



icmr | **NICED**
INDIAN COUNCIL OF
MEDICAL RESEARCH | NATIONAL INSTITUTE OF
CHOLERA AND ENTERIC DISEASES

उपलब्धि एवं कार्यकलाप

ACHIEVEMENTS & ACTIVITIES

2018-2019

आई सी एम आर - राष्ट्रीय कॉलरा और आंत्र रोग संस्थान
ICMR - National Institute of Cholera and Enteric Diseases

स्वास्थ्य अनुसंधान विभाग / Department of Health Research
स्वास्थ्य और परिवार कल्याण मंत्रालय / Ministry of Health and Family Welfare
भारत सरकार / Government of India

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S. Dutta (Principal Investigator), Bacteriology Division

Changes in Antimicrobial resistance and molecular attributes of Typhoidal *Salmonellae*, Kolkata, India, April 2018-March 2019

Globally, enteric fever remains one of the important diseases of public health importance. *S. Typhi* (ST) and *S. Paratyphi A* (SPA) are the major etiological agents of the disease. In this study, a total of 69 (57 ST, 12 SPA) blood isolates were collected from three hospitals in and around Kolkata during the April 2018 to March 2019 (Fig 1a). Additionally, 734 blood culture performed among pediatric patients (<15 years) from B.C. Roy hospital OPD during the same period, of which, 18 (2.5%) were positive for ST and 1 (0.14%) was positive for SPA (Fig 1b). The study strains were tested for antimicrobial resistance (AMR) profiles; AMR genes; H58 haplotypes. A total of three and more resistance profile was observed among ST and SPA study isolates (Table 1). Fluoroquinolone (FQ) resistance was observed in both the serovars with ciprofloxacin resistance was in 23% (17/75) and 31% (4/13) isolates and ofloxacin resistance was in 19% (14/75) and 92% (12/13) isolates respectively (Table 1). Majority ($\geq 69\%$) of the isolates were decreased ciprofloxacin susceptible (DCS). Single point mutation in *gyrA* gene (S83F) of the QRDR region was most commonly associated for FQ non-susceptibility among 44.4% (20/45) of ST and 70% (7/10) of SPA isolates (Table 2). PMQR (plasmid mediated quinolone resistance) genes were absent among the isolates. Multidrug resistance (MDR) was found in only one ST strain (1.3%), encoding the genes *bla*TEM-1, *catA*, *sul*, *strA-strB*, class 1 integron with *dfrA7* and absent in SPA isolates. This MDR ST possessed a non-conjugative non-*IncHI1* (180 kb) plasmid (Table 1). Almost 64% of ST belonged to H58 haplotype. The study reported AMR and mechanism of AMR in Typhoidal *Salmonellae* for better understanding of the *S. Typhi* epidemiology.

Fig. 1a

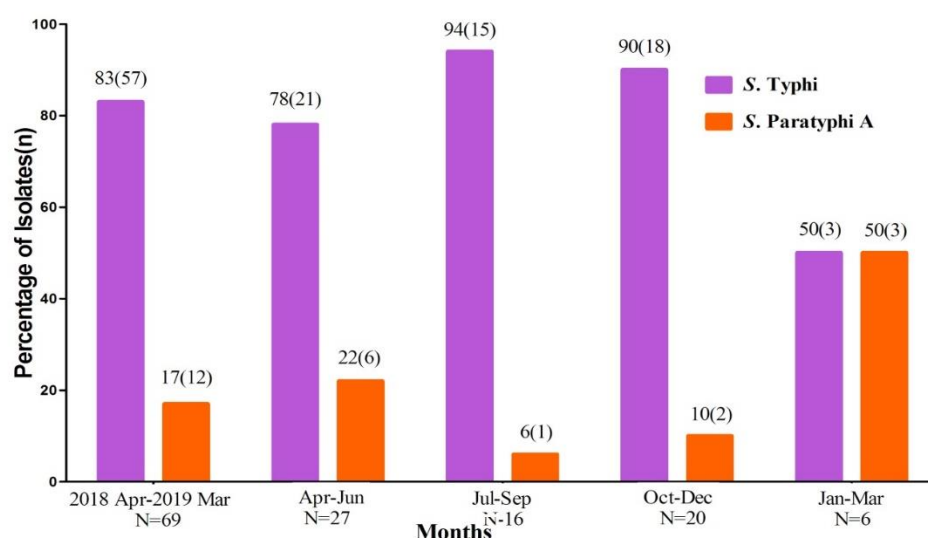


Fig 1b

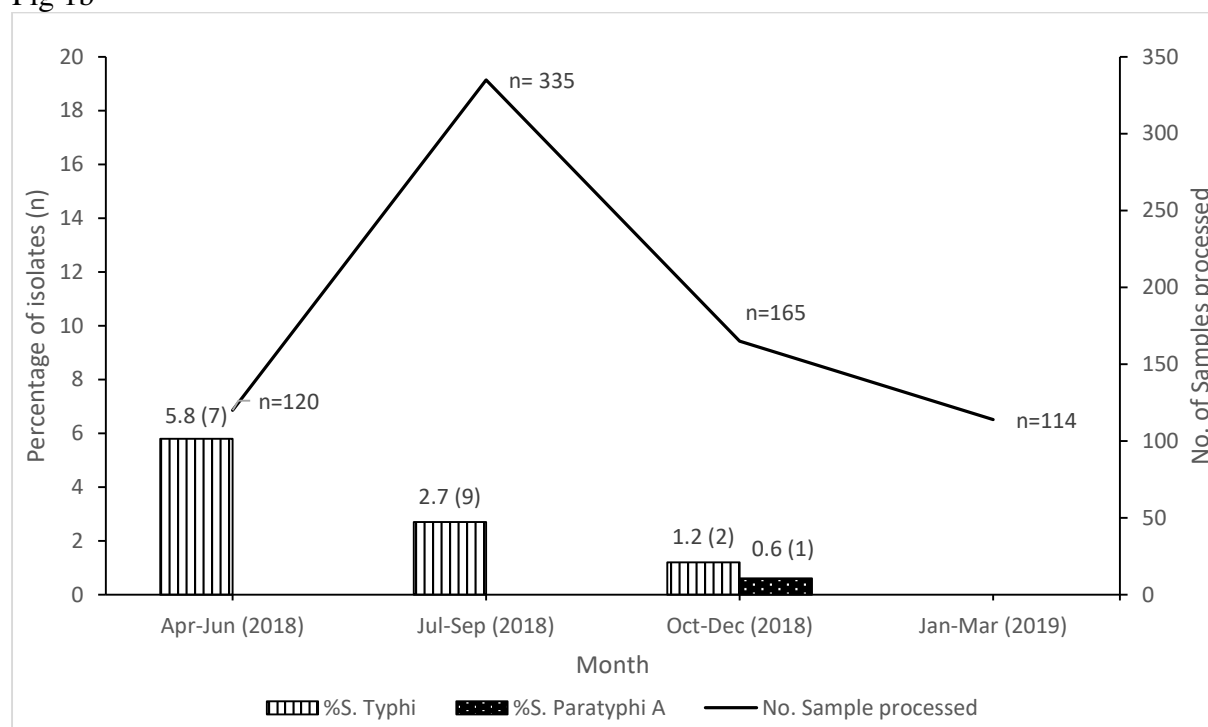


Fig1. (1a): Distribution of *S. Typhi* and *S. Paratyphi A* isolated from typhoid fever cases attending various hospitals, in and around Kolkata during April 2018 to March 2019.

(1b): Total number of blood sample processed (N = 734) and % distribution of *S. Typhi* and *S. Paratyphi A* isolates from B.C.Roy hospital during April 2018 to March 2019.

Table 1. Antimicrobial resistance profiles of *S. Typhi* and *S. Paratyphi A* Kolkata isolates, H58 haplotype of *S. Typhi* isolates and presence of resistance genes for MDR^a *S. Typhi* isolates

| Resistance profile | <i>S. Typhi</i> N (%) | <i>S. Paratyphi A</i> N (%) | H58 Haplotype <i>S. Typhi</i> , n/N (%) | Detection of resistance genes and integrin by PCR followed by sequencing (<i>S. Typhi</i>) | PlasmidType, size <i>S. Typhi</i> |
|-------------------------|-----------------------|-----------------------------|---|---|-----------------------------------|
| Na ^R DCS | 56 (75) | 1 (7.7) | 30/75 (40) | - | - |
| NaCi ^R | 3 (4) | 0 | 3/75 (4) | - | - |
| NaCiOfLe ^R | 14 (19) | 0 | 14/75 (19) | - | - |
| ACQSNa ^R DCS | 1 (1.3) | 0 | 1/75 (1.3) | <i>bla</i> _{TEM-1} , <i>catA</i> I, <i>sul</i> 1, <i>sul</i> 2, <i>strAB</i> , <i>int</i> 1 ^b | Untypable, 180kb |
| NaOf ^R DCS | 0 | 8 (61.5) | - | - | - |
| NaCiOf ^R | 0 | 4 (30.7) | - | - | - |
| Susceptible | 1 (1.3) | 0 | 0 | - | - |
| Total No. of Isolates | 75 | 13 | 48 (64) | - | - |

Abbreviation used, Na, nalidixic acid; DCS, decreased ciprofloxacin susceptibility; Ci, ciprofloxacin; Of, ofloxacin; Le, Levofloxacin; A, ampicillin; C, chloramphenicol; Q, co-trimoxazole; S, streptomycin

^aMDR, multidrug resistance (resistant to A, C, Q)

^bclass 1 integron associated with *dfrA7* gene cassette (750bp), 180kb plasmid is a nonconjugative plasmid.

Table 2. Correlation of flouroquinolones (ciprofloxacin, ofloxacin and levofloxacin) and nalidixic acid MIC & mutation(s) in DNA gyrase & topoisomerase IV subunit genes of QRDR of *S. Typhi* strains (n=45) and *S. Paratyphi A* (n=10)

| Grouping based on MICs of flouroquinolones and QRDR mutation(s) n(%) | MIC range in µg/ml (n) | | | | QRDR mutation(S) in gene | | | |
|--|------------------------|----------|-----------|-------|--------------------------|-------------|-------------|-------------|
| | Ci | Of | Le | Na | <i>gyrA</i> | <i>gyrB</i> | <i>parC</i> | <i>parE</i> |
| <i>S. Typhi</i> (N=45), | | | | | | | | |
| G1, 1(2.2) | 0.064 | 0.032 | 0.019 | <16 | WT | WT | WT | WT |
| G2, 20(44.4) | 0.25-0.5 | 0.5-1 | 0.25-1 | ≥ 256 | S83F | WT | WT | WT |
| G3, 12(26.7) | 0.25-0.5 | 0.25-1 | 0.25-1 | ≥ 256 | S83Y | WT | WT | WT |
| G4, 2(4.4) | 1-2 | 1 | 0.75 | ≥ 256 | S83F | WT | E84G | WT |
| G5, 10(22) | 16- ≥ 32 | 16- ≥ 32 | 16- 32 | ≥ 256 | S83F, D87N | WT | S80I | WT |
| <i>S. Paratyphi A</i> (N= 10) | | | | | | | | |
| Gp1, 4(40) | 0.25-0.5 | 0.75-4 | 0.38-0.75 | ≥ 256 | S83F | WT | WT | WT |
| Gp2, 3(30) | 0.75-1 | 2-4 | 0.5-1 | ≥ 256 | S83F | WT | WT | WT |
| Gp3, 1(10) | 0.125-0.5 | 1 | 0.5-1 | ≥ 256 | S83Y | WT | WT | WT |
| Gp4, 2(20) | 0.25-0.5 | 2 | 0.38-0.5 | ≥ 256 | S83Y | WT | WT | WT |

Abbreviation used, Ci, ciprofloxacin susceptible; Of, ofloxacin, Le, levofloxacin; Na, nalidixic acid. WT, wild-type; S, serine; Y, tyrosine; F, phenylalanine; D, aspartate; N, asparagine; G, glycine; E, glutamic acid; I, isoleucine.

Awards/Honours received:

- Invited to become External Examiner for evaluating the project dissertations and conducting the viva-voce examinations of students in Dual Degree M. Tech (final year) in the specialisation Biotechnology & Biochem (Engg.) and attended the exam at IIT, Kharagpur on **3rd May, 2018**
- Recipient of “**Vikram Sarabhai Memorial Award**” for 2018-2019 of Indian Science Congress for her contribution in the development of Science and Technology especially in the realm of Medical Microbiology on 3rd January, 2018 at the 106th Indian Science Congress held in Lovely Professional University, Jalandhar.
- Invited to act as the **Mentor** in the **UK-India Newton Bhaba Fund Researcher Links Workshop and delivered a lecture** on “Scopes and Challenges for the development of Novel Antimicrobial Agents from Ayurvedic agents from Ayurvedic Medicinal Plants to combat the problem of Antimicrobial Resistance” in a seminar organized by School of Natural Product studies, at Jadavpur University held on Sept 04-07, 2018.
- One DBT-TWAS sandwich postgraduate fellow from Cameroon worked under my guidance since 14 August 2018 until 31 March 2019 on “Metabolic syndrome and antimicrobial resistance in adults patients coming for consultation for enteric infections at Mbouda Adlucem and District Hospital.”

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Attended the 1st meeting of the Core Evaluation Team for the Impact Evaluation of ART Programme under NACP (ART-IE India) at NARI, Pune during **3- 4 April, 2018**
- Attended the second meeting of Domain Expert Group to discuss on "Portable Device for Early Stage and Cost-effective Diagnosis of Typhoid" under NMITLI at 10.00 hrs. on **17th April, 2018** at CSIR Hqrs., New Delhi
- External Examiner to evaluate the project dissertations and conducting the viva-voce examination of Dual-Degree M.Tech (final year students) students in the specialisation Biotechnology & Biochem. Engg., IIT, Kharagpur held on **3rd May, 2018**
- Participated in the ICMR Directors’ First meeting with DG, ICMR Prof. Balram Bhargava to discuss various issues at ICMR institutes on **16-17 May, 2018** at ICMR Hqrs.
- A meeting was organized with Ms. Manjari Chakravorty, Prosperity Adviser, British Deputy High Commission Kolkata, on 22 May, 2018 at ICMR-NICED, to explore potential possibilities for collaboration with ICMR-NICED on AMR research and establishment of an Indo-UK AMR Centre at ICMR-NICED.
- Attended Project Review Committee meeting of Regional Level VRDLs on **5- 6 June, 2018** at the DHR Conference Hall, New Delhi.
- First Meeting on “Integration of Climate data with Health Information Systems of Climate Sensitive Diseases” to develop early warning system in coming times on **7th June, 2018** at NCDC, New Delhi
- WHO Prequalification Evaluating Laboratories meeting at WHO Hqrs. Geneva, Switzerland during **12-13 June, 2018**
- 5th Annual meeting of the Global Task Force on Cholera Control (GTFCC) at the Foundation Merieux Conference Centre, Les Pensieres, Veyrier du Lac, France on **13-14 June, 2018**.

- Scientific Advisory Committee Meeting of Gut Microbiota and Probiotic Science Foundation (India) at the Eros Hotel, New Delhi on **23rd June, 2018**
- 5th meeting of National Steering Committee (NSC) - TNA Climate Change Project - Health sector at TIFAC, New Delhi on **26th June, 2018**
- Meeting with Shri Anil Verma, Principal Secretary, MoH&FW, GoWB at Swasthya Bhawan on **29th June, 2018**
- ICMR-NICED and NIID joint bilateral meeting, Tokyo, Japan **4-5 July, 2018**
- Meeting to finalize costing of testing charges for Oral Cholera Vaccine in National Institute of Biologicals, Noida on **July 13, 2018**
- Delivering the guest lecture in the IAMM Karnataka Chapter, CME titled "Update on gastrointestinal infections" to be held on **28th July, 2018** at Father Muller Medical College, Mangalore
- Attended workshop involving National and International stakeholders to develop Nipah virus research and development of roadmap for India held on **6-8 August, 2018** at New Delhi (Attended the meeting on 7-8 Aug 2018 supported by CDC, WHO)
- Meeting with Kaushik Bose from Global Health Strategies team, on “communications/media relations” on **13 August, 2018** at NICED.
- Meeting with Drs. Makoto Oinishi, Masatomo Morita, Mitsutoshi Seno, Taichiro Takemura of NIID, Tokyo, Japan at ICMR_ NICED for having discussion with the scientists of ICMR-NICED on collaborative research proposals on enteric infections during **21-22 August, 2018**
- Meeting with Ms. Pulkita Sood, Acquisitions Librarian, US Library of Congress, New Delhi Overseas Office on **24th August, 2018** to discuss the availability of unregistered articles, documents and publications for the collection of the Library of Congress.
- Attended Scientific Advisory Committee meeting of NIPER, Kolkata on **28th August, 2018** at 3.00 p.m. as a member.
- Visited the field sites in Chattisgarh for monitoring the activities of field workers for follow up study of STH prevalence mapping from fresh stool samples on **30 August, 2018**
- Attended the review Committee Meeting on the functioning of all 14 MRHRUs on **4 September, 2018** at 08:30 AM called by the Secretary, DHR through Video conferencing with the mentor ICMR institutes
- Participated in a Public Outreach Program as part of IISF 2018 organized by ICMR-NICED, Kolkata on **24 September, 2018**
- Attended Interactive meeting with staff from Hilleman Lab on **25 September, 2018** at ICMR Hqrs on development of Shigella vaccine in collaboration with ICMR & NICED held under the Chairmanship of Dr. Chander Sekhar, Addl DG, ICMR.
- 6th Meeting of National Steering Committee (NSC) on **26th September, 2018** at TIFAC, New Delhi
- Typhoid Conjugate Vaccine investigators meet for the study “Typhoid surveillance and TCV implementation” held on **11-12 Oct, 2018** at Navi Mumbai

- Attended the 9th India Probiotic Symposium on **24-25 Nov. 2018** held at Amity University Campus, New Town as a co-organiser along with the Amity University, Kolkata and liver foundation, Kolkata
- Attended 42nd Annual Conference of Indian Association of Medical Microbiologists (IAMM) held at NIMHANS Convention Centre, Bengaluru during **30 Nov. to 2 Dec., 2018 and presented**
- Meeting of the SEC (Vaccine) held on **18th December, 2018** at the CDSCO, FDA Bhawan, New Delhi
- Invited to attend as an expert “Conclave on Status, Challenges and Way-forward: A Review of Childhood Diarrheal Disease” organised by ICMR-RMRC, Bhubaneswar, Odisha on **Dec 22, 2018**.
- Attended the 106th session of the Indian Science Congress Association held during **3 - 7 January, 2019** at the Lovely Professional University, Jalandhar and Chaired a Plenary Session on “ Health and Climate”.
- On invitation delivered a Lecture entitled “Cholera: Current status on prevention and control of the disease” on **Jan 10, 2019** for the UGC sponsored Refresher Course held at the N.R. Sen Auditorium of the Rashbehari Siksha Prangan (Rajababazar Science College Campus).
- As Chairperson, attended the meeting to discuss the research activities at Multi-disciplinary Research Unit (MRU) of NRS Hospital on **23 January, 2019** at 12.00 pm in the conference Room of Academy Building (1st floor), NRS Medical College and Hospital, Kolkata
- Delivered a presentation on “Changes in molecular attributes of Salmonella Typhi and Paratyphi isolates, Kolkata, during recent years” at the US-Japan Cooperative Medical Sciences Program (USJCMSP) and 21st International Conference on Emerging Infectious Diseases in the Pacific Rim held in Hanoi, Vietnam on **Feb 26-Mar 01 2019**.
- Attended a meeting at ICMR Hqrs. on **March 18, 2019** in presence of DG, ICMR, Chief, ECD, to discuss TCV study implementation in Navi Mumbai.
- Delivered a presentation on “Cluster analysis of enteric fever cases in urban slums in Kolkata” at 11th International conference on typhoid and Other Invasive Salmonellosis held in Hanoi, Vietnam from **26-28 March, 2019**.

Post and Pre-Dictorial Fellows:

Post-Doctoral Fellow:

Dr. Debmalya Mitra, ICMR-PDF

Pre-Doctoral Fellow:

Ms. Sriparna Samajpati, SRF-ICMR

Ms. Priyanka Jain, SRF

Mr. Gourab Halder, JRF-CSIR

Ms. Sunayana Saren, JRF-UGC

Ms. Sohini Sikder, JRF-CSIR

Ms. Puja Bose, Research Assistant-Project

A. Palit (Principal Investigator), Bacteriology Division

Seasonal dynamics of enteropathogenic bacteria in Gulf of Khambhat, Gujarat: its impact on health of coastal population

In this Ministry of Earth Science (MoES, GOI) funded study, the laboratory working group is exploring the effect of biogeochemical gradients on seasonal dynamics and dispersion of different enteropathogenic bacteria viz., *V. cholerae*, *V. parahaemolyticus* and *E. coli* at pre-selected sites of Gulf of Khambhat, Gujarat. The study outcomes will highlight the possible route of transport for the enteropathogenic bacteria to the coastal cities like Bhavnagar, Gujarat both through water sediments and other marine organisms such as marine edible fishes.

Findings:

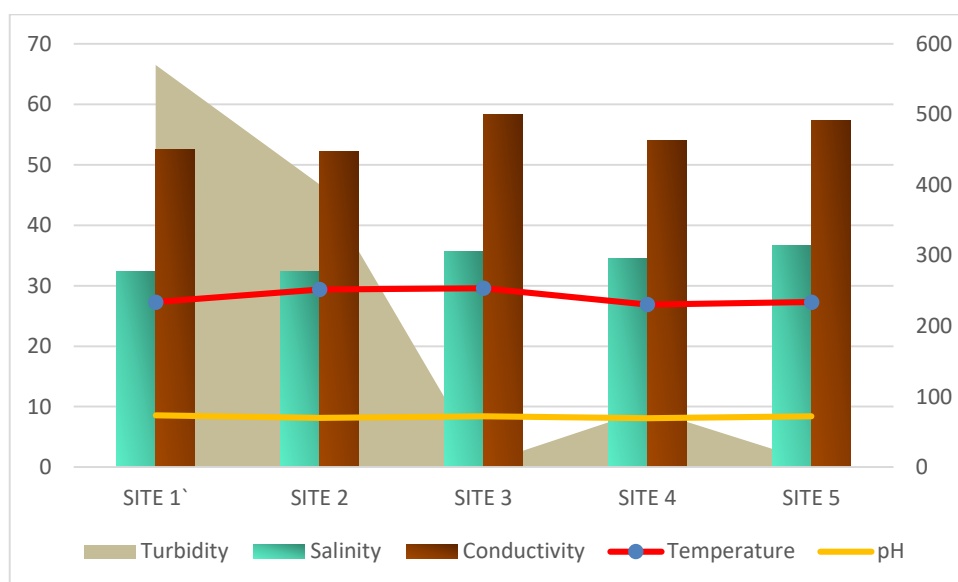


Fig 2: Physico- chemical variations of water samples

- A huge turbidity variation along the gulf area has been observed, which is much higher towards the inland site of the gulf and abruptly decreases as it progresses towards the sea mouth. Salinity increases gradually from deep inside the gulf coast to the open sea and parallel conductivity fluctuations also have been noted (Fig 2).
- Interestingly, we have found toxigenic *E. coli* and other coliforms from the Gulf which is a reasonably high saline zone very near to the sea sites (Site5). Detection of toxigenic and Diarrheagenic *E. coli* from an excessively high saline water of the Gulf of Khambhat is the first time report from this diarrhoea endemic zone.

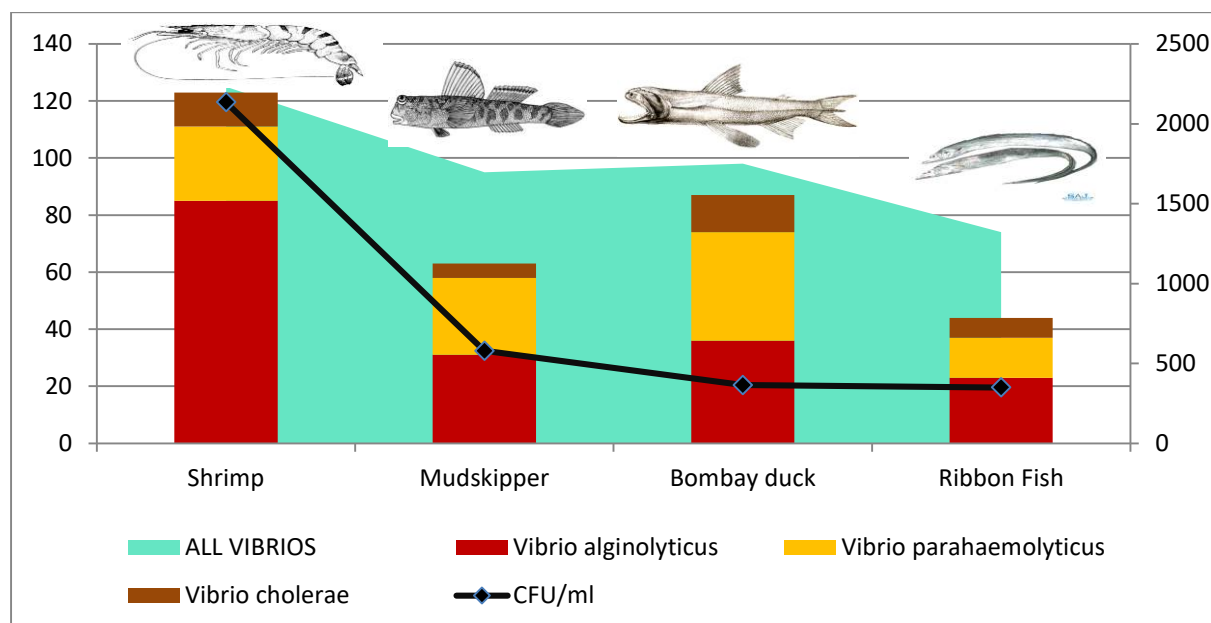


Fig 3: Vibrio load in common sea food of commercial interest off Bhavnagar coast

- Results of the analysis of food samples delineate that all the samples are highly contaminated with Vibrios. Most of the fishes and shrimps are highly contaminated with toxigenic *V. alginolyticus*, followed by *V. parahaemolyticus* and *V. cholerae* (Fig 3). Consumption of sea food without proper cooking on high flame is highly hazardous for humans.

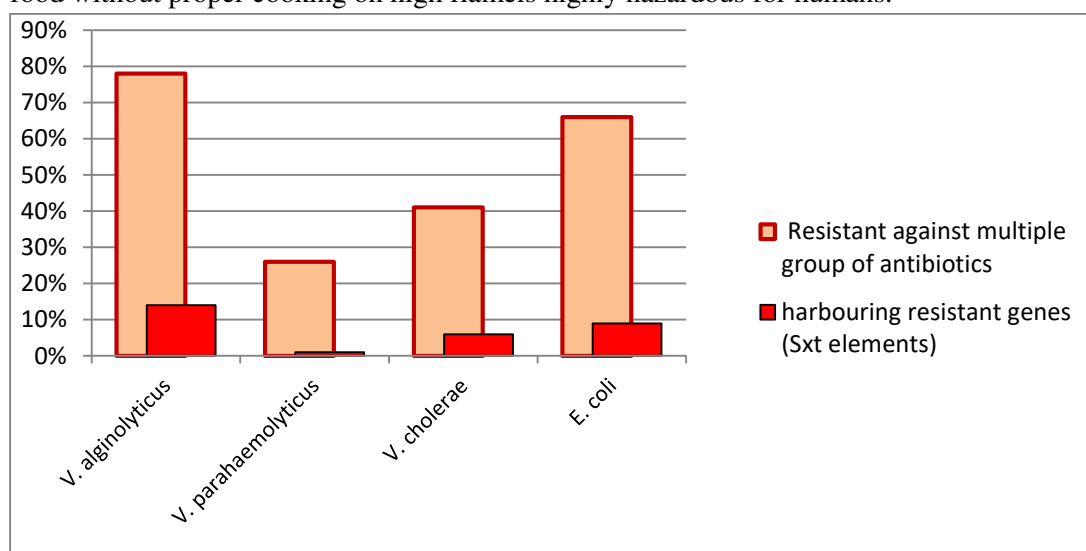


Fig 4: Resistance gene profiling of resistant pathogens

- Antibiotic susceptibility test shows that about 80% organisms are sensitive to tetracycline and 60% to Carbapenem group of antibiotics, while they show resistance against majority of the commonly prescribed antibiotics. Above 90% of the organisms showed resistance against amoxicillin–clavulanic acid and β -lactam group of antibiotics. More than 75% organisms were found to be resistant to cephalosporin and 50% against quinolone group of antibiotics.

- Maximum number of *V. alginolyticus* was found to be resistant against multiple groups of antibiotics as well as harbours antibiotic resistant genes (*sxt* element) (Fig 4). Among other pathogenic Vibrios least percentage of *V. parahaemolyticus* harbours resistant genes. 66% of *E. coli* shows resistance to majority of antibiotics and 9% of them belongs to resistant genotype. A few of *V. alginolyticus* (3%) harbours *tetA* and *sul2*, 2% of *V. cholerae* bearing *dfr18*.

Awards/Honours received:

- **Invited & reviewed Ph. D. theses:** Pondicherry University, Pondicherry, India University of Burdwan (W.B.), India, AcSIR (CSIR-CSMCRI) etc.

Ph D Awarded:

Dr. Subham Mookerjee received PhD Degree from University of Calcutta

Title of the Thesis: Characterization and Ecological Dynamics of Entero-Pathogenic Vibrios of Riverine and Estuarine Environs of Gangetic Delta of West Bengal

Date of Award: 19th February, 2019

Pre-Doctoral Fellow:

Ms. Madhumanti Halder, SRF-UGC

Mr. Suvajit Saha, JRF-MoES Project

R. K. Nandy (Principal Investigator), Bacteriology Division

Non-metabolizable arabinose mediated growth inhibition of *Vibrio cholerae*

Marine bacterium *Vibrio cholerae*, belonging to serogroups O1 and O139 are responsible to cause cholera in human. Pentose sugar arabinose (Ara) is nonmetabolizable by the pathogen and is present in environmental niches as well as in the human intestine. During this period, Ara mediated *V. cholerae* growth has been assessed in M9 medium containing gluconate (M9-Gnt). *V. cholerae* strains didn't grow in presence of 0.5% Ara in M9-Gnt. Ara failed to induce any growth inhibition in M9-glucose medium. No impact on the growth was noted by the presence of another non-metabolizable sugar xylose (Fig. 5). Transcriptional analysis revealed differential regulation of *edd* and *eda*, the genes that constitute the ED pathway. Growth of *V. cholerae* in M9-Gnt caused ~100-fold and ~50-fold increase of *edd* and *eda*, respectively as compared to M9-Glu grown cells. All these indicated primary importance of the ED pathway to utilize Gnt. Bioinformatics approach indicated that Ara could upregulate expression of the ED pathway and such indication was confirmed by observed increase of *edd* transcripts by ~14-fold in AKI with 0.5% Ara as compared to AKI only. Therefore, it was thought that observed growth inhibition in M9-Gnt was possibly related to hyperactive ED pathway leading to accumulation of metabolic intermediate 2-dehydro-3-deoxy-phosphogluconate (KDPG), a known bacteriostatic agent. Observed *in vitro* growth inhibition phenotype was extended for its relevance *in vivo* using animal model. Suckling mouse colonisation assay revealed severe attenuation of colonization potential of *V. cholerae* strain in presence of 0.5% Ara. Therefore, non-toxic sugar Ara can be considered to have potential to inhibit cholera.

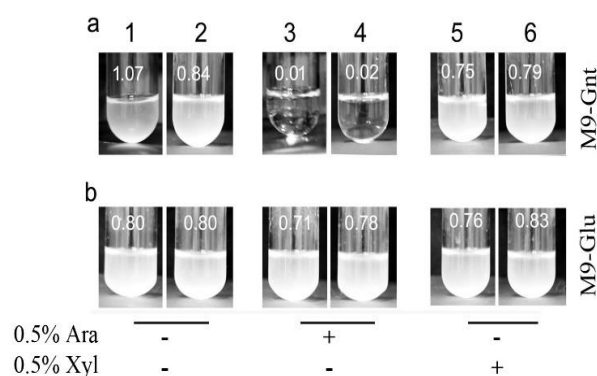


Fig 5: Growth phenotypes of *V. cholerae* O1 Inaba strain N16961 (tubes 1,3,5) and O139 strain MO10 (tubes 2,4,6) in M9-Gnt (a), and M9-Glu (b) containing either 0.5% Ara (tubes 3,4) or 0.5% Xyl (tubes 5,6). Values in reverse represent cell opacity at 600nm

List of patent(s) filed/accepted /Technology developed

Under submission process; title “Aqueous arabinose solution: novel product for cholera diarrhea management” by Golder T, P Mukherjee, Koley H and Nandy RK

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Participated 2nd National Exhibition on the theme of New India: Future leader of Globe organized by Central Calcutta Science & Culture Organization for Youth, Kolkata during August 3-6, 2018 at Milan Samity Maidan, Nimta, Kolkata 700049. Role: Coordinator.
- On directives from Indian Council of Medical Research (ICMR Hqrs.) and the Director, ICMR-NICED, an outreach programme as a part of India International Science Festival (IISF), 2018, was organized on September 24, 2018 at NICED-II Seminar Room in presence of school students and their teachers. Role: Coordinator.
- Conducted ‘Containment of Polioviruses in the Laboratory’ programme. This was a search programme for laboratory containment of Poliovirus (PV) infected and/or potentially infectious materials (PIM) on October 31- November 15, 2018 for all NICED Buildings and report has been submitted to National Task Force coordinator through the Director. Role: Coordinator.
- Participated 14th Jatiya Sanhati Utsab-O-Bharat Mela 2018 organized by Bangiya Seva Samity during December 12- 16, 2018 at Shimultala Play Ground, Sonarpur, Kolkata 700150. Report submitted to the Director. Role: Coordinator.
- Delivered lecture ‘Overview of Viral Diagnostic Techniques’ in 4th Hands-on Training Workshop on Laboratory Diagnosis of Emerging Viral Diseases during February 7-9, 2019 organized by Regional Viral Research and Diagnostic Laboratory, ICMR-NICED, Kolkata.
- Poster presentation entitled “Arabinose inhibits growth of pathogenic *Vibrio cholerae* by modulating metabolic pathways’ at 53rd US-Japan Cooperative Medical Sciences Program (USJCMSP) under 21st International Conference on Emerging Infectious Diseases (EID) in the Pacific Rim, Hanoi Vietnam during February 26 to March 01, 2019.

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellow:

Dr. Prosenjit Pyne, PDF-DST-SERB

Pre-Doctoral Fellow:

Ms. Taniya Golder, SRF-ICMR

A. K. Mukhopadhyay (Principal Investigator), Bacteriology Division

Haitian variant *V. cholerae* strains manifest higher virulence in Animal Models

Vibrio cholerae causes fatal diarrhoeal disease cholera in humans due to consumption of contaminated water and food. To instigate the disease, the bacterium must evade the host intestinal innate immune system; penetrate the mucus layer of the small intestine, adhere and multiply on the surface of microvilli and produce toxin(s) through the action of virulence associated genes. Several devastating cholera outbreaks have been reported worldwide in the recent past. Among them, the Haitian cholera outbreak in the year 2010 placed this ancient disease once again at the front line of the global public health agenda. *V. cholerae* O1 that has caused a major cholera outbreak in Haiti contained several unique genetic signatures. With the appearance of this Haitian variant, there has been a subtle but distinct change in the cholera epidemiology in recent years. These differences include an increase in the severity of the disease as compared to those caused by canonical El Tor, the tendency of the epidemics to linger longer as has been seen recently in Zimbabwe, Haiti and Yemen. These novel traits are used to differentiate them from the canonical El Tor strains. Several studies reported the spread of these Haitian variant strains in different parts of the world including Asia and Africa, but there is a paucity of information on the clinical consequence of these genetic changes. To understand the impact of these changes, we undertook a study involving mice and rabbit models to evaluate the pathogenesis of El Tor and Haitian variant strains. The growth kinetics of both El Tor representatives and Haitian variants were found to be predominantly sigmoidal indicating the consistency in their growth patterns. Although the *V. cholerae* strains had different genetic backgrounds, their growth pattern did not differ significantly (Figure 6).

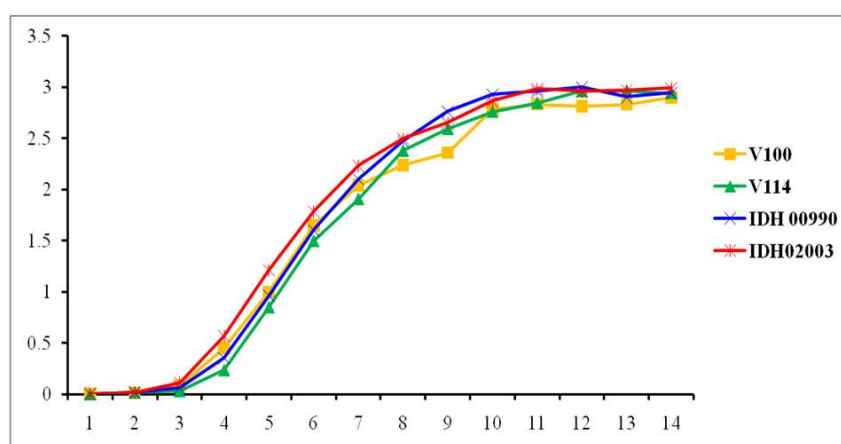


Fig 6: *Vibrio cholerae* growth curve of El Tor strains (V100, V114) and Haitian variant Strains (IDH00990 and IDH02003) were grown in Luria-Bertani broth for 14 h, and the optical density was measured every hour at 600 nm.

The colonization ability of Haitian variant strain in comparison to canonical El Tor strain was found to be significantly more in both suckling mice and rabbit model. Adult mice also displayed the same results. Besides that, infection patterns of Haitian variant strains showed a completely different picture (Figure 7)

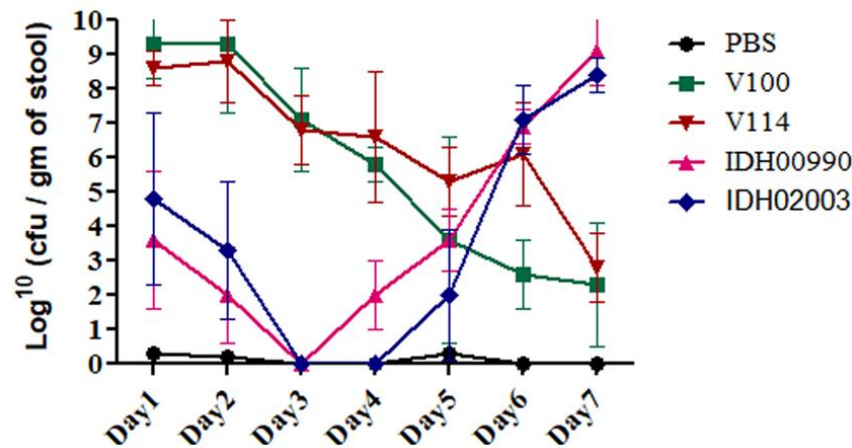


Fig 7: Shedding of *V. cholerae* strains in stools of adult mice challenged with El Tor and Haitian variant strains. Log phase *V. cholerae* El Tor strains V100 (1×10^9), V114 (1×10^9) and Haitian variant strains IDH00990 (1×10^9), IDH02003 (1×10^9) were inoculated and CFU/gm of stool was measured for each day over a 7-day period. Data are expressed as mean \pm SD of three different mice from each group. Bacterial shedding prevailed throughout the 7-day observation period. V100 displayed peak shedding at day 1 followed by a gradual decline. In contrast, bacterial shedding of IDH02003 totally halted on days 3 and 4, followed by enhanced shedding up to day 6. V114 and IDH00990 followed almost similar pattern of V100 and IDH02003 respectively.

Increased mucosal damaging, colonization and inflammatory changes were observed through haematoxylin-eosin staining and transmission electron microscopy (Figure 8)

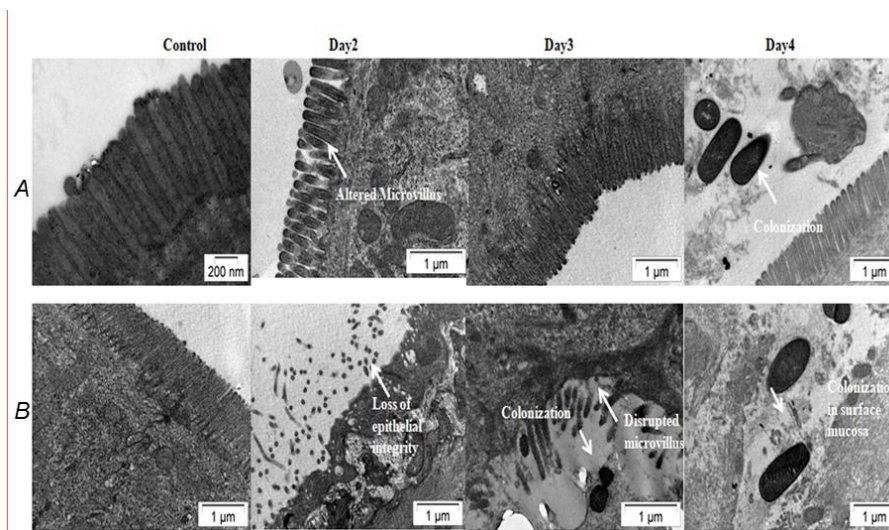


Fig 8: Transmission electron microscopy of mice intestine challenged with *V. cholerae* strains. (A) Log phase *V. cholerae* El Tor strain V100 (1×10^9) as inoculated and mice intestine were collected for TEM analysis as described in Section “Materials and Methods.” (B) Log phase *V. cholerae* Haitian variant strain IDH02003 (1×10^9) was inoculated and mice intestine were collected for TEM analysis as described in Section “Materials and Methods.” In each case uninfected mice were used as control. Infection with V100 showed altered microvillus structure on day 2, which comes to almost normal stage on day 3. Colonization of bacteria was seen on day 4. As can be seen that infection with IDH02003 on the other hand showed gross disruption of the microvillus structure on day 2. On day 3 along with disruption, bacterial colonization was observed.

Fluid accumulation ability was also significantly higher in rabbit model. Our study indicated that these virulence features of the Haitian variant strain may have some association with the severe clinical outcome of the cholera patients in different parts of the world. There is a constant need for identifying and tracking these strains to implement appropriate measures and to contain the outbreaks and epidemics.

Azithromycin Resistance Mediated by Phosphotransferase-Encoding *mph(A)* in Diarrheagenic *Vibrio fluvialis*

The progressive rise in antibiotic resistance among enteric pathogens in developing countries is becoming a big concern. India is one of the largest consumers of antibiotics, and their use is not well regulated. *V. fluvialis* is increasingly recognized as an emerging diarrheal pathogen of public health importance. Here, we report the emergence of azithromycin resistance in *V. fluvialis* isolates from diarrheal patients in Kolkata, India. Azithromycin has been widely used in the treatment of various infections, both in children and in adults. The azithromycin resistance conferred by phosphotransferase is encoded in the gene *mph(A)*. This gene has been discovered in and reported for many bacterial species. We examined the prevalence of azithromycin resistance in *Vibrio fluvialis* (AR-VF) isolated during 2014 to 2015 from the hospitalized acute diarrheal patients in Kolkata, India. Most of the *V. fluvialis* isolates are identified as the sole pathogen (54%). The prevalence of AR-VF was higher in 2015 (19 [68%]) than in 2014 (9 [32%]). Among AR-VF isolates, the azithromycin MICs ranged from 4 to >256 mg/liter. Twenty-eight of the 48 (58%) *V. fluvialis* isolates harbored the gene *mph(A)* and phenotypically resistant to azithromycin. All the AR-VF isolates remained susceptible to doxycycline. In addition to azithromycin, other antimicrobial resistance encoding genes of AR-VF were also characterized. All the AR-VF isolates were positive for class 1 integron, and most of them (17/28) carried the *dfrA1* gene cassettes. Only one isolate was positive for the *ereA* gene, which encodes resistance to erythromycin. The majority of the isolates were resistant to β -lactam antibiotics (*bla*OXA-1 [96%], *bla*OXA-7 [93%], and *bla*TEM-9 [68%]) and aminoglycoside acetyltransferase, conferring resistance to ciprofloxacin-modifying enzyme (96%). Analyses by pulsed-field gel electrophoresis (PFGE) showed that the AR-VF isolates belonged to different genetic lineages. This is the first study to report azithromycin resistance and the presence of the *mph(A)* gene in *V. fluvialis* isolates. Circulation of AR-VF isolates with high azithromycin MICs is worrisome, since it may limit the treatment options for diarrheal infections. Finally, emerging azithromycin resistance in *V. fluvialis* is a major public health challenge, and future studies should be focused on identifying ways to prevent the dissemination of this antibiotic resistance gene.

Therapeutic Potential of Ellagic acid against *Helicobacter pylori* infection

Helicobacter pylori is of growing concern today because of its crucial role in the pathogenesis of chronic gastritis, peptic ulcer diseases and in the multi-step carcinogenic process of gastric cancer. Recently, *H. pylori* has been registered by the WHO among 16 antibiotic resistant bacteria that pose the greatest menace to human health. Due to the emergence of antibiotic-resistant *H. pylori* strains, there is an imperative need for alternative, cost-effective antimicrobial agents that are non-antibiotic and suitable for the next generation of eradication therapy. For this reason, an inexpensive, diet-based treatment against *H. pylori* infection would be of great interest.

Numerous studies have shown that plant polyphenols are an important class of antimicrobial agents against organisms ranging from bacteria, viruses to protozoa. Ellagic acid (C₁₄H₆O₈) is a naturally

occurring dietary polyphenol, present in free form or in the form of ellagitannins or glucosides. It is generally found in certain rich dietary sources like Terminalia Chebula (Haritaki) walnuts, pomegranates, strawberries, blackberries, cloudberries and raspberries. Ellagic acid is known to possess an array of pharmacological and biological activities. So, one study was conducted (i) to assess the efficacy of ellagic acid as an antibacterial agent against *H. pylori* strains isolated from patients in India; (ii) to observe alteration of *H. pylori* morphology upon ellagic acid treatment (iii) to understand the effectiveness of ellagic acid in eradicating *H. pylori* infection in a murine (C57BL/6) infection model. Results indicated that Ellagic acid inhibited the growth of all the tested *H. pylori* strains having different antimicrobial resistance patterns. The minimum inhibitory concentration (MIC) of ellagic acid ranges from 5 mg/L to 30 mg/L, showing its bactericidal properties *in vitro* (Figure 9-i).

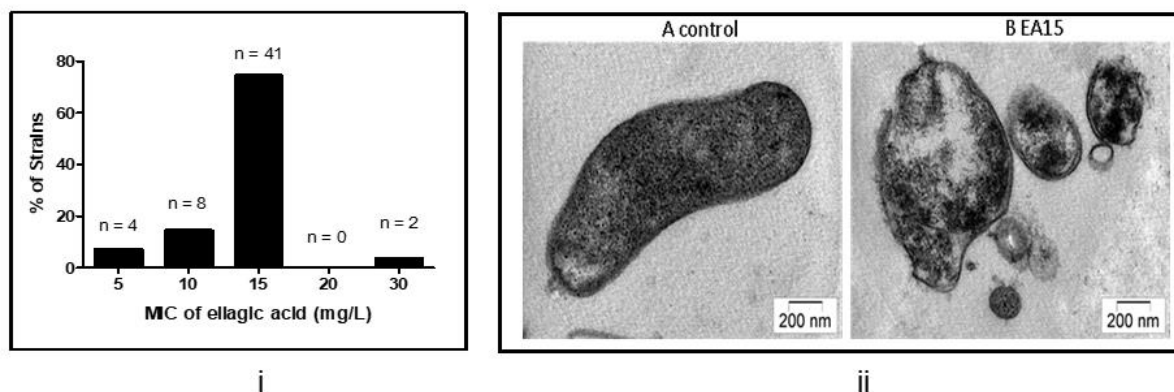


Fig 9: Ellagic acid as a promising antibacterial agent against *H. pylori*. (i) Distribution of ellagic acid MICs among the *Helicobacter pylori* strains isolated from gastroduodenal patients in India. (ii) Transmission electron micrographs of *H. pylori* (A) at 12 h of treatment with ellagic acid (B) inducing the coccoid morphology of bacteria.

The morphological changes of *H. pylori* strain SS1 following ellagic acid treatment was examined by transmission electron microscopy (TEM). Results indicated that ellagic acid is an effective anti-*H. pylori* molecule, promoting the coccoid morphology of bacteria that is known to be a non-cultivable form (Figure 9-ii). Ellagic acid also demonstrated anti-*H. pylori* efficacy in eradication of this organism *in vivo* model as well as restitution and repair of *H. pylori*-induced gastric mucosal damage (Figure 10). Finally, our study paves the way into the preventive and therapeutic approaches of ellagic acid against *H. pylori* infection and thus, can be considered as a promising antibacterial agent against *H. pylori* associated gastro-duodenal diseases in humans.

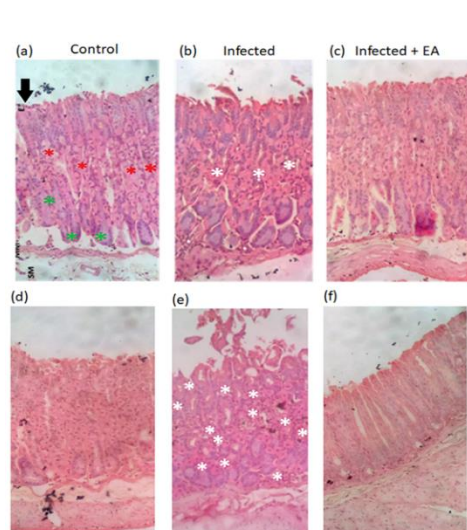


Fig 10: Histopathology of hematoxylin and eosin stained sections of mouse gastric tissues after *H. pylori*-infection and eradication. Representative images of hematoxylin and eosin stained sections of mouse gastric tissues taken at X40 magnifications. Histological analysis revealed appearance of gastric tissues from (a), (d) negative control (i.e. no *H. pylori*); (b), (e) positive control (i.e. *H. pylori* with no treatment) showed significant damage in the mouse gastric tissues infected with mouse colonizing strain SS1 for three weeks like loss of normal mucosal architecture; (c), (f) this layer was restored to almost normal after treating with ellagic acid at 10 mg/kg bw. The gastric mucosal epithelium, gastric glands, parietal cells (top) Chief cells (bottom) and inflammatory cell infiltration are shown in black arrows, orange stars, green stars and white stars respectively.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Dr. Mukhopadhyay was invited for presentation at US-Japan Cooperative Medical Sciences Program (USJCMSP) 21st International Conference on Emerging Infectious Diseases in the Pacific Rim, Hanoi Vietnam during Feb 26 to March 1, 2019.
- Dr. Mukhopadhyay was invited to participate and to deliver a talk on “Non-antibiotic Therapeutic Regimens for *Helicobacter pylori* in an Era of Increasing Antibiotic Resistance” in the 2nd International Conference on Contemporary Antimicrobial Research (ICCAR 2018) held at IIT, Kharagpur during December 15-17, 2018.
- Dr. Mukhopadhyay was invited as a special speaker to talk on the topic entitled “Incessant Genomic changes in El Tor Vibrios – a global disquiet” in the “52nd Vibrio Symposium” held at Fukushima, Japan during October 26th to 27th, 2018.
- Dr. Mukhopadhyay was invited to attend the NICED-NIID joint bilateral meeting regarding the HMSC cleared collaborative project on “Laboratory based collaboration network of infectious diseases in Asia” held in NIID, Tokyo, Japan during July 04-05, 2018.
- Dr. Mukhopadhyay was invited to participate in the Global Task Force on Cholera Control (GTFCC) meeting organized by the Fondation Mérieux to discuss the capacity development for cholera prevention and control globally at the Fondation Merieux Conference Centre les Pensières, in Veyrier du Lac, Annecy, France during April 16-18, 2018.

PhD Awarded:

Dr. Arindam Naha received PhD Degree from the University of Calcutta

Title of the Thesis: “Genomic and Functional analysis of Cholera Toxin B Subunit and The Promoter region of ctxAB operon in Clinical Isolates of *Vibrio cholerae* O1”

Date of Award: 8th August 2018

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellows:

Dr. Gautam Chowdhury, OUP

Dr. Raghwan, NASI

Dr. Tanmoy Dey, ICMR

Pre-Doctoral Fellows:

Ms. Piyali Mukherjee, SRF-ICMR Project

Mr. Bipul Chandra Karmakar, SRF-Inspire DST

Mr. Prosenjit Samanta, SRF-CSIR

Ms. Sangita Paul, SRF-CSIR

Ms. Debjani Ghosh, JRF-CSIR

Ms. Sreeja Shaw, JRF-CSIR

Diverse sequence types of NDM-1-producing *Klebsiella pneumoniae* (ST29, ST347, ST1224, and ST2558) causing sepsis in neonates in a tertiary care hospital of North-East India

Carbapenem-resistant Enterobacteriaceae (CRE) has become a major clinical concern worldwide particularly in neonatal units. As these resistance determinants are often associated with other resistance alleles, they confer resistance to almost all classes of antibiotics limiting treatment options severely. Geographical differences can manifest in different spectra of microorganisms and patterns of antibiotic resistance. Considering this, Enterobacteriaceae isolated from septicemic neonates from a tertiary care centre in Agartala, India were studied with focus on carbapenem resistance.

K. pneumoniae was the primary organism causing sepsis in neonates. Antibiotic resistance to different antimicrobials was high except for aminoglycosides and carbapenems. The *bla*_{CTX-M} was prevalent in all isolates. All carbapenem-resistant isolates harboured *bla*_{NDM-1} as the only carbapenemase. No other variant of the gene was identified. *bla*_{CTX-M-15} and *qnrS1* were detected in all. Plasmid analysis of transconjugants revealed that *bla*_{NDM-1} along with *bla*_{CTX-M-15}, *qnrS1*, *qnrB1*, *aac*(6')-Ib, *aac*(6')-Ib-cr and *ccdAB* or *vagCD* addiction systems were carried on large IncFIIK conjugative plasmids of varied sizes. *bla*_{NDM-1} was associated with IS*Aba125* or IS*Ec33* element at its 5'-end. In addition, all isolates also harboured *wabG*, *uge*, *fimH*, *mrkD*, and *entB* virulence genes. The NDM-1-producing *K. pneumoniae* were distributed in 4 STs (ST347, ST29, ST2558, and ST1224), of which ST347 was predominant (Figure 11). ST29 and ST1224 *K. pneumoniae* were detected in China causing ventilator-associated pneumonia and bloodstream infection, respectively. The similarity with strains from China may indicate the propagation of these ST types in these regions. The association of *bla*_{NDM-1} with diverse STs in *K. pneumoniae* from neonates indicates the promiscuity of the gene and its widespread dissemination.

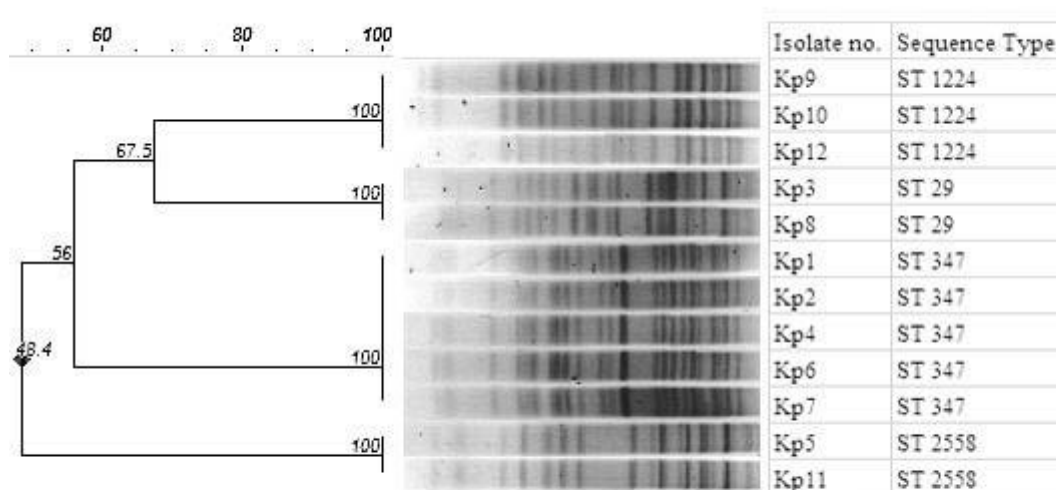


Fig 11: Analysis of genetic relationship according to Dice's similarity coefficient and unweighted pair group method with arith mean (UPGMA) (the position tolerance and optimization were set at 1.0% and 1.0% respectively) of the XbaI-digested pattern cNDM-1 producing *K. pneumoniae* isolates

Co-transfer of plasmid-mediated fluoroquinolone resistance and *bla*_{NDM} genes in Enterobacteriaceae causing neonatal septicemia

The *bla*_{NDM-1} (New Delhi Metallo- β -lactamase-1) gene has disseminated around the globe. NDM-1 producers are found to co-harbour resistance genes against many antimicrobials, including fluoroquinolones. The spread of large plasmids, carrying both *bla*_{NDM} and plasmid-mediated fluoroquinolone resistance (PMQR) markers, is one of the main reasons for the failure of these essential antimicrobials. A study was carried out to evaluate the fluoroquinolone resistance and the prevalence of Plasmid mediated fluoroquinolone resistance (PMQRs) genes in NDM positive and NDM-negative Enterobacteriaceae isolates and to find a possible association of *bla*_{NDM} and PMQRs in carriage and transmission.

There was no significant difference in ciprofloxacin non-susceptibility (97% vs 85%) and the prevalence of PMQRs (85% vs 77%) between NDM-positive and NDM-negative isolates. Sequencing of all the *bla*_{NDM} revealed that most of them were *bla*_{NDM-1} apart from three *E. coli* isolates which harbored *bla*_{NDM-5}, *bla*_{NDM-7} and *bla*_{NDM-15}. The sequence of the novel variant *bla*_{NDM-15} was submitted to Genbank (accession no. KP735848).

Overall, 40% isolates co-harboured NDM and PMQRs, of which 41% co-transferred PMQRs along with *bla*_{NDM} in large plasmids of IncFIIK, Inc A/C, IncN types. Plasmids carrying only *bla*_{NDM} were of IncHIB-M type predominantly. Most of the isolates had IS*Aba125* in the upstream region of *bla*_{NDM} gene. We have also found IS630, IS5, and IS*kpn26* present upstream truncated IS*Aba125*.

We hypothesize that the spread of PMQRs was independent of the spread of NDM-1 as their co-transfer was confirmed only in a few isolates. Although the co-occurrence of these genes poses a great threat to the treatment of neonates.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- 22ndADNAT Convention & International Symposium on Antibiotic Resistance One Health Perspective, IIT-Roorkee, India. 5th-8th March, 2019. Carbapenem Resistance in Neonatal Units: Trials and Tribulations. Sulagna Basu. (Invited talk)
- 2nd International Conference on Contemporary Antimicrobial Research ICCAR 2018, IIT-Kharagpur, India. 15th – 17th December, 2018. The story of colistin resistance is unfolding: another storm in the cradle?? Sulagna Basu. (Invited talk)
- 2nd International Conference on Contemporary Antimicrobial Research ICCAR 2018, IIT-Kharagpur, India. 15th – 17th December, 2018. Prevalence and co-transfer of New Delhi metallo- β -lactamase and plasmid mediated fluoroquinolone resistance in Enterobacteriaceae isolates from a NICU of a Tertiary care hospital in Kolkata, India. Shravani Mitra, Suchandra Mukherjee, Sharmi Naha, Pinaki Chattopadhyay, Shanta Dutta and Sulagna Basu.
- 2nd International Conference on Contemporary Antimicrobial Research ICCAR 2018, IIT-Kharagpur, India. 15th – 17th December, 2018. Diversity of carbapenem resistance mechanisms among *Acinetobacter baumannii* isolated from septicemic neonates: highlighting both enzymatic (carbapenemases) and non-enzymatic mechanisms (Efflux pumps, PBP & Porins). Roy S, Chatterjee S, Chattopadhyay P and Basu S.
- 9th India Probiotic Symposium, Amity University, Kolkata, India. 24th - 25th Nov. 2018.
- 42nd Annual Conference of Indian Association of Medical Microbiologists, Bengaluru, India. 28th Nov. - 2nd Dec. 2018. Mobile genetic elements associated with the co-transmission of *bla*_{NDM-1} and pmqrs in Enterobacteriaceae isolated from septicemic neonates.
- Invited to attend the meeting and deliberations on ‘Antimicrobial Resistance: Challenges and Solutions’, hosted by BD India, New Delhi, 1st August 2018

Ph D Awarded:

Dr. Somdatta Chatterjee received PhD Degree from University of Calcutta

Title of the Thesis: Studies on the Transmissible Carbapenem Resistance In *Acinetobacter* spp.

Date of Award: 18th January 2019

Post and Pre-Doctoral Fellows:*Post-Doctoral Fellow:*

Dr. Subhasree Roy – Senior Research Associate (CSIR Scientist Pool)

Pre-Doctoral Fellow:

Ms. Shravani Mitra, SRF-DST (WB) Project

Ms. Sharmi Naha, SRF-ICMR

Mr. Subhankar Mukherjee, SRF-ICMR Project

Ms. Amrita Bhattacharya, JRF-ICMR

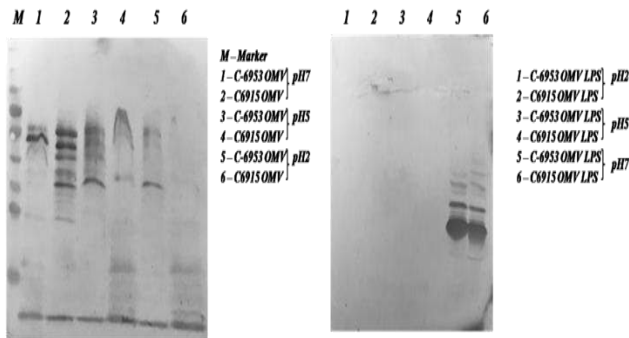
Ms. Priyanka Basak, JRF-ICMR

H. Koley (Principal Investigator), Bacteriology Division

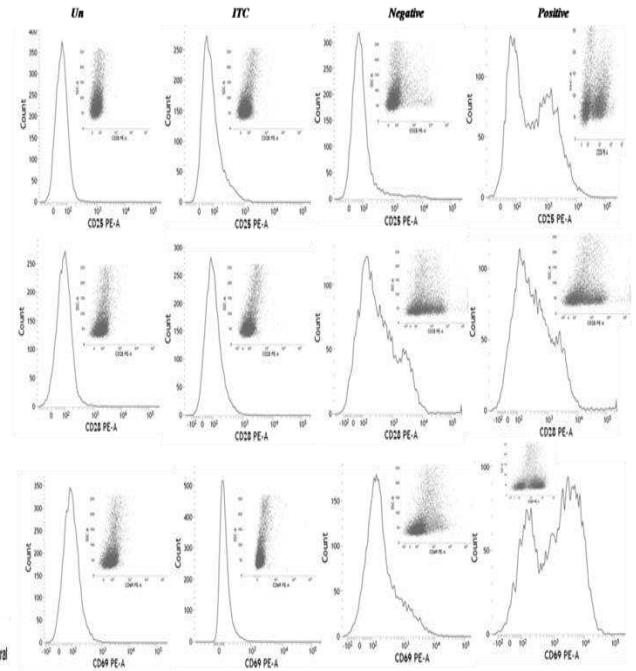
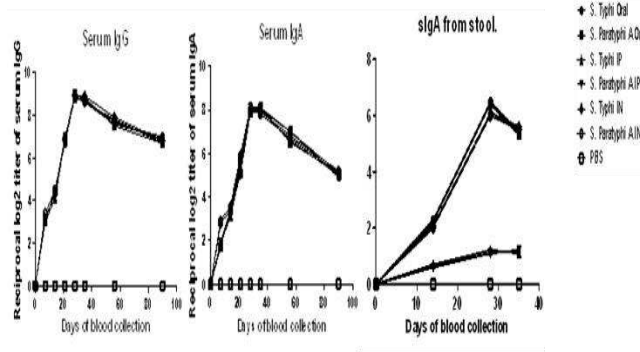
Formulation of a novel Outer Membrane Vesicles (OMVs) based immunogen from *S. Typhi* and *S. Paratyphi A* and the induction of adaptive immunity and protective efficacy in mice model.

The bivalent immunogen was found to be activating CD4, CD8 α , CD19, CD25, CD28, CD69, CD44. Later on, the same immunogen was also tested via different routes of immunization, such as intra-peritoneal (IP) and intra-nasal (IN). IP and IN routes were found to provide much greater protection than the oral route. Also, they required less amount of immunogen which lessens the chance of reactogenicity. The diversity of the genera *Salmonella* provides a lot of diversification in their way of infection. They can cause from mild gastroenteritis to severe forms of diarrhea to enteric fever. Without a single licensed vaccine against the NTS strains, it is quite difficult now a day for developing countries and travelers. Keeping this in mind, the same bivalent typhoidal OMV immunogen was used to see the efficacy in NTS mice models. Since systemic Typhimurium infection follows the same course of infection in mice as the Typhi does in humans, more than one model was used to assess the immunogen's true efficacy in mice. Namely, oral streptomycin model is specific for NTS infection which causes gastroenteritis in mice just as they do in humans. While two dose intervention provides moderate immune response in mice, three dose intervention provides significant protection than the control group of mice. Anti-OMV polyclonal mice serum was found to be immunogenic in western blot assays. Both NTS and TS starts off with similar infection pathways. Similarities in the immune response generation and natural infection pathways converge and provide the desirable protection in both NTS and TS clinical infections in mice.

Effect of acid on isolated typhoidal OMVs



Comparison of immunogenicity and protective efficacy via different routes of immunization



Comparison of protective efficacy via different routes of immunization

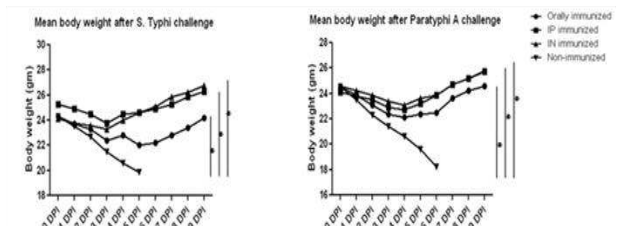
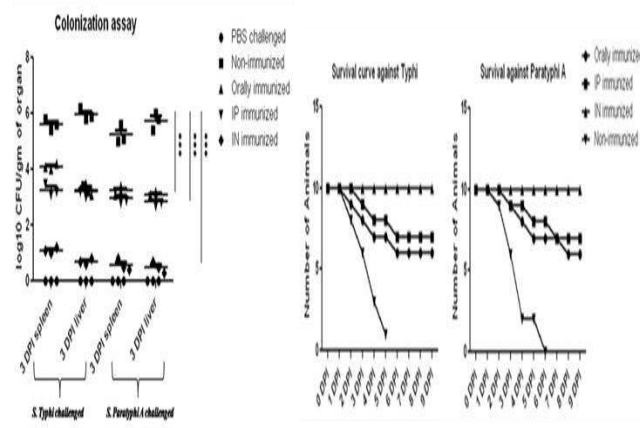


Fig. Change in body weight after challenge with *S. Typhi* and *S. Paratyphi A*.



| Time points | Orally immunized | IP immunized | IN immunized | Non-immunized control | PBS control |
|-------------|------------------|--------------|--------------|-----------------------|-------------|
| 0 DPI | - | - | - | - | - |
| 1 DPI | - | - | - | - | - |
| 2 DPI | - | - | - | - | - |
| 3 DPI | - | - | - | - | - |
| 26 DPI | - | - | - | - | - |
| 27 DPI | - | - | - | - | - |
| 28 DPI | - | - | - | - | - |

Fig. Piloerection (if any) observed and noted pre-, during and post-immunization.

| Time points | Orally immunized | IP immunized | IN immunized | Non-immunized control | PBS control |
|-------------|------------------|--------------|--------------|-----------------------|-------------|
| 0 DPI | - | - | - | - | - |
| 1 DPI | + | + | + | ++ | - |
| 2 DPI | ++ | ++ | + | +++ | - |
| 3 DPI | +++ | + | - | +++ | - |
| 4 DPI | +++ | + | - | +++ | - |
| 5 DPI | ++ | + | - | +++ | - |

Fig. Piloerection (if any) observed and noted pre- and post-infection.

Fig 12: Typhoidal OMVs were found to be sensitive to acidic environment. As a result, IP and IN routes were also assessed. Immunity was assessed via ELISA where serum and secretory immunoglobulins were found to be present. FACS analysis showed upregulation of CD25, CD28 etc among other surface markers. Protective efficacy was checked and IP and IN routes were found to be much more protective in response to challenge with clinical isolates.

Awards/Honours received

- Bill and Melinda Gates travel award to attend U.S.-Japan Cooperative Medical Sciences Program (USJCMSP) 21st International Conference on Emerging Infectious Diseases in the Pacific Rim, February 26-March 1, 2019.
- PENSA travel award to attend 19th Congress of The Parenteral and Enteral Nutrition Society of Asia: PENSA, 13-16th June, 2018.Seoul, South Korea.

List of patent(s) filed/accepted /Technology developed

- Dr. Hemanta Koley, Dr. Sengupta and Dr. Shanta Dutta have recently filed a patent on “Fortified Soy-Yogurt Composition for Anti-Hypercholesterolemic Effect” and the said patent application has been filed on May 20, 2019, with application number 201911019853.
- Dr. Hemanta Koley, Mr. Debaki Ranjan Howlader, Dr. Shanta Dutta. A Bivalent Outer Membrane Vesicles (BOMVs) based vaccine against typhoidal salmonellae. Publication number: 201711011707. PCT number: PCT/IN2018/050158. Date of publication: 05.10.2018.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- **Debaki R Howlader**, Hemanta Koley*, Ushasi Bhaumik. A new zebrafish model for Shigella pathogenesis, transmission, vaccine efficacy and therapeutic studies. 19thCongress of The Parenteral and Enteral Nutrition Society of Asia: PENSA, 13-16th June, 2018.Seoul, South Korea.
- Poster Presentation: Trivalent Outer Membrane Vesicles – A Prophylactic Approach and Gut Immune-Modulation Study Against Shigellosis. **Ushasi Bhaumik**, Debaki Ranjan Howlader, Hemanta Koley. 19th Congress of PENSA (Parenteral and Enteral Nutrition Society of Asia).June 13th to 16th, 2018, Seoul, South Korea.
- Research paper presented on Oral presentation session entitled “Hypocholesterolemic Effect of Soy Yogurt Fortified with Bitter Gourd Seed Oil Rich in 9cis, 11trans, 13trans-conjugated Linolenic Acid (CLnA) in Swiss Albino Mice" by Samadrita Sengupta*, Hemanta Koley and Shanta Dutta in 19th Congress of Parenteral and Enteral Nutrition Society of Asia (PENSA 2018), in conjunction with the 17th Annual Congress of the Korean Society for Parenteral and Enteral Nutrition (KSPEN), Grand Walkerhill Hotel, Seoul, Korea on June 13 to 16, 2018.
- **Debaki R Howlader**, Hemanta Koley, Shanta Dutta. Mechanism of protection of a newly developed typhoidal *Salmonella* OMVs immunogen in direct and passive mice model. 106th Indian Science Congress, Jalandhar 2019.
- **Debaki Howlader**, Hemanta Koley*. Typhoidal bivalent Outer Membrane Vesicles (OMVs) induce protective immune response in mice. USJCMSP, 2019, Hanoi, Vietnam.
- Poster presented “*Development of newly formulated OMVs based vaccine against NTS infection in chickens.*” By **Suhrid Maiti**, Vivek Mandal, Sounak Sarkar, Debaki Ranjan Howlader, Asish Mukhopadhyay, Shanta Dutta, Hemanta Koley. In United States – Japan Cooperative Medical Sciences Priogram 21st International Conference on Emerging Infectious Diseases in the Pacific Rim 26th February – 1st March 2019 Hanoi, Vietnam.
- Poster presented on “Development of a newly formulated Outer Membrane Vesicle based vaccine against NTS infection in chickens.” By **Suhrid Maiti**, Vivek Mandal, Sounak Sarkar,

Debaki Ranjan Howlader, Asish Mukhopadhyay, Shanta Dutta, Hemanta Koley, in 106th Indian Science Congress, 3rd- 7th January, 2019, Jalandhar, India.

- Poster Presentation: Immunomodulation by Tetravalent Outer Membrane Vesicles based Immunogen of *Shigella*. **Ushasi Bhaumik**, Soma Mitra, Debaki Ranjan Howlader, Jiro Mitobe, Shanta Dutta, Hemanta Koley. U.S.-Japan Cooperative Medical Sciences Program (USJCMSP) 21st International Conference on Emerging Infectious Diseases In The Pacific Rim. 26th January -1st March, 2019, Hanoi, Vietnam.
- Poster Presentation: Immunomodulatory Roles of *Shigella* Tetravalent Outer Membrane Vesicles against shigellosis. **Ushasi Bhaumik**, Debaki Ranjan Howlader, Suhrid Maiti, Shanta Dutta, Hemanta Koley. 106th Indian Science Congress, 3-7th January, 2019, Jalandhar, India.
- Research paper presented on Oral presentation session entitled “Studies on hypocholesterolemic effect of functional soy yogurt in Balb/c mice” by Samadrita Sengupta*, Hemanta Koley and Shanta Dutta in 106th Indian science Congress held at Lovely Professional University, Phagwara, Jalandhar from January 3 to 7, 2019.

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellow:

Dr. Sanjukta Kar, ICMR

Pre-Doctoral Fellow:

Ms. Priyadarshini Mukherjee, SRF-UGC-CSIR

Mr. Debaki Ranjan Howlader, SRF-CSIR

Ms. Ushasi Bhaumik, SRF-DST

Mr. Suhrid Maiti, SRF-ICMR

Mr. Sounak Sarkar, SRF-AYUS

Mr. Vivek Mondal, SRF-CSIR

Mr. Prolay Halder, JRF-ICMR

Studies on *Vibrio cholerae* adherence and survival in gut and environment

Vibrio cholerae O1, a cause of epidemic diarrheal diseases, normally resides in aquatic environment associated with the chitinous exoskeletons of zooplankton and utilizes chitin as the sole nutrient source by chitin utilization pathway. Our studies are directed towards the understanding of this chitin utilization pathway of *V. cholerae* in environmental survival, horizontal gene transfer and pathogenesis. In recent years, there has been evolution of antibiotic-resistant strains of *V. cholerae*. Novel antibacterials are, therefore, needed to address growing problem of bacterial resistance to conventional antibiotics. Essential oils possess important volatile compounds with diverse bioactivities including antimicrobial potential. In this study, we have analyzed the role of carvacrol, a naturally occurring essential oil fraction of Oregano (*Origanum vulgare*) on *V. cholerae* pathogenesis. Our study showed minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of carvacrol on *V. cholerae* growth was 150 µg/ml (Figure 13). *V. cholerae* motility through mucin was 9-fold less defective than the untreated control in presence of carvacrol. Adhesion to HT-29 intestinal cell line was reduced significantly at one-fourth MIC of carvacrol. Quantitative RT-PCR assay revealed that this essential oil down-regulated the transcription of *tcpA*, *toxT* and *ctxB* genes at one-fourth MIC. At one-eighth MIC, carvacrol completely inhibited the formation of biofilm. These results suggested that carvacrol might act as potent inhibitor of virulence, adhesion and motility, which ultimately reduces the pathogenicity of *V. cholerae*. It is important to explore in future the possibility to utilize this essential oil effectively as an alternative to antibiotic to treat cholera.

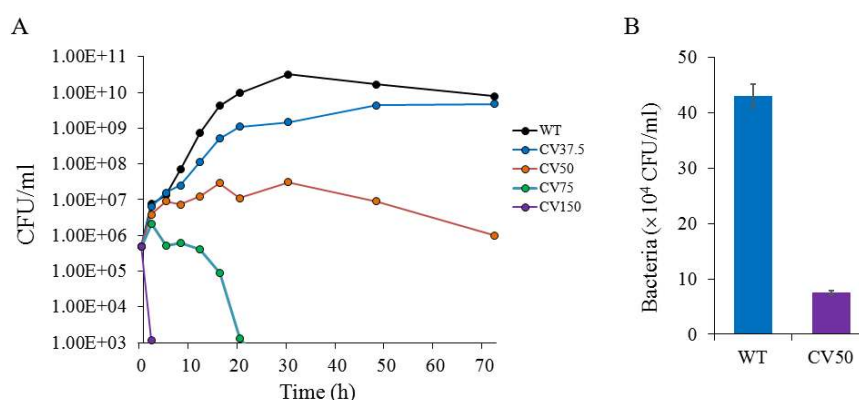


Fig 13: Effect of Carvacrol on growth and mucin penetrating ability of *V. cholerae*

Molecular characterization of Enterotoxigenic *Escherichia coli* colonization factors

Enterotoxigenic *Escherichia coli* (ETEC) infection is the leading cause of infantile diarrhea in developing countries and an important etiologic agent for traveler's diarrhea. ETEC can colonize in human and other hosts in order to cause pathogenesis. Colonization factors (CF) play the important role

in initiating the disease and had been the major vaccine targets. During this period of investigation, we aim to understand the regulation of CS6, a prevalent colonization factor of ETEC. We tested different host factors to understand the modulation of CS6 expression. We tested the effect of crude bile did not have effect on CS6 expression, but sodium chenodeoxycholate (NaCDC), an individual component of bile caused upregulation. The expression of CS6 was upregulated by 38-fold at 0.1 % NaCDC concentration (Fig 14A). Iron is an essential nutrient for almost all organisms. Bacteria also take advantage of low-iron conditions to sense the intestinal environment and to trigger expression of virulence genes which is evident from the 5-fold increased expression of CS6 at 0.2mM of iron concentration with respect to low iron (0.025mM) (Fig 14 B). CS6 was more expressed at acidic pH, 0.171 osmol/l NaCl and at 37°C. At higher temperature, the expression of CS6 decreased significantly. From our experiment, it can be observed that CS6 expression is stimulated in response to conditions similar to those in the intestinal environment to initiate pathogenesis. Understanding of the regulation of colonization factor CS6 generates important information that can be exploited towards developing methods of controlling infection

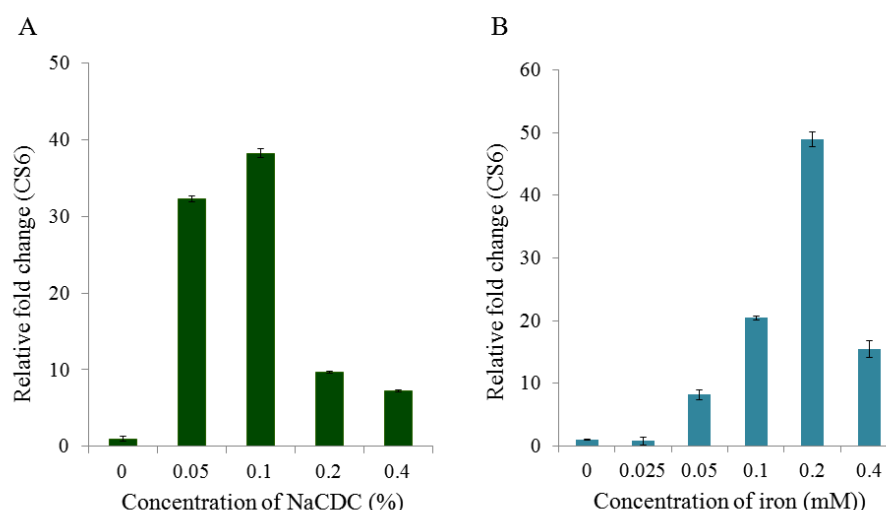


Fig 14: CS6 expression in presence of NaCDC (A) and iron (B).

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Two half-day Biosafety Training was organized by ICMR-NICED for 2nd Year M. Pharm students of the Division of Microbiology & Biotechnology, Dept. of Pharmaceutical Technology, Jadavpur University, Kolkata on 6th April, 2018 and 29th March 2019. The first training was given by Drs. N. S. Chatterjee and M. Chawla-Sarkar. Drs. N. S. Chatterjee, A.K. Mukhopadhyay and M. Chawla-Sarkar acted as the resource persons for the second one. The students were given lectures on basic Bioethics, Biohazard and Biosafety Levels,

followed by hands-on exposure in Biosafety Level 2 laboratories. Eighteen students attended the training for both the program.

Ph D Awarded:

Dr. Rhishita Chourashi received Ph D. from the University of Calcutta

Title of the thesis: “Studies on regulation of a two-component *Vibrio cholerae* sensor histidine kinase ChiS: role in chitin utilization and pathogenesis”

Date of Award: 24th August, 2018

Pre-Doctoral Fellow:

Mr. Debjyoti Bhakat, SRF-ICMR

Mr. Suman Das, SRF-ICMR

Mr. Indranil Mondal, JRF-DBT Project

S. Bhattacharya (Principal Investigator), Biochemistry Division

Therapeutic inhibition of *Shigella flexneri* host pathogen interaction by a herbal Compound

Infectious diseases like shigellosis causing dysentery are a major threat to human health. The impact of shigellosis is more severe in the developing countries and in cases of children under 5 year old. The causative organism for shigellosis is *Shigella* an intracellular, multidrug resistant bacteria. *Shigella* infection is characterised by painful abdominal cramps, along with blood and mucus in the stool. *Shigella* reorients the host defence machinery during pathogenesis. As host directed therapy is an emerging approach for multidrug resistant microbes, intervention with host cell factors during *Shigella* infection may be an effective therapeutic. It is noteworthy that among various host cell factors autophagy mechanism is associated with bacterial clearance and also regulates various pathophysiological conditions. Pharmacological modulation of autophagy is a new approach which provides an opportunity for exploration in infectious diseases. There are a group of herbal drugs which are acting as autophagy modulators. We have identified a herbal compound known as capsaicin which can act as autophagy inducer to combat *Shigella flexneri* host pathogen interaction. This herbal compound can exert antimicrobial activity via autophagy and in doing so it may overcome pre-existing mechanisms of resistance. Capsaicin induces autophagy in intestinal epithelial cells by augmenting different autophagic genes. We have observed that capsaicin also inhibits intracellular *S flexneri* growth in intestinal epithelial cells using similar concentration that induces autophagic genes. This study will help us to develop a new therapeutic approach in combating *S flexneri* pathogenesis and also address antimicrobial resistance.

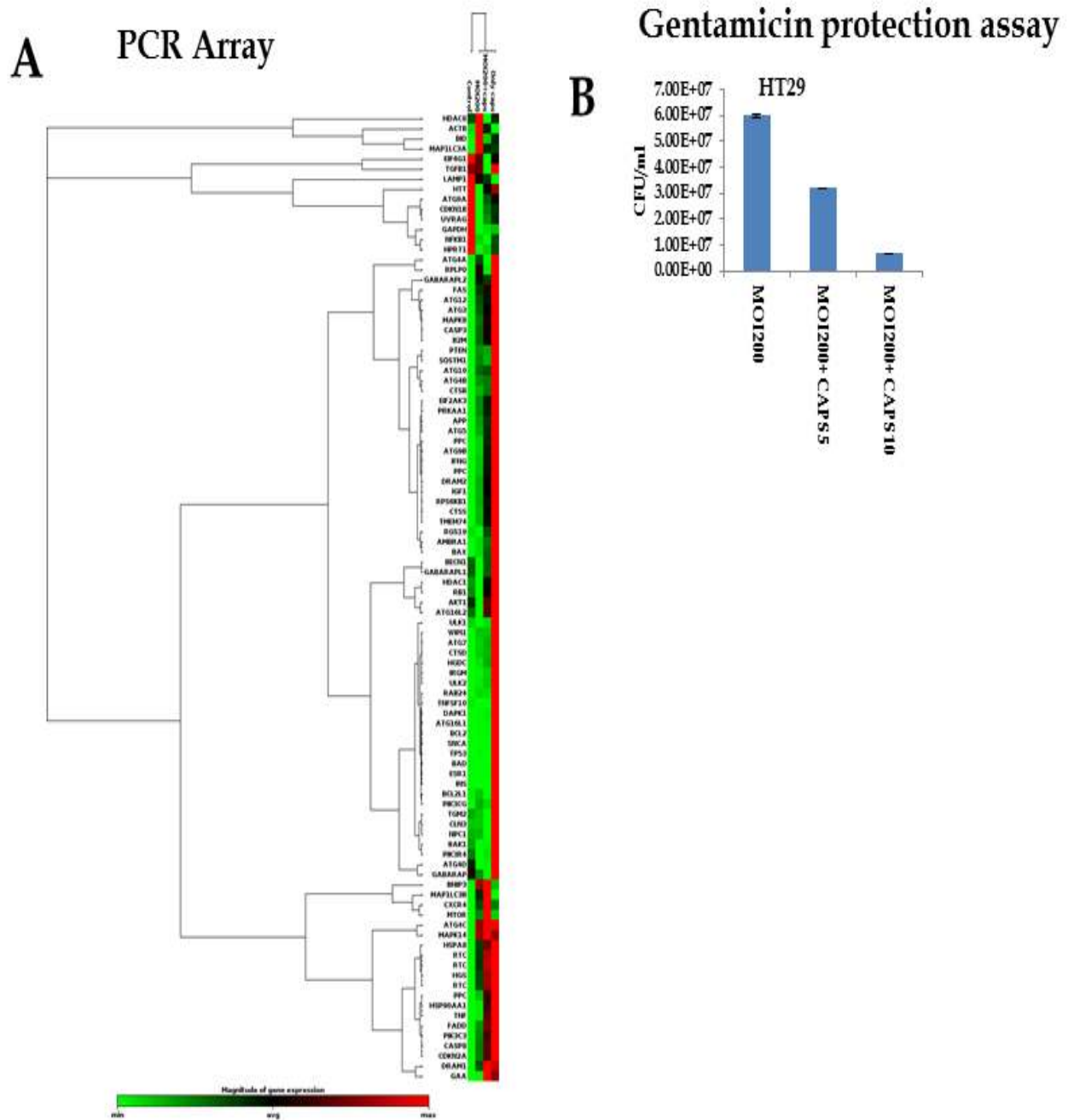


Fig 15: Capsaicin (Caps) induces autophagic genes in *Shigella flexneri* infected intestinal epithelial cells HT29 and inhibits intracellular *S flexneri* growth (A) PCR array shows multiple autophagic genes upregulated in infected cells by Caps (5 µg/ml). (B) Caps inhibits intracellular *S flexneri* growth at different doses (5, 10 µg/ml) by gentamicin protection assay

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Participated in a workshop known as UK INDIA Newton Bhabha Researcher Link workshop organized at the School of Natural Product Studies, Jadavpur University Kolkata during September 4-7, 2018. Title: Therapeutic inhibition of *Shigella flexneri* host pathogen interaction by a herbal compound

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellow:

Dr. Kalyani Saha, PDF-ICMR

Pre-Doctoral Fellow:

Ms Priyanka Basak, JRF-DBT

Ms Uzma Khan, JRF-CSIR

S. Basak (Principal Investigator), Bioinformatics Division

Analysis of amino acid usage profile of envelope gene sequences of Dengue virus genome.

Dengue is a vector-borne disease that is a major public health threat globally and caused by the dengue virus. Molecular studies using the envelope genes indicate a dramatic increase in genetic diversity within serotypes at the onset of widespread human transmission. How such diversity impacts virulence remains unanswered.

We performed relative amino acid usage based correspondence analysis of the envelope genes separately for each serotype to address probable variations in their amino acid usage patterns. Correspondence analysis generated two clusters for each of the four serotypes along the horizontal axis. Figure 16 depicts the distribution of envelope genes along the horizontal axis for one serotype. Other serotypes also represent similar pattern of distribution of envelope genes based on amino acid usage pattern. In Figure 16, one cluster comprises of data points representing envelope genes isolated from Asia (blue dots) and the other cluster comprises of data points representing envelope genes isolated from North America (yellow dots) and South America (green dots).

We calculated average evolutionary rate through Ka and Ks for both the clusters separately for each serotype. The ratio of the number of nonsynonymous substitutions per non-synonymous site (Ka), in a given period of time, to the number of synonymous substitutions per synonymous site (Ks), in the same period measures the relative rates of synonymous and nonsynonymous substitutions. Observed variation of Ka and Ks is not uniform for all the serotypes. We noted that selective constraint influences the pattern of amino acid usage differently for different serotypes of dengue virus genome.

The molecular evolution analyses based on viral genomic sequences may provide valuable insights into dengue virus evolutionary history and epidemiology.

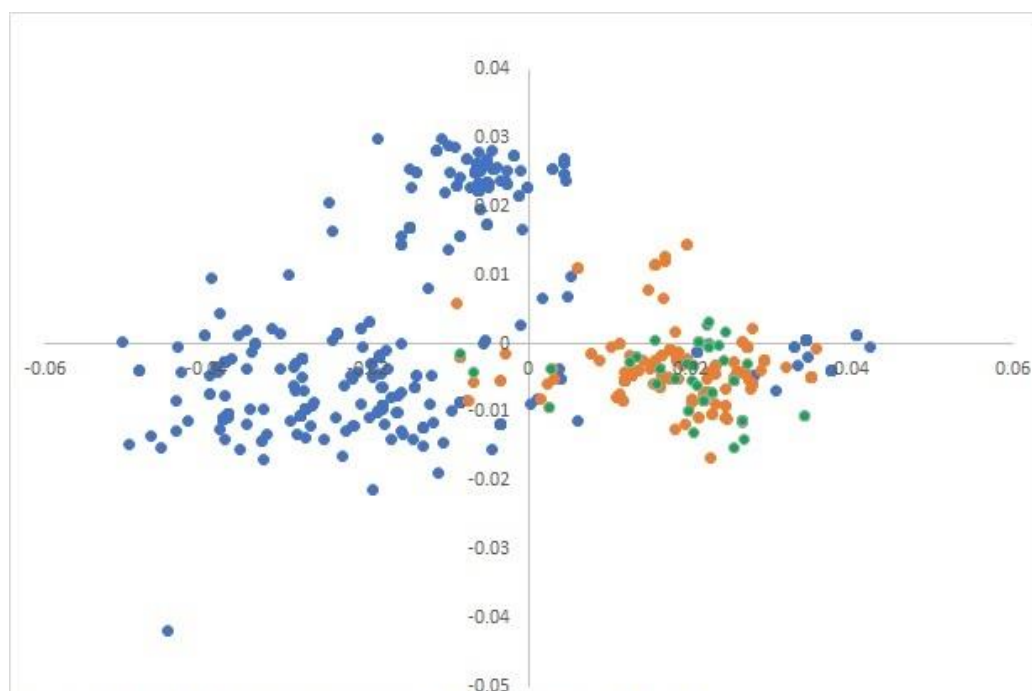


Fig 16: Distribution of envelope gene based on amino acid usage

Characterization of Stringent Response in *Salmonella enterica* serovar Typhi and elucidation of its role in pathogenesis

To combat various environmental stress, bacteria have evolved a global adaptive response called stringent response (SR), which is typically characterized by altering the bacterial transcriptome. SR is mediated by GTP- and GDP-derived small molecules, collectively called (p)ppGpp and their metabolism is governed by two canonical enzymes, RelA and SpoT. Being an intestinal as well as intracellular pathogen, it appears likely that *Salmonella enterica* serovar Typhi (*S. Typhi*) faces a plethora of adverse nutritional and physico-chemical stresses in order to establish a successful infection. However, how *S. Typhi* survives multiple stressful microenvironments inside the gastrointestinal tract and within the macrophages remains poorly understood. In our laboratory, we had previously shown that *S. Typhi* has a bona-fide (p)ppGpp mediated SR system and that several virulence-associated traits as well as pathogenicity of *S. Typhi* Ty2 strain are regulated by (p)ppGpp. In iron overloaded mouse model of infection, engineered (p)ppGpp⁰ *S. Typhi* (Ty2ΔRelAΔSpoT) showed minimal systemic infection as opposed to the wild type bacteria (Figure 17). *In vitro* experiments revealed modest impairment of cell adhesion, but markedly reduced invasion into the intestinal epithelial cells by Ty2ΔRelAΔSpoT strain, and significantly attenuated survival of bacteria within macrophages (Figure 18). During this study, we observed that global transcriptional changes of several metabolic regulators in (p)ppGpp⁰ *S. Typhi*, which otherwise share an inter-dependent or overlapping regulation, may be attributed to the above findings. We propose a working model for (p)ppGpp-dependent gene expression in *S. Typhi* (Figure 18). This is the first study that concluded that (p)ppGpp is essential for determining optimal pathogenic fitness of *S. Typhi*.

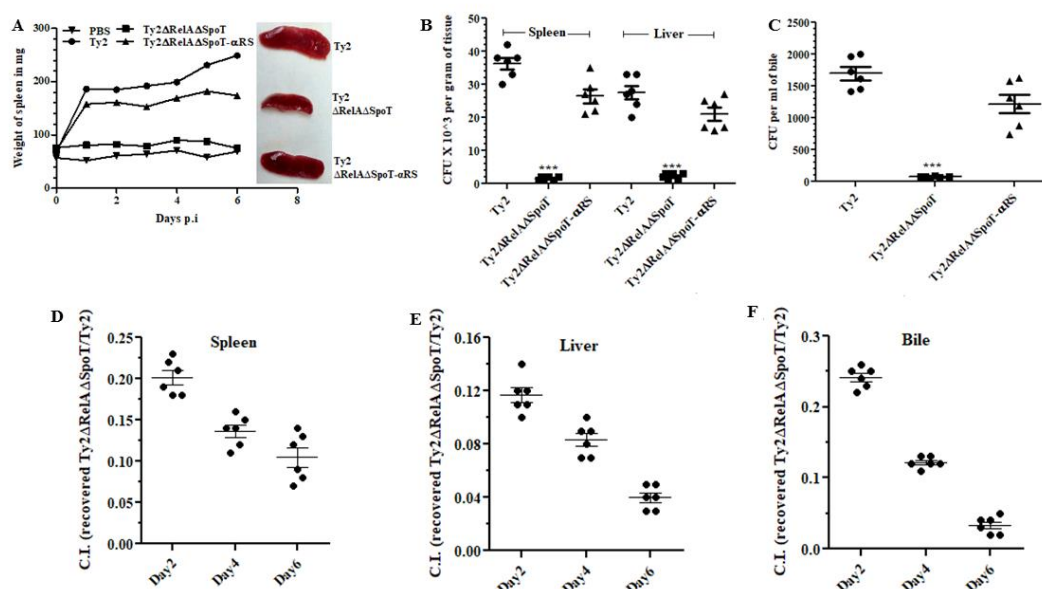


Fig 17: (p)ppGpp is critical for *S. Typhi* pathogenesis in mice. A. Weights of spleens collected at autopsy from BALB/c mice (n=7) infected with 10xLD₅₀ dose of *S. Typhi* Ty2 strains. Each dot represents one mouse. B, C. Scatter plot showing bacterial recovery 2 days post-infection with sublethal dose (5 x 10⁵ CFU) of the indicated *S. Typhi* strains. Horizontal bars indicate mean CFU. D-E. Competitive index assay (C. I.). CFU ratios of recovered bacteria after infection with premixed (1:1) bacterial strains. Horizontal bars represent the mean ratios.

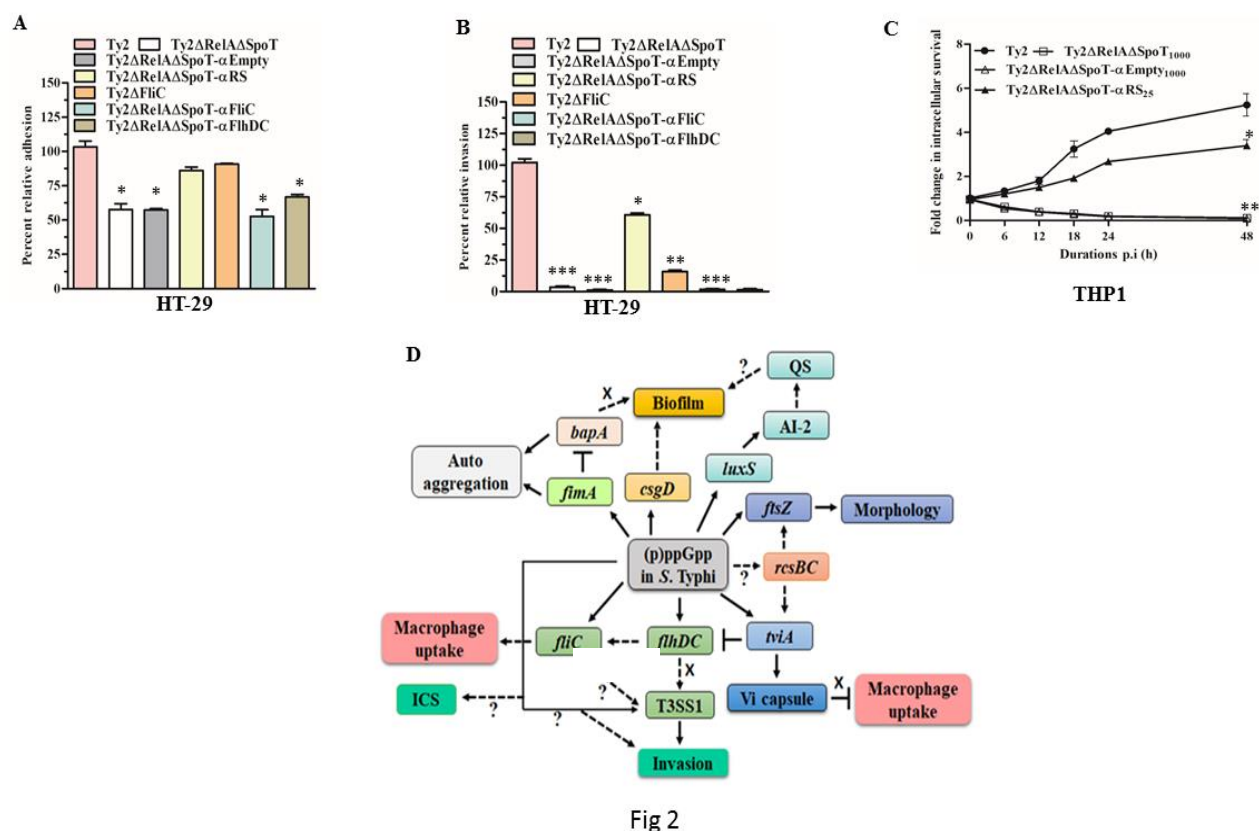


Fig 18: (p)ppGpp is required for host cell invasion and intracellular survival of *S. Typhi* *in vitro*.

A. HT-29 cell monolayer adhesion of *S. Typhi* strains taking invasion by wild type bacteria as 100%. B. Intracellular *S. Typhi* recovered after gentamycin protection assay and plotted as percentages of invasion by WT strain Ty2. C. Intracellular survival of *S. Typhi* strains in THP-1 cells (MOI indicated in the suffix after the strain name) at the indicated time points after infection and plotted as fold changes relative to the CFU of the same strain at 0 time point (30 min of infection, followed by gentamycin treatment for 1 hour). Significance of fold changes calculated at 48 h time point. Statistical significance was calculated using one-way ANOVA and Dunnett's multiple-comparison test. D. Probable mechanisms of (p)ppGpp-mediated regulation of metabolic pathways in *S. Typhi*. Black continuous and dotted arrows indicate direct and indirect upregulation by (p)ppGpp, respectively, T-bars represent repression, "X" indicates possible elimination of (p)ppGpp dependent regulation of the specific pathway in *S. Typhi*, considering phenotypes observed in (p)ppGpp⁰ strain, "?" indicates yet unsolved regulation, warranting further investigations.

Awards/Honours received

Nominated as a member of the Undergraduate Board of Studies (BOS) of the Department of Microbiology, Ramkrishna Mission Vidyamandira, Belur.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- 53rd US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections held at Hanoi, Vietnam during February 26 to March 2, 2019.

PhD Awarded:

Dr. Pujarini Dutta received PhD award from University of Calcutta

Title of the thesis: A study on the regulation of innate immune responses at the intestinal mucosal epithelium by commensal and pathogenic microorganisms and its role in intestinal homeostasis

Date of Award: 7th January, 2019

Dr. Sayan Das received PhD award from University of Calcutta

Title of the thesis: Deciphering the *Salmonella*-Host Interaction and Devising Strategies to Prevent Infections

Date of Award: 7th January, 2019

Dr. Rimi Chowdhury received PhD award from University of Calcutta

Title of the thesis: Multiplicity of Invasion Mechanisms of *Salmonella*

Date of Award: 7th January, 2019

Dr. Rahul Shubhra Mandal received PhD award from University of Calcutta

Title of the thesis: Identification of novel bacterial virulence factors and its inhibitors using *in-silico* approaches

Date of Award: 7th January, 2019

Post and Pre-Doctoral Fellows

Post-Doctoral Fellow:

Dr Shreya Dasgupta, PDF-ICMR

Pre-Doctoral Fellow:

Ms. Suparna Chakraborty, JRF-DST Inspire

Mr. Ranjan Kumar Barman, SRF-ICMR

Ms. Pujarini Dutta, SRF

Mr. Sayan Das, SRF

Ms. Rimi Chowdhury, SRF-OUP

Mr. Rahul Shubhra Mandal, Scientist II ICMR BIC Phase II

A. Sinha (Principal Investigator), Clinical Division

Medical Comorbidity, Drug Use and Medication Management Perspective among the Geriatric Population: A study from a urban community of Kolkata

In this project the geriatric population in a urban community is assessed for the medical comorbidity, their medication use so that we can find the inappropriate /redundant medications and design interventions to act this directions

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Was part NIH workshop on Clinical Trials in Hyderabad on April 2018
- Was India s representative and presented paper in Water & Sanitation Conference, Istambul in June 2018
- Chaired session in National Conference of Indian Public Health Association in Kakinada on 31jan to 3 rd February, 2019
- Acted as Chief Quiz Master in West Bengal State conference of Indian Association of Preventive & Social Medicine in March 2019

M. Dutta (Principal Investigator), Electron Microscopy

Isolation and Characterization of a Shigella Phage

A bacteriophage was isolated from lake/pond water from an area of Kolkata after a sudden outbreak of enteric disease. The phage showed infectivity to most of the shigella species except *Shigella boydii*. Physicochemical characterization including host range, one step growth curve, temperature, UV and pH sensitivity of the isolated Shigella phage were done. Morphology was checked by negative staining transmission electron microscopy and the phage was found to belong to the Myoviridae family characterized by long contractile tail structure. Phage attachment to host bacteria with contracted tail (to transfer genome) was observed by negative staining and intracellular progeny phages were also located clearly in ultrathin sections of Shigella bacteria. Further experiments using cryo-electron microscopy are under planning.

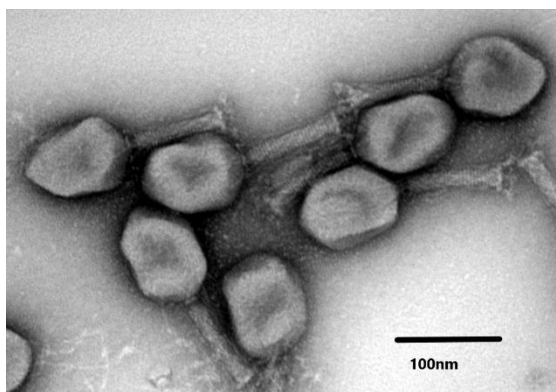


Fig 19: Negatively stained long-tailed shigella phage particles.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Attended International Conference on Microscopy & XXXIX Annual Meeting of EMSI, July 18–20, 2018 at Mayfair Convention Centre, Bhubaneswar, India as an **Invited Speaker** and the title of the presentation was “In situ Structure Determination of Biomolecules by Cryo-electron Tomography and Sub-tomogram Averaging”.
- Attended the first Regional Young Investigators’ Meeting-Kolkata at Presidency University, Kolkata held on 5th-6th February, 2019 as an Attendee.

Pre-Doctoral Fellow:

Ms. Bani Mallick, JRF-UGC

The Interplay of Climate and Non-Climate Factors in Determining the Risks and Predicting Outbreaks of Waterborne Diseases

Climate change can have adverse effects on ecosystems, overall well-being of the biosphere and human health, resulting in large number of morbidities in less developed countries where a complex relationship exists between climate change and water quality resulting in waterborne diseases. Our study titled "The Interplay of Climate and Non-Climate Factors in Determining the Risks and Predicting Outbreaks of Waterborne Diseases" aims to establish the relationship between climate change and diarrheal disease with a secondary attempt to develop an early warning system for diarrheal outbreaks. The study setting comprises of 26 villages in two rural panchayats in coastal Sundarbans area, where an ongoing diarrheal disease surveillance in this population of ~37,000 so far has detected ~1000 cases, which will be correlated with seasonal water quality data from the locality. Along with retrospective climate, disease (IDSP) and water quality data, it will help us to understand whether, how and to what extent the climatic and non-climatic factors regulate the preponderance of enteropathogens and their interrelation with diarrhoeal disease dynamics. Seasonal studies of water systems in Canning and Mathurapur revealed significant physico-chemical and bacteriological variations. The bacteriological preponderance was very high in summer than in winter at both the sites and was largely influenced by temperature and salinity. Bacterial load of River samples was higher than the potable water samples. Temperature and turbidity were found to be directly proportional to the bacterial load. Species level identification reveals *V. cholerae* to be the most dominant *Vibrio* in both the sites, followed by *V. alginolyticus* and *V. parahaemolyticus* along with high preponderance of *E. coli* in the potable water samples. Our preliminary results disclosed thus far that both the sites are highly vulnerable to enteropathogenic diseases caused by bacteriological entities in potable water.

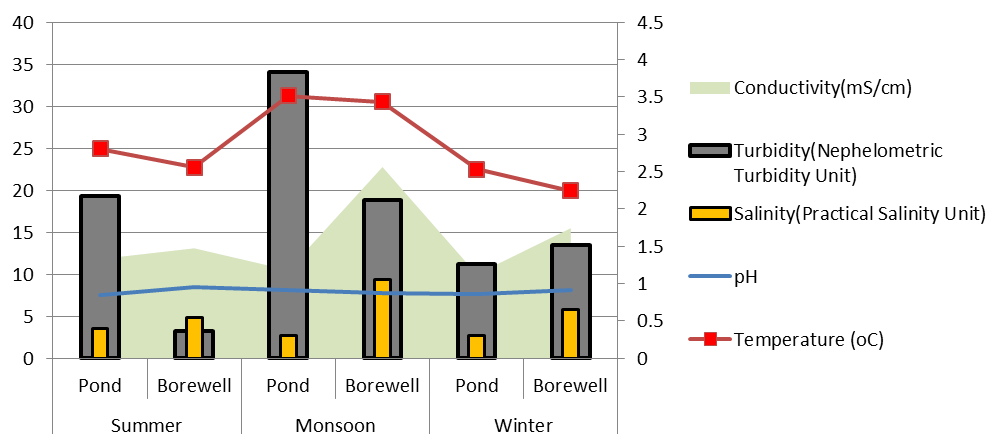


Fig 20: Physico-chemical analysis of Mathurapur (S.24 Pargana)

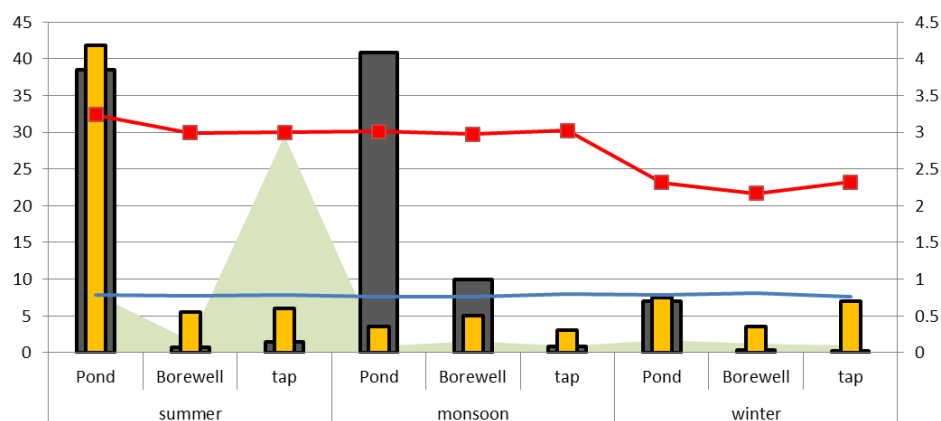


Fig 21: Physico-chemical analysis of Canning (S.24 Pargana)

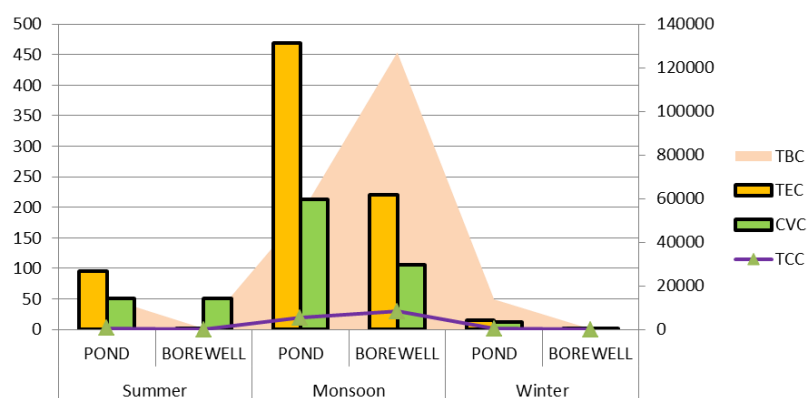


Fig 22: Seasonal variation of Bacteriological attributes in Mathurapur

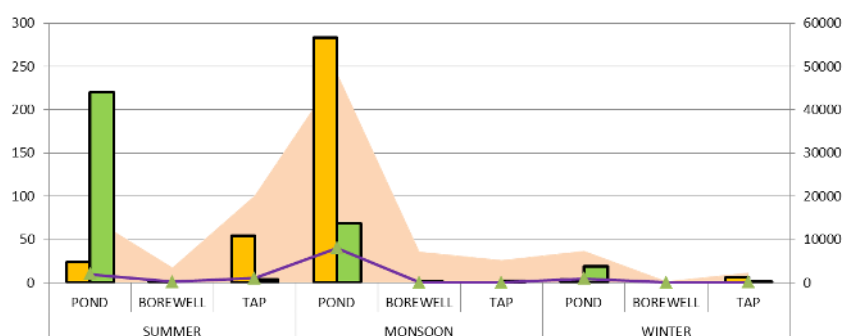


Fig 23: Seasonal variation of Bacteriological attributes in Canning

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Participated in the second meeting on “Integration of Climate Data with Health Information Systems of Climate Sensitive Diseases” held at NCDC, New Delhi on February 7, 2019.

- Participated as a faculty in a one-day workshop on Research Methodology for pediatricians, post-graduate students of pediatrics and doctoral students, held at ICMR-NICED on December 5, 2018.
- Attended the 25th SAG Meeting of ECD Division of ICMR Hq held at ICMR Hq, New Delhi during December 1-2, 2018.
- Attended the workshop on “Infectious Disease Modeling” organized by ICMR-NIE at Chennai during November 12-15, 2018.
- Attended the meeting of the Technical Resource Group (TRG) on HIV Surveillance and Estimation held at NACO, New Delhi on October 30, 2018.
- Participated in a meeting as a National Working Group Member for District Level HIV Estimation held at ICMR-NIMS, New Delhi on August 14, 2018.
- Participated as a guest speaker in the National Level Workshop on Infectious Disease Modeling held at IPGME&R, Kolkata during July 6-8, 2018.
- Participated as a faculty in the 3rd Hands-On Training Workshop on laboratory Diagnosis of Emerging Viral Diseases, organized by Regional VRDL at ICMR-NICED during June 28-29, 2018.

S. Kanungo, (Co-Principal Investigator), Division of Epidemiology and Data Management

National Surveillance System for Enteric Fever in India (Tier-1)

The study is designed to estimate the burden of culture confirmed typhoid fever in the community and to describe the incidence of acute febrile illness and its associated treatment practices in the community. The study had been initiated in Urban/semi urban populations in four states in various locations of India (Tamil Nadu, Maharashtra, Delhi and West Bengal). Each site had enrolled minimum of 6000 children and follow them up for 24 months. In Kolkata, the study is conducted in Wards 58 and 59 of Kolkata Municipal Corporation area. Through a combination of weekly fever surveillance and self-reporting of febrile episodes by the primary care givers to the Community health workers, fever cases are identified. Any febrile episode meeting the criteria for suspected typhoid fever (a fever of three or more consecutive days) are encouraged to report at the fields clinic where study physician evaluates and draw blood sample for culture as per protocol. Some medicines like antipyretic and antibiotic are provided free of costs from the clinic, as per prescription by the study physician. Data are collected through electronic data capturing system (EDSS) at the site level (Table 3).

Table 3: NSSEFI - Overall Study Status

| Events | Numbers |
|--|----------------------------------|
| Subjects enrolled between 6 months and 4 years 364 days | 2017 |
| Subjects enrolled between 5 years and 9 years 364 days | 2000 |
| Subjects enrolled between 10 years and 13 years 364 days | 2000 |
| Total number of Fever episodes identified | 9691 |
| Total number of Suspected Typhoid Fever (STF) cases identified | 2416 |
| Total number of blood culture reported | 1371 |
| S. Typhi/Paratyphi- positive | S. Typhi (53), S. Paratyphi (07) |

Indian Network of population-based Surveillance Platform for Influenza and other Respiratory viruses among Elderly (INSPIRE)

The study is designed to estimate the incidence of influenza and RSV associated acute respiratory infections (both upper and lower) in patients attending outpatient clinic and hospital among a community dwelling cohort of older adults (≥ 60 years) at four sites in India. This study also aims to identify risk factors for influenza and RSV associated ALRI, hospitalization, ICU admission and mortality, to estimate the annual cost of influenza associated acute respiratory infections and also to estimate the effect of Influenza and RSV infection on frailty and cognition among a community dwelling cohort of older adults. The surveillance is being conducted in four sites of the country –AIIMS- New Delhi, ICMR- NICED, Kolkata, NIE-Chennai and NIV-Pune

The ongoing study is in second phase – INSPIRE-II (Table 4)

Table 4: INSPIRE-II- Overall Study Status

| Events | Community | Hospital |
|---|--|---|
| Number of participants enrolled under surveillance | 1,512 | Not applicable |
| Number of participants loss to follow up due to (Death, Migration) | 146 | Not applicable |
| Number of AURI cases detected | 1031 | Not applicable |
| Number of ALRI cases detected | 99 | 47 |
| Total number of samples tested positive for influenza with type (Number, %) | Total Tested: 391 INF Positive: 34 (8.7%) INF-A: 23 (5.9%) INF-B: 11 (2.8%) | Total Tested: 44 INF-A: 06 (13.6%) INFB: 00 |
| Total number of samples tested positive for RSV (Number, %) | Tested: 92 [RSV: 2 (2%)] | Tested: 41, RSV: 0 |

Awards/Honours received:

- SKOCH Order-of-Merit 2019 Research and innovation in the control of cholera and rotaviral diarrheal diseases in Feb 2019

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Poster presentation titled “Making the Case for Programmatic Implementation of Oral Cholera Vaccine in Cholera Hotspots of India” at the 53 rd. US-Japan Cooperative Medical Sciences Program (USJCMSP) under 21 st International Conference on Emerging Infectious Diseases (EID) in the Pacific Rim, Hanoi Vietnam during February 26 to March 01, 2019
- Poster presentation titled “Water, Sanitation and Hygiene (WaSH) related practices in an enteric fever endemic urban slum area in India 11th International Conference on Typhoid and Other Invasive Salmonellosis, to be held on March 26-28, 2019 at Hanoi, Vietnam
- Delegate at the 5th Annual meeting of the Global Task Force on Cholera Control (GTFCC) and Presented Indian scenario on cholera organized by the Fondation Mérieux at the Fondation Merieux Conference Centre les Pensières, in Veyrier du Lac, France, June 13-14, 2018

F. Debnath (Principal Investigator), Epidemiology and Data Management Division

Early interruption of exclusive breast feeding: A qualitative insight towards identifying key determinants and constructs

Despite established benefits, exclusive breast feeding (EBF) rate remains poor in India. The objective of this study was to focus on the mother/family/healthcare delivery system interactions to identify the potential areas for intervention.

We collected data from 169 mother – new-born dyads born in a rural hospital during July 2017 -August 2018, on a scheduled day of week, using a semi-structured questionnaire containing open ended questions to capture the breast-feeding practices and reasons by following them up to 42 days of post – partum period.

Of the 169 recruited new-borns, 102 (60%) were put on breast feeding within one-hour of birth. The median time taken to start breast feeding was 40 minutes (IQR, 34 – 86 minutes). In total 77 (/169, 46%) infants were exclusively breast fed up to 42 days' post-partum period. All of them received colostrum. Of the mothers, 58% studied up to primary level, 91% belong to lower socio-economic stratum, 49% lived in joint family and in 36% of the families, the father of the new-born was the major earner. Lack of self-conviction about EBF among mothers; significant family members' influence on choice of feeding mode; cultural beliefs; mothers' perception of insufficient nutrition emerged as major barriers of EBF. Whereas, positive family support, repeated counselling by the health workers; prior positive experience were the facilitators for successful EBF.

From the identified factors, we conclude that family centered narrative counselling and targeting appropriate time period for that are two potential domains for intervention to ensure better infant feeding outcome.



Focus group discussion with mothers for questionnaire development



Focus group discussion with mothers, Dhaniakhali, Hooghli



Data collection for EBF & EIBF project, Dhaniakhali, Hooghli



With a study participant, Dhaniakhali, Hooghli

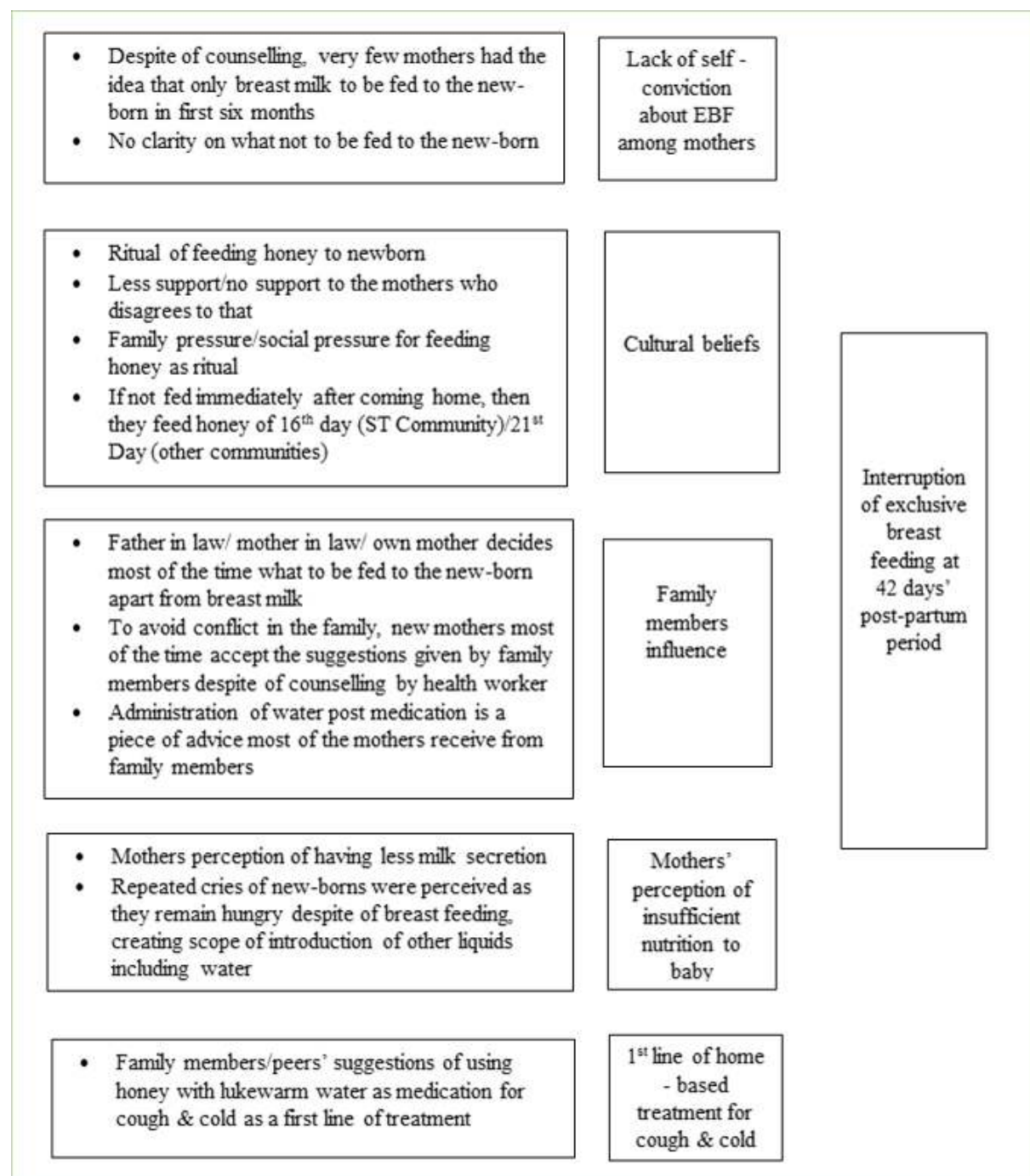


Fig 24: Reasons of interruption of exclusive breast feeding (EBF) in first few weeks of life: exploratory study of reasons for failure of EBF at 42 days' post-partum period, Hooghli, West Bengal, India, 2018 (N=169)

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Conference title: 14th International Conference on Vector and Vector Borne Diseases; 9 – 11 January, 2019; Bhubaneswar; India; organized by National academy of Vector Borne Diseases

Status of participation: Presenter (Oral)

Presentation title: Dengue the febrile scourge: Unfolding the reality of an urban agglomerate from West Bengal, India.

P. Chatterjee (Principal Investigator), Epidemiology and Data Management Division

Identifying Strategic Priority Areas for the Control of Enteric Infections in West Bengal (SPACEWeB):

The aim of the proposed study is to provide policymakers and research funding agencies with a structured understanding of the enteropathogens affecting West Bengal, and a mapping of the existing knowledge gaps and the priority research areas needed to address the prevention and control of the priority agents. Currently the study is undertaking the abstraction of data for the scoping literature review.

Identifying risk factors for enteric fever in children residing in an endemic setting: A case-control study

The aim of the study is to identify the risk factors and behavioral patterns which may predispose children residing in highly endemic areas to suffer from enteric fever. The study hypothesis is that children who have a recent history of exposure to feces contaminated sludge have a higher risk of acquiring enteric fever. The study is currently in the data collection and abstraction phase.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- At 11th International Conference on Typhoid and Other Invasive Salmonellosis Hanoi, Vietnam, March 2019, the following were presented:
 - Water, sanitation and hygiene (WASH) related practices in an enteric fever endemic slum area in India. Kanungo S, Chatterjee P, Saha J, John J, Kang G, Dutta S.
 - Cluster analysis of enteric fever cases in urban slums of Kolkata. Kanungo S, Chatterjee P, Saha J, John J, Kang G, Dutta S.
 - Lessons from deploying an active surveillance system to detect enteric fever in urban slums of Kolkata. Chatterjee P, Kanungo S, Saha J, John J, Kang G, Dutta S.
- Attended the 53rd US-Japan Cooperative Medical Sciences Program (USJCMSP) under 21st International Conference on Emerging Infectious Diseases in the Pacific Rim, in Hanoi, Vietnam, on February 2019, where the following were presented:
 - Making the Case for Programmatic Implementation of Oral Cholera Vaccine in Cholera Hotspots of India. Kanungo S, Chatterjee P, Dutta S.
 - Analyzing the Gains in the Battle Against Cholera: 1990 versus 2017. Chatterjee P, Kanungo S, Dutta S.
- At the American Society of Tropical Medicine and Hygiene's 67th Annual Meeting on October 28 - November 1, 2018, at New Orleans, Louisiana, United States of America, the following were presented:
 - SANIPATH-Typhoid and Environmental Surveillance for Typhoid: A Prototype for Large Scale Deployment in Cities in Low- and Middle-Income Countries. Kanungo S,

Dutta S, Green J, Wang Y, Wadhwa A, Chatterjee P, Raj S, Kapoor R, Ebdon J, Mukhopadhyay A, Saha J.

- Successful Application of Microbial Source Tracking using GB-124 Bacteriophage as an Indicator of Human Fecal Contamination in Environmental Samples in Kolkata, India. Wadhwa A, Dutta S, Ebdon J, Chowdhary G, Kapoor R, Wang Y, Mukhopadhyay A, Kanungo S, Chatterjee P, Moe C.

M. Bhaumik (Principal Investigator), Immunology Division

Role of short chain fatty acid in cholesterol homeostasis

The association of gut microbiota and cholesterol imbalance is of prime importance to explain enteric pathogenesis. The link between the two complex events is gradually coming into focus. The gut microbial population ferments dietary fibres to produce short chain fatty acids (SCFA) like propionate, butyrate and acetate. Reports showed SCFA like butyrate decreases hepatic cholesterol biosynthesis the mechanism of which is not very clear. We examined the status of serum cholesterol in oral treatment of butyrate in murine model. The murine liver displayed altered expression of lipid metabolic enzyme (HMGCR), which is an indirect target of miR122. Concomitant decrease in miR122 expression was observed on butyrate treatment. We evaluated the pathway, and show butyrate upregulates a RNA binding protein AUF-1 expression, which targets pre miR122 processor Dicer1 and prevents the biogenesis of miR122. Furthermore, downregulation of cholesterol synthesis causes decrease in cholesterol in cell membranes which disrupts physical properties of the membrane. The cholesterol is a central element in the interaction of pathogen with the host cell membrane. The cholesterol rich microdomains or lipid rafts are associated with microbe induced pathogenesis in the intestine. Our further research activities are focused to show SCFA disrupts lipid rafts and thus can prevent enteric pathogen invasion. Thus, the study will show a novel mechanism of cholesterol synthesis regulation by SCFA and also provides a new approach for prevention and treatment of enteric infection. Nevertheless, it is reassuring that in cases of antimicrobial resistant enteric pathogenesis, SCFA can be a viable alternative.

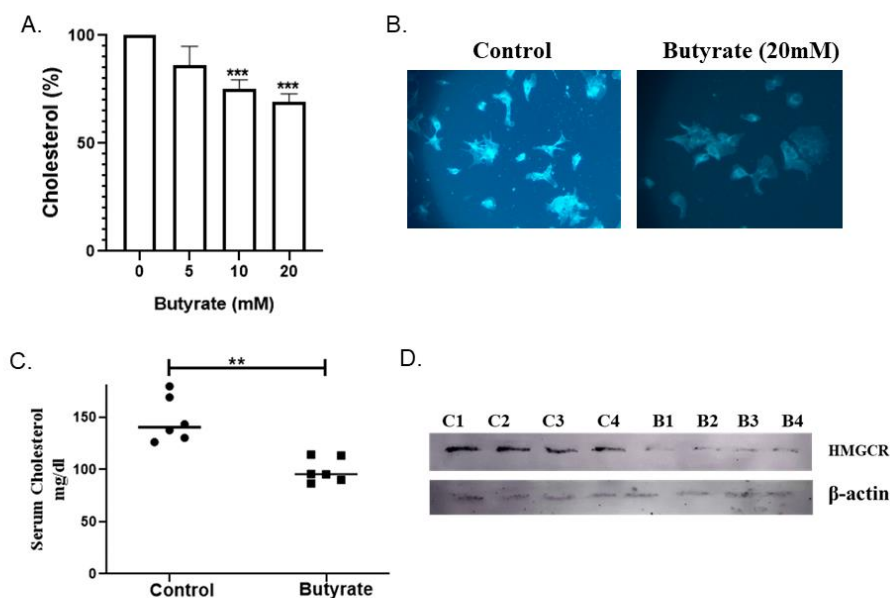


Fig 25: Butyrate treatment decreases cholesterol metabolism. A, Human liver cell line Huh7 treated with sodium butyrate shows dose dependent decrease in total cellular cholesterol, B, Huh 7 after treatment with 20mM sodium butyrate shows decrease in fillipin binding. C, BALB/c mice fed with 150mM sodium butyrate by oral gavage for 15 days show significant reduction in serum

cholesterol. D, the expression of rate limiting enzyme in cholesterol synthesis HMGCoA reductase, is reduced in the animals fed with sodium butyrate.

Prenatal arsenic exposure is associated with impaired immunity in juvenile mice.

Infectious disease is the primary cause of mortality in young children in arsenic affected areas. As arsenic is reported to cross placenta, a fetus is exposed to arsenic during its development in the uterus but its effect in the infancy remain elusive. Prenatal and postnatal periods are the critical periods for the development of immune system in infants. This study is undertaken to investigate the impact of prenatal arsenic exposure on immune function in juvenile mice that can have long-lasting pathologic consequences. BALB/c pregnant mice were exposed to environmentally relevant dose of arsenic trioxide supplemented with drinking water. The immune functions in the pups were studied in two important cell types of the immune system – the macrophages and the T cells. By setting various mixed leucocyte reactions we have shown that the T cells and not the macrophages play the critical role in immune suppression of juvenile mice exposed to arsenic *in utero*. Inadequate activation of CD4 cells is an important event occurring due to arsenic exposure, causing lowering of IL-2 production, an essential growth factor for T cells. Taken together, our findings, indicates environmentally relevant dose of arsenic exposure to the mothers during gestation causes immunosuppression in juveniles by poor CD4 T cell activation. These effects may have consequences for susceptibility to various other immune related diseases.

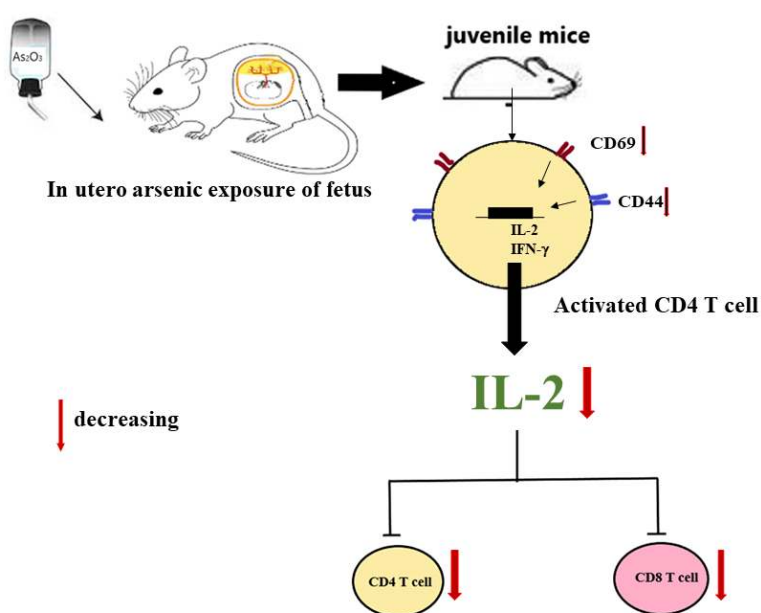


Fig 26: Schematic representation of impaired T cell activation in juvenile mice exposed to arsenic prenatally

Awards/Honours received:

- Outstanding paper award in State Science Congress (Southern region) (Dec 2018)

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- 9th India Probiotic Symposium, Amity University, Nov 2018 (Attendee)
- “Gut microbial dysbiosis and immunosuppression in early life arsenic exposure: a quest in mice model.” ICCAR, IIT Kharagpur Dec 2018 (Poster)
- “Arsenic Exposure Cause Gut Microbial Dysbiosis and Immune Modulation in Progenies: A Quest in Mice Model” State Science Congress, Dec 2018 (Oral)

Pre-Doctoral Fellow

Mr. Mainak Chakraborty, JRF-CSIR

Ms. Oishika Das, JRF-Inspire DST

S. Ganguly (Principal Investigator), Parasitology Division

State wise prevalence mapping of soil transmitted helminthes in Indian children to support health impact evaluation. A ministry of health and family welfare, Govt. of India initiative. (Eastern nodal PI). 2015-2019.

India is endemic for STH as per WHO 2013. None of the previous National or Sub-national surveys captured information on worm load. There was an urgent need for a National database for mapping of prevalence of worm infestation loads in India across all States/ UTs and accordingly adopting the WHO recommendation of either annual or bi-annual deworming rounds. Thus, Govt. of India has taken this initiative under National Health Mission for assessment of prevalence of STH in India. I have been invited by the ministry as an expert member of this core committee and we have been chosen as Eastern and north eastern nodal center for providing training for STH detection and worked in field for STH detection in school children and prevalence mapping. We have been working extensively and successfully for mapping the prevalence of STH throughout India and we have already finished STH prevalence mapping in many states as directed by ministry of health, GOI like Rajasthan, Madhya Pradesh, Uttar Pradesh, Chattisgarh, Telengana, West Bengal, Tamil Nadu, Tripura, Nagaland, Mizoram, Manipur, Meghalaya, Arunachal Pradesh, Sikkim, Assam.

Currently we have started the follow up study in different states and already finished the state of Chattisgarh and the next planned follow up studies are planned in Rajasthan, Madhya Pradesh, Bihar, Tripura and other north eastern states.

Our follow up study has confirmed that the prevalence of soil transmitted helminthes in Chattisgarh, India decreases significantly after deworming.

Identification and Molecular Characterization of Common Enteric Parasites in Kolkata, Funded by ICMR (PI) 2016-2021.

This study was carried out to generate an idea about the prevalence of common enteric parasites in diarrhoeal patients in Kolkata and adjacent area. This study addresses the above mentioned issue providing the current status of occurrence of parasitic diarrhoeal parasitic disease along with the seasonal trend of different enteric parasites. Moreover, for years, *Entamoeba moshkovskii* was considered primarily a free-living amoeba. But human infection caused by *E. moshkovskii* has been reported in recent studies in different countries such as United States, Italy, Iran, Turkey, Bangladesh, India, Australia and Brazil. So, this study has indeed an impact in scientific community as it has shown appreciably a high prevalence of *E. moshkovskii* (3.34%) in the patients.

Giardiasis is a major cause of diarrhea in both developing and developed countries. The mechanisms that contribute to pathogenicity of *G. lamblia* are not totally understood, but are clearly multifactorial and involve both parasite and the gut environment and host immune response. From the genomic data alone, the characterization of the virulence factors of local isolates would be inconceivable. Also, strategies for knocking down or knocking out genes in this parasite are much more difficult. Therefore, in order to correlate the outcome, axenisation of the local strains from diarrheal patients need to be carried out. The axenisation of the clinical isolates has already been initiated. We were successful in carrying out the axenisation process upto the stage of excystation of one of the clinical samples with one of such methods, though failed in stages afterwards.

Awards/Honours Received

- Glory of India Gold medal award has been awarded to Dr. Ganguly by Best Citizen publishing house for his outstanding performance in medical research in 2018.
- Reviewer of different peer reviewed International Journals viz. Indian Journal of Medical Research, Parasitology International, Journal of Parasitic Diseases, Epidemiology and Infection, Chemotherapy, Indian Journal of Gastroenterology etc.
- Advisory committee member of Department of Microbiology at Saint Xaviers College, Kolkata (Autonomous).
- All India Radio interviews as a resource person on different infectious diseases throughout the tenure.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- An invited lecture was delivered at CSIR one-day symposium on World Environment Day Celebration organized by the Dept. of Environmental Science, Ashutosh College on “Climate change - an Individual's responsibilities”, on June 5, 2018.
- Japan India Bilateral Meeting on the collaborative research projects on “Genetic Variations of *Entamoeba histolytica* and *Giardia lamblia*”, at National Institute of Infectious Diseases (NIID), Tokyo on July 4, 2018.
- Japan India Bilateral Meeting on the collaborative research projects on “New Chemotherapeutics against *Entamoeba histolytica*” at National Institute of Infectious Diseases (NIID), Tokyo on July 5, 2018.
- Oral and poster presentation on “Prevalence mapping of Soil Transmitted Helminthes in Eastern and North Eastern India”. 14th International Congress of Parasitology, 2018, held at Daegu, Korea from 19-24 Aug, 2018.
- Meeting for prevalence study of Kato Katz based detection of soil transmitted helminthes. “Prevalence mapping of STH in field: challenges for lab”, by DTWi and partners, 26-27 Jul, 2018, Chennai.
- Invited participation and presentation on “Different parasitic etiologies for enteric diseases”, in the CME organized by IATP (Indian Association of Tropical Parasitology) at All India Institute of Hygiene and Public Health, Kolkata, India Dec 10, 2018.
- Short term training on “*In vivo* testing of chemotherapeutics against *Giardia* in animal model” at National Institute of Infectious Diseases (NIID), Japan held during December 18th to 21st 2018.
- Invited participation and presentation in the first meeting on ICMR mission mode paragonimiasis project at ICMR- Indian Institute of Traditional Medicine, Belgaum, India on February 6-7, 2019.

Pre-Doctoral Fellow:

Ms. Rituparna Sarkar, SRF-ICMR
Mr. Sanjib Kr. Sardar, SRF-ICMR
Ms. Ajanta Ghosal, JRF-ICMR
Mr. Md. Maimoon Maruf, JRF-CSIR
Mr. Tapas Halder, JRF-CSIR

A. Pal (Principal Investigator), Pathophysiology Division

Mechanism of *Vibrio cholerae* hemagglutinin protease induced over expression of PAR1 in colon cancer cells

The role of PAR1 in tumor biology is well established and is characterized by direct correlation between its expression level and epithelial tumor growth. Activation of PAR1 can induce or inhibit apoptosis in a variety of cells depending on the dosage of its ligand. In an earlier study we have shown that *Vibrio cholerae* hemagglutinin protease (HAP) induces over expression of PAR1 and triggered the intrinsic pathway of apoptosis in breast cancer cells. In this study we have shown the molecular mechanism of over expression of PAR1 in human and mouse colon cancer cells. HAP activates PAR1 and PI-3kinase which induces phosphorylation of PKC ζ . PKC ζ activation induces phosphorylation of Sp1. Phosphorylation of Sp1 causes its nuclear translocation and binding with PAR1 promoter region that enhances the expression level of PAR1. AP2 which negatively influences the expression of PAR1 is down-regulated by HAP. HAP treatment enhances the binding probability of SP1 as compared to AP2 on PAR1 promoter region resulting in over expression of PAR1. The downstream signaling of PAR1 induces MAP kinase and NF κ B pathways which increases cellular ROS level and induces the intrinsic pathway of apoptosis. Specific inhibitors against PAR1, PI-3kinase, NF κ B and MAPkinase showed significant decrease in apoptosis. HAP induced PAR1 over expression and its cellular signaling plays a role in apoptosis of malignant cells.

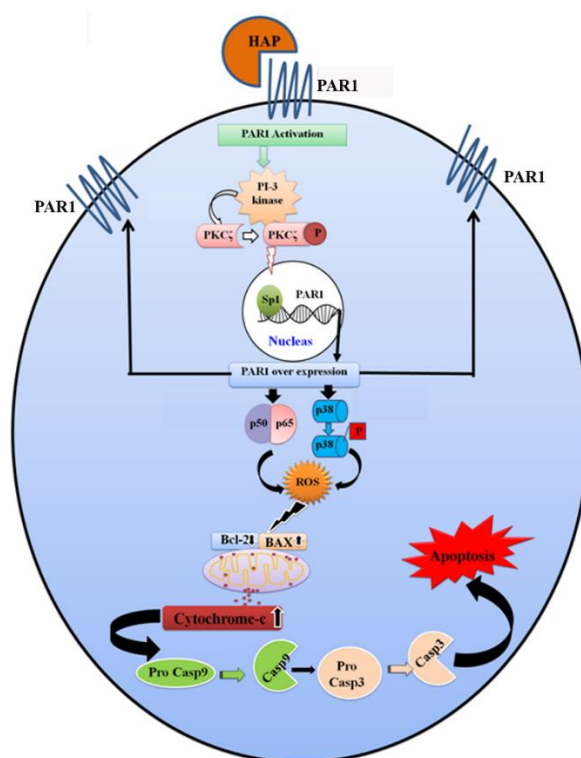


Fig 27: Mechanism of HAP induced PAR1 over expression and cellular apoptosis in colon cancer cells. HAP induced the activation of PAR1 and triggered PI-3K mediated phosphorylation of PKC ζ . It resulted in the over expression and nuclear translocation of Sp1 that enhanced the binding of the transcription factor Sp1 to the PAR1 promoter region and induced the over expression of PAR1. HAP

mediated PAR1 over expression increases the receptor density for HAP in malignant cells and triggered its downstream signaling NF κ B and MAP Kinase pathways that increased the cellular ROS level and induced cellular apoptosis in malignant cells compared to normal healthy cells.

SsIE (YghJ) activates CD4⁺ T cells toward type 1 polarization for protection against neonatal septicemic *E. coli* via maternal immunization

SsIE of neonatal septicemic *E. coli* was found to be potent stimulator of naïve CD4⁺ T cells. CD4⁺ T cells from immunized mice proliferated significantly in response to SsIE pulsed macrophages and dendritic cells, while the cells from non-immunized mice did not. The increased expression of activation molecules CD69, CD25, and CD28 on SsIE-primed CD4⁺ T cells further confirms activation of naïve CD4⁺ T cells. Immunization of BALB/c mice with SsIE induced intracellular expression and release of Th1 cytokines IFN- γ , TNF- α and IL-2 both *in vitro* (co-culture with both SsIE pulsed macrophages and SsIE pulsed dendritic cells) and *in vivo* whereas no effect on the secretion of IL-4, a Th2 cytokine, could be found. In addition to the release of Th1 cytokines, immune CD4⁺ T cells also showed overexpression of Th1 chemokines such as RANTES, MIP-1 α , MIP-1 β and lymphotactin both at RNA and protein levels whereas expression of Th2 chemokines such as MDC, and eotaxin-2 remained unaltered (Fig 28). Neonates delivered from immunized and *E. coli* infected mothers exhibited greater survival than neonates delivered from non-immunized but infected mothers. Presence of anti-SsIE IgG was detected in sera of mother as well as neonate. All these data actually indicate that SsIE induces Th1 skewed adaptive response in adult mice and showed protective efficacy in neonates from early-onset sepsis through maternal or passive immunization suggesting that SsIE could be a potent vaccine candidate against septicemic *E. coli* to protect both mother and neonate.

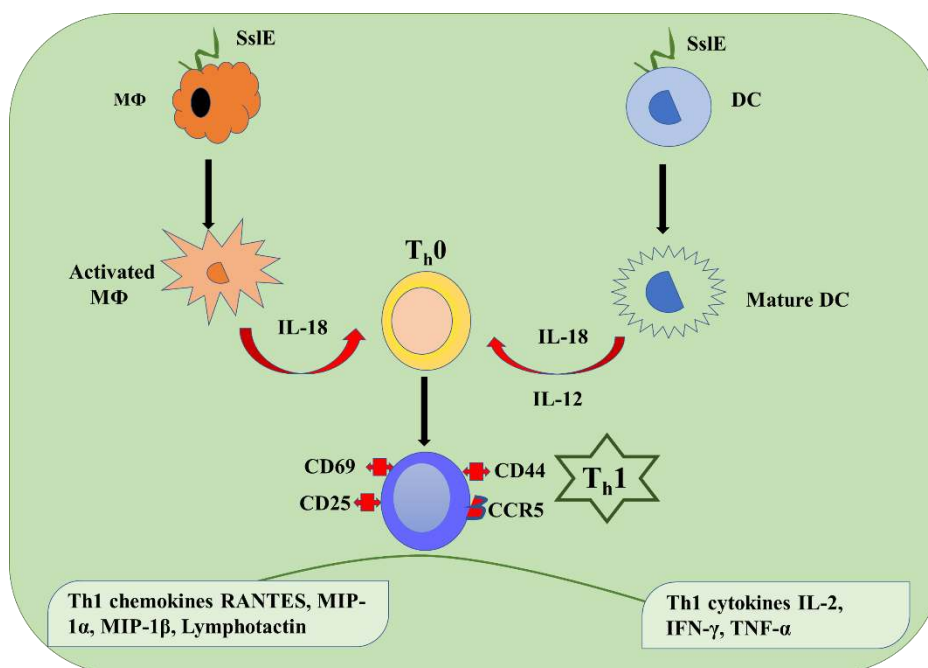


Fig 28: Schematic representation of SsIE induced activation and differentiation of naïve CD4⁺ T cells to Th1 subtype. SsIE is presented through MΦ and BMDCs to naïve CD4⁺ T cells which in turn secretes Th1-specific cytokines such as IL-2, IFN- γ and TNF- β , Th1 chemokines such as MIP-1 α , MIP-1 β , RANTES and lymphotactin with increased expression of Th1 chemokine receptor CCR5 and activation markers such as CD25, CD69 and CD44 indicating activation and type 1 polarization of CD4⁺ Th0 cells to Th1 type.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Delivered the Platinum Jubilee Lecture entitled “Role of microbial proteases in pathogenesis and molecular targeting therapy of cancer” in the Section of Medical Sciences (Including Physiology) at the 106th Indian Science Congress held at Lovely Professional University, Jalandhar from 3-7th January, 2019.

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellows:

Dr. T. Ray, DBT Women’s Scientist
Dr. R. Tapadar Ghosh, ICMR Postdoctoral fellow
Dr. T. Paul, DST-SERB Research Associateship

Pre-Doctoral Fellows:

Mr. Dwiprohi Kar, SRF-CSIR
Ms. Nanda Singh, JRF-CSIR
Mr. Niraj Nag, JRF-UGC

M. K. Saha (Principal Investigator), Virology Division

HIV among geriatric population: Systematic review and meta-analysis.

Geriatric population with HIV is increasing. Nearly half of newly diagnosed HIV infections in US are found among people older than 50 years. Diagnosis and treatment of HIV infected geriatric patients tends to be delayed by several health-care factors as several life-threatening diseases are common in geriatric people.

This systematic review and meta-analysis aimed to find the pooled HIV prevalence in geriatric population and the current situation of continuum care for the geriatric HIV patients. All published articles from 2000 to 2018 are retrieved using MEDLINE, PUBMED, Cochrane Library, EMBASE, Google Scholar. DerSimonian and Laird Random Effects model are used to critically appraise articles. STATA 13.0 is used to perform the Meta-analysis and Q-GIS are used to prepare the map. The I^2 statistics has been used to test heterogeneity and publication biases. The results have been presented using forest plots. The pooled global HIV prevalence in geriatric population was 17.07% (95% CI; 11.14, 23.95) with a lower rate of viral suppression as 15.26% (95% CI; 14.92, 15.6) along with a moderate number 34.35% (95% CI; 4.66, 73.94) of geriatric patients retained in care. Despite successful administration of ART in developing world that have relatively high retention rates among HIV infected geriatric patients, a small fraction are virally suppressed largely due to interactions of geriatric drugs with ART and comorbidities that reduces life span of elderly people.

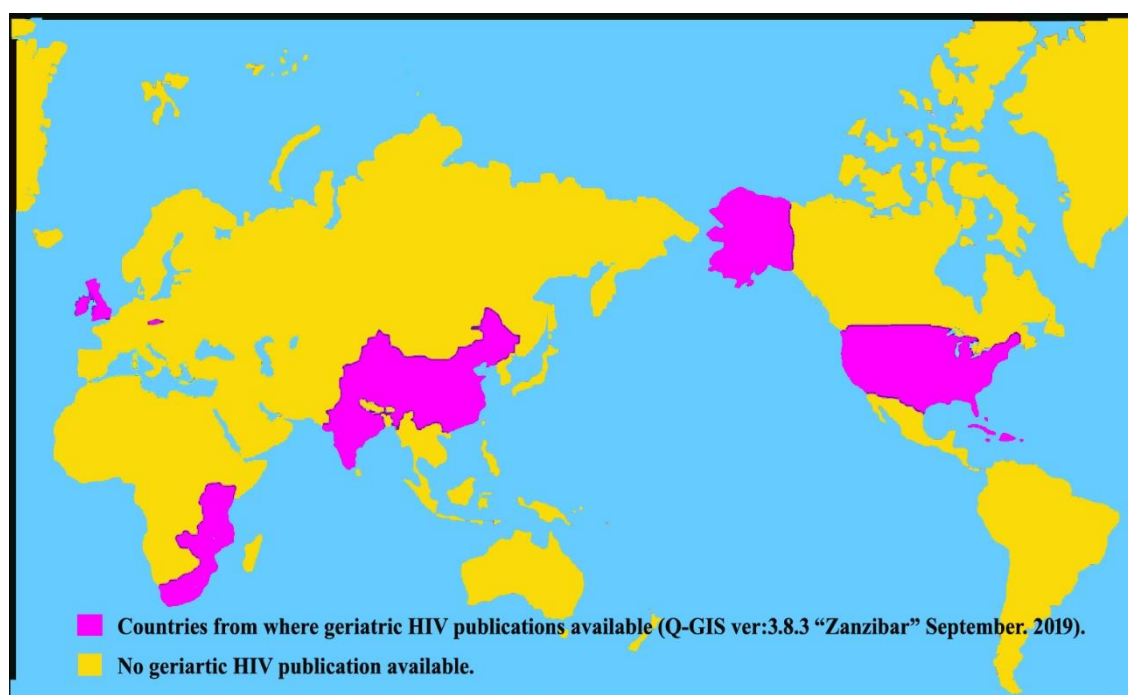


Fig: Geographical distribution HIV infected geriatric population (with the help of Q-GIS ver: 3.8.3 "Zanzibar" September, 2019). Data based on region has been entered into the digitized map as the non-spatial attributes.

Motivation factors for adherence to ART HIV infected Transgender in Eastern India

Maintaining Anti-retroviral Therapy (ART) adherence over the years is challenging for patients due to the issues of toxicity, side effects, daily-life disruptions, returning for follow-up at ART centre.

Qualitative study to find the motivation for adherence to ART among Transgender (TG) PLHIV in West Bengal revealed that their survival as the prime motivation of lifelong ART medication. Motivation also enhanced due to the techniques adopted for routine remembering, disclosure support received, supportive ARTC facility, TG community and PLHIV network support for their causes. Given the chronic nature of the disease, HIV treatment and care require appropriate involvement of patients into their treatment plans and strategies while transgender PLHIV who are able to receive regular assistance of their community-based group-members', acting as peer navigators, stand the better chance of maintaining treatment adherence.

Awards/Honours received:

- **NABL Accreditation** (Quality Council of India), ICMR-NICED Laboratory.
- **Member, Sectional Committee**, Immuno-Biological Diagnostic Kits, Bureau of Indian Standards, New Delhi, Govt of India. Since 2010.
- **Member, Expert Committee**, Strengthening of Quality Control Testing Procedure of Immuno Diagnostic Kit Laboratory (IKDL), National Institute of Biologicals, N Delhi, Govt. of India.
- **Member, Technical Resource Group**, Laboratory Services, NACO, N Delhi,
- **Member, Technical Expert Committee** for strengthening of scientific activities of Molecular Diagnostic Laboratory, National Institute of Biologicals, New Delhi.

M. Chawla-Sarkar (Principal Investigator), Virology Division

Screening of small molecules with antiviral activity as adjunct therapy for viral diarrhea

Although showing promising trends in the developed countries, the efficacy of currently licensed RV vaccines is sub-optimal in socio-economically poor settings with high disease burden. Currently, there are no approved anti-rotaviral drugs adjunct to the classical vaccination program. Interestingly, dissecting host-rotavirus interaction has yielded novel, non-mutable host determinants which can be subjected to interventions by selective small molecules. The present study was undertaken to evaluate the anti-RV potential of RA-839, a recently discovered small molecule with potent and highly selective agonistic activity towards cellular redox stress-sensitive Nuclear factor erythroid-derived-2-like 2 (Nrf2)/Antioxidant Response Element (ARE) pathway. *In vitro* studies revealed that RA-839 inhibits RV RNA and protein expression, viroplasm formation, yield of virion progeny and virus-induced cytopathy independent of RV strains, RV-permissive cell lines and without bystander cytotoxicity. Anti-RV potency of RA-839 was subsequently identified to be independent of stochastic Interferon (IFN) stimulation but to be dependent on RA-839's ability to stimulate Nrf2/ARE signaling. Interestingly, anti-rotaviral effects of RA-839 were also mimicked by 2-Cyano-3, 12-dioxo-oleana-1, 9(11)-dien-28-oic acid methyl ester (CDDO-Me) and Hemin, two classical pharmacological activators of Nrf2/ARE pathway. Overall, this study highlights that RA-839 is a potent antagonist of RV propagation *in vitro* and can be developed as anti-rotaviral therapeutics (Figure).

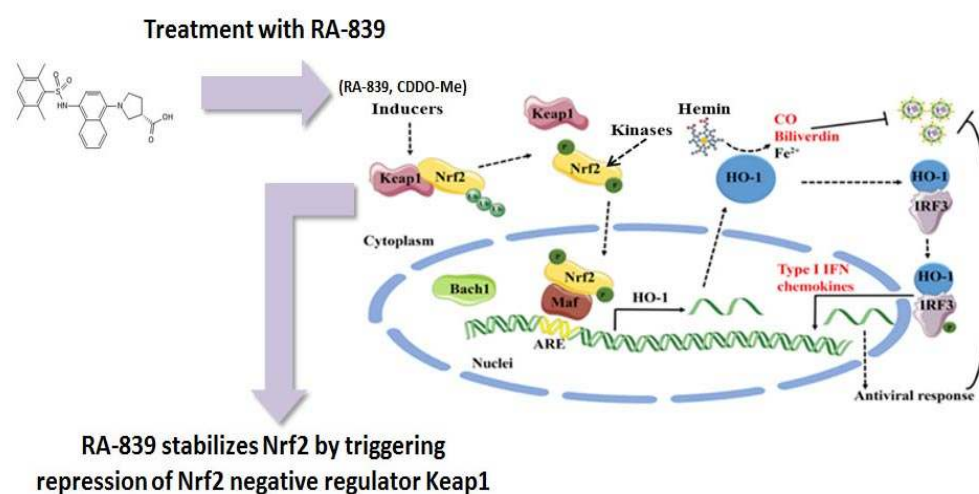


Figure: RA839-a selective agonist of cellular redox stress responsive transcriptional regulator Nrf2 shows potent anti-rotaviral efficacy

Surveillance and molecular characterization of Group-A Rotavirus among children reporting with acute gastroenteritis

As part of the Institutional diarrheal disease surveillance and ICMR funded extramural project, rotavirus (RV) surveillance is conducted to assess the prevalence of Rotavirus infection among hospitalized children and to monitor circulating strains in the region. This surveillance aims to assess baseline data prior to introduction of RV vaccine in West Bengal. Vast diversity in the RV genotypes and rapid emergence of novel types due to recombination in developing countries raise concern, thus comparison

of pre-vaccination data with the post vaccine scenario is important for determining vaccine efficacy. A total of 717 and 503 samples (≤ 5 y) were tested during April 2018 - Feb 2019 from ID & BG Hospital (IDBG) and BC Roy Children's hospital (BCH). Of 717 samples from IDBG, 200 (27.89%); 65 (9.06%); 55 (7.67%) and 31 (4.32%) samples were positive for Rotavirus, Adenovirus, Astrovirus and Norovirus respectively. Co-infection rates were 7.8% (n=56). In BCH, of 503 samples, 147 (29.22%) were RV positive, 50 (9.94%) were Adenovirus positive, 38(7.55%) were Astrovirus positive and 27(5.36%) were Norovirus positive; co-infections cases were 24(4.77%). Maximum infection rate was observed in 6-12 months' age-group. Genetic characterization of positive strains revealed predominance of G3P[8] (58%) during this period in both IDBG and BCH, while other genotypes like G9(12.5%); G1(10.32%); G2(2.96%) and G12(1.2%) were observed at low frequency. G3P[8], which emerged during 2016, continued to dominate in this region in 2017-2018. The percentage of un-typables was $\approx 12\%$ (Figure)

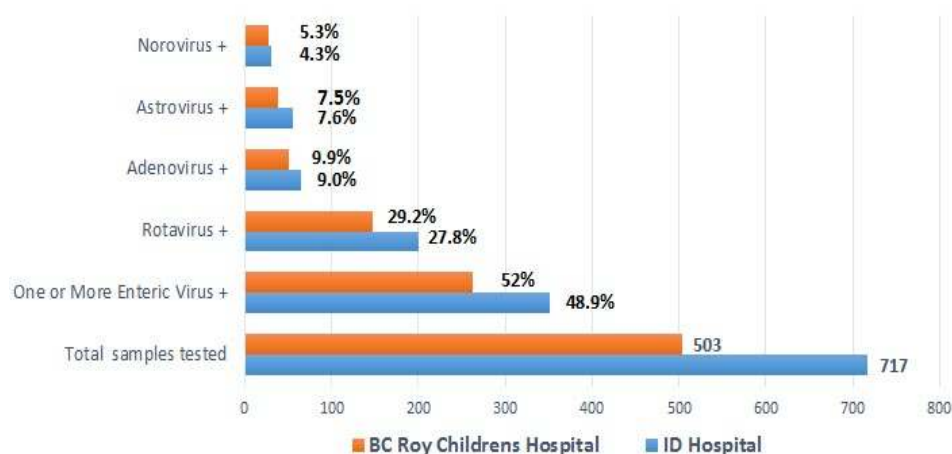


Figure: Proportion of viral etiology among children hospitalized with acute gastroenteritis (Apr 2018-March 2019)

Awards/Honours received

- ICMR Kshnaila Oration Award (2017)
- Fellowship of West Bengal Academy of Science & Technology (WAST) 2018

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- **Regional_Young Investigator's Meet Kolkata**, 5th-6th Feb 2019 at Presidency University. Organized by Presidency University and India Bioscience. Title: OMICS goes viral: Coupling Host-Rotavirus Interactions to Drug repurposing for designing antiviral therapeutics. **M. Chawla-Sarkar_(Invited Speaker)**.
- **6th Molecular Virology Meeting, Feb 28th - March 2nd 2019 at IIT Kharagpur**. Organized by IIT Kharagpur in association with ICMR NICED and Amity University Kolkata. Title of Presentation: "Surveillance of common enteric viruses among hospitalized children (≤ 5 years)

with acute gastroenteritis in Kolkata”. **S. Mitra**, A. Sinha, S. Chatterjee, S Dutta and M. Chawla-Sarkar. **(Poster)**.

- **6th Molecular Virology Meeting. Feb 28th-March 2nd 2019 at IIT, Kharagpur.** Organized by IIT Kharagpur in association with ICMR NICED and Amity University Kolkata. Title: Dynamics of rotavirus genotypes circulating among children hospitalized with diarrhea during pre-vaccination period in West Bengal:2014-2018. **A Banerjee**, M Lo, S Dutta, M Chawla Sarkar. **(Poster)**.
- **6th Molecular Virology Meeting. Feb 28th-March 2nd 2019 at Indian Institute of Technology, Kharagpur.** Title: The Interplay Between Rotavirus Infection and Cellular RNA-interference Machinery. **U Mukhopadhyay**, S Chanda and M Chawla-Sarkar. **(Poster) (Best Poster award)**
- **6th Molecular Virology Meeting. Feb 28th-March 2nd 2019 at IIT, Kharagpur.** Organized by IIT Kharagpur in association with ICMR NICED and Amity University Kolkata. Title: Rotavirus activates and exploits cellular DNA damage response machinery for its own replication. **R Sarkar**, M Chawla Sarkar. **(Poster). Received Best Poster award.**
- **6th Molecular Virology Meeting. Feb 28th-March 2nd 2019 at IIT, Kharagpur.** Organized by IIT Kharagpur in association with ICMR NICED and Amity University Kolkata. Title: Assessing in vitro anti-rotaviral efficacy of a selective Nrf2 inducer RA-839. **U Patra**, M Chawla Sarkar **(Poster)**.
- **International Conference of Virology. November 12th-November 14th 2018 at PGIMER Chandigarh.** Organized by Indian Virology Society. Title: Delineating the role of DNA damage response during rotavirus replication. **R Sarkar**, M Chawla Sarkar **(Oral Presentation)**.
- **International Conference of Virology. November 12th-November 14th 2018 at PGI Chandigarh.** Organized by Indian Virology Society and PGIMER Chandigarh. Title : Phylodynamics of circulating genotypes in a hospital based rotavirus surveillance study during 2008-2017. **M Lo**, M Chawla-Sarkar. **(Poster)**.
- **Frontiers in Biotechnology, Chapter III, 12th October 2018 at, St. Xavier’s College, Kolkata.** Organized by Department of Biotechnology St Xaviers College. Title: Using and abusing host cell pathways by Rotavirus: A journey deep into cellular power houses. **M Chawla Sarkar (Invited Speaker)**.
- **13th International dsRNA Virus Symposium. September 24th - September 28th 2018 at Houffalize, Belgium.** Organized by KU Leuven, Belgium. Title: Rotavirus hinders antiviral RNA interference by degradation of Argonaute-2. **U Mukhopadhyay** and M Chawla Sarkar. **(Poster)**
- **13th International dsRNA Virus Symposium. September 24th - September 28th 2018 at Houffalize, Belgium.** Organized by KU Leuven, Belgium. Title: Rotavirus infection down-regulates redox-sensitive transcription factor Nrf2 and Nrf2 driven transcription units. **U Patra and M Chawla Sarkar. (Poster)**.
- **13th International Rotavirus Symposium at Minsk, Belarus during August 29-31, 2018.** Organized by Sabin Vaccine Institute and Rota Council. Title: “Genetic diversity of group A rotavirus strains in children hospitalized with gastroenteritis in West Bengal”. **M Chawla Sarkar (Poster)**

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellow

Dr Anupam Mukherjee (Ramanujam Fellow Scientist)

Pre-Doctoral Fellow

Ms. Arpita Mukherjee, SRF-UGC

Ms. Anindita Banerjee, DST Women Scientist

Mr. Upayan Patra, SRF-ICMR

Ms. Urbi Mukhopadhyay, SRF-UGC

Mr. Rakesh Sarkar, SRF-UGC

Mr. Mahadeb Lo, JRF-CSIR

A. Chakrabarti (Principal Investigator), Virology Division

Functional evaluation of the role of PB1-N40 Protein of influenza virus in apoptosis and inflammation

PB1 and PB1-N40 genes were cloned in the mammalian expression vector (pAc-GFP1-C2) and expression analysis of PB1 and PB1-N40 proteins was performed in A549 cell line (Fig1). However, MTT assay using these clones revealed that PB1-N40 was not associated with apoptosis. The real-time PCR analysis of inflammatory gene expression was performed and it was found that PB1-N40 has no role in the regulation of inflammation.

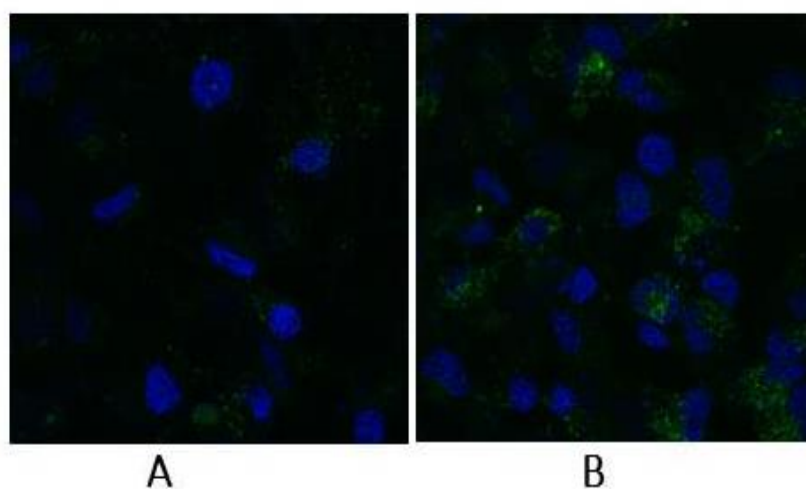


Figure: Expression and localization of A. PB1 and B. PB1-N40 protein in A549 cells

To find out function of PB1-N40, we are studying the role of Trim32 which directly ubiquitinates PB1, leading to PB1 protein degradation and subsequent reduction of polymerase activity. We found time-dependent increase of TRIM32 protein in influenza virus-infected cells. PB1-N40 has binding sites for Trim32. Our hypothesis is that whether PB1-N40 competes with PB1 protein for binding with TRIM32 more efficiently and prevent Trim32 mediated ubiquitination of PB1 protein and promotes virus replication. Studies are ongoing to understand whether PB1-N40 interact with anti-viral host factor TRIM32.

Nationwide screening of phage types of *V. cholerae* O1 and O139

As a National centre for phage typing of *V. cholerae*, Vibrio Phage Reference Laboratory of ICMR-NICED receives strains from medical colleges and hospitals from all the cholera endemic zone of India for biotyping, serotyping and phage typing study. *V. cholerae* strains isolated from clinical samples and environmental samples from different states were sent to the Vibrio Phage Reference Laboratory for

phage typing study. A total of 127 strains were received by us during the current year which was used for phage typing study.

Strains received from different states were screened and only the confirmed *V. cholerae* O1 biotype El Tor strains were used for phage typing. Among the *V. cholerae* O1 biotype El Tor strains, most of the isolates belonged to serotype Ogawa and few were found as serotype Inaba. Panel of typing phages available with us at the Vibrio Phage Reference Laboratory was used for phage typing at RTD following the standard methodology. Conventional scheme of Basu and Mukherjee showed the presence of two different types, Type 2 and Type 4 but six different types were observed when the new phage typing scheme was used.

Phage typing analysis showed the presence of different phage types within the *V. Cholerae* O1 biotype El Tor strains.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

Provided training in Workshop/Delivered lectures

- Attended and provided training to the workshop participants of “3rd Hands on Training Workshop on Laboratory Diagnosis of Emerging Viral Diseases for a period of two days between 28 -29 June 2018 on Real time PCR for diagnosis of influenza viruses.
 - Participants were trained to work in their center to detect influenza viruses from clinical samples following the standard protocol as recommended by WHO.
 - Basic tissue culture techniques were explained in the laboratory and I have demonstrated virus (influenza) infection in cell culture in different time point post infection.
 - I have also delivered a lecture on Cell Culture Techniques during the workshop.
- Delivered oral presentation entitled “Cell Culture Techniques” in 3rd Hands on Training Workshop on Laboratory Diagnosis of Emerging Viral Diseases for a period of two days between 28 -29 June 2018”
- Two participants from the Science & Technology Unit, of INDOVAX PVT LTD were provided training on “isolation and characterization of bacteriophages including phage typing of *V. cholera*” for a period of five days between December 17 to December 22, 2018, in Vibrio phage Reference Laboratory, ICMR-NICED
 - Participants were trained on basic techniques of isolation, titration, purification and overall characterization of *V.cholerae* phages to implement in their laboratory.
- Attended and provided training to the workshop participants of 4th hands-on training workshop on 'Laboratory Diagnosis of Emerging Viral Diseases' from 07th to 09th February, 2019
 - During this training workshop I was involved in laboratory training of the participants on Real time PCR to diagnose influenza virus from clinical samples.
 - Delivered a lecture on basics of “PCR and Real time PCR “
- Delivered oral presentation entitled “basics of “PCR and Real time PCR” during 4th hands-on training workshop on 'Laboratory Diagnosis of Emerging Viral Diseases' on 7th February, 2019.
- Delivered oral presentation as a sensitization program on “Influenza viruses-A general overview and outbreak situations” during the outbreak investigation of Avian influenza at Godda District organized by Dist. Medical Hospital, Godda , Jharkhand on February 12, 2019

Pre-Doctoral Fellow

Ms. Sampurna Biswas, SRF-ICMR

Mr. Devendra nath Tewari, JRF-UGC

Mr. Partha Pratim Mandal, JRF-UGC

N. Chakrabarti (Principal Investigator), ICMR-NICED Virus Laboratory

Study of Rubella seroprevalence and full envelope glycoprotein profiling of Cytomegalovirus subtype identification from newborn clinical specimens collected from West Bengal, India.

We performed molecular diagnosis of both CMV and Rubella on referral suspected neonate and infant patient sample from different hospitals of Kolkata. A total of 150 samples were tested for IgM ELISA for both CMV and Rubella. Only 12 samples (8% positivity) were positive for Rubella while 59 samples (39.33%) were positive for CMV. Further, CMV DNA PCR was performed as a confirmatory test for CMV and 45 samples (30 % positivity) found to be a true positive. We also detected 5 samples (3.33% positivity) that were dually infected Low birth weight found to be significantly associated with the prevalence of CMV

Strategy to study screening of anti- CMV (Cytomegalovirus) compounds from some medicinal and edible mushrooms

Natural products serve as the inspiration to develop new strategies towards the synthesis of novel small molecule libraries and play important roles in the development of new drugs. The available anti-HCMV drugs are used as both prophylactic and preemptive agents and are all targeted at the viral DNA polymerase, which is responsible for the replication of the viral genome. However, they suffer from several drawbacks including long-term toxicity, unfavorable pharmacokinetic properties, and the emergence of viral resistance

We aimed to isolate polysaccharide, terpenoids and other bioactive compounds from mushroom and screen their anti HCMV activity. To carry out the work following mushrooms has been identified and characterized-*coriolus versicolor* (Family- polyporaceae), *lenzites sp.* (Family- polyporaceae), *Lentinus squarrosulus* (Family- polyporaceae), *Pleurotus ostreatus* (Family- pleurotaceae.), *Phellinus sp.* (Family- Hymenochaetaceae), *Polyporus alveolaris.* (Family- polyporaceae), *Irpex sp.* (Family- Steccherinaceae) (Table)

Pleurotus and *Lentinus sp.* shows significant anti CMV response and its further characterization needs to be done.

Table. Antiviral Response of different Concentration of mushroom extract from *Pleurotus sp* & *Lentinus sp*.

| | Pleurotus sp. | | | | | Lentinus sp. | | | | |
|----------------------------------|---------------------------|---------------------------|---------------------------|----------------------|-------------------------------------|---------------------------|---------------------------|---------------------------|----------------------|-------------------------------------|
| | Repli ca 1(O. D) | Repli ca 2(O. D) | Repli ca 3(O. D) | Avera ge (O.D) | Viral inhibiti on rate (%) | Repli ca 1(O. D) | Repli ca 2(O. D) | Repli ca 3(O. D) | Avera ge (O.D) | Viral inhibiti on rate (%) |
| Cell (control) | 1.66 | 1.23 | 1.09 | 1.32 | | 1.63 | 1.39 | 1.08 | 1.37 | |
| cell+ virus (control) | 0.251 | 0.392 | 0.198 | 0.28 | | 0.196 | 0.263 | 0.278 | 0.25 | |
| Methan ol (control) | 1.38 | 1.65 | 0.92 | 1.32 | | 1.62 | 1.19 | 1.21 | 1.34 | |
| Methan ol+ virus (control) | 0.465 | 0.095 | 0.162 | 0.24 | | 0.175 | 0.238 | 0.261 | 0.22 | |
| 150 µg/ml | 1.73 | 1.31 | 0.735 | 1.26 | 94.07 | 1.56 | 1.3 | 1.1 | 1.32 | 96.42 |
| 100 µg/ml | 1.32 | 0.86 | 0.76 | 0.98 | 67.30 | 1.03 | 0.761 | 1.47 | 1.087 | 75.62 |
| 50 µg/ml | 0.69 | 0.39 | 0.83 | 0.64 | 34.29 | 0.743 | 0.482 | 0.638 | 0.621 | 34.01 |
| 10 µg/ml | 0.35 | 0.49 | 0.21 | 0.35 | 6.73 | 0.421 | 0.326 | 0.267 | 0.338 | 8.75 |

Antiviral response with respect to different concentration of mushrooms extracts (150 µg/ml ,100 µg/ml, 50 µg/ml, 10 µg/ml) has been calculated (Chatterjee et.al,2009). IC50 value of *Pleurotus sp* extract was 82.6 µg/ml and that of *Lentinus sp* was 77.6 µg/ml.

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellow

Dr. Agniswar Sarkar, PDF-UGC

Pre-Doctoral Fellow

Mr. Sabbir Ansari, SRF-WB-DST Project

Mr. Aroni Chatterjee, SRF-UGC

Mr. Rajendra Prasad Chatterjee, SRF-DBT Project

Mr. Debsopan Roy, JRF- WB-DST Project

P. C. Sadhukhan (Principal Investigator), ICMR-NICED Virus Laboratory

Studies on genomic variation of hepatitis C virus in high risk group population in Eastern part of India

Co-Investigators: Samiran Panda, Souvik Ghosh, Ashokananda Konar, Maitreyee Bhattacharyya, Prasanta Chaudhary

Hepatitis C virus (HCV) is a global health problem specially within the high risk group (HRG) population. It is very important to monitor genomic diversity and evolution of HCV on a regular basis to help clinicians for clinical management and therapeutic intervention for DAAs treatment.

During this period, we received 483 HCV sero-reactive blood samples from different HRG population including HCV infected general population with chronic liver diseases (GP CLD) from this region. Overall, 339 (70.18%) were found to be HCV RNA positive and the positivity varied among different HRG populations, such as RNA positivity in thalassemia patients and PWIDs were 64.73% and 84.61% respectively, whereas GPCLDs was 71.23% and with chronic kidney disease (CKD) was 77.58%. HCV genotype data showed that the distribution of HCV also varied in different population groups (Figure). Overall, HCV genotype 3 (58.05%) was the major circulating strain in this study population followed by 1 (38.90%) and 4a (3.05%). Interestingly, majority of thalassemia patients were infected with HCV genotype 3 (90.47%) and 3a alone was 78.09% whereas 72.22% of hemodialysis patients were infected with genotype 1c (Figure). During this period, 318 patients with different HCV genotypes have been completed DAAs treatment, 15 of them were relapsed cases. New HCV genotypes/subtypes such as 4a, 3g and 3i have been observed within HRGs population that were not reported earlier from this region. Overall, HCV genomic diversity is more prominent within HRG population and HCV drug resistant cases following DAAs treatment is also frequently reported.

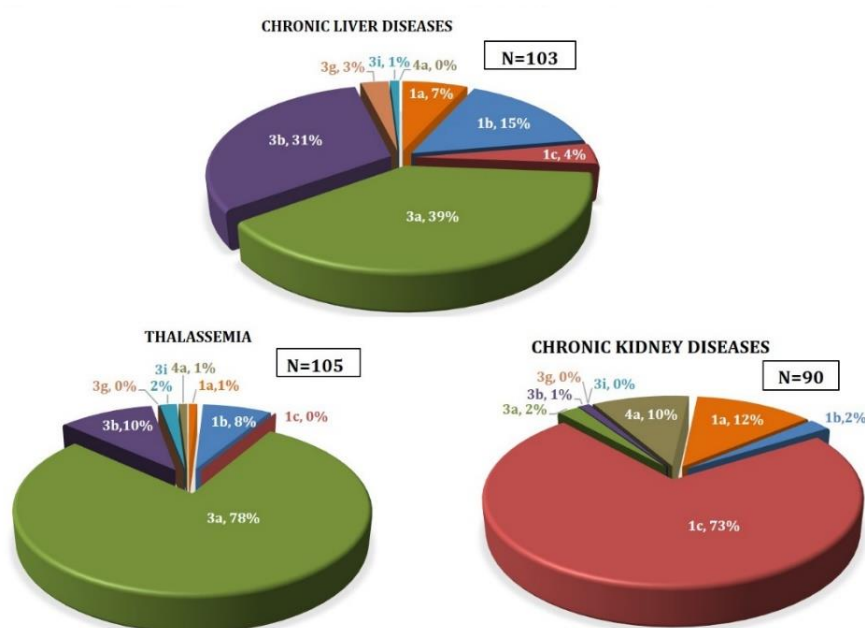


Figure: HCV genotype distribution in different high risk group population in West Bengal

Circulating Dengue Serotypes in West Bengal

Co-Investigator: S. Dutta

Dengue is one of the most aggressive arthropod-borne viral diseases. Every part of India is now affected by this virus and becomes a public health burden. The genomic diversity of dengue virus is very important for its management, drug and vaccine development. The evolution of DENV may lead to phenotypic changes in the viruses that alter their potential to cause outbreaks of severe or attenuated disease. Understanding DENV genomic variation is especially important as we continue to understand better mechanisms behind its pathogenesis and outbreak.

During this period, we received 802 DENV NS1 seropositive blood samples from different districts of West Bengal from north to south Bengal. All the samples were processed for dengue serotyping, of which 72 were dengue RNA negative. Co-circulation of all four dengue serotypes was observed in the different districts. Overall, DENV-2 was the most prevalent serotype (76.85%) followed by DENV-3 (15.07%), DENV-1 (4.24%) and DENV-4 (3.84%) (Figure). DENV 3 is gradually increasing in this region, specially in North Bengal.

From 2012 to 2018, we observed a rapid change in DENV serotype prevalence in the state of West Bengal, from 2012-2015, DENV-3 was the most prevalent serotype whereas in 2016, DENV-1 was the major prevalent serotype but in 2017, DENV2 followed by DENV 4 whereas in 2018, DENV-2 followed by DENV-3 was the most predominant serotype.

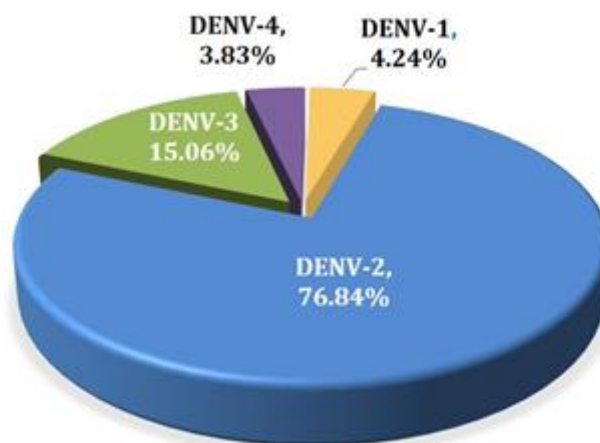


Figure: Circulating dengue serotype in 2018 dengue outbreak in West Bengal

Awards/Honours Received:

- Regular reviewer of journal for Hepatology, PLoS One, Journal of General Virology, Journal of hepatitis Research, Virus Diseases, Viral Immunology, Journal of Medical Virology, International Journal of Public Health and Epidemiology; International Journal of Tropical Diseases & Health, British Microbiology Research Journal, Indian Journal of Medical Microbiology, Indian Journal of Medical Research.

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

Paper presented in Conference by student:

- Upasana Baskey, Supradip Dutta, Promisree Chowdhury Priya Verma, Sagnik Bakshi, Raina Das, Aritra Biswas, Shanta Dutta and Provash Chandra Sadhukhan. Comparative Genomic Analyses of Hepatitis C Virus Infection in Multi-Transfused Thalassemia Patients in West Bengal. 6th Molecular Virology Meeting 2019, 28th February to 2nd March, 2019, IIT Kharagpur, West Bengal.
- Priya Verma, Upasana Baskey, Supradip Dutta, Promisree Choudhury, Sagnik Bakshi, Raina Das, Shanta Dutta and Provash Chandra Sadhukhan. Rapid Change of Dengue Virus Serotypes in West Bengal over Last 4 Years (2015 - 2018). 6th Molecular Virology Meeting 2019, 28th February to 2nd March, 2019, IIT Kharagpur, West Bengal.
- Supradip Dutta, Sagnik Bakshi, Upasana Baskey, Priya Verma, Aritra Biswas, Raina Das, Promisree Choudhury, Shanta Dutta and Provash Chandra Sadhukhan. Genomic Diversity of Hepatitis C Virus Among High Risk Group Population in Eastern Part of India. 6th Molecular Virology Meeting 2019, 28th February to 2nd March, 2019, IIT Kharagpur, West Bengal.
- Promisree Choudhury, Sagnik Bakshi, Supradip Dutta, Aritra Biswas, Upasana Baskey, Priya Verma, Raina Das, Shanta Dutta and Provash Chandra Sadhukhan. Genomic Diversity of Hepatitis C Virus among People Who Inject Drugs (PWID) from Four North-Eastern States of India. 6th Molecular Virology Meeting 2019, 28th February to 2nd March, 2019, IIT Kharagpur, West Bengal.
- Supradip Dutta, Upasana Baskey, Priya Verma, Aritra Biswas, Shanta Dutta and Provash Chandra Sadhukhan. Comparative study on Genomic diversity of Hepatitis C virus among People Who Inject Drugs (PWID) in East and North-Eastern states of India. 8th Annual CME of Society of Tropical Medicine and Infectious Diseases of India, 22nd July, 2018, Kolkata, West Bengal.
- Upasana Baskey, Supradip Dutta, Priya Verma, Aritra Biswas, Shanta Dutta and Provash Chandra Sadhukhan. Rapid Change of Dengue Virus Serotypes in West Bengal over Last 3 Years (2015-2017). 8th Annual CME of Society of Tropical Medicine and Infectious Diseases of India, 22nd July, 2018, Kolkata, West Bengal.

Oral Presentation in Conferences/CME Courses:

- Delivered lecture as resource person for 4th hands-on training workshop on “Laboratory Diagnosis of Emerging Viral Diseases” organized Regional – VRDL, ICMR-NICED, by on February, 07th-09th, 2019, Kolkata.
- Invited speaker for IDSP Annual Review Meeting of West Bengal State on “Dengue serotype – 2018” Swasthya Bhawan, Kolkata, 21st January, 2019.
- Delivered lecture on “Quality Control Protocol” for training workshop on “Online Data entry and QA/QC for ICMR Task Force Project” on “A systematic Assessment of Acute Viral Hepatitis and Chronic Liver Disease in Northeast India with special reference to strengthening of laboratories in the region”, December 12-13, 2018, Dibrugarh, Assam (As site PI).
- Delivered lecture as resource person for 3rd hands-on training workshop on “Laboratory Diagnosis of Emerging Viral Diseases” organized Regional –VRDL, ICMR-NICED, by on June 27th- 28th, 2018, Kolkata.

Training attended:

- Attended Workshop/Training on “Climate change and vector borne Diseases” organized by ICMR-National Institute of Malaria Research, New Delhi, March 25-29th, 2019.
- Attended training workshop on “Online Data entry and QA/QC for ICMR Task Force Project” on “A systematic Assessment of Acute Viral Hepatitis and Chronic Liver Disease in Northeast India with special reference to strengthening of laboratories in the region”, December 12th-13th, 2018, Dibrugarh, Assam.
- Attended Workshop on “Evolving Trends in Diagnosis of Tuberculosis & Hepatitis C” organized by Cepheid (GeneXpert), Kolkata, April 27th, 2018.

Scientist: Dr. Promisree Choudhury (Project Research Scientist)

Post and Pre-Doctoral Fellows:

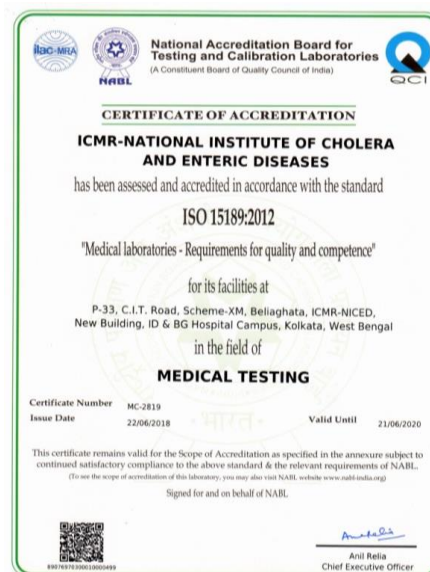
Post-doctoral fellow: Dr. Ronita De, ICMR Research Associate

Pre-doctoral fellow: Mr. Supradip Dutta, JRF-UGC
Ms. Upasana Baskey, JRF-UGC
Ms. Priya Verma, JRF-UGC
Mr. Sagnik Bakshi, JRF-Project
Ms. Raina Das, JRF-Project

SERVICE PROVIDED BY THE INSTITUTE

NABL Accreditation:

ICMR-NICED has expanded the scope of NABL accreditation in accordance with ISO 15189:2012 in the year 2016. In 2018, NABL has granted the accreditation including the expanded scope of ICMR-NICED, HIV molecular assay (quantitative), detection of *G. lamblia*, *Cryptosporidium parvum*, *Entamoeba histolytica*, Dengue IgG & IgM, and Chikungunya in the field of Medical Testing which undergoes the discipline of Microbiology and serology.



WHO IVD prequalification Laboratory

WHO team conducted comprehensive assessment of individual IVDs (i) *Vibrio Cholerae* O1 and (ii) HIV antibody analyte through a standardized procedure (ISO: 15189-2012 standard) for determining if the product/procedure meets WHO prequalification requirements.



Quality Assurance for HIV Testing

- External Quality Assurance Scheme is one of the important tools to assess the performance of the laboratory and their ability to generate accurate results. National Reference Laboratory of ICMR-NICED is the proficiency testing provider for HIV antibody testing for the States Reference Labs (SRLs) of A&N, Assam, Jharkhand, Meghalaya, Mizoram and Orissa.



- Referral Services: National Reference Lab, NICED has been entrusted with the responsibility of verifying results for samples sent by Hospitals. Samples tested, result communicated within the turnaround time, analyzed the root cause of discordance and trained the referring lab personnel for improvement and technical capacity building. Most of the samples are positive for HIV antibody indicating improvement of quality of the referring labs. (Table 1 & Table 2)

Table 1: Referral Service done for the institutions at NACO NRL, ICMR-NICED, Kolkata.

| Sl. No. | Source of Samples | No. of sample Tested | No. of sample Positive |
|---------|--------------------------------|----------------------|------------------------|
| 1. | Command Hospital (EC), Kolkata | 25 | 24 |

Table 2: HIV Sentinel Surveillance 2017 (ANC): Quality Assurance for SRLs under NACO NRL, NICED, Kolkata and other Testing Center (sample received from April 2018 to March 2019)

| State | Name of SRL/Testing Centre | Samples sent by SRL | | Samples rejected by NRL | Confirmed Result at NRL | | Discordant |
|---------------|---|---------------------|---------|-------------------------|-------------------------|---------|------------|
| | | HIV - ve | HIV +ve | | HIV - ve | HIV +ve | |
| Jharkhand | Regional Institute of Medical Sciences, Ranchi, Jharkhand | 205 | 5 | 0 | 205 | 5 | 0 |
| | Patuliputra Medical College, Dhanbad, Jharkhand | 133 | 2 | 2 | 131 | 2 | 0 |
| | MGM Medical College, Jamshedpur, Jharkhand | 100 | 1 | 5 | 95 | 1 | 0 |
| Assam | Silchar Medical College & Hospital, Silchar, Assam. | 41 | 6 | 0 | 41 | 6 | 0 |
| A & N Islands | GB Pant Hospital, Port Blair, A & N Islands | 20 | 0 | 0 | 20 | 0 | 0 |

- Proficiency testing program for NRLs conducted by Apex Lab (NARI, Pune): NACO-National Reference Laboratory of ICMR-NICED participated in the proficiency testing program conducted by Apex Laboratory, ICMR-NARI, Pune twice in a year.
- Proficiency testing program for SRLs and their attached ICTCs: NACO- National Reference Laboratory of ICMR-NICED conducted “Proficiency Testing Programme” for 12 State Reference Laboratory and their attached ICTCs. Collection of samples, preparation, characterization and validation of panel is the steps to be followed for whole activity.

Integrated Testing & Counseling Centre (ICTC)

- HIV counseling and testing services is the key entry point to prevention of HIV infection and to treatment and care of people who are infected with HIV.
- ICTC provides basic information on modes of transmission and prevention of HIV and Sexually Transmitted Infections (STI) for promoting behavioral changes and reducing vulnerability.
- ICTC conducts HIV diagnostic tests (Table 4) and VDRL test for High Risk Group (HRG).
- ICTC also conducting HBsAg and HCV tests.
- Other functions of ICTC includes:
 - Providing psycho-social support to HIV positive people as well as to caregiver/family of the HIV positive people as and when required.
 - Link HIV positive people, with other HIV & opportunistic Infections prevention, care and treatment services.
 - Providing PEP as and when required.
 - Free condom distribution.
 - Cross referrals to TB, STI, ART, TI-NGO etc. (Table 3 & Table 4)

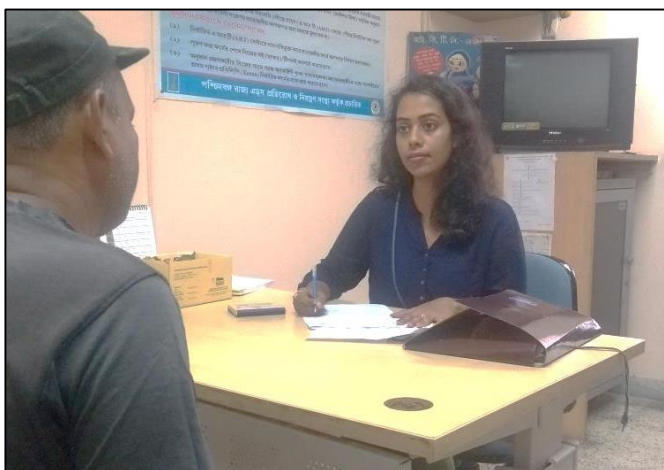


Table 3: HIV testing details at ICTC unit ICMR-NICED (April 2018 – March 2019)

| Total Tested | Positive | Positivity |
|--------------|----------|------------|
| 736 | 39 | 5.29% |

Table 4: Referral details at ICTC unit ICMR-NICED from different services

| Referred from RNTCP | | Referred from Govt. Hospital | | Client Initiated | | | Referred from TI NGO | | |
|---------------------|--------|------------------------------|--------|------------------|--------|----|----------------------|--------|----|
| Male | Female | Male | Female | Male | Female | TG | Male | Female | TG |
| 17 | 5 | 261 | 224 | 136 | 65 | 8 | 3 | 0 | 10 |

Early Infant Diagnosis (EID)

Molecular diagnosis of HIV among babies (up to 18 months) born to HIV infected mothers is being done at ICMR-NICED Regional Reference Lab (RRL), using Dried Blood Spot (DBS) samples, employing state-of-art molecular assay for 14 states of East and North-Eastern India. The aim of this National Program is to ensure early initiation of ART for the infected babies and also to monitor effectiveness of current practice of PPTCT (Prevention of Parent To Child Transmission).

NACO-conducted EID Program is the cornerstone in the efforts to significantly reduce HIV related morbidity and mortality in infants. The diagnosis of HIV infection in infants and children younger than 18 months is different from that in adults due to trans-placental transfer of maternal antibodies from mother to child during pregnancy, childbirth and breast feeding. Hence, HIV-1 TNA (Total Nucleic Acid) PCR testing is recommended for the babies less than 18 months of age.



ICMR-National Institute of Cholera and Enteric Diseases (NICED) is one of the 6 Regional Reference Laboratories (RRL) among AIIMS, ICMR-NICED, NITR, MUniv, NIMHANS & NARI, under NACO, performing RealTime HIV-1 Qualitative in vitro amplification assay for the qualitative detection of Human Immunodeficiency Virus Type 1 (HIV-1) nucleic acids from Dried Blood Spot (DBS) samples. In ICMR-NICED, EID program has been started from August, 2010 initially with three states, West Bengal, Orissa and Chhattisgarh. With gradual success of the program, the North Eastern states (Jharkhand, Bihar, Assam, Manipur, Mizoram, Nagaland, Meghalaya, Arunachal Pradesh, Sikkim, Tripura, and Andaman & Nicobar Islands) were also included under ICMR-NICED-RRL (Molecular HIV Laboratory).

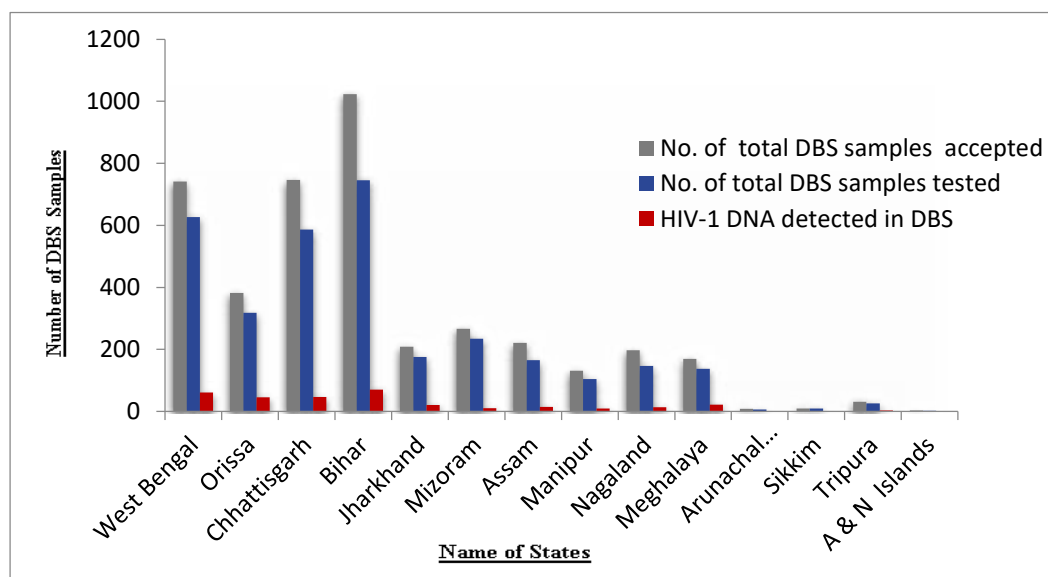
Presently, 1269 ICTCs are involved in collection of DBS samples in 14 states under NICED-RRL for DBS HIV-1 PCR. A National Testing Algorithm comprising of two sections according to the age group of the child (Algorithm A: for infants < 6 months and Algorithm B: for child 6-18 months) have been followed for HIV exposed infants in this EID program for detection of HIV-1 DNA. All DBS HIV-1 PCR reactive/detected specimens are further confirmed by a 2nd Confirmatory HIV-1 PCR of the same sample.

A total of **4173** DBS samples were received from April 2018 to March 2019 at ICMR-NICED-Regional Reference Laboratory (Molecular HIV Lab) and among them **4139** samples were accepted for testing, according to sample acceptance criteria. A total of **3284** DBS samples were tested for the period of 01.04.2018 to 31.03.2019 (The accepted samples can be tested in any month. Therefore, the number of samples accepted and tested in a month may not tally) and their status is depicted below. (Table 5 and Figure)

Table 5: Status of EID DBS samples accepted and tested (with HIV-1 positivity) at ICMR-NICED from April 2018 to March 2019:

| Name of States | No. of total DBS samples accepted | No. of total DBS samples tested | HIV-1 DNA detected in DBS |
|-------------------|-----------------------------------|---------------------------------|---------------------------|
| West Bengal | 741 | 627 | 61 |
| Orissa | 382 | 318 | 46 |
| Chhattisgarh | 747 | 587 | 47 |
| Bihar | 1023 | 745 | 70 |
| Jharkhand | 209 | 176 | 21 |
| Mizoram | 267 | 235 | 11 |
| Assam | 221 | 165 | 15 |
| Manipur | 131 | 104 | 10 |
| Nagaland | 197 | 147 | 14 |
| Meghalaya | 169 | 137 | 22 |
| Arunachal Pradesh | 8 | 6 | 1 |
| Sikkim | 10 | 9 | 0 |
| Tripura | 31 | 26 | 3 |
| A & N Islands | 3 | 2 | 0 |
| TOTAL | 4139 | 3284 | 321 |

N.B: No. of samples 'tested' is more than the No. of samples 'accepted', as samples of previous year were tested in this current period (year)



Plasma Viral Load Assay for HIV

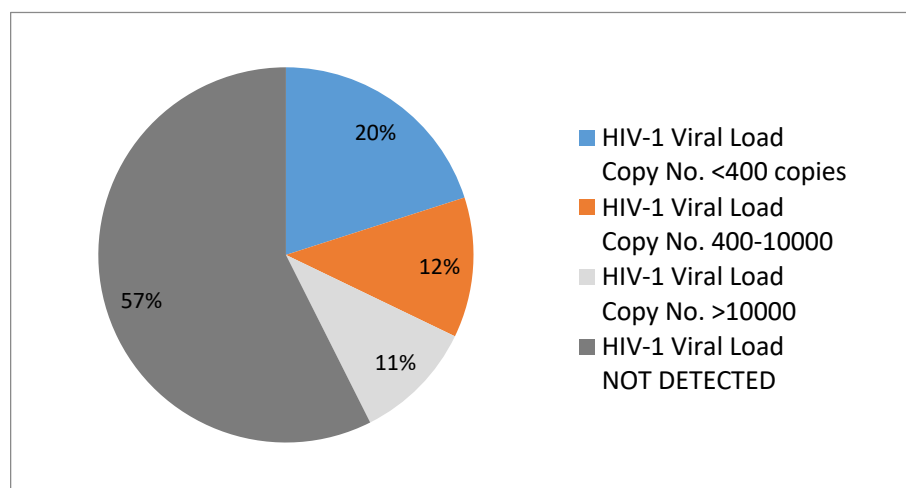
HIV Viral load assay under NACO, is being conducted at ICMR-NICED – Molecular HIV Laboratory, for ensuring efficacy of ART and taking evidence based decision for initiation of further treatment.

Quantitative measurement of HIV level in peripheral blood has greatly contributed to the understanding of the pathogenesis of HIV infection and has been shown to be an essential parameter in prognosis and management of HIV infected individuals. Decisions regarding initiation or changes in antiretroviral therapy are guided by monitoring plasma HIV RNA levels (viral load). The goal of antiretroviral therapy is to reduce the HIV virus in plasma to below detectable levels of available viral load tests. ICMR-NICED is one of the Laboratories under NACO that uses Abbott RealTime HIV-1 RNA assay, which is an in vitro reverse transcription polymerase chain reaction (RT-PCR) assay for the quantization of HIV-1 in human plasma. ICMR-NICED Molecular HIV laboratory restarted HIV viral load assay for the patients under ART for monitoring effectiveness of on-going treatment as per national guidelines and also to assist in HIV drug resistance mutation assay.

Presently, there is one linked center in West Bengal sending specimens to ICMR-NICED for HIV Viral Load test. For the period of April 1st, 2018 to March 31st, 2019, 337 Viral Load samples were received at ICMR-NICED, and a total of 364 samples were tested for HIV viral load during the particular period. No. of samples 'tested' is more than the No. of samples 'received', as samples of previous year were tested in this current period (year). The status of the samples is depicted below. (Table 6 and Figure)

Table 6: Status of HIV Viral Load Assay for patients under ART for the period of April 1st, 2018 to March 31st, 2019:

| No. of Samples | | HIV-1 Viral Load Copy No. <400 copies | HIV-1 Viral Load Copy No. 400- 10000 | HIV-1 Viral Load Copy No. >10000 | HIV-1 Viral Load NOT DETECTED |
|----------------|--------|---|--|--|-------------------------------------|
| Received | Tested | | | | |
| 337 | 364 | 73 | 44 | 38 | 209 |



Regional Institute for HIV Surveillance

The activity of Regional Institute (East), ICMR-NICED, involves implementation of HIV Sentinel Surveillance (HSS) among Antenatal Clinic (ANC) attendees and High Risk Group (HRG) for the East and North Eastern states with the aims to monitor the (i) trends and prevalence of HIV infection, (ii) distribution and spread of HIV prevalence in different population subgroups and in different geographical areas (iii) to identify emerging pockets of HIV epidemic in the country and (iv) to generate data for HIV estimations and projections. RI (E) also has an important role in data entry and data management of HSS.

Major Activities of Regional Institute:

- Technical support & guidance to State AIDS Control Societies SACS in overall planning & implementation of HSS activities in eastern Indian states, facilitating smooth implementation of HSS activities by liaising with the concerned state authorities and addressing specific problems at sentinel sites/ testing laboratories.
- Technical Validation & approval of new sites through review of relevant data & site visits.
- Conduction of Regional Pre & Post-surveillance co-ordination & planning meetings, Regional Trainings and Workshops for HSS – ANC and HRG round.



- Technical & Supervisory support for state level training of site personnel & lab personnel.
- Monitoring & Supervision during HSS through site visits by RI team members.
- Constitution of State Surveillance Teams (SST) and coordination of all their activities including Monitoring & Supervision by SST members.
- Ensuring timely reporting & corrective action at sites/testing labs during the round.
- Data Entry, matching, modifying, freezing & cleaning through SIMS.
- Concurrent data monitoring and initiation of corrective action, as required.
- Guide SACS in preparation of state surveillance reports after the round.
- Undertaking special epidemiological or operational studies and in-depth analyses during the inter-surveillance period to validate or strengthen surveillance findings.
- Technical review and approval of any other specific proposal from SACS related to HSS.
-



- Submission of report of activities undertaken during surveillance and analysis of the surveillance findings in the allocated states.
- From 2019, HSS Plus is being initiated at 50 central prisons to monitor the level and trends of HIV prevalence and related risk behaviours over time among the inmates of central prison.
- BSS lite along with HSS Plus among high risk and bridge population and prisoners will also be initiated from 2019. (Table 7 & Table 8)

Table 7: ANC Sites in ICMR-NICED region for HSS 2019

| States | No. of Sites | Samples Allotted | No. of Testing lab |
|---------------------------|--------------|------------------|--------------------|
| Andaman & Nicobar Islands | 4 | 1600 | 1 |
| Chhattisgarh | 26 | 10400 | 3 |
| Meghalaya | 11 | 4400 | 2 |
| Nagaland | 13 | 5200 | 2 |
| Sikkim | 5 | 2000 | 1 |
| West Bengal | 25 | 10000 | 4 |

Table 8: Prison Sites in ICMR-NICED region for HSS 2019

| States | No. of Sites | Samples Allotted |
|--------------|--------------|------------------|
| Chhattisgarh | 1 | 400 |
| Nagaland | 1 | 400 |
| West Bengal | 3 | 1200 |

Epidemiological Investigations

In view of the preliminary findings of sustained as well as emerging pockets of high HIV prevalence from HSS 2017, the National AIDS Control Organization (NACO), Ministry of Health & Family Welfare, Government of India intends to launch an epidemiological investigation into the States of Manipur, Mizoram, Nagaland, Meghalaya and Tripura. This investigation aims to define the location, behavioral and contextual factors that drive the HIV epidemic in these States.

Regional Institutes lead the implementation of Epidemiological Investigations into the following states:

- ICMR-NICED: Nagaland, Meghalaya, Assam & Tripura
- RIMS: Manipur, Mizoram

The following activities were performed during April 2018 to March 2019:

- Bilingual (English & Bengali) prospective data collection tool and instruction manual for data collection was prepared, printed and distributed to data collection sites.
- Provided field level training for prospective data collection for the state of Nagaland, Tripura, Assam, Manipur and Mizoram at. RI (E) team members were attended the training program as resource persons. (Figure 10)
- One year retrospective data from selected ICTCs of Assam, Tripura, Meghalaya, and Nagaland were received by RI (E). All data were cleaned, formatted, analyzed and prepared a short report.
- Draft of preliminary findings from prospective data was shared with NACO.



Behavioral Surveillance Survey - Lite

The BSS-Lite is proposed to be implemented during 2019 with an objective to estimate the prevalence of HIV related risk and safe behaviors, knowledge, attitude and practices and service uptake among key population groups. The findings from the BSS-Lite will be also used to work out the appropriate correction factors for the behavioral component of the HSS Plus.

BSS lite – along with HSS Plus among high risk and bridge population and prisoners, and HSS among pregnant women will together provide a more comprehensive and updated picture of the level and trends of HIV among population groups and their risk behaviours. This key information would also be used for the HIV estimations exercise.

BSS-Lite 2019 will be implemented in 14 States for the population groups of Female Sex Workers (FSW), Men who have Sex with Men (MSM), Injecting drug Users (IDU) and Hijras/Transgender (H/TG) people.

Regional institute ICMR-NICED will lead the BSS Lite program in the following states:

| State | FSW | MSM | IDU | Hijra/TG | Total Study Units |
|-------------|-----|-----|-----|----------|-------------------|
| West Bengal | ✓ | ✓ | ✓ | ✓ | 4 |
| Nagaland | ✓ | ✓ | ✓ | - | 3 |

Study on Antiretroviral Therapy Impact Evaluation

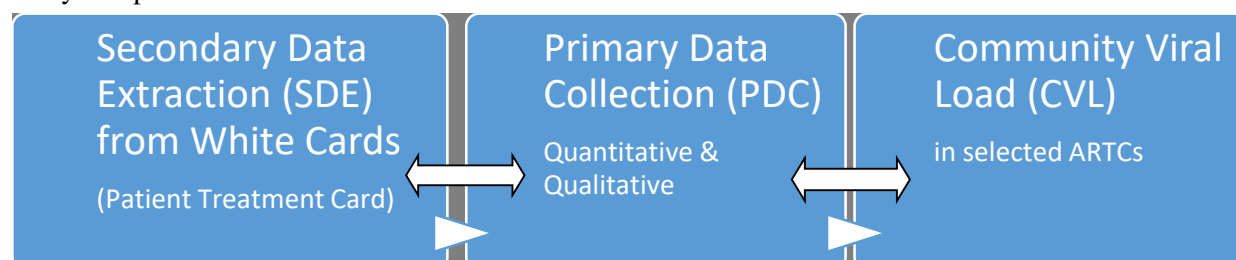
National AIDS Control Organisation (NACO) commissioned the study to evaluate Impact of Antiretroviral Therapy under the National AIDS Control Programme in India (ART-IE India)

ICMR-National AIDS Research Institute (ICMR-NARI), Pune, Maharashtra, in collaboration with National Institute of Cholera & Enteric Diseases (NICED), Kolkata. ICMR-NICED has, been implementing the study in North-East (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura and Sikkim) and Eastern states (Bihar, Odisha and West Bengal).

Aims of the study are to assess effectiveness / impact of ART components and also its attribution to overall NACP Goals, covering the 10 major parameters viz. quality of life of PLHIV; mortality of PLHIV; morbidities in PLHIV; HIV transmission rates; HIV incidence; opportunistic infection profile; incidence of TB in PLHIV; hospitalization rates; new infection in children; and cost-benefit analysis of

Antiretroviral Therapy, the impact of ART on health (e.g. illness profiles, hospitalization, incidence of TB and deaths, quality of life) of people living with HIV (PLHIV) taking treatment in NACO supported ART centers (ARTC) in India. The study also attempts to assess the impact of ART on uninfected partners, as well as persons at risk of HIV.

The study that started at ICMR-NICED region from October 2018 is primarily based on the following study components: -



Secondary Data Extraction: Investigators trained and engaged by ICMR-NICED are to extract the White Card Data from the selected ART centres for those patients registered in between the period from 1st April 2012 till 31st March 2017 and whose ARV medications administered during the period. ICMR-NIED ART IE Team, with the required facilitation by SACS authority and support from the ARTCs concerned could access the White Cards (Patients Card) and relevant records to record the data in the SDET for necessary data entry. Accordingly ART IE Personnel visited each of the ARTCs to deploy suitable Interns and also provided field level training of Interns on secondary data extraction. Altogether 45 Interns volunteered for the secondary data extraction in the identified 15 ARTCs in 11 states. Functionaries of ART IE Project conducted periodic field visits together with conducting data quality check for all the centres; and periodically reported.

Primary Data Collection: Component of the study adopted mixed method approach with both quantitative and qualitative Methodologies. To begin this phase of the study, ICMR-NICED conducted three-day Training of Trainers, in consultation with the concerned SACS, on 29-31 January 2019 at NICED, Kolkata. The three-day ToT was conducted through participatory approaches through presentations, group work among and discussion sessions among participants. (Figure 11) The ToT participants trained, on both the quantitative and qualitative components of the study, subsequently trained local Interns for the purpose of conducting primary data collection among targeted PLHIV at the designated ARTCs in their respective states. Thereafter, structured interview (through PDCT) began by Interns with consecutively sampled PLHIV (both on Pre-ART and on ART during the concerned period) at ARTC, their Spouses/Partners, Care Givers of Paediatric HIV+ve patients of ARTC and ARTC Personnel. Besides, sampled number of In-depth Interviews



(IDI) and Focus Group Discussions (FGD) were planned in consultation with ARTC authorities as part of qualitative index of the study. (Figure 12)

Functionaries of ART IE Project conducted periodic field visits together with conducting data quality check for all the centres; and periodically reported in prescribed format.

Community Viral Load: Aims at providing an understanding of how the provision of ART through NACP has impacted plasma HIV-1 viral loads of persons on ART at various times since initiation, during the study period of 2012-17. The study envisages testing of plasma samples and pooled viral load testing is the approach that will be used to save on costs. Plasma will be separated within 6 hours of blood collection, aliquot and stored at -80°C until further VL testing. Hence the proof-of-concept study will be conducted at three locations wherein NACO affiliated HIV viral load testing facilities are available. For NICODE region, R G Kar MC ART centre in West Bengal has been selected for CVL. In order to initiate the CVL, Official from ICMR-NARI visited ICMR-NICODE on 20-21 December 2018 to overview the progress of SDE and PDC. Concurrently, they conducted a session on community viral load on 20 December 2018 wherein the details of CVL component of the study was explained through presentation by ICMR-NARI Officials. Subsequently the scheduled list of 296 CVL respondents for Kolkata R G Kar MCH ARTC was handed over for implementation.

Brief outline of Training & Extension activities

- One day workshop on GCLP and External Quality Assessment Scheme (EQAS) for SRLs of A & N Islands, Assam, Jharkhand, Meghalaya, Mizoram and Odisha was organized by ICMR-NICODE during 19th September 2018. Number of participants: 20
- Regional Training of Trainers for HIV Sentinel Surveillance for the states of A & N Islands, Chhattisgarh, Meghalaya, Nagaland, Sikkim and West Bengal was organized by ICMR-NICODE during 26th – 27th September 2018. Number of participants: 48
- Regional Level Training on “Elimination of Mother to Child Transmission of HIV and Syphilis (EMTCT)” for West Bengal and Odisha was organized by ICMR-National Institute of Cholera and Enteric Diseases, Kolkata (ICMR-NICODE) and West Bengal State AIDS Prevention and Control Society (WBSAP & CS) in collaboration with ICMR-National Institute of Epidemiology, Chennai (ICMR-NIE) held on 19th & 20th November 2018. Number of participants: 20
- Workshop on data analysis for 'Investigation into the drivers of HIV epidemic in North Eastern states of India' organized by ICMR-NICODE during 20th – 22nd December 2018. Representatives from NACO-New Delhi, FHI 360, WHO India, RIMS-Imphal, Independent experts and scientists and Regional Institute team from ICMR-NICODE attended the workshop. Number of participants: 20
- Training of Trainers on Primary Data Collection Tools (Quantitative) and Qualitative component of Antiretroviral Therapy Impact Evaluation (ART IE) under National AIDS Control Program was organized by ICMR-NICODE during 29th -31st January 2019. Number of participants: 15
- Workshop on “External Quality Assessment Scheme (EQAS) and Training on Data Management on Reverse Testing and Proficiency Testing” was conducted by ICMR-NICODE for Technical

Officer and Medical Laboratory Technologists of 12 State Reference Labs (SRLs) of A & N Islands, Assam, Jharkhand, Meghalaya, Mizoram and Odisha held during 14th – 15th March 2019.
Number of participants: 24

List of Conferences/ Seminars /Workshops / Meetings / Trainings Attended

- Field level training on data collection tool for Nagaland for the study entitled "an investigation into the drivers of HIV epidemic in states of India" was held at Kohima, Nagaland during 19th April 2018 – Representatives from ICMR-NICED attended as resource person
- Field level training on data collection tool for Tripura for the study entitled "an investigation into the drivers of HIV epidemic in states of India" held at Agartala, Tripura during 2nd May 2018 – Representatives from ICMR-NICED attended as resource person
- Field level training on data collection tool for Meghalaya for the study entitled "an investigation into the drivers of HIV epidemic in states of India" held at Shillong, Meghalaya during 8th May 2018 – Representatives from ICMR-NICED attended as resource person
- Field level training on data collection tool for Assam for the study entitled "an investigation into the drivers of HIV epidemic in states of India" held at Guwahati, Assam during 9th May 2018 – Representatives from ICMR-NICED attended as resource person
- Field level training on data collection tool for Manipur for the study entitled "an investigation into the drivers of HIV epidemic in states of India" held at Imphal, Manipur during 17th – 18th May 2018 – Representatives from ICMR-NICED attended as resource person
- Field level training on data collection tool for Mizoram for the study entitled "an investigation into the drivers of HIV epidemic in states of India" held at Aizwal, Mizoram during 24th – 25th May 2018 – Representatives from ICMR-NICED attended as resource person
- National Pre-Surveillance Meeting held at AIIMS, New Delhi during 8th – 9th October 2018 – Representatives from ICMR-NICED attended the meeting
- Training for Primary data collection' for the 'Impact Evaluation of ART Programme under NACP study' held at ICMR-NARI, Pune during 23rd – 25th October 2018 – Representatives from ICMR-NICED participated in the training
- State level training for HIV surveillance (ANC and prison site) for West Bengal, South Bengal Region held at Swasthya Bhavan, Kolkata during 10th – 11th December 2018– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (ANC site) for West Bengal, North Bengal region held at Siliguri, West Bengal during 13th – 14th December 2018– Representatives from ICMR-NICED attended as resource person
- Sensitization meeting with NGO implementation partners for HIV surveillance at prison sites held during 14th December 2018 at New Delhi– Representative from ICMR-NICED attended the meeting

- State level training for HIV surveillance (ANC site) for Andaman & Nicobar Islands held at Port Blair, Andaman & Nicobar Islands during 27th – 28th December 2018– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (ANC site) for the state of Chhattisgarh held at Raipur, Chhattisgarh during 3rd – 5th January 2019– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (prison site) for the state of Chhattisgarh held at Raipur, Chhattisgarh during 3rd – 5th January 2019– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (ANC sites) for Nagaland held at Kohima, Nagaland during 8th – 9th January 2019– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (ANC site) for Meghalaya, Garo Hills Region held at Tura, Meghalaya during 9th – 10th January 2019– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (ANC site) for Meghalaya, Khasi & Jaintia Hills Region held at Shillong, Meghalaya during 15th – 16th January 2019– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (ANC site) for Sikkim held at Gangtok, Sikkim during 21st – 22nd January 2019– Representatives from ICMR-NICED attended as resource person
- State level training for HIV surveillance (prison sites) for Nagaland held at Dimapur, Nagaland during 15th February 2019– Representatives from ICMR-NICED attended as resource person

Regional VRDL, ICMR-NICED:

Establishment of a Network of Laboratories for Managing Epidemics and Natural Calamities: Virus Research and Diagnostic Laboratory (VRDL) at ICMR-National Institute of Cholera and Enteric Diseases is a regional level laboratory established under the Department of Health Research (DHR) to facilitate timely identification of emerging, re-emerging, novel viruses and agents causing epidemics or outbreaks. Collaboration exists with Virus Diagnostic Laboratories (VDLs), government and private health facilities in Bihar, Jharkhand, Sikkim and West Bengal to provide diagnostic, training and research support. Manned by 18 well trained staff, the state-of-the-art laboratory provides serology and molecular diagnosis of Dengue, Chikungunya, Japanese Encephalitis, Mumps, Measles, Rubella, Cytomegalovirus, Rota, Hepatitis A, E, B, C, Influenza, Respiratory Syncytial Virus (A,B), Human Metapneumovirus (A1A2), Parainfluenza (1,2,3,4), Respiratory Adenovirus, Rhinovirus and also zoonotic diseases like Scrub typhus and Leptospirosis. Screening for Zika virus by PCR is a regular activity.

| Investigations Performed | Total Tested in 2018-19 | Positive |
|--|-------------------------|----------|
| Dengue NS1 ELISA | 1005 | 206 |
| Dengue IgM ELISA | 926 | 213 |
| Dengue IgG ELISA | 31 | 6 |
| Chikungunya PCR | 1173 | 68 |
| Chikungunya IgM ELISA | 357 | 38 |
| Japanese Encephalitis IgM ELISA | 43 | 3 |
| Hepatitis A IgM ELISA | 376 | 85 |
| Hepatitis E IgM ELISA | 348 | 88 |
| Hepatitis B Surface Ag ELISA | 164 | 15 |
| Hepatitis C Ab ELISA | 149 | 8 |
| Influenza panel PCR | 2669 | 545 |
| Respiratory panel PCR (other than Influenza) | 451 | 104 |
| Zika PCR | 1090 | 0 |
| Rotavirus Ag ELISA | 410 | 145 |
| Adenovirus Ag ELISA | 253 | 8 |
| Scrub typhus IgM ELISA | 527 | 156 |

Ongoing research involves monitoring of Dengue serotypes, Chikungunya, Influenza virus and drug resistance pattern (neuraminidase inhibitor) among the circulating strains. As a regional centre, regular training of healthcare professionals is conducted in the form of hands-on-workshops covering epidemiology, specimen handling and transport, serological and molecular diagnosis of emerging viral diseases, cell culture techniques, laboratory safety and quality assurance. Two workshops were conducted in 2018-19 involving 32 external participants in total from various institutes of Bihar, Jharkhand, Sikkim and West Bengal. As the country continues to have frequent epidemics due to various viral pathogens, both old and novel, the Regional VRDL, ICMR-NICED, strives to fill the gaps in detection delay and inadequate outbreak data which significantly affect response time for interventions.

Brief outline of services provided by ICMR-NICED:

| Pathogen/Disease | Parameter Tested | Principle of Test |
|---------------------------|-------------------------------------|--------------------------|
| Dengue | Dengue NS1 Antigen | ELISA |
| | Dengue IgM Antibody | |
| | Dengue IgG Antibody | |
| Chikungunya | Chikungunya IgM Antibody | ELISA |
| | Chikungunya viral RNA | Real Time PCR PCR |
| Zika | Zika viral RNA | Real Time PCR PCR |
| Japanese Encephalitis | Japanese encephalitis IgM Antibody | ELISA |
| Hepatitis | Hepatitis A virus IgM Antibody | ELISA |
| | Hepatitis E virus IgM Antibody | |
| | Anti-Hepatitis C virus Antibody | |
| | HBsAg | |
| Influenza | Influenza A viral RNA | Real Time PCR |
| | Influenza A - H1N1 viral RNA | |
| | Influenza A - H3N2 viral RNA | |
| | Influenza B viral RNA | |
| | Influenza B - Yamagata viral RNA | |
| | Influenza B - Victoria viral RNA | |
| Other Respiratory Viruses | Respiratory syncytial virus - A RNA | Real Time PCR |
| | Respiratory syncytial virus - B RNA | |
| | Human metapneumovirus - A1A2 RNA | |
| | Human parainfluenza virus - 1 RNA | |
| | Human parainfluenza virus - 2 RNA | |
| | Human parainfluenza virus - 3 RNA | |
| | Human parainfluenza virus - 4 RNA | |
| | Respiratory adenovirus DNA | |
| | Rhinovirus RNA | |
| Mumps | Mumps IgM Antibody | ELISA |
| Measles | Measles IgM Antibody | ELISA |
| Rubella | Rubella IgM Antibody | ELISA |
| | Rubella IgG Antibody | |
| Varicella Zoster | Varicella zoster IgM Antibody | ELISA |
| Cytomegalovirus | Cytomegalovirus IgM Antibody | ELISA |
| Enteric Viruses | Rotavirus Antigen | ELISA |
| | Adenovirus viral DNA | |
| Scrub Typhus | Scrub typhus IgM Antibody | ELISA |
| | Scrub typhus DNA | Real Time PCR |
| Leptospira | Leptospira IgM Antibody | ELISA |

List of Conferences / Seminars /Workshops / Meetings / Trainings Attended / Organised

- Organised 3rd Hands-on Training Workshop (28-29 June, 2018)
Participants - Fifteen nominated participants from other VRDLs, VDLs and Medical Colleges of Bihar, Jharkhand and West Bengal attended the training.
Lecture sessions:
 - Overview of emerging viral infections - Dr. Alok K. Deb
 - Novel techniques and advances in viral detection - Dr. P.C. Sadhukhan
 - Laboratory safety, Quality control and Quality Assurance - Dr. M.K. Saha
 - Overview of Cell culture techniques and its application, demonstration of cytopathic effects - Dr. A.K. Chakrabarti*Hands-on training sessions:*
 - Dengue-IgM antibody ELISA - Dr. P.C. Sadhukhan
 - RNA isolation from serum, conventional nested RT-PCR for Hepatitis C virus - Dr. P.C. Sadhukhan
 - RNA isolation from throat swab, real time RT-PCR for H1N1 influenza virus - Dr. M.C. Sarkar
- Organised 4th Hands-on Training Workshop (07-09 February, 2019)
Participants - Seventeen nominated participants from different institutes and Medical Colleges from the states of Jharkhand, Sikkim and West Bengal.
Lecture sessions:
 - Epidemiology of emerging viral infections - Dr. S. Kanungo
 - Overview of viral diagnostic techniques - Dr. R.K. Nandy
 - A brief discussion on sample packaging and transport, hands-on demonstration of standard triple packaging - Dr. A. Majumdar
 - Laboratory safety, Quality control and Quality Assurance - Dr. M.K. Saha
 - Overview of Cell culture techniques and its application, demonstration of cytopathic effects - Dr. M.C. Sarkar*Hands-on training sessions:*
 - Sample receiving, labelling, aliquoting – Dr. A. Majumdar
 - Rotavirus antigen ELISA - Dr. M.C. Sarkar
 - RNA isolation from serum, conventional RT-PCR for Dengue virus and Real time RT-PCR for Zika virus - Dr. A.K. Chakrabarti and Dr. A. Chatterjee
- “Congenital Rubella Syndrome Surveillance Program” (22-26 May, 2018) at NIV, Pune
Organized by: NIV, Pune, Attended by: Dr. Agniva Majumdar
- “Review Meeting for Regional Level VRDLs” (05-06 Jun, 2018) at DHR Headquarter, New Delhi, Organized by: DHR, Attended by: Dr. Shanta Dutta and Dr. Rajarshi Gupta (Presenter)
- “Training on EAT Module of PFMS Facilitation” (16-21 Jul, 2018) at DHR Headquarter, New Delhi, Organized by: DHR, Attended by: Mr. Soumodip Mitra
- “Online/Offline Data Management Workshop” (13-14 Aug, 2018) at NIE, Chennai, Organized by: NIE, Chennai, Attended by: Mr. Soumodip Mitra
- “Infectious Disease Modelling Workshop” (12-15 Nov, 2018) at Hotel Accord, Chennai
Organized by: NIE, Chennai, Attended by: Dr. Agniva Majumdar

- “Monitoring of Dengue, Chikungunya, Influenza viruses and Scrub typhus/Leptospira strains circulating in India” (26 Nov-02 Dec, 2018) at NIV, Pune, Organized by: NIV, Pune, Attended by: Dr. Soumen Mukherjee
- “Biosafety and Biosecurity in the context of Emerging Infections” (03-07 Dec, 2018) at NIV, Pune, Organized by: NIV, Pune, Attended by: Dr. Agniva Majumdar (Presenter) and Mr. Satyabrata Ghorai
- “Biosafety & the use of Technology and Knowledge Bank in Modern Medical Practice” (10-11 Dec, 2018) at Tata Medical Center, Kolkata, Organized by: Academy of Clinical Microbiologists, Attended by: Dr. Hasina Banu
- “Congenital Rubella Syndrome Surveillance - Phase II meeting” (14 Dec, 2018) at Hotel Benz Park, Chennai, Organized by: NIE, Chennai, Attended by: Dr. Agniva Majumdar
- “Data Management Workshop” (13 Feb, 2019) at NIE, Chennai, Organized by: NIE, Attended by: Ms. Madhumonti Biswas
- “Influenza Systematic Surveillance - Review meeting” (19 Mar, 2019) at DHR Headquarter, New Delhi, Organized by: DHR, Attended by: Dr. Mamta Chawla Sarkar and Dr. Agniva Majumdar

Influenza Diagnostics:

- We are working on a project on “Strengthening/Promoting evidence based advocacy for influenza prevention and control in India”. Under this project, we have received 395 samples of elderly population from the community field. All the samples were typed and subtyped in our laboratory. 37 (9.36%) samples were found influenza virus positive out of which 23 (5.9%) were positive for influenza A and 14(3.58%) samples showed presence of influenza B virus. We found the presence of H1N1, H3N2 and influenza B Yamagata subtypes. Two samples were found positive for RSV which is a new finding among elderly in India.

Phage typing of *V. cholerae* O1:

- Vibrio phage Reference Laboratory of ICMR-NICED provides service to the nation to classify *V. cholerae* strains into different phage types and in this aspect, I am involved in a project entitled “Nationwide screening of phage types of *V. cholerae* O1 and O139” ICMR-NICED use to receive strains from different medical colleges and research institutes around the country of India for bio typing, serotyping and phage typing study. We have received a total of 127 strains for phage typing. Phage typing was performed using the panel of the typing phages and our results indicated presence of phage type 27 as a major type in India.

Microbial Analysis of Potable water

- Microbial analyses of potable water samples from different diarrhea affected foci across the districts of the state of W. Bengal and also endemic & outbreak affected wards of Kolkata Municipal Corporation and its adjoining areas, dissemination of intimation to the respective agencies with a copy to Health Secretariat, Govt. of West Bengal has been a routine activity of the Unit.
- Preventive measures, as and where possible has also been advised.

Influenza A/pdm H1N1 testing

- The NICED VRDL and Virology laboratories actively provides services to the state health department for Influenza A/ pdm H1N1 testing. In 2018-19, a total number of 2669 referred cases (In-patients with severe respiratory illness) from various private and government hospitals from West Bengal and Jharkhand were received at NICED. Of 2669 samples, 440 (16.48%) were positive of Influenza A/pdm H1N1, 18 (0.67%) H3N2 and 27 (1.0%) as Inf B. Reports were disseminated to the State Health Department and FluNET regularly.

ICMR-NICED Virus Laboratory

- We regularly receive various type of sample i.e. Blood, urine, CSF, tracheal aspirate from Immunocompetent adult patient who is critically ill and neonate & infant for the molecular diagnosis of CMV infection from different metropolis hospitals in Kolkata. We are performing follow up of patient especially neonate & Infant for proper management of patients. During this duration we have performed confirmatory test on around 130 samples.
- Dengue virus serotyping service to West Bengal State Health, Kolkata Municipal Corporation and NVBDCP, Govt. of India as a service component.
- Hepatitis C virus RNA detection, viral load estimation and genotyping services to Medical Colleges and Hospitals of Kolkata and District Hospital of West Bengal as a service component.

Diarrhoea treatment unit (DTU)

- The DTU at the OPD of Dr B C Roy Postgraduate Institute of Pediatric Sciences, Kolkata conducts surveillance of diarrhoeal diseases and treat the patients. In addition, blood samples are collected as part of the surveillance of enteric fever.

FLAGSHIP PROGRAMMES-SWACHH BHARAT CAMPAIGN:

The activities of ICMR-NICED under the Swachhta Action Plan during the period April 2018 to March 2019 included Swachhta Awareness Campaign among the students in various schools in Kolkata, Health and Hygiene Campaigns in among the owners and consumers of several roadside eateries, public seminars and cleanliness programmes among residents of urban slum communities as well as observation of special programmes linked to Swachhta Pakhwada. A brief account of each of these activities are mentioned below.

Swachhta Awareness Campaign in the Schools:

The members of the Health & Hygiene Committee of ICMR-NICED organized several interactive sessions to raise Swachhta related awareness among the school students. The topics usually included water and food safety, importance of maintaining personal hygiene and environmental sanitation including cleanliness of household and school premises, as well as prevention and home management of common illnesses like diarrhea. The students were also demonstrated proper techniques of hand washing and colored leaflets depicting this were also distributed among them.

| Date | Venue | Participants |
|-------------|--|---|
| 18/05/2018 | Panchkari Radharani Adarsha Vidyalaya, Kolkata | 54 students of 6 th and 10 th standard and 2 teachers |
| 25/07/2018 | Bani Vidyamandir Girls' High School, Kolkata | 10 students and 8 teachers |
| 24/08/2018 | Samaj Kalyan Primary School, Kolkata | 47 girl and 43 boy students of class V and 2 class teachers |
| 20/11/2018 | Tangra Muslim Boys' School, Kolkata | 18 girl and 4 boys students of class IV and 2 class teachers |
| 17/01 2019 | Sura Kanya Vidyalaya, Kolkata | 49 girl students of class XI and 2 teachers |



Health and Hygiene Campaigns in Roadside Eateries:

During the period, special Swachhta awareness drives were made for the roadside eateries around the institute. The target audience were the eatery owners and the customers present during our visit. Water and food safety including common water and food borne diseases and the ways to prevent them were discussed. Hand washing techniques were also demonstrated. Colored leaflets showing hand washing technique were distributed and also pasted on the walls of the eateries.

| Date | Venue | Participants |
|-------------|---|------------------------------------|
| 28/06/2018 | Roadside eateries beside B.C. Roy Polio Hospital, Kolkata | Owners and customers of 3 eateries |
| 26/10/2018 | Roadside eateries Beside I.D. & B.G Hospital, Kolkata | Owners and customers of 2 eateries |



Swachhta Programmes in the Communities:

ICMR-NICED organized three community-based programmes to promote Swachhta-related awareness and practices among the community members. The ICMR-NICED team members discussed about safe water as well as safer foods, especially for the children. They also stressed upon keeping their households and surrounding clean and garbage free and encouraged the community members to undertake voluntary cleanliness drives within their localities. Through interactive question and answer sessions in each of these events, they were made aware of prevention and management of many common illnesses including diarrhea, hepatitis, typhoid fever, and various mosquito borne diseases.

A drawing competition was organized on the topic “Clean Environment Means Good Health” at the premises of a local Club “Hatgachia Pally Unnayan Samity”, Kolkata -700105 in Ward No. 58 for promoting Health and Hygiene Campaign by involving children residing in the locality on 04.03.2019. The 30 participants were children between age group 5 years to 13 years, divided into two groups, Group A (16 children) aged 5-8 years and Group B (14 children) aged 9-13 years.





| Date | Venue | Participants |
|------------|--|---|
| 19/09/2018 | Janakalyan Sikkhyamandir, Kolkata | 47 women including school children. |
| 26/12/2018 | I.D & B.G Hospital , Restroom of patients party | About 22 patients part member were interviewed by the Health & Hygiene member of ICMR-NICED |
| 20/02/2019 | Community Level Program at Haatgachiya 58 Ward kolkata | 40 Mothers & 10 under 5 years children were present on the awareness program |
| 04/03/2019 | Hatgachia Pally Unnayan Samity | Drawing competition for 30 children in various age groups |

Observation of Swachhta Pakhwada

ICMR-NICED observed Swachhta Pakhwada during the period April 1 - 15, 2018. The purpose of this special drive within a fortnight period was to boost up 'Swachhta Activities' that were being carried out by ICMR-NICED every month.

As per the Swachhta Pakhwada action plan, ICMR-NICED organized a popular lecture on the occasion of World Health Day, 2018 within the Institute on 7th April, 2018. The event was attended and thoroughly enjoyed by not only the scientists, staff and students of ICMR-NICED, but also by several women from the surrounding communities. In the inaugural speech, Dr. Shanta Dutta, Director, ICMR-NICED elaborated on the theme of World Health Day, 2018 - "Universal Health Coverage: Everyone, Everywhere." The chief guest of the programme, Prof. (Dr.) Ashoke Kumar Mallick, Professor and Head, Department of Maternal & Child Health, All India Institute of Hygiene & Public Health, Kolkata spoke in detail about the different facets of Universal Health Coverage and implications of it. His lecture was followed by an interactive session with the audience including the women from the communities.

A public seminar also was organized on April 11, 2018 within an urban slum area. The venue was a local club premises known as Hatgachia Pally Unnayan Samity and the President and Secretary of the club facilitated in organizing the event. A total of 60 local residents were among the audience. The seminar used lectures, display of posters as well as an interactive session with the audience to highlight the importance of maintaining personal hygiene, household and environmental sanitation and proper hand washing. Home management of diarrheal illnesses along with preparation of oral rehydration salts solution (ORS) were also explained. Later, proper hand washing technique was demonstrated in front of the attendees and relevant IEC materials were also distributed.

The members of Swachh Bharat Committee of ICMR-NICED conducted an awareness campaign on April 13, 2018 to create awareness and promote hygienic practices among the roadside food vendors on the streets around the institute. However, they avoided the peak hours so as not to hamper their business and to be able to communicate effectively. The team members interacted with the owners of three eateries regarding maintenance of personal hygiene, food and water safety, and environmental

sanitation including proper waste disposal. The members also demonstrated the hand washing technique with soap and water to the shop owners and the customers present at that time. Health education materials regarding hand washing was also distributed and these were requested to be displayed within the shop.



OUTBREAK INVESTIGATIONS

Kerala Post Flood Outbreak Investigation: Following a devastating flood that affected several districts of Kerala in the last week of August 2018, five scientists of ICMR-NICED (Drs. A.K. Deb, H. Koley, S. Basu, A. Chakrabarti and A. Sinha) were deployed in two phases (September 1-14 and Sep 15-30, 2019) by the EMR Division, DGHS, Govt. of India to assess public health situation including potential of any epidemic and prevention and control measures to be implemented in the flood-affected areas. The scientists formed part of three-member teams, consisting of a public health specialist, a microbiologist and an entomologist, that were deployed in the flood-hit districts, and were posted in Thrissur, Kasargod, Kannur, Idukki and Thiruvananthapuram districts of Kerala. Upon arrival at Thiruvananthapuram, all team members were briefed about the overall scenario and expectations from each team by officials from the Regional Directorate of Health Services. Thereafter, each team proceeded to the allocated district, where the members first held discussions with the District Medical Officer (DMO), District Programme Manager (DPM) and other health officials and laid down a detailed plan of action regarding scrutinizing IDSP daily data, detecting potential of any outbreak, looking for mosquito breeding activities, checking for stockpiling of essential drugs and chemicals as well as water safety and sanitation, especially for the most affected parts of respective districts. Many local people were also shifted to temporary shelters that were set up in local schools, community halls and religious places; the teams also visited some of these camps and assessed their health and other requirements. The teams also made daily reporting to the DMO and DPM at the end of each day and revised their further action plan whenever necessary. For example, in Thrissur district, an outbreak of leptospirosis was detected but was quickly brought under control through distribution of appropriate

chemoprophylaxis to all people at risk by the local health authority. Further, on several occasions, the teams detected inadequate chlorination of drinking water that was available to local residents in some areas; this was promptly brought to the notice of the health authorities and appropriate measures were taken. Thus, the scientists played an important role to alleviate flood-related public health problems in several districts of Kerala.

Avian Influenza outbreak Investigation at Village Fajilkhutahari, Godda District, Jharkhand: A Central Public Health Team was deployed by Directorate General of Health Services, Emergency Medical Relief Division, Ministry of Health and Family Welfare, Govt. of India regarding Avian influenza outbreak control and containment at Village Fajilkhutahari, Godda District, Jharkhand during February 9-18, 2019. Dr. A. Chakrabarti took part in the team as a Microbiologist. During the investigation the team in association with State, District, Block and Field level health officials. Initially the team members were briefed by the State Headquarters and then moved to the affected areas as per the direction. They visited the affected areas, trained health personnels and conducted seminar on influenza. No human cases were detected and the situation was under control. Surveillance activity was scrutinized and a proper surveillance was suggested. Test laboratories were also visited and proper guidance was provided.

TRAINING & EXTENSION

A. Important Meetings held at ICMR-NICED

Institutional Ethics Committee meeting of ICMR-NICED held on 28th May, 2018



Site Investigators' meeting for Rotavirus Interchangeability Study funded by MoH&FW, GoI through ICMR held on 23-24 July, 2018 at ICMR-NICED, Kolkata



Meeting with Prof. Shinji Yamasaki, Professor of Laboratory of Prevention of International Epidemics, Department of Veterinary Science, Graduate School of Life and Environmental Sciences, Osaka Prefecture University, Japan on 27th July, 2018.



The 46th Scientific Advisory Committee (SAC) meeting was held on 5th and 6th October, 2018 at ICMR-NICED, Kolkata under the Chairmanship of Dr. G. Balakrish Nair, Ag Regional Adviser, Research Policy Coordination Unit, Communicable Diseases Department, WHO, New Delhi and in presence of Prof. N.K. Ganguly, Ex-DG, ICMR and other experts.



Review Meeting of Multi-Disciplinary Research Unit (MRU) took place at ICMR-NICED on 30/11/2018. The meeting was chaired by Mrs. Sarita Mittal, Additional Secretary, DHR, MoH&FW, GOI. Principal or Representatives of Principal, and Nodal Persons of MRUs of following Medical Colleges like (1) Medical College, Kolkata, (2) NRS Medical College, Kolkata, (3) RG Kar Medical College, Kolkata and (4) IPGMER, Kolkata attended the meeting



Institutional Ethics Committee (IEC) meeting of ICMR-NICED held on 7th December, 2018



A meeting with Dr. Christine Moe and other staff of Emory University before initiation of the study on “Environmental Transmission Dynamics of Typhoid Organism in the city of Kolkata (SaniPath-Typhoid)” held on 25th January, 2019 at ICMR-NICED, Kolkata



B. Visit of Scientists / Scientific Staff / Academicians

Lectures/Seminars delivered by Invited scientists

- Prof. Dhruvajyoti Chattopadhyay, Vice Chancellor, Amity University, Kolkata has delivered a lecture entitled “Trozan Horse in Cahdipua Virus Infection” on occasion of Foundation day celebration and Dr. S. C. Pal memorial oration on 9 Mar, 2018.
- Prof A. K. Mallik, Director, Dept. of maternal and child health, All India Institute of Hygiene and Public Health has delivered a lecture entitled “Universal health coverage, everyone, everywhere” for Health day celebration on 7 Apr, 2018.
- Yogacharya. Pallab Dasgupta from Pallab’s Yoga Institute has delivered a lecture and training on “common protocols for yoga” for Yoga Day celebration on 21 Jun, 2018.
- Dr. Tapas kumar Ghosh, ID and BG hospital, Kolkata and Prof. Shantanu Tripathy, has delivered two lectures entitled for Doctor’s day celebration on 2nd July, 2018.
- Prof. Swapan kumar Pramanik has delivered a lecture on “eradicate corruption – build a new India” on occasion of Vigilance awareness week celebration on 2 Nov 2018.
- Dr Samarjit Jana has delivered a lecture entitled “HIV AIDS - a fighting stigma associated with it” on occasion of World AIDS day celebration on 1st Dec, 2018.
- Prof. Ashish Swarup Verma, pro vice chancellor, Adamas University, Kolkata has delivered a lecture entitled “HIV AIDS and neuro AIDS” on occasion of Foundation day celebration and Dr. S. C. Pal memorial oration on 18 Feb, 2019.
- Prof. Sandip Samanta, BC Roy children’s hospital, has delivered a lecture entitled “Early childhood development harnessing the power of neuroplasticity” on occasion of Science Day celebration on 28 Feb, 2019.

C. Training/ Workshop/ Conferences held at ICMR-NICED

The Hands-on training workshop on Laboratory Diagnosis of Emerging Viral Diseases: The 3rd Hands-on training workshop on Laboratory Diagnosis of Emerging Viral Diseases was conducted by Regional Virus Research and Diagnostic Laboratory (VRDL) at ICMR–NICED, Kolkata from 28th to 29th June, 2018. A total of 15 participants (faculty and scientific staff) from State and Medical College Level Virus Diagnostic Laboratories, Public hospitals and Medical Colleges of Bihar, Jharkhand and West Bengal attended the workshop. Participants were provided with first-hand experience on various viral diagnostic techniques such as immunoassays, nucleic acid amplification testing (both conventional and real time) and cell culture. Issues such as laboratory safety, quality control and quality assurance

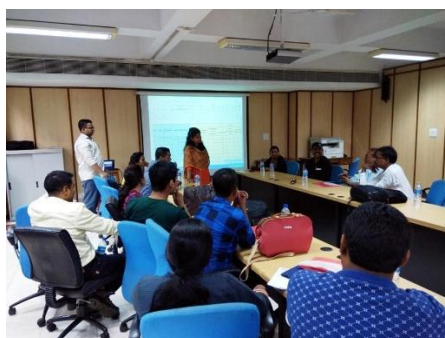
were also discussed. The participants were satisfied with the program and provided generally positive feedback. They urged Regional VRDL, ICMR–NICED to arrange for more of such sessions in future so that viral diagnostic network in this region of the country may be strengthened.



Training Programme for BHMS students: One-day training programme cum workshop has been arranged at ICMR-NICED, Kolkata for BHMS students of National Institute of Homeopathy, Kolkata on 9th July, 2018. About 80 students have participated in this programme. Lecture courses on Bacteriology, Parasitology and Virology have been offered along with lab visit and training by Faculties from different divisions. The programme was concluded after a question answer session of the students with the faculties.



GCLP and EQAS workshop: One-day workshop on GCLP and External Quality Assessment Scheme (EQAS) for SRLs was conducted by ICMR-NICED for Technical Officer and Medical Laboratory Technologists of 12 State Reference Labs (SRLs) of A&N Islands, Assam, Jharkhand, Meghalaya, Mizoram and Odisha under NACO-National Reference Laboratory (NRL), ICMR-NICED, on 19th September, 2018.



Training on Elimination of Mother to child Transmission of HIV and Syphilis: Two days Regional Training on “Elimination of Mother to Child Transmission of HIV and Syphilis (EMTCT)” for West Bengal and Odisha was organized by ICMR-National Institute of Cholera and Enteric Diseases, Kolkata (ICMR-NICED) and West Bengal State AIDS Prevention and Control Society (WBSAP & CS) in collaboration with ICMR-National Institute of Epidemiology, Chennai (ICMR-NIE) on November 19th & 20th at Pearl Hotel, Kolkata. Medical Officers and Laboratory and field experts from West Bengal and Odisha were participated in this programme.



Regional Training of Trainers: In connection with HIV Sentinel Surveillance, Regional Training of Trainers for the eastern region of India was held during 26th – 27th November 2018 at ICMR-NICED. This training program was organized by Regional Institute (East) for HSS, ICMR-NICED for the states of A & N Islands, Chhattisgarh, Meghalaya, Nagaland, Sikkim and West Bengal. Professor, Assistant professor of Medical Colleges, members of State AIDS Control Societies and NACO representative participated in the training.



Workshop on data analysis for 'Investigation into the drivers of HIV epidemic in North Eastern states of India' organized by ICMR-NICED during 20th – 22nd December 2018. Representatives from NACO-New Delhi, FHI 360, WHO India, RIMS-Imphal, Independent experts and scientists and Regional Institute team from ICMR-NICED attended the workshop. Number of participants: 20

ART Impact Evaluation (IE) study: Training of Trainers was held during 29th – 31st January 2019 at ICMR-NICED organized by Regional Institute for ART-IE study, ICMR-NICED for the states of Arunachal Pradesh, Assam, Bihar, Jharkhand, Manipur, Meghalaya, Mizoram, Nagaland, Odisha, Sikkim, Tripura and West Bengal. Medical Officer, Counsellors of ART centres and members of State AIDS Control Societies participated in the training.



VRDL Workshop: The 4th Hands-on Training Workshop on 'Laboratory Diagnosis of Emerging Viral Diseases' was held from 07th - 09th February, 2019 at the Regional VRDL, ICMR-NICED. A total of 17 participants from different Virus Diagnostic Laboratories of the states of Bihar, Jharkhand, Sikkim and West Bengal attended the training. The workshop included didactic lectures and hands-on experience with various techniques employed in the diagnosis of emerging viral infections.



Training Workshop for BHMS Students of National Institute of Homeopathy: A one day hands on training programme cum workshop has been arranged at ICMR-NICED, Kolkata for BHMS students of National Institute of Homeopathy (NIH), Kolkata on 14th March, 2019. About 105 final year BHMS students (26th Batch) of NIH have participated in this programme along with their Faculty, Prof. Prasanta Rath. Welcome address was delivered by Director, ICMR-NICED followed by a number of lectures and hands on training at the lab were imparted by the scientists of ICMR-NICED. The program has ended successfully with an interactive session with the students.



Workshop on “External Quality Assessment Scheme (EQAS) and Training on Data Management on Reverse Testing and Proficiency Testing: Two days workshop on “External Quality Assessment Scheme (EQAS) and Training on Data Management on Reverse Testing and Proficiency Testing” was conducted by ICMR-NICED for Technical Officer and Medical Laboratory Technologists of 12 State Reference Labs (SRLs) of A & N Islands, Assam, Jharkhand, Meghalaya, Mizoram and Odisha under NACO-National Reference Laboratory (NRL), ICMR-NICED, during March 14th to 15th, 2019. Along with the training “ICTC QMS Tool”, developed by National AIDS Control Organization (NACO) to Assess Quality Management Systems at ICTC was also discussed.



Biosafety Training Workshop: A half-day Biosafety Training was organized by ICMR-NICED for eighteen 2nd Year M. Pharm students of the Division of Microbiology & Biotechnology, Dept. of Pharmaceutical Technology, Jadavpur University, Kolkata on 29th March 2019. Drs. N. S. Chatterjee, A.K. Mukhopadhyay and M. Chawla-Sarkar acted as resource persons. The students were given lectures on basic Bioethics, Biohazard and Biosafety Levels, followed by hands-on exposure in Biosafety Level 2 laboratories.



Other Events

World Health Day Celebration at ICMR-NICED: ICMR-NICED celebrated the World Health Day, 2018 today on 7th April, 2018 in NICED 2 Auditorium. Dr. Shanta Dutta, Director & Scientist G delivered welcome address. Prof. A. K. Mallick, Director Professor and Head, Dept. of Maternal and Child Health, All India Institute of Hygiene & Public Health, Kolkata, was present as Chief Guest and delivered a lecture on this year's theme "Universal health coverage, everyone, everywhere." Scientists, staff and students of NICED and 25 people from local community attended the program, who have actively participated in an interactive session following the lecture. Director, ICMR-NICED has presented tokens of appreciation to all the community members as well as the Chief Guest. The program ended with vote of thanks.



4th International Day of Yoga was celebrated at the ICMR-NICED, Kolkata on 21st June, 2018 at 11.00 a.m. On this occasion, eminent Yogacharya Pallab Dasgupta, staff of NICED, delivered his thoughtful speech and demonstrated common Yoga protocols with his team members comprising of International Champion in the 26th World Sports Yoga Championship, Argentina 2018, Mr. Sohail Ahmed and other national level award winners in Yoga. Scientists, staff, students of NICED and delegates from Okayama University, Japan have participated in the mass Yoga performance. The program was ended successfully.



Observance of Doctors' Day at ICMR-NICED, Kolkata: ICMR-NICED celebrated Doctor's day on 2nd July, 2018 at the Seminar Room of NICED II building. Dr. Shanta Dutta, Director, ICMR-NICED delivered the welcome address. Dr. Tapas Kumar Ghosh, Sr. Medical Officer, ID & BG Hospital, Kolkata delivered a talk on the importance of the day and role of clinical doctors in this regard. Prof Santanu Tripathi, Head, Department of Clinical & Experimental Pharmacology, Calcutta School of Tropical Medicine, Kolkata delivered speech on the convergence of Medical practice with Clinical Research and role of Medical Researchers in this regard. Scientists, research scholars and staff of ICMR-NICED attended the program.



Participation of ICMR-NICED in the 6th Indian National Exhibition-Cum-Fair 2018 organized by Bengal Human Resource Development Foundation from 26th to 29th July, 2018 at Kolkata Metropolitan Development Authority (KMDA) Ground, Patuli, Kolkata. The theme of the event was 'Science and Technology for National Development'. Scientists and staff from ICMR-NICED and ROHC, Kolkata have represented ICMR research activities in the Exhibition.



World Hepatitis & World ORS Day: ICMR-NICED in collaboration with All India Institute of Hygiene & Public Health (AIHH&PH) observed World Hepatitis Day & World ORS Day in Urban Health Training Centre, Chetla on 02/08/2018. Director, AIHH&PH, Dean, AIHH&PH, Representative of Director, ICMR-NICED, Senior Scientists and Public Health Specialists of both the Institutes attended and presented their view on Viral Hepatitis and ORS. At least 140 common people including school students actively participated in the programme to make it successful.



22nd National Health Exhibition Participation of ICMR-National Institute of Cholera and Enteric Diseases in the 22nd National Health Exhibition on the theme of New India: Future leader of Globe organized by

‘Central Calcutta Science & Culture Organization for Youth’ during August 3-6, 2018 at Milan Samity Maidan, Nimta, Kolkata. Resource persons from ICMR-NICED, ICMR-ROHC(E) and the Council joined the event to represent ICMR research activities. Prof. Saugata Roy, Hon’ble member of the Parliament visited ICMR stall. Overwhelming responses were received from the visitors of all age groups



Celebration of 72nd Independence Day of India at ICMR-NICED, Kolkata. NICED staff and their family members participated in the flag hoisting ceremony on 15th August, 2018 at 11.00 a.m.



Sadbhavana Diwas: Sadhbhavana Diwas was celebrated at ICMR-NICED by pledge taking ceremony at ICMR-NICED, Kolkata



Hindi Pakhwada: आई.सी.एम.आर. -राष्ट्रीय कॉलरा और आंत्र रोग संस्थान में हिंदी पखवाड़ा उत्सव (14-28 सितंबर 2018)

आई.सी.एम.आर.-नाईसेड 14 सितंबर से (14-28 सितंबर, 2018) हिंदी पखवाड़ा आयोजित कर रहा है। 14 सितंबर को हिंदी में सेमिनार आयोजित करके हिंदी दिवस तथा हिंदी पखवाड़ा उत्सव का शुभारंभ किया गया है। इस अवसर पर, प्रोफेसर बिवा कुमारी, कल्याणी विश्वविद्यालय, पश्चिम बंगाल, ने “भूमंडलीकरण के परिप्रेक्ष्य में महिला सशक्तिकर्ण” विषय पर अपना व्याख्यान दिया। डॉ. शांता दत्ता, निदेशक ने हिंदी दिवस के महत्व को बताया और कर्मचारियों को अपने दैनिक आधिकारिक काम में हिंदी का उपयोग करने के लिए प्रोत्साहित किया। डॉ. दत्ता ने कार्यक्रम की सफलता के लिए हिंदी पखवाड़ा के दौरान आयोजित निबंध लेखन, कविता पाठ और वाद-विवाद प्रतियोगिताओं में भाग लेने के लिए सभीको अनुरोध किया।



Celebration of 150th Birth Anniversary of Mahatma Gandhi: To commemorate 150th Birth Anniversary of Mahatma Gandhi, a special event was organized by ICMR-NICED on October 01, 2018. In the morning, the event was inaugurated by Dr. Shanta Dutta, Director, who elucidated the views and contributions of Gandhiji in making our nation independent by his non-violence and equality movements. This was followed by a popular lecture by Dr. Tapas Ghosh, Senior Medical Officer, ID & BG Hospital, Kolkata, who illustrated Gandhian views on cleanliness, the perspectives of Swachh Bharat Campaign and its effects on human health and diseases. He emphasized that only our concerted efforts in this regard could achieve the benefit of “cleanliness” that Gandhiji viewed more important than “independence”. In the afternoon, a cleanliness drive was organized in all three premises of ICMR-NICED, with the involvement of scientists and staff of the institute was led by the Director, ICMR-NICED.



India International Science Festival (IISF) is going to be organized jointly by the Department of Science & Technology and the Ministry of Earth Sciences, coordinated by the Department of

Biotechnology together with Vijnana Bharati (VIBHA) on October 5-8, 2018 at Indira Gandhi Pratisthan, Lucknow.

The aim of this programme is to generate increased awareness about science among the general population. On directives from Indian Council of Medical Research (ICMR Hqrs.) an outreach programme as a part of IISF, 2018, was organized by ICMR-National Institute of Cholera & Enteric Diseases (ICMR-NICED), Kolkata on September 24, 2018 in presence of school students and their teachers at this Institute. About 100 participants from five local schools joined this programme which included popular scientific lectures, laboratory facility tour, poster exhibition and interaction with the scientists and the research scholars of ICMR-NICED. Poster exhibition at the Institute and the interaction of the students' with scientists and research scholars were greatly appreciated.



Rashtriya Ekta Diwas (National Unity Day) pledge taking ceremony at ICMR-NICED, Kolkata by the staff members of the Institute to commemorate the birth anniversary of Sardar Vallabhbhai Patel on 31st October, 2018



Vigilance Awareness Week: Vigilance Awareness week was observed at ICMR-NICED from 29th October to 3rd November 2018. On 29th November, pledge taking ceremony was performed by the scientists and staff. As a part of a week long celebration of Vigilance awareness week, a program was arranged at Dr. B. C. Deb Auditorium of ICMR – NICED on 2nd Nov, 2018. Prof. Swapan Kumar Pramanik, former Vice Chancellor, Vidyasagar University, West Bengal was the Chief Guest. The Programme was inaugurated by the Director of the Institute Dr. Shanta Dutta and followed by a lecture on this year's Vigilance awareness week theme given by Prof. Pramanik. This was followed by Prize

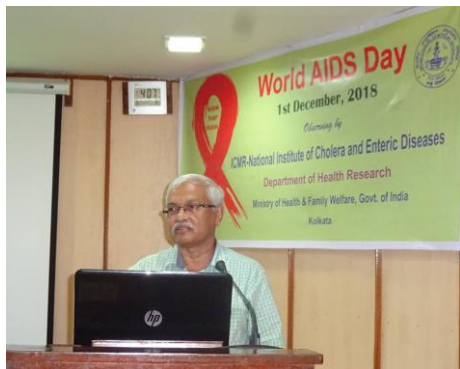
Distribution Ceremony. Vote of thanks was delivered by Dr. Sandipan Ganguly, Scientist E and Vigilance Officer of ICMR–NICED.



The inauguration ceremony of Regional Level ICMR-NICED Virus Research Diagnostic Lab (VRDL) was held today in the gracious presence of Dr. V.M. Katoch, Ex-Secretary, DHR and Ex-DG, ICMR, who has kindly inaugurated the Lab. The Regional NICED-VRDL Lab will act in coordination with other Virus Diagnostic Labs (VDLs) of the states of West Bengal, Jharkhand, Bihar and Sikkim for addressing early diagnosis of any emerging viral pathogen and controlling the transmission of the same.



World AIDS day was observed by ICMR-NICED on 30th November 2018 at Seminar Room. Dr. M. K. Saha, Scientist-F, ICMR-NICED, delivered opening speech on current HIV scenario and introduced Dr. Smarajit Jana, Chief Advisor, Durbar Mahila Samanwaya Committee, main speaker of the program. Dr. Jana delivered an inspiring lecture on “HIV/AIDS: fighting stigma associated with it”.



14th Jatiya Sanhati Utsav-O-Bharat Mela 2018: ICMR–NICED participated in the Science fair titled “14th Jatiya Sanhati Utsav-O-Bharat Mela 2018” organized by Bangiya Seva Samiti in Simultala Agragami Play Ground, Sonarpur from 12th to 16th December. The following scientists and staff of NICED - Dr. Ranjan Nandy, Dr. Sandipan Ganguly, Dr. Abhik Sinha, Dr. Falguni Debnath and Dr. Moumita Dutta, along with Mr. Subrata Seal, Mr. Chandan Mandal, Mr. Suhasit Ranjan Ghosh, Mr. Khokon Sen and Mr. Supriya Basu attended the Fair. The ICMR-NICED team explained the topics on the prevention and management of Enteric Diseases, Dengue, Soil Transmitted Helminth, Malnutrition in Under Five Population and HIV/AIDS to the common people who came to the ICMR stall to visit the posters. The research achievement of ICMR-NICED was also stressed upon.



Celebration of 70th Republic Day of India at ICMR-NICED, Kolkata. Director, Staff and their family members participated in the flag hoisting ceremony at 11.00 a.m. on 26th January, 2019 at the premises of NICED-1 building.



Foundation Day Celebration: 57th Foundation Day of ICMR-NICED has been celebrated on 18th February, 2019 at the Dr. B.C. Deb Auditorium of Dr. S.C. Pal building in presence of the Director, Staff, Students and Pensioners, ICMR-NICED; Director, ICMR-NIOH, Ahmedabad; Director, Calcutta School of Tropical Medicine; Director, All India Institute of Hygiene and Public Health. On this occasion Dr. S.C. Pal Memorial Oration was awarded to Prof. Ashish S. Verma, PhD, Pro-Vice-Chancellor, Adamas University, Barasat, West Bengal. The oration lecture was on “NeuroAIDS: A matter of concern” followed by one cultural program performed by the students and staff of this Institute.



ICMR-NICED celebrated National Science day on 28th February, 2019. On this occasion Prof. Sandip Samanta, MSVP, Dr. B.C. Roy Post Graduate Institute of Pediatric Sciences, Kolkata has delivered a popular talk on "Early childhood development - harnessing the power of neuroplasticity". Scientists, research scholars and staff of ICMR-NICED attended the program.



EXTRAMURAL PROJECTS

Title : National Surveillance System for Enteric Fever in India (NSSEFI)
PI : Dr. S. Dutta, ICMR-NICED
CoI/CoPI/ collaborators with name of collaborating institute(s) : CoPI: Dr. S. Kanungo, ICMR-NICED
Co-I - Dr. P. Chatterjee, ICMR-NICED
Funding Agency : BMGF through CMC, Vellore, India
Period : 2017-2019

Title : Preparation of NOSODE from Escherichia coli and Vibrio cholera: the preclinical effectiveness and safety evaluation
PI : Dr. S. Dutta, ICMR-NICED
Funding Agency : Central Council for Research in Homeopathy (CCRH), Delhi
Period :

Title : Immunogenicity and Safety of Rotavac® and Rotasiil® Administered in an Interchangeable Dosing Schedule among Healthy Indian Infants: A Multicentric, Phase IV, Open-Labelled, Randomized, Controlled Trial (RVICS)
PI : Dr. S. Dutta, ICMR-NICED
Funding Agency : MoH&FW, GoI through ICMR
Period :

Title : SaniPath Typhoid-Assesment of Typhoid Exposure Pathways in Low-Income Urban Settings.
PI : Dr. S Dutta, ICMR-NICED
CoI/CoPI/ collaborators with name of collaborating institute(s) : Co-PI - Dr. S. Kanungo, ICMR-NICED
Co-I: Dr. P. Chatterjee, ICMR-NICED and Dr.Asish Mukhopadhyay ICMR-NICED
Funding Agency : Emory University
Period : 2019-2021

Title : Evaluation of a Typhoid Conjugate Vaccine (TCV) Introduction Program — Navi Mumbai, India
PI : Dr. S. Dutta, ICMR-NICED
Funding Agency : WHO India
Period : 2018-2020

Title : Strengthening Laboratory Surveillance for Pneumococcal Meningitis in India to Understand the Impact of Pneumococcal Conjugate Vaccine (PCV) rollout
 PI : Dr. S. Dutta, ICMR-NICED
 Funding Agency : ICMR, Delhi
 Period :

Title : ICMR Task Force Project on Rational Use of Medicines
 PI : Dr. S. Dutta, ICMR-NICED
 Funding Agency : ICMR
 Period : 2019-2020

Title : Mobile Application for Immunization Data in India (MAIDI)
 PI : Dr. S. Dutta, ICMR-NICED
 CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. S. Basak, ICMR-NICED, Dr. A. Sinha ICMR-NICED
 Funding Agency : DBT-BIRAC
 Period : 2019 to 2020

Title : Human pulmonary paragonimiasis in crab eating communities and smear negative suspected TB cases from some states of India.
 PI : Dr. S. Dutta, ICMR-NICED
 CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. S. Ganguly (Co-PI), ICMR-NICED
 Funding Agency : Indian Council of Medical Research
 Period (20-- to 20--) : 2018-2021

Title : Establishment of a Network of Laboratories for Managing Epidemics and Natural Calamities
 PI : Dr. S. Dutta, ICMR-NICED
 CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. M.K. Saha, ICMR-NICED, Dr. M. Chawla Sarkar, ICMR-NICED, Dr. P. Chandra Sadhukhan, ICMR-NICED
 Funding Agency : DHR
 Period : 2013-14 to 2017-18
 2017-18 to 2019-20

Title : Congenital Rubella Syndrome Surveillance in India
 PI : Dr. Shanta Dutta (NICED)

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| CoI/CoPI/ collaborators with name of collaborating institute(s) | Dr. Jaydeb Ray (ICH) Dr. Agniva Majumdar (NICED) Dr. Aniruddha Ghosh (ICH) |
| Funding Agency | : UNDP |
| Period | : 2019-2022 |
| Title | : Seasonal dynamics of enteropathogenic bacteria in Gulf of Khambhat, Gujarat: its impact on health of coastal population (ICMR-NICED & CSIR-CSMCRI collaboration) |
| PI | : Dr. A. Palit, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : Dr. Soumya Halder, CSIR-CSMCRI, Bhavnagar, Gujarat |
| Funding Agency | : Ministry of Earth Sciences, GOI |
| Period | : 2016-2019 |
| Title | : Apoptosis and molecular targeting therapy in cancer by microbial proteases |
| PI | : Dr. A. Pal, ICMR-NICED |
| Funding Agency | : DST-SERB |
| Period | : 2017-2020 |
| Title | : Studies on a novel virulence factor YghJ in Gram negative pathogens causing neonatal septicaemia |
| PI | : Dr R. Tapader |
| Mentor | Dr. A. Pal, ICMR-NICED |
| Funding Agency | : ICMR-PDF |
| Period | : 2016-2019 |
| Title | : Targeting pro-apoptotic peptide for PAR1 mediated programmed cell death in colon cancer cell |
| PI | : Dr T. Ray |
| Mentor | Dr. A. Pal, ICMR-NICED |
| Funding Agency | : DBT Women's Scientist |
| Period | : 2017-2020 |
| Title | : External Quality Assurance for HIV testing |
| PI | : Dr. M. K. Saha |
| Funding Agency | : National AIDS Control Organization |
| Period | : 2002 - 2019 |
| Title | : HIV Sentinel Surveillance |
| PI | : Dr. M. K. Saha |
| Funding Agency | : National AIDS Control Organization |

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|----------------|---|---|
| Period | : | 2008-2019 |
| Title | : | Evaluation of diagnostic kits for HIV, HBV and HCV |
| PI | : | Dr. M. K. Saha |
| Funding Agency | : | National AIDS Control Organization |
| Period | : | 2015 – 2020 |
| Title | : | Molecular detection of HIV in infants and children under age of 18 months |
| PI | : | Dr. M. K. Saha |
| Funding Agency | : | National AIDS Control Organization |
| Period | : | 2012 – 2019 |
| Title | : | Counseling and Testing for HIV, Blood Borne Infections and STIs |
| PI | : | Dr. M. K. Saha |
| Funding Agency | : | WBSAP&CS |
| Period | : | 2012 - 2019 |
| Title | : | Molecular assay for HIV-1 Plasma Viral Load |
| PI | : | Dr. M. K. Saha |
| Funding Agency | : | National AIDS Control Organization |
| Period | : | 2015 - 2019 |
| Title | : | Behavioural Surveillance Survey <i>Lite</i> (BSS- <i>Lite</i>) |
| PI | : | Dr. M. K. Saha |
| Funding Agency | : | National AIDS Control Organization |
| Period | : | 2018 - 2020 |
| Title | : | Evaluation of impact of antiretroviral therapy under National AIDS Control Program in India |
| PI | : | Dr. M. K. Saha |
| Funding Agency | : | National AIDS Control Organization |
| Period | : | 2017-19 |
| Title | : | Molecular diversity of Hepatitis C virus in a tertiary care hospital of Manipur, India |
| PI | : | Dr. M. K. Saha |
| Funding Agency | : | DBT, Govt. of India |
| Period | : | 2018-21 |

Title : Regulation of the colonization factor CS6 of enterotoxigenic *Escherichia coli* in pathogenesis

PI : Dr. N. S. Chatterjee, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. A. K. Mukhopadhyay, ICMR-NICED

Funding Agency : Dept. of Biotechnology, Govt. of India

Period : 2019-22

Title : The Interplay Of Climate And Non-Climate Factors In Determining The Risks And Predicting Outbreaks Of Waterborne Diseases

Project Coordinator : Dr. S Dutta, ICMR-NICED

PI : Dr. A. Kumar Deb, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. A. Palit, ICMR-NICED
Dr. F. Debnath, ICMR-NICED
Dr. A. De, IPGME&R, Kolkata

Funding Agency : DST, Govt. of India

Period : 2017-2020

Title : Etiology of Childhood Pneumonia in India: An ICMR Task Force Study

Project Coordinator : Dr. S. Dutta, ICMR-NICED

PI : Dr. A. K. Deb, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. A. K. Mukhopadhyay, ICMR-NICED
Dr. M. Chawla Sarkar, ICMR-NICED
Dr. S. Kanungo, ICMR-NICED
Dr. S. Ghosh, HOD, Pediatrics, BCRPGIPS
Dr. S. Samanta, MSVP, BCRPGIPS

Funding Agency : ICMR

Period : 2017-2019

Title : Retrospective analysis on the evolutionary aspects of *Vibrio cholerae*

PI : Dr. A. K. Mukhopadhyay, ICMR-NICED

collaborators with name of collaborating institute(s) : Dr. Makato Onishi and Dr. Masatomo Morita; NIID, Japan

Funding Agency : NIID, Japan

Period : 2015-2020

Title : Changing pattern of the *Vibrio cholerae* strains in India along with the antimicrobial resistance and its

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| | relationship with pathogenesis for better management of cholera |
| PI | : Dr. A.K. Mukhopadhyay, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : Dr. H. Koley, ICMR-NICED and Dr. S. Das, ICMR-NICED |
| Funding Agency | : AMED, Japan |
| Period | : 2015-2020 |
| | |
| Title | : Role of <i>Helicobacter pylori</i> Tumour Necrosis Factor Alpha inducing protein (Tip Alpha) in causing gastro duodenal diseases including gastric cancer |
| PI | : Dr. Rajashree Das (Amity University) |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : Dr. A. K. Mukhopadhyay (Co-PI), ICMR-NICED |
| Funding Agency | : ICMR |
| Period | : 2017-2020 |
| | |
| Title | : Exploratory study to standardize PCR tests on paraffin sections to detect <i>Helicobacter pylori</i> and compare with other detection tests |
| PI | : Dr. A. K. Mukhopadhyay, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : Dr. R. Sukanya (ICMR-NCDIR, Bengaluru) |
| Funding Agency | : ICMR |
| Period | : 2017-2019 |
| | |
| Title | : Deciphering the Mechanisms of Invasion by Salmonella Invasins |
| PI | : Dr S. Das, ICMR-NICED |
| Funding Agency | : Department of Science and Technology |
| Period | : 2017-20 |
| | |
| Title | : Studies on therapeutic peptides against human <i>Salmonella</i> infections as drugs and vaccine adjuvants |
| PI | : Dr S. Das, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : Dr Anirban Bhunia, Bose Institute, Kolkata Prof Keinosuke Okamoto, Okayama University, Japan. |
| Funding Agency | : Okayama University, Japan. |
| Period | : 2015-2020 |

Title : State wise prevalence mapping of soil transmitted helminthes in Indian children to support health impact evaluation. A ministry of health and family welfare, Govt. of India initiative through NCDC.

PI : Dr. S. Ganguly (Eastern nodal PI)

Funding Agency : WHO and DTWi

Period : 2015-2019

Title : Isolation and molecular characterization of Tenascin in Giardia and its role in pathogenicity.

PI : Dr. S. Ganguly, ICMR-NICED

Funding Agency : Council of Scientific and Industrial Research

Period : 2017-2022

Title : Differential pathogenesis of Giardia : Role of Giardia Virus” under the mother project “Laboratory –based collaboration network of infectious diseases in Asia

PI : Dr. S. Ganguly, ICMR-NICED

Funding Agency : National Institute of Infectious Diseases, Japan

Period : 2011-2020

Title : Characterization of the Pathogenic Factors of Local Isolates of *Giardia lamblia*.

PI : Dr. S. Ganguly, ICMR-NICED

Funding Agency : Indian Council of Medical Research

Period (20-- to 20--) : 2017-2022

Title : Study of regulation of RNA interference during rotavirus infection and characterization of cellular miRNAs as novel antiviral therapeutics.

PI : Dr. M. Chawla Sarkar, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. Anupam Mukherjee (Ramanujam Fellow Scientist)

Funding Agency : DST-SERB

Period (20-- to 20--) : 3 years (2018 to 2021)

Title : An approach to identify the environmental drivers modulating rotavirus seasonality

PI : Dr. M. Chawla Sarkar, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : R. K Nandy, ICMR-NICED
Dr. A. K Deb, ICMR-NICED

Funding Agency : ICMR

Period : 3 years (2017 to 2020)

Title : Coupling virus-host interaction to host subcellular quantitative proteomics: An unbiased integrated approach to decipher host determinants for rotaviral infection

PI : Dr. M. Chawla Sarkar, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. N. S Chatterjee, ICMR-NICED

Funding Agency : WB-DST

Period : 3 years (2018-2021)

Title : Burden of Antibiotic Resistance in Neonates from Developing Societies(BARNARDS)

PI : Dr. T. R. Walsh, Cardiff University
Dr. S. Basu (India Site), ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. R.K. Nandy ICMR-NICED
Dr. S. Mukherjee, IPGEMR,Kolkata, Dr. B. Saha IPGEMR,Kolkata

Funding Agency : Cardiff University, UK with support from Bill & Melinda Gates foundation, USA.

Period : 2017—2018

Title : Assessing drug resistance in Enterobacteriaceae causing neonatal sepsis in North-East India: resistance mechanisms and transmission.

PI : Dr. S. K. Debbarma, AGMC, Tripura

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. S. Basu, ICMR-NICED, Dr. T Majumdar, AGMC, Tripura

Funding Agency : ICMR

Period : 2015—2018

Title : Acquired mechanisms of quinolone resistance in carbapenem-resistant Enterobacteriaceae: relevance in neonatal health care

PI : Dr. S. Basu, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr. T. Some (IPGEMR,Kolkata)

Funding Agency : Dept. of Science & Technology, Govt. of West Bengal

Period : 2015—2018

Title : Development of Nanoparticle or Microparticle Adjuvanted Subunit oral Vaccine against Poultry Salmonellosis

PI : DR. H. Koley, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Dr.S. Tamuly(AAU), Dr. D. Chowdhury(IASST)

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| Funding Agency | : | DBT BCIL-NER |
| Period | : | 2016-2019 |
| Title | : | Indian Network of population-based Surveillance Platform for Influenza and other Respiratory viruses among Elderly (INSPIRE) |
| PI | : | Dr. S. Kanungo, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : | Dr. A. Chakrabarti, ICMR-NICED |
| Funding Agency | : | All India Institute of Medical Sciences, New Delhi in collaboration with Centre for Disease Control and Prevention, Atlanta, USA |
| Period | : | 2017-2020 |
| Title | : | Immunogenicity and Safety of Rotavac® and Rotasiil® Administered in an Interchangeable Dosing Schedule among Healthy Indian Infants: A Multicentric, Phase IV, Open-Labeled, Randomized, Controlled Trial (Protocol Version no. 1.2 dated 11 Dec 2017). |
| PI | : | Dr. S. Kanungo, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : | Dr. R.K. Nandy, ICMR-NICED, Dr. P. Chatterjee, ICMR-NICED, Dr. S. Samanta, |
| Funding Agency | : | Ministry of Health and Family Welfare, Govt. of India |
| Period | : | 2018-2020 |
| Title | : | Strengthening/ Promoting evidence based advocacy for influenza prevention and control in India |
| PI | : | Dr. S. Kanungo, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : | Dr Alok Kumar Chakrabarti (Lab PI) |
| Funding Agency | : | CDC-AIIMS |
| Period | : | 2017-2021 |
| Title | : | Strategy to study screening of anti- CMV (Cytomegalovirus) compounds from some medicinal and edible mushrooms |
| PI | : | Dr. N. Chakraborty, ICMR-NICED |
| CoI/CoPI/ collaborators with name of collaborating institute(s) | : | Dr. Swapan kr. Ghosh, PG Department of Botany, Ramakrishna Mission Vivekananda Centenary College, Rahara N (24) Parganas |
| Funding Agency | : | WB-DST (2017-2020), Sanction No. 934(Sanc.)/ST/P/S&T/1G-10/2016 |
| Period | : | August 2018 to July 2021 |

Title : Studies on genomic variations of hepatitis C virus among multi-transfused thalassemic patient in West Bengal

PI : Dr. P. C. Sadhukhan, ICMR-NICED

CoI/CoPI/ collaborators with name of collaborating institute(s) : Co-I: Prof. Maitreyee Bhattacharyya

Funding Agency : West Bengal DST

Period : 2015-2018 (Till continuing)

Title : Development of rapid, sensitive one-tube duplex RT-PCR assay for specific and differential diagnosis of Chikungunya and Dengue

PI : Dr. P. C. Sadhukhan, ICMR-NICED

Funding Agency : ICMR (Extramural)

Period : 2017-2019

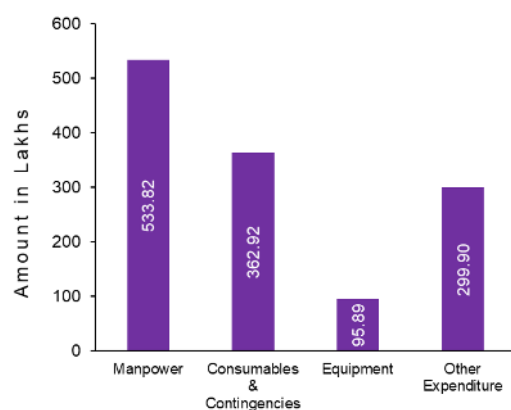
Title : A systematic assessment of acute viral hepatitis and chronic liver diseases in Northeast India with special reference to strengthening of laboratories in the region.

Site PI : Dr. P. C. Sadhukhan, ICMR-NICED

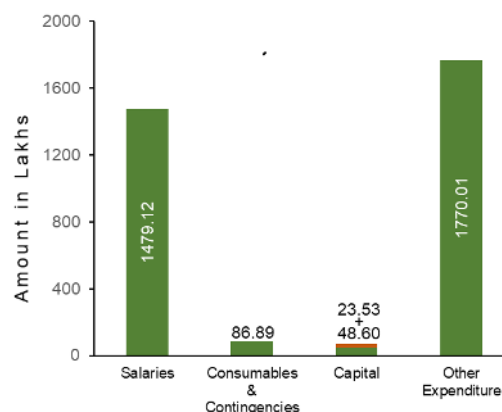
Site Co-PI: Dr. A. Sinha, ICMR-NICED

Funding Agency : ICMR (Extramural)

Period : 2018-2021



Extramural grant heads for F.Y. 2017-19
(Total no. of projects = 56)



Intramural grant heads for F.Y. 2017-19
(Total no. of projects = 29)

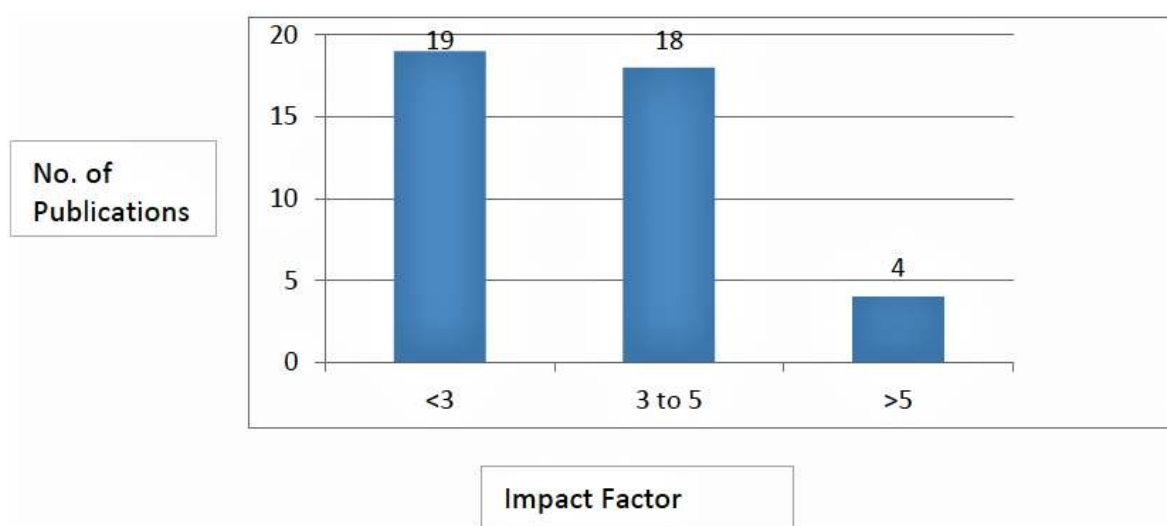
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2. Banerjee A, Lo M, Indwar P, Deb A. K., Das S, Manna B, Dutta S, Bhadra U, Bhattacharya M, Okamoto K, Chawla-Sarkar M. Upsurge and spread of G3 rotaviruses in Eastern India (2014–2016): Full genome analyses reveals heterogeneity within Wa-like genomic constellation. Infect Genet Evol. 2018 Sept; 63: 158-174.
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4. Bhakat D, Debnath A, Naik R, Chowdhury G, Deb A, Mukhopadhyay A, Chatterjee NS. Identification of common virulence factors present in enterotoxigenic *Escherichia coli* isolated from diarrheal patients in Kolkata, India. J Appl. Microbiol. 2019 Jan; 126(1): 255-265
5. Bhattacharyya KK, Biswas A, Gupta D, Sadhukhan PC. Experience of HCV Sero-prevalence and its Genomic Diversity among Transfusion Dependent Thalassemia Patients in a Transfusion Centre. Asian Journal of Transfusion Science. 2018 Jul; 12(2): 112-116.
6. Biswas A, Gupta N, Gupta D, Datta A, Firdaus R, Chowdhury P, Bhattacharyya M, Sadhukhan PC. Association of TNF-alpha (-308 A/G) and IFN-gamma (+874 A/T) gene polymorphisms in response to spontaneous and treatment induced viral clearance in HCV infected multitransfused thalassemic patients. Cytokine. 2018 Jun; 106:148-153.
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8. Chatterjee P, Kanungo S, Dutta S. Challenges for programmatic implementation of killed whole cell oral cholera vaccines for prevention and control of cholera: a meta-opinion. Expert Opinion Biol. Therapy. 2018 Aug;18(9):983-988
9. Chatterjee P, Seth B, Biswas T, Bera K. Burden of H1N1 Influenza in India (2010-2017): Identifying Hotspots and Policy Directions. American Journal of Respiratory and Critical Care Medicine. 2018 May; 197:A4948.
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14. Chowdhury R, Das S, Ta A, Das S. Epithelial invasion by *Salmonella* Typhi using STIV-Met Interaction. Cell Microbiol. 2019 Mar;21(3):e12982.

15. Das S, Dutta M, Sen A, Ghosh AN. Structural analysis and proteomics studies on the Myoviridae vibriophage M4. Arch Virol. 2019 Feb;164(2):523-534.
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Book Chapter

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ADMINISTRATION

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| Dr. Sanjay Mehendale Former ADG, ICMR & Research Director, PD Hinduja Hospital, Mumbai | : Member |
| Dr. Bhaskar Saha Scientist 'G' National Centre for Cell Science NCCS Complex, Pune University Campus Ganeshkhind, Pune- 411 007 | : Member |
| Dr. Neelam Taneja Professor & In-charge Enteric Laboratory Dept. of Medical Microbiology, Post Graduate Institute of Medical Education and Research (PGIMER) Sector-12, Chandigarh - 1610012 | : Member |
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| Dr. R.R. Gangakhedkar | : ICMR Representative |

Division of ECD and Communicable Diseases
ICMR HQs, New Delhi

Dr. Shanta Dutta : Member Secretary

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Professor & Head
Department of Clinical & Experimental Pharmacology
Calcutta School of Tropical Medicine
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Prof. Subir Kumar Dutta : Member
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CF 198, Salt Lake, Sector I,
Kolkata – 700064

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Kolkata- 700106

Dr. Suman Kanungo : Member
Scientist-E
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Beliaghata, Kolkata –700010

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Social Scientist, Medica Superspeciality Hospital
127 Mukundapur, Kolkata – 700099

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Saikat Apartment
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Kolkata – 700 060

Mr. Chinmoy Guhathakurta : Member
792/1 Raj Danga Main Road
Kolkata –700107

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129/35 S. N. Roy Road
Kolkata –700038

Mr. Tapan Kanti Sengupta : Member
26/12 Jhil Road, Dhakuria
Kolkata – 700031

Dr. P. Dutta : Member
Former Scientist
ICMR-NICED, Kolkata

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Biological discipline

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Biological discipline

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Uttarayan, Block D, Flat 2C, 40 Dum Dum Road, Kolkata 74
Veterinarian Member

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Calcutta University, 92, APC Road, Kolkata -700009
Main Nominee, CPCSEA

Dr. Capt. Kamal Kanti Dutta, Natritam (NGO) : Member
Link Nominee, CPCSEA

Dr. Sikha Dutta, Dept. of Pharmacology, Govt. of West Bengal : Member
Medical College, Flat 34, 20 Manik Tata Road Kolkata 54 -
Scientist from outside Institute, CPCSE

Mr. Biswajit Lahiri, : Member
1/ Bhutnath Mukherjee Road, Shibpur
Howrah, West Bengal, Pin – 711102,
Socially Aware Nominee, CPCSEA

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Dr. Nabendu Sekhar Chatterjee, Scientist-F : Member Secretary
Dr. Asis Kr. Mukhopadhyay, Scientist-E : Member
Dr. Mamta Chawla Sarkar, Scientist-E : Member
Dr. Suman Kanungo, MBBS, DPH : Medical/Biosafety Officer
Dr. Rupak Bhadra, Sr. Principal Scientist, : External Expert
Division of Infectious Diseases and Immunology,
CSIR-IICB, Kol.

| | |
|--|---------------|
| Dr. Parminal Karmakar, Prof. Dept. of Life Science and Biotechnology, Jadavpur University, Kolkata | : DBT Nominee |
|--|---------------|

Right to Information Act (RTI)

| | |
|---|---|
| Dr. Ranjan Kr. Nandy, Scientist-E | : Appellate Authority |
| Dr. Sulagna Basu, Scientist-E | : CPIO (Central Public Information Officer) |
| Administrative Officer | : CPIO |
| Mr. Shyamal Kr. Das, Private Secretary | : CPIO |
| Mr. Avijit Chakraborty, Technical Assistant | : Coordinator |

Official Language Implementation Committee

| | |
|--------------------------------------|-------------------|
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| Dr. Falguni Debnath, Scientist-C | : Member |
| Dr. Pallavi Indwar, Scientist-B | : Member |
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| Mr. Sunil Bernard, Private Secretary | : Member |
| Mr. Sudhir Omesh, TO-A | : Member |
| Mr. Vishwanath Besra, Assistant | : Member |

SC/ST cell

| | |
|--|-------------------------------|
| Dr. Malay Kr. Saha, Scientist 'F' | : Chairperson/Liaison Officer |
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| Dr. Pallavi Indwar, Scientist 'B' | : Member |
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| Mr. Vishwanath Besra, Assistant | : Member |

Grievance Cell

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| Dr. Sulagna Basu, Scientist-E | : Chairperson |
| Dr. Suman Kanungo, Scientist-E | : Member |
| Administrative Officer, NICED | : Member |
| Mr. Pradip Kr. Bose, Section Officer | : Member Secretary |
| Mr. Vishwanath Besra, Assistant | : Member |
| Mr. Somesh Chandra Bhunia, Sr.TO-2 | : Member |
| Mr. Sudhir Omesh, TO-A | : Member |

Internal Complaints Committee of ICMR-NICED for Sexual Harassment of Women at Workplace

| | |
|--------------------------------------|---------------|
| Dr. Triveni Krishnan, Scientist-F | : Chairperson |
| Dr. Mamta Chawla Sarkar, Scientist-E | : Member |

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|---|---|--------|
| Dr. Sulagna Basu, Scientist-E | : | Member |
| Mr. Tapan Kr. Saha, Admin. Officer | : | Member |
| Smt. Arpita Sarbajna, Technical Officer-A | : | Member |

From 20th June, 2018

| | | |
|---|---|------------------|
| Dr. Sulagna Basu, Scientist-E, NICED | : | Chairperson |
| Dr. Falguni Debnath, Scientist-C, NICED | : | Member |
| Administrative Officer, ICMR, NICED | : | Member |
| Ms. Saheli Samanta, Sr.TO-2, NICED | : | Member Secretary |
| Mr. Pradip Bose, Section Officer, NICED | : | Member |

| | | |
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| Dr. Miratun Nahar, President, Talash, NGO | : | External Member from |
| (Email: nahar1949@gmail.com ; Mob:9830553133) | : | NGO |

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| Dr. N.S. Chatterjee, Scientist-F | : | Working Chairperson |
| Dr. Mamta Chawla Sarkar, Scientist-E | : | Coordinator |
| Dr. Suman Kanungo, Scientist-E | : | Member |
| Dr. Moumita Bhowmick, Scientist-C | : | Member |
| Administrative Officer | : | Member |
| Mrs. Saheli Samanta, Sr.Technical Officer-2 | : | Member |

From 18th September, 2018

| | | |
|--|---|---------------------|
| Dr. Shanta Dutta, Director & Scientist-G | : | Chairperson |
| Dr. Ranjan Kumar Nandy, Scientist-F | : | Working Chairperson |
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| Dr. Surajit Basak, Scientist-C | : | Member |
| Administrative Officer | : | Member |
| Mrs. Saheli Samanta, Sr. Technical Officer-2 | : | Coordinator |
| Mr. Tapas Pal, Sr. Technical Officer-1 | : | Member |

Purchase Committee

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| Dr. Amit Pal, Scientist-F | : | Chairperson |
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| Dr. Alok Kr. Deb, Scientist-E | : | Member |
| Dr. Ranjan Kr. Nandy, Scientist-E | : | Member |
| Dr. Sandipan Ganguly, Scientist-E | : | Member |
| Administrative Officer | : | Member |
| Mr. Gopal Ch. Das, Store-in-Charge | : | Member |

From 12th November, 2018

| | | |
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| Dr. Malay Kr. Saha, Scientist-F | : | Member |
| Dr. Abhik Sinha, Scientist-C | : | Member |
| Dr. Moumita Dutta, Scientist-C | : | Member |
| Mr. Vishwanath Besra, Store-in-Charge | : | Member |

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| Dr. Sandipan Ganguly, Scientist-E | : | Co-opt Member |
| Mr. Sunil Bernard, Private Secretary | : | Member |
| Mrs. Saheli Samanta, ALIO | : | Coordinator |

From 18th September, 2018

| | | |
|--|---|---------------------|
| Dr. Shanta Dutta, Director-in-Charge | : | Chairperson |
| Dr. Ranjan Kumar Nandy, Scientist-F | : | Working Chairperson |
| Dr. Falguni Debnath, Scientist-C | : | Member |
| Dr. Surajit Basak, Scientist-C | : | Member |
| Mrs. Saheli Samanta, Sr. Technical Officer-2 | : | Coordinator |
| Mr. Tapas Pal, Sr. Technical Officer-1 | : | Member |
| Mr. Sunil Bernard, Private Secretary | : | Member |
| Mr. Vishwanath Besra, Assistant | : | Member |

Staff List

Scientists:

Dr. S. Dutta, Scientist G & Director
Dr. A. Palit, Scientist G
Dr. A. Pal, Scientist G
Dr. M. K. Saha, Scientist G
Dr. N. S. Chatterjee, Scientist-F
Dr. R K Nandy, Scientist F
Dr. A.K. Deb, Scientist F
Dr. A. K. Mukhopadhyay, Scientist F
Dr. S. Das, Scientist F
Dr. S. Ganguly, Scientist E
Dr. M. Chawla Sarkar, Scientist E
Dr. S. Basu, Scientist E
Dr H. Koley. Scientist E

Dr. S. Kanungo, Scientist E
Dr. N. Chakraborty, Scientist E
Dr. P. C. Sadhukhan, Scientist E
Dr. A. K. Chakrabarti, Scientist D
Dr. F. Debnath, Scientist C
Dr. A. Sinha, Scientist C
Dr. M. Bhaumik (Ghosh), Scientist C
Dr. M. Dutta, Scientist C
Dr. S. Basak, Scientist C
Dr. P. Indwar, Scientist C
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Dr. S. Bhattacharya, Scientist B,

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Mr. S. R. Ghosh, Technical Officer A
Mr. A. Ganai, Technical Officer
Ms. M. Mallick, Technical Officer
Mr. T. Barman, Technical Officer
Mr. S. De, Technical Assistant
Ms. M. Das, Technician (2)
Mr. M. L. Gupta, Technician-B
Mr. P. Samanta, Laboratory Assistant
Mr. S. Dey, MTS (General)
Mr. Subrata Kumar Singha

Clinical Medicine Division

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Mr. K. G. Saha, Laboratory Assistant
Mr. S. Turi, Laboratory Assistant
Mr. A. Pramanik, MTS (General)

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Mr. B. R. Mallick, Laboratory Attendant-2

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Mr. S. Kr. Biswas, Laboratory Technician

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Mr. C. Mandal, Sr. Technical Officer (1),
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Mr. Supriya Basu, Health Assistant

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Mr. N. C. Mondal, Laboratory Assistant

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Mr. K. Sen, Technical Assistant
Ms. P. De, Technical Assistant
Md. M. Hossain, Sr. Technician (1)
Ms. C. Das, Laboratory Assistant

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Mr. S. Sen, Personal Assistant
Mr. N. G. Sutradhar, Laboratory Assistant

Department of Animal House

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Mr. S. Hari, Laboratory Assistant
Mr. P. Turi, Laboratory Assistant
Mr. R. Hazra, Laboratory Assistant
Mr. S. Balmiki, Laboratory Assistant

Library:

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Mr. T. Pal, Sr. Technical Officer (1)
Mr. B. Roy, Lab. Assistant

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Mr. A. R. Das, Care Taker
Mr. S. K. Dey, Technical Assistant
Mr. K. Dey, Sr. Technician-1
Mr. S. K. Routh, Laboratory Assistant
Mr. B. Mandi, Laboratory Assistant
Mr. B. Das, Laboratory Assistant
Mr. S. Mullick, Laboratory Assistant
Mr. S. Hazra, Laboratory Assistant
Mr. A. Das, Laboratory Assistant
Mr. B. Moshi, Laboratory Assistant
Ms. B. Hela, Laboratory Assistant
Mr. D. Turi, Laboratory Assistant
Mr. A. Seal, MTS (General)
Mr. S. Maiti, MTS (General)

Media Section:

Dr. A. Palit, Scientist-G
Mr. K. Ghosal, Lab. Assistant
Mr. S. Mondal, MTS(Technical)
Mr. V. K. Singh, Lab. Assistant

Training & Extension

Mr. A. Jana, Technician B
Mr. S. Adhikary, Laboratory Assistant

Store Section:

Mr. V. Besra, Assistant
Mr. S. Omesh, Technical Officer-A
Mr. A. Mitra, Sr. Technician (2)
Mr. B. Mitra, Lab. Asst.

Office of Administrative Officer

Dr. A. Pal, Administrative Officer (Additional Charge)
Mr. S. K. Das, Private Secretary (till 31.12.2018)
Ms. R. Jaiswal, Upper Division Clerk
Mr. Kh. I. Singh, MTS (General)

Accounts Section:

Dr. A. Palit, Accounts Officer (Addl. Charge)
Mr. Ratan Chowdhury, Assistant
Mr. Dipak Kumar Gayen, Upper Division Clerk
Mr. Prasenjit Guha, Upper Division Clerk

Cash Section:

Mr. Chinmoy Kumar Naskar, Assistant
Mr. Ranjit Biswas, UDC (upto 31.12.2018)
Mr. Kishore Sharma, UDC

Despatch Section:

Mr. A. Chandra, UDC
Mr. A. Kumar Roy, Lab. Assistant
Mr. A. Banerjee, Telephone Operator
Mr. J. Malakar, Lab. Asst.

Establishment Section:

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Mr. G. Ch. Das, Asst
Mr. B. Ganguly, Technician (1) (Half Duty)
Mrs. M. Bhattacharya, Lab. Attendant (2)

Pension Section:

Mr. P. K. Bose, Section Officer
Mr. R. L. Saha, Sr. Technical Officer (2)
Mr. B. Ganguly, Technician (1) (Half Duty)

Personnel Section:

Mr. Pradip Bhadra, Section Officer
Mr. Avijit Chakraborty, TA
Mr. Somnath Mullick, UDC
Mr. Rajesh Hela, Lab. Assistant

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Mr. H. P. Das, Sr. Technician (2)
Mr. A. K. Dutta, Driver (Grade II)
Mr. R. Bhakta (Driver-cum-Mechanic Gr.II)
Mr. S. Das, Driver (Grade II)

Mr. S. K. Ghosh, Driver (Ordinary Grade)
Mr. D. Dey, Driver (Ordinary Grade)

Regional VRDL, ICMR-NICED

Scientists

Dr. A. Majumdar, Research Scientist II (Medical)
Dr. S. Mukherjee, Research Scientist II (Non-Medical)
Dr. H. Banu, Research Scientist I (Medical)
Dr. A. Chatterjee, Research Scientist I (Non-Medical)

Ms. Madhumonti Biswas, Research Assistant
Mr. Rudrak Gupta, Research Assistant
Mr. Suman Das, Laboratory Technician
Ms. Shreema Chakraborti, Laboratory Technician
Mr. Satyabrata Ghorai, Laboratory Technician
Mr. Chinmoy Mondal, Laboratory Technician
Mr. Soumodip Mitra, Data Entry Operator
Mr. Nayan Basuli, Data Entry Operator

Mr. Biswajit Dey, MTS
Mr. Kartick Chandra Mondal, MTS
Mr. Tapan Turi, MTS
Mr. Ranajoy Sarkar, MTS
Ms. Sutapa Hazra, MTS
Mr. Asish Kumar Jana, MTS
Mr. Arghyadip Majumder, Laboratory Technician, CRSS

Scientists Associated with ICMR-NICED

Dr. A. Ghosh, J.C. Bose Distinguished Chair Professor, National Academy of Science, India
Dr. M. K. Chakrabarti, ICMR Emeritus Scientist
Dr. A. N. Ghosh, ICMR Emeritus Scientist
Dr. M. K. Bhattacharya, ICMR Emeritus Scientist
Dr. B. L. Sarkar, ICMR Emeritus Scientist
Dr. B. Manna, ICMR Emeritus Scientist

Retired Employees of the Institute during 2018-19

| <i>Name</i> | <i>Designation</i> | <i>Date of Retirement</i> |
|-----------------------|----------------------|---------------------------|
| Dr. Triveni Krishnan | Scientist F | 30.04.2018 |
| Mr. Guru Charan Tudu | Laboratory Assistant | 31.05.2018 |
| Mr. Tapan Kr. Paul | Laboratory Assistant | 31.08.2018 |
| Mr. Rajbir Balmiki | Technician C | 30.09.2018 |
| Mr. Ashim Kumar Saha | Laboratory Assistant | 30.09.2018 |
| Mr. Shyamal Kumar Das | Private Secretary | 31.12.2018 |
| Mr. Ranjit Biswas | Assistant | 31.12.2018 |
| Mr. Gobinda Kundu | Assistant | 31.01.2019 |
| Mr. Sipaya Hari | Laboratory Assistant | 31.01.2019 |
| Mr. S. L. P. Singh | Technician B | 31.01.2019 |

Obituary...our tribute and homage

"You will always be remembered...rest in eternal peace"

| Name of the Employee | Designation | Date of Retirement | Passed away on |
|-------------------------|----------------|--------------------|----------------|
| Mrs. B. Guhathakurta | Dy. Director | 30/09/1999 | 04/03/2018 |
| Mr. Sankar Ch. Sen | T.O.(A) | 30/04/2011 | 04/12/2018 |
| Mr. K. K. Sadhu | Care Taker | 30/09/2000 | 25/08/2018 |
| Mr. S. P. Guin | T.O. | 31/05/2009 | 28/10/2018 |
| Mr. Mrinalendu Ghosh | Lab. Assistant | 31/10/1999 | 27/01/2018 |
| Mr. B. Nag | T.A. | 31/12/1994 | 08/04/2019 |
| Mr. C. R. Bose | A.O. | 30/06/2007 | 01/02/2019 |
| Mr. Subhas Chandra Saha | T.A. | 30/11/2015 | 06/04/2019 |
| Mr. S. N. Smanata | Lab. Assistant | 31/08/1999 | 14/03/2019 |