

Dipyaman Ganguly MBBS PhD PhD



Nationality: Indian

Date of birth: 25.10.1977

Current address: Flat 4, Dipali Apartment, E-28, Sammilani Park,
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Core research area:

Dendritic cell biology and autoreactive inflammation

Role of mechanical cues in immune cells

Therapeutic targeting of plasmacytoid dendritic cells and type I interferons

Work experience:

01/2018-till date: Principal Scientist, CSIR-Indian Institute of Chemical Biology, Kolkata, India.

08/2018-08/2023: Swarnajayanti Fellow, CSIR-Indian Institute of Chemical Biology, Kolkata, India.

01/2014-01/2018: Senior Scientist, CSIR-Indian Institute of Chemical Biology, Kolkata, India.

01/2018-till date: Associate Professor, Academy of Scientific & Innovative Research, India.

04/2014-01/2018: Assistant Professor, Academy of Scientific & Innovative Research, India.

01/2013-01/2014: Ramanujan Fellow, CSIR-Indian Institute of Chemical Biology, Kolkata, India.

07/2010-12/2012: S.L.E.Foundation Postdoctoral Fellow, Columbia University, New York City, USA.

08/2006-05/2010: Graduate Research Assistant, UT MD Anderson Cancer Center, Houston, USA.

11/2003-08/2006: Senior Research Fellow, Indian Institute of Chemical Biology, Kolkata, India.

03/2003-10/2003: Clinical Associate, Institute of Genomics and Integrative Biology, Delhi, India.

Education and research training:

Postdoctoral Fellowship, Columbia University, New York City, USA, 2010-2012.

PhD in Immunology and Biomedical Science, 2010, UT MD Anderson Cancer Center, Houston, USA.

PhD in Biotechnology, 2006, Indian Institute of Chemical Biology, Kolkata, India.

MBBS, 2002, Medical College & Hospitals, Calcutta, India.

Professional Registration

Registered Medical Practitioner, West Bengal Medical Council, Registration no. 58215, 2002.

Details of doctoral degrees:

PhD in Immunology and Biomedical Sciences, 2010

Supervisor: *Michel Gilliet, MD*, Dept. of Immunology, University of Texas MD Anderson Cancer Center, Houston, Texas, USA. (Currently, Professor & Head, Dept. of Dermatology, University Hospital, Lausanne, Email: Michel.Gilliet@chuv.ch)

Thesis: *Immune recognition of self nucleic acids driven by endogenous antimicrobial peptides: role in autoimmunity*

Degree awarded by University of Texas Health Science Center Graduate School of Biomedical Sciences, Houston, Texas, USA.

PhD in Biotechnology, 2006

Supervisor: *Santu Bandyopadhyay, PhD*, CSIR-Indian Institute of Chemical Biology, Kolkata, West Bengal, India. (Currently, superannuated, Email: drsantub@yahoo.com)

Thesis: *Immunobiology of Granulocyte Macrophage Colony Stimulating Factor Driven Human Myeloid Cells.*

Degree awarded by West Bengal University of Technology, West Bengal, India (Presently renamed as Maulana Abul Kalam Azad University of Technology).

Honours and Awards:

2019- **Merck Young Scientist Award** in Life Sciences, from Merck, India (<https://mpoweringlifescience.com/mysa/>)

2019- **CDRI Award for Excellence in Drug Research** Life Sciences, from Central Drug Research Institute, India (<https://indiabioscience.org/grants/cdri-awards-2022-for-excellence-in-drug-research>)

2017- **National Bioscience Award for Career Development**, from Dept. Of Biotechnology, Govt. of India (https://en.wikipedia.org/wiki/National_Bioscience_Award_for_Career_Development)

2017- **Swarnajayanti Fellowship in Life Sciences**, from Dept. of Science & Technology, Govt. of India (https://en.wikipedia.org/wiki/Swarnajayanti_Fellowship)

2017- **NASI Scopus Young Scientist Award in Medicine**, from National Academy of Science India and Elsevier (<https://www.elsevier.com/en-in/solutions/scopus/scopus-awards-2022>)

2016- Invited to deliver **Plenary lecture in the 14th International Symposium on Dendritic cells**, Shanghai, China.

2015- Invited to **Overseas Outstanding Young Scholars Forum**, Sun Yat-sen University & Zhongshan Medical School, Guangzhou, China.

2011- **Ramanujan Fellowship**, Dept. of Science & Technology, Govt. of India.

2011- **Lupus Foundation Postdoctoral Fellowship** from the S.L.E. Foundation, New York.

2009- Keystone Symposium Scholarship.

2007- **Vivian L. Smith Outstanding Young Immunologist Award** from the Center for Cancer Immunology Research, UT MD Anderson Cancer Center, Houston, Texas, USA.

Key scientific contributions:

- Discovery of the innate initiation events in pathogenesis of Psoriasis and identification of an important danger signal for innate immune activation relevant in autoimmunity. [*J Exp Med*, 2009; *Nat Rev Immunol*, 2013; *Eur J Immunol*, 2014]
- Identification of dying neutrophils as the major source of nuclear antigens in lupus pathogenesis and activation of plasmacytoid dendritic cells (pDCs) as the key initiator event in systemic lupus erythematosus (SLE). [*Sci Transl Med*, 2011 (*Commentary in N Engl J Med*, 2011, 365(8):758-60; featured in *Nat Rev Key Advances in Medicine*, 2012)]
- First genetic evidence for the key role of pDC- derived type I interferons in pathogenesis of systemic lupus erythematosus. Using mice genetically deficient in pDCs we established the role of these cells in the pathogenesis of SLE. [*J Exp Med*, 2014 (*Commentary in Nat Rev Rheumatol*, 2014)]
- First evidence for involvement of plasmacytoid dendritic cells and type I interferons in obesity associated metabolic syndrome in humans. [*Diabetes*, 2016; *Trends Immunol*, 2018, *Obesity*, 2023]
- Discovery of a novel mechanosensory module in human T cells, driven by the professional mechanosensor Piezo1, which is critical for T cell activation (*first report of Piezo1 function in immunocellular regulation*) and chemotactic migration of T cells. [*eLife*, 2023; *J Immunol (Cutting Edge)*, 2018; *Crit Rev Immunol*, 2019].
- Discovery of novel regulatory pathways in human plasmacytoid dendritic cells, for example driven by a lipid metabolite (2-arachidonyl glycerol) and an oncometabolite (lactate) [*J Immunol (Cutting Edge)*, 2019; *Front Immunol*, 2019].
- Identification of an endophenotype in SLE involving dysregulation of the endocannabinoid-mediated regulatory pathway [*J Immunol (Cutting Edge)*, 2019].
- Development of novel small molecule antagonists for toll-like receptor 9 and 7, promising therapeutic targets in systemic autoimmune diseases as they inhibit activation of plasmacytoid dendritic cell activation and type I IFN induction. [*Eur J Med Chem*, 2017; *Eur J Med Chem*, 2018; *J Med Chem*, 2020; *Eur J Med Chem*, 2020; *J Med Chem*, 2021; *J Med Chem*, 2021; two USA Patents]
- Exploration of host immune response in COVID-19 and clinical trial on convalescent plasma therapy in severe COVID-19. [*Gut Pathog*, 2023; *mBio*, 2023; *Mayo Clin Proc IQ&O*, 2022; *Nat Commun*, 2022; *JAMA Netw Open*, 2022; *Front Immunol*, 2021; *J Infect Dis*, 2020].

PUBLICATIONS

(*corresponding author/s; #equal contribution)

Publications (per year) in the past five years:

2018: 3
2019: 4
2020: 6
2021: 10
2022: 8
2023 (till July 31): 6

Citations (per year) in the past five years:

2018: 357
2019: 404
2020: 443
2021: 663
2022: 723
2023 (till July 31): 384

Publications in the core research areas

Dendritic cell biology and autoreactive inflammation:

Ghosh AR[#], Bandopadhyay P[#], Sarkar J, Khanna S, Chaudhuri T, Tantiya O, Chakrabarti P, **Ganguly D***. Mitochondrial sourcing of interferogenic ligands and an autoantigen in human obesity-associated metaflammation. **Obesity**. 2023 Jul 26.

Ganguly D*. Multi-omics studies in interpreting the evolving standard model for immune functions (Review). **Briefings in Functional Genomics**, 2023. Mar 10:elad003.

Liu B, Huang J, Asbraf A, Rahaman O, Lou J, Wang L, Cai P, Wen J, Anwaar S, Liu X, Ni H, **Ganguly D**, Zhao J, Yang CY*. The RNase MCPIP3 promotes skin inflammation by orchestrating myeloid cytokine response. **Nature Communications**, 2021 Jul 2;12(1):4105.

Rahaman O, **Ganguly D***. Endocannabinoids in immune regulation and immunopathologies (Review). **Immunology**. 2021. Oct;164(2):242-252.

Ferriere A, Santa P, Garreau A, Bandopadhyay P, Blanco P, **Ganguly D**, Sisirak V*. Self-Nucleic Acid Sensing: A Novel Crucial Pathway Involved in Obesity-Mediated Metaflammation and Metabolic Syndrome (Review). **Frontiers in Immunology**. 2021 Jan 26;11:624256.

Raychaudhuri D*, Duttgupta P, Liu CSC, Sarif J, Ghosh AR, Rahaman O, **Ganguly D***. Role of Ca²⁺ in toll-like receptor 9 activation in human plasmacytoid dendritic cells. **Cytokine**. 2019 Aug 27;125:154822. doi: 10.1016/j.cyto.2019.154822.

Raychaudhuri D, Bhattacharya R, Sinha BP, Liu CSC, Ghosh AR, Rahaman O, Bandopadhyay P, Sarif J, D'Rozario R, Paul S, Das A, Sarkar DK, Chattopadhyay S, **Ganguly D***. Lactate Induces Pro-tumor Reprogramming in Intratumoral Plasmacytoid Dendritic Cells. **Frontiers in Immunology**. 2019 Aug 7;10:1878. doi: 10.3389/fimmu.2019.01878.

Rahaman O, Bhattacharya R, Liu CSC, Raychaudhuri D, Ghosh AR, Bandopadhyay P, Pal S, Goswami RP, Sircar G, Ghosh P, **Ganguly D***. Cutting Edge: Dysregulated endocannabinoid-rheostat for plasmacytoid dendritic cell activation in a systemic lupus endophenotype. **Journal of Immunology**, 2019 Mar 15;202(6):1674-1679.

Ganguly D*. Do type I interferons link systemic autoimmunities and metabolic syndrome in a pathogenetic continuum? (Review) **Trends in Immunology**, 2018 Jan;39(1):28-43.

Nargis T, Kumar K, Ghosh AR, Sharma A, Rudra D, Sen D, Chakrabarti S, Mukhopadhyay S, **Ganguly D***, Chakrabarti P*. KLK5 induces shedding of DPP4 from circulatory Th17 cells in Type 2 Diabetes. **Molecular Metabolism**, 2017 Nov;6(11):1529-1539.

Ghosh AR, Bhattacharya R, Bhattacharya S, Nargis T, Rahaman O, Duttgupta P, Raychaudhuri D, Chen Liu CS, Roy S, Ghosh P, Khanna S, Chaudhuri T, Tantiya O, Haak S, Bandyopadhyay S, Mukhopadhyay S, Chakrabarti P, **Ganguly D***. Adipose

Recruitment and Activation of Plasmacytoid Dendritic Cells Fuel Metaflammation. **Diabetes**. 2016 Aug 25. 65 (11): 3440-3452.

Meller S, Di Domizio J, Voo KS, Friedrich HC, Chamilos G, **Ganguly D**, Conrad C, Gregorio J, Le Roy D, Roger T, Ladbury JE, Homey B, Watowich S, Modlin RL, Kontoyiannis DP, Liu YJ, Arold ST, Gilliet M*. TH17 cells promote microbial killing and innate immune sensing of DNA via interleukin 26. **Nature Immunology**. 2015 Sep;16(9):970-9.

Lande R#, Chamilos G#, **Ganguly D**#, Demaria O, Frasca L, Durr S, Conrad C, Schröder J, Gilliet M*. Cationic antimicrobial peptides in psoriatic skin cooperate to break innate tolerance to self-DNA. **European Journal of Immunology**. 2015 Jan;45(1):203-13. doi: 10.1002/eji.201344277.

Sisirak V#, **Ganguly D**#, Lewis KL, Couillault C, Tanaka L, Bolland S, D'Agati V, Elkone KB, Reizis B (#equal contribution). Genetic evidence for the role of plasmacytoid dendritic cells in systemic lupus erythematosus. **Journal of Experimental Medicine**. 2014. Sep 22;211(10):1969-76.

Ganguly D, Haak S, Sisirak V, Reizis B*. Role of dendritic cells in autoimmunity (Review). **Nature Reviews Immunology**. 2013 Aug;13(8):566-77.

Di Domizio J, Dorta-Estremera S, Gagea M, **Ganguly D**, Meller S, Li P, Zhao B, Tan FK, Bi L, Gilliet M, Cao W*. Nucleic acid-containing amyloid fibrils potently induce type I interferon and stimulate systemic autoimmunity. **Proc Natl Acad Sci U S A**. 2012 Sep 4;109(36):14550-5.

Lande R, **Ganguly D**, Facchinetti V, Frasca L, Conrad C, Gregorio J, Meller S, Chamilos G, Sebasigari R, Ricciari V, Bassett R, Amuro H, Fukubara S, Ito T, Liu YJ, Gilliet M*. Neutrophils activate plasmacytoid dendritic cells by releasing self-DNA-peptide complexes in systemic lupus erythematosus. **Science Translational Medicine**. 2011 Mar 9;3(73):73ra19. doi: 10.1126/scitranslmed.3001180.

Ganguly D, Chamilos G, Lande R, Gregorio J, Meller S, Facchinetti V, Homey B, Barrat FJ, Zal T, Gilliet M. Self-RNA-antimicrobial peptide complexes activate human dendritic cells through TLR7 and TLR8. **Journal of Experimental Medicine**. 2009 Aug 31;206(9):1983-94. doi: 10.1084/jem.20090480.

Ganguly D, Paul K, Bagchi J, Rakshit S, Mandal L, Bandyopadhyay G, Bandyopadhyay S*. Granulocyte-macrophage colony-stimulating factor drives monocytes to CD14^{low} CD83⁺ DCSIGN⁺ interleukin-10-producing myeloid cells with differential effects on T-cell subsets. **Immunology**. 2007 Aug;121(4):499-507.

Pal C*, **Ganguly D**, Paul K, Pal S. Dendritic cells and antigen trapping technology--a revolution in vaccine/immunotherapy strategy (Review). **Indian Journal of Experimental Biology**. 2007 Jun;45(6):491-504.

Role of mechanical cues in immune cells:

Liu CSC, Mandal T, Biswas P, Hoque MA, Bandopadhyay P, Sinha BP, Sarif J, D'Rozario R, Sinha DK, Sinha B, **Ganguly D***. Piezo1 mechanosensing regulates integrin-dependent chemotactic migration in human T cell. **eLife**, 2023, in production, doi: <https://doi.org/10.1101/2022.08.16.504114v2>

Liu CSC, **Ganguly D***. Mechanical Cues for T Cell Activation: Role of Piezo1 Mechanosensors (Review). **Critical Reviews in Immunology** 2019. Epub. DOI: 10.1615/CritRevImmunol.2019029595

Liu CSC, Raychaudhuri D, Paul B, Chakrabarty Y, Ghosh AR, Rahaman O, Talukdar A, **Ganguly D***. Cutting Edge: Piezo1 mechanosensors optimize human T cell activation. **Journal of Immunology**, 2018 Feb 15;200(4):1255-1260.

Therapeutic targeting of plasmacytoid dendritic cells and type I IFNs:

(Collaboration with the Medicinal Chemistry lab led by Dr. Arindam Talukdar, CSIR-IICB, India, to continue)

Das N, Bhattacharya D, Bandopadhyay P, Dastidar UG, Paul B, Rahaman O, Hoque I, Patra B, **Ganguly D***, Talukdar A*. Mitigating hERG Liability of Toll-Like Receptor 9 and 7 Antagonists through Structure-Based Design. **ChemMedChem**. 2023 Mar 31:e202300069.

Das N#, Bandopadhyay P#, Roy S#, Sinha BP, Ghosh Dastidar U, Rahaman O, Pal S, **Ganguly D***, Talukdar A*. Development, Optimization and In-vivo Validation of New Imidazopyridine Chemotype as Dual TLR7/TLR9 Antagonists Through Activity Directed Sequential Incorporation of Relevant Structural Sub-units. **Journal of Medicinal Chemistry**. 2022 Sep 8;65(17):11607-11632.

Pal S*, Ghosh Dastidar U, Ghosh T, **Ganguly D**, Talukdar A*. QSAR Assisted Exploration of Ligand-Based Insights for the Design of Small-Molecule TLR7 Antagonists. **Molecules**, 2022 Jun 23;27(13):4026.

Kundu B#, Raychaudhuri D#, Mukherjee A#, Sinha BP#, Sarkar D, Bandopadhyay P, Pal S, Das N, Dey D, Ramarao K, Nagireddy K, **Ganguly D***, Talukdar A*. Systematic Optimization of Potent and Orally Bioavailable Purine-Scaffold Dual Inhibitor for Toll-Like Receptors 7 and 9. **Journal of Medicinal Chemistry**. 2021. Jul 8;64(13):9279-9301.

Talukdar A*, **Ganguly D**, Roy S, Das N, Sarkar D. Structural Evolution and Translational Potential for Agonists and Antagonists of Endosomal Toll-like Receptors (Review). **Journal of Medicinal Chemistry**. 2021 Jun 24;64(12):8010-8041.

Pal S, Paul B, Bandopadhyay P, Preethy N, Sarkar D, Rahaman O, Roy S, **Ganguly D***, Talukdar A*. Synthesis and Characterization of New Potent TLR7 Antagonists Based on Analysis of the Binding Mode using Biomolecular Simulations. **European Journal of Medicinal Chemistry**. 2021 Jan 15;210:112978.

Mukherjee A#, Raychaudhuri D#, Sinha BP#, Kundu B, Mitra M, Paul B, Bandopadhyay P, **Ganguly D***, Talukdar A*. A chemical switch for transforming a purine agonist for toll-like receptor 7 to a clinically relevant antagonist. **Journal of Medicinal Chemistry**. 2020 May 14;63(9):4776-4789.

Paul B#, Rahaman O#, Roy S, Pal S, Satish S, Mukherjee A, Ghosh AR, Raychaudhuri D, Bhattacharya R, Goon S, **Ganguly D***, Talukdar A*. Activity-guided development of potent and selective toll-like receptor 9 antagonists. **European Journal of Medicinal Chemistry**. 2018 Nov 5;159:187-205.

Roy S, Mukherjee A, Paul B, Rahaman O, Roy S, Maithri G, Ramya B, Pal S, **Ganguly D***, Talukdar A*. Design and development of benzoxazole derivatives with toll-like receptor 9 antagonism. **European Journal of Medicinal Chemistry**. 2017 Jul 7;134:334-347. doi: 10.1016/j.ejmech.2017.03.086.

Other research areas

Response to pandemic – COVID-19 immunopathology and clinical trial:

Sinha BP, Mehta P2, Hoque MA, Bandopadhyay P, Nandi A, Saba I, Nandi Mitra A, Mondal A, Bhattacharjee B, Chamilos G, Pandey R*, Basu K*, **Ganguly D***. Deficient phagocytosis in circulating monocytes from patients with COVID-19-associated mucormycosis. **mBio**, 2023, in press.

D'Rozario R, Raychaudhuri D, Bandopadhyay P, Sarif J, Mehta P, Liu CSC, Sinha BP, Roy J, Bhaduri R, Das M, Bandyopadhyay S, Paul SR, Chatterjee S, Pandey R, Ray Y, **Ganguly D***. Circulating Interleukin-8 Dynamics Parallels Disease Course and Is Linked to Clinical Outcomes in Severe COVID-19. **Viruses**. 2023 Feb 16;15(2):549.

Raychaudhuri D, Bandopadhyay P, D'Rozario R, Sarif J, Ray Y, Paul SR, Singh P, Chaudhuri K, Bhaduri R, Pandey R, Bhattacharya P, Sengupta S, Chatterjee S, **Ganguly D***. Clinical trial sub-group analyses to investigate clinical and immunological outcomes of convalescent plasma therapy in severe COVID-19. **Mayo Clinic Proceedings: Innovation, Quality & Outcome**. 2022 Dec;6(6):511-524.

Singh P *et al.* and CSIR Phenome India Cohort Investigators. A machine learning-based approach to determine infection status in recipients of BBV152 (Covaxin) whole-virion inactivated SARS-CoV-2 vaccine for serological surveys. **Computers in Biology and Medicine**. 2022 Apr 25;146:105419.

Ray Y*, Paul SR, Bandopadhyay P, D'Rozario R, Sarif J, Labiri A, Bhowmik D, Vasudevan JS, Maurya R, Kanakan A, Sharma S, Kumar M, Singh P, Roy R, Chaudhuri K, Maiti R, Bagchi S, Maiti A, Perwez MM, Mondal A, Tewari A, Mandal S, Roy A, Saha M, Biswas D, Maiti C, Chakraborty S, Sharma Sarkar B, Halder A, Saha B, Sengupta S, Pandey R, Chatterjee S, Bhattacharya P, Paul S, **Ganguly D***. A Phase 2 Single Center Open Label Randomised Control Trial for Convalescent Plasma Therapy in Patients with Severe COVID-19. **Nature Communications**, 2022, 13(1):383.

Park H, Tarpey T, Liu M, Goldfeld K, Wu Y, Wu D, Li Y, Zhang J, **Ganguly D**, Ray Y, Paul SR, Bhattacharya P, Belov A, Huang Y, Villa C, Forshee R, Verdun NC, Yoon HA, Agarwal A, Simonovich VA, Scibona P, Pratz LB, Belloso W, Avendaño-Sola C, Bar KJ, Duarte RF, Hsue PY, Luetkemeyer AF, Meyfroidt G, Nicola AM, Mukherjee A, Ortigoza MB, Pirofski LA, Rijnders BJA, Troxel A, Antman EM, Petkova E*. Development and Validation of a Treatment Benefit Index to Identify Who May Benefit from Convalescent Plasma among Patients Hospitalized With COVID-19. **JAMA Network Open**. 2022, in press.

Sarif J#, Raychaudhuri D#, D'Rozario R#, Bandopadhyay P#, Singh P#, Mehta P#, Hoque MA, Sinha BP, Kushwaha M, Sabni S, Devi P, Chattopadhyay P, Paul SR, Ray Y, Chaudhuri K, Banerjee S, Majumdar D, Saha B, Sarkar BS, Bhattacharya P, Chatterjee S, Paul S, Ghosh P, Pandey R, Sengupta S*, **Ganguly D***. Plasma Gradient of Soluble Urokinase-Type Plasminogen Activator Receptor Is Linked to Pathogenic Plasma Proteome and Immune Transcriptome and Stratifies Outcomes in Severe COVID-19. **Frontiers in Immunology**. 2021 Oct 28;12:738093.

Bandopadhyay P#, Rozario R#, Labiri A#, Sarif J#, Ray Y#, Paul SR#, Roy R, Maiti R, Chaudhuri K, Bagchi S, Maiti A, Perwez MM, Sharma Sarkar B, Roy D, Chakraborty R, Vasudevan JS, Sharma S, Biswas D, Maiti C, Saha B, Bhattacharya P, Pandey R, Chatterjee S, Paul S, **Ganguly D***. Nature and dimensions of the systemic hyper-inflammation and its attenuation by convalescent plasma in severe COVID-19. **Journal of Infectious Diseases**. 2021. Aug 16;224(4):565-574.

Shah VK, Fimal P, Alam A, **Ganguly D**, Chattopadhyay S*. Overview of Immune Response During SARS-CoV-2 Infection: Lessons From the Past (Review). **Frontiers in Immunology**. 2020 Aug 7;11:1949.

Other collaborative research:

McNamara N, Saunders E, Varghese S, Zheng R, Simpson K, Varma DM, Johnson MM, Zabid MSH, Bachelder EM, Ainslie KM, No JH, Koh D, Shum D, Das N, Patra B, Roy J, Talukdar A, **Ganguly D**, McConville M, Baell J*. Hit-to-lead optimization of novel phenyl imidazole carboxamides that are active against *Leishmania donovani*. **European Journal of Medicinal Chemistry**. 2022 Jul 1;240:114577.

Roy Chattopadhyay N, Chatterjee K, Tiwari N, Chakrabarti S, Sabu SK, Roy SD, Ghosh A, Reddy R, Das P, Mal S, Karnar BB, Das AK, Tsering S, Riba K, Puii Z, Zomania E, Singh YI, Suryavanshi AR, Kumar A, **Ganguly D**, Goswami C, Choudhuri T*. TLR9 Polymorphisms Might Contribute to the Ethnicity Bias for EBV-Infected Nasopharyngeal Carcinoma. **iScience**. 2020 March 27; 23(3):100937.

Chakraborty JB, Mahato SK, Joshi K, Shinde V, Rakshit S, Biswas N, Choudhuri Mukherjee I, Mandal L, **Ganguly D**, Choudhuri AA, Chaudhuri J, Paul K, Pal BC, Vinayagam J, Pal C, Manna A, Jaisankar P, Chaudhuri U, Konar A, Roy S, Bandyopadhyay S*. Hydroxychavicol, a Piper betle leaf component, induces apoptosis of CML cells through

mitochondrial reactive oxygen species-dependent JNK and endothelial nitric oxide synthase activation and overrides imatinib resistance. **Cancer Science**. 2012 Jan;103(1):88-99. doi: 10.1111/j.1349-7006.2011.02107.x.

*Chamilos G, Ganguly D, Lande R, Gregorio J, Meller S, Goldman WE, Gilliet M, Kontoyiannis DP**. Generation of IL-23 producing dendritic cells (DCs) by airborne fungi regulates fungal pathogenicity via the induction of T(H)-17 responses. **PLoS One**. 2010 Sep 23;5(9):e12955. doi: 10.1371/journal.pone.0012955.

*Rakshit S, Bagchi J, Mandal L, Paul K, Ganguly D, Bhattacharjee S, Ghosh M, Biswas N, Chaudhuri U, Bandyopadhyay S**. N-acetyl cysteine enhances imatinib-induced apoptosis of Bcr-Abl+ cells by endothelial nitric oxide synthase-mediated production of nitric oxide. **Apoptosis**. 2009 Mar;14(3):298-308. doi: 10.1007/s10495-008-0305-7.

*Ghosh M, Mandal L, Maitra S, Rakshit S, Paul K, Bagchi J, Ganguly D, Pal C, Bandyopadhyay S**. Leishmania donovani infection of human myeloid dendritic cells leads to a Th1 response in CD4+ T cells from healthy donors and patients with kala-azar. **Journal of Infectious Disease**. 2006 Aug 1;194(3):294-301.

*Sharma M, Batra J, Mahalingam U, Goswami S, Ganguly D, Labkar B, Bhatia NK, Kumar A, Ghosh B**. Suggestive evidence of association of C-159T functional polymorphism of the CD14 gene with atopic asthma in northern and northwestern Indian populations. **Immunogenetics**. 2004 Oct;56(7):544-7.

PATENTS:

1. *Inhibitors of phosphatidylinositol-3-kinase and nitric oxide*. US Patent: US-20120190738-A1, granted in 2016.
2. *Blocking toll-like receptor 9 signalling using small molecule antagonists*. US Patent: US-10662177-B2, granted in 2020.
3. *Purine based compounds as toll-like receptor 9 antagonists*. US Patent: US-11168084-B2, granted in 2021.

Monograph:

Ganguly D. Plasmacytoid Dendritic Cells. Springer-Verlag. ISBN-13: 9789811955945.

Book chapters:

1. *Bandopadhyay P, Ganguly D*. Host immune responses in COVID-19: Implication for Pre-existing Chronic Systemic Inflammation. Book chapter in 'Genomic Surveillance and Pandemic Preparedness' 1st Edition 2023, Elsevier.
2. *Mukhopadhyay S, Dutta D, Ganguly D*. Psoriasis and Diabetes: An association likely missed. Book chapter in 'Psoriasis and Psoriatic Arthritis: Pathophysiology and Therapeutic Interventions' 1st edition 2018, Taylor & Francis.
3. *Mukhopadhyay S, Dutta D, Ganguly D*. Lipid induced insulin resistance: Molecular Mechanisms and Clinical Implications. Book chapter in 'Nutritional and Therapeutic Interventions for Diabetes and Metabolic Syndrome' 2nd edition 2018, Elsevier.
4. *Talukdar A, Ganguly D*. Small Molecule Inhibitors of Toll-like Receptors. Book chapter in 'Protein-Protein and Protein-Nucleic Acid Interaction Regulators; Drug Discovery Series' 1st edition 2020, Royal Society of Chemistry.
5. *Ghosh AR, Bandopadhyay P, Ganguly D*. Type I Interferons in Metabolic Syndrome. Book chapter in 'Metabolic Syndrome: From mechanisms to interventions' 1st edition in press, Elsevier.
6. *Bandopadhyay P, Ganguly D*. Dysbiosis of Human Microbiome and Metabolic Diseases. Book Chapter in 'Human Microbiome in Health and Diseases, Volume A' 1st edition, Elsevier.
7. **Ganguly D**. The endocannabinoid system in the immunobiology of dendritic cells. Book Chapter in 'Cannabis, Cannabinoids and endocannabinoids' 1st edition in press, Elsevier.

Research collaborations

International collaborations:

1. Indo-French Collaborative Research Project (Ongoing)

Role: Indian PI

Title: Exploring the role of DNase1L3 in obesity-associated metaflammation and type 2 diabetes

Brief description: A pathogenetic role of the nuclease DNase1L3, already found to have crucial role in SLE pathogenesis, in obesity associated metaflammation is being explored, using human samples, preclinical models and genetic models in animals.

Collaborators:

Prof. Patrick O. Blanco, CNRS ImmunoConcept, University of Bordeaux, Bordeaux, France (French PI)

Dr. Vanja Sisirak, CNRS ImmunoConcept, University of Bordeaux, Bordeaux, France (French Co-I)

2. Indo-Italian Grant for Significant Research (Ongoing)

Role Indian PI

Title: Exploring the heterogeneity of systemic lupus patients based on autoantibodies distribution and multi-omics approaches compared in two ethnic cohorts

Collaborators:

Dr. Roberto Lande, Istituto Superiore di Sanita, Rome, Italy (Italian PI)

Dr. Fabrizio Conti, University Hospital, Rome, Italy (Italian Co-I)

Prof. Parasar Ghosh, Institute of Postgraduate Medical Education and Research, Kolkata, India. (Indian Co-I)

Prof. Sanghamitra Bandyopadhyay, Indian Statistical Institute, Kolkata, India. (Indian Co-I)

3. Indo-Australian Strategic Fund (Completed)

Role: Indian co-investigator

Title: Collaborative project on drug discovery for neglected diseases

Collaborators:

Prof Jonathan Bael, Monash University, Melbourne, Australia (Australian PI)

Prof. Malcolm McConville, University of Melbourne, Melbourne, Australia. (Australian Co-I)

Dr. Arindam Talukdar, CSIR-Indian Institute of Chemical Biology, Kolkata, India. (Indian PI)

4. Shared research interest-based scientific collaboration (not supported by any grant) with Prof. Cliff Y. Yang, Zhongshan School of Medicine, Sun-Yat Sen University, Guangzhou, China.

Brief description: Identifying novel molecular regulators of dendritic cells; role of chemerin in metabolic syndrome.

5. Shared research interest-based scientific collaboration (not supported by any grant) with Prof. Georgios Chamilos, IMBB FoRTH, University of Crete, Heraklion, Greece.

Brief description: Innate immune response to fungal infection and potential role of mechanical cues.

National collaborations:

Clinical collaborators:

Prof. Satinath Mukhopadhyay, Professor, Dept. of Endocrinology, Institute of Postgraduate Medical Education and Research, Kolkata, India

(for studies on patients with metabolic syndrome and type 2 diabetes)

Prof. Parasar Ghosh, Professor and Chair, Dept. Of Rheumatology and Clinical Immunology, Institute of Postgraduate Medical Education and Research, Kolkata, India

(for studies on patients with autoimmune rheumatic disorders, viz. SLE, psoriasis, Rheumatoid arthritis)

Prof. Amita Aggarwal, Professor and Chair, Dept. Of Rheumatology and Clinical Immunology, Sanjay Gandhi Postgraduate Institute of Medical Education and Research, Lucknow, India.

(for studies on patients with autoimmune rheumatic disorders, viz. SLE, psoriasis, Rheumatoid arthritis)

She is also the co-coordinator for the National Alliance for Translational Research in Autoimmune Diseases, with Dr. Ganguly being the Alliance coordinator. This is a knowledge-sharing national consortium consisting of 12 basic research institutes, 13 clinical institutions and 2 public health organizations.

Dr. Yogiraj Ray, Associate Professor, Department of Infectious Diseases, Institute of Postgraduate Medical Education and Research, Kolkata, India
(for studies on patients with COVID-19 and other relevant infections)

Basic science collaborators:

Dr. Arindam Talukdar, Principal Scientist and Associate Professor, CSIR-Indian Institute of Chemical Biology, India.
(for development of novel small molecule antagonists for therapeutic targeting of plasmacytoid dendritic cells in autoimmune disorders and metabolic disorders)

Dr. Rajesh Pandey, Senior Scientist and Assistant Professor, CSIR-Institute of Genomics and Integrative Biology, India.
(for collaborative experiments involving next generation sequencing and analyses)

Prof. Shantanu Sengupta, Chief Scientist and Professor, CSIR-Institute of Genomics and Integrative Biology, India.
(for collaborative experiments involving proteomics and metabolomics on mass spectrometry platform)

Dr. Bidisha Sinha, Associate Professor, Department of Biological Sciences, Indian Institute of Science Education and Research, Kolkata, India.
(for collaborative experiments involving interference reflection microscopy techniques and other advanced microscopy studies)

Notable invited talks outside India:

October, 2009: Center for Neurologic Disease, Harvard Institutes of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, USA.

October, 2009: Dept of Cancer Immunology and AIDS, Dana Farber Cancer Institute, Boston, USA

October, 2009: Dept of Molecular & Cell Biology, University of California, Berkeley, USA

February, 2010: Icahn Medical Institute, Mount Sinai Hospital, New York, USA.

February, 2010: Dept of Microbiology and Immunology, College of Physicians and Surgeons, Columbia University, New York, USA.

December, 2015: Overseas Outstanding Young Scholars Forum, Sun Yat-Sen University & Zhongshan Medical School, Guangzhou, China.

October, 2016: Plenary Lecture, 14th International Symposium on Dendritic Cells, Shanghai, China.

May 2018: Doherty Institute, University of Melbourne, Melbourne, Australia.

March, 2022: CNRS ImmunoConcept University of Bordeaux, Bordeaux, France.

April, 2022: IMBB Forth, University of Crete, Heraklion, Crete, Greece.

April, 2022: Department of Medicine, University of Crete Hospital, Heraklion, Crete, Greece.

Notable invited talks in India:

February, 2011: Institute of Genomics and Integrative Biology, Delhi, India.

December, 2014: Annual Conference of Indian Rheumatology Association (IRACON), Chandigarh, India.

August, 2015: Annual Conference of Indian Rheumatology Association (West Bengal Chapter), Kolkata.

November, 2016: Tata Translational Cancer Research Center, Tata Medical Center, Kolkata, India.

November, 2016: Annual Conference of Indian Rheumatology Association (West Bengal Chapter), Kolkata.

December, 2016: Plenary Lecture, 3rd International Meet on Advanced Studies in Cell Signaling Network (CeSiN 2016), CSIR-Indian Institute of Chemical Biology, Kolkata, India.

January, 2016: 8th East Zonal Oncology Symposium by Indian Association of Surgical Oncology, Saroj Gupta Cancer Center & Research Institute, Kolkata, India.

January, 2017: 14th Ann. Meeting of International Society of Heart Research Indian Section, Delhi, India.

February, 2017: 43rd Annual Conference of Indian Immunology Society, Vishakhapatnam, India.

March, 2017: Indian Association for Cultivation of Science, Kolkata, India.

July, 2017: National Institute of Biomedical Genomics, Kalyani, India.

November, 2017: National Center for Cell Sciences, Pune, India.

November, 2017: 3rd BK Bacchawat Memorial Symposium, CSIR-IICB, Kolkata

January, 2018: Molecular Immunology Forum, Pune, India.

March, 2018: Welcome Trust-DBT India Alliance 'Developing Indian Physician Scientist' workshop, CSIR-Center for Cellular & Molecular Biology, Hyderabad, India.

August, 2018: Annual Conference of Society for Inflammation Research, Bangalore, India.

September, 2018: Indian Institute of Science, Bangalore, India.

November, 2018: 45th Annual Conference of Indian Immunology Society, THSTI, Faridabad, India.
 November, 2018: National Institute of Immunology, New Delhi, India.
 February, 2019: Molecular Immunology Forum, Hyderabad, India.
 March, 2019: International Symposium on Frontiers in Development and Mol. Medicine, Kolkata, India.
 April, 2019: DBT-NIAID Vaccine Adjuvant Development Collaborative Workshop, National Institute of Immunology, New Delhi.
 June, 2019: Pre-conception meeting of the National Alliance for Translational Research in Autoimmune Diseases, CSIR-Indian Institute of Chemical Biology, Kolkata, West Bengal.
 August, 2019: Ind-CEPI Networking Meeting, invited by Department of Biotechnology, SCOPE complex, New Delhi.
 November, 2019: Annual Conference of the International Chemical Biology Society, Hyderabad, India.
 November, 2020: Annual Conference of Indian Rheumatology Association (West Bengal Chapter), Kolkata.
 October, 2021: Annual Conference of the Indian Proteomics Society, Online, India.
 October, 2021: Annual Conference of the Cytometry Society, Chandigarh, India.
 December, 2021: 47th Annual Conference of Indian Immunology Society, online, India.
 March, 2022: Lupus Initiative Kolkata, Annual Meeting, Kolkata, India.
 April, 2022: Annual Conference of the Research Society for the Study of Diabetes in India and Endocrine Society of India (Crescendo), Kolkata, India.
 July, 2022: 48th Annual Conference of Indian Immunology Society, online, India.
 July, 2022: National Symposium on Inflammation, Translational Health Science and Technology Institute, Faridabad, India.
 January, 2023: Frontiers in Modern Biology, Indian Institute of Science Education and Research, Kolkata, India.
 February, 2023: Annual Conference of Indian Rheumatology Association (West Bengal Chapter), Kolkata.
 March, 2023: International Meet on Advanced Studies in Cell Signaling Network (CeSiN 2023), CSIR-Indian Institute of Chemical Biology, Kolkata, India.
 March, 2023: Advanced Immunology Workshop, Dept. of Rheumatology, Christian Medical College, Vellore, India.

Peer-review responsibilities:

Domain expert, European Commission.
 Associate Editor, Antigen Presenting Cell Biology, Frontiers in Immunology.
 Associate Editor, Aging and the immune system, Frontiers in Immunology.
 Review Editor, Inflammation, Frontiers in Immunology.
 Review Editor, Molecular Innate Immunity, Frontiers in Immunology.
 Research Topic Guest Associate Editor for Frontiers in Immunology, 'Molecular Mechanisms of Dendritic Cell-Mediated Immune Tolerance and Autoimmunity' 2020.
 Research Topic Guest Associate Editor for Frontiers in Immunology, 'Epigenetic and Metabolic Regulation of Immunotherapy Mediated Anti-Tumor Responses' 2021.
 Research Topic Guest Associate Editor for Frontiers in Immunology, 'Control of Adaptive Immune Responses by Innate Immune Cells: Learning from the Human Immune System' 2022.
 Ad-hoc reviewer for journals like Nature Reviews Rheumatology, Trends in Immunology, Frontiers in Immunology, European Journal of Immunology, Diabetologia, Immunobiology, Oncoimmunology etc.
 Ad-hoc Grant Proposal reviewer for Agence Nationale De La Recherche, France.
 Ad-hoc grant reviewer, UK Research and Innovation, UK.
 Ad-hoc grant reviewer, Indo-French Centre for the Promotion of Advanced Research (IFCPAR/CEFIPRA).

Teaching experience

PhD coursework:

2013-2018: Course initiator and coordinator for 'Molecular and cellular immunology', PhD coursework at CSIR-Indian Institute of Chemical Biology.
 2018-present: Course faculty for 'Molecular and cellular immunology', PhD coursework at CSIR-Indian Institute of Chemical Biology.
 Classes taught: History and philosophy of immunology, Dendritic cell biology, Autoimmune disorders, Introduction to cancer immunosurveillance.

Invited teaching lectures for Masters students:

Department of Rheumatology, Institute of Postgraduate Medical Education and Research, Kolkata, India.
 Department of Genetics, University of Calcutta, Kolkata, India.
 Department of Zoology, State University of West Bengal, Barasat, India.

Teachers' training courses:

Faculty, University Teachers' Refresher Course, University of Calcutta, Kolkata, India.

Faculty, University Teachers' Refresher Course, West Bengal State University, Borasat, India.

PhD supervision:

Alumni:

Dr. Amrit Raj Ghosh, 2018.

Thesis title: *Innate immune regulation of metabolic syndrome.*

Presently Postdoctoral Fellow, Ragon Institute, Boston, USA (with Prof. Facundo Batista)

Dr. Oindrila Rahaman, 2019.

Thesis title: *Exploring novel regulatory mechanism of plasmacytoid dendritic cell function and therapeutic modulation in contexts of autoimmunity.*

Presently Postdoctoral Fellow, Emory University, Atlanta, USA (with Prof. Ignacio Sanz)

Dr. Deblina Raychaudhuri, 2020.

Thesis title: *Exploring putative mechanisms of cancer immunosurveillance.*

Presently Postdoctoral Fellow, UT MD Anderson Cancer Center, Houston, USA (with Dr. Sangeeta Goswami)

Dr. Chinky Shiu Chen Liu, 2022.

Thesis title: *Exploring the role of mechanical cues in T cell function*

Currently a Postdoctoral Fellow in CSIR-Institute of Genomics and Integrative Biology, New Delhi.

Present PhD students:

Purbita Bandopadhyay, expected to graduate in Dec, 2023

Jafar Sarif, expected to graduate in Feb, 2024

Ranit D'Rozario, expected to graduate in Feb, 2024

Bishnu Prasad Sinha, expected to graduate in Feb, 2024

Md. Asmaul Hoque, expected to graduate in Dec, 2024

Shreshtha Pattanayak, expected to graduate in Dec, 2025

Masters dissertation supervision and internship mentoring:

Chinky Shiu Chen Liu, St. Xaviers College, Kolkata, India. (Currently in the lab as Postdoctoral Fellow)

Shounak Ray, Birla Institute of Technology, Mesra, India. (Currently, Texas A&M Univ. USA)

Oindrila Mukherjee, Jadavpur University, Kolkata, India. (Currently, University of Connecticut, USA)

Titas Sil, Indian Institute of Science Education and Research, Bhopal, India. (Currently, IISER, Bhopal, India)

Donna Mathew, Vellore Institute of Technology, Vellore, India. (Currently, Cardiff Metropolitan Univ., UK)

Britya Ghosh, National Institute of Technology, Durgapur, India. (Currently, Univ. of British Columbia, Canada)

Sanjali Mitra, St. Xaviers College, Kolkata, India. (Currently, Columbia University, USA)

Dr. Raghumoy Ghosh, National Medical College, Kolkata, India. (Currently, AIIMS-Jodhpur, India)

Dr. Avas Das, National Medical College, Kolkata, India. (Currently, UT South-Western, USA)

Dr. Somnath Mahapatra, National Medical College, Kolkata, India. (Currently, Univ. of Michigan, USA)

Saptaswa Chakraborty, St. Xaviers College, Kolkata, India. (Currently, National Center for Biological Sciences, India)

Sampurna Pal, St. Xaviers College, Kolkata, India. (Currently, IISER, Mohali, India)

Swapnoneel Bannerjee, St. Xaviers College, Kolkata, India. (Currently, Bhaba Atomic Research Center, India)

Suravi Mukherjee, St. Xaviers College, Kolkata, India. (Currently in the lab as Project Fellow)

Shreya Roy, Kalinga Institute of Industrial Technology, Bhubaneswar, India. (Currently in the lab as Project Fellow)

Akash Majumdar, Amity University, Noida, India.

Arkadyuti Bhattacharya, Kalinga Institute of Industrial Technology, Bhubaneswar, India.

Sristi Sinha, Kalinga Institute of Industrial Technology, Bhubaneswar, India.

Koushiki Das, Indian Institute of Technology, Roorkee, India.

Milie Desai, Indian Institute of Science Education and Research, Pune, India. (Masters student currently in the lab)

Shreya Roy, Kalinga Institute of Technology, India. (currently in the lab as a project associate)

Suravi Mukherjee, St. Xaviers College, Kolkata, India. (currently in the lab as a project associate)

Membership in National Advisory Committees

Member (PMO Taskforce nominee), Apex Committee, COVID Suraksha Mission (<https://pib.gov.in/PressReleasePage.aspx?PRID=1676998>), BIRAC, Department of Biotechnology, Govt. of India.

Member, Gene Therapy Advisory and Evaluation Committee (GTAEC), Indian Council of Medical Research, India (<https://gtaec.icmr.org.in/index.php>).

Member, Advisory Committee for Department of Scientific and Industrial Research- TePP Outreach cum Cluster Innovation Centre (DSIR-TOCIC) at CSIR-CSIR-Central Glass & Ceramic Research Institute, Kolkata (<http://164.100.166.67/tepp-outreach-cum-cluster-innovation-centres-tocics>).

Invited member, Technical Advisory Committee, Medical Biotechnology: Chronic Disease Biology, Department of Biotechnology, Govt. of India.

Member, Technical Advisory Committee, New Drug Discovery and vaccine research, Department of Biotechnology, Govt. of India.

Member, Scientific Advisory Committee, International Co-operation, Department of Science and Technology, Govt. of India, 2020-Present.

Notable Academic Society Membership

Executive Committee Member, Indian Immunology Society, India, 2018-2022.

Vice-President (East), Indian Immunology Society, India, 2022-present.

Life member, Proteomics Society of India, 2022-present.

Membership in Institutional Committees

Adjunct Faculty, Public Health Foundation of India, 2022-till date.

Member, Institutional Human Ethics Committee, CSIR-Indian Institute of Chemical Biology, Kolkata, India, 2015-till date.

Member, Postgraduate Board of Studies, Department of Genetics, University of Calcutta (<https://www.caluniv.ac.in/>), Kolkata, India, 2016-till date.

Alternative Chairman and Member, Independent Review Board, Tata Medical Center (<https://tmckolkata.com/in/>), Kolkata, India, 2020-till date.

Member, INCLEN SOMAARTH Mawphlang Ethics Committee, INCLEN Trust (<http://inclentrust.org/inclen/>), Mawphlang, India, 2021-till date.

Member, Institutional Biosafety Committee, Presidency University (<https://www.presiuniv.ac.in/web/ihs.php>), Kolkata, India, 2021-till date.

Organization of International Conferences:

Indo-Australian Workshop on Rational Drug Development, Kolkata, India, February 2018, co-organizer, with Arindam Talukdar (CSIR-IICB, India)

Indo-Australian Workshop on Rational Drug Development, Kolkata, India, February 2019, co-organizer, with Arindam Talukdar (CSIR-IICB, India)

International Symposium on Frontiers in Development and Molecular Medicine, Kolkata, India, March 2019, co-organizer, with Amitava Sengupta (CSIR-IICB, India)

47th Annual Conference of the Indian Immunology Society, Kolkata, India, December 2021, Organizing Secretary

Indo-French Symposium on Metaflammation, March 2022, co-organizer, with Vanja Sisirak (L'universite de Bordeaux, France)

SCIENCE COMMUNICATION EFFORTS

Popular Books:

Ganguly D. 'Public & Science: Lost in Communication' (English), published by Kolikata Letterpress, Kolkata, India, January 2022, ISBN: 9-789393-293008-00250.

Ganguly D. 'Akash Dekhar Golpo-Swolpo' (Bengali), published by Saptarshi Prakashon, Kolkata, India, 2022, ISBN: 978-93-94114-02-9.

Popular science communication for school children:

Popular talk, Sripat Singh College, Jiagunj, West Bengal, September 2016.

Popular talk, Batanagar Sri Ramakrishna Ashram Vivekananda Vidyamandir, West Bengal, January, 2017.

Popular Talk, Uttar Garifa Pallimangal High School, Naihati, West Bengal, January, 2017.

Popular talk, IITF, Pragati Maidan, New Delhi, April, 2017.

Popular Talk, CSIR Festival, CSIR-Indian Institute of Chemical Biology, Kolkata, India, December, 2017.

Popular talk, World Immunology Day, CSIR-Indian Institute of Chemical Biology, Kolkata India, April, 2018.

Popular Talk, Jhalda Satyabhama High School, Jhalda, Purulia, West Bengal, July, 2018.

Popular Talk, Begunkodor High School, Begunkodor, Purulia, West Bengal, April, 2019.

Popular Talk (CSIR 'Jigyasa' Program), Kendriya Vidyalay-1, Salt Lake, Kolkata, West Bengal, August, 2019.

Popular Articles:

Ganguly D. The 'Public' and the 'Outreach': Public Outreach of Science in India. **Dialogue** (Indian Academy of Sciences), 2018.

Ganguly D. Coronavirus: the fight & the soldiers. **The Telegraph**, India. April, 2020. <https://www.telegraphindia.com/west-bengal/calcutta/coronavirus-the-fight-the-soldiers/cid/1765874>

Ganguly D & Gangopadhyay S. Preparing for long-lasting Covid. **The Telegraph**, India. November, 2020. <https://www.telegraphindia.com/opinion/coronavirus-pandemic-preparing-for-long-lasting-covid/cid/1797372>

Ganguly D. One pandemic unmasking another. **The Telegraph**, India. December 2020. <https://www.telegraphindia.com/opinion/one-pandemic-unmasking-another/cid/1800550>

Ganguly D. More 'strain' on Covid management. **The Hindu Businessline**, India. January 2021. <https://www.thehindubusinessline.com/opinion/more-strain-on-covid-management/article33560841.ece>

Ganguly D. Will the vaccines protect us from new strains of the novel coronavirus? **The Telegraph**, India. January 2021. <https://www.telegraphindia.com/opinion/will-the-vaccines-protect-us-from-new-strains-of-the-novel-coronavirus/cid/1804558>

Ganguly D. Slow mutation of the Covid pandemic. **The Hindu Businessline**, India. February 2021. <https://www.thehindubusinessline.com/opinion/slow-mutation-of-the-covid-pandemic/article33794829.ece>