

CURRICULUM VITAE



ANURODH SHANKAR AGRAWAL

PERSONAL

Post-doctoral Research Fellow I,
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CAREER OBJECTIVE

Interested to build a career that offers an excellent opportunity to work with committed and dedicated people which will help me to explore myself fully and realize my potential.

RESEARCH INTEREST

Basic research in Immunology including cell culture, immunochemistry and molecular biology. Molecular Virology, Viral Pathogenesis, Host-virus interaction, Genomic Diversity and Evolution (Phylogenetic) of Viruses, Molecular Epidemiology, vaccine and antiviral drug development, Factors involving in Ig Class switching Recombination.

EDUCATION

2005-2010	Ph.D. (Virology)	Division of Virology, National Inst. of Cholera & Enteric Diseases Jadavpur University Kolkata, India.
2003-2005	M.Sc. [1 st class] (Molecular Biology & Biotechnology)	Department of Biotechnology Tezpur University, Assam, India
1998-2001	B.Sc. [1 st Class] (Major: Zoology) (Minor: Botany, Chemistry)	Gaya College, Gaya, Magadh University, Bodhgaya, Bihar, India.

ASSOCIATSHIP

- June 2013- till date** **Postdoc Research fellow** in Dept. of Microbiology & Immunology, UTMB, Galveston, Texas
- Dec 2010-May 2013** **Postdoctoral Research Associate** by Dept. of immunology, Duke University medical center, USA.

FELLOWSHIP/AWARDS

- Oct 2007-Sept 2010** **Senior Research Fellowship** (SRF) awarded by ICMR (Indian Council of Medical Research), India during my PhD program.
- Oct 2005- Sep 2007** **Junior Research Fellowship** (JRF) awarded by ICMR (Indian Council of Medical Research), India during my PhD program.
- Aug 2003-June 2005** Fellowship awarded by **DBT (Department of Biotechnology), Govt. of India during M.Sc. (Master of Science).**
- ❖ Received **Travel award** by European society for clinical virology (ESCV) for presenting my research paper at 12th ESCV meeting, Istanbul, Turkey from 27-30 September 2009.
 - ❖ Qualified the **Graduate Aptitude Test in Engineering (GATE)-2004** and **GATE-2005** examination in life science with 92.25 percentile and 89 percentile respectively.

RESEARCH EXPERIENCE

I have more than 10 years of research experience worked in various biological fields especially in basic immunology, molecular virology, microbiology and biochemistry with the ability to design assays in multiple model systems. I have worked on the project requiring multiple skills in biological sciences; thereby acquired the knowledge of different techniques used in modern day molecular biology research.

- June 2013-till date** Generating and establishing the transgenic mice model expressing human CD26 for studying pathogenesis of MERS-CoV infection and evaluating prophylactic and therapeutic interventions
- Dec. 2010-April 2013** Studied on the antibody diversification and the major repair pathways Involve during class switch recombination with emphasis to homologous recombination repair protein Xrcc3.
- Sept. 2005-Nov. 2010** Doctoral research at Division of Virology, National Institute of Cholera & Enteric Diseases, Kolkata, India. Worked on detection and Molecular Characterization of human respiratory RNA viruses with special reference to Influenza viruses.
- 2004-2005** M.Sc. dissertation research work at Department of Molecular Biology and Bio- technology, Tezpur University, Tezpur, Assam, India. Worked on “**cloning, characterization and expression** of a **thermostable** intracellular **α -amylase** expressing gene from a hyper thermophilic bacterium *Bacillus subtilis*.”

1. **Anurodh S Agrawal**, Rahul Arya, Shyam Unniraman. **Role of Xrcc3 in microhomology-mediated end joining during class switch recombination**. Poster presented in Keystone symposia on Mutations, Malignancy and Memory – Antibodies and Immunity, held in Boston, USA from March 18-22, 2012.
2. **Anurodh S Agrawal**, S. Chakrabarty and Mamta Chawla-Sarkar. **Two year surveillance for Influenza and RSV using Real-time PCR among children with acute respiratory infections in Kolkata reveals distinct seasonality of Infection**. Poster accepted in 14th International Congress on Infectious Diseases, MIAMI, FLORIDA, USA, 9-12 March, 2010.
3. **Anurodh S Agrawal**, Mehuli Sarkar, Swati Ghosh, Sekhar Chakrabarti, Trailokya N Naik and Mamta Chawla-Sarkar. **Surveillance and Genetic characterization of circulating Influenza-A virus strains in Kolkata during 2005-2008**. Poster presented in ICGEB/IUBMB Workshop "Human RNA Viruses", New Delhi, India. 10-12 February 2010.
4. **Anurodh S. Agrawal**, M. Sarkar and M. Chawla-Sarkar. **Comparative evaluation of multiplex real-time PCR and conventional RT-PCR during a two year surveillance study for influenza and respiratory syncytial viruses among children in Kolkata, India**. Poster presented at 12th European society of clinical virology (ESCV) meeting, Istanbul, Turkey from 27-30 September, 2009.
5. Participation in the Real time PCR workshop for the detection of **Influenza A (H1N1) of swine lineage** held at National Institute of Virology, Pune, India from 17th-18th June 2009.
6. Participation in the 13th International Conference on “**Emerging Infectious Diseases of the Pacific Rim: Focus on Enteric Diseases**” from 6-9 April, 2009, Kolkata, India.
7. **Anurodh S. Agrawal**, M. Sarkar, S. Ghosh and M. Chawla-Sarkar. **Respiratory Syncytial Virus Group B BA-IV Genotype Strains with Six Nucleotide Deletion are Circulating among Children with Acute Respiratory Tract Infection in Kolkata, Eastern India**. Poster Presented at the 96th Annual Meeting of Indian Science Congress, Shillong, India from 3-7 January, 2009.
8. Chawla-sarkar M, Sarkar M, **Agrawal A. S.**, Dey R. **Natural plant products: an effective source for developing new anti influenza Virus drugs**. Poster presented at 3rd European Influenza conference, Vilamoura, Portugal from 14-17 September 2008.
9. NIV-ICMR-CDC-HHS-USA laboratory workshop on “**Real-Time PCR for detection of Human and avian Influenza viruses**” from October 8-12, 2007 at National Institute of Virology (NIV), Pune, India.
10. Participation in International Symposium on **Teaching, Research & Exploration in Biochemistry: 50 Years of journey** from 6-7 January, 2006 organized by Department of Biochemistry, university of Calcutta, India.

EXPERTISE AND TECHNICAL SKILLS

Major Accomplishments

- Experience with mice, including but not limited to (a) breeding and colony expansion, (b) genotyping, (c) maintenance of the database of all the strains of mice in the lab, and (d) various survival and terminal mouse procedures in ABSL2 and ABSL3 high containment laboratory.
- Generation and maintenance of transgenic mice colonies for studying the pathogenesis and infection of newly emerged MERS-Coronavirus.
- Designed and developed a Multiplex PCR based assay for the detection of different Human Respiratory RNA viruses among children and adults in Kolkata, India.
- Molecular Characterization of Human Influenza, Respiratory Syncytial Viruses and Human Metapneumoviruses.
- Adaptation and Propagation of human Influenza virus in different cell lines.
- Real-time PCR for detection of Influenza and RSV, SARS and MERS coronaviruses.
- Host-Virus interaction and signaling mechanism after antiviral drug treatment for the regulation of Influenza virus infection.

Molecular Biology & Biochemistry

- Extensive experience in primer designing,
- Cloning and Gene expressing in human and murine cell system
- Luciferase Reporter assay
- DNA isolation (Both Genomic and Plasmid)
- RNA Extraction, RT-PCR, PCR Purification and Gel Elution
- Real time PCR (ABI, Eppendorf), Multiplex PCR,
- Site directed Mutagenesis
- Large scale sequencing using Big Dye Terminator Chemistry of ABI Prism
- Native and SDS-PAGE, Western Blotting
- Protein estimation, Biochemical tests, Protein purification.

Biological system handled

- Human and mouse adherent and Suspension cell lines
- Maintenance and adaptation of different respiratory viruses
- Virus infection, plaque assay, Fluorescent microscopy.
- Bacteria (E.Coli, Bacillus)
- Baculovirus
- Different Primary cells and mouse models.

Immunology

- Mouse immune cell isolations and culture invitro
- Enzyme Linked Immunosorbent Assay (ELISA), Haemagglutinin assay
- T cell-dendritic cell interaction assays in mice
- Immunostaining & fluorescence microscopy, Immunoprecipitation
- Multi-color flow cytometry and analysis using flowjo software
- Animal vaccination/immunization and behavior studies
- Working experience in BSL2, BSL3, ABSL2 & ABSL3

Bioinformatics:

- Sequence and Phylogenetic analysis using bioinformatics tools.
- Use of DNA and Protein analysis software
- Bibliography software endnote
- Adobe Photoshop CS3, MS-Office
- Graph making and Statistical analysis using SigmaPlot, GraphPad

PUBLICATIONS

1. Xinrong Tao, Tania Garron, **Anurodh Shankar Agrawal***, Abdullah Algaissi, Bi-Hung Peng, Maki Wakamiya, Teh-Sheng Chan, Lu Lu, Lanying Du, Shibo Jiang, Robert B. Couch, and Chien-Te K. Tseng. ***Characterization and Demonstration of value of a Lethal Mouse Model of Middle East Respiratory Syndrome Coronavirus Infection and Disease.*** Accepted in Journal of Virology. * **Equal Contributor.**
2. **Anurodh Shankar Agrawal**, Tania Garron, Xinrong Tao, Bi-Hung Peng, Maki Wakamiya, Teh-Sheng Chan, Robert B. Couch, Chien-Te K. Tseng. ***Generation of a Transgenic Mouse Model of Middle East Respiratory Syndrome Coronavirus Infection and Disease.*** Journal of Virology. 89:3659–3670. Impact Factor: 5.07
3. Mukti K. Nayak, **Anurodh S Agrawal**, Sudesh Bose, Shaon Naskar, Rahul Bhowmick, Saikat Chakrabarti, Sagartirth Sarkar, Mamta Chawla-Sarkar. ***Antiviral Activity of Baicalin against Influenza virus H1N1-pdm09 is due to modulation of NS1 mediated cellular innate immune responses.*** Journal of Antimicrobial Chemotherapy. May; 69(5):1298-310. Impact factor: 5.3.
4. Tao, Xinrong, Feng Mei, **Anurodh Agrawal**, Clarence J. Peters, Thomas G. Ksiazek, Xiaodong Cheng, Chien-Te K. Tseng. ***Blocking of Exchange Proteins Directly Activated by cAMP (Epac) Leads to Reduced Replication of Middle East Respiratory Syndrome-Coronavirus.*** Journal of Virology. Apr; 88 (7):3902-10. Impact Factor: 5.07
5. Mukherjee T R, **Agrawal A S**, Chakrabarti S, Chawla-Sarkar M. ***Full genomic analysis of an influenza A (H1N2) virus identified during 2009 pandemic in Eastern India: evidence of reassortment event between co-circulating A(H1N1)pdm09 and A/Brisbane/10/2007-like H3N2 strains.*** Virol. J. 2012. Oct; 9:233.
6. Tapasi Roy, **Anurodh S. Agrawal**, Anupam Mukherjee, Akhilesh C. Mishra, Man-deep S. Chadha, Harpreet Kaur, Mamta Chawla-Sarkar. ***Surveillance and molecular characterization of human influenza B viruses during 2006–2010 revealed co-circulation of Yamagata-like and Victoria-like strains in eastern India.*** Infect. Genet. and Evolution. 2011, Oct; 11(7):1595-601.
7. Mehuli Sarkar, **Anurodh S. Agrawal**, Rakhi S. Dey Shiladitya Chattopadhyay, Ranajay Mullick, Papiya Dey, Sekhar Chakrabarti, Mamta Chawla-Sarkar. ***Molecular characterization and comparative analysis of pandemic H1N1/2009 strains with co-circulating seasonal H1N1/2009 strains from eastern India.*** Arch.Virol. 2011,156:207-217.
8. **Anurodh S Agrawal**, Tapasi Roy, Swati Ghosh, Mamta Chawla-Sarkar. ***Genetic variability of attachment (G) and Fusion (F) protein genes of human metapneumovirus strains circulating during 2006-2009 in Kolkata, Eastern India.*** Virology Journal. 2011, 8:67.

9. **Anurodh S. Agrawal**, Mehuli Sarkar, Swati Ghosh, Tapasi Roy, Sekhar Chakrabarti, Renu Lal, Akhilesh C Mishra, Mandeep S Chadha and Mamta Chawla-Sarkar. *Genetic characterization of circulating seasonal Influenza A viruses (2005-2009) revealed introduction of oseltamivir resistant H1N1 strains during 2009 in Eastern India*. *Infect., Genet. and Evolution*. 2010, 10: 1188-1198.
10. Anupam Mukherjee, Tapasi Roy, **Anurodh S Agrawal**, Mehuli Sarkar, Renu Lal, Sekhar Chakrabarti and Mamta Chawla-Sarkar. *Prevalence and epidemiology of pandemic H1N1 strains in hospitals of Eastern India*. *J. Pub. Health and Epidemiol.* 2010, 2(7): 171-174.
11. **Anurodh S. Agrawal**, Sarkar M., Chakrabarti S., Rajendran K., H. Kaur, Mishra A. C., Chatterjee M. K., Naik T. N., Chadha M. S., Mamta Chawla-Sarkar. *Comparative evaluation of real-time PCR and conventional RT-PCR during two year surveillance for Influenza and RSV among children with acute respiratory infections in Kolkata reveals distinct seasonality of infection*. *J. Med. Microbiol.* 2009, 58:1616-1622.
12. **Anurodh S. Agrawal**, Sarkar M., Ghosh S., Chawla-Sarkar M., Chakraborty N., Basak M., Naik T.N. *Prevalence of Respiratory Syncytial Virus Group B Genotype BA-IV Strains among Children with Acute Respiratory Tract Infection in Kolkata, Eastern India*. *J Clin. Virol.* 2009, Aug; 45(4): 358-61.

MEMBERS IN PROFESSIONAL SOCIETY

1. Member of the “American Society for Microbiology (ASM)”, USA.
2. Member of the “European Society of Clinical Microbiology and Infectious Diseases”.
3. Member of the “American Association of Immunologist, USA.
4. Member of the “European society for Clinical Virology”.
5. Member of the “Indian Science Congress”, India.

DECLARATION: I hereby declare that the above mentioned information is correct up to the best of my knowledge and belief.



(Anurodh S. Agrawal)