Dr. Satyajit Rath

M.B.,B.S.
University of Pune, India

M.D. (Pathology)
University of Mumbai, India

Postdoctoral Research
Haffkine Institute, Mumbai, India; London School of Hygiene and
Tropical Medicine, London, UK; Brandeis University, Waltham,
USA; Yale University School of Medicine, New Haven, USA.

Email satyajit@nii.res.in

Research Interest

The focus of ongoing programmes in our group is the physiological control of the generation and activation of T, B and antigen-presenting cells (APCs) of the myeloid lineage, using a variety of interlinked experimental systems and approaches in association with many collaborators both within and outside NII.

Group Members

Chaitali Banerjee, Shalini Tanwar, Jasneet Kaur Khalsa, Renu Balyan, Amanpreet Singh Chawla, Atika Dhar, Bahadur Singh Gurjar

Summary of Research

Our current projects are examining APCs and pathways involved in antigen presentation to MHC class I and class II-restricted T cells, and analysing the consequences of intracellular signal transduction modulation for both development and responses of T cells and myeloid cells using genetic as well as pharmacological tools. Here below are a few ongoing examples, along with the group members and collaborators involved in them.

In one approach, we are trying to elucidate the unique roles that individual death pathways play at different stages of the development and functioning of T and B cells.
(Shalini Tanwar, Jasneet Kaur Khalsa and Atika Dhar, in collaboration with Anna George and Vineeta Bal at NII, Apurva Sarin at NCBS, Bangalore, India, and Jeannine Durdik at the University of Arkansas, Fayetteville, USA)

In a second approach, we are trying to understand how the dynamics of MHC and T cell receptor molecules on interacting T cells and APCs are controlled, and how these controls regulate the functional responses of T cells.

(Renu Balyan in collaboration with Anna George and Vineeta Bal at NII, and Satyajit Mayor at NCBS, Bangalore, India)

In a third approach, we are dissecting the roles of quantitative modifiers of immune signal transduction pathways, ranging from proteasomal components to tyrosine kinases, in controlling the development and functioning of myeloid and lymphoid cells.
(Shalini Tanwar and Amanpreet Singh Çhawla in collaboration with Anna George and Vineeta Bal at NII, and Savit Prabhu at PBC-THSTI, Delhi-NCR)

In a fourth approach, we are characterising the diversity and stability of immunocyte subpopulation phenotypes in human peripheral blood and their correlation with various states of immune dysfunction in neonates. (Amanpreet Singh Chawla in collaboration with Anna George and Vineeta Bal at NII, Savit Prabhu, Uma Chandra Mouli Natchu, Nitya Wadhwa and Shinjini Bhatnagar at PBC-THSTI, Delhi-NCR, and Ranjan Sen at the NIA-NIH, Baltimore, USA)

In a fifth approach, we are examining the immunogenetic basis of autoimmune responses to complement components and their contribution to human disease (Bahadur Singh Gurjar in collaboration with Anna George and Vineeta Bal at NII, Savit Prabhu, Uma Chandra Mouli Natchu, Nitya Wadhwa and Shinjini Bhatnagar at THSTI, Gurgaon, Arvind Bagga at AIIMS, New Delhi, Priyadarshni Chatterjee at RCB, Delhi-NCR, and Arvind Sahu at NCCS, Pune)

Selected Publications

- Upadhyay M, Priya GK, Ramesh P, Madhavi MB, Rath S, Bal V, George A, Vaidya T. CD40 signaling drives B lymphocytes into an intermediate memory-like state, poised between naïve and plasma cells. J Cell Physiol. 2014 Oct;229(10):1387-96. doi: 10.1002/jcp.24572. PubMed PMID: 24482285.
- Saini AS, Shenoy GN, Rath S, Bal V, George A. Inducible nitric oxide synthase is a major intermediate in signaling pathways for the survival of plasma cells. Nat Immunol. 2014 Mar;15(3):275-82. doi: 10.1038/ni.2806. Epub 2014 Jan 19. PubMed PMID: 24441790.
- Sinha A, Gulati A, Saini S, Blanc C, Gupta A, Gurjar BS, Saini H, Kotresh ST, Ali U, Bhatia D, Ohri A, Kumar M, Agarwal I, Gulati S, Anand K, Vijayakumar M, Sinha R, Sethi S, Salmona M, George A, Bal V, Singh G, Dinda AK, Hari P, Rath S, Dragon-Durey MA, Bagga A; Indian HUS Registry. Prompt plasma exchanges and immunosuppressive treatment improves the outcomes of anti-factor H autoantibody-associated hemolytic uremic syndrome in children. Kidney Int. 2014 May;85(5):1151-60. doi: 10.1038/ki.2013.373. Epub 2013 Oct 2. PubMed PMID: 240889
- Salam N, Rane S, Das R, Faulkner M, Gund R, Kandpal U, Lewis V, Mattoo H, Prabhu S, Ranganathan V, Durdik J, George A, Rath S, Bal V. T cell ageing: effects of age on development, survival & function. Indian J Med Res. 2013 Nov;138(5):595-608. Review. PubMed PMID: 24434315; PubMed Central PMCID: PMC3928693.
- Prabhu SB, Khalsa JK, Banerjee H, Das A, Srivastava S, Mattoo HR, Thyagarajan K, Tanwar S, Das DS, Majumdar SS, George A, Bal V, Durdik JM, Rath S. Role of apoptosis-inducing factor (Aif) in the T cell lineage. Indian J Med Res. 2013 Nov;138(5):577-90. Review. PubMed PMID: 24434313; PubMed Central PMCID: PMC3928691.
- Banerjee H, Das A, Srivastava S, Mattoo HR, Thyagarajan K, Khalsa JK, Tanwar S, Das DS, Majumdar SS, George A, Bal V, Durdik JM, Rath S. A role for apoptosis-

inducing factor in T cell development. J Exp Med. 2012 Aug 27;209(9):1641-53. doi: 10.1084/jem.20110306. Epub 2012 Aug 6. PubMed PMID: 22869892; PubMed Central PMCID: PMC3428951.

- Shenoy GN, Chatterjee P, Kaw S, Mukherjee S, Rathore DK, Bal V, Rath S, George A. Recruitment of memory B cells to lymph nodes remote from the site of immunization requires an inflammatory stimulus. J Immunol. 2012 Jul 15;189(2):521-8. doi: 10.4049/jimmunol.1102814. Epub 2012 Jun 6. PubMed PMID: 22675203.
- Panda SK, Kumar S, Tupperwar NC, Vaidya T, George A, Rath S, Bal V, Ravindran B. Chitohexaose activates macrophages by alternate pathway through TLR4 and blocks endotoxemia. PLoS Pathog. 2012;8(5):e1002717. doi: 10.1371/journal.ppat.1002717. Epub 2012 May 24. PubMed PMID: 22654663; PubMed Central PMCID: PMC3359989.
- Chatterjee P, Tiwari RK, Rath S, Bal V, George A. Modulation of antigen presentation and B cell receptor signaling in B cells of beige mice. J Immunol. 2012 Mar 15;188(6):2695-702. doi: 10.4049/jimmunol.1101527. Epub 2012 Feb 10. PubMed PMID: 22327079.
- Khare A, Viswanathan B, Gund R, Jain N, Ravindran B, George A, Rath S, Bal V. Role of Bruton's tyrosine kinase in macrophage apoptosis. Apoptosis. 2011 Apr;16(4):334-46. doi: 10.1007/s10495-010-0569-6. PubMed PMID: 21193961.
- Satpathy S, Shenoy GN, Kaw S, Vaidya T, Bal V, Rath S, George A. Inhibition of terminal differentiation of B cells mediated by CD27 and CD40 involves signaling through JNK. J Immunol. 2010 Dec 1;185(11):6499-507. doi: 10.4049/jimmunol.0903229. Epub 2010 Oct 25. PubMed PMID: 20974987.
- Varanasi V, Mattoo H, Tupperwar NC, Thyagarajan K, Das A, Kumar R, Bal V, Vaidya T, George A, Rath S. A superantigen interacts with leishmanial infection in antigen-presenting cells to regulate cytokine commitment of responding CD4 T cells. J Infect Dis. 2010 Oct 15;202(8):1234-45. doi: 10.1086/656366. PubMed PMID: 20831385.