopalan A, Raghu B, Chandra N, Savithri HS, Raja A and **Bethunaickan R**. Biophysical and Biochemical Characterization of Rv3405c, a tetracycline repressor from Mycobacterium tuberculosis. *BBRC* 2018. Feb12; 496(3):799- 805.doi:10.1016/j.bbrc.2018.01.152. PMID: 29395080
5. Rajasekaran S, Anuradha R, Manokaran G and **Bethunaickan R**. An overview of Lymphatic Filariasis Lymphedema. *Lymphology* 2017;50(4)164-182
6. Sivaprakasam R, Anuradha R, **Bethunaickan R**, and Manoharan G. Multi-modality treatment for the near normal of Grade IV lymphedema – a Case Study. *Lymphology*. 2018. In press: March 2018

7. Rajasekaran S, Anuradha R, and **Bethunaickan R**. TLR Specific Immune Responses against Helminth Infections. *Journal of Parasitology Research*. 2017, doi:10.1155/2017/6865789.PMID: 29225962
8. Chandrasekaran P, Saravanan N, **Bethunaickan R** and Tripathy S. Malnutrition: Modulator of Immune Responses in Tuberculosis. *Frontiers in Immunology*. 2017 Oct 18; 8:1316. doi: 10.3389/fimmu.2017.01316. eCollection 2017. PMID: 29093710
9. Pathakumari B, **Bethunaickan R**. Biomarker and Therapeutic Targets for Tuberculosis: Role of Micro RNAs. *J. Investig. Genomics*. 2016;3(3): 00050. DOI: 10.15406/jig.2016.03.00050
10. Davidson A, **Bethunaickan R**, Berthier C, Sahu R, Zhang W, Kretzler M. Molecular studies of lupus nephritis kidneys. 2015; *Immunol. Res*. Sept. 16. PMID: 26376897
11. Boneparth A, Huang W, **Bethunaickan R**, Woods M. Sahu R, Arora S, Akerman M, Lesser M and Davidson A. TLR7 influences germinal center selection in murine SLE. *PLoS ONE*. 2015; 10(3); e0119925. PMID: 25794167.
12. **Bethunaickan R**, Berthier CC, Zhang W, Eksi R, Li H, Guan Y, Kretzler M, and Davidson A. Identification of stage specific genes associated with lupus nephritis and response to remission induction in NZB/W and NZM2410 mice. *Arthritis and Rheum*. 2014. PMID: 24757019.
13. Sahu R, **Bethunaickan R**, Singh S and Davidson A. Structure and function of renal macrophages and dendritic cells from SLE prone mice. *Arthritis Rheum*. 2013. 2012: 64 (10):3399–3408. PMID: 22674120.
14. **Bethunaickan R**, Berthier C, Zhang W, Kretzler M, and Davidson A. Comparative transcriptional profiling of 3 murine models of SLE nephritis reveals both unique and shared regulatory networks. *PLoS ONE* - 01/2013; 8(10):e77489. PMID: 24167575
15. Liu Z, **Bethunaickan R**, Sahu R, Brenner M, Laragione T, Gulko PS, Davidson A. The multiple chemokine-binding Bovine Herpesvirus 1 Glycoprotein G (BHV1gG) inhibits polymorphonuclear cell by not monocyte migration into inflammatory sites. *Mol Med*. 2013. 19: 276-285.PMID: 23979709.
16. Mosini I, Huang W, **Bethunaickan R**, Sahu R, Ricketts PG, Akerman M, Eilat D, Lesser M, Davidson A. The Yaa locus and IFN α fine tune germinal center B cell selection in murine SLE. *The Journal of Immunology*. 2012: 189: 4305–4312. PMID: 23024275.
17. **Bethunaickan R**, Sahu R, Liu Z, Tang YT, Huang W, Edegbe O, Tao H, Ramanujam M, Madaio MP and Davidson A. Anti-TNF treatment of IFN induced lupus nephritis reduces the renal macrophage response but does not alter glomerular immune complex formation. *Arthritis Rheum*. 2012: 64 (10):3399–3408. PMID: 22674120.
18. **Bethunaickan R**, Sahu R and Davidson A. Analysis of renal mononuclear phagocytes in murine models of SLE. *Methods Mol Biol*. 2012; 900:207-32. PMID: 22933071.
19. Berthier C *, **Bethunaickan R** *, Gonzalez-Rivera T *, Nair V, Ramanujam M, Zhang W, Bottinger EP, Segerer S, Cohen CD, Davidson A, and Kretzler M. Cross-species transcriptional network analysis defines shared inflammatory responses in murine and human lupus nephritis. *The Journal of Immunology*. 2012: 189: 988-1001.PMID:22723521. (* - Authors contributed equally to the work)
20. **Bethunaickan R**. and Davidson, A. Process and Analysis of Kidney Infiltrates by Flow Cytometry from Murine Lupus Nephritis. *Bio-protocol*. 2012; 2(9): e167. <http://www.bio-protocol.org/e167>
21. **Bethunaickan R**. and Davidson, A. (2012). Isolation of Dendritic Cells and Macrophages from the Murine Kidneys of Lupus by Cell Sorter. *Bio-protocol*. 2012;2(8): e168. <http://www.bio-protocol.org/e168>
22. Ranganathan, U. D., **Bethunaickan R**. and Raja, A. Isolation of Circulating Immune Complexes from TB Patient Serum for Serodiagnosis. *Bio-protocol*. 2012.2(11): e188. <http://www.bio-protocol.org/e188>
23. Huang W, Moisini I, **Bethunaickan R**, Sahu R, Akerman M, Eilat D, Lesser M, Davidson A. BAFF/APRIL Inhibition Decreases Selection of Naive but Not Antigen- Induced Autoreactive B Cells in Murine Systemic Lupus Erythematosus. *The Journal of Immunology*. 2011: 187: 6571–6580.PMID:22102726.
24. Liu Z, **Bethunaickan R**, Huang W, Ramanujam M, Madaio MP and Davidson A. Interferon- α confers resistance to SLE nephritis to therapy to NZB/W F1 mice. *The Journal of Immunology*. 2011: 187; 1506-1513.PMID:21705616.
25. **Bethunaickan R**, Berthier C, Ramanujam M, Sahu R, Zhang W, Sun Y, Bottinger E, Ivashkiv L, Kretzler M, and Davidson A. A unique hybrid renal mononuclear phagocyte activation phenotype in murine SLE Nephritis. *The Journal of Immunology*. 2011; 186; 4994-5003.PMID:21411733.

26. Liu Z, **Bethunaickan R**, Huang W, Lodhi U, Solano I, Madaio MP, Davidson A. Interferon- α accelerates murine systemic lupus erythematosus in a T cell-dependent manner. *Arthritis Rheum.* 2011; 63(1):219-29. PMID: 20954185.
27. Ramanujam M, **Bethunaickan R**, Huang W, Tao H, Madaio MP, Davidson A. Selective blockade of BAFF for the prevention and treatment of systemic lupus erythematosus nephritis in NZM2410 mice. *Arthritis Rheum.* 2010 May; 62(5):1457-68. PMID: 20131293.
28. Kahn P, Ramanujam M, **Bethunaickan R**, Huang W, Tao H, Madaio MP, Factor SM, Davidson A. Prevention of murine antiphospholipid syndrome by BAFF blockade. *Arthritis Rheum.* 2008; 58(9):2824-34. PMID: 18759321.
29. Raja A, Uma Devi KR, and **Bethunaickan R**. Improved diagnosis of pulmonary tuberculosis by detection of antibodies against multiple Mycobacterium tuberculosis antigens. *Diagn. Microbiol. Infect. Dis.* 2008;60:361-368. PMID: 18206332.
30. Schiffer L, **Bethunaickan R**, Ramanujam M, Huang W, Schiffer M, Tao H, Madaio MP, Bottinger EP, and Davidson A. Activated Renal Macrophages Are Markers of Disease Onset and Disease Remission in Lupus Nephritis. *The Journal of Immunology.* 2008; 180 (3):1938-1947. PMID: 18209092.
31. **Ramalingam Bethunaickan**, Alain R. Baulard, Camille Loch and Raja A. Antibody response in pulmonary tuberculosis against recombinant 27kDa (MPT51, Rv3803c) protein of Mycobacterium tuberculosis. *Scand J. Infect Dis.* 2007;39(10):867-874. PMID: 17852894.
32. Srivastava V, Rouanet C, Srivastava R, **Ramalingam B**, Loch C, Srivastava BS. Macrophage-specific Mycobacterium tuberculosis genes: identification by green fluorescent protein and kanamycin resistance selection. *Microbiology.* 2007; 153(Pt 3):659-666. PMID: 17322185.
33. Alamelu Raja, Uma Devi KR, and **Ramalingam B**. Clinical value of specific detection of immune complex-bound antibodies in pulmonary tuberculosis. *Diagn. Microbiol. Infect. Dis.* 2006; 56(3):281-7. PMID: 16876372.
34. Alamelu Raja, Uma Devi KR, **Ramalingam B** and Patrick J. Brennan. Improved diagnosis of pulmonary tuberculosis by detection of free and immune complex bound anti – 30kDa antibodies. *Diagn. Microbiol. Infect. Dis.* 2004; 50 (4):253-259. PMID: 15582298.
35. **Ramalingam B**, Alain R. Baulard, Camille Loch , Narayanan PR and Raja A. Cloning expression and purification of the 27kDa (MPT51, Rv3803c) protein of Mycobacterium tuberculosis. *Protein Expression and Purification.* 2004; 36 (1):53-60. PMID: 15177284.
36. Uma Devi KR, **Ramalingam B** and Raja A. Antibody response to Mycobacterium tuberculosis 30 and 16kDa antigens in pulmonary tuberculosis with human immunodeficiency virus coinfection. *Diagn. Microbiol. Infect. Dis.* 2003 Jul;46(3):205-209. PMID: 12867096.
37. **Ramalingam B**, Uma Devi KR, and Raja A. Isotype-specific anti-38 and 27 kDa (mpt 51) response in pulmonary tuberculosis with human immunodeficiency virus coinfection. *Scand J. Infect Dis.* 2003; 35(4):234-239. PMID: 12839150.
38. Uma Devi KR, **Ramalingam B** and Alamelu Raja. Qualitative and quantitative analysis of antibody response in childhood tuberculosis against antigens of Mycobacterium tuberculosis. *Indian Journal of Medical Microbiology.* 2002; 20 (3); 145-149. PMID: 17657054.
39. Alamelu Raja, Uma Devi KR, **Ramalingam B** and Patrick J. Brennan. Immunoglobulin G, A and M responses in serum and circulating immune complexes elicited by the 16-Kilodalton antigen of Mycobacterium tuberculosis. *Clinical and Diagnostic Laboratory Immunology.* 2002; 9 (2): 308-312. PMID: 11874868.
40. Uma Devi K. R., Senthil Kumar K. S., **Ramalingam B** and Alamelu Raja. Purification and characterization of three immunodominant proteins (38, 30 and 16 kDa) of Mycobacterium tuberculosis. *Protein Expression and Purification.* 2002; 24:188-195. PMID: 11858712.
41. **Ramalingam B**, Uma Devi KR, Soumya Swaminathan and Alamelu Raja. Isotype specific antibody response in childhood tuberculosis against purified 38kDa antigen of Mycobacterium tuberculosis. *Journal of Tropical Pediatrics.* 2002, 48 (3): 188–189. PMID: 12164607.
42. Alamelu Raja, Uma Devi KR, **Ramalingam B** and Vijayasekeran D. Serologic response to a secreted (30kDa) and a cytosolic (16kDa) antigen of Mycobacterium tuberculosis in childhood tuberculosis. *The Pediatric Infectious Disease Journal.* 2001; 20:1161-1165. PMID: 11740324.

43. Uma Devi KR, **Ramalingam B**, Brennan PJ, Narayanan PR, Alamelu Raja. Specific and early detection of IgG, A and M antibodies to Mycobacterium tuberculosis 38kDa antigen in pulmonary tuberculosis. *Tuberculosis*. 2001; 81:249-253.PMID:11466037.

Chapters in books:

44. **Bethunaickan R**, Sahu R and Davidson A. Analysis of renal mononuclear phagocytes in murine models of SLE. Autoimmunity: Methods and protocols. Springer Protocols: Methods in Molecular Biology 900: Humana Press; 2nd edition 2012, Edited by Andras Perl, MD, Ph.D.

Scientific Proceedings:

45. Meera Ramanujam, Martha Tepas, Haiou Tao, Dan Frank, Anne Davidson, **Ramalingam Bethunaickan**. Remission of IFN alpha induced SLE in NZB/W mice with cyclophosphamide/CTLA4Ig but not mycophenolate mofetil/CYLA4Ig. *Arthritis Rheumatism*. 2006; 54(9); S451.
46. Meera Ramanujam, **Ramalingam Bethunaickan**, Anne Davidson. Activated Interstitial Macrophages are Important Mediators of SLE Nephritis. *Clinical Immunology*. 2007.123;S88 (FOCIS-2007 meeting San Diego, June 7-11, 2007- USA)
47. Berthier C., **Bethunaickan R**, Bottinger E., Kretzler, M. and Davidson A. Proliferative SLE Nephritis and Progressive Non-inflammatory Glomerulosclerosis share key Gene Expression Profiles. (American College of Rheumatology scientific meeting October 24-29, 2008)
48. Ramanujam M. **Bethunaickan R**, Bottinger E and Davidson A. Analysis of Activated Renal Macrophages And Dendritic Cells In SLE Nephritis. (American College of Rheumatology scientific meeting October 24-29, 2008)
49. **Ramalingam Bethunaickan**, Meera Ramanujam, Haiou Tao and Anne Davidson Mononuclear Phagocytes That Upregulate ITGAM Are Markers of SLE Nephritis Onset and Remission *Sunday, October 18, 2009*: (American College of Rheumatology scientific meeting October 16-21, 2009, Philadelphia)
50. Zheng Liu, **Ramalingam Bethunaickan**, Weiqing Huang and Anne Davidson. IFN_ Induced SLE in NZB/W Mice Is T Cell Dependent but Blockade of TFH Does Not Prevent Disease. *Arthritis rheumatism*: 2010; Vol.62:5:S918 (American College of Rheumatology scientific meeting November 7- 11, 2010, Atlanta.)
51. Tania C. Gonzalez Rivera, Celine C. Berthier, Viji Nair, **Ramalingam Bethunaickan**, Matthias Kretzler, Anne Davidson and ERCB Consortium . Transcriptional Inflammatory Mechanism in Murine Lupus Nephritis: An Insight into Human Disease. *Arthritis and Rheumatism*; 2010; 62:5:S958 (American College of Rheumatology scientific meeting November 7-11, 2010, Atlanta.)
52. **Ramalingam Bethunaickan**, Yiting Tang and Anne Davidson. TNF Inhibition Prevents Peri-Glomerular Resident Renal Macrophage Accumulation and Activation in SLE Nephritis . *Arthritis and Rheumatism* 2011:63; 10; S213 (American College of Rheumatology scientific meeting Chicago, Illinois November 4-9, 2011.)
51. Huang W., Moisini I., **Bethunaickan R.**, Sahu R. Akerman, M Lesser M., Eilat D., Davidson A. BAFF/APRIL Inhibition Induces Negative Selection of Naïve Autoreactive B Cells but Does Not Prevent Positive Selection of Autoreactive B Cells in the Germinal Center. *Arthritis and Rheumatism* 2011:63;10; S998 (American College of Rheumatology scientific meeting Chicago, Illinois November 4-9, 2011.)
53. **Ramalingam Bethunaickan**, Celine C. Berthier, Matthias Kretzler and Anne Davidson. Shared and Unique Molecular Features of Nephritis in 3 Models of Murine SLE. *Arthritis and Rheumatism* 2012: 64:10:S621. (American College of Rheumatology scientific meeting November 9-14, 2012, Washington DC. USA.)
54. Ranjit Sahu, **Ramalingam Bethunaickan** and Anne Davidson. Characterization of Renal Mononuclear Phagocyte Populations in Murine SLE Nephritis. *Arthritis and Rheumatism*. 2012:64:10:S624. (American College of Rheumatology scientific meeting November 9-14, 2012, Washington DC. USA.)
55. Alexis Boneparth , **Ramalingam Bethunaickan**, Weiqing Huang and Anne Davidson. Effects Of BAFF Inhibition On B Cell Selection In Murine SLE. *Arthritis and Rheumatism*. 2013:65:10:S1196. (American College of Rheumatology scientific meeting October 25-30, 2013, San Diego, USA)
56. **Ramalingam Bethunaickan**, Celine C. Berthier, Hong-dong Li, Weijia Zhang, Yuanfang Guan,

Matthias Kretzler and Anne Davidson. Identification of Stage Specific Genes Associated With Lupus Nephritis and Response To Remission induction In NZB/W Mice. *Arthritis and Rheumatism*. 2013;65:10:S241.

American College of Rheumatology scientific meeting October 25-30, 2013, San Diego, USA)

57. Weiqing Huang, Megan Woods, Alexis Boneparth, **Ramalingam Bethunaickan**, Ranjit Sahu and Anne Davidson. TLR7 Influences Autoreactive B Cell Selection in the Germinal Center. *Arthritis and Rheumatism*.2014;66:10:S1254. (American College of Rheumatology scientific meeting. November 14-19, Boston, USA)
58. Mishra R, **Bethunaickan R**, Zhang W, Davidson A. Disturbance of Renal Circadian Rhythm in Lupus Nephritis. *Arthritis Rheumatol*. 2016; 68 (suppl 10). <http://acrabstracts.org/abstract/disturbance-of-renal-circadian-rhythm-in-lupus-nephritis/>. Accessed september 20, 2016.
59. Mishra R, **Bethunaickan R**, Zhang W, Davidson A. Disturbance of Renal Circadian Rhythm in Lupus Nephritis. *Journal of Immunology*. 2017; 68 (suppl. 10). October 18, 2017.

D. Research Support

Completed Research Projects

1. Title : Mechanism of Remission of SLE Nephritis.
Role : Principal Investigator
Agency : SLE Foundation, New York, USA.
Type : Research Grant.
Amount : \$135,000
Period : June-2006 to June 2009.

2. Title : Targeting renal inflammatory pathways of SLE nephritis in mouse and man
Role : Senior key personnel
Agency : NIDDK, NIH, USA.
Type : R01, DK085241-01
Amount : \$1,829,551 (direct cost)
Period : March -2010 to March 2014

3. Title : Altered renal circadian rhythm in SLE Nephritis
Role : Senior Key Personnel
Agency : Lupus Research Institute, USA
Type : Novel Research Grant
Amount : \$234,000
Peroid : Jan-2015 to Jan-2017

Ongoing Research support:

4. Title : Molecular analysis of Monocyte subsets in humans infected with Mycobacterium Tuberculosis
Role : Principal Investigator
Agency : DBT, Ministry of Science and Technology, Government of India.
Type : NRI Re-entry Fellowship
Amount : 95 Lakhs
Peroid : June-2015 to June-2020