

MITHUN MAJI, Ph.D.

Personal Details

Assistant Professor of Botany

Joined on 4th May 2010

Place of Birth: Asansol, West Bengal, India

Nationality: Indian

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Academic Positions

Ph.D. awarded (November, 2016) in Biochemistry (CU) under the supervision of **Dr. Nahid Ali**, Indian Institute of Chemical Biology (IICB), Kolkata, India.

Education

- **M.Sc in Botany** (2005-2007), The University of Burdwan, India (special paper Microbiology and Biotechnology)
- **B.Sc in Botany** (2002-2005), Asansol B.B College, The University of Burdwan, India

Research Experiences

Doctoral Research:

Title: Immunostimulation of Antigen-Presenting Cells by Differentially Charged Liposomes

My doctoral research focused on evaluating vaccines formulated with wild-type (soluble leishmanial antigens) and recombinant proteins (gp63), combined with liposomal adjuvants against experimental visceral leishmaniasis. The primary goal was to elucidate the mechanisms of antigen uptake, processing, and presentation by differentially charged liposomes within dendritic cells (DCs) and macrophages, aiming at developing effective vaccine strategies.

Current Research Interests:

During my Ph.D. in Prof. Nahid Ali's lab as a CSIR-Junior Research Fellow, I demonstrated that cationic liposomes encapsulating leishmanial antigens and TLR adjuvants induce robust CD4+ and CD8+ T cell responses, conferring long-term protection against visceral leishmaniasis (PLoS Neglected Tropical Diseases, 2011; Molecular Pharmaceutics, 2012).

Further studies revealed liposomal formulations facilitated antigen uptake and promoted efficient cross-presentation to CD8+ T cells via a TAP-dependent pathway (Scientific Reports, 2016).

My current research, published recently in ACS Omega, focuses on defining the roles of various liposomal formulations in antigen processing and presentation by APCs. Comparative analyses of these processes in dendritic cells and macrophages are ongoing. Additionally, I aim to explore pharmaceutical applications of plant extracts, emphasizing their biochemical and immunological properties.

Awards/Honors

- *Qualified National Eligibility Test (NET) for CSIR-Junior Research Fellowship (CSIR-JRF) in 2008 conducted by CSIR-UGC, New Delhi, INDIA.*
- *Qualified Graduate Aptitude Test in Engineering (GATE) in Life Science (2008) conducted by Indian Institute of Technology (IIT) and Indian Institute of Science (IISc), Bangalore, INDIA jointly.*

Publications

1. **Maji M**, Ghosh S, Didwania N, and Ali N. Differentially Charged Liposomes Stimulate Dendritic Cells with Varying Effects on Uptake and Processing When Used Alone or in Combination with an Adjuvant. **ACS Omega** 2024 9 (27), 29175-29185. DOI: 10.1021/acsomega.3c07814. **I.F-3.512**
2. **Maji M**, Mazumder S, Bhattacharya S, Thakur Choudhury S, Sabur A, Md. Shadab, Bhattacharya P, Ali N. A Lipid Based Antigen Delivery System Efficiently Facilitates MHC Class-I Antigen Presentation in Dendritic Cells to Stimulate CD8+ T Cells. **Scientific Reports**, 2016, 6:27206. **I.F-4.259**
3. Ravindran R*, **Maji M*** and Ali N. (2012) Vaccination with Liposomal Leishmanial Antigens Adjuvanted with Monophosphoryl Lipid–Trehalose Dicorynomycolate (MPL-TDM) Confers Long-Term Protection against Visceral Leishmaniasis through a Human Administrable Route. **Mol. Pharmaceutics** 2012, 9, 59–70. **I.F-4.570**
(*R.R. and M.M. contributed equally to this work.)

4. Mazumder S, **Maji M**, Ali N. Potentiating Effects of MPL on DSPC Bearing Cationic Liposomes Promote Recombinant GP63 Vaccine Efficacy: High Immunogenicity and Protection. *PloS Negl Trop Dis*, 2011:e1429. **I.F-4.716**
5. Mazumder S, **Maji M**, Das A, Ali N. Potency, Efficacy and Durability of DNA/DNA, DNA /Protein and Protein/Protein Based Vaccination Using gp63 Against *Leishmania donovani* in BALB/c Mice. *PloS One*.2011; 6:e14644. **I.F-4.092**
6. Shadab M, Banerjee A, Sinha R, Das S, Asad M, **Maji M**, Deepthi M, Jha B, Kumar M, Tripathi A, Kumar B, Chakrabarti S, ALI N. RNA-seq revealed expression of many novel genes associated with *Leishmania donovani* persistence and clearance in the host macrophage. *Frontiers in Cellular and Infection Microbiology*. 2019, 9, 17. **I.F- 4.12**

Presentation

1. **Maji M** and Ali N. Immunostimulation of APCs by differentially charged liposomes and their processing. 2nd CSIR-IICB Research Meet. CSIR-IICB 2nd Campus, Salt Lake, Kolkata. June 24th to 15th 2014. **(Oral)**
2. **Maji M**, Ali N. Immunostimulation of APCs by differentially charged liposomes and their processing. 39th Annual Conference of Indian Immunology Society, UGC Advanced Immunodiagnostic Training and Research Centre, Banaras Hindu University, Varanasi, November 9-11, 2012. **(Poster)**
3. Mazumder S., **Maji M.**, Ali N. Monophosphoryl lipid A in association with rgp63 entrapped into cationic lipid vehicle increased immunogenicity against experimental visceral leishmaniasis. 4th World Congress on Leishmaniasis 2009, Worldleish4. CDRI, Lucknow, India, February 3-7, 2009. **(Poster)**
4. **Maji M**. Cross-presentation: an approach against the life-threatening diseases. A Two Day National Conference On Science and Technology: Rural Development. Indian Science Congress Association Kolkata Chapter & Surendranath College Kolkata, Kolkata, India. 20th-21st January 2020. **(Invited Lecture in the Modern Biology)**

Symposium attended

1. **Indo-Brazil Symposium on Infectious Diseases 2009 (DST sponsored symposium)** held on December 10-11, 2009 at Hotel Floatel, Kolkata, India.
2. **4th WorldLeish Congress on Leishmaniasis 2009 (WorldLeish4)** held on February 03-

07, 2009 at Scientific Convention Center, Lucknow, India organized by Central Drug Research Institute (CDRI), Lucknow, India.

Training and Workshop Attended

1. **1st National workshop For College Teachers on Application of Flow Cytometry, Cell Sorting Imaging in Biological sciences** (Organized by Centre for Modern Biology and Centre for Research in Nanoscience and Nanotechnology, University of Calcutta) held on December 18-24, 2011 at CRNN, Salt Lake, Sector III, Kolkata.
2. **Training Programme on Laboratory Safety: Radiation Safety, Chemical Safety & Bio-Safety** (Organized by Indian Institute of Chemical biology, Kolkata) held on 18th September, 2008.

Supervisory Experiences

Trainee Mentor:

Master Students (4)

Indian Institute of Chemical Biology (IICB, Kolkata, India) During my Ph.D

- **Debanjali Dasgupta** (M.Sc. Department of Biochemistry, University of Calcutta, India)
- **Riya Ghosh** (M. Tech in Biotechnology, Vellore Institute of Technology, Vellore, India)
- **Souparno Bhattacharya** (M.Sc. Biotechnology, St. Xavier's College, Kolkata, West bengal, India)
- **Paroma Roy** (M.Sc. Biotechnology, St. Xavier's College, Kolkata, West bengal, India)

Teaching Experiences

Working as an Assistant Professor (Botany) at Dinabandhu Andrews College (Affiliated to the University of Calcutta), Kolkata, West Bengal, India. (Joined on 4th May 2010)

Technical Skills

Microbiological Techniques

- Propagation, maintenance and storage of various bacterial strains.
- Culture, maintenance and storage of different strains of *Leishmania* parasites.
- Culture, maintenance of different mammalian cell lines.

Molecular Biological Techniques

- Plasmid DNA isolation from bacteria.
- Genomic DNA isolation from bacteria and *Leishmania* parasites.
- Total RNA isolation from *Leishmania* parasites and mammalian cells.
- PCR, RT-PCR techniques.
- Cloning techniques, transformation and overexpression of proteins in bacteria.
- Transfection by siRNA.
- siRNA mediated silencing.

Protein Chemistry Techniques

- SDS-PAGE.
- Immunoblotting.
- Protein purification using Ni-NTA column.

Cell Biology Study

- Multi-parametric FACS using FACS canto, LSR-Fortessa (Nine colour).
- Sorting immune cells using MACS and FACS sorter.

- Immunofluorescence technique.
- Confocal Microscopy.
- Colocalization study.

Biophysical Study

- Preparation of Liposomes, entrapment of protein and plasmid DNA.
- Spectrophotometric analysis.
- Fluorometric analysis.

Immunological Techniques

- Isolation of Bone-marrow and culture of Bone-marrow derived dendritic cells and macrophages.
- Isolation of peritoneal exudates cell from mice.
- Isolation of Spleen, Lymph nodes, and Thymus.
- Splenocyte and macrophage proliferation.
- Isolation of human peripheral blood mononuclear cells (PBMCs).
- Isolation of CD4+ and CD8+ T, CD11c+ cells using MACS.
- Determination of secretory cytokines and antibody using ELISA.
- TCR stimulation and cytokine analysis

Data analysis

- FlowJo for FACS analysis
- Image J for western blot analysis
- GraphPad Prism software
- Nikon Imaging System for Confocal analysis

Administrative responsibilities:

- i) Bursar, Dinabandhu Andrews College
- ii) Member, Finance sub-committee
- iii) Member, Provident Fund and Income Tax sub-committee
- iv) Member, ICT sub-committee
- v) Joint Convener, Purchase and E-Tender sub-committee

- vi) *Joint Convener, HRMS & CMS sub-committee*
- vii) *Member, Data Management sub-committee*

Declaration

I certify that the information contained above is true and complete to the best of my knowledge.



(DR. MITHUN MAJI)

Place: Kolkata, India