2019-20

उपलब्धि एवं कार्यकलाप रिपोर्ट

ACHIEVEMENT & ACTIVITY REPORT

स्वास्थ्य अनुसंधान विभाग
Department of Health Research

स्वास्थ्य और परिवार कल्याण मंत्रालय Ministry of Health & Family Welfare

भारत सरकार / Government of India

The Achievement & Activity Report was compiled by the following editorial team

Dr. Shanta Dutta, Director & Scientist G	Chairperson
Dr. Nabendu Sekhar Chatterjee, Scientist F	Acting Chairperson
Dr. Alok Kr. Deb, Scientist F	Member
Dr. Sulagna Basu, Scientist F	Member
Mrs. Saheli Samanta, Sr. Technical Officer (2)	Member
Mr. Tapas Pal, Sr. Technical Officer (1)	Member

The scientific content of this report belongs to the individual scientist and does not reflect the view of the editorial team.

CONTENTS

S. Dutta (Principal Investigator), Bacteriology Division

Emergence of Third Generation Cephalosporin Resistant Salmonella Typhi blood isolate from Kolkata, India: Whole Genome Sequence Analysis

Over the past few decades emergence of antimicrobial resistant *S*. Typhi isolates possess a great public health concern for the treatment of enteric fever cases. Following the emergence of MDR (multidrug resistant) and fluoroquinolone resistant *S*. Typhi isolates, ceftriaxone and azithromycin have been increasingly used as alternative drugs for enteric fever treatment. In this study we report isolation of one *S*. Typhi isolate (KOL585) which was resistant to ampicillin, 3rd generation cephalosporin and its WGS (whole genome sequencing) analysis. The *S*. Typhi strain was isolated from a patient (31 years, male) admitted to Calcutta Medical Research Institute (CMRI) at Kolkata on 22nd June, 2019, with a history of high fever for 20 days and associated abdominal pain for last one month. He had a recent travel history to Delhi. He was treated with oral antibiotic azithromycin for five days. The *S*. Typhi isolate showed MIC value of ≥ 32µg of 3rd generation cephalosporin (ceftriaxone) as well as ampicillin (Table1). The Illumina Miseq platform was used to perform WGS of these isolates with 350bp chemistry. Raw data assembly was achieved denovo in SPADES assembler. The number of contigs (≥500bp) found upon genome assembly of this isolate was 82 with a genome coverage of 69x. Upon analysis, the presence of bla_{SHV12} gene was found responsible for 3rd generation cephalosporin resistance. In addition, the isolate harboured IncX3 plasmid (Table 2). The study isolate belongs to ST1 type and of 4.3.1.2 lineage (H58 haplotype) (Table 2). This is the first report *S*. Typhi isolates resistant to 3rd generation cephalosporin from Eastern region of India. The whole genome sequence of the study isolate has been deposited in the NCBI sequence read archive under the bio project (PRJNA623257) (Fig1).

Table 1. MIC value of the antibiotics against the *S*. typhi study isolates (KOL585)

Antibiotic	MIC (µg/ml)
Ampicillin	>32 (R)
Ciprofloxacin	0.5 (I)
Ofloxacin	1 (I)
Ceftriaxone	>32 (R)
Ceftazidime	>32 (R)
Cefotaxime	>32 (R)
Azythromycin	12 (S)

Abbreviation used: R, resistant; I, Intermediate; S, susceptible

Table 2. Summary of genome analysis of the *S*. Typhi blood isolates from Kolkata

Sample ID	KOL585
No. of contigs	82
Genomic length (bp)	4767777
G+C Content (%)	51.99
No. of CDS	5008
No. of functional protien	4385
Presence of antimicrobial resistance gene	bla_{SHV12}
Presence of plasmid	IncX3 (60bp)
QRDR mutation (*gyrA*)	S83Y
Haplotype	4.3.1.2 (H58)
MLST type	ST1

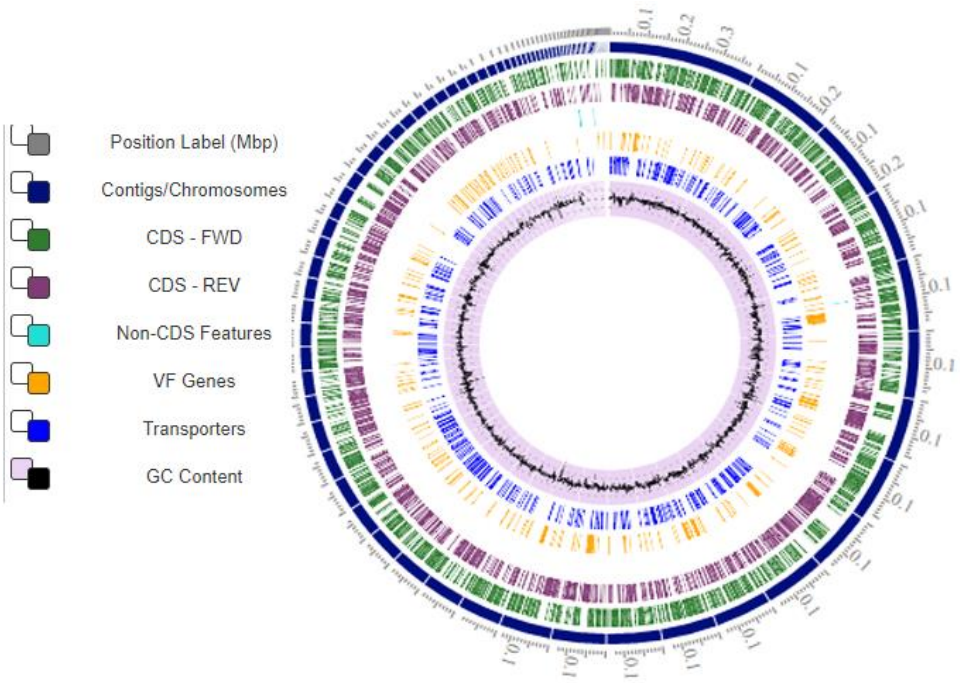


Fig 1. Circular view of the genome of *S.* Typhi isolate (KOL585)

Awards/ Honours received

- Elected as Fellow of National Academy of Sciences (FNASc), India for 2019.

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

April 2019

- Performance Review meeting of MRUs and MRHRUs held at DHR, New Delhi on 3-4th April, 2019

- Shigella Vaccine Technology - execution of the License Agreement and press release for transfer of this technology to Hilleman Labs in the presence of DG, ICMR, scientists from ICMR and NICED, scientists from BCIL and Hilleman held on 23rd April, 2019 at ICMR Hqr.

May 2019

- Participated in the workshop "Ethics in Human Health Research and Good Clinical Practice" organized by ICMR-NICED on 7th May, 2019 at NICED, Kolkata

June 2019

- 6th Annual meeting of the Global Task Force on Cholera Control (GTFCC) and Welcome Trust meeting on Cholera Research and Practice held on 3rd to 5th June, 2019 at the Foundation Merieux Conference Centre, Les Pensieres, in Veyrier du Lac, France
- The Expert meeting on "Using climate and weather information for predicting and preparing for cholera and vector-borne diseases" held on 25th to 26th June, 2019 at the World Meteorological Organization (WMO), 7bis Avenue de la Paix, Geneva, Switzerland jointly organized by the WHO, the WMO and the UK Met Office.

July 2019

- ICMR Technical Advisory Group meeting with PI's of Rational Use of Medicine to discuss the task force activity held on 22-23 July, 2019 at ICMR Hqrs.

August 2019

- Study Protocol Development Workshop of FIND/ICMR Collaborative Project on AMR Diagnostics Use Accelerator held on 1st and 2nd August 2019 at ICMR Headquarters, New Delhi
- First Conclave of DBT-TWAS Fellows held on 8-9th August, 2019 at Chennai
- Nominated by the Vice-Chancellor, Jadavpur University, as a Chairperson of the Selection Committee for promotion under Career Advancement Scheme to the post of Professor (Stage 4 to Stage 5) in the Department of Pharmaceutical Technology held on 19th August 2019 at 12.00 noon in the Committee Room No. I (Aurobinda Bhavan).
- Invited as Guest of Honour to attend the 61st Annual State Conference, Indian Public Health Association, West Bengal State Branch held on 31st August, 2019 at MCH Hub, Medical College and Hospital, Kolkata

September 2019

- Asian-African Research Forum in Emerging and Reemerging Infections 2019 organized by The Japan Agency for Medical Research and Development (AMED) held on September 5-6, 2019 in Sapporo, Japan

October 2019

- Experts committee meeting to review the concept proposal entitled “Cholera disease burden estimation and vaccine implementation" held on 14th October 2019 at ICMR-NIMS, New Delhi.
- Meeting with Prof. Balram Bhargava, Secy DHR & DG, ICMR with Dr. Jerome Kim and Dr. Julia Lynch on 16th October, 2019 at ICMR Hqrs.
- Invited as Special Guest for the 7th Convocation of National Institute of Pharmaceutical Education and Research (NIPER)-Kolkata held on 30th October, 2019 at Bose Institute, Unified Academic Campus, Bidhan Nagar, Kolkata

November 2019

- WHO Prequalification Evaluating Laboratories 2nd Meeting, held on 5th to 6th November, 2019 at WHO Hqrs. Geneva, Switzerland
- 2019 World Conference on Access to Medical Products - Achieving the SDGs 2030" held on 19th to 21st November, 2019 at Hotel the Grand, New Delhi
- ICMR-GARDP workshop for enabling AMR related clinical trials held on 25-26th November, 2019 at ICMR Hqrs.

December 2019

- Scientific Advisory Group (SAG) meeting of ECD held on 5-6 December, 2019 at ICMR Hqrs. New Delhi
- Invited to attend Research Advisory Committee (RAC) Meeting at Ph. D Cell of St. Xavier's College (Autonomous) Kolkata on 7th December, 2019
- 54th US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections to be held on 10th to 13th December, 2019 at Osaka University, Japan
- Stakeholder consultation for working paper on Preventive Health and Disease Surveillance held on 19th December, 2019 at NITI Aayog, Delhi
- 89th Annual Session of the National Academy of Sciences, India held on 21-23 December 2019 at ICAR-National Academy of Agricultural Research Management, Hyderabad

January 2020

- 15th Asian Conference on Diarrhoeal Disease and Nutrition (ASCODD 2020) held during 28-30th January, 2020 in Dhaka Bangladesh and delivered a lecture entitled “Challenges for programmatic implementation of oral cholera vaccine in India”

February 2020

- Meeting with DG, Andrew Azman and Shanta Dutta on 4th February, 2020 at ICMR Hqrs.

- Meeting to discuss utility of International training hostel at ROHC (E), Kolkata under the Chair of DG, ICMR on 4th February, 2020 at 2.00 pm at ICMR Hqrs.
- Attended the Foundation Day Lecture of National Institute of Biomedical Genomics, Kalyani by Prof. K. Vijay Raghavan, Principal Scientific Advisor to the Govt. of India on "Brains and Machines", at Science City Auditorium Prof. K. Vijay Raghavan at Science City on 24th February, 2020

Post and Pre-Doctoral 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

Nonmetabolizable arabinose inhibits *Vibrio cholerae* growth in M9 medium with gluconate as sole carbon source

Marine bacterium *Vibrio cholerae*, belonging to serogroups O1 and O139 are responsible to cause cholera in human. Pentose sugar arabinose is nonmetabolizable by the pathogen and is present in environmental niches as well as in the human intestine. In this study, arabinose mediated *V. cholerae* growth interference has been assessed in M9 minimal medium containing gluconate as sole carbon source in the light of Entner-Doudoroff (ED) pathway, an obligatory metabolic route for gluconate utilization. *V. cholerae* O1 and O139 strains failed to grow in presence of ≥0.3% arabinose in M9 with 0.2% gluconate but no growth inhibition in presence of arabinose in M9 with 0.2% glucose (Fig.2 and Table 3). Transcriptional analysis of *edd* and *eda*, the genes constituting the ED pathway, showed ~100 and ~17 folds increase, respectively, in M9-gluconate. Minor increase of ~4 and ~2 folds for the *edd* and *eda*, respectively, was noted in 0.5% arabinose supplemented AKI. Observed arabinose mediated growth inhibition also contributes to understanding of altered phenotypes, if any, during complementation/expression studies in *V. cholerae* with PBAD vectors and arabinose as an inducer.

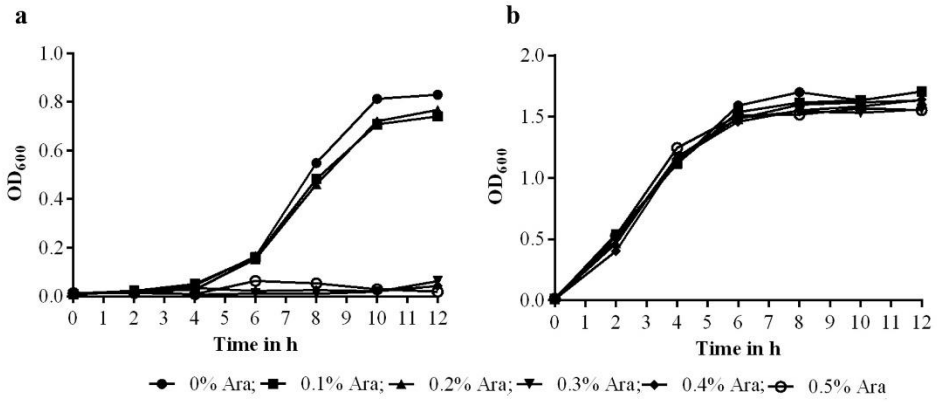


Fig 2: Growth phenotypes of *V. cholerae* O1 Inaba N16961 in M9-gluconate (a) and AKI pH 7.4 (b) media containing varied amount of arabinose. Cell opacity measured at 600 nm. Ara, L-arabinose

Table 3. Growth of *V. cholerae* under various cultural condition at 37°C, shaking for 12h

V. cholerae Strains	Serogroup	Serotype	Year of isolation/ (reference)	Growth characteristics in media						
				without arabinose supplementation				with 0.5% arabinose supplementation		
				AKI	M9-glucose	M9-gluconate		AKI	M9-glucose	M9-gluconate
N16961	O1	Inaba	(18)	+	+	+		+	+	-
4756	O1	Ogawa	2012	+	+	+		+	+	-
5752	O1	Ogawa	2013	+	+	+		+	+	-
6845	O1	Ogawa	2014	+	+	+		+	+	-
7176	O1	Ogawa	2014	+	+	+		+	+	-
7837	O1	Ogawa	2015	+	+	+		+	+	-
8148	O1	Ogawa	2015	+	+	+		+	+	-
9431	O1	Ogawa	2016	+	+	+		+	+	-
10964	O1	Ogawa	2017	+	+	+		+	+	-
MO10	O139	NA	(8)	+	+	+		+	+	-
AM233	O139	NA	1996	+	+	+		+	+	-
AM205	O139	NA	(40)	+	+	+		+	+	-

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

- Applied for one patent entitled 'Composition for management of *Vibrio cholerae* induced diarrhea'

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

- Attended workshop titled 'Ethics in Human Health Research and Good Clinical Practice' organized by ICMR-National Institute of Cholera and Enteric Diseases, May 7, 20219.
- Joined Training workshop upon nominated by the Director on e-Procurement at ICMR, Hqrs. on August 6, 2019.

Post and Pre-Doctoral Fellows*:*

Post-Doctoral Fellow:

Dr. Prosenjit Pyne, DST-SERB

Pre-Doctoral Fellow:

Ms. Taniya Golder, ICMR Fellow

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

A novel point mutation in *carR* triggered the emergence of polymyxin B-sensitive *Vibrio cholerae* O1

Cholera, a life threatening disease is still continuing in developing countries where people do not have a good sanitary system, hygiene practice and safe drinking water supply. *V. cholerae* O1 is the main cause of the disease and is responsible for the seven pandemics in the recorded history of cholera. Antimicrobial peptides play an important role in host-defence against *Vibrio cholerae*. Among the two naturally occurring *V. cholerae* biotypes, classical is polymyxin B sensitive whereas El tor is relatively resistant. Acquisition of classical biotype traits like *ctxB1* and polymyxin B (PB) sensitivity in El Tor strains have been observed in recent years. Also, the strains caused recent Yemen cholera outbreak in 2016-18, the worst cholera outbreak in the history of cholera, contained the same polymyxin B-sensitive signature.

To investigate the factor(s) responsible for the shift in the trend of sensitivity towards PB, we studied the two-component system *carRS* regulating the lipidA modification of El Tor vibrio and found that only *carR* contains a single nucleotide polymorphism (SNP) in recently emerged PB-sensitive strains (Fig 3). We designated these two alleles present in PB-resistant and sensitive strains as $carR^R$ and $carR^S$, respectively and replaced the $carR^S$ allele of a sensitive strain with $carR^R$ using allelic exchange approach. The sensitive strain then became resistant. PB-resistant strain N16961 was made susceptible to PB in a similar fashion (Fig 4).

Based on *in-silico* studies, the D89N substitution of CarR was found to be more stable in nature than other mutations in the *carR* allele because this particular mutation has pervasive positive/diversifying selection, which possibly has a selective advantage and environmental stability in subsequently emerged *V. cholerae* strains. Moreover, our *in-silico* CarR models suggested that D89N substitution in more stable $CarR^S$ brings the two structural domains of CarR closer constricting the DNA binding cleft, which results in the reduction of DNA binding specificity (Fig 5). This probably reduces the expression of *carR*-regulated *almEFG* operon inducing the PB-susceptibility. Expressions of *almEFG* in PB-sensitive strains were found to be down-regulated at natural culturing condition (Fig 6). Finally, the down-regulation of *almEFG* in $CarR^S$ strains confirmed that G265A mutation (D89N substitution) is responsible for the emergence of PB-sensitive *V. cholerae* El Tor strains (Fig 7).

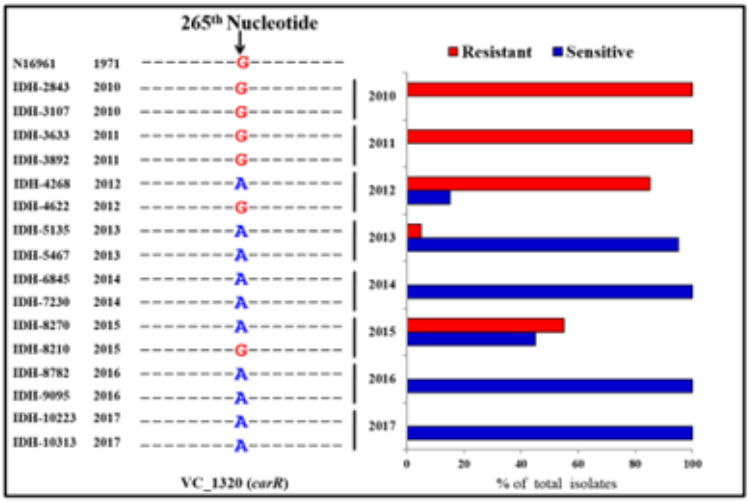


Fig 3: Sequencing analysis depicted that there was a single base substitution (G to A) at the 265th nucleotide position of *carR* gene of *V. cholerae* isolates in Kolkata. It was found that the strains containing nucleotide "G" at the 265th position of *carR* showed resistant phenotype against polymyxin B (PB), whereas the strains containing nucleotide "A" at the 265th position of *carR* showed sensitive phenotype to PB. Retrospective analysis revealed that PB sensitive strains first appeared in Kolkata during 2012.

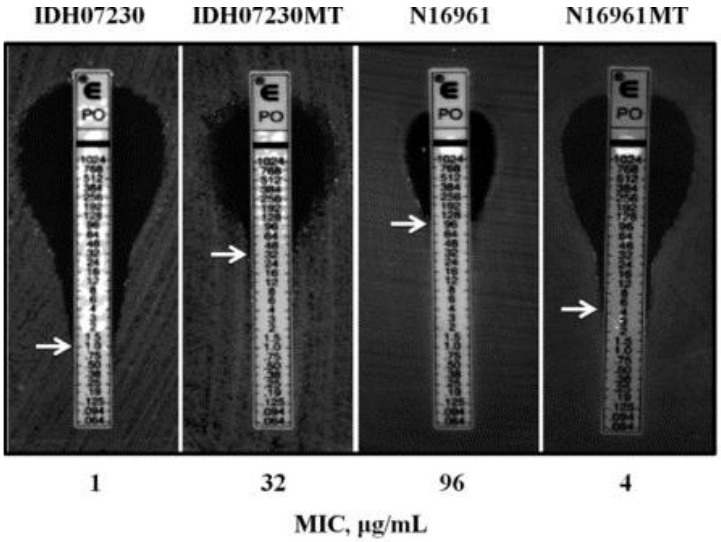


Fig 4: Polymyxin B MIC assays of wild-type (IDH07230 and N16961) and mutant (IDH07230MT and N16961MT) strains. [Actually, in order to confirm the role of the A-to-G change in PB susceptibility, we replaced the A residue in nucleotide 265 of carR of the recent PB-sensitive strain IDH07230 with G, constructing the IDH07230MT strain using allelic exchange approach. To strengthen the hypothesis, we made a G265A substitution in carR of the PB-resistant El Tor standard strain N16961 and constructed N16961MT]. The arrows indicate the MICs (in micrograms per milliliter) on Etest gradient polymyxin B strips; MIC values are shown below the images.

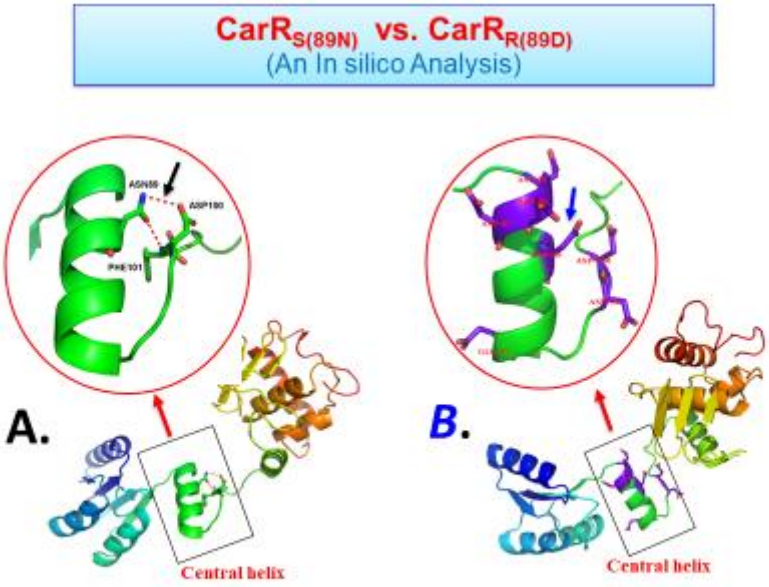


Fig 5: Figure A is depicting the CarR^S protein where N89 is interacting with D100 and F101 through H-bonding (black arrow). These interactions hold the adjacent loop in close contact with the central helix and restrict protein flexibility. On the other hand, the CarR^R protein (Figure B) unable to make any interaction between the central helix and the adjacent loop (blue arrow) due to the presence of negative charge density (contributed by four Aspartate and one Glutamate residue) at the central helix and in the loop (D99 and D100). The repulsive negative forces at this region help the CarR^R protein to retain its indigenous flexibility facilitating DNA binding.

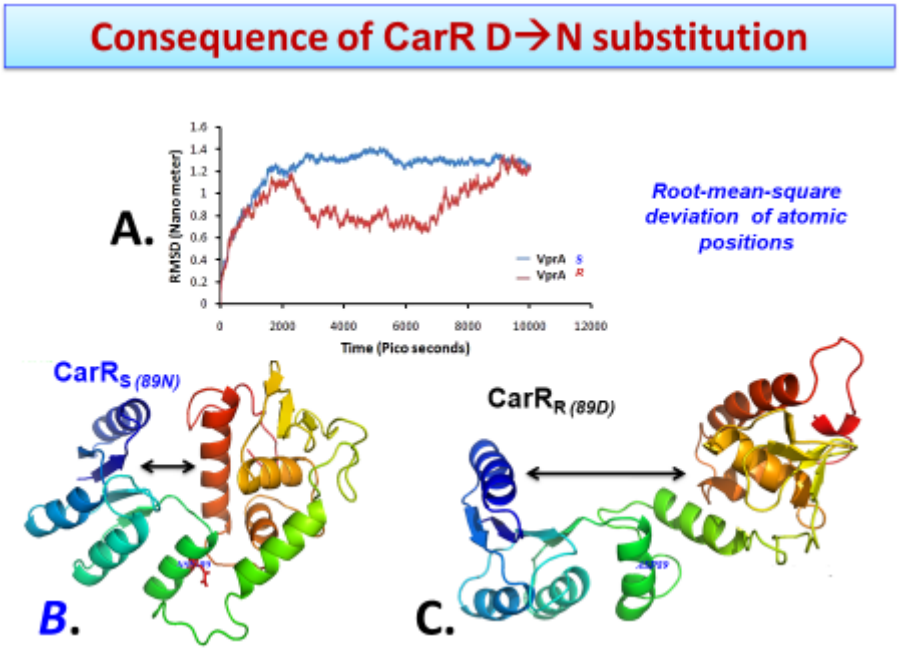


Fig 6: Figure A is showing the comparative RMSD plot of the $CarR^S$ and $CarR^R$ protein, it is evident from the plot that the $CarR^S$ protein get stabilized after 2000 ps whereas the $CarR^R$ protein retain its flexibility. The minimum energy conformation for both the $CarR^S$ and $CarR^R$ protein was extracted from the 10ns molecular dynamics simulation trajectory. The S protein showed a compact folding (Figure B) whereas the R protein retained its extended folding pattern (Figure C) which supposed to confer stable DNA binding of R than S and thereby exerted its positive regulatory action that leads to polymyxin resistance.

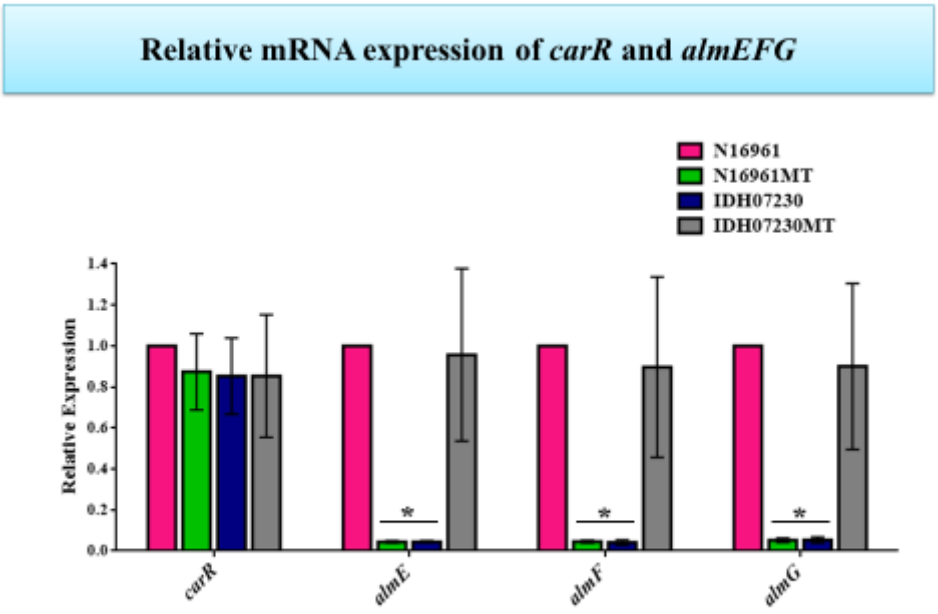


Fig 7: Relative expression levels of *carR*, *almE*, *almF*, and *almG* mRNA levels measured via qRT-PCR in clinically isolated wild-type and corresponding mutant strains to compare the effects of the G265A mutation in the *carR* gene on transcription of *almE*, *almF*, and *almG*. The data were normalized to *recA* expression using the Pfaffl method, with expression of the wild-type N16961 set to 1.0. The graph represents the mean expression levels from three independent experiments performed in triplicate. *, *P*_0.05. One-way analysis

of variance (ANOVA) and Dunnett's multiple-comparison tests were used to determine the statistical significance. The error bars represent standard deviations from the mean.

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

- Dr. Mukhopadhyay delivered a talk on "Discrete vicissitudes in the genome of El Tor vibrios concomitant with large cholera epidemics" in the 54th US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections held in **Osaka, Japan** during **December 10-13, 2019.**
- Dr. Mukhopadhyay delivered a talk on "Evolutionary transitions and epidemics of cholera: are the genetic traits of El Tor vibrio reconciles?" in the Asian-African Research Forum in Emerging and Reemerging Infections 2019 held **in Sapporo, Japan** during **September 5-6, 2019.**
- Dr. Mukhopadhyay was invited to participate in the 4th GTFCC SURVEILLANCE Working Group Annual Meeting at the Fondation Merieux Conference Centre les Pensières, in **Veyrier du Lac, France** during **April 15-17, 2019.**
- Dr. Mukhopadhyay was invited to deliver a talk on "Genetic diversity and its role in virulence and antimicrobial resistance" on **28th September, 2019** in the "*Short term Training course on DNA Barcoding and Genomic diversity"* held at **University of Kalyani**, West Bengal, India during 17th September to 1st October, 2019.

PhD Awarded:

Piyali Mukherjee was awarded PhD from University of Calcutta
Title of the Thesis: "Molecular characterization of *Campylobacter jejuni* isolated from hospitalized diarrheal patients in Kolkata, India"
Date of Degree: June 28, 2019

Post and Pre-Doctoral Fellows*:*

Post-Doctoral Fellows:
Dr. Gautam Chowdhury, PDF-OUP
Dr. Tanmoy Dey, PDF-NASI

Pre-Doctoral Fellows:
Mr. Bipul Chandra Karmakar, SRF-DST INSPIRE (Till Aug 2019); RA(Since Sept 2019)
Mr. Prosenjit Samanta, SRF-CSIR
Ms. Sangita Paul, SRF- CSIR
Ms. Debjani Ghosh, JRF-CSIR
Ms. Sreeja Shaw, JRF-CSIR

S. Basu (Principal Investigator), Bacteriology Division

KPC-2-producing *Klebsiella pneumoniae* ST147 in a neonatal unit: Clonal isolates with differences in colistin susceptibility attributed to AcrAB-TolC pump.

Klebsiella pneumoniae carbapenemases (KPCs), are class A enzymes, that confer decreased susceptibility to virtually all β-lactams and are mostly present in *Klebsiella pneumoniae*. With increased resistance towards carbapenems, colistin is being used as one of the last treatment options. Isolates which are resistant to both colistin and carbapenem have been reported. Such isolates are dreaded in clinical setups, particularly in neonatal intensive care units (NICU) as treatment options are already limited in the newborns. This study describes the characterization of four KPC-2-producing *K. pneumoniae* strains from neonates belonging to a single sequence type 147 (ST147) in relation to carbapenem resistance and explores probable mechanisms of differential colistin resistance among the clonal cluster.

WGS revealed that the isolates were nearly 100% identical (Fig 8A) harbouring resistance genes (*bla*$_{\text{OXA-9,CTX-M-15,SHV-11,OXA-1,TEM-1B}}$, *oqxA*, *oqxB*, *qnrB1*, *fosA*, *arr-2*, *sul1*, *aacA4*, *aac(6')Ib-cr*, *aac(6')Ib*), and several virulence genes. *bla*$_{\text{KPC-2}}$ was the only carbapenem-resistant gene found, bracketed between IS*Kpn7* and IS*Kpn6* of Tn*4401*b on a non-conjugative IncFII plasmid (Fig 8B). Remarkably, one of the clonal isolates was resistant to colistin, the mechanistic basis of which was not apparent from comparative genomics. The transmissible colistin resistance gene, *mcr*, was absent. Efflux pump inhibitor CCCP rendered a sharp decrease in the MIC of colistin in the resistant isolate only. *acrB*, *tolC*, *ramA*, and *soxS* genes of the AcrAB-TolC pump system overexpressed exclusively in the colistin-resistant isolate, although the corresponding homologs of AcrAB-TolC pump, regulators and promoters were mutually identical. No change was observed in the expression of other efflux genes (KpnEF & KpnGH) or Two Component System genes (*phoP*, *phoQ*, *pmrA*, and *pmrB*).

We postulate that colistin resistance in one of the clonal KPC-2-producing isolate was due to overexpression of AcrAB-TolC pump. This study is probably the first to report clinical clonal *K. pneumoniae* isolates with differences in colistin susceptibility. The presence of carbapenem-resistant isolates with differential behavior in the expression of genomically identical pump system indicates the nuances of the resistance mechanisms and the difficulty of treatment thereof.

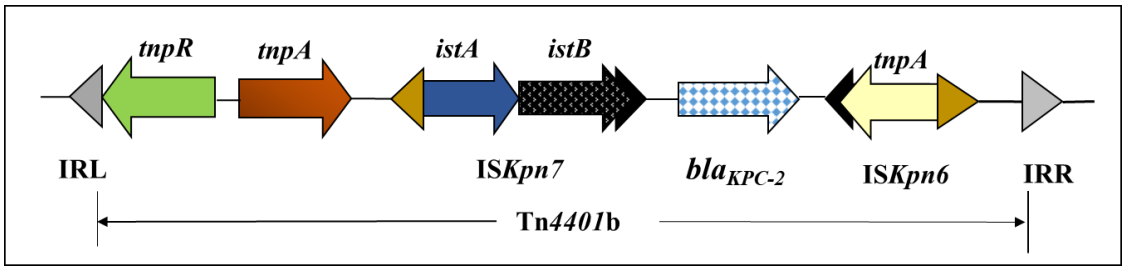


Fig 8A: Schematic representation of Tn *4401* b bearing ***bla KPC-2.*** Genes and their corresponding transcription orientations are indicated by horizontal arrows. Tn *4401b* is delimited by two inverted repeat sequences, IRR and IRL (grey triangles). Small open triangles represent the inverted repeats of IS *Kpn6* and IS *Kpn7*.

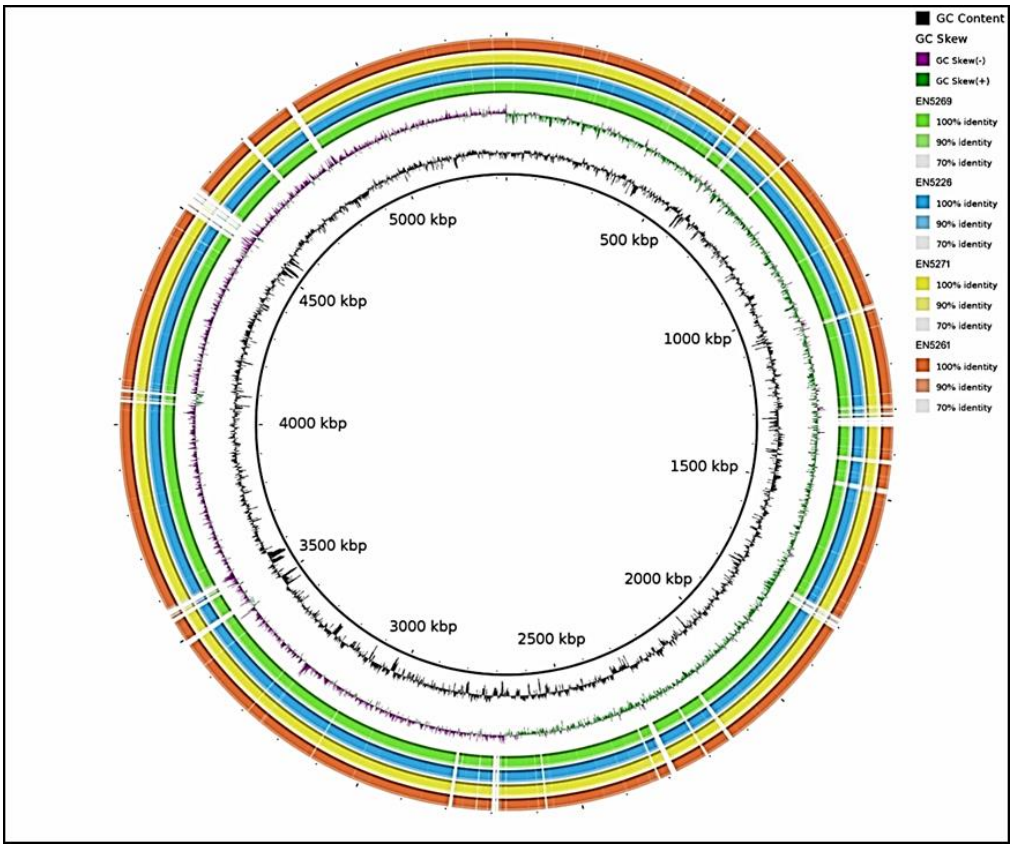


Fig 8B: BRIG analysis of KPC-2-producing *K. pneumoniae*.
Comparative genome map of KPC-2-producing *K. pneumoniae* using *Klebsiella pneumoniae subsp. pneumoniae HS11286* as a reference. From the inside out, circle 1 represents the mean centered G + C content; circle 2 shows GC skew calculated as (G −C) / (G + C); circle 3 to 6 represent the genome sequence similarity of EN5269 (*Kp3*), EN5226 (*Kp1*), EN5271 (*Kp4*), and EN5261 (*Kp2*) based on color gradient against the reference genome. The color gradients indicate the degree matching in the BLAST result for a shared region, as given at the top right of the ring.

Emergence of OXA-232-producing hypervirulent *Klebsiella pneumoniae* ST23 causing neonatal sepsis

Hypervirulent *Klebsiella pneumoniae* (hvKP) is an emerging pathogen causing severe community-acquired invasive life-threatening infections in healthy and adult individuals. Recently, convergence of both multidrug-resistant and hypervirulent attributes have been detected in some clinical *K. pneumoniae* isolates, making the scenario further complicated. This study aimed to characterize the hvKP isolates recovered from the septicaemic neonates. Detailed genotypic characterization revealed that a total of 28 isolates with hypervirulent trait were detected in the study period. Among them a further detailed microbiological and genome-level characterization of an OXA-232-producing hvKP was performed. Whole genome sequence (WGS) analysis of the carbapenem-resistant hypervirulent *K. pneumoniae* (CR-hvKP) EN5275 revealed that genome of EN5275 consisted of ~6 Mb (56.13% G+C content). EN5275 was a ST23 strain that harboured 22 antimicrobial resistance genes, eight plasmid replicons [Col440I, Col440II, ColKP3, ColRNAI, IncFIB(pQil), IncFII(K), IncA/C2, and IncX3], K1 serotype, and 86 putative virulence factors. Several hypervirulent molecular markers including pLVPK-associated markers (*rmpA*, *rmpA2*, *iroBCDEN*,

and *iucABCDiutA*) were detected in EN5275 genome. Comparative genomic analysis of EN5275 with publicly available hypervirulent genomes via BLAST+ and BLASTN programme showed high (>99.5%) genomic similarity the negatively stained TEM image of the strain revealed the presence of a prominent layer of hypercapsule with clear indication of a fine meshwork, indicating its strong biofilm-forming capability (Fig 9). Transmissibility assessment revealed that the $bla_{\text{OXA-232}}$ gene was located in a non-conjugative ColKP3-type plasmid.

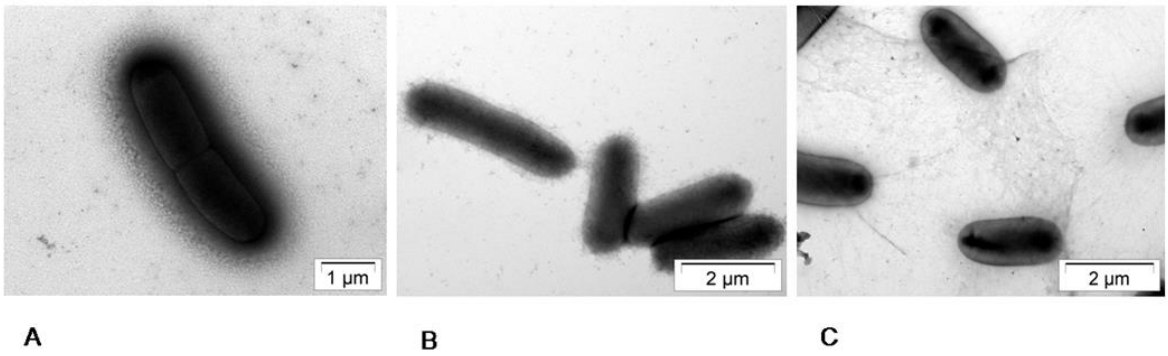


Fig 9: Transmission electron micrograph of an OXA-232-producing carbapenem-resistant hypervirulent *Klebsiella pneumoniae* (CR-hvKP) ST23 K1 EN5275 strain. A) Presence of a prominent layer of hypercapsule. B) A clear indication of fimbriae at the cell surface. C) Cellular appendages forming a fine meshwork.

To the best of our knowledge, this is the first report of a CR-hvKP ST23 strain causing neonatal sepsis and a plausible route of strain infiltration from the community is speculated. Further investigation and active surveillance of CR-hvKP strains are required to prevent these perilous strains from disseminating.

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

- **107th Indian Science Congress, Bengaluru, India, 3-7 January, 2020.** Transmission of carbapenem resistance genes in Enterobactericae isolated from septicaemic neonates: involvement of mobile genetic elements. Sharmi Naha, Shravani Mitra, Pinaki Chattopadhyay, Shanta Dutta and **Sulagna Basu (invited talk)**

- **29th European Congress of Clinical Microbiology & Infectious Diseases, at Amsterdam, Netherlands**, from 13 - 16 April 2019. Colistin resistance in carbapenem- resistant Klebsiella pneumoniae from septicemic neonates: Efflux pumps and two component systems. (Poster presentation)

- **29th European Congress of Clinical Microbiology & Infectious Diseases, at Amsterdam, Netherlands**, from 13 - 16 April 2019. "Burden of Antibiotic Resistance in Neonates from Developing Societies (BARNARDS): Klebsiella pneumoniae in neonatal sepsis" (Attendee)
- **29th European Congress of Clinical Microbiology & Infectious Diseases, at Amsterdam, Netherlands**, from 13 - 16 April 2019. "Whole genome characterisation of bacterial isolates causing sepsis in infants in low-middle income countries" (Attendee)
- **29th European Congress of Clinical Microbiology & Infectious Diseases, at Amsterdam, Netherlands**, from 13 - 16 April 2019. Microbiota of mothers, infants and clinical environment and genomes of isolates causing sepsis in infants from low- and middle-income countries: BARNARDS (Attendee)
- **29th European Congress of Clinical Microbiology & Infectious Diseases, at Amsterdam, Netherlands**, from 13 - 16 April 2019. Incidence of neonatal sepsis from hospitals in South Asia

and Africa. The Burden of Antibiotic Resistance in Neonates in Developing Societies (BARNARDS) - a group study (Attendee)

- **29th European Congress of Clinical Microbiology & Infectious Diseases, at Amsterdam, Netherlands**, from 13 - 16 April 2019. "Risk factors of neonatal sepsis from hospitals in South Asia and Africa. The Burden of Antibiotic Resistance in Neonates from Developing Societies (BARNARDS) a group study." (Attendee)

Post and Pre-Doctoral Fellows*:*

Post-Doctoral Fellow:
Dr. Subhasree Roy, CSIR Scientist Pool

Pre-Doctoral Fellow:
Ms. Shravani Mitra, SRF-Agartala ICU
Ms. Sharmi Naha, SRF-ICMR
Ms. Amrita Bhattacharya, JRF-ICMR
Ms. Priyanka Basak, JRF-ICMR

Studies on Immunogenicity and protective efficacy of multi-serotype OMV's of circulating *Salmonella* strains in Chicken model.

H. Koley, S. Maiti, A. K. Mukhopadhyay, S. Dutta

Brief Outcome: Chicken is the most common reservoir of salmonellae. Humans are also being contaminated from chicken live stock. Usage of conventional antibiotics enhances the chance of formation of MDR pathogens in chicken. So here in this study we would try to develop a potential candidate vaccine against poultry Salmonellosis.Non-typhoidal *Salmonella* strains secret Outer Membrane Vesicles (OMVs) from their surface into the outer environment naturally. OMVs are spherical in nature, size ranges between 20-300 nm. In SDS-PAGEanalysis, it was proved that OMVs contain different proteins of different molecular weight. OMVs are immunogenic in nature in chicken model. We also found that after three doses of oral immunization of chicks, it induces serum immunoglobulin level in their blood and the serum immunoglobulin IgY and IgA were found above the detection level till 180 days after oral immunization. After one week of final immunization chicks were infected orally and we found that OMVs immunized chicks' shoes 100% protective efficacy against homologous strains and 75-80% efficacy against heterologous strains (Fig 10).

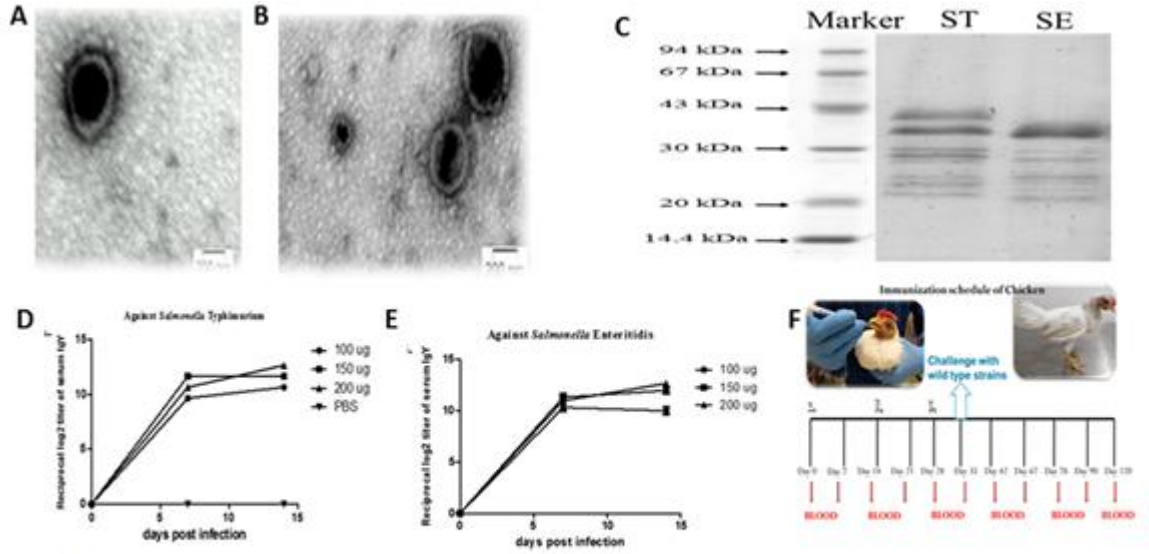


Fig 10: A. OMV of *Salmonella* Typhimurium, **B.** OMVs of *Salmonella* Enteritidis. **C.** SDS-PAGE image of OMVs of NTS strains contain proteins of different molecular weight. **D, E.** Standardization of optimal immunization dose; Immunogenicity of different groups of chickens after single dose of immunization with three different doses. **F.** Schematic diagram of immunization schedule of chickens.

Nanoparticle Adjuvanted Subunit Oral Vaccine against Poultry Salmonellosis

H. Koley, S. Tamuli, V. Mandal, S. Maiti, S. Dutta

Brief Outcome: Bacteria-derived outer membrane vesicles (OMVs) are highly immunogenic and are capable of eliciting protective immune responses. The isolated OMVs contain different proteins in varying concentrations as evidenced by the 12 % SDS-PAGE. Proteins Identified in the MS-MS of OMVs isolated from salmonella typhimurium and also lipids identified in OMVs through GC-MS (Fig 11).

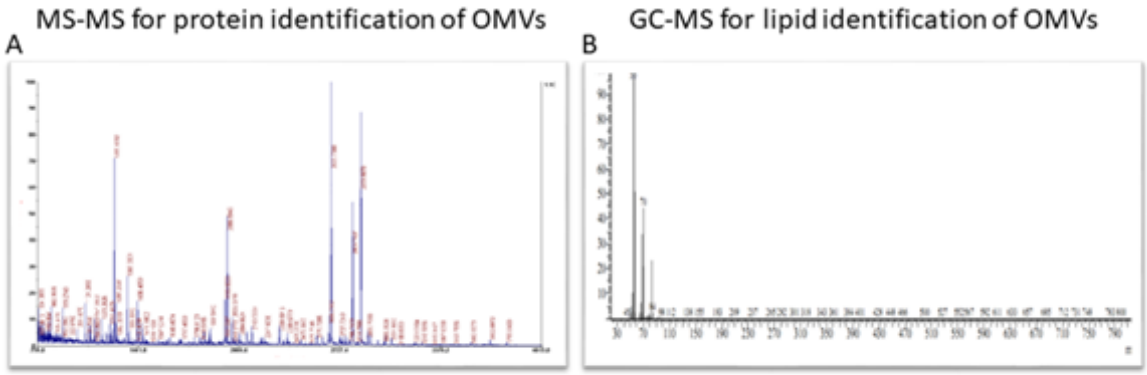


Fig 11 : A. Proteins identified in the MS-MS of OMVs isolated from *Salmonella* Typhimurium. **B.** Lipids identified in OMVs of *Salmonella* Typhimurium through GC MS.

In this study, we investigated the production and immunogenicity of Salmonella Typhimurium OMVs as well as coated with different polymers and polysaccharides - Poly anhydride coated OMV(PO), Gantrez coated OMV(GO), Chitosan coated OMV(CHO) and unconjugated OMV(OMV) in mice and chicken to check any cross-protection.

The chitosan nanoparticle-outer membrane vesicle conjugate has been found to be in the expected size of nanoparticles as evident from its size and has got good stability as it is evident from the zeta potential of 12. 8 mV. The polyanhydride nanoparticle also have been found to be in the expected size of nanoparticle with good stability evident from the zeta potential of 52. 7 mV. (Fig 12).

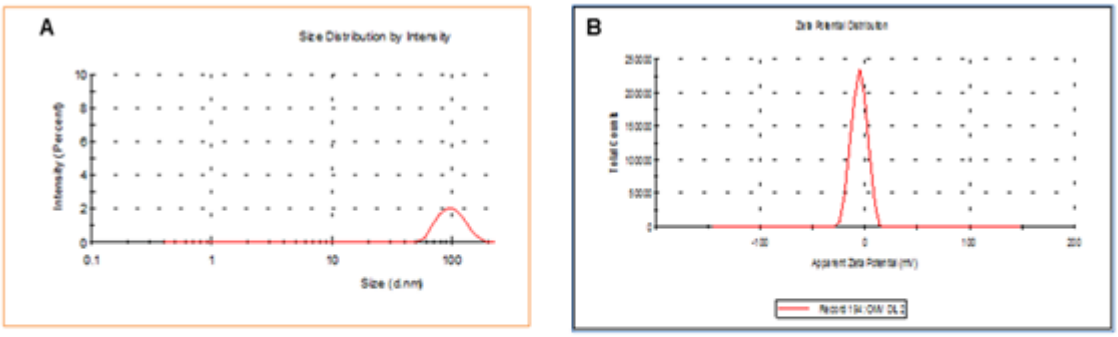


Fig 12: (A) The particle size distribution of the OMVs (B) zeta potential analysis of the OMVs for the selection of nonoparticle adjuvanted subunit oral vaccine against poultry Salmonellosis

On the other hand, the poly-lactide co-glycolidemicroparticles showed the size of 1-2µm, however, the zeta potential in distilled water was found to be 3 indicating less stability in water. Thus, poly-lactide co-glycolidemicroparticles could be adjuvanted subunit oral vaccine against poultry Salmonellosis

Awards/Honours received

- Fellow of West Bengal Academy of Science & Technology (WAST)

List of patents filed/ accepted/Technology Developed

- ICMR licensed the technology for Shigella vaccine developed by ICMR-NICED for further C to MSD Welcome Trust Hilleman Laboratories Pvt. Ltd., New Delhi on April 23, 2019 at the ICMR, Headquarters

- Patent application for: “Fortified Soy-Yogurt Composition for Anti-Hypocholeserolemic Effect”. The said patent has been filed on May 20, 2019 with application number 201911019853

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

- SanjuktaKar, Hemanta Koley, Shanta Dutta, Minakshi Ghosh. Development of Quail protein incorporated Health Margarine from a composite blend by using response surface methodology.15thAsian Conference on Diarrhoeal Disease and Nutrition (ASCODD), January 28-30, 2020, Dhaka, Bangladesh. (**Poster Presentation**)

- Hemanta Koley, Suhrid Maiti, Asish Mukhopadhyay, Shanta Dutta, Keinosuke Okamoto, Yoshifumi Takeda. “Immunogenicity and protection study of heat killed EIEC immunogen in mice model.” 54th US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections.10th -13th December, 2019, Osaka, Japan. (**Poster Presentation**)

- Suhrid Maiti, ProlayHalder, Sounak Sarkar, VivekMondal, Asish Mukhopadhyay, Shanta Dutta, Hemanta Koley. “Oral Passive Immunization of NTS Outer Membrane Vesicle Derived Polyreactive Serum Protects Day Old Chicken Against Experimental Salmonellosis.”54th US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections. 10th-13th December, 2019 Osaka, Japan. (**Poster Presentation**)

- Ushasi Bhaumik, DebakiRanjanHowlader, NamrataBaruah, Suhrid Maiti, ShantaDutta, Hemanta Koley. Immunogenicity and protective efficacy of tetravalent OMVsbased immunogen of Shigella in mice model. 54th US-Japan Joint Panel Conference onCholera and Other Bacterial Enteric Infections. 10th-13thDecember, 2019, Osaka, Japan. (**Oral Presentation**)

- DebakiRanjanHowlader, ProlayHalder, Suhrid Maiti, Ushasi Bhaumik, Shanta Dutta, Hemanta Koley. Cross protective nature of a newly developed bivalent typhoid vaccine in response to non-typhoidal infection. 54th US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections.10th -13th December, 2019, Osaka, Japan. (**Poster Presentation**)

- Suhrid Maiti, Asish Mukhopadhyay, Shanta Dutta, Keinosuke Okamoto, Takeda Yoshifumi, Hemanta Koley. “Oral Heat Killed EIEC immunogen induces immunogenicity and deliver protection in mice model” Indian International Science Festival 2019 Health Research Conclave, 7th-8th November, 2019 Kolkata, India. (**Poster Presentation**)

- Ushasi Bhaumik, Hemanta Koley. “Study of mechanistic pathway of Outer Membrane Vesicle proteins in Shigella”. Health Research Conclave, India International Science Festival, 7th-8th November, 2019, Kolkata, India. (**Oral Presentation**)

- Debaki Ranjan Howlader, Hemanta Koley. Study of Outer Membrane Vesicle (OMV) based antigen for vaccine potential against Salmonella. Health Research Conclave, India International Science Festival, 7th -8th November, 2019, Kolkata, India. (**Poster Presentation**)

- Suhrid Maiti, Hemanta Koley, Dhrubajyoti Nag, Ushasi Bhaumik, Priyodarshini Mukherjee, Asish Kumar Mukhopadhyay, Takeda Yoshifumi, Keinosuke Okamoto, Shanta Dutta. “Development of Shigella Vaccine.” Asian-African Research Forum in Emerging and Reemerging Infections 2019. 5th -6th September, 2019 Sapporo, Hokkaido, Japan. (**Poster Presentation**)

- Hemanta Koley. Workshop on “19th Vaccinology course”. September 02-06, Seoul, South Korea. (**Workshop**)

- SanjuktaKar, Hemanta Koley, Shanta Dutta, Minakshi Ghosh. Hypolipidemic effects of DAG enriched oils-based sesame spreads. 18th Annual Congress of Korean Society for Parenteral and Enteral Nutrition & 2019 International Symposium (KSPEN 2019), June 21- 22, 2019, Seoul, South Korea. (**Oral Presentation**)

Post and Pre-Doctoral Fellows:

Post-Doctoral Fellow:

Dr. SanjuktaKar; ICMR-PDF

Pre-Doctoral Fellow:

Ushasi Bhaumik, SRF-DST-INSPIRE

Suhrid Maiti, SRF-ICMR

Vivek Mandal, SRF-CSIR

ProlayHalder, JRF-ICMR

Soumalya Banerjee, JRF-UGC

N. S. Chatterjee (Principal Investigator), Biochemistry Division

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

Vibrio cholerae O1 normally resides in aquatic environment associated with the chitinous exoskeletons of zooplankton and utilizes chitin as the sole nutrient source by chitin utilization pathway. Presently, our studies are directed towards the understanding of this chitin utilization pathway of *V. cholerae* in environmental survival, horizontal gene transfer and pathogenesis. Here we have investigated the role of different chitinase inhibitors to reduce pathogenesis. Chitinase inhibitors dequalinium chloride, pentoxifylline, theophylline and caffeine were identified. The total chitinase activity were 2.0-fold and 9.8-fold less in presence of pentoxifylline and theophylline, respectively, compared to the wild type enzyme activity. The enzyme activity was completely inhibited in presence of 50 µg/ml dequalinium chloride. *V. cholerae* motility in mucin were 8.4-fold, 21.9-fold, 17.7-fold and 10.1-fold less in presence of pentoxifylline, caffeine, dequalinium chloride and theophylline, respectively, compared to the mucin penetration ability of the wild type *V. cholerae*. The *V. cholerae* adherence to HT-29 intestinal cells showed significant reduction in presence of 50 µg/ml dequalinium chloride. The toxin secretion were 5.5-fold, 13.5-fold, 6.9-fold and 17.5-fold less produced in presence of pentoxifylline, caffeine, dequalinium chloride and theophylline, respectively, compared to the wild type. The chitinases inhibitors did not have any effect on biofilm formation at the concentration tested. These results suggest that the chitinase inhibitors might prevent growth, adhesion, motility and cholera toxin production which might ultimately reduce pathogenicity of *V. cholerae* (Fig 13).

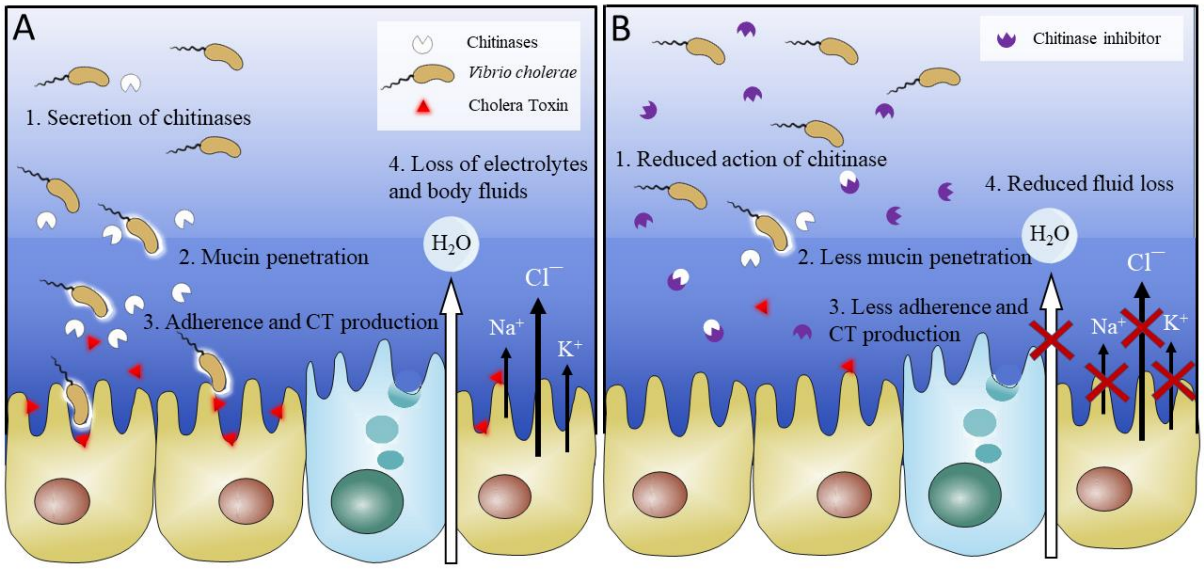


Fig 13: A graphical representation of action of chitinase inhibitors on *V. cholerae* pathogenesis

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. Colonization factors (CF) along with enterotoxins and non-classical virulence factors play the important role in initiating the disease and had been the major vaccine targets. We looked into the distribution of these virulence factors in clinical ETEC

isolated between 2015 and 2019 from two Kolkata hospitals (Fig. 14). Analysis of 379 ETEC showed CS6 (41%), CS5 (22%) and EatA (69%) are the prevalent virulence factors amongst the 32 virulence factors tested. CS6-harboring ETEC showed resistance to some of the current choice of antibiotics for treatment like Ceftriaxone-30µg (32%), Norfloxacin-10µg (39%), Cefepime - 30µg (24%), Chloramphenicol - 30µg (11%), Sulfamethoxalone (39%) and Ciprofloxacin- 5µg (71%). In a clinical ETEC 469, expression of CS6 increased 45-fold under 0.2 mM iron compared to the physiological concentration of 4 mM. Expression also increased 10-fold at 0.5% NaCl concentration compared to 1% physiological condition. CS6 expression was optimum at 37˚C and pH 7.4. CS6 expression increased in ETEC 65-fold when in contact with HT-29 cells during infection. In an ETEC harboring CS6+CS5+EatA, CS6 expression is enhanced in the presence of CS5 and EatA. In a rabbit ileal loop model, CS6 expression decreased 6-fold, 2-fold and 17-fold in ΔCS5, ΔEatA and ΔCS5+ΔEatA double mutant, respectively. In mice colonization model, the mutants ΔCS5, ΔEatA and ΔCS5+ΔEatA showed 6-fold, 20-fold and 40-fold decreased adherence, respectively, compared to the wild type strain (Fig 15).

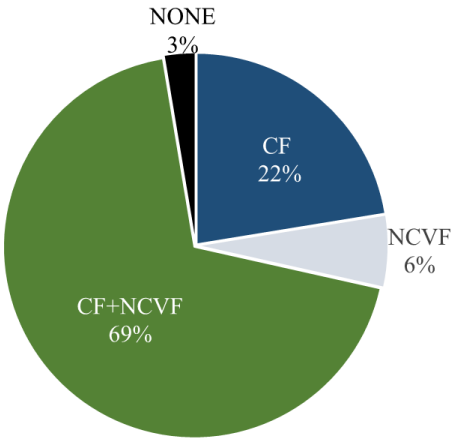


Fig. 14: Distribution of ETEC virulence factors during the study period 2015-2019 (n=379).

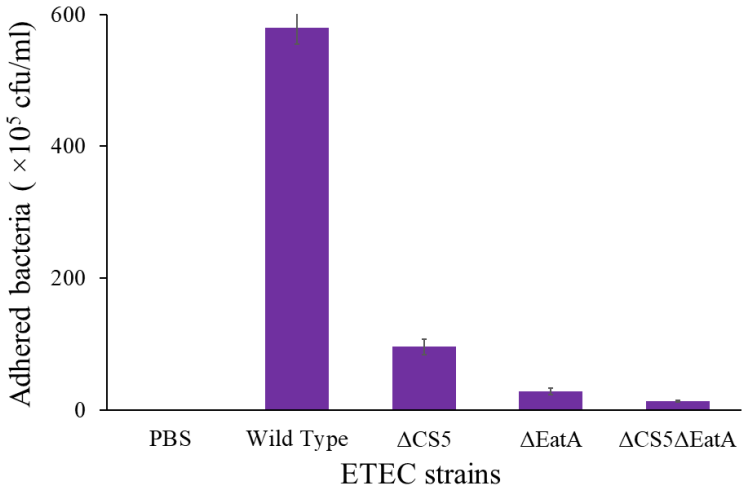


Fig 15: A graphical representation of comparative adherence by wild type ETEC strain (CS6+CS5+EatA) and its isogenic mutants in mice colonization assay by plate count method.

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

- 8th Congress of the European Microbiologists (FEMS 2019) held in Glasgow, Scotland during July 07-11, 2019. Title of the poster presentation: Carvacrol is a potent inhibitor of *Vibrio cholerae* pathogenesis.

- Asian-African Research Forum in Emerging and Reemerging Infections 2019 held in Hokkaido University, Sapporo, Japan during September 05--06, 2019. Title of the poster presentation: Identification of inhibitor against *Vibrio cholerae*

- 54th US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections held in Osaka University, Osaka, Japan during December 10-13, 2019. Title of the poster presentation: Chitinase inhibitors can diminish *Vibrio cholerae* pathogenesis

- Participated in the workshop entitled "Integrity and Ethics in Clinical Research Publications" held at ICMR-NITM, Belagavi on 8th November, 2020

- Participated in the workshop entitled "ICMR Training on Responsible conduct of Research & Publication Ethics" held at the ICMR-NCDIR, Bengaluru on 28th February, 2020

Pre-Doctoral Fellow

Mr. Debjyoti Bhakat, SRF-ICMR

Mr. Suman Das, SRF-ICMR

Mr. Indranil Mondal, JRF-DBT Project

Ms. Sushmita Kundu, JRF-UGC

S. Bhattacharya (Principal Investigator), Biochemistry Division

Therapeutic intervention of *Shigella flexneri* host pathogen interaction by a small molecule herbal compound

Shigella flexneri is an intracellular pathogen that affects millions every year around the globe causing bacillary dysentery. Antibiotics are used for treatment. But antibiotic resistance is a major problem to deal with shigellosis. Therefore, new approaches are investigated for therapeutic intervention.
In this project, we have identified a herbal compound named capsaicin acting as an autophagy inducer to reduce *S flexneri* infection. Capsaicin can exert antimicrobial activity during *S flexneri* infection via autophagy and in doing so it may overcome pre-existing mechanisms of resistance. Cellular homeostasis is maintained by autophagy as it degrades unwanted products and pathogens. Capsaicin induces autophagy by augmenting autophagic genes like MAP1LC3B (Fig. 16). We have observed that capsaicin also inhibits intracellular *S flexneri* growth in intestinal epithelial cells using similar concentration that induces autophagic genes. It has been confirmed by knocking down important autophagy gene Atg5 that capsaicin mediated inhibition of *S flexneri* growth is via autophagy. Further we have observed that capsaicin induces autophagy in intestinal epithelial cells by increasing nuclear translocation of TFEB which is a major player in autophagosome biogenesis (Fig. 17). Upregulation of autophagy genes in *S flexneri* infected cells is mediated by TFEB during capsaicin treatment (Fig. 18). We have also seen reversal of capsaicin effect in *S flexneri* growth by using autophagy inhibitors. Thus, we have found a novel approach in treating *S flexneri* infection by capsaicin exploiting the mechanism of autophagy (Fig. 19). We have also come out with a new therapeutic target of capsaicin i.e. TFEB transcription factor.

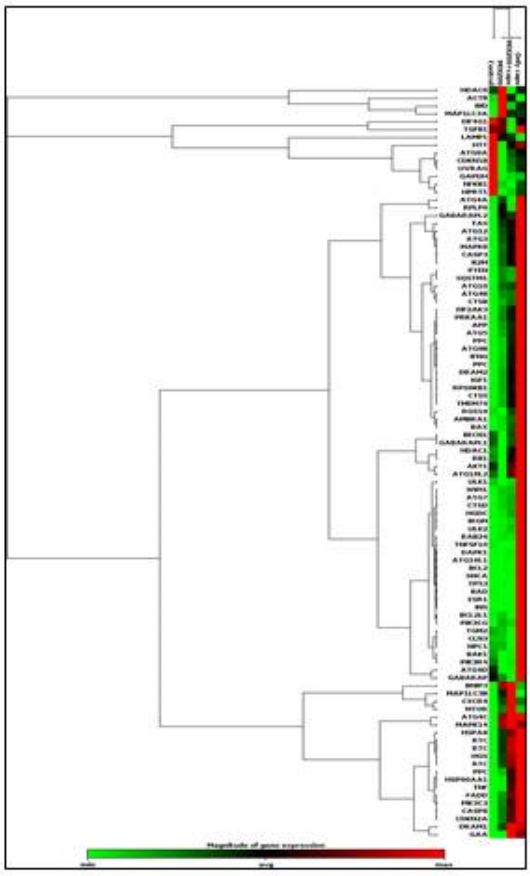


Fig 16: PCR array showing upregulation of several autophagy genes by capsaicin (Caps)

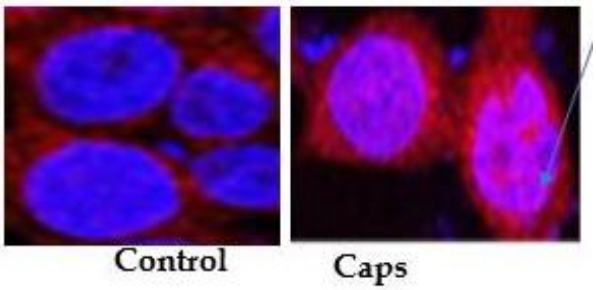


Fig 17: Confocal microscopy showing nuclear translocation of TFEB in Capsaicin treated intestinal cells

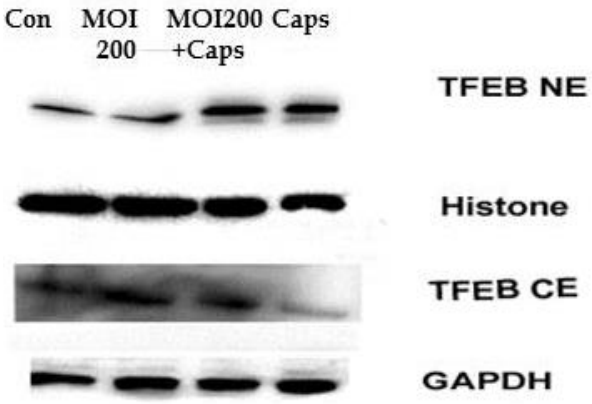


Fig 18: Higher level of TFEB expression in nuclear extract (TFEB NE) of capsaicin treated cells by Western blot analysis MOI200-*S flexneri* infected at MOI200

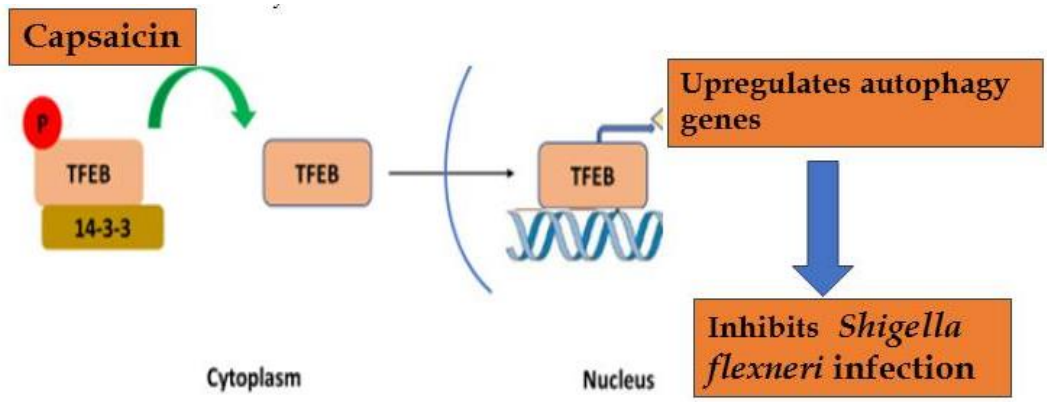


Fig 19: Capsaicin induces nuclear translocation of TFEB which upregulates autophagy genes and autophagy in turn inhibits *S flexneri* infection

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

- Participated in **5th IUPHAR World Conference on Pharmacology of Natural Products** held from 5th -7th December 2019 in ICMR-NIN Hyderabad. Received Young Scientist Award for presentation of paper "**Therapeutic inhibition of *Shigella flexneri* host pathogen interaction by a herbal compound"**

Post and Pre-Doctoral Fellow:

Post-Doctoral Fellow:

Dr. Kalyani Saha, PDF-ICMR

Pre-Doctoral Fellow:
Ms. Priyanka Basak, JRF-DBT
Ms. Uzma Khan, JRF-CSIR
Ms. Priyanka Moitra, JRF-CSIR

S. Basak (Principal Investigator), Bioinformatics Division

Analysis of genetic diversity and evolution of Dengue virus using completely sequenced genomes.

The envelope gene sequences of Dengue virus serotype 1 were retrieved from Genbank database. Multivariate analysis on the basis of amino acid usage was performed on envelope gene sequences. We observed two separate clusters consist of env gene sequences. One cluster is mostly dominated by envelope gene sequences from Asia and another cluster is dominated by envelope gene sequences from north and south America (Fig 20A). We calculated average evolutionary rate through Ka and Ks for both the clusters separately for each serotype. The ratio of rate of non-synonymous substitutions per nonsynonymous site (Ka) to rate of synonymous substitutions per synonymous site (Ks) measures the relative rates of synonymous and nonsynonymous substitutions and indicates the impact of evolution on a gene. Observed variation of Ka and Ks of envelope genes between Asian and American isolates 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.
Systematic inspection of the two concerned categories of envelope gene sequences (isolated from American and Asian region) with human host revealed that the selection pressure due to human host also varies between Asian and American isolates depending on dengue virus serotypes.
To better assess the host influence over the pathogen we have performed binding analysis of envelope protein with the host receptor protein molecule, DC-SIGN. Molecular docking was performed between DC-SIGN and envelope proteins separately for each serotype. Binding energies were calculated through molecular docking between envelope protein and DC-SIGN receptor. We observed variation of binding energies between Asian and American envelope proteins as their amino acid usages are also different (Fig 20 B).
This study will demonstrate the importance of dengue virus genetic variation and increase the knowledge regarding dengue infection and probable drug target site.

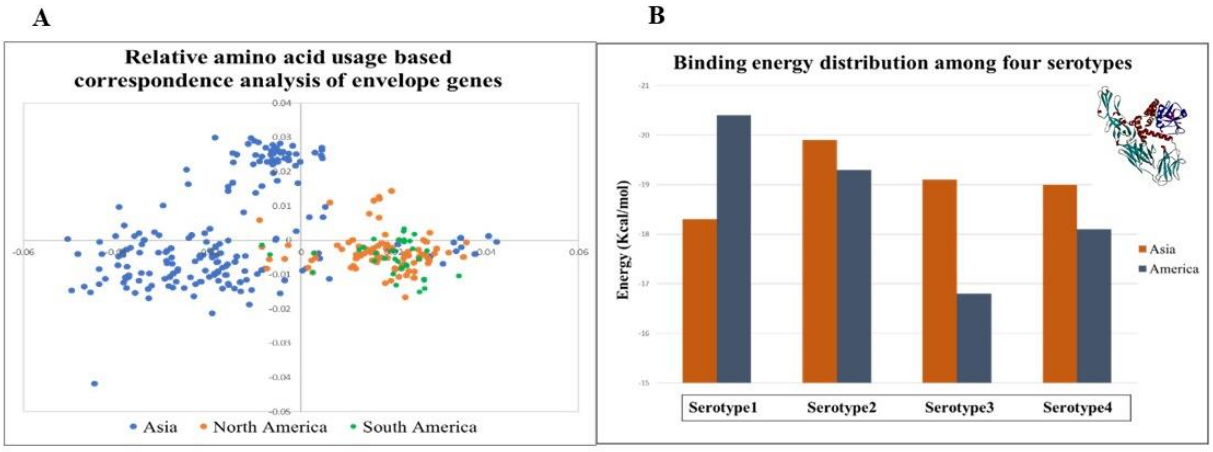


Fig **20** : A) Distribution of envelope genes on the basis of amino acid usage. Envelope genes isolated from Asia and America are clustered in different locations along horizontal axis.

B) Variation of binding energy between envelope protein and dc-sign receptor calculated through molecular docking experiment of four serotypes of dengue virus.

Pattern of sequence evolution of envelope genes correlates with the HIV progression

The study addresses the differential features of envelope genes representing various categories of HIV disease progression. Moreover, the types of HIV progressors were compared in detail with simian

immunodeficiency virus (SIVcpz). Strikingly, marked genomic, evolutionary and functional similarities were observed between long-term non-progressors (LTNP) and SIVcpz in contrast to rapid progressors (RP) and slow progressors (SP) (Fig 21 A). Robust analysis revealed that selective constraints of human host on SP and LTNP associated envelope genes and chimpanzee host on SIVcpz envelope genes were more severe compared to selection pressure operational on RP associated envelope genes (Fig 21 B). Evolutionary forces of selection appeared to be more relaxed on the RP envelope genes in contrast to SP, LTNP and SIVcpz types. Better binding of RP envelope glycoprotein 120 (gp120) compared to envelope gp120 representing SP, LTNP and SIVcpz with host cellular receptor CD4, as inferred through molecular docking approaches, promises to confer meaningful insights into the event of speedy progression of HIV in rapid progressors. It was interesting to note that envelope glycoprotein exhibited a tendency of hindering proper interaction of host (human/chimpanzee) CD4 and major histocompatibility complex II (MHC II), with a better efficacy in rapid progressors, thus, facilitating highest degrees of immune suppression. Proper identification of the contrasting features might confer a scope to modulate rapid progression of HIV to a long-term non-progressive controlled case, as observed in LTNP and SIVcpz infection, simultaneously aiding therapeutic research against AIDS targeted at drug and vaccine development.

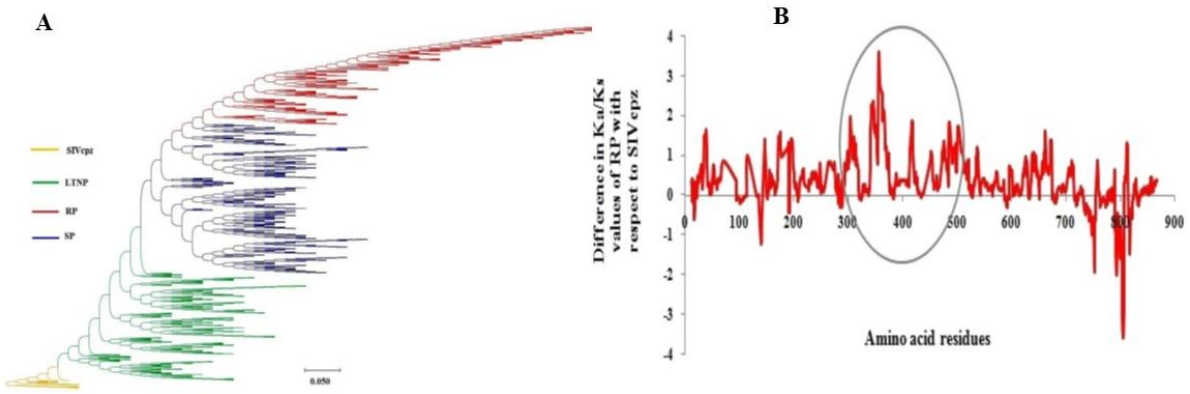


Fig **21** : A) Neighbor-joining method based phylogenetic tree of the envelope gene sequences representing RP, SP, LTNP and SIVcpz.
B) Residue-wise difference of evolutionary rate of RP associated envelope genes with respect to SIVcpz envelope genes. Difference in evolutionary rate (Ka/Ks) of RP envelope genes with respect to SIVcpz envelope genes has been marked by the red line. The zone of maximum evolutionary difference has been marked by the black colored circle.

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

- Delivered lecture on "Evolutionary selection of envelope protein of dengue virus genome (serotype 1)" in the 12th National Conference on Vector-borne and Zoonotic Diseases held at Zoological Survey of India, Kolkata during 25-26 November, 2019.

- Participated in the whole genome sequencing workshop as part of the 15th Asian Conference on Diarrheal Disease and Nutrition (ASCODD) held in Dhaka, Bangladesh on 31st January 2020.

Pre-Doctoral Fellow:

Ms. Manisha Ghosh, SRF-ICMR

S. Das (Principal Investigator), Clinical Division

Selection of adjuvants to augment subunit vaccine-induced mucosal immune response against Salmonella enterica serovar Typhi

We had earlier reported the induction of robust humoral and cell-mediated immune responses by a novel candidate vaccine, which was designed based on an outer membrane protein (T2544) of Salmonella enterica serovar Typhi (S. Typhi). This subunit vaccine, administered subcutaneously (s.c.) into mice also induced secretory IgA (sIgA) response in the intestine. To further augment the mucosal immune response, we co-administered S. Typhi flagellin (FliC) s.c. or generated fusion protein of T2544 and the cholera toxin B subunit (T2544-CTB) for intranasal immunization. T2544-specific sIgA that significantly inhibited S. Typhi migration in the semi-solid agar motility assay was detected well beyond 1:320 dilution in the stool and intestinal washes for both the adjuvanted vaccines. In addition, T2544-specific serum IgG was detected at high levels in the immunized mice along with IgG and IgA antibody secreting cells (ASCs) in the spleen, mesenteric lymph nodes and Peyer's Patches. The candidate adjuvanted vaccines significantly augmented the number of IL-17 and IFN-γ-producing $CD4^+$ T cells in the intestine (Fig 22). Augmentation of T2544-specific intestinal immune response by FliC and CTB was associated with higher protection of the immunized mice against oral S. Typhi infection in an iron-overload mouse model.

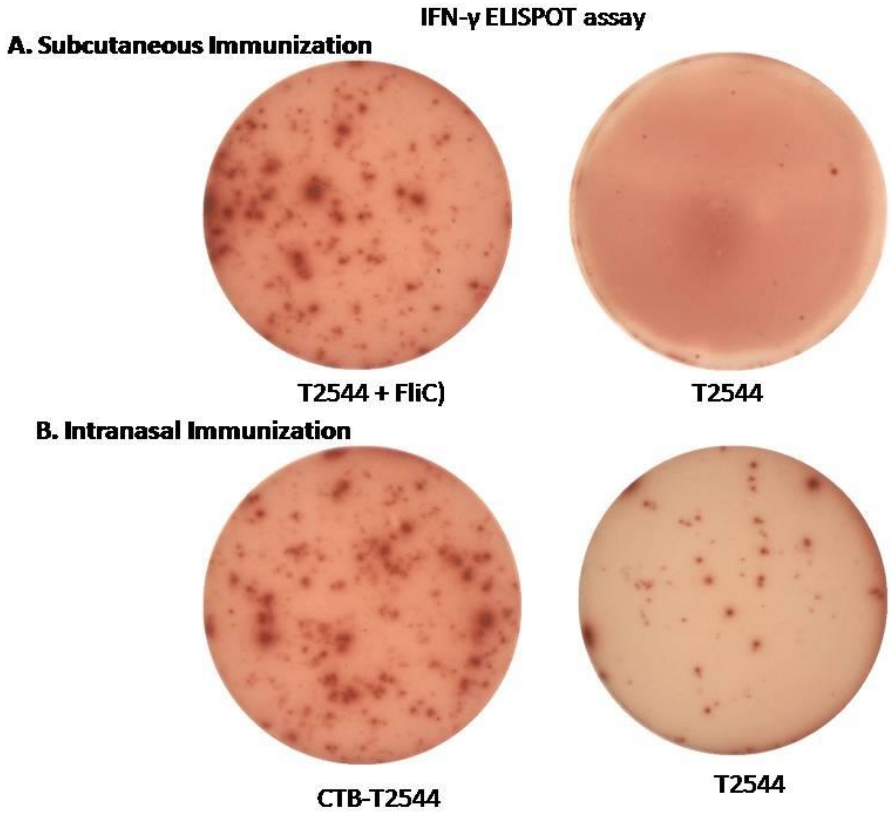


Fig 22. A. BALB/c mice (4 weeks old) were immunized subcutaneously with T2544 with or without adjuvant (FliC). Interferon gamma-secreting T cells in the Peyer's Patches were enumerated by the ELISPOT assay. B. Mice were immunized intranasally with T2544 or cholera toxin B (CTB)-T2544 fusion protein followed by ELISOPT assay as above.

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

- "Lysosomal trafficking in typhoidal *Salmonella* infection" Oral presentation at the 54th US-Japan Joint Panel Conference on Cholera and Other Bacterial Enteric Infections held at Osaka University, Japan on 10-13th December, 2019.
- Attended the 7th International Conference on Plasmodium vivax Research (ICPvR) and the Investigators Meeting of PATH Collaborative Projects held at Paris, France on June 25-28, 2019.

PhD Awarded:

Dr. Asim Biswas received PhD from the University of Calcutta

Title of the Thesis: A Study on the Role of Cationic Antimicrobial Peptides and TLR Signalling In the Modulation of Host Immune Responses

*Date of Degree:*29th May, 2019

Post and Pre-Doctoral Fellows*:*

Post-Doctoral Fellow:

Dr Shreya Dasgupta, PhD

Dr. Pujarini Dutta, PhD

Pre-Doctoral Fellow:

Mr. Ranjan Kumar Barman, SRF-ICMR

Ms. Suparna Chakraborty, JRF-DST INSPIRE

A. Sinha (Principal Investigator), Clinical Division

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

This project started with the objectives of to assess the clinicosocial profile and medical comorbidities of the geriatric population under study, to assess the medication usage pattern among the elderly people under study and to identify adverse drug reactions currently or in the recent past if any in them.

Data collection with the predesigned pretested questionnaire is continuing. in the study area.

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

- One of the two Coordinators for ICMR-NICED in India International Science Festival in Science City, Nov 2020.
- Chairperson Scientific Session IPHA National Conference, AIIMS New Delhi Feb 2020
- Invited Speaker in United Nations Meet on Climate Change in India Expo Mart New Delhi September 2020
- Invited speaker in NCDC Meet on climate change in December 2020.
- Research Methodology Workshop in Medical college MRU, May 2019
- NACO Facilitation workshop on HIV/AIDS in June, 2019

M. Dutta (Principal Investigator), Electron Microscopy

High Resolution Structural studies of Newly Isolated Shigella Phages by Cryo-electron Microscopy and Image Processing

Physicochemical characterization including host range, one-step growth curve, temperature, UV, and pH stabilities of the isolated Shigella phage has been carried out successfully. The phage morphology and head and tail lengths were also determined (Myoviridae family phage). Phage attachment to host bacteria (Fig.23) was observed by scanning electron microscopy (SEM). The effect of the phage on biofilm disruption is currently under study by scanning electron microscopy (SEM) analysis. The phage genome was isolated using a DNA extraction kit, genome library prepared successfully, expecting the sequencing result of the whole genome. Analysis of the protein profiles of purified phages in SDS-PAGE revealed one major protein fraction at around 53kDa and two minor fractions around 76 and 80kDa.

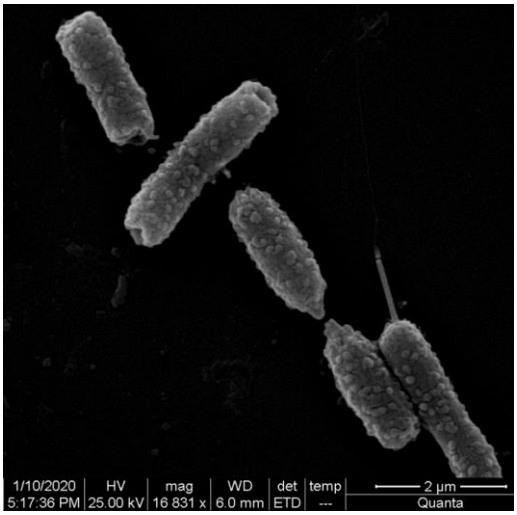


Fig 23: Scanning electron micrograph of bacteriophage attached to *Shigella flexneri* 2a cell surface

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

- Invited speaker on the 3rd National Workshop on "Applications of Electron Microscopy in Life Sciences" held during 16th-18th July, 2019 at CSIR-CDRI, Lucknow, organised by CSIR-CDRI, SAIF. Title of presentation "Single Particle Cryo-electron microscopy: The Technique and its application in life sciences" and "Principle, techniques and applications of cryo-electron tomography".

Pre-Doctoral Fellow:

Ms Bani Mallick, JRF-UGC

Ms Payel Mondal, JRF-CSIR

A. Deb (Principal Investigator), Epidemiology and Data Management Division

Climate and non-climate factors in determining risks and predicting outbreaks of waterborne diseases

We received mandatory approvals from all concerned authorities including the local village panchayats as per norms. Simultaneously, we developed different study tools such as questionnaires, informed consent forms, various logs and Standard Operating Procedures (SOPs) for different activities. Besides, we also developed a framework to identify appropriate documents and capture information on relevant non-climate factors related to the study sites. The recruited project staff were trained, where the study purpose was described, the roles and responsibilities of each staff category were explained and the nature of work as well as distribution of work was elaborated through interactive sessions. Hands-on trainings of each category of staff (field staff, research assistant for laboratory and data entry operator) were conducted separately. The database was also been designed specifically for the purpose of this study using Epi Info ver. 7.2.2.2 software. The baseline survey has been completed and the population cohorts in the two selected village panchayats under the study have been delineated. The prospective disease surveillance captured cases of diarrhea in the community and outbreaks are being tracked through local health authorities. We also had quarterly collection of water samples to check seasonal variations. The relevant IDSP data have been located and extraction of the retrospective disease data from the IDSP records as well as collection of the climate data (retrospective as well as prospective) from the Regional Meteorological Department is ongoing.

Etiology of childhood pneumonia in India

The primary objective of this project is to estimate the relative prevalence of selected bacterial and viral pathogens in cases with clinically diagnosed community acquired severe pneumonia and in healthy controls among children aged 29 days to 59 months of age. Here, infants and children aged 1-59 months with severe or very severe pneumonia presenting to two hospitals (Dr. B.C. Roy Postgraduate Institute of Pediatric Sciences and Kolkata Medical College & Hospital) were recruited. For these ‘cases’, blood samples and nasopharyngeal (NP) swabs were taken by physicians / trained study personnel and a chest X-ray was done, whereas NP swabs were collected from age and gender matched ‘controls’ to identify bacterial and viral pathogens using routine and state-of-the art laboratory techniques. In total, 96 cases and 96 controls have been recruited under the study. The collected samples were processed at bacteriology and virology laboratories of ICMR-NICED. Most of the collected data have already been entered into a database through online data entry process.

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

- Participated in the meeting to discuss Health Adaptation Plan for Climate Sensitive Diseases organized by NCDC, New Delhi on May 3, 2019 at Nirman Bhawan, New Delhi.
- Participated in training programme on Ethics in Human Health Research and Good Clinical Practice held on May 07, 2019 at ICMR-NICED.

- Resource Person in the Research Methodology Workshop for Biomedical Health Research organized by Medical College, Kolkata (in association of ICMR, New Delhi) during May 20-22, 2019.

- Resource person in the workshop on "Developing Models for Forecasting Climate-Sensitive Waterborne Diseases" held at ICMR-NICED, Kolkata on June 19, 2019.

- Resource person for the workshop on Laboratory Diagnosis of Emerging Viral Diseases conducted by Regional VRDL at ICMR-NICED, Kolkata during July 17-19, 2019.

- Participated in a workshop on Disaster Management Preparedness held on July 31, 2019 at ICMR-NICED.

- Participated in the Study Protocol Development Workshop of FIND/ICMR Collaborative Project on AMR Diagnostics Use Accelerator held during August 1-2, 2019 at ICMR Headquarters, New Delhi.

- Acted as a Resource Person for BSS Lite SFD Regional Level training under national AIDS Control Programme held at ICMR-NICED during August 20-23, 2019.

- Participated as a Special Invitee in the Workshop on the Impact of Climate Change on Vector Borne Diseases organized by WHO-SEARO during September 09-10, 2019 in Kathmandu, Nepal.

- Participated in the 7th Indian National Exhibition cum fair; organized by Bengal Human resource Development Foundation at KMDA ground, Patuli, Kolkata during September 25-29, 2019.

- Participated in the Regional Consultation Workshop on Health Resilience & Capacity Building organized by National Institute of Disaster Management, New Delhi at Taj Vivanta, Kolkata on November 4, 2019.

- Participated in the Second Meeting to discuss Health Adaptation Plans for Climate Sensitive Diseases held on November 20, 2019 in New Delhi.

- Acted as a faculty in the BSS Lite Main Survey State Level Training in Kolkata during December 16-19, 2019.

- Participated in the National level Health and Health Awareness Exhibition cum Seminar titled '15th Jatiya Sanhati Utsav-O-Bharat Mela 2019" organized by Bangiya Seva Samity during December 14-18, 2019 at Rajpur Agami Club Play Ground, Rajpur, Kolkata.

- Participated in the Social Science and behavior Change Communication training organized by FIND during February 25-27, 2020 at Jan Swasthya Sahyog, Bilaspur, Chhattisgarh.

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

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

Principal Investigator: S. Dutta

Co- Principal Investigator: S. Kanungo

The study was 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 was initiated on 06th Nov 2017 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 were identified. Any febrile episode meeting the criteria for suspected typhoid fever (a fever of three or more consecutive days) were encouraged to report at the field clinic where study physician evaluated and collected blood sample for culture as per protocol. Some medicines like antipyretic and antibiotic were provided free of cost from the clinic, as prescribed by the study physician. Data was collected through electronic data capturing system (EDSS) at the site level (Table 4). The study concluded on January 2020 (Fig 24).

Table 4: NSSEFI- Overall Study Status

Events	Numbers
Total enrolled subjects	**6017**
- 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	17751
Total number of Suspected Typhoid Fever (STF) cases identified	4286
Total number of blood culture reported	2290
Positive cases	**93**
- S. Typhi	80
- S. Paratyphi	13

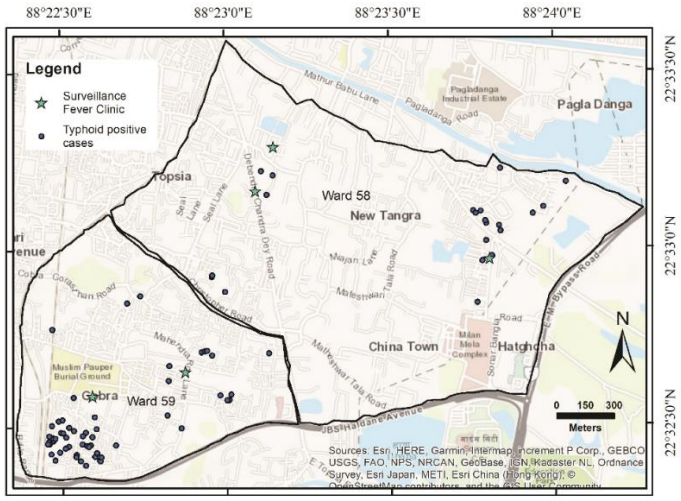


Fig 24: NSSEFI – GPS Location of typhoid positive cases

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

Principal Investigator: S. Dutta

Site Principal Investigator: S. Kanungo

The study was designed to look wheter the mixed regimen of the two currently available rotavirus vaccine in public health practices in India are interchangeable in terms of safety and immunogenity so that the coverage of vaccination can be scaled up across the country. The study had been initiated in urban/semi urban population in two states in India (West Bengal, Maharashtra). Each site had enrolled 1980 healthy infants at 6-8 weeks and followed them till 28 days after third dose of vaccination. In Kolkata the study was initiated on March, 2019. Infants were randomized to six groups, after screening and consent. Four groups of infants received a mixed regimen of Rotavac® and Rotasiil®, and one group received three doses of Rotavac and the other group received three doses of Rotasiil. After enrollment the first dose of study vaccine was administered, followed by two more doses at one-month interval (±7 days). Blood samples were collected before the first vaccine dose and four weeks after the third dose. ELISA IgA assay was done for quantification of seroconversion with respect to baseline. Active surveillance was conducted for vaccine reactogenicity over the 7-day period after each vaccination. All the SAEs were reported to the relevant regulatory authority. Interim analysis indicated that the mixed regimens for rotavirus vaccines are non-inferior to the single regimens in terms of immunogenicity and safety. The study concluded on April, 2020. The final analysis is ongoing.

Ongoing vaccine dosing process

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

- 4th GTFCC Case Management Working Group Meeting".
- 15th Asian Conference on Diarrhoeal Disease and Nutrition (ASCODD) in Dhaka, Bangladesh during January 28-30, 2020
- Cholera WG member for NTAGI

D. Chakraborty (Principal Investigator), Epidemiology and Data Management Division

A facility based cross sectional study on status of nutrition, immunization and chemoprophylaxis in Children Living with HIV/ AIDS (CLHIV) aged 1- 14 years in a tertiary hospital, Kolkata, India." (Intramural)

Principal Investigator: D. Chakraborty, Scientist D, Epidemiology, ICMR- NICED, Kolkata
Site- PI: Dr. Kalpana Datta, Professor, Dept of Pediatrics and Programme Director, PCOE

Proposal Summary: Care of HIV infected children is considered in multiple domains with each having considerable impacts in overall clinical outcome. Though Antiretroviral drugs remain the mainstay of management, other interventions particularly nutrition, immunization and different prophylaxis have critical role to play in maintaining health and development of HIV affected children. National AIDS Control Organization has a guideline on nutrition, immunization for Pediatric HIV Exposed and infected Children Though sporadic studies in India has assessed prevalence of malnutrition, the adherence to the nutritional guideline and the associated dietary pattern needs to be investigated further. Hence this ART centre based cross sectional study is planned to estimate prevalence of malnutrition, immunization coverage, chemoprophylaxis adherence and factors associated based on assessment of 400 HIV infected children (1-14 years) registered at ART centre of Paediatric Centre of Excellence at Medical College & Hospital catering to more than 50% of the registered pediatric HIV cases of the state. The study will be conducted over three years through consecutive sampling where a pre-designed and pre-tested questionnaire will be utilized to record demographic, clinical and dietary, immunization related data along with assessment relevant serum micronutrient and biomarkers of metabolism such as Vitamin D, Ferritin, Zinc, Selenium, Albumin, Globulin, SGPT, Lipid etc from a NABL accredited laboratory. Hence this study will generate evidence on nutritional, immunization and chemoprophylaxis status and adherence gap if any in reference to national guidelines for HIV infected children and their key determinants. Hence from this study a holistic approach can be derived at and a standardized guideline will be framed to deliver different relevant services under single umbrella of ART centre thereby ensuring appropriate management, minimum attrition, overall improvement in clinical outcome and optimization of health care expenditure.

Field visit MCH

Work Progress so far:

1. Designed case record form, informed consent form.
2. Presented in SAC of ICMR- NICED and approval obtained.
3. Presented in IEC of ICMR- NICED and approval obtained.
4. Presented in IEC of MCH, Kolkata and approval obtained.
5. Completed initial meeting of investigators to prepare roll out plan.

Limitation:

Initiation of Data collection is awaited due to lockdown situation and conversion of MCH into COVID-19 Hospital at present.

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

• Attended the workshop on data analysis of Epidemiological Drivers of HIV epidemic in North East, organized at ICMR- NICED from 22- 24 July 2019.

• Attended Social Media Training Workshop in Agra on 26-27 August 2019.

• Attended seminar on current challenges of Antimicrobial Resistance and Potential Intervention by Bacteriophages organized by ICMR-NICED on 16-17 September 2019.

• Attended 4th GTFCC case management working group meeting on 5- 6 November 2019, New Delhi.

• Attended India International Science Festival 2019 at Kolkata. Delivered a talk on Current Challenges in Infectious Disease: Anti Microbial Resistance on behalf of the Director, ICMR- NICED on November 7, 2019.

• Attended meeting at DBT-BIRAC for project presentation on December 17, 2019.

• Attended proposal development meeting on cholera serosurveillance at ICMR HQ, New Delhi, from 6- 8 January 2020.

• Attend meeting on working paper on Preventive Health and Disease Surveillance at NITI Aayog, New Delhi on 23 January 2020.

• Attended meeting of Nodal Communication Officers (NCO) at ICMR HQ on 6 February, 2020. Presented the salient achievements of 2019 and future plan in terms of ICMR- NICED`s media endeavours.

• Attended Workshop on Mathematical Modelling on Infectious Disease at ICMR HQ /NIMS, New Delhi from 10-12 February 2020.

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

Rates of early initiation of breast feeding (EIBF) and exclusive breast feeding (EBF) up to 42 days of post-partum period and factors associated with failure to early initiation of breast feeding in rural West Bengal

BACKGROUND: Despite established benefits, exclusive breast feeding (EBF) rate remains poor in India. This study measured the rate of early initiation of breast feeding (EIBF), EBF up to 42 days post-partum period and the reasons associated with early interruption of EBF.
METHODS: In this study we followed a cohort 319 mother- new-born dyads, on a scheduled day of each week for 42 post-partum days, during May 2017 – March 2019. Using content analysis method, we analysed the data captured through open ended question on current breastfeeding practice and reasons to identify the sociocultural facilitators/barriers of EBF.
RESULTS: Of the retained 306 new-borns, EIBF rate was 60% (184/306). Whereas, EBF rate was 47% (143/306). Father being not the major earner of the family **(RR, 2.4; CI, 1.7-3.3)**, mothers' belief of breastfeeding having no longstanding effect (**RR, 1.8; CI, 1.3-2.1**) along with lack of self-conviction about EBF among mothers; significant family members' influence; cultural beliefs; emerged as major determinants of early interruption of EBF.
CONCLUSIONS: We conclude that the socio-environmental causes need to be addressed for ensuring better infant feeding outcome.

Table 5: Baseline characteristics of study participants: exploratory study of reasons for failure of EBF at 42 days' post-partum period, Hooghli, West Bengal, India, 2018 (N=306)

Characteristics		n	%
Age	≤22	159	52
	>23	147	48
Religion	Hindu	270	88
Caste	ST	110	**36**
	SC	138	**45**
Educational qualification of the mother	Up to primary	178	**58**
	Illiterate	35	**11**
Educational qualification of the father	Up to primary	198	**66**
	Illiterate	54	**18**
Socioeconomic status	Lower	261	**85**
Family type	Joint family	164	**53**
Families where father of the child is the major earner		105	**34**
BMI	<18.5Kg/m²	35	**11**
	23-24.9 & ≥25 Kg/m²	111	**36**

Table 6: Risks for unsuccessful exclusive breastfeeding practices for first 42 days infants' life, West Bengal, India, 2017-2019 (N=306)

Characteristics		Outcome				RR	CI
		Unsuccessful EBF (163)		Successful EBF (143)			
		n	%	n	%		
Mother's education	Illiterate (35)	18	51.4	17	48.6	1.2	(0.6-2.1)
	Primary to high school (247)	135	54.7	112	45.3	1.3	(0.8-2.1)
	Higher secondary till post graduate (24)	10	47.5	14	52.5	1	
Father the major earner of family	No (201)	134	66.7	67	33.3	**2.4**	1.7-3.3
	Yes (105)	29	27.6	76	72.4		
Mothers who believe that effect of breastfeeding is longstanding	No	68	77.3	20	22.7	**1.8**	1.5 - 2.1
	Yes	95	43.6	123	54.4		
Mothers who believe that locally available food can be started from 2-3 months onwards	Yes (58)	40	69	18	31	**1.4**	1.1-1.7
	No (248)	123	49.6	125	50.4		
Mothers who heard breastfeeding reduces chance of breast related disease	NO	135	65.5	71	34.5	**2.3**	1.6-3.2
	Yes	28	28	72	72		

Focus group discussion with mothers of infants aged between one month – six months of age, Dhaniakhali gram panchayat, Hooghli district, West Bengal.

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

- Attended seminar on current challenges of Antimicrobial Resistance and Potential Intervention by Bacteriophages organized by ICMR-NICED on 16-17 September2019.
- Attended International Science Festival 2019 at Kolkata.
- Attended meeting at DBT-BIRAC for project presentation on December 17, 2019.

Gut microbiome derived butyrate exploits miR122 biogenesis for cholesterol homeostasis

Given butyrate, produced by gut-microbiome affects cholesterol synthesis, we studied the molecular mechanism of butyrate on the hepatic cholesterol synthesis in the high-fat-diet (HFD) induced obesity model of C57BL/6 mouse. We show that butyrate given orally decreased HFD induced serum hypercholesterolemia coupled with decreased expression of the cholesterol metabolizing enzymes. Interestingly we found, butyrate suppressed the miR122 (abundant microRNA in liver playing regulatory role in cholesterol metabolism) biogenesis but enhanced the expression of post transcriptional regulator protein, AUF-1 (Fig 25). Furthermore, mice exposed to cocktail of antibiotics showed decrease in butyrate production which was associated with increase in serum cholesterol and miR122 in liver. These findings show the critical link between butyrate and cholesterol synthesis in animal model and cell line and also in experimental pathology.

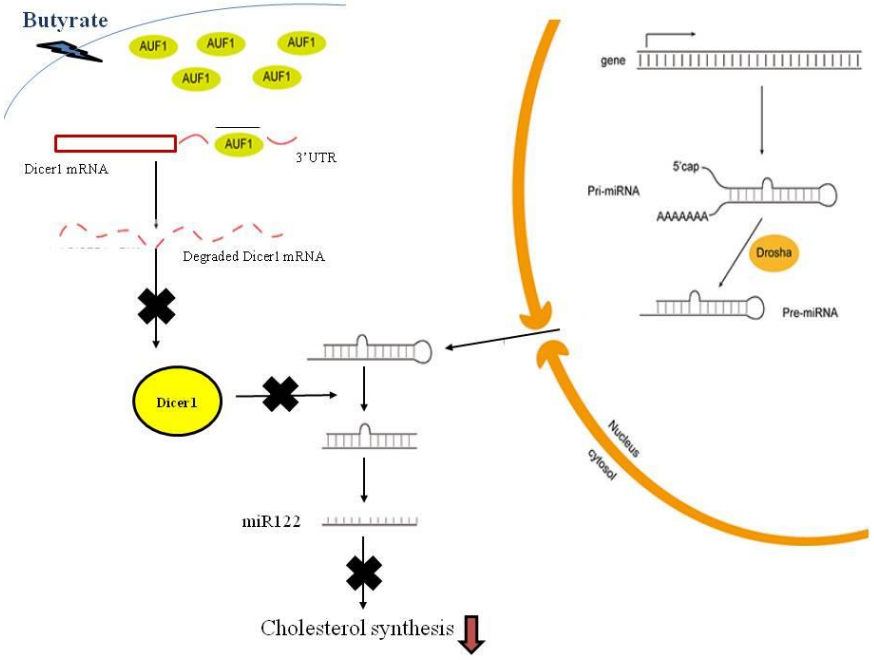


Fig 25: Schematic representation of putative mechanism of butyrate decreasing cholesterol synthesis by miR122 axis.

Effect of gut microbiome derived SCFA on lipid rafts: implication in pathogen invasion.

The gut microbiome ferments dietary fibers to produce short chain fatty acids (SCFA) like: propionate, butyrate and aceatate. Reports showed SCFA decreases the hepatic cholesterol biosynthesis. Decrease in cholesterol, disrupts the cholesterol rich microdomains or lipid rafts in the cell membrane. These micro-domains, are associated with various pathogen invasion in intestine. Rafts were found to be important in the adhesion of a number of bacteria. The study is undertaken with the objective to study the effect of SCFA on lipid rafts. We show, butyrate significantly downregulates cholesterol synthesis. Interestingly, concominant decrease in cholesterol increases the membrane fluidity by disrupting the lipid rafts (Fig 26A). The influence of butyrate induced lipid raft disruption is addressed by studying the resistance to enteric pathogen infection. The association of gut microbiota and cholesterol imbalance

is of prime importance to explain colonization resistance to pathogenic bacteria. The link between these two "complex events" is necessary for understanding enteric pathogenesis (Fig 26B).

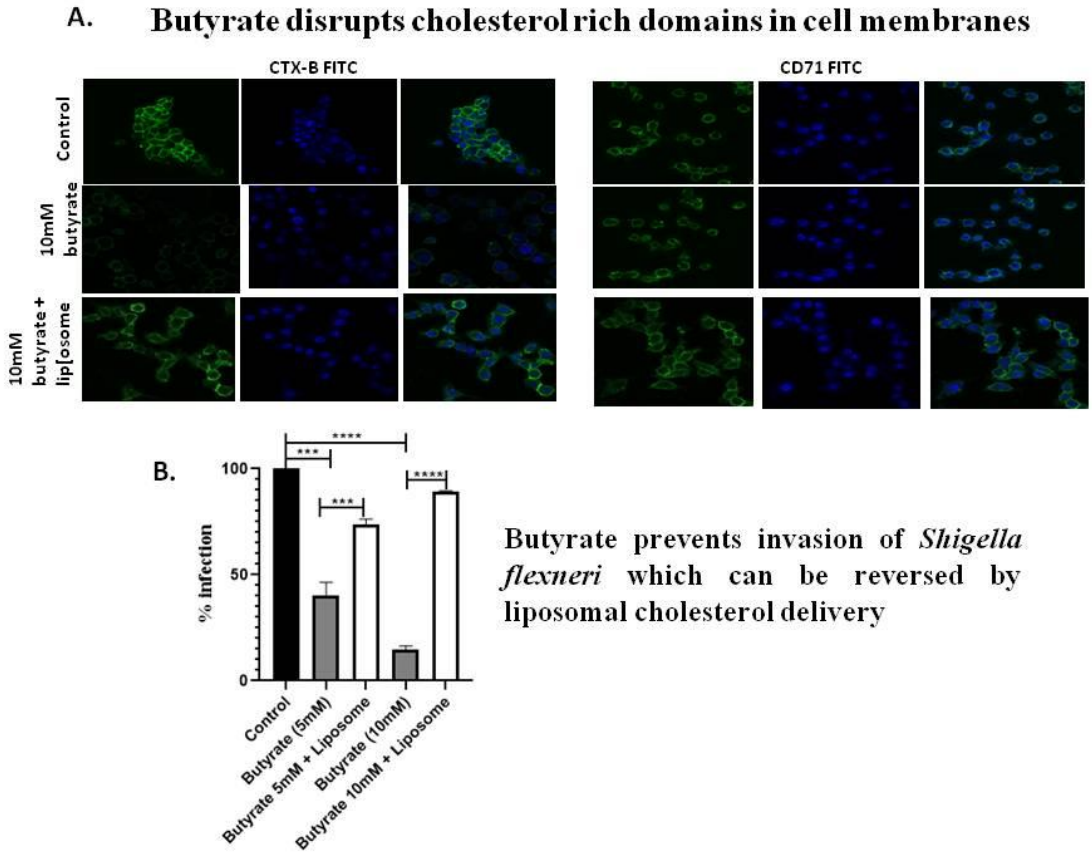


Fig 26: Butyrate disrupts lipid rafts and prevents pathogen invasion:
A) RAW 264.7 cells treated with butyrate shows reduced binding of CTX-B (raft marker) compared to control. CTX-B binding is reversed back to normal on further treatment with liposomal cholesterol. The binding for CD71 (non-raft marker) remain unaltered with butyrate or liposomal cholesterol treatment.
B) Pathogen invasion assay shows that butyrate treatment decreases invasion of *Shigella flexneri* compared to control. Further treatment with liposomal cholesterol increases the *Shigella flexneri* invasion in butyrate treated cells.

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

- Title: Microbiome: hopes and promises for future
  Invited Lecture
  Adamas University, Barasat, June 2019

- Title: Ünveiling the role of short chain fatty acid in cholesterol regulation: implication in pathogen colonization in gut.
  Oral presentation
  International Conference of Cell Surface Macromolecules (ICSM 2020) Feb 17-20, IISER, Pune.

Pre-Doctoral Fellows:

Mr. Mainak Chakraborty, SRF-CSIR

Ms. Oishika Das, JRF-DST INSPIRE

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. Govt. of India has taken the 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.

We have started the follow up study in different states and already finished the state of Chattisgarh and Tripura. The next planned follow up studies has been planned in Rajasthan, Madhya Pradesh, Bihar and rest of north eastern states. Our follow up study has confirmed that the prevalence of soil transmitted helminthes in both Chattishgarh and Tripura, India decreases significantly after deworming (Fig 27).

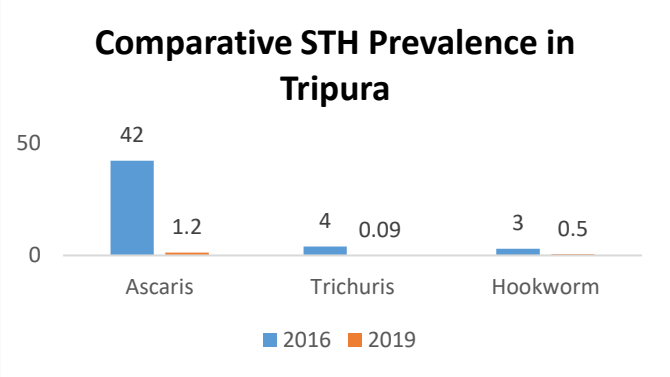


Fig 27: Bar Graph shows the significant decrease in Prevalence rate of different STH in Tripura after deworming campaign

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

A hospital based systemic surveillance study has been conducted among the patients admitted to Infectious Disease Hospital, Kolkata and B C Roy Hospital with diarrheal complaints from April 2019 to March 2020. Along with the common enteric parasites we also focused on the prevalence study of *E. moshkovskii* in this year. Nowadays importance of *E. moshkovskii* is increasing in study of amoebiasis due to its genetic relatedness to the pathogenic *E. histolytica.* Presence of *E. moshkovskii* in fecal samples from humans has been reported in different countries viz. United States, Italy, Iran, Turkey, Bangladesh as well as in India. This year we observed a 3.40% prevalence rate of *E. moshkoskii* positive cases. This finding is of great importance as *E. histolytica* prevalence rate are decreasing in this part of the country and there may be a possibility that *E. moshkovskii* is taking the place of *E. histolytica* infections. Genetic characterization of *E. moshkovskii* local isolates using 18SrRNA has already been started. We also targeted and successfully amplified Amoebapore C gene locus of *E. moshkoskii* local

isolates. The obtained sequences have been submitted in NCBI GenBank (Accession number: 18SrRNA- MN49610-MN49619 and MT350103-MT350117; Amoebapore C- MT372823-MT372830). We have analyzed the distribution of SNPs among different disease outcome groups of *E. moshkovskii* (Fig 28 and Fig 29).

As there are many microbes that can potentially induce diarrhea, the presence of other diarrheagenic microbes was also tested in the diarrheal samples that were associated with **E. moshkovskii** (Fig 30).

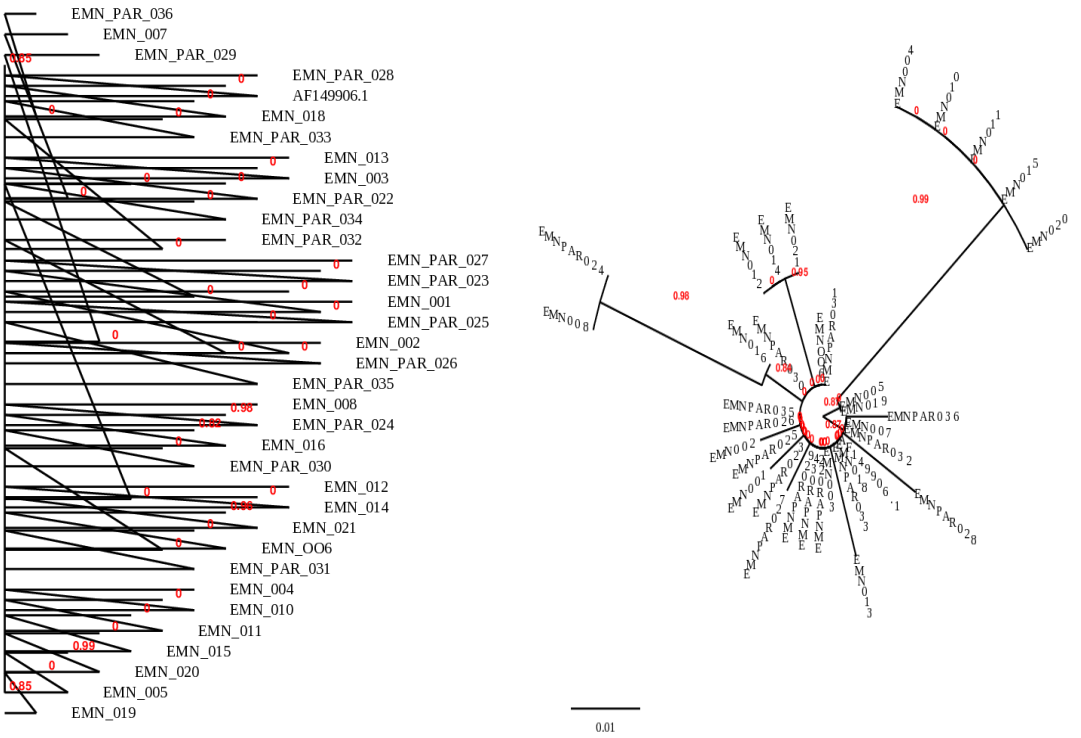


Fig 28: Phylogenetic tress of local isolates of Em basis 18SrRNA a. Cladogram (ignore branch lengths)(left) b. Radial (by TreeDyn) (Right); (AF149906.1 is reference strain of *E. moshkovskii*)

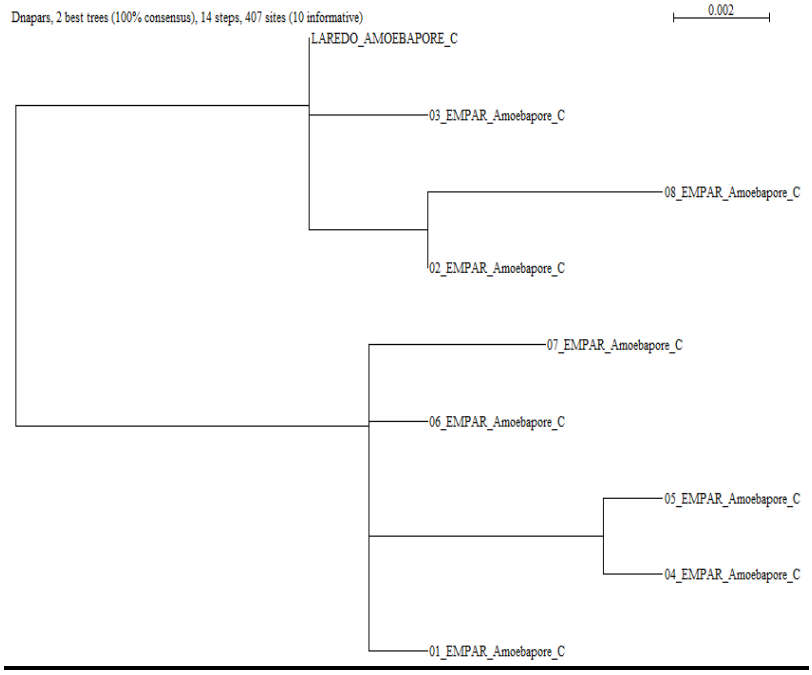


Fig 29: Phylogenetic tree of local isolates of *Em* using seaview4 software basis on Amoebapore C locus

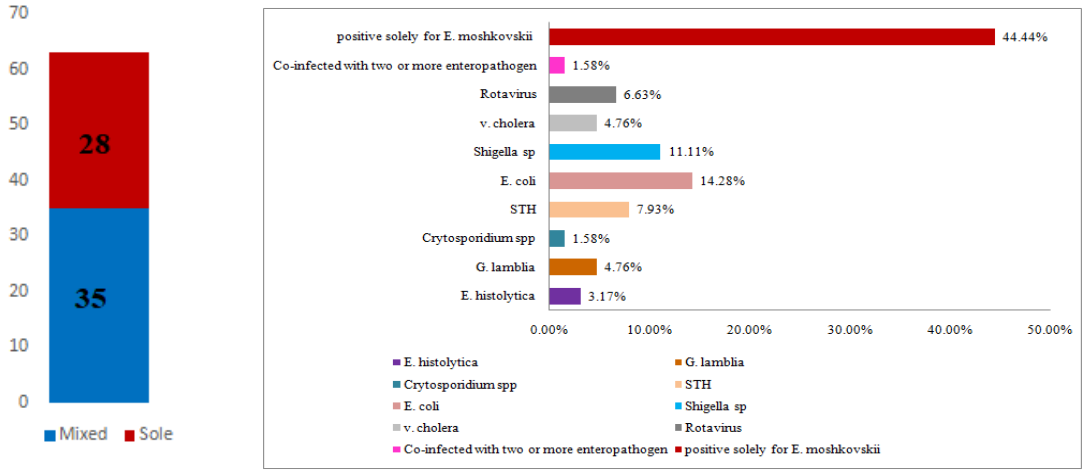


Fig 30: Number of mixed and sole infections of *E. moshkovskii* in our study samples. B. Comparative number of different enteropathogens commonly co-infected with *E. moshkovskii*.

Giardiasis is a major cause of diarrhea in both developing and developed countries. In Kolkata and eastern region of India giardiasis is a serious health problem since the climatic condition pose a favorable environment for growth and transmission of the pathogen. Recently we have observed a steep decrease in the prevalence rate of this pathogen, which can solely be due improvements made in water supply and sanitation in this region. There may also be other underlying factors that may have contributed to this outcome viz. changes in the genetic make-up which in turn resulted in mode of pathogenicity. Therefore, we started out the genetic characterization of the current human isolates utilizing Multilocus Sequence Typing of several housekeeping genes viz. β-giardin (*bg*), triose phosphate isomerase (*tpi*), glutamate dehydrogenase (*gdh*) in order to determine the genetic assemblages at subtype level. Although Beta Giardin (BG) (Fig 31) sequence data were inconclusive in determining sub-assemblages in most cases, Triose Phosphate Isomerase (TPI) (Fig 32) and Glutamate Dehydrogenase (GDH) (Fig 33) loci sequence data provide better resolution for subtyping. New variants of different sub-assemblages were obtained (Table 7). Incongruency might still arise because of emergence of new variety which maybe a result of inter/intra-assemblage/sub-assemblage genetic exchange.

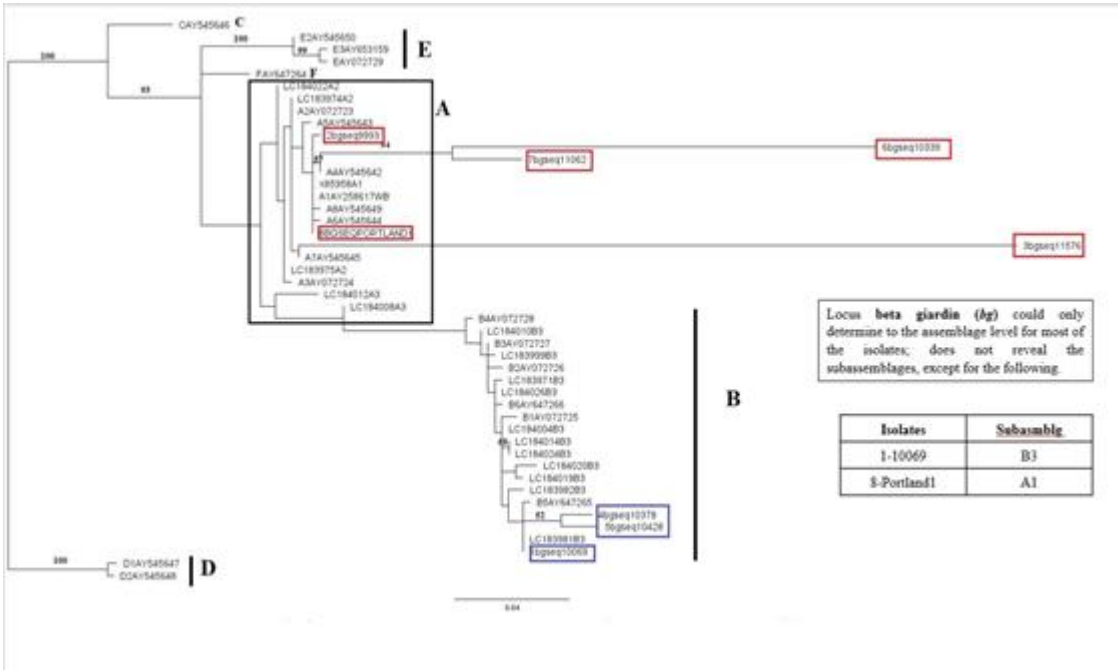


Fig 31: Phylogenetic tree of study isolates based on partial nucleotide sequence of *bg* gene locus

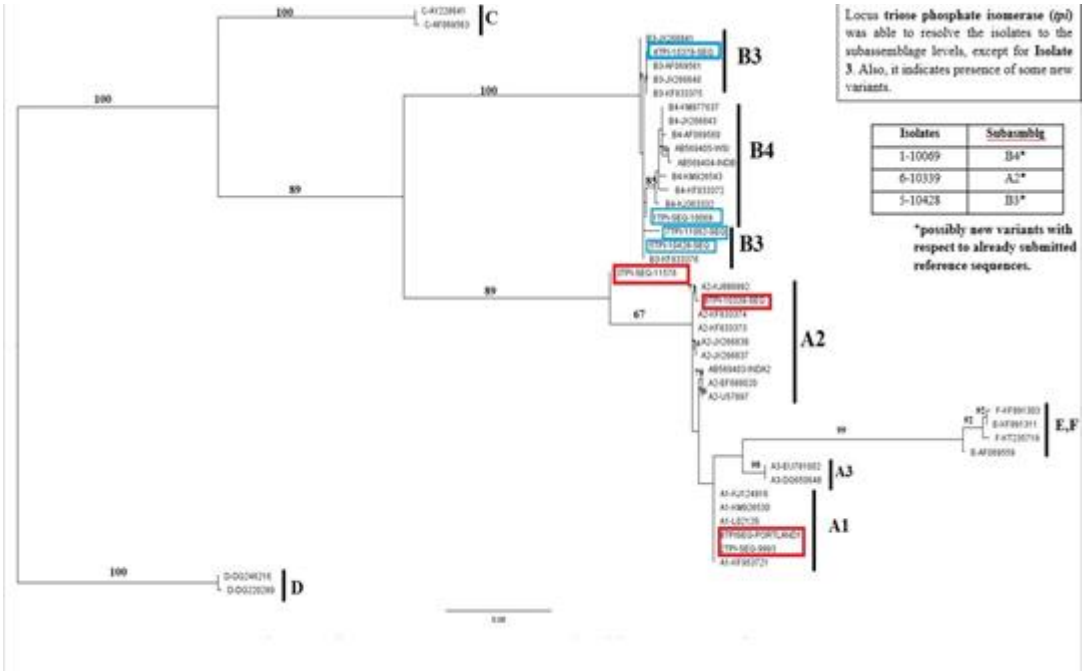


Fig 32: Phylogenetic tree of study isolates based on partial nucleotide sequence of *tpi* gene locus

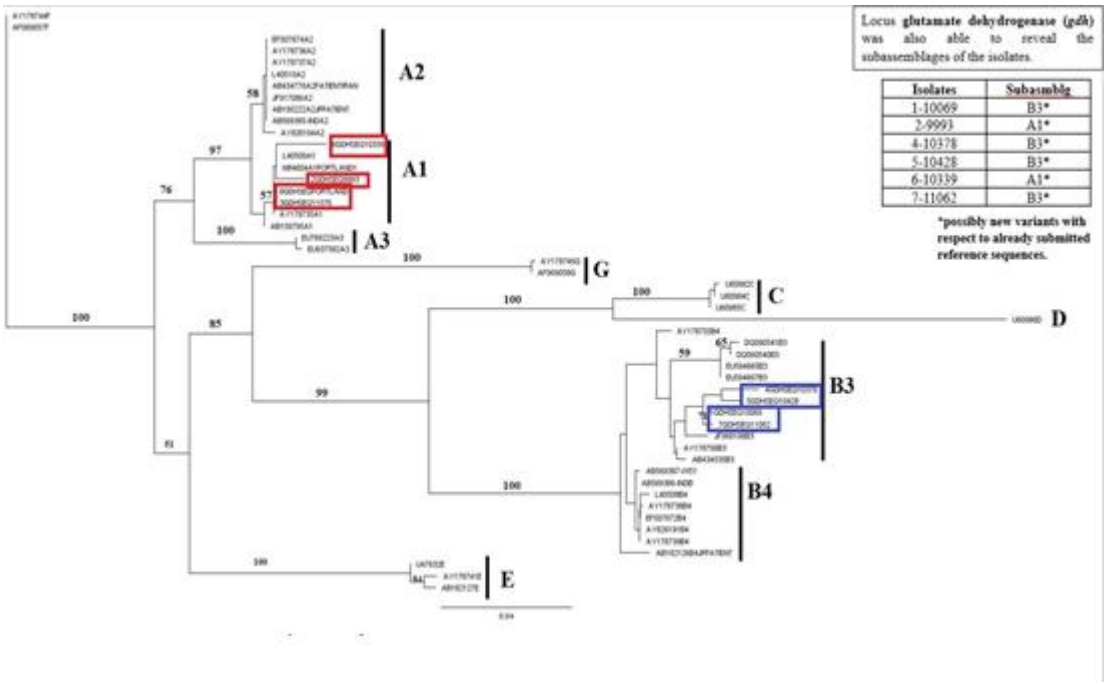


Fig 33: Phylogenetic tree of study isolates based on partial nucleotide sequence of *gdh* gene locus

Table 7: Sub-assemblage Assignment of the current local human isolates of *Giardia lamblia*

SAMPLE NO.	BETA GIARDIN	TRIOSE PHOSPHATE ISOMERASE	GLUTAMATE DEHYDROGENASE
Isolate1	B3	B4	B3
Isolate2	A	A1	A1
Isolate3	-	-	A1
Isolate4	B	B3	B3
Isolate5	B	B3	B3
Isolate6	-	A2	A1
Isolate7	-	B3	B3
Isolate8 PORTLAND1	AI	A1	A1

Incongruent result- mixed subassemblage

Awards/Honours Received

- Recipient of Raj Kristo Dutt Memorial Award (2019-20) from Indian Science Congress Association.
- Awarded Membership of High Level Scientific Committee (HLSC) for Soil Transmitted Helminthes, Ministry of Health and Family Welfare, Govt. of India.

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

- Invited participation in the ICMR Paragonimiasis workshop held at RMRC Dibrugarh from 8-9 Apr, 2019.
- Attended Review and Planning Meeting for Soil-Transmitted Helminths (STH) Prevalence Survey, Delhi, May 16, 2019.
- Organizer and Resource person for a training program organized by NICED for training on "Identification of Soil Transmitted Helminths using KatoKatz technique" 01 - 05 Jul, 2019.
- Participated and presented the work on 'Studies on the oxidative stress regulation in the microaerophilic amitochondriate Giardia lamblia' in Asian-African Research Forum in Emerging and Reemerging Infections 2019" organized by the Japan Initiative for Global Research Network on Infectious Diseases in Sapporo, Japan during September 05-06, 2019.
- Participated in "National Conference of The Indian Academy of Tropical Parasitology - IATP" held at Manipal Academy of Higher Education, Karnataka, India from 7- 9 Sep, 2019 and presented papers.
- Participated in a seminar on Current Challenges of Antimicrobial Resistance and Potential Intervention by Bacteriophages. ICMR-NICED, September 16-17, 2019.
- Invited participation as a resource person for panel discussion on "Chronic diarrhoea due to parasitic diseases in Indian perspective" in 2nd Annual Workshop followed by a CME on the theme of Zoonotic Parasitic Diseases in India on 7-8th of December, 2019 in collaboration with West Bengal University of Animal & Fishery Sciences, Kolkata and Indian Veterinary Research Institute (Eastern Regional Station), Kolkata.
- Invited participation in a short-term training on "Parasite microbiome – basics and protocols" at Dept. of Parasitology in the National Institute of Infectious Diseases (NIID), Tokyo from December 18th to 22nd 2019.
- Participated and presented the work on 'Studies on the oxidative stress regulation in the microaerophilic amitochondriate Giardia lamblia' in 107th Indian Science Congress held in Bengaluru India during 3-7 Jan, 2020 and delivered a lecture for Raj Kristo Dutt Memorial Award.
- Participated and presented the work in first review meeting for PIs in the ICMR Paragonomiosis Mission Mode project held at Trivandram, Kerala from 13-14 Jan, 2020.

Pre-Doctoral Fellow

Ms. Rituparna Sarkar, SRF-CSIR

Mr. Sanjib Kr. Sardar, SRF-ICMR

Ms. Ajanta Ghosal, SRF-ICMR

Mr. Md. Maimoon Maruf, SRF-CSIR

Mr. Tapas Haldar, JRF-CSIR

A. Pal (Principal Investigator), Pathophysiology Division

Purification and characterization of environmental microbial protease subtilisin and its role in apoptosis of cancer cells

In our earlier studies we had shown the role of hemagglutinin protease from *V. cholerae* in causing tumor regression of EAC (breast cancer cells) in mice model (Apoptosis 2015). We also showed that HAP induces cell death by intrinsic pathway of apoptosis by activating the PAR1 receptor (Apoptosis 2016). From the HAP induced cleavage of PAR1 a novel pro-apoptotic peptide was synthesized and used to kill cancer cells both in vivo and in-vitro (Apoptosis 2018).

In this study the main objective of this study was to search for microbial proteases which can induce apoptosis in cancer cells. A total of 140 environmental microbial strains were tested for protease activity. Only 5 strains showed significantly higher protease activity (Fig 34 A). All the 5 strains were tested in HT29 (colon cancer cells) for apoptotic effect. One strain DHS 96 showed apoptotic response which was inhibited by PMSF (Fig 34 B). The protease was purified from DHS96 strains by ammonium sulphate precipitation, ion-exchange and gel filtration chromatography. SDS-PAGE showed presence of two bands and a single band was observed in Native PAGE (Fig 34 C). The amino acid sequence of the bands showed homology with subtilisin. The 16 sRNA sequence showed significant homology with *Bacillus subtilis*. The purified protease showed both dose and time dependent apoptosis on breast cancer cells (MCF-7) and colon cancer cells (HT29). Subtilisin induced caspase indendent pathway of apoptosis (Fig 34 D). Interestingly subtilisin could degrade tubulin which could be inhibited in presence of MG132 (Fig 34 E & F). Our results show that subtilisin can induce apoptosis by protesomal mediated degradation of tubulin.

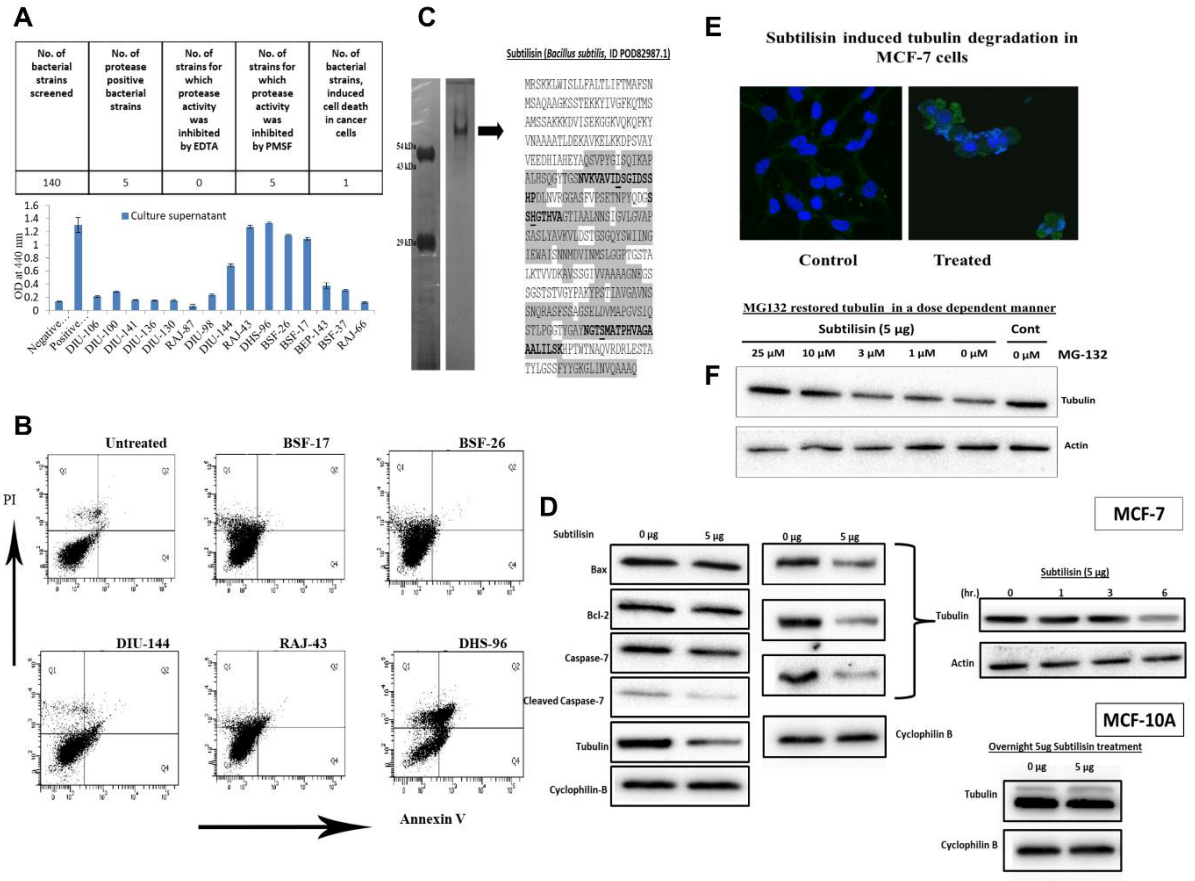


Fig 34: Purification and characterization of subtilisin and its role in apoptosis of cancer cells. A) Microbial strains isolated from environmental sources were screened for protease activity. B) Of the 5 strains showing protease activity only one strain DHS96 showed apoptotic response in MCF 7 cell line (breast cancer). C) The protease was purified by ion-exchange and gel filtration chromatography and showed two bands in SDS-PAGE and a single band in native PAGE. The amino acid sequence of all the bands showed homology with subtilisin from *B. subtilis*. D) Purified subtilisin did not induce the intrinsic pathway of apoptosis. E) Subtilisin induced apoptosis by degradatioin of tubulin in MCF7 cells as observed in confocal microscopy F) Subtilisin induced degradation of tubulin was inhibited in presence of MG132. The apoptosis induced on cancer cells was by the proteosomal mediated pathway.

Post and Pre-Doctoral Fellows

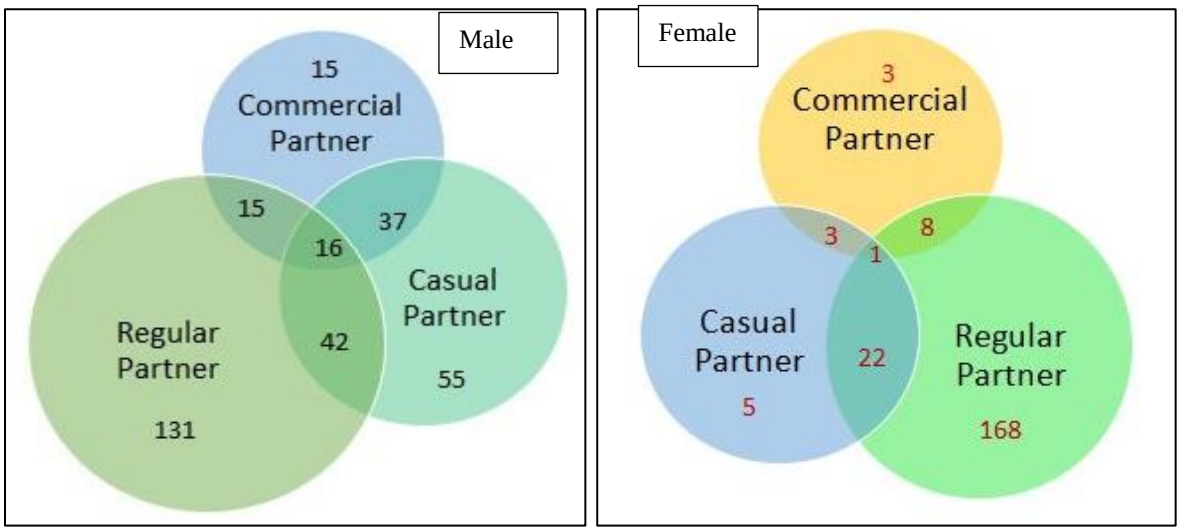
Post-Doctoral Fellow:
Dr. Rima Tapader, ICMR
Dr. Tanusree Ray, DBT Women's Scientist
Dr Tanmoy Paul, RA, DST-SERB

Pre-Doctoral Fellow:
Mr. Dwiprohi Kar, SRF-CSIR
Ms. Nanda Singh, JRF-CSIR
Mr. Niraj Nag, JRF-UGC

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

Piloting Audio Computer Assisted Self Interview (ACASI) in eliciting HIV related risks among Integrated Counselling and Testing Centre (ICTC) Attendees

The WHO funded study aimed to evaluate differences in reporting of HIV-related risk behaviors by ICTC attendees using ACASI and Face To Face (FTF) interactions. The pilot was conducted in three different states: West Bengal, Meghalaya and Nagaland.
The result of this study indicates that the ACASI use in ICTC settings can improve the quality of data collection in terms of completeness, accuracy and granularity as well as feasibility. It also shows that ACASI use improved the quality of information by increasing response to sensitive questions. This mode of information collection minimizes data entry errors. (Fig 35)
The key findings suggested that ACASI improved the quality of information by increasing response to sensitive questions and decreasing socially desirable responses.



Behavioral Surveillance Survey – Lite (BSS-Lite)

Consistent endeavor of National AIDS Control Organization over the various National AIDS Control Program is to have more granular, updated, and geographically & population representative bio-behavioral information made available to inform the HIV prevention and treatment program. Behavioral information is a critical information source indicating the extent to which AIDS response is having an impact on behaviours of specific key population groups so that accordingly efforts can be adjusted or intensified. It also acts as an early warning system of population groups at risk for HIV in specific locations. In view of this, BSS-Lite has been 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. Findings from BSS-Lite will -also be used to work out appropriate correction factors for the behavioral component of the HSS Plus.
BSS-Lite 2019 was 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 at ICMR-NICED was responsible for implementation of the BSS-Lite in 2 States- Nagaland and West Bengal.

There were three distinct technical implementation phases of the BSS-Lite: a) Sampling Frame Development, b) Cluster Selection, and c) Behavioural Survey.

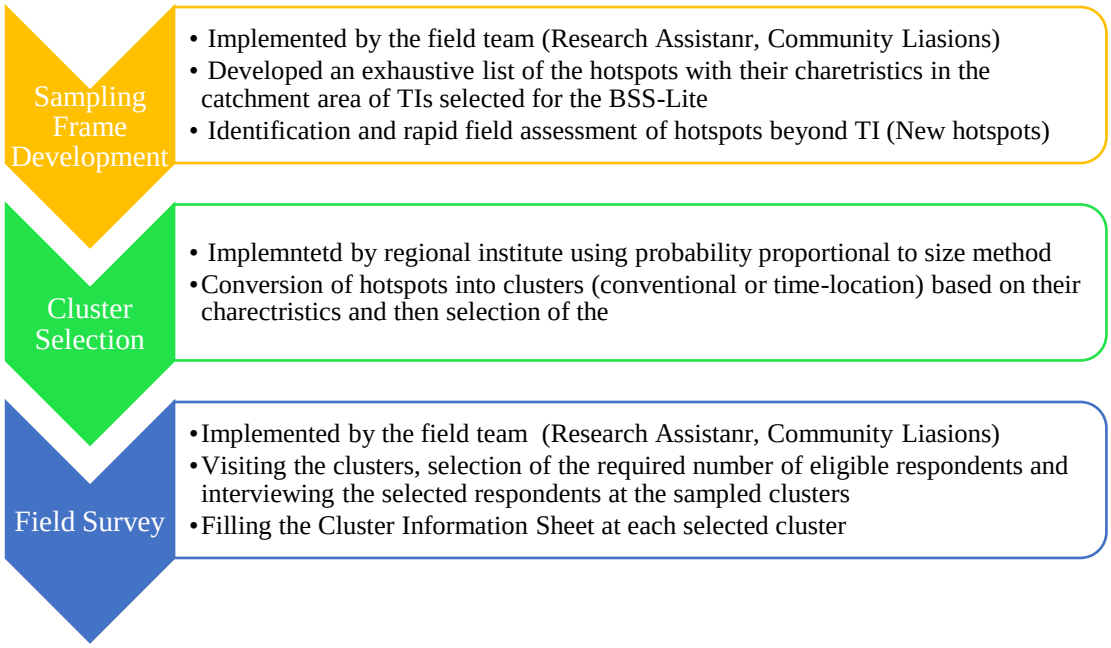


Fig 36:

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

- National Training of Trainers for BSS-Lite was held during 20th – 23rd May 2019 at Gurgaon, organized by All India Institute of Medical Sciences (AIIMS), New Delhi. Focal person & Project Coordinator of Regional Institute (RI) were attended the program.
- Workshop on 'Review of datasets and Data Analysis' under ART-IE study held at ICMR-NARI Pune during 11th – 13th July 2019. Representative from ART-IE study project, ICMR-NICED attended the program.
- National Level training for Sampling Frame Development (SFD) of Behavioral Surveillance Survey-Lite (BSS-Lite) was held at AIIMS, New Delhi, during 17th – 20th August 2019. Project Coordinator and Research Officer of Regional Institute (RI) were attended the training program.
- Four days training program on 'Laboratory Quality Management System & Internal Audit' organized by Institute of Apllied Quality Management held during 28th – 31st August 2019. Representative from NRL, ICMR-NICED attended the training program.
- SFD State level training on BSS-Lite for Nagaland was held during 11th – 14th September 2019 at Kohima and representative from RI (E) was attended the training program as resource person.

- Felicitation of a four day “Refresher and review workshop and training on Early infant diagnosis of HIV (to eliminate the mother to child transmission of HIV)” from 15th to 18th October,2019 organized by Plan international, Piramal swasthya and Assam state AIDS control society in collaboration with UNICEF, at Gauhati, Assam.
- Four days “State Level Orientation Training & Workshop On EARLY INFANT DIAGNOSIS” for laboratory technicians for SA-ICTCs & PPTCTs of Bihar from 16th to 19th December,2019 at Patna, Bihar.
- Panel Aliquoting Workshop under Consortium of NRLs for Kit Quality held at ICMR-NARI, Pune during 8th – 9th January 2020. Representative from NRL, ICMR-NICED attended the workshop.
- One day workshop for NACO-PRAYOGSHALA held at ICMR-NARI, Pune on 7th February 2020. Representative from NRL, ICMR-NICED attended the workshop.

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

Rotavirus activates a non-canonical ATM-Chk2 branch of DNA damage response during infection to positively regulate viroplasm dynamics

Surveillance for maintaining genomic pristineness, a protective safeguard of great onco-preventive significance, has been dedicated in eukaryotic cells to a highly conserved and synchronized signaling cascade called DNA damage response (DDR). Not surprisingly, foreign genetic elements like those of viruses are often potential targets of DDR. Viruses have evolved novel ways to subvert this genome vigilance by twisting canonical DDR to a skewed, non-canonical response through selective hijacking of some DDR components while antagonizing the others. Though reported for many DNA and a few RNA viruses, potential implications of DDR have not been addressed yet in case of infection with Rotavirus (RV), a double stranded RNA (dsRNA) virus. In the present study, we aimed at the modulation of ATM-Chk2 branch of DDR in response to RV infection *in vitro*. We found activation of the transducer kinase Ataxia Telangiectasia Mutated (ATM) and its downstream effector Check point kinase2 (Chk2) in RV-SA11 infected cells, the activation response being maximal at 6 hours post infection. Moreover, ATM activation was found to be dependent on induction of the upstream sensor MRN (Mre11, Rad50, Nbs1) complex. Interestingly, RV-SA11 mediated maximal induction of ATM-Chk2 pathway was revealed to be neither preceded by occurrence of nuclear DNA damage nor transduced to formation of damage-induced canonical nuclear foci. Subsequent investigations affirmed sequestration of MRN components as well as ATM-Chk2 proteins away from nucleus into cytosolic RV replication factories (viroplasms). Chemical intervention targeting ATM and Chk2 significantly inhibited fusion and maturation of viroplasms leading to attenuated viral propagation (Fig 37). Cumulatively, the current study describes RV-mediated activation of a non-canonical ATM-Chk2 branch of DDR skewed in favour of facilitated viroplasm fusion and productive viral perpetuation (Sarkar R et al., Cell Microbiol 2020).

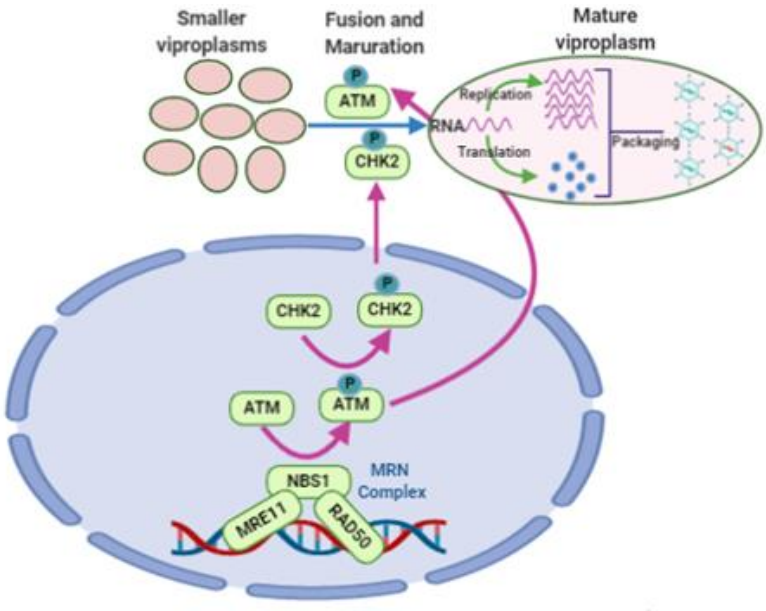


Fig 37: Rotavirus infection activates ATM-CHK2 branch of DNA Damage Response (DDR). Activated ATM (p-ATM) and CHK2 (p-CHK2) translocate from the nucleus to cytosol and help in fusion and maturation of viroplasm, the site of Rotavirus replication.

Development and evaluation of a multiplex conventional RT-PCR assay for detection of common viral pathogens causing acute gastroenteritis

Timely identification of etiological agents of enteric infections is necessary to reduce the burden of infantile diarrheal mortality. Nucleic acid amplification based detection methods offer a quick, reliable way for diagnosis of microbes in clinical specimens. This study was undertaken to evaluate an easy–to -use, cost -effective multiplex conventional RT -PCR assay developed at ICMR -NICED virology laboratory to identify four common enteric viruses (rotavirus, norovirus, adenovirus, astrovirus) in stool samples from patients who were being evaluated for acute diarrhea (Fig 38). On comparison with a commercially available real -time PCR method, significant agreement in sensitivity and specificity was observed. Though the turn -around time for RT -PCR was 6 -8h compared to 5 - 6h for real -time PCR, the real -time PCR has high test cost (approx. 28 USD/2000 INR) for FTD kit -based qRT -PCR vs. 6 USD or 400 INR for conventional multiplex RT -PCR/sample. Thus, the conventional RT -PCR method is expected to be adaptable at local hospitals and health -cares in resource -poor settings (Mitra S et al., DMID 2020).

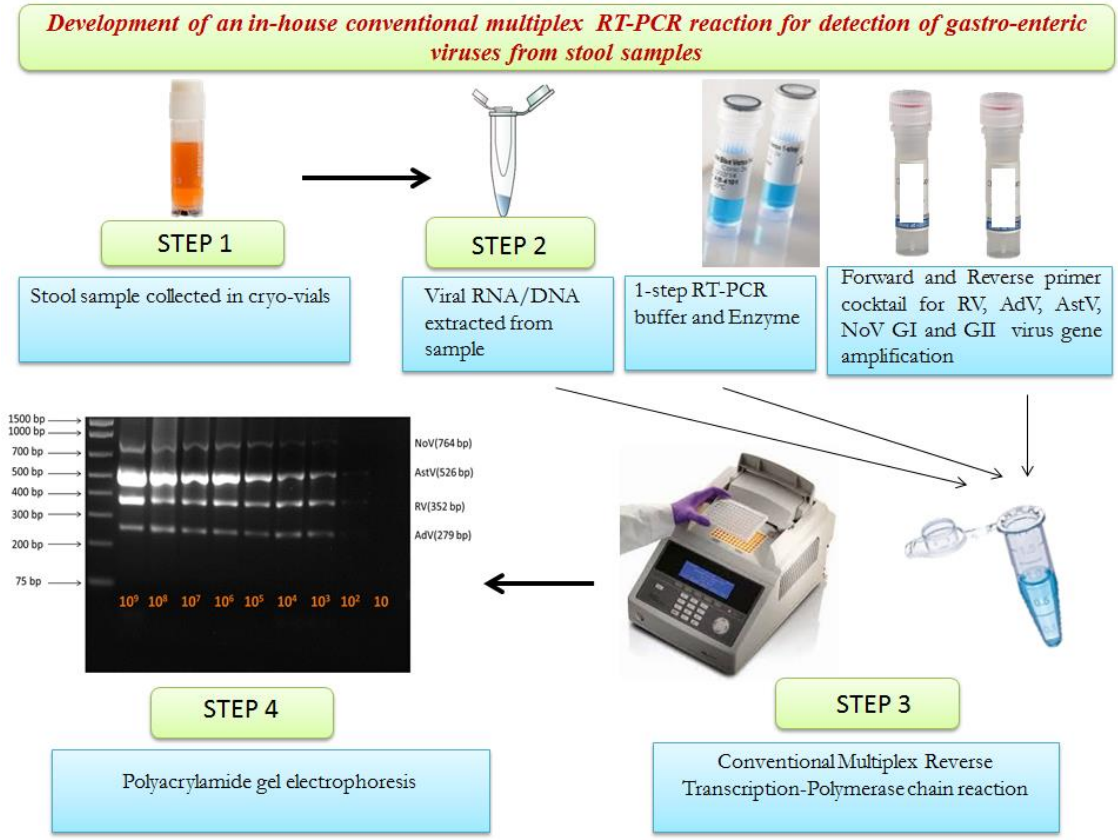


Fig 38: Development of an in-house conventional multiplex RT-PCR reaction for detection of gastro-enteric viruses from stool samples

Awards/Honours received

- Fellowship of Indian National Science Academy 2020 (FNA) in Dec 2019

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

- Asian African Research Forum on Emerging and Reemerging Infections, Sept 5-6 2019 at Hokkaido University, Sapporo, Japan. Presentation title "Andragrapholide exerts antagonistic effects on rotaviral infection: Therapeutic potential of an ethnomedicine adjunct to the conventional vaccination" (**Poster**)
- International Conference on Evolution of Viruses and Viral Diseases (VIROCON 2020), Feb 18-20, 2020 at Indian National Science Academy, New Delhi. Organized by Indian Virological Society (IVS). Presentation title "Rotaviral Gastroenteritis: Current Scanario and future perspective towards alternative therapeutic approaches" (**Invited lecture)**

PhD. Awarded

Dr. Arpita Mukhopadhayay was awarded PhD. From the University of Calcutta
Title of Thesis: A Study on Host-Rotavirus Interaction: Delineating Cellular Signalling Pathways Activated During Infection
*Date of degree***:** 18th Dec 2019

Dr. Anindita Banerjee was awarded PhD. From the University of Calcutta
Title of Thesis: Surveillance and molecular characterization of circulating enteric viruses among children with acute gastroenteritis in Kolkata seeking health care facilities.
Date of degree: 18th Dec 2019

Pre-Doctoral Fellow
Mr. Upayan Patra, SRF-ICMR
Ms. Urbi Mukhopadhayay, SRF-UGC
Mr. Rakesh Sarkar, SRF-UGC
Mr. Mahadeb Lo, SRF-CSIR
Ms. Priyanka Saha, JRF-DBT
Ms. Suvrotoa Mitra, JRF-ICMR Project

A. Chakrabarti (Principal Investigator), Virology Division

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

Vibrio phage Reference Laboratory of NICED is a referral laboratory which provides service to the nation on phage typing of *V. cholerae* strains. As a National center ICMR-NICED use to receive strains from different medical colleges, hospitals and research institutes around the country of India for bio-typing, sero-typing and phage typing study.

A total of 132 *V. cholerae* O1 biotype ElTor strains were received from different part of the country for phage typing analysis. Strains received were confirmed as *V. cholerae* O1 biotype ElTor. All the strains were serotyped and phage typing was performed using the sets of typing phages available with us at routine test dilution following the standard methodology. Ogawa was found as major serotype. Although only two types; T-2 and T-4 was found using Basu and Mukherjee phage typing scheme, results of phage typing using new phage typing scheme revealed the presence of several phage types among *V. cholerae* O1 biotype ElTor strains. Phage type 27 was the most prominent type. Typing phages were propagated to be used for future study using MAK-757 as standard propagating strain. Apart from typing of bacterial strains, isolation of new phages against *V. cholerae* O1, *Shigella* and *Salmonella* sp. are ongoing.

Future plan: This study will be continued to determine phage types of *V. cholerae*. New bacteriophages will be isolated and characterized.

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 and expression analysis of PB1 and PB1-N40 proteins was performed in A549 cell line. It was found that PB1-N40 was not associated with apoptosis and PB1-N40 has no role in the regulation of inflammation. The functional importance of PB1-N40 protein in the life cycle of Influenza A virus has been studied with TRIM32 which is an E3-ubiquitin ligase. It has the capability of binding and ubiquitinate the viral PB1 polymerase protein resulting in subsequent reduction of polymerase activity and impaired production of virus from infected cells. We have observed that TRIM32 protein expression gradually increases in a time-dependent manner within the virus-infected cells. As PB1 and PB1-N40 get synthesized from the same ORF of PB1 segment of the viral genome and have the structural similarity, it was assumed that PB1-N40 can also bind with TRIM32. PB1, PB1-N40, and TRIM32 were cloned into respective vectors and transfected into A549 and HEK293T cell lines. PB-N40 protein was found co-localized with TRIM32 indicating its interaction (Fig 39).

Future Plan: Interactions between PB1-N40 and TRIM32 will be analysed in details by co-immune precipitation, co-immune blotting and bioinformatics analysis

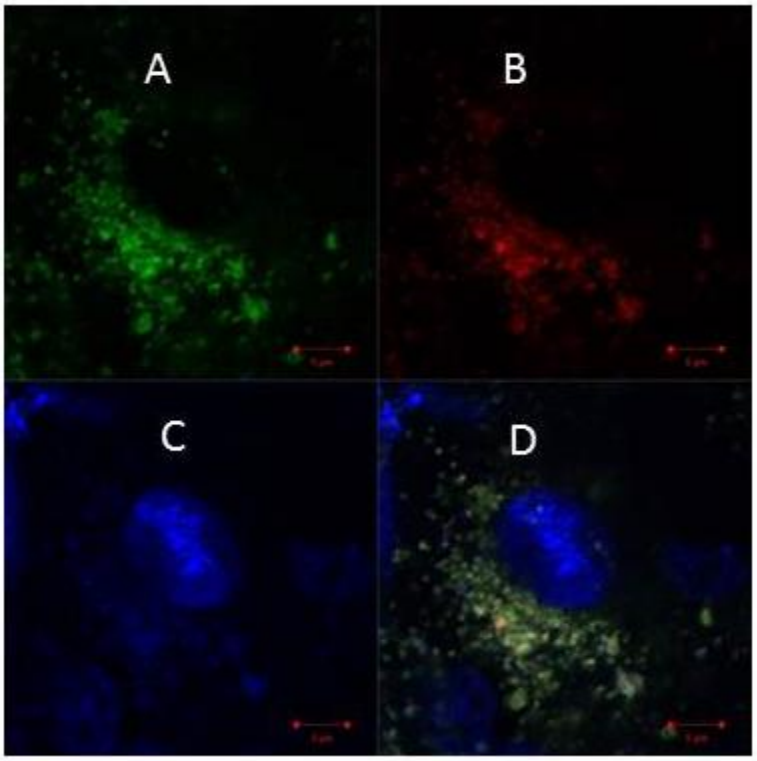


Fig 39: Co-localization study of PB1 and human TRIM 32 protein in confocal microscopy

PB1 gene was cloned into pAc-GFP1-C2 mammalian expression vector that express both PB1 and PB1-N40 proteins. TRIM32 was cloned into Ds-RED-Express-N1 vector. PB1-GFP1-C2 and human TRIM32 -Ds-RED-Express-N1 clones were co-transfected into A549 cell line for viral protein expression and localization study of desired proteins.

A. GFP tagged PB1 Protein expressed into A549 transfected cells.
B. Ds-RED tagged TRIM32 protein expressed into A549 transfected cells.
C. Nucleus of the A549 cells stained with DAPI.
D. Merged image of the Both expressed proteins.

Strengthening/ Promoting evidence-based advocacy for influenza prevention and control in India

Indian Network of population-based Surveillance Platforms for Influenza and other Respiratory viruses among Elderly **(INSPIRE)** is a multi-centric project to understand the status of influenza in elderly populations in Eastern part in India. Community based surveillance among elderly population is critically important to understand the status of influenza virus infection among the elderly population in India. Hospital surveillance also added extra strength to understand flu status in elderly population. A total of 778 samples received from the community field were analyzed for the presence of influenza viruses. All the samples were typed and subtyped in our laboratory. 56 (7.19%) samples were found influenza virus positive out of which 33 (4.24%) were positive for influenza A and 23 (2.95%) samples showed presence of influenza B virus. We found the presence of H1N1, H3N2, influenza B Yamagata and influenza B Victoria subtypes. Apart from the field, we received 284 samples from hospitals of which 46 samples were positive for influenza viruses. 44 (15.49%) samples were positive for influenza A of which 15 samples were influenza A H1N1 and 29 were influenza A H3N2. 2 samples were found positive for influenza B Victoria linage. Two samples were found positive for RSV which is a new finding among elderly in India.

Future plan: This study will continue in its current format to understand the prevalence of influenza among the elderly population.

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

- Attended One day UGC sponsored National Seminar "MICROBIAL WORLD 2020" at North Bengal University, Siliguri, West Bengal on 27th February 2020 and delivered invited lead lecture entitled **"Emerging viral diseases and flu: is Influenza still dominating?"**
- Attended Regional Workshop on "Alternative Approaches to Combatting Anti-Microbial Resistance (AMR)" at Kazakh National Academy of Sciences, Almaty, Kazakhstan, April 18-19, 2019 and delivered invited lecture on "**Use of bacteriophages in typing of *Vibrio cholerae* strains in India.**"

Pre-Doctoral Fellow
Mr. Devendranath Tewari, SRF-UGC
Ms. Sampurna Biswas, SRF-ICMR
Mr. Partha Pratim Mandal, JRF-UGC
Mr. Sanjoy Biswas, JRF-UGC

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

Objective: To estimate the seroprevalence pattern and profiling of envelope glycoprotein including subtype identification of HCMV among the newborns (Both symptomatic and asymptomatic) in an East Indian population cohort and the seroprevalence pattern of Rubella among the newborns (Both symptomatic and asymptomatic) in an East Indian population cohort.

Outcome of the project: We performed serological diagnosis for HCMV and Rubella virus on 252 pediatric samples collected from local metropolitan hospitals of Kolkata, West Bengal. Among those 252 samples 83 samples (32.93 %) became HCMV-IgM positive and 169 samples (67.06%) were HCMV-IgM negative. Further molecular diagnosis by qualitative PCR were done on HCMV seropositive patients and 79 samples (31.34%) became HCMV true positive.

Rubella seroprevalence was also checked. Among the 252 samples 16 samples (13.33%) were Rubella IgM positive and 104 samples (86.66%) were Rubella IgM negative. Swab samples were collected from rubella seropositive patients and total viral RNA extraction followed by cDNA synthesis as well as Reverse Transcriptase PCR was performed using Rubella E1 gene specific primers.
We did not get any RT-PCR positive Rubella samples because in children it is mild and self-limiting within 1-3 days. So parents rarely attend any healthcare provider for this and the cases go almost unnoticed and undiagnosed. Moreover, there is an increasing coverage of rubella vaccine with development of herd immunity, so numbers of actual cases are also limited. Main concern is congenital rubella syndrome. Transmitted vertically from infected mother and it is easily diagnosed but still it is rare may be due to herd immunity.

Among these 83 samples, 17 pediatric samples were selected with symptomatic HCMV infection. Sequencing and phylogenetic analysis was then performed using Bayesian interference on HCMV Glycoprotein gB gene (Fig 40). Significant genotypic clades [gB1-gB2-gB3-gB5] were grouped closely based on gene sequences where gB1 genotype was 41.17%, gB2 genotype was 35.29%, gB3 genotype was 23.52 %, gB4 genotype was 5.88% and gB5 genotype was 17.64%

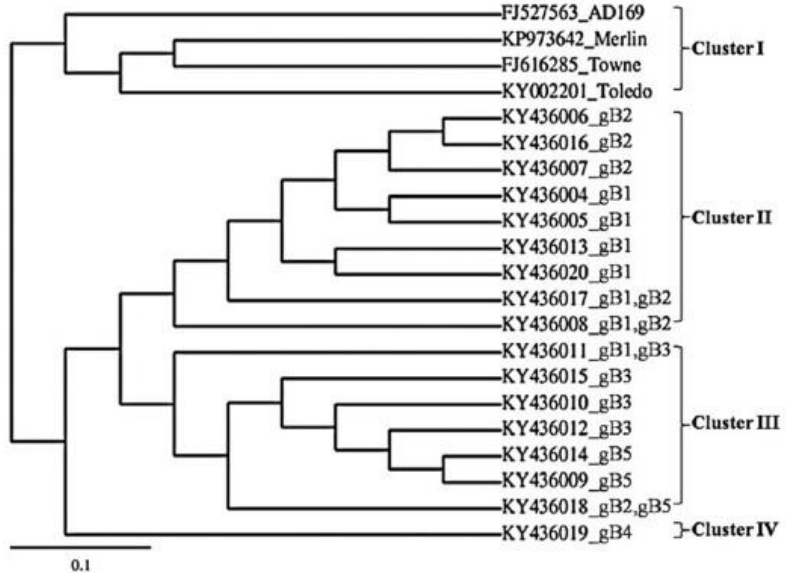


Fig 40: Phylogenetic tree based on the Neighbour-joining [N-J] method for the analysis of CMV gB gene sequences. The represents intra genetic distribution along with reference strains; and the phylogenetic position of CMV-gB sequences isolated from tested samples of eastern India

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

Objective: The main objective is to in vitro investigation of the antiviral property from some medicinal mushrooms against HCMV.

Outcome of the study: Organic crude Extracts from *Pleurotus sp*. and *Lentinus sp*. has been tested over MRC5 and 1B4 cell lines. In 1B4 cell line *Pleurotus sp*. and *Lentinus sp*. mushroom extracts show lower CC50 value (822.28±1.27 and 468.07±0.80 µg/ml respectively) in comparison to MRC5 cell line (502.12 ± 3.34 and 429.61±1.59 µg/ml respectively) against HCMV AD169 strain (MOI-1.0). The EC50 value of *Pleurotus sp*. and *Lentinus sp.* were 80.39±1.26 µg/ml and 69.48±1.68 µg/ml respectively clearly indicates that both these mushrooms have some distinctive antiviral chemical constituent. In order to achieve 100 % efficiency of the antiviral responses both these extracts were applied in dose dependent manner where *Pleurotus sp* exhibit complete antiviral response at 180 µg/ml and 160 µg/ml in case of *Lentinus sp* extract (Fig 41). The selectivity index of both *Pleurotus sp* and *Lentinus sp* were 6.24 and 6.18 respectively. Time dependent antiviral response were calculated by determining the percentage of inhibition of viral log copy number which showed that other than ganciclovir both these mushroom extracts show similar response to HCMV replication as a result viral load decreases in course of time. 80-90% inhibition was achieved at 48 to 72 h.p.i but at 36 h.p.i. both PE and LE strongly reduced viral load (70-72%) in comparison to ganciclovir (50-55%). These data clearly represent that the crude extracts of both the mushroom were able to effectively inhibit the propagation of human cytomegalovirus *in vitro*. (Fig 42)

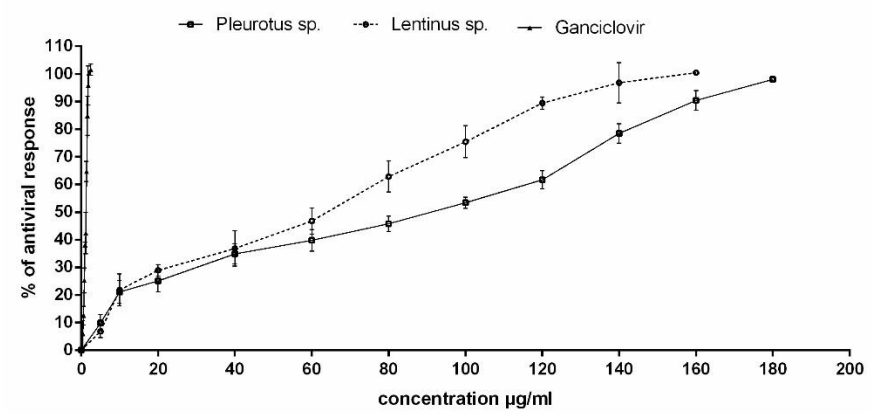


Fig 41: Comparison of dose dependent antiviral response of Pleurotus sp. and Lentinus sp. mushroom extracts against Human Cytomegalovirus

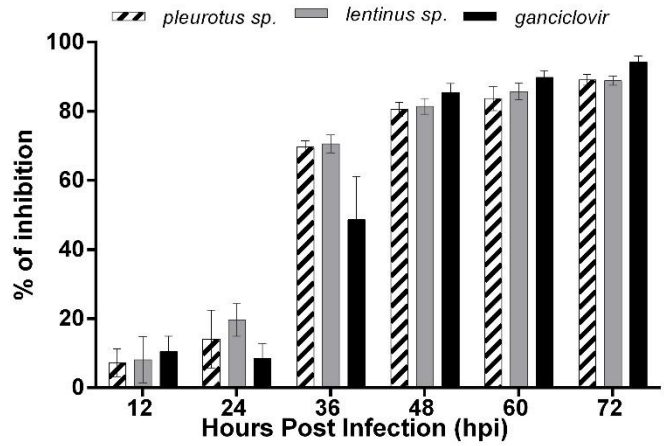


Fig 42: Time dependent log viral copy number reduction of Pleurotus sp. and Lentinus sp. mushroom extracts against Human Cytomegalovirus.

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

- Delivered an oral presentation at the conference Brainstorming on 'Biological Hazards in Foods: Current Status and Future Roadmap' organized by Veterinary Research Institute, IVRI held on 29.02.2020 at Izatnagar, IVRI, Bareilly, UP

Title of the presentation – "Foodborne biological Hazards-Status, challenges and future perspectives"

Post and Pre-Doctoral Fellows

Post-Doctoral Fellow

Dr. Agniswar Sarkar, UGC

Pre-Doctoral Fellow
Mr. Sabbir Ansari, SRF-UGC
Mr. Aroni Chatterjee, SRF-UGC
Mr. Rajendra Prasad Chatterjee, SRF-DBT
Mr. Debsopan Roy, JRF-WBDST

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

Principal Investigator: Provash C. Sadhukhan

Co-Investigator: Shanta Dutta, Souvik Ghosh, Ashokananda Konar, Maitreyee Bhattacharyya, Prasanta Chaudhary

Hepatitis C virus infection is one of the leading causes of liver failure and hepatocellular carcinoma worldwide. HCV being an RNA virus, genomic evolution is a continuous process to evolve new genotypes and subtypes. Different HCV isolates worldwide show substantial nucleotide sequence variability throughout the viral genome. So, it is very important to monitor the genomic diversity and pattern of evolution of this virus on a regular basis, especially within the high-risk group (HRG) population, such as thalassemia hemophilia and hemodialysis patients and people who inject drugs (PWIDs), as they are the major HCV reservoirs and the prime reason behind the transmission of HCV. Knowing the molecular diversity of HCV in different population groups will assist clinicians and health care providers to come up with proper therapeutic intervention for infected individuals since direct acting antivirals (DAAs) are specific to HCV genotypes.

During this period, we received 784 HCV sero-reactive blood samples from different HRG population as well as from general population with chronic liver diseases (CLD) from the eastern part of India. We observed that HCV RNA positivity varied among different HRG populations, such as RNA positivity in thalassemia patients and PWIDs were ~63% and ~84% respectively, whereas general population with CLD was 71% and CKD was 73%. Our HCV genotype data showed that the distribution of HCV also varied in different population groups. Overall, 3a (47.41%) was the major circulating strain in our study population followed by 1c (18.77%), 3b (14.08%), 1a (5.16%), 1b (10.32%) and 4a (2.34%). We also observed that the majority of thalassemia patients were infected with HCV genotype 3a (77.58%) whereas 66.66% of hemodialysis patients were infected with genotype 1c. 317 RNA positive patients completed full treatment with genotype specific DAAs. Approximately 93% (n=296) patients showed positive response to DAAs and rest (6.62% n=21) were relapsed. Study also revealed that most resistant cases had occurred in males (71%) than females (29%). Majority of the resistant cases were found within Chronic Liver Disease 48% (n=10) patients followed by β-thalassemia 19% (n=4) (Fig 43) patients. We also observed HCV genotype 3 is more resistant than genotype 1 against DAAs.

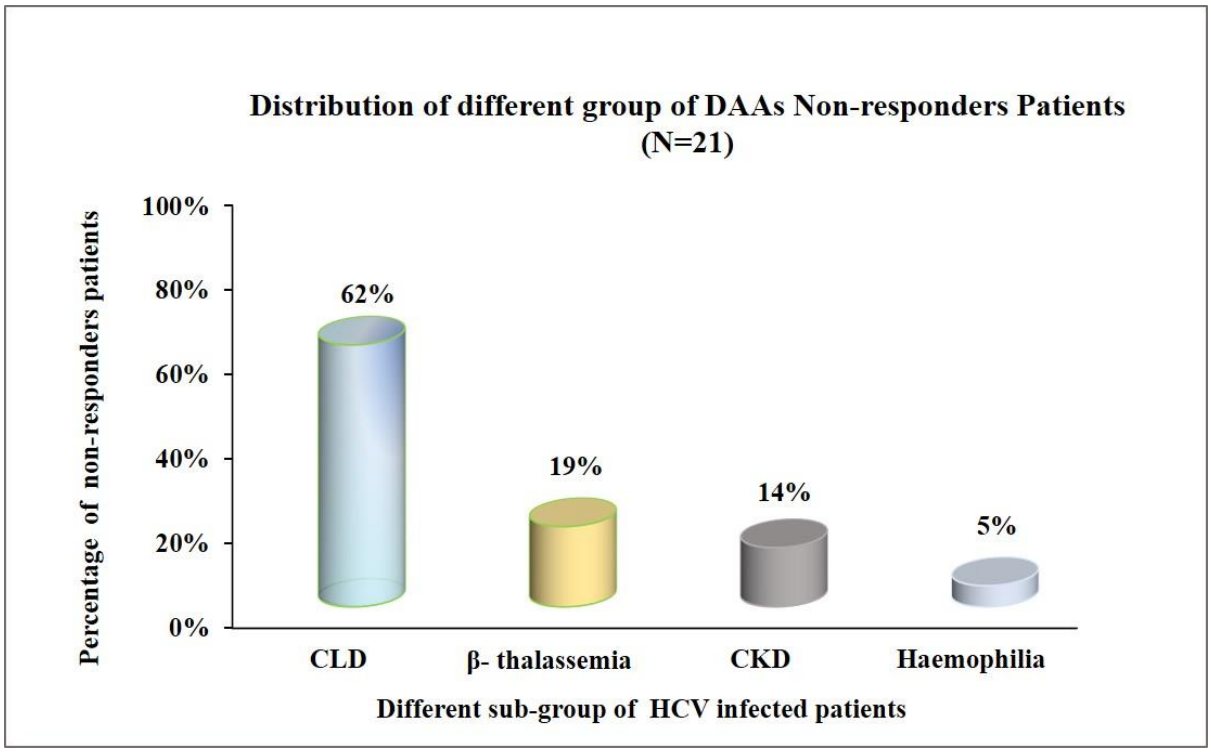


Fig 43: Distribution of different group of HCV infected non-responders to direct acting antivirals.

Circulating Dengue Serotypes in 2019 Dengue outbreak in West Bengal

Investigators: Provash C. Sadhukhan and Shanta Dutta

Dengue virus (DENV) infection is one of the major health problems globaly including India in terms of morbidity and mortality. In most parts of the world, co-circulation of four dengue serotypes develops major complications due to lifelong serotype specific immunogenicity. Thus it is very important to know the circulating dengue serotypes for clinical management of dengue infected patients.

In 2019, dengue outbreak was observed all over West Bengal. A total of 1259 dengue NS1 sero-reactive samples were received from Subdivision and District Hospitals as well as from different Medical Colleges from all over West Bengal. Among them, 878 were processed for dengue viral RNA genome detection and 841 were found to be dengue RNA positive. RNA positive samples were further processed for dengue serotyping. We found co-circulation of all four dengue serotypes. The distributions of the serotypes were: 14.34% (n=156) DENV 1, 36.95% (n=402) DENV 2, 21.23% (n=231) DENV 3 and 4.78% (n=52) DENV 4. In Southern part of West Bengal, overall predominant circulating serotype was DENV 2 but co-circulation of all 4 serotypes were noticed. We observed in few districts one particular serotype was predominant, e.g., DENV 4 was dominated in Howrah district but in Murshidabad, Hooghly and Purba Midnapore districts DENV 1 were the major circulating serotype. Interestingly, DENV 3 was found to be the major serotype in North Bengal in 2019 whereas DEN 2 was the major serotype there in 2018. So, there was a rapid serotype change was observed in North Bengal. Similar rapid change in serotype was observed in South Bengal from 2016 to 2017. It was observed that from 2012-2015, DENV-3 was the most prevalent serotype whereas in 2016, DENV-1 was the prevalent strain and in 2017-2019, DENV-2 was the most predominant strain in this region (Fig 44)

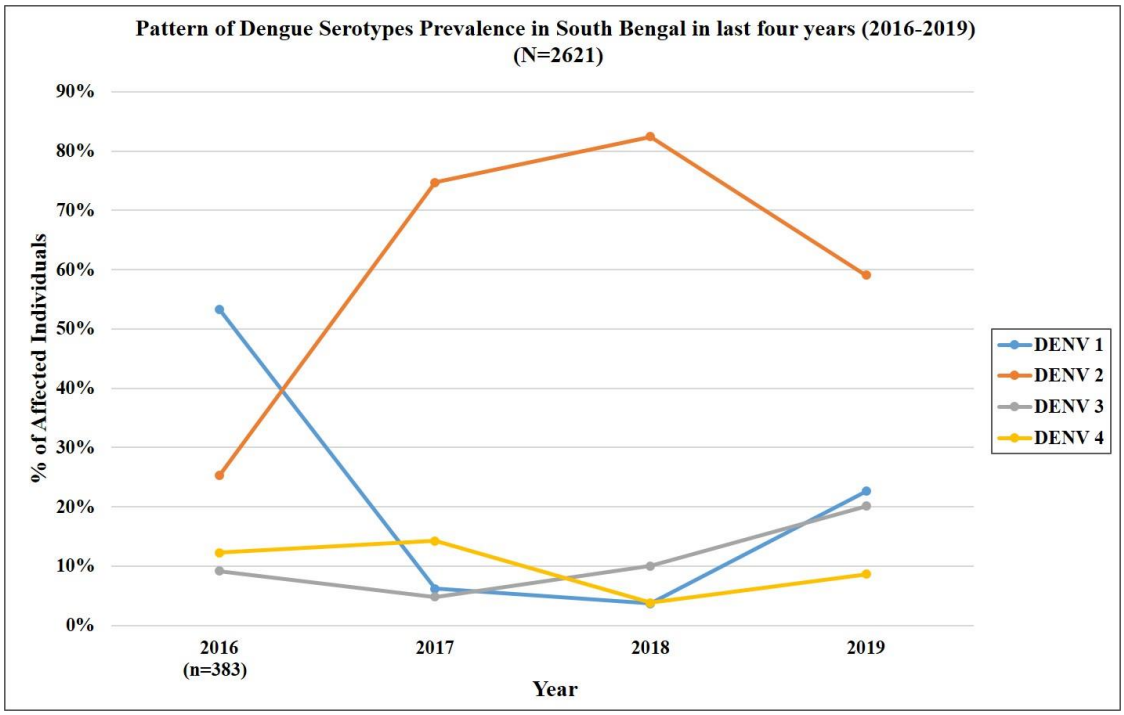


Fig 44: Pattern of Dengue Serotypes Prevalence in South Bengal in last four years (2016 - 2019)

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

- Attended Workshop on "Nipah Clinical Trial with m102.4 monoclonal antibodies" organized by **ICMR in collaboration with NIH, USA**, **New Delhi, May 7-9, 2019**.
- Attended "**Dengue Project Review Committee meeting**" at **ICMR Hqrs, New Delhi on 28th May, 2019.**
- Delivered lecture on "**Overview of Viral Diagnostic Techniques**" as resource person for **5th hands-on training workshop** on "**Laboratory Diagnosis of Emerging Viral Diseases**" organized by Regional –VRDL, ICMR-NICED, on **June 17- 19, 2019, Kolkata**.
- Participated Principal Investigators Meeting of ICMR task Force project: "A Systematic Assessment of Acute Viral Hepatitis and Chronic Liver Disease in Northeast India with special reference to strengthening of laboratories in the Region". Organised by North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), Shillong, **Meghalaya, August 6, 2019**.
- Participated and Chair "**Young Scientist programme**" in 9th CME of Society of Tropical Medicine and Infectious Diseases in India, **August 18, 2019, Kolkata**.
- Participated "**India International Science Festival 2019**", Ministry of Science and Technology, Ministry of Earth Sciences and the Ministry of Health and Family Welfare, Biswa Bangla Convention Centre & Science City, Kolkata, **October 7, 2019**.
- Participated 1st Annual Task Force/Advisory Group meeting of ICMR task Force project: "A Systematic Assessment of Acute Viral Hepatitis and Chronic Liver Disease in Northeast India with special reference to strengthening of laboratories in the Region". at **ICMR Hqrs, New Delhi on October 15, 2019**.

- Attended Workshop/Symposium on "Advances in Biomedical Mass Spectrometry & Metabolomics" organised by **Saha Institute of Nuclear Physics, Kolkata, November 11-14, 2019.**

Oral presentation or poster presentation by Student:

- Sagnik Bakshi, Supradip Dutta, Raina Das, Priya Verma, Upasana Baskey, Promisree Choudhury, Aritra Biswas, Shanta Dutta and **Provash Chandra Sadhukhan**. Hepatitis C Virus Drug Resistance is not Uncommon in Eastern India. 9th CME on Tropical and Infectious Diseases at the Oberoi Grand Hotel, Kolkata, 18th August 2019.
- Priya Verma, Upasana Baskey, Supradip Dutta, Sagnik Bakshi, Raina Das, Shanta Dutta and **Provash Chandra Sadhukhan**. Dengue: Changing trends of clinical manifestation with no serotype specific co-relation. 9th CME on Tropical and Infectious Diseases at the Oberoi Grand Hotel, Kolkata, 18th August, 2019.

PhD Awarded

Dr. Aritra Biswas was awarded PhD from
Title of the Thesis "Epidemiological and Molecular Studies on HCV Infection Among Multitransfused Thalassemic Individuals in Eastern India".
Date of thesis:

Dr. Rushna Firdaus was awarded PhD from
Title of the Thesis "Studies on the Immunomodulatory Effects of Hepatitis C Virus Core Protein in HCV Pathogenesis".

Post and Pre-doctoral Fellows

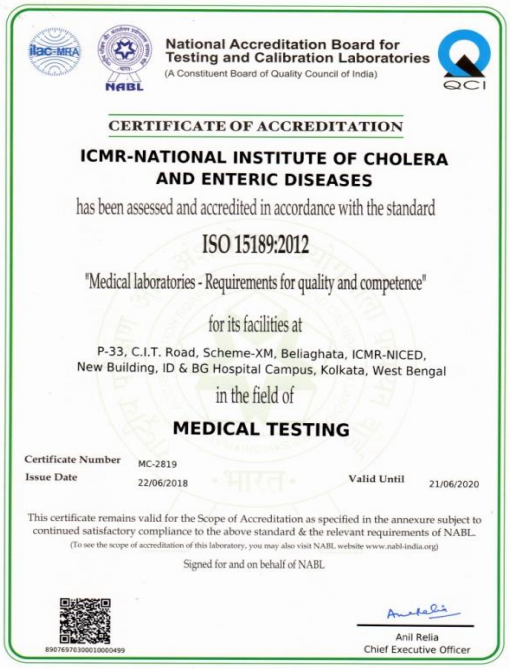
Post-doctoral fellow:
Dr. Ronita De, ICMR Research Associate

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

SERVICES PROVIDED BY THE INSTITUTE

NABL Accreditation:

ICMR-NICED provide quality medical laboratory service to comply with ISO 15189:2012 standards all time. The scope has been expanded with different analytes from bacteriology, parasitology, virology and VRDL division in the discipline of Microbiology and Infectious Disease Serology of NABL. This year all the divisions have completed desktop surveillance conducted by NABL in accordance with ISO 15189:2012.



National Accreditation Board for Testing and Calibration Laboratories
(A Constituent Board of Quality Council of India)

CERTIFICATE OF ACCREDITATION

ICMR-NATIONAL INSTITUTE OF CHOLERA AND ENTERIC DISEASES

has been assessed and accredited in accordance with the standard

ISO 15189:2012

"Medical laboratories - Requirements for quality and competence"

for its facilities at

P-33, C.I.T. Road, Scheme-XM, Beliaghata, ICMR-NICED, New Building, ID & BG Hospital Campus, Kolkata, West Bengal

in the field of

MEDICAL TESTING

Certificate Number MC-2819
Issue Date 22/06/2018 Valid Until 21/06/2020

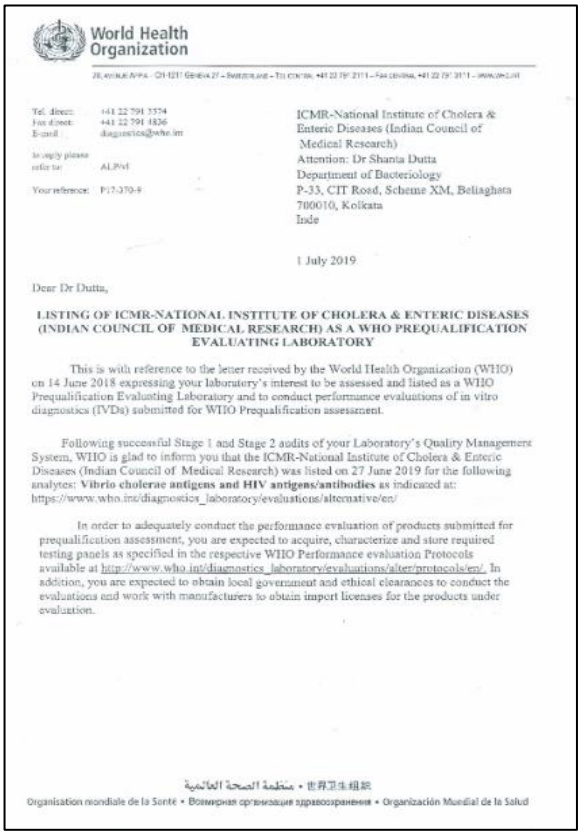
This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.
(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Signed for and on behalf of NABL

Anil Relia
Chief Executive Officer

WHO IVD prequalification Laboratory

WHO team conducted stage 1 and stage 2 audits of laboratory's Quality Management System based on ISO 15189:2012 standard in bacteriology and virology divisions of ICMR-NICED. After two successful audits, ICMR-NICED has been listed as a "WHO Prequalification Evaluating Laboratory" to conduct performance evaluations of in vitro diagnostics (IVDs) for *Vibrio cholerae* antigens and HIV antigen/ antibodies.



World Health Organization

ICMR-National Institute of Cholera & Enteric Diseases (Indian Council of Medical Research)
Attention: Dr Shanta Dutta
Department of Bacteriology
P-33, CIT Road, Scheme XM, Beliaghata
700010, Kolkata
Inde

1 July 2019

Dear Dr Dutta,

LISTING OF ICMR-NATIONAL INSTITUTE OF CHOLERA & ENTERIC DISEASES (INDIAN COUNCIL OF MEDICAL RESEARCH) AS A WHO PREQUALIFICATION EVALUATING LABORATORY

This is with reference to the letter received by the World Health Organization (WHO) on 14 June 2018 expressing your laboratory's interest to be assessed and listed as a WHO Prequalification Evaluating Laboratory and to conduct performance evaluations of in vitro diagnostics (IVDs) submitted for WHO Prequalification assessment.

Following successful Stage 1 and Stage 2 audits of your Laboratory's Quality Management System, WHO is glad to inform you that the ICMR-National Institute of Cholera & Enteric Diseases (Indian Council of Medical Research) was listed on 27 June 2019 for the following analytes: **Vibrio cholerae antigens and HIV antigens/antibodies** as indicated at: https://www.who.int/diagnostics_laboratory/evaluations/alternative/en/

In order to adequately conduct the performance evaluation of products submitted for prequalification assessment, you are expected to acquire, characterize and store required testing panels as specified in the respective WHO Performance evaluation Protocols available at http://www.who.int/diagnostics_laboratory/evaluations/alter/protocols/en/. In addition, you are expected to obtain local government and ethical clearances to conduct the evaluations and work with manufacturers to obtain import licenses for the products under evaluation.

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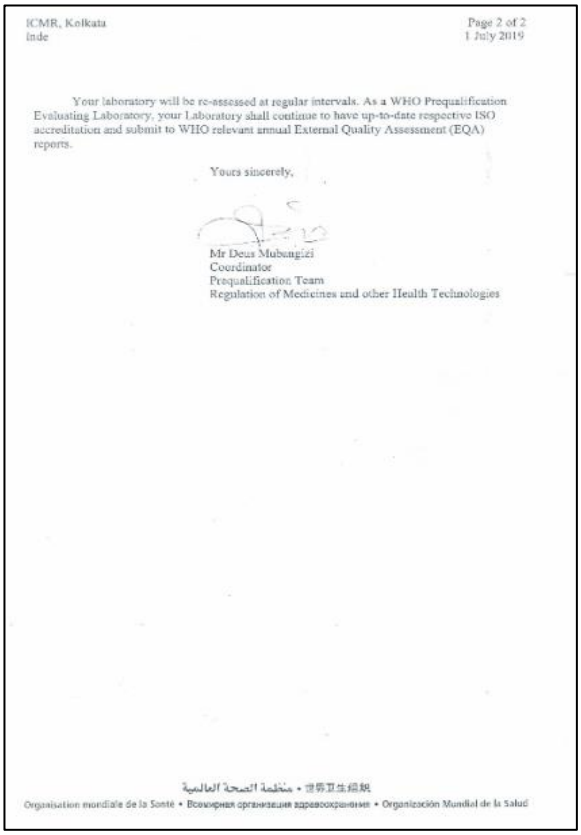
Organisation mondiale de la Santé • Всемирная организация здравоохранения • Organización Mundial de la Salud



ICMR, Kolkata
Inde

Page 2 of 2
1 July 2019

Your laboratory will be re-assessed at regular intervals. As a WHO Prequalification Evaluating Laboratory, your Laboratory shall continue to have up-to-date respective ISO accreditation and submit to WHO relevant annual External Quality Assessment (EQA) reports.

Yours sincerely,

Mr Deus Mubangizi
Coordinator
Prequalification Team
Regulation of Medicines and other Health Technologies

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Sampling Frame Development started in West Bengal on 24th September 2019 and it ended on 27th November 2019. For Nagaland it started on 18th September 2019 and it ended on 27th November 2019. Data collection for BSS-Lite Main Survey started from 15th January 2020 and 1st February 2020 in West Bengal and Nagaland respectively. Data collected till March 2020 for West Bengal: FSW – 100%, MSM – 88%, IDU – 98% and TG – 22%. Data collected till March 2020 for Nagaland: FSW – 100%, MSM – 100% and IDU – 100%

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, ICMR-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 & 2)

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

Source of Samples	No. of sample Tested	No. of sample Positive
Command Hospital (EC), Kolkata	19	16

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

State	Name of SRL/Testing Centre	Samples sent by SRL		Samples rejected at NRL	Confirmed Result at NRL		Discordant
		HIV -ve	HIV +ve		HIV -ve	HIV +ve	
Jharkhand	SRL-Regional Institute of Medical Sciences, Ranchi	60	2	0	60	2	0
	SRL-Patuliputra Medical College, Dhanbad	89	5	0	89	5	0
	SRL-MGM Medical College, Jamshedpur	100	1	5	95	1	0
Assam	SRL-Silchar Medical College & Hospital, Silchar	41	6	0	41	6	0
	SRL-Assam Medical College & Hospital, Dibrugarh	140	1	7	133	1	0
	SRL-Guwahati Medical College & Hospital, Guwahati	340	22	6	334	22	0
A & N Islands	SRL-GB Pant Hospital, Port Blair	63	1	0	63	1	0
Odisha	SRL-SCB Medical College, Cuttack	470	30	0	470	30	0
	SLN-Medical College, Koraput	100	12	0	100	12	0
Meghalaya	Blood Bank, Tura Civil Hospital, Tura	73	1	0	73	1	0
	Regional Blood Bank, Pasture Institute, Shillong	139	17	0	139	17	0
West Bengal	NRL-School of Tropical Medicine, Kolkata	120	5	0	120	5	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.

Diagnostic Kit Evaluation by Consortium of NRLs at ICMR-NICED

The evaluation of diagnostic kits for transfusion transmitted infections, before using in field, is an important aspect of obtaining good quality kits. In this direction, a robust mechanism has been developed by Consortium of National Reference Labs following the uniform procedure countrywide to evaluate performance of commercial kits. Being a member of Consortium labs, ICMR-NICED is engaged in Quality assurance of HIV, HBV & HCV diagnostic kit which is routed through Consortium secretariat, ICMR-NARI, Pune. (Table 3)

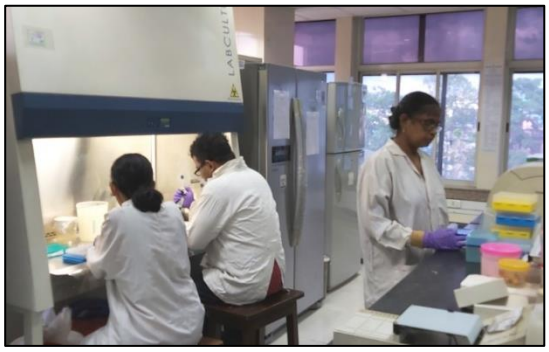


Table 3: Kit Evaluation by Consortium of NRLs, ICMR-NICED, Kolkata

Type of Kit Evaluated	No. of Kit/ Batch Received	No. of Kit/ Batch accepted and Evaluated	No. of Batches meet the required Sensitivity	No. of Batches meet the required Specificity	Total no. of batches complying with specification of CDSCO
HIV ELISA	02	02	02	02	02
HIV RAPID	16	16	16	16	16
HBsAg ELISA	02	02	02	02	02
HBsAg RAPID	00	NA	NA	NA	NA
HCV ELISA	02	02	02	02	02
HCV RAPID	00	NA	NA	NA	NA
TOTAL	22	22	22	22	22

Integrated Counseling & Testing Centre (ICTC)

Integrated Counseling & Testing Centre (ICTC), currently known as HIV Counseling and Testing Services (HCTS) is key entry point to prevention, treatment and care of HIV and related infections. It continues to envisage the provision of comprehensive services in an integrated manner. HCTS comprises of counseling (pre-test counseling, informed consent and post-test counseling); testing and

prompt delivery of test results with embedded quality assurance; ensuring audio-visual privacy and confidentiality; also, linkages to appropriate HIV prevention, care, support and treatment services after meticulously following "5Cs" viz. Consent, Confidentiality, Counseling, Correct test results and Connection.

The main functions of the ICTC include:

- Conducting HIV diagnostic test.
- Conducting VDRL test to High Risk Groups (HRG).
- Conducting HbsAg, HCV tests when required.
- Providing basic information on modes of transmission and prevention to promote healthy behavioral change and reduce vulnerability.
- Providing psycho-social support to HIV positive clients. (Figure: 8)
- Link HIV positive clients with other HIV prevention, care treatment services.
- Providing risk reduction counseling to clients who found HIV negative.
- Follow-up counseling and testing.
- PEP distribution if required.
- Free condom distribution.
- Cross referrals to RNTCP, STI, ART, TI-NGOs etc. (Table 4 & 5)

Table 4: HIV testing details at ICTC, ICMR-NICED (April 2019- March 2020)

Total Tested	Positive	Positivity	HIV-TB Co-Infection	Client initiated Tested	Provider Initiated Tested
823	35	4.25%	6	259	564

Table 5: HBSAG, HCV, VDRL testing details in ICTC, ICMR-NICED (April 2019-March 2020)

Tests	HbsAg	HCV	VDRL
Total Tested	117	121	29
Total Positive	1	3	2

A high standard of testing is maintained at ICTC by using 3 test principles for diagnosing HIV. ICMR-NICED ICTC secured 100% concordance result in external quality assurance scheme (EQAS) through State Reference Laboratory.

From April 2019 to March 2020 total 823 clients were tested for HIV in ICTC. Among them 35 were found positive. (Fig: 1) HIV positive clients were linked to ART centre, STI clinic and RNTCP for further treatment and care. HIV negative clients were also linked to STI centre and RNTCP if required.

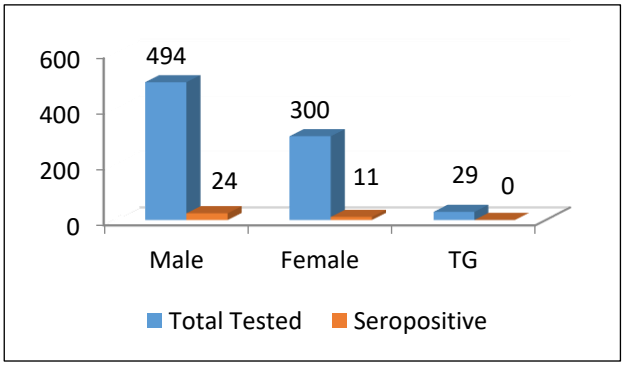


Fig 1:

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 **4532** DBS samples were received from April 2019 to March 2020 at ICMR-NICED-Regional Reference Laboratory (Molecular HIV Lab) and among them **4164** samples were accepted for testing,

according to sample acceptance criteria. A total of **5156** DBS samples were tested for the period of 01.04.2019 to 31.03.2020 (The number of samples and tested in a month may not tally due to previous pending samples) and their status is depicted below. (Table 6) (Fig 2)

Table 6: Status of EID DBS Sample Accepted and Tested (with Positivity of HIV-1) at ICMR-NICED from the period April 2019 to March 2020

Name of States	No. of DBS Samples Accepted	No. of DBS Samples Tested	No. of HIV-1 DNA Detected DBS Samples
West Bengal	659	804	71
Odisha	341	415	39
Chhattisgarh	749	929	70
Bihar	967	1263	92
Jharkhand	219	268	26
Mizoram	245	293	20
Assam	267	331	36
Manipur	166	215	8
Nagaland	246	295	41
Meghalaya	235	264	30
Arunachal Pradesh	10	12	0
Sikkim	6	7	0
Tripura	47	52	5
A & N Islands	7	8	0
TOTAL	4164	5156	438

*(*The accepted samples can be tested in any month. Therefore, the number of samples accepted and tested in a month MAY not tally)*

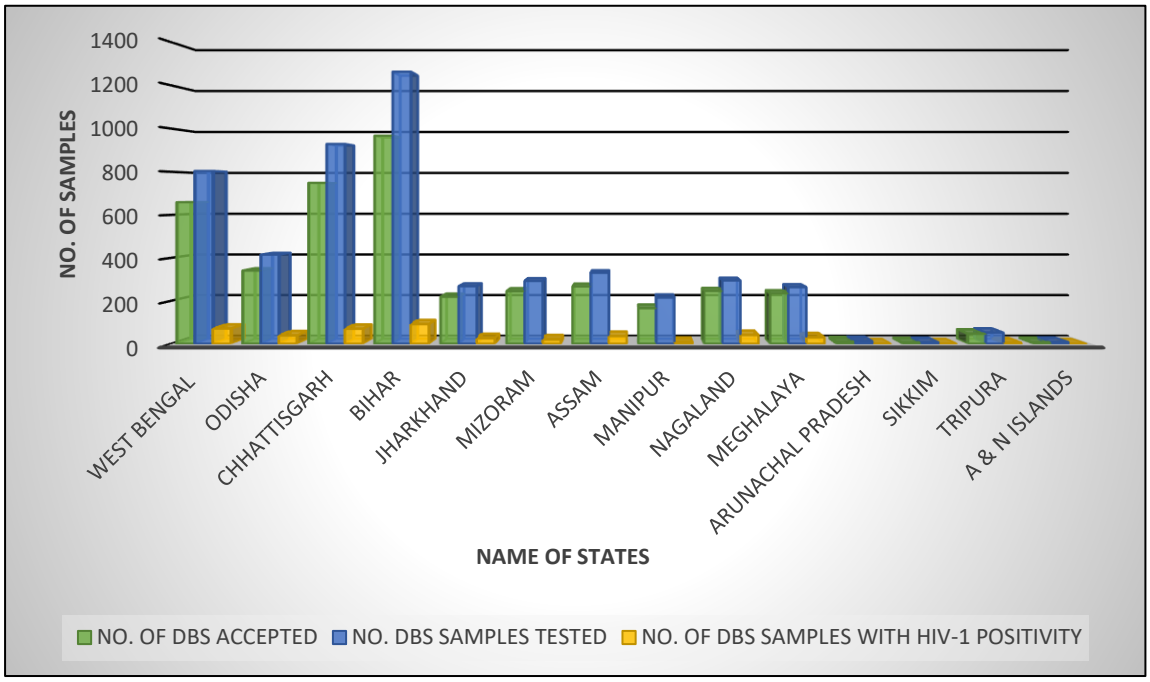


Fig 2:

Plasma Viral Load Assay of 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 (below 1000 copies/ml of plasma which corresponds to a viral suppression and efficacy of the antiretroviral therapy). 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, 2019 to March 31st, 2020, **2701** Viral Load samples were received at ICMR-NICED, and a total of **2578** samples were tested for HIV viral load during the particular period. (Table 7) (Fig 3)

Table 7: Status of HIV Viral Load Assay for patients under ART for the period of April 1st, 2019 to March 31st, 2020

No. of Samples		HIV-1 Viral Load Copy No. <1000 copies/ml of plasma	HIV-1 Viral Load Copy No.>1000 copies/ml of plasma	HIV-1 Viral Load TARGET NOT DETECTED
Received	Tested			
2701	2578	256	308	2014

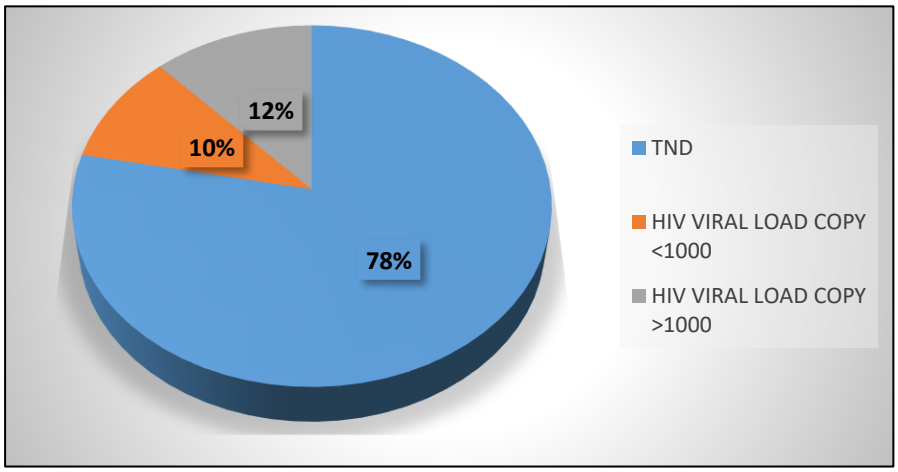


Fig 3:

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 liaisoning 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 HIV Surveillance.
- 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.
- The BSS-Lite is being 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. (Table 8 & Table 9)

Table 8: 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 9: 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

Behavioral Surveillance Survey - Lite

The BSS-Lite is being 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 was 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 at ICMR-NICED was responsible for implementation of the BSS-Lite in 2 States- Nagaland and West Bengal.

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

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

The target sample size for each population group for each state was 400. At first, Sampling Frame Development (SFD) phase was carried out in the catchment area of selected Targeted Interventions (TI). In this phase, clusters (conventional or time-location) were selected at the hotspots.

In the next phase, during main survey, selection of respondents were carried out at the selected clusters (conventional or time-location), following a random selection approach. The field work for the main survey phase was implemented till March 2020. All data for all typology were collected in Nagaland. For West Bengal, 100% data were collected for all typology except transgender.





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 ICMR-NICED at lead the implementation of Epidemiological Investigations in the states of Nagaland, Meghalaya, Assam and Tripura.

For the investigation, individual-level one-year existing data from select ICTCs were collected for all HIV positives and five HIV negative attendees for each positive, based on gender, age and completeness of available data. Moreover, additional primary data were collected prospectively at the select ICTCs for three months to have important supplementary information on individual risk behaviors that are not regularly captured at the ICTCs.

Piloting ACASI in eliciting HIV related risks among Integrated Counselling and Testing Centre (ICTC) Attendees

Accurate behavioral data is essential for understanding transmission dynamics of HIV and for interventions to prevent spread of infection. Method used for collecting relationship and risk behavior data may influence reported prevalence of some key behaviors and also reduce influence of societal expectations on reporting. Although majority of survey data are collected through face-to face (FTF) interview, increasing use has been made of technology-based alternatives, such as Audio Computer-Assisted Self- Interviewing (ACASI). In ACASI, participants listen to questions through headphones and enter responses using an electronic device. This technique provides greater standardization than other interview methods and also affords better privacy to participants than other modes. Studies comparing responses from FTF interviews and ACASI of self-reports of socially sensitive behaviors revealed that ACASI responses were more complete for socially sensitive behaviors like admitting to having same-gender sex partners and illicit drug use, commercial/casual sex, condom use during sex than FTF interviews.

The present pilot study intends to evaluate differences in reporting of HIV-related risk behaviors by ICTC attendees using ACASI and FTF interactions. The pilot was conducted in three different states

namely West Bengal, Meghalaya and Nagaland. The pilot study was carried for six months, from June to November 2019. Three months retrospective (June-August 2019) data was collected from ICTC register in selected ICTCs to understand completeness of data. Client's socio-demographic and risk-behavior information was captured through face to face interactions and documentation in the ICTC register. Prospective data was collected through ACASI from select ICTC from September to November 2019. Qualitative explorations were done to assess the participants' experience with the ACASI mode of inquiry through informal group discussions and informal interactions with key individuals.

The result of this pilot study indicates that the ACASI use in ICTC settings can improve the quality of data collection in terms of completeness, accuracy and granularity as well as feasibility. It also shows that ACASI use improved the quality of information by increasing response to sensitive questions. This mode of information collection minimizes data entry errors.

The key findings suggested that ACASI improved the quality of information by increasing response to sensitive questions and decreasing socially desirable responses.

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 had 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 were 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 attempted to assess the impact of ART on uninfected partners, as well as persons at risk of HIV.

Training and Extension activities:

- Data Analysis Workshop for 'Epidemiological Investigations into the drivers of HIV Epidemic in Select North-Eastern States of India' was held during 22-24 July 2019 at ICMR-NICED, Kolkata. Representatives from NACO-New Delhi, FHI 360, WHO India, RIMS-Imphal, Independent experts and scientists and Regional Institute team from ICMR-NICED attender the workshop. Number of participants – 14

- Four days Regional level training for Sampling Frame Development (SFD) for BSS-Lite for Research Assistants for the States of Nagaland and West Bengal was held during 20th - 23rd August 2019 at ICMR-NICED, Kolkata. Research Assistants and members of State AIDS Control Societies of the respective states, representatives from ICMR-NIMS, ICMR-NIE and NACO representative attended the training program. Number of participants – 28

- One-day workshop on "External Quality Assessment Scheme (EQAS) and Proficiency Testing Panel Distribution for SRLs" on 23rd September 2019 at ICMR-NICED, Kolkata. Technical Officers and Medical Laboratory Technologists of 12 State Reference Labs (SRLs) of A & N Islands, Assam, Jharkhand, Meghalaya, Mizoram and Odisha attended the training program. Number of participants – 31

- Workshop on data analysis and report writing for the project entitled "Piloting ACASI in eliciting in HIV related risk among ICTC clients in India" during 25-26 November 2019 at ICMR-NICED, Kolkata. Participants from WHO India, CDC India, UNDP, FHI 360, CARE India, Meghalaya and Nagaland State AIDS Control Societies, Independent consultant and other stakeholders attended the workshop. Number of participants – 25

- Training for BSS-Lite Main Survey for West Bengal was held during 16th -19th December 2019 at ICMR-NICED, Kolkata. Participants include Research Assistants and members of West Bengal State AIDS Control Societies. Number of participants - 12

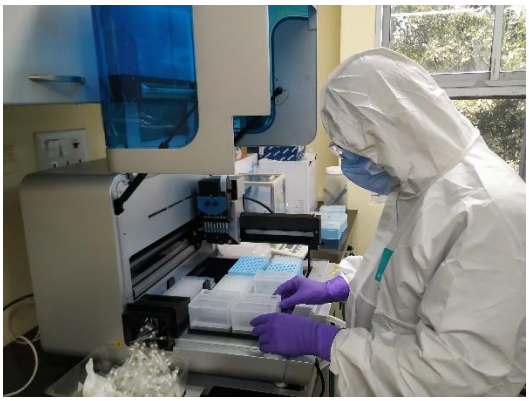
Virus Research and Diagnostic Laboratory (VRDL) at ICMR-NICED is a regional level laboratory established under the Department of Health Research (DHR) to facilitate timely identification of emerging, re-emerging, novel viruses and agents causing epidemics or outbreaks. Apart from the diagnosis and research on common viruses and agents of public health importance, VRDL-NICED has been in the forefront of fighting the war against COVID-19 by providing RT-PCR based diagnostic support since 03 February 2020.

Investigations Performed	Total No. of Samples Tested in 2019-20	Positive Samples	Isolation Rate
Dengue NS1 ELISA	778	108	13.88
Dengue IgM ELISA	845	132	15.62
Dengue IgG ELISA	33	12	36.36
Chikungunya PCR	437	0	0
Chikungunya IgM ELISA	59	23	38.98
Japanese Encephalitis IgM ELISA	40	0	0
Hepatitis A IgM ELISA	416	89	21.39
Hepatitis E IgM ELISA	656	57	8.68
Hepatitis E IgG ELISA	244	62	25.40
Hepatitis B Surface Ag ELISA	176	12	6.81
Hepatitis C Ab ELISA	225	9	4.00
Zika PCR	437	0	0
Rotavirus Ag ELISA	386	83	21.50
Scrub typhus IgM ELISA	1987	613	30.85
Leptospira IgM ELISA	77	12	15.58
Rubella IgM ELISA	11	1	9.09
Measles IgM ELISA	13	1	7.69
Influenza A-H1N1 PCR	3614	147	4.06
Influenza A-H3N2 PCR	3614	286	7.91
Influenza B PCR	3614	126	3.48
Influenza B-Yamagata PCR	126	3	-
Influenza B-Victoria PCR	126	123	-
Respiratory RSV-A PCR	655	162	24.73
Respiratory RSV-B PCR	655	33	5.03
Respiratory hmPV-A1A2 PCR	655	13	1.98
Respiratory PIV-1 PCR	655	1	0.15
Respiratory PIV-2 PCR	655	0	0
Respiratory PIV-3 PCR	655	31	4.73
Respiratory PIV-4 PCR	655	2	0.31
Respiratory Adenovirus PCR	655	107	16.33
Respiratory Rhinovirus PCR	655	102	15.57
SARS-CoV-2	524	44	8.40

Workshops/trainings conducted

- Hands-on Training Workshop on Laboratory Diagnosis of Emerging Viral Diseases
  Date: 17-19 July 2019
  Participants: 15 external (Bihar, Karnataka, Odisha and West Bengal) and 21 internal participants
- Training Workshop on Biosafety and Biosecurity
  Date: 20 September 2019
  Participants: 46

Future plan regarding viral diagnostics: Future plan involves ramping up the testing capacity of SARS-CoV-2 while decreasing the turnaround time. Genomic analysis of the SARS-CoV-2 strains over the period of time will reveal the changing characteristics of the virus. 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.



Influenza Diagnostics:

- Influenza surveillance among elderly is specifically important to understand the status of influenza virus infection among the elderly population in India. Samples received from the community field and designated hospitals were analyzed for the presence of influenza viruses. All the samples were typed and subtyped to evaluate the presence of influenza virus. Presence of H1N1, H3N2, influenza B Yamagata and influenza B Victoria subtypes were detected among elderly. Moreover, RSV was also detected 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 in classifying *V. cholerae* strains into different phage types. 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 cholera endemic areas of India for bio typing, serotyping and phage typing study. We have received a total of 132 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.

Gastrointestinal Tract Pathogens Repository (GTPR):

- Division of Microbiology of ICMR-NICED has a well-established GTPR facility which is a national facility) sponsored by the Indian Council of Medical Research (ICMR), New Delhi for the maintenance, and supply of enteric pathogens. As per the directive, I am working in Gastrointestinal Tract Pathogens Repository (GTPR) of ICMR-NICED with the responsibility to look after the laboratory activities of GTPR.

  Results of the diagnostic test received from the different divisions of our institute have communicated to the concerned sender of the strains by this facility. As a national facility GTPR laboratory store strains received for characterization. In this connection, relevant consent for storage of strain in GTPR laboratory has been received from different laboratories who have sent strain for diagnostic or characterization purposes at ICMR-NICED. Strains are being stored following the standard protocols and records are being updating and storage of new strains is ongoing.

Involvement in COVID-19 Pandemic work:

- The rapid spread of SARS-Cov-2 all over the world created alarming situations since December 2019. ICMR-NICED is deeply involved in research and management of COVID-19 pandemic. I have contributed in this aspect by evaluation of viral diagnostics kits, RNA extraction kits and providing training to state laboratory staffs. (Input of Dr. A. K. Chakraborty)

Other Services

- In 2013, the National Task Force, India surveyed biomedical laboratories (about 70000 listed) to prepare a National Inventory of laboratories/ institutions storing wild poliovirus infectious and potentially infectious materials as per the Global Action Plan II and a requirement for wild poliovirus- free certification of the Region. In 2013 and 2014, the WHO released the Polio Eradication & Endgame Strategic Plan 2013-2018 and the Global Action Plan III for poliovirus containment, respectively. In 2015, the laboratories listed in the National Inventory were resurveyed for wild poliovirus 2 materials. In September 2015 the Global Certification Commission declared that wild poliovirus 2 has been globally eradicated. This was followed by the simultaneous global withdrawal of Sabin's oral poliovirus vaccine type 2 (OPV2) in April 2016 and introduction of bivalent OPV containing Sabin 1and Sabin 3 vaccine. The National Task Force resurveyed the laboratories for any materials containing OPV2 and Sabin2 derived strains and requested destruction of such materials or transfer to bio-safe laboratories. OPV manufacturers and the Ministry of Health & Family Welfare worked to recall and destroy all stocks of unused trivalent OPV. As a part of continuous effort of poliovirus containment for success of global polio eradication, an update of "poliovirus containment" activities of all concerned departments and laboratories need to be submitted yearly basis to the National Task Force (of India) for laboratory containment of Poliovirus. With aforementioned background, annual survey was conducted on September 30 -October 8, 2019 for all NICED Buildings. This was a search programme for laboratory containment of Poliovirus (PV) infected and/or potentially infectious materials (PIM) and report submitted to National Task Force coordinator through the Director on October 9, 2019. Role: Coordinator

- Dengue virus serotyping service was provided to West Bengal State Health, Kolkata Municipal Corporation and NVBDCP as a service component and ARL activities.

- Hepatitis C virus RNA detection, viral load estimation, genotyping and HCV drug resistance screening services provided to the collaborative Medical Colleges and Hospitals as a service component

- Scientists of ICMR-NICED in charge of Diarrhoea treatment unit (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 for enteric fever.

ICMR-NICED Virus Laboratory

- The 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.

FLAGSHIP PROGRAMMES-SWACHH BHARAT CAMPAIGN:

The activities of ICMR-NICED under the Swachhta Action Plan during the period April 2019 to March 2020 included Swachhta Awareness Campaign among the students in various schools in Kolkata, Health and Hygiene Campaigns 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 as directed by concerned ministry. 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	SCHOOL	PARTICIPANTS
12-04-2019	Sanat Roy Chowdhury Institution, Tangra, Kolkata - 700 046	10 students participated in an elocution competition on "Role of School Students in Propagation of Swachh Bharat Ideas"
27-06-2019	Ultadanga United High School, Kolkata – 700 004	34 students and 3 teachers
23-07-2019	Indrani Memorial Girls' School, Kolkata-54	94 students of classes VII to XI and five class teachers
02-08-2019	A.I.W.C. Buniyadi Vidyapith Girls' High School, Kolkata-10	104 girl students from 11^{th} and 12^{th} standards
23-09-2019	Ultadanga United Girls' High School, Kolkata	25 girl students of 9th and 10th standards and two teachers
21-01-2020	B. M. Girls' High School, Kolkata-15	45 students of Class VI

Swachhta Programmes in the Communities:
ICMR-NICED organized several 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. They also visited roadside eateries around ICMR-NICED to convey food, hand and personal hygiene related matters. Through interactive question and answer sessions in each of these events, the participants were made aware of prevention and management of many common illnesses including diarrhea, hepatitis, typhoid fever, and various mosquito borne diseases. The programme in March 2020 also incorporated Swachhta issues around ongoing COVID-19 infection.

DATE	VENUE	PARTICIPANTS
30-04-2019	ID& BG Hospital campus, Kolkata	Relatives / guardians of patients admitted in the hospital
28-05-2019	Three eateries on the roadside of Beliaghata Main Road	Food handlers, customers and the eatery owners
26-07-2019	Lecture hall of Janakalyan Siksha Mandir, a Co-Ed High School in North Tangra, Dhapa, Kolkata - 700105	145 students (80 male and 65 female) from classes V-XII and several school teachers
30-09-2019	Urban slum area in Hatgchhia, Ward No. 58 of Kolkata Municipal Corporation	25 local residents as well as 8 school children

26-11-2019	Waiting room for the patients' relatives at ID & BG Hospital compound	Relatives / guardians of patients admitted in the hospital
23-12-2019	Two food vendors and one sweet shop along Beliaghata Main Road, Kolkata - 10	Food handlers, customers and the eatery owners
14-02-2020	Baranagar Boropukur Math Sporting Club, Kolkata	38 adult male and female participants
24-03-2020	Wards 58 & 59 of Kolkata Municipal Corporation (focusing on ongoing COVID-19 infection)	Key community stakeholders including municipal waste handlers and on-road traffic police personnel

Special Swachhta Drives by ICMR-NICED:

(a) A special cleaning activity at NICED-I building premises was conducted on April 12, 2019. Around 50 staff members of the institute including scientists, technical, and administrative staff participated in the event under the guidance and active participation of the Director, ICMR-NICED.

(b) Swachhata Hi Seva (SHS) 2019 – Plastic Waste Management (September 11 – October 02, 2019 & October 03 – October 27, 2019)

(i) Lecture on no use of plastics:
Dr. Sujay Mitra, Chief Manager, Planning & Monitoring, in State Urban Development Agency, Govt. of West Bengal delivered a popular lecture on "Say No to Plastic" for all staff of ICMR-NICED on 24th September, 2019.

(ii) Shramadaan activity for plastic waste collection and disposal:
Scientists and staff of ICMR-NICED undertook a special drive at places around ICMR-NICED on 1st October, 2019. They collected several plastic materials including plastic packets, bottles, sheets and empty containers that were scattered along the way at different places. During the process discussions were also made with the passersby as well as shop owners to make them aware about the menaces of plastic usage, ways to reduce their usage and how to dispose plastic materials properly. Later on, the members of Health & Hygiene Committee of ICMR-NICED continued these activities twice a week till October 27, 2019. The collected plastic wastes were later disposed in a nearby solid waste management unit of Kolkata Municipal Corporation.




Distribution of personal protective gears to the frontline COVID Warriors on 23-03-2020


OUTBREAK INVESTIGATIONS

POST-FLOOD VISIT AT PATNA, BIHAR:

In response to the concerns raised by the severe flood in Patna, I visited as part of the central team during October 3-10, 2019 under the guidance of the Director RMRIMS. He briefed about the current situation of flood affected areas and about the work to be done by each member of the team. The team also met Hon'ble Minister of State for Health and Family Welfare, Govt. of India, who expressed his views and expectations from the team. The team visited several areas in Patna, many of which were still submerged under water. In many places Aedes vector breeding was noted and brought to the notice of concerned municipal health authorities and suggested appropriate measures. Water and food safety were also checked in the visited areas and recommendations were made as per needs.

PUBLIC HEALTH SUPPORT AFTER EXTREMELY SEVERE CYCLONE "FANI" IN ODISHA:
An extremely severe cyclonic storm, Fani, struck coastal Odisha around Puri district on 3rd May, 2019. Following this, several scientists of ICMR-NICED took turn to be deployed in various affected areas of the State as part of the Central Public Health Team formed by the Directorate General of Health Services, Emergency Medical Relief Division, Ministry of Health & Family Welfare, Govt. of India to assist the State Health Department. Dr. Suman Kanungo (Epidemiologist) visited Bhubaneswar during May 3-6, Dr. R. K. Nandy (Microbiologist) was deployed in Puri district during May 8-21 2019, Dr. Asish K. Mukhopadhyay (Microbiologist) was posted to Khordha District during May 8-22, while Dr. **A. K. Chakraborty** (Microbiologist) was stationed in Puri District during May 23-June 06, 2019. The teams visited the affected areas and did a rapid situation analysis, assessed the preparedness and needs of the local health facilities especially in terms of water and vector-borne diseases, trained several peripheral health staff and made recommendations as appropriate.


EMR team members and State Health Officials meeting at Puri


Filed testing for chlorination of drinking water source


Testing for Malaria parasites at the household level by EMR team using Rapid Testing Kit.

TRAINING & EXTENSION

A. Important Meetings held at ICMR-NICED

The 47th Scientific Advisory Committee (SAC) meeting of ICMR-NICED held on 26-27 September, 2019 under the Chairmanship of Dr. G. B. Nair in presence of other expert Members of the committee, Director, and scientists of ICMR-NICED.


Scientific Advisory Committee meeting

Institutional Ethics Committee meeting of ICMR-NICED held on 14th January, 2020

Institutional Ethics Committee meeting

B. Visit of Scientists / Scientific Staff / Academicians

Lectures/Seminars delivered by Invited scientists

- Invited Prof. Elena Orlova, Institute for Structural and Molecular Biology, Department of Biological Sciences, Birkbeck College, London for the seminar hosted by NICED Scientific Forum on January 21st, 2020 at 3.30PM. Her talk was on "Similarity and divergence of viral portal proteins"

- A dissemination event was held at ICMR-NICED for the project entitled "Burden of Antibiotic Resistance in Neonates from Developing Societies (BARNARDS)" on 22nd January, 2020 at 3:30 PM. BARNARDS is a multi-disciplinary study of Cardiff University, funded by Bill and Melinda Gates Foundation involving 7 countries analysing the risk factors for sepsis within Low-middle income countries. It focusses on the burden of antibiotic resistance in neonates and carriage of drug-resistant organisms in developing societies.

  To present the data, members from UK team led by Rebecca Milton was present at ICMR-NICED and India team led by Dr. Sulagna Basu also presented the data of India site in the seminar.

  Speakers:

  1. Rebecca Milton- Cardiff University, UK

  2. Kathryn Thompson- Cardiff University, UK

  3. Calie Michelle Dyer- Cardiff University, UK

Significant Achievements:

MOA has been signed for licensing the technology for Shigella Vaccine developed by ICMR-NICED for further scaling up of commercialization between ICMR and MSD Wellcome Trust Hilleman Laboratories Pvt. Ltd., New Delhi on 23rd April, 2019 at ICMR Hqrs. in presence of Biotech Consortium India Limited (BCIL), New Delhi who executed the License Agreement. DG, ICMR,

Addition DG, ICMR, Scientists from ICMR-NICED, Scientists from ICMR Hqrs., CEO and other staff from Hilleman Lab were present in the event. Dr. Hemanta Koley, ICMR-NICED is the lead inventor of the vaccine.

ICMR-NICED Lab has been visited by WHO Auditor, Prof. Willy Urassa on 12th June, 2019 for "WHO Prequalification" of the said Lab. The visit is meant for verification of in-vitro diagnostic kits for cholera and HIV/AIDS by the NICED prequalified Lab.

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

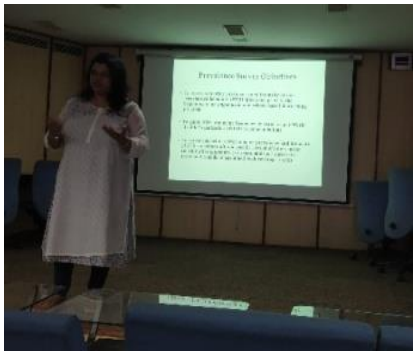
Orientation workshop on ICMR study "Strengthening Laboratory Surveillance for Pneumococcal Meningitis in India to Understand the Impact of Pneumococcal Conjugate Vaccine (PCV) rollout" was organized at ICMR-NICED on 8th and 9th April, 2019 for the project investigators and staff at five clinical recruitment sites (CRS). Clinical Microbiologists, Peditricians and Research Assistants from North Bengal Medical College, Bardhaman Medical College, Bankura Samillani Medical College, and Guwahati Medical College attended the workshop. The lectures were delivered by experts of CDC, Atlanta, ICMR, New Delhi, CMC, Vellore and NIE, Chennai.

A Workshop on "Ethics in Human Health Research and Good Clinical Practice" was organized at ICMR-NICED, Kolkata on May 7, 2019. Prof. Shantanu Kumar Tripathi, Professor & Head, Department of Clinical & Experimental Pharmacology, Calcutta School of Tropical Medicine, Kolkata; Prof. Suparna Chatterjee, Department of Pharmacology, Institute of Post Graduate Medical Education and Research (IPGMER), Kolkata and Dr. Chiranjib Bagchi, Asst. Prof., Department of Pharmacology, STM, Kolkata were the guest faculties in this one day workshop. The program started with the opening remarks of Director, ICMR-NICED. The workshop covered topics like regulatory and ethical requirements for clinical research, safety reporting of clinical trials / registration and accreditation of Ethics Committees. Few case studies were discussed by Dr. Bagchi. The students, faculties, staff of NICED, the members of Ethics Committee of this institute were benefited from this interactive workshop and received certificates at the end of the workshop.

A workshop on "Developing Models for Forecasting Climate Sensitive Waterborne Diseases" was held at ICMR-NICED on June 19, 2019 in presence of Dr. Rameshwar Sorokhaibam, Assistant Director, Centre for Environmental and Occupational Health, Climate Change and Health, NCDC, New Delhi. Other participants included Nodal Officer of State Environmental Health Cell, IDSP officials from the State Health and Kolkata Municipal Corporation, DDHS (PH), Govt. of West Bengal, DDG, Regional Meteorological Office, Kolkata, the Director, ICMR-NICED and scientists, ICMR-NICED.

Presentations followed by interactive discussions took place over a preliminary diarrhea forecasting model developed at ICMR-NICED.

Training on Kato-Katz Technique to identify and measure intensity of Soil Transmitted Helminth Infection: The division of Parasitology, ICMR-NICED was again in the fore-front in a national level public health initiative against soil transmitted helminth infection. A national level training programme on Kato-Katz technique was conducted from July 15, 2019 to July 22, 2019 prior to the field survey in Tripura. The training conferred detailed information about the project, knowledge on mode of infection, frequency and prevalence rate with basic knowledge about biosafety and stool handling. Hands-on training was imparted on identification and enumeration of different soil transmitted helminth eggs (Ascaris lumbricoides, Trichuris trichiura and Hookworm). This workshop covered on the kato-katz method and methods of Egg per gram (EPG) of stool calculation. The performance of the participants was assessed by internal experts as well as external experts both prior to the workshop and after.



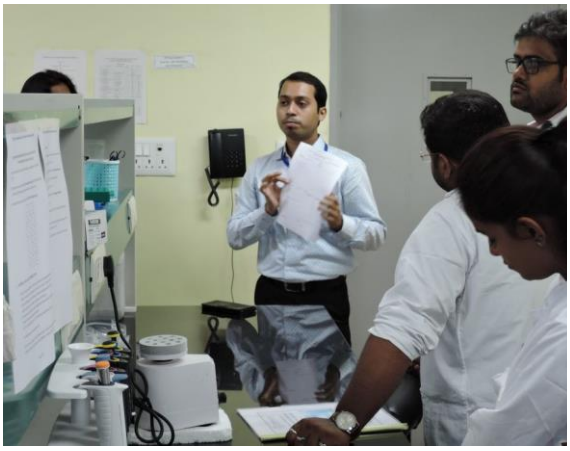
Theory class by External Expert

Participants attending the classes

Hands on training in Microscopy and Kato-Katz method in progress

Data analysis workshop for 'Investigation into the drivers of HIV Epidemic in select North-Eastern States of India held at ICMR-NICED during 22nd to 24th July 2019, attended by representatives from NACO-New Delhi, FHI 360, WHO India, RIMS-Imphal, Independent experts and scientists and Regional Institute team from ICMR-NICED.

5th Hands-on Training Workshop on Laboratory Diagnosis of Emerging Viral Diseases was conducted by Regional VRDL, ICMR-NICED from 17-19 July, 2019. Fifteen participants from different institutes of Bihar, Karnataka, Odisha and West Bengal and twenty-one internal participants attended the training. The workshop included lecture sessions on viral infection epidemiology, diagnostic techniques, sample transport, biosafety and QA/QC. The hand-on demonstration comprised of serological and molecular techniques.



A public seminar was organized on 26th July, 2019 by ICMR-NICED for awareness on water conservation, personal hygiene, cleanliness and hand washing in a school situated in urban slums of Kolkata, attended by 145 school students of classes 6 to 10. Emphasis was given on water conservation, wastage of water in the community level and for a clean locality and hygiene. It was accompanied with a drawing competition on the topic 'Water Conservation - Safe water for a better future'

A workshop on "Disaster Management Preparedness" was organized at ICMR-NICED on 31st July, 2019. Dr. Monalisha Sahu & Dr. Nandini Bhattacharya from All India Institute of Hygiene & Public Health were the resource persons. Topics like basic concept in hazard, vulnerability, disaster and basic concepts and principles of Incident Response System were covered. In this regard, a mock drill session on fire safety was also organized. Fire consultant from PWD, Govt. of West Bengal conducted the drill session. Staff and students of ICMR-NICED participated in both the events and made it a successful.

Regional level Training for Sampling Frame Development for Behavioral Surveillance Survey (BSS)-Lite was held during 20th to 23rd August, 2019 at ICMR-NICED. This training program was organized by Regional Institute (East) for HSS, ICMR-NICED for the states of, Nagaland and West Bengal. Research Assistants and members of State AIDS Control Societies of the respective states, representatives from ICMR-NIMS, ICMR-NIE and NACO representative attended the training program.

Training workshop for laboratory personnel on Biosafety: A one-day Training Workshop on Biosafety and Biosecurity was organized by Regional VRDL, ICMR-NICED, on 20th September 2019 at VRDL Conference Room, NICED-I (Dr. S.C. Pal Building). The program included lecture sessions on Biosafety & Biosecurity, Emerging and Re-emerging Infectious Diseases: Role of Containment Laboratories, Emergency responses in the Laboratory, Biomedical Waste Management and Fire Safety followed hands-on demonstration of Hand washing, PPE donning and doffing, Spill management, triple layer packaging and fire safety drill. A total of 46 participants and 8 faculty/resource person attended the training.

Scientists delivering lectures on Biosafety

Fire Safety Drill in progress

Training on Molecular techniques for identification and Characterization of diarrheagenic bacterial pathogens": Two Officers [Dr. Dhirendra Kumar (Assistant Director) and Mr. Manoranjan Mishra (Research Assistant)] from National Centre for Disease Control, Delhi received training during November 4 to 8, 2019 on "Molecular techniques for identification and Characterization of diarrheagenic bacterial pathogens" based on the request from the NCDC Director, Dr. Sujeet K Singh.

During the stay at the Bacteriology division of ICMR-NICED, they were trained on the following aspects:

a) Rapid diagnostics for detection of diarrheal disease pathogens
b) Phenotypic detection, identification and serotyping of various bacterial diarrheal disease pathogens
c) Designing and primer selection for various bacterial and viral diarrheal disease pathogens.
d) Molecular identification and characterisation of diarrheagenic *E coli, Salmonella spp., Vibrio spp., Shigella spp., Clostridium difficile, Campylobacter spp.*

"EMBO Practical Course CEM3DIP2020: Single Particle cryo-EM of Macromolecular Assemblies and Cellular Tomography" was held at IISER-Kolkata and CSIR-IICB during 19–30th January, 2020. Organized by Ramanathan Natesh, IISER Thiruvananthapuram (Organizer); local organizer being Partha Pratim Datta (IISER Kolkata) and Co-organizers were: Jayati Sengupta (CSIR-IICB), Smarajit Polley (Bose Institute) and Moumita Dutta (ICMR-NICED). Total number of Participants was 43

Training Workshop for M.Sc. students of Sambhalpur University: One day training cum workshop was carried out in ICMR-NICED, Kolkata for the M.Sc. students of Sambhalpur University, Odissa on 7th February, 2020. 16 students attended this workshop along with two of their faculty members. The students and faculty were welcomed into the institute with an opening address delivered by Dr. Shanta Dutta, Director of ICMR-NICED. After brief introductory lectures by individual laboratory heads, all the students were given a short tour to the laboratories (of Bacteriology, Virology, Parasitology, Animal House) for practical demonstration of basic research techniques. The program ended with a concluding note by Dr. Sandipan Ganguly, Divisional Head, Parasitology.

Hands on training on Microscopy in progress

Demonstration of different molecular biology techniques was imparted

Training Workshop for BHMS students of National institute of Homeopathy: One day training cum workshop was arranged in ICMR-NICED, Kolkata for the final year BHMS students of National Institute of Homeopathy, Kolkata on 2nd March, 2020. About 80 students participated in this workshop along with one NIH faculty Prof. Prasanta Rath. The students and faculty were welcomed into the institute with an opening address delivered by Dr. Shanta Dutta, Director of ICMR-NICED. After a brief introductory lecture, series of educational lectures on different etiological agents (bacterial, viral, parasitological) of diarrheal diseases were delivered by the scientists of different divisions. Afterwards, the students visited the laboratories (of Bacteriology, Virology, Parasitology, Animal House) in small groups for practical demonstration of basic research techniques. The program ended with an interactive question answer session between scientists and the BHMS students.

BHMS students attending the workshop

Educational lectures delivered by Laboratory Heads

Laboratory visit and hands on training in progress

Other Events

"**World Health Day**" was observed at the ICMR-NICED on April 8, 2019 at the Seminar Room of NICED-II building. Prof. Maitreyee Bhattacharyya, Director, Institute of Haematology, Calcutta Medical College, Kolkata was present as Chief Guest and delivered a popular lecture on "Thalassemia and its' preventive aspects". Scientists, staff and students of this Institute took part in this program and made this event successful.

"World No Tobacco Day" was observed in ICMR-NICED on May 31, 2019. The program started with pledge taking ceremony following which, the guest speaker, Dr. Angira Dasgupta, Senior Divisional Medical Officer of Pulmonary Medicine, BR Singh Hospital, Kolkata, delivered a lecture on "Tobacco & Lung Health" – the theme of this years' observation. Her study was focused on tobacco use and its side effects. Scientists, staff and students of this Institute took part in this program and made this event successful.

5th International Yoga Day was observed at ICMR-NICED, Kolkata on 21st June, 2019 at 11.00 a.m. The day started with an inauguration speech by Dr. Shanta Dutta, Director followed by a thoughtful speech on the significance and utility of Yoga by eminent Yogacharya Shri Pallab Dasgupta. Later, Shri Pallab Dasgupta and his team has trained different asanas to scientists, staffs, students of the Institute and distinguished scientists and guests from Japan on this special occasion in a mass yoga performance. A token of appreciation was presented to Yogacharya Pallab Dasgupta by the Director, ICMR-NICED. The program was ended successfully.

Introductory speech by Director, ICMR-NICED

Artistic Yoga Performance by Mr. Pallab Dasgupta Team

Scientists, Staff and students of ICMR-NICED taking part in Yoga Lesson

A token of appreciation presented to Yogacharya Pallab Dasgupta by the Director

Awareness Campaign Program on Sexual Harassment of Women in workplace was held at ICMR-NICED on 28th June 2019. Dr. Miratun Nahar, former Professor of Philosophy, Victoria College, Kolkata, also an eminent writer and External Member of the Internal Complaints Committee was invited to give a lecture on Sexual harassment of Women at Workplace. Dr. Miratun Nahar, delivered a lecture after the welcome address by Dr. Shanta Dutta, Director, ICMR-NICED. Her lecture was followed by an interactive session with the audience that included scientists, staff members, research scholars of the Institute. The chairperson of the Committee, Dr Sulagna Basu informed all about the She-box initiative. Dr. Basu delivered the vote of thanks to wind up the lecture session.

Dr. Shanta Dutta, Director, ICMR-NICED delivering welcome address

Dr. Miratun Nahar, Guest Lecturer delivering her speech

Director, ICMR-NICED handing over memento to Dr. Nahar

Audience listening to the speech of Dr. Nahar

Observation of Doctor's Day: The Doctors' day was celebrated on 1st July, 2019 at the ICMR-NICED in presence of all scientific, technical, administrative and project staff. Eminent pediatrician Dr. Arun Kr. Mangalik was invited as Chief Guest in this occasion. Following welcome address by the Director, Dr. Mangalik delivered the lecture on "ADHD, Autism and other psychiatric issues in young children". The lecture was appreciated by all and the program was ended by handing over a token of appreciation to the Chief Guest.

Dr. Arun Kr. Mangalik delivering his speech

A token of appreciation presented to Dr. Arun Kr. Mangalik by the Director

Celebration of 73rd Independence Day of India All the NICED staff and their family members and students of the institute participated in the flag hoisting ceremony on 15th August, 2019 at 11.00 a.m.

Flag hoisting ceremony on 15th August

NICED staff and their family members and students of the institute participated in the ceremony

Inauguration of first National Antimicrobial Resistance Hub at ICMR-NICED, Kolkata by Hon'ble US Ambassador Mr. Kenneth I. Juster in presence of Prof. (Dr) Balram Bhargava, Secretary DHR & DG ICMR, Dr. Shanta Dutta, Director, ICMR-NICED, Dr. Hendrik Jan Bekedam, WHO Country Representative, Dr. Debashish Bhattacharya, DME, Govt. of West Bengal on 16th Sept 2019 with the aim to fight against AMR through strengthening research, directing policies and promoting public private partnerships.

Digital Unveiling of the plaque of National Repository of AntiMicrobial Resistant Bacteria was also done as the first milestone of this AMR HUB aiming storage of Antimicrobial Resistant isolates and steering academicians, researchers, microbiologists to promote research on AMR

Observation of Swachhata Hi Seva: As part of observation of Swachhata Hi Seva 2019 at ICMR-NICED, a popular lecture on "Say No To Plastics" was organized on 24th September, 2019. The event was inaugurated by Dr. Shanta Dutta, Director, ICMR-NICED thorough her welcome address. Dr. Sujay Mitra, Chief Manager – Planning and Monitoring, State Urban Development Agency, Govt. of West Bengal delivered the lecture emphasizing on adverse effects of plastic use, impact on future generation, possible solutions, Acts, bye laws, integrated solid waste management plan, role of Government and citizens etc. The lecture was followed by four short videos reflecting initiatives worldwide. All scientists, students, and staff of ICMR- NICED participated in the programme and made the event successful.

Inaugural speech by Director

Lecture by Dr. Sujay Mitra

Token of appreciation to Dr. Sujay Mitra

Vigilance Awareness Week- 2019: The Vigilance Awareness Week started on 28th October, 2019 at ICMR-NICED with the pledge taking ceremony at Dr. B.C. Deb Auditorium, ICMR-NICED at 11:00 AM. The Director, The Vigilance Officer and the Accounts Officer of ICMR-NICED lead the pledge in English, Bengali and Hindi respectively. It was followed by a short speech by the Director, and a lecture on the theme topic on "Integrity-a way of life" by the Chief Guest, Dr. Swapan Kumar Pramanick, Vice President, the Asiatic Society, Kolkata, former Vice Chancellor, Vidyasagar University, and unveiling of the vigilance week flyer of ICMR-NICED. Staff of the institute participated in the in-house lecture competition. The program ended with a note from the Vigilance Officer on different program arranged at ICMR-NICED on the occasion of Vigilance Awareness Week 2019.

Unveiling of the vigilance week flyer

Lecture being delivered by Dr. Swapan Kumar Pramanick

Pledge taking ceremony at Dr. B.C. Deb Auditorium

Rashtriya Ekta Diwas pledge taking ceremony at ICMR-NICED, Kolkata on 31st October, 2019 at 4.00 p.m.

Pledge taking ceremony on Rashtriya Ekta Diwas

India International Science Festival ICMR-NICED co-organized 5th India International Science Festival (IISF) in Kolkata from 5th to 8th November, 2019. Participants from various national level institutes of this country participated in this program. Many scientists and students presented their work in this national platform. Activities included popular scientific lectures by eminent scientists, visit to sophisticated instrumentation facilities, sharing of research activities of the Institute through Posters and interaction with scientists. 50 students from two schools participated in this programme. The informal feedback from students was very encouraging which showed that organizing such kind of programme not only gives exposure to the students on sophisticated laboratory facilities but also inculcates interest among them about health, hygiene, various diseases and their preventions which is really challenging.

Address by Dr. Shanta Dutta
Director, ICMR-NICED, Kolkata

Address by Guest of Honour Prof. Sanjay Ghosh
Head, Department of Biochemistry,
University of Calcutta, Kolkata

Address by Chief Guest Prof. Sankar Kumar Ghosh
Vice Chancellor, Kalyani University, Kalyani

Interaction between honourable speakers and students during outreach programme

Visit to sophisticated instrumentation facility and Poster exhibition

Participants from ICMR-NICED at the 5th IISF

Observation of World AIDS Day 2019 (1st December) took place on 2nd December 2019 at ICMR-NICED. On behalf of the Director, Dr. Malay Kumar Saha delivered welcome address followed by brief explanation of the contribution of ICMR-NICED in the field of HIV/AIDS research and the way forward. Dr. Suman Ganguly, Consultant (PPTCT) from West Bengal State AIDS Prevention and Control Society took the audience through a journey from Maternal HIV to Adolescent HIV; a Life Cycle Approach where he emphasized the role of holistic and multidimensional approach towards Elimination of Mother to Child Transmission of HIV along with Global Pledge of End Adolescent AIDS. The programme was attended by Scientists, Staff and Students of NICED. IEC material on HIV /AIDS was also distributed among the participants.

Dr. M. K. Saha delivering welcome address

Dr. Suman Ganguly delivering his speech

Scientists and staff of ICMR-NICED attending the talk

National level Health and Health Awareness Exhibition cum Seminar: ICMR–NICED participated in the "National level Health and Health Awareness Exhibition cum Seminar" titled "15th Jatiya Sanhati Utsav-O-Bharat Mela 2019" organized by Bangiya Seva Samity held during December 14-18, 2019 at Rajpur Agami Club Play Ground, Rajpur, Kolkata. The ICMR-NICED team attended the Fair and

explained the topics on the prevention and management of Enteric Diseases, Typhoid, Dengue, Soil Transmitted Helminth, and use of herbal products as an alternate to control emergence and spread of antimicrobial resistant bacterial pathogens to all visitors who came to the ICMR stall. The research achievements of ICMR-NICED were also stressed upon.


ICMR Stall and the Visitors

Celebration of National Flag hoisting ceremony: National Flag Hoisting was observed at ICMR-NICED on the occasion of 71st Republic Day of India on 26th January, 2020 in presence of Director, Staff and some of their family members. The Director of the institute addressed the ICMR-NICED staff with encouraging words and some of the staff also shared their opinion. On this occasion national anthem was sung by the staff.


National Flag Hoisting on the occasion of 71st Republic Day of India


National anthem being sung by the staff

Free viral Hepatitis E detection camp: ICMR-NICED organized free viral Hepatitis E detection camp in Baranagar, Kolkata on 14th February, 2020 which was attended by ICMR-NICED scientists and technical staff. A total of 138 blood samples were collected for Hepatitis E screening at ICMR-NICED VRDL. This was followed by awareness generation program among the participants. The event was successful and further holding such camps have been promised.


Hepatitis E Awareness program and detection camp

Celebration of 58th Foundation Day of ICMR-NICED has been celebrated on 26th February, 2020 at Seminar Room, NICED-II Building. The Director, Staff, Students and Pensioners of ICMR-NICED, Director, Calcutta School of Tropical Medicine; Director, NIPER, Kolkata attended the occasion. Dr. Shanta Dutta, Director was felicitated for completing 25 years of service at ICMR-NICED. On this occasion NICED Foundation Day Oration was delivered by Dr. Sujit Kr. Bhattacharya, Former Additional Director General, ICMR & Former Director, ICMR-NICED on the topic of "Cholera Research and Control essential for alleviating human misery and economic prosperity" followed by one cultural program performed by the scientists, students and staff of this Institute. The occasion ended with a happy note.

Dignitaries lighting the lamp

Dr. Shanta Dutta, Director being felicitated for completing 25 years of service at ICMR-NICED

Dr. Sujit Kr. Bhattacharya being felicitated by Director, ICMR-NICED

Inaugural song being performed by ICMR-NICED staff and students

Celebration of National Science Day: ICMR-NICED celebrated National Science Day on 28th February, 2020. This year's the theme for the event was "Women in Science". On this occasion, Dr. Madhuchanda Kar, Clinical Director, Department of Oncology, Peerless Hospital & B. K. Roy Research Centre, Kolkata delivered a popular talk on "Can We Prevent Cancer?" following a inaugural speech by the Director. Scientists, research scholars and staff of ICMR-NICED attended the program with enthusiasm and interest. The day ended by presenting a token of appreciation to Dr. Madhuchanda Kar.

Dr. Madhuchanda Kar delivering the talk

A token of appreciation presented to Dr. Madhuchanda Kar by the Director

Celebration of International Women's Day: ICMR-NICED observed the International Women's Day on March 13, 2020. Three successful women professionals - Prof. (Dr.) Kalpana Datta from Medical science, Prof. (Dr.) Maitree Bhattacharya from Basic research and Prof. (Dr.) Mita Nasipuri from Engineering science were invited to share their views. The Program was inaugurated by the Director, ICMR-NICED, followed by the lectures and ended with Institute's young female scientists' composition on liberty of a woman to think freely. The program was attended by staff, students of this institute and ended successfully.

Prof. (Dr.) Kalpana Datta delivering her speech

Prof. (Dr.) Maitree Bhattacharya delivering her lecture

Prof. (Dr.) Mita Nasipuri delivering her lecture

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)	:	Dr. S. Kanungo, ICMR-NICED, Dr. P. Chatterjee, ICMR-NICED
Funding Agency	:	BMGF through CMC, Vellore, India
Period	:	2017-2020

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
CoI /CoPI / collaborators with name of collaborating institute(s)		Dr. Hemanta Koley, ICMR-NICED Dr. Alok Kr. Chakrabarti, ICMR-NICED
Period	:	2017-2019

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
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Suman Kanungo, ICMR-NICED Dr. Ranjan Kr. Nandy, ICMR-NICED
Funding Agency	:	MoH&FW, GoI through ICMR
Period	:	2018-2020

Title	:	SaniPath Typhoid-Assesment of Typhoid Exposure Pathways in Low-Income Urban Settings.
PI	:	Dr. Shanta Dutta, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Suman Kanungo, ICMR-NICED, Dr. Pranab Chatterjee, ICMR-NICED, 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. Shanta Dutta, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Debjit Chakraborty, 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. Shanta Dutta, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. A.K. Deb, ICMR-NICED Dr. Suman Kanungo, ICMR-NICED Dr. Asish Kr. Mukhopadhyay, ICMR-NICED
Funding Agency	:	ICMR, Delhi
Period	:	2019-2022

Title	:	National Repository of Antimicrobial Resistant Bacterial Isolates (NRAMRB) at ICMR-NICED: A Pilot study
PI	:	Dr. Shanta Dutta, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Sulagna Basu, ICMR-NICED Dr. Ranjan Kr. Nandy, ICMR-NICED Dr. Asish Kr. Mukhopadhyay, ICMR-NICED
Funding Agency	:	ICMR, Delhi
Period	:	2019-2020

Title	:	ICMR Task Force Project on Rational Use of Medicines
PI	:	Dr. Shanta Dutta, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Suman Kanungo, ICMR-NICED Dr. Debjit Chakraborty, ICMR-NICED
Funding Agency	:	ICMR, Delhi
Period	:	2019-2020

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

Title	:	Human pulmonary paragonimiasis in crab eating communities and smear negative suspected TB cases from some states of India
PI	:	Dr. Shanta Dutta, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Sandipan Ganguly, ICMR-NICED
Funding Agency	:	ICMR, Delhi
Period	:	2019-2021

Title	:	Establishment of a Network of Laboratories for Managing Epidemics and Natural Calamities
PI	:	Dr. Shanta Dutta, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. M. Chawla Sarkar, ICMR-NICED, Dr. Provash Ch. 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, ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Agniva Majumdar, ICMRNICED
Funding Agency	:	UNDP
Period	:	2019-2022

Title	:	Apoptosis and molecular targeting therapy in cancer by microbial proteases.
PI	:	Dr Amit Pal
Funding Agency	:	DST-SERB
Period	:	2017--2020

Title	:	Targeting pro-apoptotic peptide for PAR1 mediated programmed cell death in colon cancer cells
Name of PI	:	Dr. Tanusree Ray
Mentor	:	Dr Amit Pal
Funding Agency	:	DBT
Period	:	2017-2020

Title	:	A novel therapeutic approach to kill cancer cells by microbial protease mediated proteasomal degradation of microtubule
PI	:	Dr Amit Pal

Funding Agency	:	ICMR
Period	:	2020-2023

Title	:	External Quality Assurance for HIV testing
PI	:	Dr. M. K. Saha
Funding Agency	:	National AIDS Control Organization
Duration/ period	:	2002 - 2025

Project Title	:	HIV Sentinel Surveillance
PI	:	Dr. M. K. Saha
Funding Agency	:	National AIDS Control Organization
Duration/ period	:	2008-2021

Title	:	Evaluation of diagnostic kits for HIV, HBV and HCV
PI	:	Dr. M. K. Saha
Funding Agency	:	National AIDS Control Organization
Duration/ period	:	2015 – 2025

Title	:	Molecular detection of HIV in infants and children under age of 18 months.
PI	:	Dr. M. K. Saha
	:	National AIDS Control Organization
Funding Agency	:	2012 – 2025
Duration/ period		

Title	:	Counseling and Testing for HIV, Blood Borne Infections and STIs.
PI	:	Dr. M. K. Saha
Funding Agency	:	WBSAP&CS
Duration/ period	:	2012 – 2025

Title	:	Molecular assay for HIV-1 Plasma Viral Load.
PI	:	Dr. M. K. Saha
Funding Agency	:	National AIDS Control Organization
Duration/ period	:	2015 – 2025

Title	:	Behavioral Surveillance Survey Lite
PI	:	Dr. M. K. Saha
Funding Agency	:	National AIDS Control Organization
Duration/ period	:	2019-20

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
Duration/ period	:	2017-20

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
Duration/ period	:	2018-21

Title	:	Piloting Audio Computer Assisted Self-Interview (ACASI) in Eliciting HIV Related Risks among ICTC Attendees in India
PI	:	Dr. M. K. Saha
Funding Agency	:	WHO
Duration/ period	:	2019-20

Title	:	Regulation of the colonization factor CS6 of enterotoxigenic *Escherichia coli* in pathogenesis
PI	:	Dr. N. S. Chatterjee
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. A. K. Mukhopadhyay
Funding Agency	:	Dept. of Biotechnology, Govt. of India
Period	:	2019-2022

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. K. 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 Dr. Mihir Sarkar, Medical College, Kolkata
Funding Agency	:	ICMR
Period	:	2017-2020

Title	:	Retrospective analysis on the evolutionary aspects of *Vibrio cholerae*
PI	:	Dr. Asish K Mukhopadhyay
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 relationship with pathogenesis for better management of cholera
PI	:	Asish K Mukhopadhyay
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Hemanta Koley and Dr. Santasabuj Das
Funding Agency	:	AMED, Japan
Period	:	2015-2020

Title	:	Role of *Helicobacter pylori* 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. Asish K Mukhopadhyay (Co-PI)
Funding Agency	:	ICMR
Period	:	2017-2020

Title	:	Exploratory study to standardize PCR tests on paraffin sections to detect *Helicobacter pylori* and compare with other detection tests
PI	:	Dr. Asish K Mukhopadhyay
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. R. Sukanya (ICMR-NCDIR, Bengaluru)
Funding Agency	:	ICMR
Period	:	2017-2020

Title	:	A Novel Diagnostic Tool to Aid Vaccine Evaluation & Surveillance of Enterotoxigenic *E. coli* & *Shigella*.
PI	:	Dr. Shanta Dutta
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Asish K Mukhopadhyay
Funding Agency	:	Johns Hopkins University
Period	:	2018-2020

Title	:	Deciphering the Mechanisms of Invasion by Salmonella Invasins
PI	:	Dr Santasabuj Das
Funding Agency	:	Department of Science and Technology
Period	:	2017-2020.

Title	:	Development of precision antimicrobial therapy through identification of virulence factor targets conferring maximum fitness loss.
PI	:	Dr Santasabuj Das
Funding Agency	:	Indian Council of Medical Research (ICMR).
Period	:	2019-2022

Title	:	Development and pre-clinical evaluation of safety, immunogenicity and protective efficacy of an outer membrane protein conjugate vaccine against typhoid and paratyphoid infections
PI	:	Dr Santasabuj Das
Funding Agency	:	DBT-BIRAC
Period	:	2019-2020.

Title	:	Facility based validation of point of care tests to detect G6PD deficiency in eastern India.
PI	:	Dr Santasabuj Das
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr Arunanshu Talukdar
Funding Agency	:	PATH, USA
Period	:	2019-2020

Title	:	Community-based evaluation of G6PD deficiency in eastern India and its relevance to infectious and metabolic diseases.
PI	:	Dr Santasabuj Das

CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr Arunanshu Talukdar
Funding Agency	:	Menzies School of Health Research, Australia.
Period	:	2019-2020.

Title	:	Differential Pathogenesis in Giardia: Role of Giardia Virus
PI	:	Dr. Sandipan Ganguly
CoI /CoPI	:	Dr. Yumiko Nakano Saito, Sr. Research Scientist
Collaborators with name of collaborating institute(s)		National Institute of Infectious Diseases, Japan
Funding Agency	:	National Institute of Infectious Diseases, Japan
Period	:	2019 to 2022

Title	:	State wise prevalence survey of Soil Transmitted Helminths in Indian Children to support health impact evaluation of Total Sanitation Campaign of Ministry of Health and Family Welfare, Govt. of India.
PI	:	Dr. Sandipan Ganguly, Scientist F
Funding Agency	:	WHO, DTWI
Period	:	2015 to 2022

Title	:	Identification and Molecular Characterization of Common Enteric Parasites in Kolkata with Special Reference to *Entamoeba* spp.
PI	:	Dr. Sandipan Ganguly
Funding Agency	:	Indian Council of Medical Research, New Delhi
Period	:	2017 to 2022

Title	:	Isolation, Identification and Molecular Characterisation of Pathogenic Factors of *Giardia lamblia*
PI	:	Dr. Sandipan Ganguly, Scientist F
Funding Agency	:	CSIR, New Delhi
Period	:	2017 to 2022

Title	:	Isolation and purification of a Novel Antiparasitic Compund from Natural Medicinal Source
PI	:	Dr. Sandipan Ganguly, Scientist F
Funding Agency	:	CSIR, New Delhi
Period	:	2018 to 2023

Title	:	An approach to identify the environmental drivers modulating rotavirus seasonality
PI	:	Mamta Chawla-Sarkar
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Ranjan K Nandy. ICMR-NICED Alok K Deb, ICMR-NICED
Funding Agency	:	ICMR
Period	:	2017-2020

Title	:	Study of regulation of RNA interference during rotavirus infection and characterization of cellular miRNAs as novel antiviral therapeutics.
PI	:	Mamta Chawla-Sarkar
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Anupam Mukherjee, Sc D, ICMR-NARI
Funding Agency	:	DST-SERB
Period	:	2018-2021

Title	:	Coupling virus-host interaction to host subcellular quantitative proteomics: An unbiased integrated approach to decipher host determinants for rotaviral infection
PI	:	Mamta Chawla-Sarkar
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Nabendu S Chatterjee, ICMR-NICED
Funding Agency	:	WB-DST
Period	:	2018-2021

Title	:	To study the bacterial aetiology, antimicrobial sensitivity pattern resistance determinants and associated risk factors of neonatal sepsis in 4 different districts of Assam
PI	:	Dr Utpala Devi, RMRC, Dibrugarh Dr Reeta Rasailly, ICMR, New Delhi Dr Sulagna Basu, NICED, Kolkata
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. P.K. Borah, Dr J Mahanta, Dr K. Narain, RMRC, Dibrugarh Dr. Shanta Dutta, Dr. Ranjan Nandy, NICED, Kolkata
Funding Agency	:	ICMR
Period	:	2019--2022

Title	:	Bacterial etiology, antimicrobial susceptibility, resistance determinants in gram negative bacteria isolated from intensive care units in Agartala: Focusing transmissible carbapenem and colistin resistance (Co Principal Investigator) 2019-2022
PI	:	Dr. Tapan Majumdar (AGMC, Tripura)
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Sulagna Basu (ICMR-NICED Dr. Pradip Bhowmik, Dr. Sanjib Kr. Debbarma, Dr. Debasish Barman, AGMC & GBPH Dr. Harpreet Kaur, ICMR Headquarters, New Delhi
Funding Agency	:	ICMR
Period	:	2019--2022

Title	:	Strategy to study screening of anti-CMV (Cytomegalovirus) compounds from some medicinal and edible mushrooms
PI	:	Dr. Nilanjan Chakraborty (Scientist- F), ICMR-NICED
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Swapan kr. Ghosh, PG Department of Botany, Ramakrisna MissionVivekananda Centenary College, Rahara (N) 24Parganas
Funding Agency	:	WB-DST
Period	:	2017 to 2020

Title	:	Development and Evaluation of a Heat-killed multi-serotype oral *Shigella* vaccine.
PI	:	Dr. Hemanta Koley
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Okayama University, Okayama, Japan
Funding Agency	:	Japan Global Initiative for Global Research Network for Infectious diseases (J-GRID)
Period	:	2009-2020 March

Title	:	Development of Shigella vaccine based on virulence gene expression
PI	:	Dr. Hemanta Koley
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Jiro Mitobe, National Institute of Infectious Diseases (NIID), Japan.
Funding Agency	:	NIID, Shinjuku, Tokyo, Japan
Period	:	2013-Till now

Title	:	Studies on immunogenicity and protective efficacy of multi-serotype OMVs of circulating Salmonella strains in chicken model.

PI	:	Dr. Hemanta Koley
Funding Agency	:	WB-DST
Period	:	2016-2021

Title	:	Vaccination and Protection studies for a targeted Nanoparticulate oral vaccine against shigellosis.
PI	:	Dr. Hemanta Koley
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Dhirendra S. Katti
Funding Agency	:	DBT
Period	:	2018-2019 December

Title	:	Development of a combination next generation outer membrane vesicles (OMVs) based immunogen to reduce multi drug resistant non-typhoidal Salmonella and Campylobacter mediated clinical health burden
PI	:	Dr. Hemanta Koley
Funding Agency	:	ICMR
Period	:	2020-2023

Title	:	Potential Probiotic Application of Novel Commensal *E. coli* with Antagonistic Activity Against Different Enteric Pathogen.
PI	:	Dr. Hemanta Koley
Funding Agency	:	ICMR
Period	:	2020-2023

Title	:	Strengthening/Promoting evidence-based advocacy for influenza prevention and control in India (INSPIRE - II)
PI	:	Dr. Suman Kanungo, Scientist E
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Alok Chakraborty, Scientist E
Funding Agency	:	CDC-All India Institute of Medical Sciences, New Delhi
Period	:	2018-ongoing

Title	:	Evaluation of Prescription Patterns of Drugs for Diarrheal Diseases and Acute Respiratory Infection in Medicine and Pediatrics OPDs of Tertiary Care Hospitals in West Bengal, India
PI	:	Dr. Shanta Dutta, Director and Scientist G
CoI /CoPI / Site PI collaborators with name of collaborating institute(s)	:	Dr. Suman Kanungo, Scientist E, Dr. Debjit Chakrabarty, Scientist D, Dr. Maloy Kumar Saha,

		Scientist F, Dr. Hemanta Koley, Scientist E, Dr. Sushmita Bhattacharya, Scientist B
Funding Agency	:	Indian Council of Medical Research, New Delhi
Period	:	1 year (2019 -2020)

Title	:	Studies on genomic variation of hepatitis C virus in high risk group population in Eastern part of India
PI	:	Dr. Provash C. Sadhukhan
Co-PI	:	Dr. Samiran Panda, Dr. Souvik Ghosh, Dr. Ashokananda Konar, Prof. Maitreyee Bhattacharyya, Dr. Prasanta Chaudhary
Funding Agency	:	ICMR-Intramural
Period	:	2017 -2020

Title	:	Studies on HCV drugs resistance in HCV infected patients in Eastern part of India
PI	:	Dr. Provash C. Sadhukhan
Funding Agency	:	ICMR- Extramural
Period	:	2019-2021

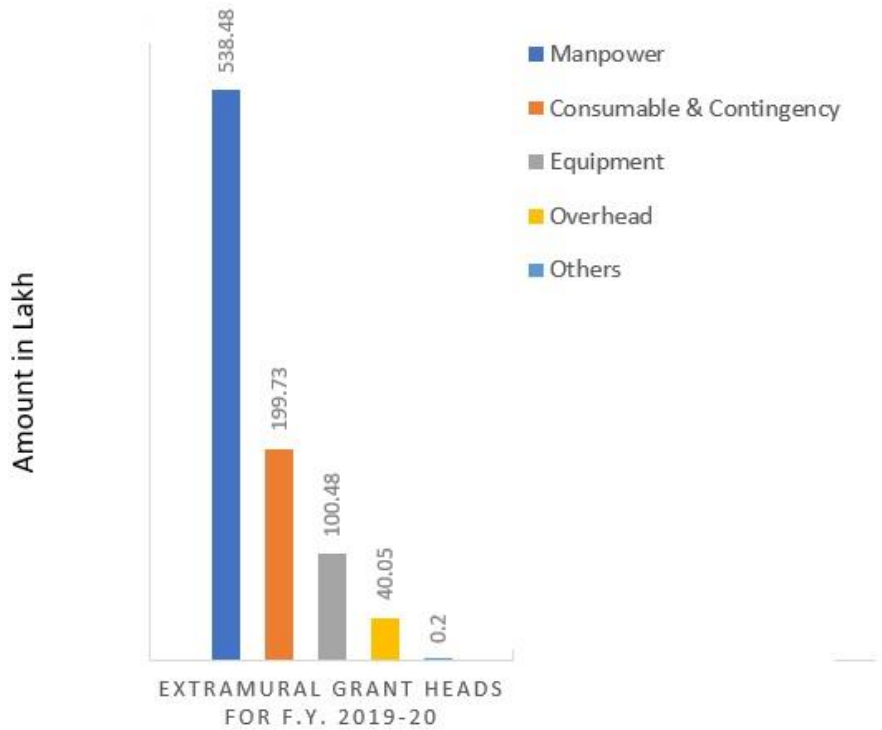
Title	:	A systematic assessment of acute viral hepatitis and chronic liver diseases in Northeast India with special reference to strengthening of laboratories in the region
PI	:	Dr. Provash C. Sadhukhan
Co-I	:	Dr. Abhik Sinha
Funding Agency	:	ICMR-Extramural
Period	:	2018-2021

Title	:	Studies on vascular endothelial dysfunction molecules in dengue virus infection: in search of an early potential biomarker for DHF/DSS
PI	:	Dr. Provash C. Sadhukhan
Co-PI	:	Dr. Shanta Dutta, Dr. Tapan Kumar Biswas, Dr. Sandeep Samanta
Funding Agency	:	ICMR-Extramural
Period	:	2020-2023

Title	:	Studies on genomic variations of hepatitis C virus among multi-transfused thalassemic patient in West Bengal.
PI	:	Dr. Provash C. Sadhukhan
Co-PI	:	Prof. Maitreyee Bhattacharyya
Funding Agency	:	ICMR

Period	:	2016-2020
Title	:	Therapeutic intervention of *Shigella flexneri* host pathogen interaction by a small molecule herbal compound
PI	:	Dr. Sushmita Bhattacharya
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Moumita Datta, NICED
Funding Agency	:	ICMR
Period	:	2019-2022

Title	:	Role of HMGB1 in *H pylori* mediated gastric cancer: A possible therapeutic candidate
PI	:	Dr. Sushmita Bhattacharya
CoI /CoPI / collaborators with name of collaborating institute(s)	:	Dr. Ashis K. Mukhopadhaya, NICED; Dr Sovan Sarkar, University of Birmingham, UK
Funding Agency	:	DBT BIOCARE
Period	:	2019-2022



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3. Barman RK, Mukhopadhyay A, Maulik U, Das S. Identification of infectious disease-associated host genes using machine learning techniques. BMC Bioinformatics.2019 Dec;20(1):736.
4. Bhattacharya D, Sinha R, Mukherjee P, Howlader DR, Nag D, Sarkar S, Koley H, Withey JH, Gachhui R. Anti-virulence activity of polyphenolic fraction isolatedfromKombucha against *Vibrio cholerae*. Microb Pathog.2019Dec;140:103927.
5. Biswas A, Bhattacharjee U, Chakrabarti AK, Tewari DN, Banu H, Dutta S. Emergence of Novel Coronavirus and COVID-19: whether to stay or die out? Crit Rev Microbiol. 2020 Mar;46(2):182-193.
6. Biswas A, Chakrabarti AK, Dutta S. Current challenges: from the path of"original antigenic sin" towards the development of universal flu vaccines. IntRev Immunol. 2020;39(1):21-36.
7. Chakraborty D, Guha S, Chakraborty AK. Critical Review on Role of Some Nutritional Components in Prevention of Cancer in India: An Educators Role. J Cancer Res Ther Oncol. 2020Mar; 8:1-8.
8. Chatterjee A, Mukherjee S, Basu B, RoyD, Basu R, Ghosh H, Bhattacharya M, Chakraborty N.A cross-sectional study exploring disease characteristics and phylogenetic nature of human cytomegalovirus among infected neonates with congenital nephrotic syndrome. Pediatr Nephrol 2020Mar;35:1257–1266.
9. Chatterjee P, Kanungo S, Bhattacharya SK, Dutta S. Mapping cholera outbreaks and antibiotic resistant *Vibrio cholerae* in India: An assessment of existing data and a scoping review of the literature. Vaccine. 2020 Feb;38Suppl 1: A93-A104.
10. Chawla-Sarkar M, Banerjee A, Lo M, Mitra S, Okamoto K, Deb A, Dutta S. A decade-long temporal analyses of human group-A rotavirus among children with gastroenteritis: pre-vaccination scenario in West Bengal, eastern India.J Med Virol. 2020Feb;92(8):1334–1342.
11. Chowdhury G, Ramamurthy T, Ghosh A, Dutta S, Takahashi E, Mukhopadhyay AK. Emergence of Azithromycin Resistance Mediated by Phosphotransferase-Encoding mph(A) in Diarrheagenic Vibrio fluvialis. mSphere. 2019May/June;4(3): e00215-19.
12. Das B, Verma J, Kumar P, Ghosh A, Ramamurthy T. Antibiotic resistance in *Vibrio cholerae*: Understanding the ecology of resistance genes and mechanisms. Vaccine. 2020 Feb 29;38Suppl 1:A83-A92.
13. Das K, Nair LV, Ghosal A., Sardar SK, Dutta S, Ganguly S. Genetic Characterisation Reveals Evidence for an Association between Water Contamination and Zoonotic Transmission of a Cryptosporidium Sp. from Dairy Cattle in West Bengal India. Food Waterborne Parasitol. 2019 Dec;17: e00064.

14. Das S, Chowdhury R, Pal A, Okamoto K, Das S. Salmonella Typhi outer membraneprotein STIV is a potential candidate for vaccine development against typhoidand paratyphoid fever. Immunobiology. 2019 May;224(3):371-382.
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19. Ganguly S, Chakraborty D, Goswami DN. A retrospective study on adverse obstetric outcomes in HIV-infected pregnancy in West Bengal, India. HIV AIDS Review.2020 Mar;19(1):39-42.
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21. Ghosal A, Ganguly S. Genetic Variation of Giardia lamblia Local Isolates from Kolkata, India. GJRA. 2019Aug;8(8):12-13.
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Nataro JP, Robins-Browne RM, Kotloff KL. Diarrhoealdisease and subsequent risk of death in infants and children residing in low-income and middle-income countries: analysis of the GEMS case-control study and12-month GEMS-1A follow-on study. Lancet Glob Health. 2020 Feb;8(2):e204-e214.

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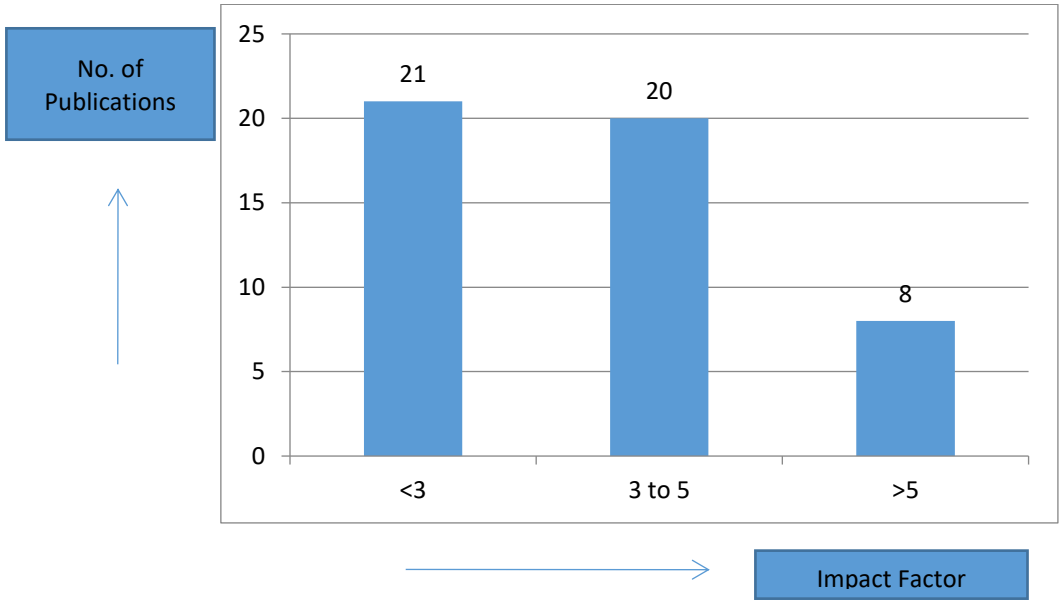

Book chapter

1. Biotechnological Application in Human Health. Edited by Sadhukhan, Provash Chandra and Premi, Sanjay. Published by Springer, Singapore, 1st Edition, ISBN No. 978-981-15-3452-2, 2020.
2. Chakraborty S, Das S.2020.Murine Models to Study Acute and Chronic Bacterial Infections. In Busi S, Madhu D, Saghir SA (eds.), Model Organisms for Microbial Pathogenesis, Biofilm Formation and Antimicrobial Drug Discovery.Springer, pp. 459-488.
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5. Verma AS, Kumar V, Saha MK, Dutta S, Singh A. HIV: Biology to treatment. NanoBioMedicine. 2019 Sep: 167–197.

ADMINISTRATION

Scientific Advisory Committee:

Chairperson	:	Dr. G. Balakrish Nair Honorary Distinguished Professor Microbiome Laboratory Rajiv Gandhi Centre for Biotechnology Poojappura, Thycaud P.O. Thiruvananthapuram – 695014, Kerala
Member	:	Dr. Lalit Dar Professor, In-charge, Virology Section Department of Microbiology, All India Institute of Medical Sciences, New Delhi
Member	:	Dr. Sanjay Mehendale Research Director, PD Hinduja Hospital, PD Hinduja Hospital SVS Rd, Mahim West, Shivaji Park, Mumbai
Member	:	Dr. Bhaskar Saha Scientist 'G', National Centre for Cell Science NCCS Complex, Pune University Campus Ganeshkhind, Pune
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
Member	:	Prof. (Dr.) A.C. Phukan Dean of Academics & HOD Microbiology NEIGRIHMS, Shillong
Member	:	Prof. Pratip Kr. Kundu Director, Calcutta School of Tropical Medicine. 108, C. R. Avenue, Kolkata
Member	:	Dr. Shashi Kant Professor & HoD, Centre for Community Medicine, All India Institute of Medical Sciences, Ansari Nagar, New Delhi
Member		Representative, Director General of Health Services Ex-Officio, Govt. of West Bengal, Swasthya Bhawan, Kolkata

ICMR Representative	:	Dr. R.R. Gangakhedkar Head, Division of Epidemiology and Communicable Diseases, ICMR HQs, New Delhi
Member Secretary	:	Dr. Shanta Dutta, Director, ICMR-NICED

Institutional Animal Ethics Committee:

Chairman, Biological Discipline	:	Dr. M.K. Chakrabarti Ex-Director-in-Charge & Ex-Emeritus Scientist, ICMR-NICED, Kolkata,
Member, Biological Discipline	:	Dr. Amit Pal, Scientist-F, ICMR-NICED, Kolkata
Member, Biological Discipline	:	Dr Santa Sabuj Das, Scientist-F, ICMR-NICED, Kolkata
Member, Veterinarian Member	:	Dr. Gautam Prasad Sarkhel, Uttranyan, Block D, Flat 2C, 40 Dum Dum Road, Kolkata
Member, Main Nominee, CPCSEA	:	Dr. Amirul Islam Mallick Dept. of Biological Sciences, IISER-K, Mohanpur, Nadia, West Bengal
Member, Link Nominee, CPCSEA	:	Dr. Shankar Maiti Dept. of Biological Sciences, IISER-K, Mohanpur, Nadia, West Bengal
Member, Scientist from outside Institute, CPCSE	:	Ms. Srimoyee Saha 36/C, Bosepukur Road, Kolkata
Member, Socially Aware Nominee, CPCSEA	:	Dr. Samiran Mondal Assistant Professor, Dept. of Veterinary Pathology, West Bengal University of Animal Fishery Science 37, Kshudiram Bose Sarani, Kolkata
Member Secretary	:	Dr. Hemanta Koley, Scientist-E, ICMR-NICED, Kolkata

Institutional Ethics Committee:

Chairman	:	Prof. Santanu K. Tripathi, Professor & Head Department of Clinical & Experimental Pharmacology Calcutta School of Tropical Medicine 108 Chitta Ranjan Avenue Kolkata 700073

Member, Basic Medical Scientist	:	Dr. Manideepa Sengupta Professor & Head, Department of Microbiology, Medical College Kolkata AE 426 Salt Lake, Kolkata- 700064
Member, Basic Medical Scientist	:	Prof. Suparna Chatterjee Department of Pharmacology Institute of Post Graduate Medical Education and Research (IPGMER) AJC Bose Road, Kolkata
Member, Clinician	:	Dr. Dilip Mahalanabis Director, Society for Applied Studies, CF 198, Saltlake, Sector I, Kolkata
Member, Clinician	:	Prof. Santi Ranjan Bagchi Prof. & Head, Dept. of Medicine College of Medicine & J.N.M. Hospital S-3/1, Shraboni Abasan, Block- FC, Sector III, Salt Lake, Kolkata
Member, Clinician	:	Dr. Suman Kanungo, Scientist-E ICMR-National Institute of Cholera & Enteric Diseases, Beliaghata, Kolkata –700010
Member, NGO Representative	:	Mrs Renuka Rath Flat 2E Lansdowne Height No 6, Sarat Bose Road, Kolkata
Member, Legal Expert	:	Mrs. Saumya Ghosh Advocate, Calcutta High Court Saikat Apartment, 274, Parnasree Pally, Kolkata
Member, Legal Expert	:	Mr. Chinmoy Guhathakurta 792/1 Raj Danga Main Road, Kolkata
Member, Lay Person (Floweriest)	:	Mrs. Anasuya Basu 129/35 S. N. Roy Road, LIC Officer Colony, Kolkata
Member, Lay Person	:	Mr. Tapan Kanti Sengupta 26/12 Jhil Road, Dhakuria, Kolkata
Member Secretary	:	Dr. Phalguni Dutta Former Emeritus Medical Scientist (ICMR) ICMR-National Institute of Cholera & Enteric Diseases Beliaghata, Kolkata

Right to Information Act (RTI):

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

Official Language Implementation Committee:

Chairperson	:	Dr. Shanta Dutta, Director
Acting Chairperson	:	Dr. Mamta Chawla Sarkar, Scientist-F
Member	:	Dr. Falguni Debnath, Scientist-C
Liaison Officer	:	Administrative Officer
Member	:	Ms. Arpita Sarbajna, Sr.TO (1)
Member	:	Mr. Sunil Bernard, Private Secretary
Member	:	Mr. Sudhir Omesh, TO-A
Member	:	Mr. Vishwanath Besra, Assistant

SC/ST cell:

Chairperson/Liaison Officer	:	Dr. Malay Kr. Saha, Scientist 'F'
Member	:	Dr. Amit Pal, Scientist 'F'
Member	:	Dr. Pallavi Indwar, Scientist 'C'
Member	:	Ms. Arpita Sarbajna, Sr. TO (1)
Member	:	Mr. Vishwanath Besra, Assistant

Grievance Cell:

Chairperson	:	Dr. Sulagna Basu, Scientist-F
Member	:	Dr. Suman Kanungo, Scientist-E
Member	:	Administrative Officer, NICED
Member Secretary	:	Mr. Pradip Kr. Bose, Section Officer & AO (Addl. Charge)
Member	:	Mr. Vishwanath Besra, Assistant (Section Officer from February 25, 2020)
Member	:	Mr. Sudhir Omesh, TO-A

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

Chairperson	:	Dr. Sulagna Basu, Scientist-F
Member	:	Dr. Falguni Debnath, Scientist-C
Co-opt Member	:	Dr. Moumita Bhaumik, Scientist-C
Member	:	Administrative Officer
Member Secretary	:	Ms. Saheli Samanta, Sr.TO-2
Member	:	Mr. Pradip Bose, Section Officer & AO (Addl. Charge)
External Member from NGO	:	Dr. Miratun Nahar, President, Talash, NGO

Library Committee:

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

Purchase Committee:

Chairperson	:	Dr. Nabendu Sekhar Chatterjee, Scientist-F
Member	:	Dr. Amit Pal, Scientist-F
Member	:	Dr. Malay Kr. Saha, Scientist-F
Member	:	Dr. Abhik Sinha, Scientist-C
Member	:	Dr. Moumita Dutta, Scientist-C
Member	:	Administrative Officer, ICMR-NICED
Member	:	Mr. Vishwanath Besra, Store-in-Charge

Web Committee:

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

Member	:	Mr. Sunil Bernard, Private Secretary
Member	:	Mr. Vishwanath Besra, Assistant

From 11th March, 2020

Chairperson	:	Dr. Mamta Chawla Sarkar, Scientist-F
Nodal Person	:	Mr. Tapas Paul, Sr.TO (1)
Resource person	:	Dr. Provash Ch. Sandhukhan, Scientist-E
Resource person	:	Dr. Debjit Chakrabarty, Scientist-D
Resource person	:	Dr. Surajit Basak, Scientist-C
Information provider	:	Mr. Sunil Bernard, Private Secretary
Information provider	:	Mr. Avijit Chakrabarty, TO

Institutional Biosafety Committee (IBSC):

Chairperson	:	Dr. Shanta Dutta, Director & Scientist-G
DBT Nominee	:	Dr. Alok Sil, Prof. University of Calcutta, Bidhan Nagar, West Bengal
Member Secretary	:	Dr. Asish Kr. Mukhopadhyay, Scientist-F
Outside Expert	:	Dr. Rupak Bhadra, Chief Scientist, Division of Infectious Diseases and Immunology, CSIR-IICB, Kolkata
Biosafety Officer	:	Dr. Alok Kumar Deb, Scientist-F
Internal Expert	:	Dr. Nabendu Sekhar Chatterjee, Scientist-F
Internal Expert	:	Dr. Sulagna Basu, Scientist-F
Internal Expert	:	Dr. Hemanta Koley, Scientist-E

Staff List

Scientists:

Dr. S. Dutta, Scientist G & Director
Dr. A. Palit, Scientist G (retired on 30.04.2019)
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 F
Dr. M. Chawla Sarkar, Scientist F
Dr. S. Basu, Scientist F
Dr H. Koley. Scientist E
Dr. S. Kanungo, Scientist E
Dr. N. Chakraborty, Scientist F
Dr. P. C. Sadhukhan, Scientist E
Dr. A. K. Chakrabarti, Scientist E
Dr. D. Chakraborty, Scientist D (joined on 31.05.2019)
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
Dr. P. Chatterjee, Scientist B (Transferred to ICMR w.e.f. 31.10.2019)
Dr. S. Bhattacharya, Scientist B,

Staff:

Bacteriology Division

Mr. J. Kharwar, Technical Officer A
Mr. A. K. Mondal, Technical Officer A
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 Officer
Ms. M. Das, Technician (2)
Mr. S. Dey, MTS (General)
Mr. Subrata Kumar Singha

Clinical Medicine Division

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

Electron Microscopy Division

Ms A. Sarbajna, Sr. Technical Officer (1)
Mr. S. Kumar, Laboratory Assistant (passed away on December 2019)
Mr. B. R. Mallick, Laboratory Attendant-2

Epidemiology and Data Management Division

Mr. R.L. Saha, Sr. Technical Officer (2) (currently posted at Maintenance Division since 17.12.2019)
Mr. S. Shil, Sr. Technical Officer (1) (Additionally posted at Personnel Section since 28.08.2019)
Mr. C. Mandal, Sr. Technical Officer (1),
Mr. A. Chakraborty, Technical Officer (Posted at Personnel Section)
Mr. Supriya Basu, Health Assistant

Immunology Division

Mr. S. K. Shaw, Technician B
Mr. N. C. Mondal, Laboratory Assistant

Pathophysiology Division

Mr. B. Roy, Technician (2)

Virology Division

Dr. S. C. Bhunia, Sr. Technical Officer (2) (retired on 31.12.2019)
Dr. S. K. Sadhukhan, Sr. Technical Officer (1) (posted at Establishment Section)
Mr. S. Omesh, Technical Officer –A (Posted at Store section)
Ms. P. Bhaumik, Technical Officer
Mr. K. Sen, Technical Assistant
Ms. P. De, Technical Officer
Md. M. Hossain, Sr. Technician (1)
Mr. M. L. Gupta, Technician-B

Department of Animal House
Mr. K. C. Pramanik, Sr. Technical Officer (1) (Additionally posted at the Accounts Section since 28.08.2019)
Mr. K. C. Tudu, Technical Assistant
Mr. S. Hari, Laboratory Assistant (retired on 31.01.2019)
Mr. P. Turi, Laboratory Assistant
Mr. R. Hazra, Laboratory Assistant
Mr. S. Balmiki, Laboratory Assistant

Library:
Ms. S. Samanta, Sr. Technical Officer (2)
Mr. T. Pal, Sr. Technical Officer (1)
Mr. B. Roy, Lab. Assistant (till 21.10.2019)
Mr. S. K. Routh, Laboratory Assistant, (Posted at Library on 25.10.2019)

Maintenance, Instruments & Equipment Section
Mr. P. K. Ghoshal, Principal Technical Officer
Mr. R. L. Saha, Sr. Technical Officer (2) (since 17.12.2019-till date)
Mr. A. R. Das, Care Taker
Mr. S. K. Dey, Technical Assistant (retired on 21.01.2020)
Mr. K. Dey, Sr. Technician-1
Mr. B. Mandi, Laboratory Assistant
Mr. B. Das, Laboratory Assistant (retired on 31.01.2020)
Mr. S. Mullick, Laboratory Assistant (taken VR on 01.11.2019)
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 (retired on 30.06.2019)
Mr. A. Seal, MTS (General)
Mr. S. Maiti, MTS (General)

Media Section:
Dr. A. K. Chakraborty, Scientist E
Mr. P. Samanta, Laboratory Assistant
Ms. C. Das, Laboratory Assistant

Director's Secretariat
Mr. S. Bernard, Private Secretary
Mr. S. Sen, Personal Assistant
Mr. N. G. Sutradhar, Laboratory Assistant

Office of Administrative Officer
Mr. Pradip Bhadra, Administrative Officer (retired on 30.11.2019)
Mr. P. K. Bose, Section Officer (Additional charge as AO from 04.12.2019)
Ms. R. Jaiswal, Upper Division Clerk
Mr. Kh. I. Singh, MTS (General)

Accounts Section:
Dr. S. S. Das, Scientist F (additional charge as ACO till 03.07.2020)
Mr. P. Chatterjee, Accounts Officer (joined on 04.07.2019)
Mr. R. Chowdhury, Assistant (till 19.08.2019)
Mr. S. Mullick, Upper Division Clerk (21.08.2019- till date)
Mr. D. Kumar Gayen, Upper Division Clerk
Mr. A. Chandra, Upper Division Clerk (till 26.04.2019)
Mr. A. Banerjee, Telephone Operator
Mr. M. S. Das, Lower Division Clerk (joined on 13.09.219)

Cash Section:
Mr. C. Kumar Naskar, Assistant
Mr. K. Sharma, Upper Division Clerk (till 26.04.219)
Mr. A. Chandra, Upper Division Clerk (Since 27.04.2019-till date)

Despatch Section:
Mr. A. Kumar Roy, Lab. Assistant (retired on 31.10.2019)
Mr. B. Roy, Lab. Assistant (From 22.10.2019 till date)
Mr. J. Malakar, Lab. Assistant

Establishment Section:
Dr. S. K. Sadhukhan, Sr. Technical Officer (1)
Mr. G. Ch. Das, Assistantt

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, Section Officer
Mr. S. Omesh, Technical Officer-A
Mr. A. Mitra, Sr. Technician (2)
Mr. B. Mitra, Lab. Asst.
Mr. B. Ganguly, Technician (1) (2nd half duty since 27.04.2019-till date)

Vehicle Section:
Mr. D. K. Chowdhury, Sr. Technician (3)
Mr. H. P. Das, Sr. Technician (3)
Mr. A. K. Dutta, Sr. Technician (2)
Mr. R. Bhakta, Sr. Technician (3)
Mr. S. Das, Sr. Technician (1)
Mr. S. K. Ghosh, Driver (Ordinary Grade)
Mr. D. Dey, Driver (Ordinary Grade)
Mr. B. Ganguly, Technician (1) (2nd half duty 1.04.2019-26.04.2019 &1st half duty since 27.04.2019-till date
Mrs. M. Bhattacharya, Lab. Attendant (2)

Pension Section:
Mr. P. K. Bose, Section Officer
Mr. R. L. Saha, Sr. Technical Officer (2) (till 16.12.2019)
Mr. K. Sharma, Upper Division Clerk (since 27.04.2019)
Mr. B. Ganguly, Technician (1) (1st half duty 1.04.2019-26.04.2019)

Personnel Section:
Mr. S. Shil, Sr. Technical Officer (1) (since 28.08.2019)
Mr. A. Chakraborty, TA
Mr. R. Chowdhury, Assistant (20.08.2019-till date)
Mr. S. Mullick, Upper Division Clerk (29.06.2018-20.08.2019)
Mr. P. Guha, Upper Division Clerk
Mr. R. Hela, Lab. Assistant

Regional VRDL, ICMR-NICED
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 (Resigned on 18.10. 2019)
Mr. Abhishek Basu, Laboratory Technician (joined on 21.11.2019)
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

Employees who Joined ICMR-NICED during 2019-20

Name	*Designation*	*Date of Joining*
Dr. Debjit Chakraborty	Scientist D	31.05.2019
Mr. Pinaki Chatterjee	Acounts Officer	04.07.2019
Mr. Mriganka Shekhar Das	Lower Division Clerk	13.09.2019

Employees who retired from ICMR-NICED during 2019-20

Name	*Designation*	*Date of Retirement*
Dr. Anup Palit	Scientist G	30.04.2019
Mr. Dilip Turi	Laboratory Assistant	30.06.2019
Mr. Anup Kumar Roy	Laboratory Assistant	31.10.2019
Mr. Sankar Mullick	Laboratory Assistant	01.11.2019 (taken VR)
Mr. Pradip Bhadra	Administrative Officer	30.11.2019
Mr. Somesh Chandra Bhunia	STO-II	31.12.2019
Mr. Sujit Kumar Dey	Technical Assistant	31.01.2020
Mr. Badri Das	Laboratory Assistant	31.01.2020

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
Mr. Balaram Nag	Technical Assistant	31.12.1994	08.04.2019
Mr. Subhash Chandra Saha	Technical Assistant	30.11.2015	06.04.2019
Mr. Sushil Kumar	Laboratory Assistant	09.12.1987 (date of joining)	19.12.2019