Annual Report 2008-09
Regional Medical Research Centre, Dibrugarh

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MISSION

To promote bio-medical research in north-eastern states of India and build up scientific man power

AIM

To carry out bio-medical research in priority areas based on following guidelines

- Diseases having priority in National Health Programmes
- Diseases common in two or more states of the north-eastern region
- Diseases unique to the north-eastern region
- Exploration of traditional knowledge

CURRENT FOCUS OF RESEARCH

Cancers, Cardiovascular diseases and hypertension, Mosquito borne diseases, HIV and drug abuse, Trematode infections, Haemoglobinopathies, Medicinal plants of NE India
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PREFACE

Regional Medical Research Centre, NE through its network of Population Based Cancer Registries brought out several new insights in the cancer scenario of the country. Besides age-adjusted rates of stomach cancer in Mizoram being the highest in the country, lung cancer has been documented as the leading cancer in Imphal (Manipur) and Mizoram among both male and females. Stroke, majority being haemorrhagic strokes, is the leading cause of adult death in Assam which has supported the findings of high prevalence of hypertension in this state. Studies on genetic polymorphism among stroke and acute myocardial infarction patients showed high prevalence of D allele in ACE gene among younger population.

Malaria remained as priority in the research agenda of the Centre. Antimalarial resistance is very high in this region. In this year the Scientists of the Centre genetically characterized the malaria parasites from Assam along with Anopheles baimaii, one of the major vectors, from the north-east. They also established An. nivipes as another vector supporting malaria transmission in this region. West Nile, the mosquito-borne virus surfaced as one of the causes for acute encephalitis syndrome in north-east India for the first time and has contributed to mortality and morbidity due to encephalitis. This Centre established the molecular identity of Paragonimus heterotremus and P. westermani isolated from the region. Scientists could also improve the serodiagnostic kit for the diagnosis of neurocysticercosis cases with monocystic lesions. Completion of the second phase of the study on Biobehavioural Assessment of IDU related HIV patients belonging to 4 districts of Manipur and Nagaland was a good achievement.

The Centre, as usual, extended the helping hand to the State Health Departments in the region in investigating and containing the outbreaks and providing diagnostic services for viral diseases.

Constant guidance of the Director General, Chief, Division of Non-Communicable Diseases, and Financial Advisor, ICMR were instrumental in achieving these feats. All administrative and financial staff of ICMR is gratefully acknowledged for their help and cooperation. Last but not the least scientific, technical and administrative staff of RMRC, NE are the main players for all works of this Centre. I extend my sincere thanks to them.

(Dr. J. Mahanta)
Director
STAFF POSITION

Director : Dr. J. Mahanta

SCIENTIFIC & TECHNICAL STAFF
(a) Epidemiology, Clinical Research and Biostatistics Group

Scientist E : Dr. P. K. Chelleng
Scientist C : Dr. R. K. Phukan
Scientist C : Dr. P. K. Borah
Technical Assistant : Sri D. Hazarika
Laboratory Technician : Sri M. Chetia
Laboratory Attendant : Sri A. K. Gogoi
Laboratory Attendant : Sri B. K. Das
Laboratory Attendant : Sri P. K. Saikia

(b) Mosquito Borne Diseases Group

Scientist E : Dr. P. K. Mohapatra
Scientist E : Dr. P. Dutta
Scientist E : Dr. Anil Prakash
Scientist D : Dr. A. M. Khan
Scientist D : Dr. D. R. Bhattacharyya
Scientist C : Dr. S. A. Khan
Technical Officer : Sri C. K. Sarma
Technical Assistant : Sri B. K. Goswami
Laboratory Technician : Sri N. K. Baruah
Laboratory Technician : Sri P. K. Doloi
Laboratory Technician : Sri A. C. Rabha
Laboratory Assistant : Sri R. C. Doloi (w.e.f 1.9.2008)
Laboratory Attendant : Sri D. Dutta

(c) Microbial Diseases Group

Scientist D : Dr. K. Narain
Scientist D : Dr. D. Biswas
Scientist C : Dr. H. K. Das
Scientist C : Dr. G. K. Medhi
Scientist C : Dr. (Ms) K. Rekha Devi
Scientist C : Dr. B. J. Borkakoty
Scientist B : Dr. (Mrs) Utpala Devi
Laboratory Technician : Sri D. K. Pegu
Laboratory Technician : Sri S. K. Rajguru
Laboratory Technician : Sri K. Gogoi
Laboratory Assistant : Sri P. N. Gogoi
Laboratory Attendant : Sri H. N. Chirring
(d) Haematology Group

Scientist E : Dr.S.K.Sharma
Laboratory Technician : Sri R.Dutta
Laboratory Technician : Sri.S.Gogoi
Laboratory Attendant : Sri M.Borah

UTILITIES

COMPUTER SECTION

Data Entry Operator (Grade D) : Sri S. K. Goswami (on study leave)
Statistical Assistant : Vacant

ANIMAL HOUSE & MOSQUITO INSECTORY

Laboratory Technician : Sri J. N. Gogoi
Animal Attendant : Sri H. N. Sharma
Peon : Sri Bisanta Konwar

LIBRARY / DOCUMENTATION

Library & Information. Assistant: Sri P . Konwar
Field Worker (Jr) : Mrs. S. Dutta

MAINTENANCE

Technical Officer : Vacant
Pump Operator : Sri R.Saikia
Field Worker (Jr.) : Sri Pobin Das

ADMINISTRATIVE STAFF

Administrative Officer : Sri R. K. Dutta
P.S. to Director : Sri A. C. Borah
Asstt. Accounts Officer : Sri M. C. Acharyya
Section Officer : Sri D. K. Sonowal (w.e.f 16.5.2008)
Assistant : Sri P. Gogoi
Assistant : Mrs. D. Das Deori
Assistant : Sri P. D. Baruah
Assistant : Mrs. R. Das Deori (w.e.f 1.9.2008)
Upper Division Clerk : Sri H. Gogoi
Upper Division Clerk : Sri M. D. Moran
Upper Division Clerk : Vacant
Lower Division Clerk : Sri P. Hazarika
Lower Division Clerk : Sri Dipak Gogoi (w.e.f 3.9.2008)
Telex Operator : Sri B. N. Sarmah
Gestetner Operator : Sri U.K. Dowrah

SUPPORTING STAFF

Sri P. C. Gohain  Sri G. Sharma  Sri R. Sonowal
Sri P. C. Gogoi  Sri Bogen Gogoi  Sri B. Konwar
Sri S. Kalita  Sri L. Gogoi  Sri A. Gogoi
Sri K. Bhuyan  Sri A. K. Das  Sri T. B. Pun
Sri I. Bailung  Sri B. Baruah
Sri P. C. Moran  Sri Babul Gogoi
EXECUTIVE SUMMARY

Cardio-vascular diseases

Stroke is the major cause of death in Assam among adults. Role of ACE insertion deletion gene polymorphisms in the development of ischaemic stroke and acute myocardial infarction was studied in 170 cases and 218 controls. A higher prevalence of D allele of ACE gene was found among the cases. The project on Community Control of RH/RFD was started and a Registry on Rheumatic Fever (RF)/Rheumatic Heart Disease (RHD) established under Jai Vigyan Mission Mode. Under this programme 51 suspected cases of RHD were detected after surveying 4,965 students through active school surveillance programme covering 5-15 years old students in Dibrugarh district. Further, 192 RHD cases were registered through passive surveillance.

Cancers

Unique distribution of different cancers has been recorded under the North-east Regional Population Based Cancer Registry Programme. Six cancer registries, covering 43.6 lakh population in 4 north-eastern states, remained operational during the year. Among males, stomach followed by oesophagus were the leading sites of cancer incidence with Mizoram contributing about 40% and Assam contributing nearly 60% of the total stomach and oesophagus cancer incidence respectively. Though overall, breast and cervix were the leading sites of cancer incidence among females yet incidence of lung cancer (Imphal & Mizoram), stomach cancer (Mizoram) and oesophagus cancer (Silchar) superseded the incidence of breast and cervix cancers in some registry areas.

It has been observed that tobacco related cancers are occupying the top position. Study to investigate the link between high incidence of cancers in north-eastern states of India and role of tobacco and genetic variation including polymorphism/mutations associated with ethnic variation was carried out. The epidemiological information was collected from 847 cases of 4 major tobacco related cancers viz. Oral cavity, Oesophagus, Stomach and Lung. Majority of the cases occurred in 41-70 years age group, however, the oral cavity and stomach cancer cases were reported even below 20 years of age. Chewing of betel nut and tobacco; and tobacco smoking were found major contributing factors for tobacco related cancers. Another study investigating the link between high incidence of cancers in north-eastern states of India and use of pesticides and genetic variation including polymorphism/mutations associated with ethnic variation continued. The epidemiological information was collected from 292 cases of 2 major sites of pesticide related cancers viz. Breast and Non-Hodgkin lymphoma. Majority of breast cancer cases were reported in 21-60 years old females whereas majority of NHL cases occurred among 21-40 years males. About one fourth of the pesticide related cancer cases were farm workers while 5-10% cases were pesticide applicators.

Malaria

Malaria due to Plasmodium falciparum is very common in north-east India. A study conducted in Assam showed that only 53.4% pregnant women with malaria had normal pregnancy outcome. Further, antimalarial resistance is a big problem in this region. The study to characterize the prevalent P. falciparum strains in Assam continued in Katlichera PHC of Hailakandi district. Overall 99% Pf isolates had resistant allele (76T) of pfcr gene, only 1%
were wild type (K-76). In case of pfmdr1 gene, 65.8% isolates were mutants (86Y) and 32.1% were wild (N86) type. Some ethnic populations in north-east India have very high prevalence of HbE haemoglobinopathy. A study was initiated to study its correlation with malaria, if any, in this region.

Members of Anopheles dirus complex are one of the major malaria vectors in north-east India. This year we investigated the sibling species composition of this complex in Nagaland state and detected only An. baimaii (An. dirus sp D) using r-DNA ITS2 based allele specific polymerase chain reaction. ITS2 region of r-DNA gene and Cytochrome Oxidase sub unit II gene of 55 specimens from 5 north-eastern states were sequenced. While no intra-specific variation in ITS2 sequences was noted, analysis of 617 bp of CO II sequences resulted in 12 haplotypes with 25 segregating sites (4.1%) and 95.6% transitions. A new investigation to study the morphological variation and molecular characterization of An. minimus species complex in Assam and Arunachal Pradesh was initiated. Presence of An. minimus species A was confirmed in Tezpur, Kamrup, Golaghat and Dibrugarh districts of Assam and Tirap district in Arunachal Pradesh using r-DNA ITS2 based allele specific PCR method. Work was also initiated on Molecular and morpho-taxonomic studies on An. philippinensis/ nivipes group mosquitoes. In Nagaland 91% concordance between morphological and molecular identification in case of An. nivipes and 75% concordance in case of An. philippinensis was found. DNA of one pool of An. nivipes mosquitoes was found positive for Plasmodium falciparum infection indicating the role of An. nivipes mosquitoes in malaria transmission in Nagaland.

Trematode / cestode infections

Molecular characterization and infrapopulation differentiation of Paragonimus in NE India was completed during the year. Phylogenetic analysis indicated that P. westermani populations from Arunachal Pradesh and Meghalaya were genetically different from each other and that Indian, P. westermani constituted a distinct lineage and perhaps represented a different species closely related to P. westermani / P. siamensis group of species. Progression of Paragonimus westermani lung flukes of Indian origin in experimental Wistar rats was studied along with chest radiography and computed tomography scan for Paragonimus heterotremus egg-positive patients from Arunachal Pradesh. Study to determine disease burden due to human pulmonary paragonimiasis using molecular methods, was initiated. A total of 2,644 blood samples, 1,476 stool samples and 686 sputum samples were collected from the hospitalized patients as well as community based surveys in Assam and Meghalaya. Of these, 12 patients from Assam and 1 patient from Meghalaya were found ELISA positive for paragonimiasis. Crabs were collected from various areas of Assam and Meghalaya and examined for infection with the metacercariae of Paragonimus species. Edible fresh water fishes in north-east are known to carry trematode metacercariae in scales and muscles. Fish borne trematode infection in Assam and Sikkim showed 21 species infected with different types of trematode metacercariae. Study on paddy field dermatitis caused by Schistosoma spindale in paddy field workers of Assam was also initiated during the year. Over 13,000 snails belonging to six species viz., Indoplanorbis exustus, Thiara tuberculata, Brotia costula, Bellamy bengalensis, Pila globusa, and Lymnea acuminate collected from seven districts of Assam were examined and many were found infected with cercariae of Schistosoma spindale.

Sero-diagnostic and radiological study on Neurocysticercosis in epileptic patients continued. CT Brain of 138 neurocysticercosis (NCC) suspects revealed cystic lesions in
73.2% cases. Majority of the lesions (67.3%) were solitary cystic in nature while only 33.7% cases had multiple cystic lesions. ELISA (IgG) and Western blotting for detection of IgG antibodies against human cysticercosis was developed using cystic fluid of locally available strains of *Taenia solium* metacestodes as source of antigen. All the cases having multiple cystic lesions (active & mixed) were detected by ELISA and western blotting.

**Japanese encephalitis virus**

Nearly 14% of the 300 CSF’s collected from AES cases were found positive for JE virus infection using JE specific RT-PCR followed by semi-nested PCR. Phylogenetic analysis of JE virus indicated genetic similarities with most of the circulating Indian strains. However, four JE sequences were genetically similar to genotype 1 strains. ELISA positive mosquito pools for JE virus were processed for virus isolation in infant mice. The phylogenetic analysis based on 400 bp sequence placed these isolates closure to GP78 sequence. Simultaneously pig and goat seroconversion was also recorded in the area.

**West Nile virus**

Neutralization test using 733913 strain of JE and G22886 strain of WN in BHK cells by CPE method in 1002 sera samples showed neutralizing antibodies against WN virus in 7.7% samples, 20.1% positive for JE and 35.9% positive for both JE and WN. A total of 1.320 blood samples were collected from pigs (607) and goats (713) in Dibrugarh district of which 2.1% and 1.9% respectively were found to possess neutralizing antibodies against WN virus, 3.9% and 4.1% respectively had neutralizing antibodies against JE virus whereas 8.6% and 7.9% respectively had a mixture of JE and WN virus antibodies. WN virus was isolated in 2 of the 45 CSF samples inoculated into infant mice.

**Dengue and chikungunya virus**

An exploratory study to see Dengue and Chikunguniya virus activity in the NE Region of India was initiated in Assam. Fifty three of the 261 acute phase clotted blood samples, collected from suspected hospitalized patients, were found positive in Haemagglutination Inhibition test with titre ranging from 20-1280 against DEN-2 antigen. In addition, 20 % school children, up to the age of 17 years, selected randomly in Dibrugarh and Sonitpur districts of Assam were found to have inapparent infection with Dengue virus. Two of the 94 sera subjected to MAC ELISA were tested positive against Chikungunya antigen.

**Influenza virus**

Under the project *Multi-site monitoring of human influenza virus in India* a total of 691 nasal / throat swab samples were collected and subjected to HA test. Until now a total of 28 isolations of influenza virus have been made out of 1,828 samples processed.

**HSV-2 and Measles virus**

HSV-2 infection is a major risk factor for heterosexual transmission of HIV. During the year serum as well as vaginal swabs were collected from women attending antenatal Clinics in the 5 NE states. A total of 9.1% samples showed positive reaction for IgG HSV-2, 0.14% for RPR test for syphilis and 6.1% were positive for HSV-2 by PCR.
RESEARCH WORK

(i) EPIDEMIOLOGY AND CLINICAL RESEARCH
(A) CARDIO-VASCULAR DISEASES

Project-1: Role of ACE insertion deletion gene polymorphisms in the development of ischaemic stroke and acute myocardial infarction (AMI)

Investigators: Dr. P. K. Borah, Dr. S. K. Sharma, Dr. J. Mahanta (RMRC, Dibrugarh); Dr. H. C. Kalita, Dr. N. Upadhyaya (AMC & H, Dibrugarh)

Duration: 3 Years (May 2007 – April 2010)

Funding: ICMR (EM)

In this hospital based case-control study the interaction of Angiotensin Converting Enzyme gene with the environment in the development of ischaemic stroke and acute myocardial infarction (AMI) is being investigated. So far, a total of 170 cases (AMI 112, Ischaemic stroke 58; mean age 56.4 ± 11.0 yrs) and 218 controls (mean age 56.3 ± 10.7 yrs) have been recruited (Table-1). Smoking was significantly higher (56.0%) among the subjects with AMI than Ischaemic stroke and controls.

Table-1: Characteristics of the study subjects

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Controls (n=218)</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AMI (n=112)</td>
<td>Ischaemic stroke (n=58)</td>
</tr>
<tr>
<td>Male (%)</td>
<td>76.2</td>
<td>81.3</td>
</tr>
<tr>
<td>Age in years (Mean ± SD)</td>
<td>56.3 ± 10.7</td>
<td>56.4 ± 11.0</td>
</tr>
<tr>
<td>Smoking (%)</td>
<td>35.7</td>
<td>56.0 *</td>
</tr>
<tr>
<td>Consumption of alcohol (%)</td>
<td>27.3</td>
<td>26.4</td>
</tr>
<tr>
<td>Body mass index (Mean ± SD)</td>
<td>21.1 ± 3.7</td>
<td>21.8 ± 5.8</td>
</tr>
<tr>
<td>SBP, mmHg (Mean ± SD)</td>
<td>143.4 ± 26.0</td>
<td>129.2 ± 24.1*</td>
</tr>
<tr>
<td>DBP, mmHg (Mean ± SD)</td>
<td>84.6 ± 11.7</td>
<td>80.3 ± 12.4*</td>
</tr>
<tr>
<td>Hypertension (%)</td>
<td>58.2</td>
<td>63.2</td>
</tr>
</tbody>
</table>

* Statistically significant (p ≤ 0.05) as compared to control

Significantly higher concentration of triglycerides and blood urea in the AMI group was found than that of control subjects. The blood glucose was significantly higher in controls as comparison to ischaemic stroke subjects (Table-2).
Table-2 : Biochemical parameters in the study subjects

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Control (n=218)</th>
<th>Cases</th>
<th>Cases</th>
<th>Ischaemic Stroke (n=58)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood glucose, mg% (Mean ± SD)</td>
<td>178.9 ±94.3</td>
<td>158.5±80.5</td>
<td>150.7 ± 62.2*</td>
<td></td>
</tr>
<tr>
<td>Cholesterol, mg% (Mean ± SD)</td>
<td>132.5 ± 49.3</td>
<td>130.8 ± 51.8</td>
<td>135.7 ± 69.4</td>
<td></td>
</tr>
<tr>
<td>Triglyceride, mg% (Mean ± SD)</td>
<td>102.7 ± 54.7</td>
<td>121.9 ± 60.9 *</td>
<td>111.2 ± 58.4</td>
<td></td>
</tr>
<tr>
<td>HDL, mg% (Mean ± SD)</td>
<td>37.1 ± 28.5</td>
<td>39.3 ± 28.7</td>
<td>31.9 ± 24.5</td>
<td></td>
</tr>
<tr>
<td>LDL, mg% (Mean ± SD)</td>
<td>67.8± 42.5</td>
<td>65.1± 42.0</td>
<td>73.5 ± 62.6</td>
<td></td>
</tr>
<tr>
<td>Blood urea, mg % (Mean ± SD)</td>
<td>31.9 ± 20.9</td>
<td>38.9± 23.9 *</td>
<td>37.2 ± 19.2</td>
<td></td>
</tr>
<tr>
<td>Serum creatinine, mg% (Mean ± SD)</td>
<td>1.4± 0.9</td>
<td>1.4 ± 0.6</td>
<td>1.3 ± 0.4</td>
<td></td>
</tr>
</tbody>
</table>

* Statistically significant (p ≤ 0.05) as compared to control

Higher prevalence of D allele of ACE gene (subjects having either Ins/Ins or Ins/Del) in the younger (up to 40 years) as well as older age groups (> 60 years) was found. Gender wise analysis revealed significantly higher prevalence in younger age group (up to 40 years) in case of male subjects and through out all age groups in case of female subjects (Table-3).

Table-3 : ACE gene I/D polymorphism in the study subjects

<table>
<thead>
<tr>
<th>Category</th>
<th>Age group (Years)</th>
<th>Genotypes</th>
<th>Control (%)</th>
<th>Cases (AMI + Stroke)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall</td>
<td>Up to 40</td>
<td>Ins/Ins</td>
<td>40.6</td>
<td>20.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ins/Del + Del/Del</td>
<td>59.4</td>
<td>80.0</td>
</tr>
<tr>
<td></td>
<td>40- 50</td>
<td>Ins/Ins</td>
<td>27.3</td>
<td>34.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ins/Del + Del/Del</td>
<td>72.7</td>
<td>65.7</td>
</tr>
<tr>
<td></td>
<td>50-60</td>
<td>Ins/Ins</td>
<td>29.4</td>
<td>36.7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ins/Del + Del/Del</td>
<td>70.6</td>
<td>63.3</td>
</tr>
<tr>
<td></td>
<td>60 plus</td>
<td>Ins/Ins</td>
<td>47.9</td>
<td>32.1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ins/Del + Del/Del</td>
<td>52.1</td>
<td>67.9</td>
</tr>
<tr>
<td></td>
<td>Up to 40</td>
<td>Ins/Ins</td>
<td>40.0</td>
<td>25.0</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ins/Del + Del/Del</td>
<td>60.0</td>
<td>75.0</td>
</tr>
<tr>
<td></td>
<td>40- 50</td>
<td>Ins/Ins</td>
<td>24.2</td>
<td>34.6</td>
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</tr>
<tr>
<td>Male</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>50-60</td>
<td>Ins/Del + Del/Del</td>
<td>75.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ins/Del + Del/Del</td>
<td>70.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>60 plus</td>
<td>Ins/Del + Del/Del</td>
<td>50.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Up to 40</td>
<td>Ins/Del + Del/Del</td>
<td>29.4</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>60 plus</td>
<td>Ins/Del + Del/Del</td>
<td>58.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Project- 2: Establishment of Rheumatic fever (RF)/Rheumatic heart disease (RHD) registry at Dibrugarh**

Investigators: Dr. J. Mahanta, Dr. K. Narain, Dr. D. Biswas, Dr. P. K. Borah, Dr. K. Rekha Devi (RMRC, Dibrugarh) ; Dr. H. C. Kalita (AMC & H, Dibrugarh)

Duration: 2 Years (June 2007 – May 2009)

Funding: Jai Vigyan Mission Mode ICMR (EM)

A registry on rheumatic fever (RF)/Rheumatic heart disease (RHD) was established at Dibrugarh in a Jai Vigyan Mission Mode Project on Community Control of RH/RFD. This project defines the prevalence of RHD and RF through a school surveillance programme covering about 10,000 students in 5-15 yrs age group and monitors secondary prophylaxis among RF/RHD cases.

2.1 **Trainings:** Five training programmes covering 197 medical officers in different health set ups of Dibrugarh district were organized to develop an efficient networking system. The participating doctors were familiarised with the case definition, identification of RF/RHD cases besides the functioning of the registry. They were also reoriented with the clinical presentation, diagnosis and treatment of RF/RHD. Further, 14 training programmes covering 486 paramedical staff including GNM, ANM, Pharmacist and Health Workers, other non medical persons like teachers, village heads, ASHA workers under National Rural Health Mission were organized in different localities of Dibrugarh district with an aim to enhance the knowledge and suspicion index on symptoms of rheumatic fever and rheumatic heart disease.

2.2 **Passive surveillance:** A total of 17 (Males 8, Females 9) suspected acute rheumatic fever cases, presenting with the history of sore throat, polyarthritis, fever and ASO test positive, were registered through passive surveillance. In addition, 192 RHD cases (Males 69, Females 123) were also registered through passive surveillance.
**2.3 Active surveillance:** A total of 4,965 (Males 2,744, Females 2,221) school children were surveyed in 52 selected schools from Dibrugarh district wherein 51 cases were identified as suspected cases of RHD. Of these, 31 cases were evaluated by echocardiography examination and four were found to have congenital heart disease (ventricular septal defect-1, pulmonary stenosis-2 and atrial septal defect-1).

**B) CANCERS**

**Project - 3: Population based Northeast Cancer Registry Programme**

| Investigators | Dr. J. Mahanta, Dr. R. K. Phukan, (RMRC, Dibrugarh); Dr. M. S. Ali (AMCH, Dibrugarh); Dr. J. N. Sharma (BBCI, Guwahati); Dr. S. Chakrabarty (SMCH, Silchar); Dr. E. Zomawia (Civil Hospital, Aizawl); Dr. Y. M. Singh (RIMS, Imphal); Dr. Y. Verma (STNM Hospital, Gangtok); Dr. A. Nand Kumar (NRCP) |
| Duration | 9 Years (2003 – 2012) |
| Funding | ICMR (EM) |

In order to generate reliable data on the magnitude and patterns of various prevailing cancers in different north-east Indian states a total of 6 Population Based Cancer Registries were set up in 2003 - 3 in Assam (Assam Medical College, Dibrugarh; Dr.B.B.C.I. Hospital, Guwahati & Silchar Medical College, Silchar), and 1 each in Sikkim (STNM Hospital, Gangtok), Manipur (RIMS, Imphal) and Mizoram (Civil Hospital, Aizawl) with central monitoring unit located at Regional Medical Research Centre, Dibrugarh. The general protocol of data collection in all the registries is similar to the Population Based National Cancer Registry Programme of India. Cancer cases reported by different registries of the north-east during 2006-07 is given in Table-4.

**Table-4: Cancer cases reported by different cancer registry units of North-Eastern States (2006-07)**

<table>
<thead>
<tr>
<th>Registry</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dibrugarh</td>
<td>1855</td>
<td>1353</td>
<td>3208</td>
</tr>
<tr>
<td>Kamrup Urban</td>
<td>1440</td>
<td>869</td>
<td>2309</td>
</tr>
<tr>
<td>Silchar</td>
<td>256</td>
<td>187</td>
<td>443</td>
</tr>
<tr>
<td>Imphal West District</td>
<td>163</td>
<td>214</td>
<td>377</td>
</tr>
<tr>
<td>(Manipur)</td>
<td>(626)</td>
<td>(643)</td>
<td>(1269)</td>
</tr>
<tr>
<td>Mizoram</td>
<td>1410</td>
<td>1165</td>
<td>2575</td>
</tr>
<tr>
<td>Sikkim</td>
<td>399</td>
<td>368</td>
<td>767</td>
</tr>
</tbody>
</table>

Stomach cancer in males (AAR: 53.4) and stomach cancer in females (AAR: 27.3) were the leading sites in the state of Mizoram whereas lung was the leading site of cancer in
both males (AAR: 19.3) and females (AAR: 16.4) in Imphal West district of Manipur state. In Kamrup urban district, Assam oesophagus was the leading site of cancer contributing about 27.0% of the total cases with an AAR of 31.5 per 100,000 in males while in females it was breast cancer (AAR 14.7). In Silchar, Assam the first five leading sites of cancer among males were lung (AAR 18.7) followed by larynx, oesophagus, pharynx, mouth. Oesophagus was the leading site of cancer (AAR 20.7) in males and breast cancer (AAR 11.7) in females in Dibrugarh. In Sikkim, cancer of the stomach (AAR 12.7) was the leading site of cancer in males and that of cervix uteri (AAR: 10.3) in females. The highest mortality incidence ratio was observed in Sikkim among both males (52.8%) and females (43.1%).

**Project- 4 : Cancers in North-east India: understanding the role of Tobacco**

**Investigators** : Dr. J. Mahanta, Dr. R. K. Phukan, (RMRC, Dibrugarh) ; Dr. H. N. Saiyed (NIOH, Ahmedabad); Dr. S. Saxena (IOP, New Delhi); Dr. B. C. Das (ICPO, New Delhi)

**Duration** : 4 Years (April 2005 – March 2009)

**Funding** : ICMR (EM)

This study is investigating the link between carcinogenic contents of tobacco used in North East India and genetic variation including polymorphism/mutations associated with ethnic variations, and is being carried out in the six population based cancer registry areas of the north-east India with a Case-Control epidemiologic design. Histologically confirmed cases were included in the study.

The epidemiological information has been collected from 847 cases of 4 major Tobacco Related Cancers (TRCs) i.e., oral cavity (339), oesophagus (225), stomach (168) and lung (115), for tobacco exposure (Fig-1). In Assam, oral cavity and oesophagus were the major contributing sites among TRCs. In Manipur among TRC cases, oral cavity and lung were the major sites. In Sikkim all the TRC sites contributed equally whereas in Mizoram major TRC sites were stomach and lung.

![Fig-1: Type and source of tobacco related cancer cases enrolled in the study](image-url)
Tobacco Related Cancer cases were found from the age of 21 years and onwards in all the sites (Fig-2). However, the cases of oral cavity cancers below 20 years of age were also reported both among males and females and that of stomach cancer only among the females. Majority of the cases from all sites occurred in the age group of 41 to 70 years of age (Fig-3).

Fig-2: Age wise distribution of various TRC among males

More than 75% of the TRC cases were married and 40% were literate up to primary and middle level. Majority were the user of locally processed underground betel nut. One-third of the cases used both Zarda and Khaini. Majority of them had developed the habit of chewing of betel nut, tobacco or other substances at a very early age of 10-20 yrs (Fig-4).

Fig-3: Age wise distribution of various TRC among females
**Fig-4: Age of TRC cases developing substance chewing habit**

Majority of the cases had the habit of retaining the betel nut & tobacco quid for more than 20 minutes in the mouth in a single use. More than 50% cases were the smokers whereas 30% were alcohol users. Chewing of betel nut, tobacco and retention of quid in the mouth had the dose-response effect on oral cavity cancer. Chewing of betel nut and tobacco smoking exhibited the dose-response effect in case of the oesophageal cancer. Tobacco smoking & some dietary factors were the risk factors for the stomach Cancer. Tobacco smoking and use of biomass fuel were found to be the risk factors for lung cancer cases. Overall, chewing of betel nut, tobacco and smoking were the major contributing factors of TRCs.

**Project- 5 : Cancers in North-east India: understanding the role of Pesticides**

<table>
<thead>
<tr>
<th>Investigators</th>
<th>Dr. J. Mahanta, Dr. R. K. Phukan, (RMRC, Dibrugarh); Dr. H. N. Saiyed (NIOH, Ahmedabad); Dr. S. Saxena (IOP, New Delhi); Dr. B. C. Das (ICPO, New Delhi);</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>4 Years (April 2005 – March 2009)</td>
</tr>
<tr>
<td>Funding</td>
<td>ICMR (EM)</td>
</tr>
</tbody>
</table>

This study, being carried out in the six population based cancer registry areas of the north-east India with a Case-Control epidemiologic design, is investigating the link between exposure to pesticides and genetic variation including polymorphism/mutations associated with ethnic variation. Histologically confirmed cases were included in the study. The epidemiological information has been collected from 292 cases of two major Pesticide Related Cancers (PRCs) i.e., Breast (213) and Non-Hodgkin lymphoma (79) for pesticide exposure from all the cancer registry areas of North-East.

Maximum PRC cases were reported from the registry areas of Assam (Dibrugarh, Guwahati and Silchar) in the age group of 21 to 60 years. Majority of NHL cases were reported among males in the younger age group of 21 to 40 years (Fig-5) whereas the breast cancer among females were reported in the age bracket of 21 - 60 years (Fig-6).
Fig-5: Age wise distribution of various PRCs among males

Fig-6: Age wise distribution of various TRCs among females

About 81% of the breast cancer and 71% of the NHL cases were married. Occupation wise, 25% PRC patients were farm workers of which 70% worked in animal farms. Nearly 14% cases had exposure to pesticides while working as pesticide applicators (Fig-7).
Overall, working in farms especially related to the job of pesticide application was found major contributing factor for breast cancer and NHL.

(C) HAEMOGLOBINOPATHIES

Project-6: Prevalence of HbE and thalassaemia in malaria endemic zones of NE India

Investigators: Dr. S. K. Sharma, Dr. P. Dutta, Dr. P. K. Borah, Dr. R. K. Phukan
Duration: 3 Years (Feb 2008 – Jan 2011)
Funding: ICMR (EM)

North-eastern region of India is endemic for haemoglobinopathies as well as malaria. This study is investigating the prevalence of haemoglobinopathies and thalassaemia among autochthonous inhabitants of malaria endemic zones of northeast India and the possible relationship of elevated foetal haemoglobin (Hb F) in subjects with Hb E and β-thalassaemia mutation pattern. During the year blood samples from 85 persons (mean age 33.7±17 yrs) were processed for various haematological parameters from a malaria non-endemic area of Dibrugarh district inhabited by Mech Kachari population. Naked Eye Single Tube Red Cell Osmotic Fragility Test (NESTROFT) was positive in 43%, doubtful in 24.7% and negative in 31.8% subjects. Mean haemoglobin level was 11.69±1.55 g/dl (males 12.72±1.53; females 11.22±1.33). Mean haemoglobin level in subjects with (i) normal haemoglobin pattern (Hb AA) was 12.20±1.67 (ii) βE heterozygous state was 11.88±1.33 and (iii) βE homozygous state was 10.63±1.07 g/dl. MCV in subjects with normal haemoglobin (Hb AA) was higher (83.15±5.63 fl) in comparison to βE heterozygous (74.16±5.15 fl), βE homozygous (60.90±5.95fl) and HbE/β-thalassaemia (62.92±3.64 fl) subjects. Similarly, subjects with normal haemoglobin had higher MCH (29.35±3.16 pg) than the subjects with βE heterozygous (25.24±1.63pg), βE homozygous (19.95±2.33 pg) and HbE/β thalassaemia (21.13±1.41 pg).

Electrophoresis and HPLC data indicated high prevalence of βE globin gene (Gene frequency 0.465) in the study population. While normal haemoglobin was detected in 30.6%
subjects, heterozygous and homozygous state of $\beta^E$ globin gene was observed in 42.4 and 12.9% subjects respectively. HbE/$\beta$-thalassaemia carrier state was seen in 7.1% subjects (Fig-8). Raised level of HbF (5.28±0.93%) was observed in 5.9% subjects. One subject was detected with a fast moving haemoglobin band on cellulose acetate electrophoresis in alkaline pH, indicating presence of Hb J. Levels of haemoglobin A$_2$ and Hb F in subjects carrying normal haemoglobin were 2.7±0.24 and 0.47±0.17% respectively. Hb F levels in subjects carrying heterozygous, homozygous $\beta^E$-globin gene and subjects with Hb E/$\beta$-thalassaemia were 0.88 ± 0.5, 2.46 ± 0.8 and 11.03 ± 2.77% respectively.

![Fig-8: Prevalence of haemoglobin variants among the study subjects](image)

(D) TASK FORCE STUDIES

Project- 7 : Epidemiology of musculo-skeletal conditions in India

Investigators : Dr. J. Mahanta, Dr. G. K. Medhi, Dr. P. K. Borah (RMRC, Dib) ; Dr. Bela Shah, Dr. Tripti Khanna (ICMR Hqts)
Duration : 2 Years (2007- 2009)
Funding : Extramural (NTF Research scheme)

There is very little information on disease burden of musculoskeletal diseases in India. This study is a part of multicentric study being carried out in 3 different locations in India with an aim to study the magnitude and impact assessment of selected musculoskeletal disorders in adults in the community with a focus on osteoarthritis, rheumatoid arthritis and spinal disorders both in urban and rural areas in an estimated sample size of 10,000 persons (5,000 urban, 5,000 rural) in the age group of 18 years and above. In urban area, 5 blocks in Dibrugarh town; and in rural area 5 villages in Dibrugarh district were selected for the study. Preparatory activities like finalization of questionnaires, training of project staff etc. were taken up during the period. About 8,000 individuals in both areas have been screened for musculoskeletal conditions.
A multi-centric task force study was taken up to establish a data base of non-communicable diseases risk factors and their monitoring over a period of time with an aim to support evolving strategies and interventions for identified risk factors so as to reduce the burden of non-communicable diseases. In the first phase the work was initiated at Mizoram with the sample size of 5,000 households distributed in 50 Primary Sampling Units (PSU) each in urban and rural areas. The work was carried out by the Nodal Officer, IDSP Cell, Govt. of Mizoram with technical guidance & support from RMRC, Dibrugarh and RIMS, Imphal, the state survey agency. RMRC, Dibrugarh also carried out quality control of 10% PSUs in Mizoram. Results have been communicated to the National Institute of Medical Statistics, New Delhi, the National Nodal Agency for this study.
RESEARCH WORK

(ii) PARASITIC DISEASES
(A) MOSQUITO-BORNE DISEASES

(a) Malaria

Project-9: Characterization of the *P. falciparum* strains prevalent in north -eastern state, Assam

**Investigators**: Dr. J. Mahanta, Dr P. K. Mohapatra (RMRC, Dibrugarh); Dr. A.P. Dash, Dr. Vas Dev, Dr. Hema Joshi, Dr. N. Valecha, Dr. P. R. Bhattacharyya, Dr. S. Biswas, Dr. V. K. Dua, Dr. Arun Sharma (NIMR, Delhi)

**Duration**: 3½ Years (November 2005 – April 2009)

**Funding**: ICMR (EM)

This study investigated drug resistant *P. falciparum* cases, its molecular markers, correlation of clinical, parasitological and molecular data and parasite diversity in two districts *viz*. North Lakhimpur and Hailakandi of Assam. During the year, the investigations were completed in Katlichera CHC, Hailakandi district, Assam. A total of 2,356 patients with acute fever or history of fever during the preceding 24 hrs attending Katlichera CHC during June-August 2008 were screened for malaria. Slide positive rate was 16.4% and 91.7% cases were of *P. falciparum*. Fifty cases each of uncomplicated *P. falciparum* malaria cases were studied for therapeutic efficacy of chloroquine (CQ) and sulphadoxine-pyrimethamine (SDX) drugs. Forty eight cases (96.0%) in each group completed the study recording 10.4% and 85.4% adequate clinical and parasitological response after 28 days for CQ and SDX respectively (Table-5). In *in vitro* sensitivity test 95% (57/60) isolates were found resistant to chloroquine.

**Table-5: Therapeutic response of CQ and SDX in Assam**

<table>
<thead>
<tr>
<th>Drug</th>
<th>Therapeutic Response</th>
<th>North Lakhimpur</th>
<th>Hailakandi</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>N = 50</td>
<td>N= 50</td>
</tr>
<tr>
<td>Chloroquine</td>
<td>ETF</td>
<td>21 (44.7)</td>
<td>28 (58.3)</td>
</tr>
<tr>
<td></td>
<td>LCF</td>
<td>9 (19.1)</td>
<td>8 (16.7)</td>
</tr>
<tr>
<td></td>
<td>LPF</td>
<td>4 (8.5)</td>
<td>7 (14.6)</td>
</tr>
<tr>
<td></td>
<td>ACPR</td>
<td>13 (27.7)</td>
<td>5 (10.4)</td>
</tr>
<tr>
<td></td>
<td>Total failure</td>
<td>34 (72.4)</td>
<td>43 (89.6)</td>
</tr>
<tr>
<td></td>
<td>Lost to follow up</td>
<td>3 (6.0)</td>
<td>2 (4.0)</td>
</tr>
<tr>
<td>Sulphadoxine / pyrimethamine</td>
<td>ETF</td>
<td>3 (6.4)</td>
<td>2 (4.2)</td>
</tr>
<tr>
<td></td>
<td>LCF</td>
<td>3 (6.4)</td>
<td>4 (8.3)</td>
</tr>
<tr>
<td></td>
<td>LPF</td>
<td>0 (0.0)</td>
<td>1 (2.1)</td>
</tr>
<tr>
<td></td>
<td>ACPR</td>
<td>41 (87.2)</td>
<td>41 (85.4)</td>
</tr>
<tr>
<td></td>
<td>Total failure</td>
<td>6 (12.8)</td>
<td>7 (14.6)</td>
</tr>
<tr>
<td></td>
<td>Lost to follow up</td>
<td>3 (6.0)</td>
<td>2 (4.0)</td>
</tr>
</tbody>
</table>
In survival analysis no significant difference was observed in cure rate between intention to treat analysis and per-protocol analysis (Fig-9).

![Survival analysis of malaria cases in Assam](image)

**Fig-9 : Survival analysis of malaria cases in Assam**

DNA from 190 Pf isolates from North Lakhimpur and Hailakandi districts were extracted and characterized for pfmdr1, pfcr, dhs436, dhs437, dhs540, dhs581, dhfr 50, dhfr 51, dhfr 59, dhfr 16, dhfr 08 and dhfr 164 loci. All except one isolates had 76T mutation (99.5%) in pfcr gene. However, for pfmdr1-64.5%, dhs437-52.5%, dhs436-22.5%, dhs540-37.5%, dhs581-18%, dhs513-19.5%, dhfr 50-4.5%, dhfr 51-17.5%, dhfr 59-94.5%, dhfr 16-1.5%, dhfr 108-95.5% and for dhfr 164-12% mutant strains were identified (Table-6).

**Table-6: Mutation pattern of CQ and SDX resistance genes in Assam**

<table>
<thead>
<tr>
<th></th>
<th>mutant</th>
<th>%</th>
<th>wild</th>
<th>0.5</th>
<th>4</th>
<th>5</th>
<th>2.1</th>
<th>187</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pfcr</td>
<td>189</td>
<td>99.5</td>
<td>1</td>
<td></td>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>190</td>
</tr>
<tr>
<td>Pfmdrl</td>
<td>122</td>
<td>65.2</td>
<td>61</td>
<td>32.6</td>
<td>4</td>
<td>2.7</td>
<td>183</td>
<td></td>
</tr>
<tr>
<td>Dhps 437</td>
<td>102</td>
<td>55.7</td>
<td>76</td>
<td>41.5</td>
<td>5</td>
<td>2.7</td>
<td>183</td>
<td></td>
</tr>
<tr>
<td>Dhps 436</td>
<td>42</td>
<td>22.7</td>
<td>143</td>
<td>77.3</td>
<td>0</td>
<td>0</td>
<td>185</td>
<td></td>
</tr>
<tr>
<td>Dhps 540</td>
<td>72</td>
<td>40.7</td>
<td>105</td>
<td>59.3</td>
<td>0</td>
<td>0.0</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>Dhps 581</td>
<td>35</td>
<td>19.8</td>
<td>138</td>
<td>78.0</td>
<td>4</td>
<td>2.3</td>
<td>177</td>
<td></td>
</tr>
<tr>
<td>Dhps 613</td>
<td>37</td>
<td>19.7</td>
<td>143</td>
<td>76.1</td>
<td>8</td>
<td>4.3</td>
<td>188</td>
<td></td>
</tr>
<tr>
<td>Dhfr 50</td>
<td>0</td>
<td>0.0</td>
<td>181</td>
<td>100.0</td>
<td>0</td>
<td>0.0</td>
<td>181</td>
<td></td>
</tr>
<tr>
<td>Dhfr 51</td>
<td>34</td>
<td>18.6</td>
<td>149</td>
<td>81.4</td>
<td>0</td>
<td>0.0</td>
<td>183</td>
<td></td>
</tr>
<tr>
<td>Dhfr 59</td>
<td>180</td>
<td>96.8</td>
<td>6</td>
<td>3.2</td>
<td>0</td>
<td>0.0</td>
<td>186</td>
<td></td>
</tr>
<tr>
<td>Dhfr 16</td>
<td>3</td>
<td>1.7</td>
<td>176</td>
<td>98.3</td>
<td>0</td>
<td>0.0</td>
<td>179</td>
<td></td>
</tr>
<tr>
<td>Dhfr 164</td>
<td>23</td>
<td>12.3</td>
<td>162</td>
<td>86.6</td>
<td>2</td>
<td>1.1</td>
<td>187</td>
<td></td>
</tr>
</tbody>
</table>
In 51 isolates (26.8%) simultaneous mutations in dhps 437 and dhps 540 loci and in 24 isolates (17.9%) in dhfr 51 and dhfr 59 loci were found. However, simultaneous mutation in dhps and dhfr genes together was not detected.

**Project-10: Impact of malaria on pregnant women and pregnancy outcome**

Investigators : Dr. A.M. Khan, Dr. P. K. Mohapatra, Dr. P. Dutta, Dr. J. Mahanta  
Duration : 3 Years (March 2006 – February 2009)  
Funding : ICMR (EM)

This study investigated the effect of malaria, specially falciparum malaria, at different periods of exposure on pregnant women and pregnancy outcome. In this study, of the 1,223 pregnant women enrolled at 4 different sites, 73 developed malaria (62 P. falciparum, 11 P. vivax) during their pregnancy (infection rate 5.9%). Altogether 67 malaria positive pregnant women (60 Pf, 7 Pv) were followed up till delivery. Among these, malaria infection was detected in 16 subjects during the 1st trimester, in 38 subjects during the 2nd trimester and in 13 subjects during the 3rd trimester. Normal delivery took place in only 36 (53.4%) malaria positive pregnant women. Normal pregnancy outcome was higher in women who contracted malaria during the 1st trimester than those who contracted malaria during their 2nd and 3rd trimester of their pregnancy. Stillbirths were more common in those who developed malaria in the 2nd and 3rd trimester as compared to the 1st trimester. Abnormalities were significantly higher among the primigravidae malaria positive women than those were in second or multi gravida.

The differences in the pregnancy outcome in malaria positive and malaria negative groups were significant. The outcome of deliveries of 1,076 malaria negative participants were- 891 (82.8 %) normal, 133 (12.7 %) low weight baby, 24 (2.2%) stillbirth, 13 (1.2%) miscarriage, 10 (0.93%) abortion and 5 (0.46%) premature deliveries. The average weight of the babies among malaria negative group (n=988) was 2.86 kg as compared to 2.46 kg among P. falciparum malaria positives (n=43) or 2.85 kg among P. vivax positive women.

**Project-11 : Sibling species profiling of Anopheles dirus complex, the forest malaria vector, in North-east India**

Investigators : Dr. Anil Prakash, Dr. D.R. Bhattacharyya, Dr. P. K. Mohapatra  
Duration : 3 1/2 Years (January 2006 – June 2009)  
Funding : ICMR (EM)

The study to identify the member species of Anopheles dirus complex (comprising of at least 7 species) in the north-eastern region using molecular tools was continued and during the year surveys were taken up in Nagaland state. With this, 6 north-eastern states i.e. Arunachal Pradesh, Assam, Meghalaya, Mizoram, Nagaland and Tripura were covered involving altogether, 30 populations of An. dirus complex. A total of 261 specimens (Assam-76, Arunachal Pradesh-45, Meghalaya-08, Mizoram-58, Nagaland 59 and Tripura-15) were identified as An. baimaii (= species D) using ITS2 r-DNA based Allele specific Polymerase Chain Reaction method. Sequencing of ITS2 region of r DNA gene in 55 specimens revealed
no intra-specific variation and sequences were found identical to that of *An. dirus* species D from Myanmar, Thailand and Bangladesh (Fig-10). Cytochrome Oxidase sub unit II (CO II) gene of mitochondrial DNA from 55 specimens was sequenced. Analysis of 617 bp of aligned CO II sequences resulted in altogether 12 haplotypes (Assam-1, Arunachal Pradesh-3, Meghalaya-4, Mizoram-4, Nagaland-1, Tripura-4). A total of 25 segregating sites (4.1%) were observed with 95.6% transitions.

**Fig-10**: NJ Phylogeny tree of rDNA-ITS2 of *An. dirus* complex mosquitoes from NE India

**Project-12**: Morphological variation and molecular characterization of *An. minimus* species complex in Assam and Arunachal Pradesh

**Investigators**: Dr. P. Dutta, Dr. Anil Prakash, Dr. D. R. Bhattacharyya, Dr. S. A. Khan  
**Duration**: 3 Years (Sept 2008 – Aug 2011)  
**Funding**: ICMR (EM)

This study was initiated with the objective to characterize the member species of *An. minimus* complex, their distribution pattern and vectorial importance in relation to ecological situations in the two north-eastern states. Mosquitoes were collected form 6 spots (foothill, plain and forest areas) in Tezpur, Kamrup, Golaghat and Dibrugarh districts (Assam) and Khonsa (Arunachal Pradesh). *An. minimus* s.l. and other members of the Minimus gp. were identified morphologically in the field and stored in silica gel individually in beam capsule for molecular identification. Genomic DNA of individual mosquitoes was extracted by Phenol Chloroform method and r-DNA ITS2 based allele specific PCR method was used to identify the member species of *An. minimus* complex and other species of the group. Species A of the *An. minimus* complex has so far been identified in Assam.
An. philippinensis and An. nivipes are two very closely related, difficult to separate from each other with certainty on adult morphological characters, mosquito species within An. annularis group and considered as potential malaria vectors in NE India. The exact distribution of these two species and identity of the species actually involved in malaria transmission in the north-eastern region is not clear and being investigated in this study.

The r-DNA based allele specific PCR method was employed to distinguish between An. philippinensis and An. nivipes. During the year mosquitoes were collected from the state of Nagaland. Of the 104 individuals of An. philippinensis/ nivipes group a product of 250 bp was amplified in 100 specimens distinguishing them as An. nivipes. Only 4 specimens were identified as (amplification product 220 bp) An. philippinensis (Fig-11). Among the 100 molecular confirmed individuals of An. nivipes, 9 showed morphological wing characters of An. philippinensis (PSD on vein 1 same length as on costa) showing only 91% concordance between morphological and molecular identification of this species. On the other hand, of the 4 molecular confirmed individuals of An. philippinensis, the wing character of 1 specimen resembled to that of An. nivipes (75% concordance).

A total of 11 pools, 10 of An. nivipes and 1 of An. philippinensis (head and thoraces of maximum 10 specimens in 1 pool) were processed for detection of human malaria parasite infection using 18ssr-DNA based nested PCR method. One pool of An. nivipes was found
positive for *Plasmodium falciparum* infection indicating the role of *An. nivipes* mosquitoes in malaria transmission in Nagaland.

**(b) Japanese encephalitis**

Project-14: Epidemiology and immune response against Japanese encephalitis virus strains at molecular level in North Eastern Region of India

*Investigators* : Dr. S. A. Khan, Dr. P. Dutta (RMRC, Dibrugarh) ; Dr. M. M. Gore, Dr. V. P. Bondre (NIV, Pune)

*Duration* : 3 1/2 Years (April 2006 – September 2009)

*Funding* : ICMR (EM)

This study in collaboration with National Institute of Virology, Pune is investigating the molecular epidemiology of circulating JE virus and analyzing the anti-JE virus antibody response in clinical and sub clinical JE infections at peptide level in north-east India. During the year, viral RNA isolated from the 300 CSF samples was processed for JE virus infection through RT-PCR followed by semi-nested PCR. About 14% CSF’s were positive for JE virus specific PCR. Phylogenetic analysis indicated genetic similarities with most of the circulating Indian strains. However, four JE sequences were genetically similar to genotype 1 strains. ELISA positive mosquito pools were processed for virus isolation in infant mice. Three mouse brain passage-1 suspensions were amplified and sequenced. The phylogenetic analysis based on 400 bp sequence placed these isolates closure to GP78 sequence. A total of 115 of 163 pig sera and 112 of 155 goat sera collected from in and around Dibrugarh district were found positive for neutralizing antibody for JE.

**(c) West Nile**

Project-15: Prevalence of West Nile virus activity in Assam : Vector incrimination and epidemiology

*Investigators* : Dr. S. A. Khan, Dr. P. Dutta, Dr. A. M. Khan (RMRC, Dibrugarh) ; Dr. D. K. Patgiri (AMC&H, Dibrugarh); Dr. M. M. Gore , Dr. V. P. Bondre (NIV, Pune)

*Duration* : 3 Years (April 2006 – March 2009)

*Funding* : ICMR (EM)

This study investigated the prevalence of West Nile (WN) virus activity in Assam and its mosquito vector(s). A total of 1,002 sera samples collected from healthy school children from the WN reporting areas were subjected to neutralization test using 733913 strain of JE and G22886 strain of WN in BHK cells by CPE method. Of these, 77 samples (7.7%) possessed neutralizing antibodies against WN virus, 201 (20.1%) samples had antibodies against JE virus, 359 (35.8%) samples were positive for both JE and WN. Blood samples were collected from pigs (n=607) and goats (n=713) in Dibrugarh district of which 2.1% and
1.9% respectively possessed neutralizing antibodies against WN virus, 3.9% and 4.1% respectively had neutralizing antibodies against JE whereas 8.6% and 7.9% respectively had mixed JE and WN antibodies. WN virus isolation was confirmed in 2 samples (positive for JE/WN mixed or WN virus) inoculated into infant mice. Mosquitoes belonging to 18 species under 5 genera were captured in dusk collections from 7 WN reporting areas of Upper Assam for virus isolation and vector incrimination.

(d) Dengue / Chikungunya

**Project-16: A study on prevalence of Dengue and Chikunguniya virus activity in the NE Region of India**

Investigators : Dr. P. Dutta, Dr. S. A. Khan, Dr. D. Biswas, Dr. A. M. Khan  
Duration : 2 Years (Sept 2007 – Aug 2009)  
Funding : ICMR (EM)

This study is investigating the prevalence and distribution pattern of Dengue/Chikungunya vectors along with determination of virus activity in mosquitoes and human subjects in Assam state. A total of 261 acute phase clotted blood samples were collected from hospitalized patients clinically suspected of having acute dengue infection. Of these, 53 (20.3%) samples were found positive in Haemagglutination Inhibition (HI) or MAC ELISA test. The positive serum specimens were further confirmed by Viral Neutralization Test (VNT) for the presence of antibodies to dengue antigens (Serotype 2). Dengue virus infection was found for the first time in several districts of Assam viz. Dhemaji, Dibrugarh, Jorhat, Sivasagar, Tinsukia, Lakhimpur and Sonitpur. The majority of dengue seropositive cases were adults (54.8%) and males (67.9%) (Fig 12). Blood samples were also collected randomly from sixty school children (up to the age of 17 years) in Dibrugarh and Sonitpur districts of which 12 (20%) had inapparent infection with dengue virus. Of the 94 sera subjected to MAC ELISA test against Chikungunya antigen, two females, aged 11 and 27 years, one each from Darrang and Lakhimpur district, were found positive. This is the first report of Chikungunya virus activity from any north-eastern state. In Assam, both the
potential vectors of dengue were recorded from different districts with container index ranging from 50.0–62.4 for \textit{Ae. aegypti} and 22.5–33.6 for \textit{Ae. albopictus}.

(B) TREMATODE / CESTODE INFECTIONS

\textbf{Project-17: Molecular characterization and infrapopulation differentiation of \textit{Paragonimus} lung flukes in north eastern region of India lung flukes}

\textbf{Investigators:} Dr. K. Narain, Dr. K. Rekha Devi, Dr. J. Mahanta
\textbf{Duration} : 4 Years (April 2005 – March 2009)
\textbf{Funding} : ICMR (EM)

Different species of \textit{Paragonimus}, the paragonimiasis causing lung fluke, prevalent in NE region and their intraspecific genetic diversity were characterized in this study. Involvement of \textit{Paragonimus heterotremus} in causing human pulmonary paragonimiasis in Arunachal Pradesh was established. Molecular characterization of \textit{P. westermani} from Meghalaya and Arunachal Pradesh revealed that it is related to \textit{P. westermani} group of species but from a distinct lineage. RAPD profile of individual lung flukes revealed significant genetic differentiation within and between populations of lung flukes from Arunachal Pradesh and Meghalaya.

During the year, partial sequences of mitochondrial DNA cytochrome oxidase subunit 1 (CO1) of 29 individual adult \textit{P. westermani}-like lung flukes from Arunachal Pradesh and Meghalaya were determined. Phylogenetic analysis using distance and maximum likelihood methods revealed 6 haplotypes. \textit{P. westermani} samples from Arunachal Pradesh and Meghalaya were genetically differentiated from each other. Inclusion of \textit{P. westermani} samples from other countries such as Japan, Korea, China, Malaysia, Philippines, Thailand and Sri Lanka in the phylogenetic analysis clearly revealed that Indian \textit{P. westermani} constitutes a distinct lineage and perhaps represents a different species closely related to \textit{P. westermani} / \textit{P. siamensis} group of species.

Development of \textit{Paragonimus westermani} lung flukes of Indian origin in experimental Wistar rats was studied by experimental infection. A total of 557 flukes were recovered from 20 rats (recovery rate 55.7\%). Majorit of these flukes were recovered from the lungs (53.7\%) followed by pleural cavity (27.3\%), skeletal muscles (9.0\%), peritoneal cavity (8.6\%) and liver (1.4\%). Eighteen days post infection, overall worm recovery rate was 70\% and majority of flukes were recovered from pleural cavity (41.4\%). Very few worms were recovered from skeletal muscles (2.0\%) and liver parenchyma (1.3\%). There was significant reduction in worm recovery rate 77 days post infection (27\%) and two rats out of 4 rats died due to paragonimiasis before they were sacrificed. The worm recovery rate from different sites during the course of infection is given in Figure-13.

Chest radiography (n= 68; 25 males and 43 females) and computed tomography (CT) scan (n= 48; 18 males and 30 females) were carried out for \textit{P. heterotremus} egg-positive patients from Arunachal Pradesh. On radiography, 61 patients (89.7\%) had pulmonary lesions and only 4 patients (5.9\%) had pleural lesions. Multiple lesions were more usual (55.9\%) compared with single lesions (33.8\%). Pulmonary lesions included consolidations (75\%), cavitary lesions (14.7\%), nodular lesions (4.4\%), mediastinal adenopathy (11.8\%), ground-glass opacity (4.4\%), fibrotic infiltrates (4.4\%) and bronchiectasis (4.4\%). Pleural
thickening was present in 4.4% of cases. Pleural effusion was evident in one case. Chest radiography findings were normal in seven patients (10.3%) yielding eggs in the sputum. CT

Fig-13: *Paragonimus westermani* worm recovery rate from different sites in wistar rats
revealed that cavitary lesions (66.7%) were the most predominant feature in *P. heterotremus*-infected subjects; 34.5% of cavitary lesions were solitary and thin walled (Fig-14). Multiple cystic lesions were also noted (Fig-15). Other lesions revealed by CT were consolidations (60.4%), nodular lesions (22.9%), ground-glass opacity (22.9%), bronchiecstasis (14.6%) and fibrotic infiltrates (12.5%). Pleural thickening was present in two cases (4.2%) and unilateral pleural effusion was seen in three cases (6.3%). CT findings were often multilesional (91.7% of cases), with single lesions being present less often (6.3%). Only one case had apparently normal CT findings.

**Fig-14:** CT scan of the thorax of a *P. heterotremus*-infected case showing a thin-walled cavitating lesion in the lateral basal segment of the right lower lobe

**Fig-15:** CT scan of the thorax of a *P. heterotremus*-infected case showing multiple cystic lesions with patchy opacity and satellite nodules in the left upper lobe. Note mild pleural thickening on the left side

**Project-18: Prevalence and molecular diagnosis of human pulmonary paragonimiasis in Northeastern region of India**

**Investigators:** Dr. K. Narain, Dr. J. Mahanta, Dr. K. Rekha Devi  
**Duration:** 3 Years (2007 – 2010)  
**Funding:** ICMR (EM)

This study is determining the disease burden due to paragonimiasis and studying the etiological agent of human pulmonary paragonimiasis using molecular methods in NE India. During the year, a total of 2,644 blood samples, 1476 stool samples and 686 sputum samples were collected from the hospitalized patients in Tezpur, Karbi Anglong and Dibrugarh districts of Assam, West Garo Hills district of Meghalaya and in community based surveys. Of these, 12 patients from Assam and 1 from Meghalaya were ELISA positive for paragonimiasis. A new focus of human paragonimiasis was detected for the first time in Assam. An ELISA positive patient from Assam presenting with chronic cough and haemoptysis and also expectorating *Paragonimus* eggs in sputum and stool, showed patchy consolidation in the posterior, superior lingular and inferior lingular segment of left upper lobe with cavitation in the posterior segment in the findings of computed tomography (CT) scan of thorax (Fig-16). During clinical examination, 17 of 992 patients from Assam were found having haemoptysis and 2 of them were ELISA positive for paragonimiasis (11.7%, n
A total of 37 patients had chronic cough, of which 2 were ELISA positive (5.4%, n =37) and 2 were AFB positive (5.4%, n =37).

Crabs were collected from the study areas and examined for infection with metacercariae of *Paragonimus* species. *P. westermani* like metacercariae were found for the first time in the state of Assam (Fig-17). Crabs were also collected from the state of Meghalaya. The metacercariae were isolated from the infected crabs and developed to adult worms in experimental Wistar rats. The rats were sacrificed after 2 to 6 months post infection. Both the strains of *P. westermani* developed to adult stage in the animal models.

Prevalence of fish borne trematode infection by molecular methods in the two northeast Indian states of Assam and Sikkim and their role in chronic hepatobiliary diseases through serodiagnostic approach is being studied in this study. A total of 475 fish samples
(359 from Assam and 116 from Sikkim) belonging to 34 species (29 from Assam and 5 from Sikkim) were collected from different water bodies like rivers, lakes, ponds and streams of Assam (Dibrugarh, Tinsukia, Jorhat and Nagaon districts) and east district of Sikkim (Table-7). Microscopic observation and pepsin digestion technique were used for isolation and identification of trematode metacercariae from scales, fins, muscles, gills and viscera of fish samples. A total of 132 fishes belonging to 21 species from Assam were found infected with different types of trematode metacercariae like *Haplorchis* spp and *Stergid* spp. Fishes examined from Sikkim showed no evidence of trematode metacercariae. Genomic DNA was extracted from individual trematode metacercariae by using conventional phenol-chloroform

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<td>Assam</td>
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<tr>
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<td><em>Neolissocheilus hexagonolepsis</em></td>
<td>Katley</td>
<td>Sikkim</td>
</tr>
</tbody>
</table>

**Table-7: Various fish species collected from Assam and Sikkim**
and chelex extraction method. The extracted DNA from metacercariae would be further sequenced by amplifying ITS2 region of ribosomal DNA gene.

For detection of human infection both hospital and community based surveys were carried out in the two states. A total of 1,826 blood samples from Assam (1,820 from community and 6 from hospitalized patients) and 116 blood samples (29 from community and 87 from hospitalized patients) from Sikkim were collected for serodiagnosis of trematode infection. In addition, a total of 1,010 stool samples from Assam and 60 stool samples (41 from hospitalized patients and 19 from community) from Sikkim were collected and examined for parasite eggs. Stool examination from Assam revealed infection due to *Ascaris lumbricoides* in 295 (29.2%), *Trichuris trichiura* in 192 (19%), *Hookworm* in 214 (21.2%), *Strongyloides* in 5 (0.5%), *Paragonimus* spp in 1 (0.01%), *Taenia* spp in 40 (3.96%), *Entamoeba histolytica* in 61 (6.04%), *Entamoeba coli* in 51 (5.04%), *Giardia lamblia* in 7 (0.7%) and *Trichostrongyloides* in 1 (0.01%) patients. Stool examination from Sikkim state revealed *Hookworm* in 6 (10%), *Entamoeba histolytica* in 6 (10%), *Entamoeba coli* in 1 (1.6%) and *Giardia lamblia* in 2 (3.33%) cases. However, no eggs of trematodes causing infection in man via eating food fishes were seen in the stool examination of both the states.

**Project-20: Morphological, molecular and immunological studies on paddy field dermatitis caused by *Schistosoma spindale* in paddy field workers of Assam**

**Investigators:** Dr. K. Rekha Devi, Dr. J. Mahanta, Dr. K. Narain  
**Duration**: 2 Years (2007 – 2009)  
**Funding**: ICMR (EM)

Cercarial dermatitis, mainly associated with paddy cultivation, is an occupational health problem in most Asian countries including India. During the year, outbreaks of cercarial dermatitis were reported among the farmers of Borjan (Tinsukia), Khowang (Dibrugarh) and Bahona (Jorhat) areas of Assam. Over 13,000 snails belonging to six different species viz., *Indoplanorbis exustus*, *Thiara tuberculata*, *Brotia costula*, *Bellamya bengalensis*, *Pila globusa*, and *Lymnea acuminate* from paddy fields in Dibrugarh, Jorhat, Tinsukia, Sonitpur, Nalbari, Morigaon and Kamrup districts of Assam were collected. The cercariae recovered from the infected snails were developed into adult worms (Fig-18) in experimental Swiss Albino mice. Antigen from the adult schistosome worms will be prepared to develop an ELISA kit for detecting schistosome antibodies.

![Fig-18: Adult *Schistosoma spindale* male worm recovered from experimental Swiss Albino mice](image-url)
A total of 1,820 blood samples were collected during community based surveys in Sonitpur and Karbi Anglong districts of Assam to find cases of cercarial dermatitis or schistosomiasis.

Project - 21: Neurocysticercosis in a referral hospital in upper Assam: A serodiagnostic and radiological study

Investigators: Dr. K. Rekha Devi, Dr. K. Narain, Dr. J. Mahanta (RMRC, Dibrugarh); Dr. N. Upadhyaya (AMC & H, Dibrugarh)
Duration: 2 Years (2007 – 2009)
Funding: ICMR (EM)

Neurocysticercosis (NCC), an infection of the central nervous system, is caused by the metacestodes of Taenia solium and affects millions of people living in developing countries. In most hospitals in India, diagnosis of neurocysticercosis is based on clinical and radiological criteria. This study aimed to develop a diagnostic kit based on indigenous strain of T. solium metacestodes having improved sensitivity to detect NCC cases with solitary as well as multiple cystic lesions.

The study was carried out among suspected NCC patients attending Assam Medical College hospital in Dibrugarh. ELISA and EITB (Eletro-Immuno Transfer Blot) along with radiological and clinical findings were used to detect cases of neurocysticercosis. During the year, sera from 164 NCC suspected cases were collected. T. solium metacestodes were collected from locally available infected pigs in Assam. Cystic fluid of the cysticercus was processed for preparation of antigen. CT brain of 138 NCC suspects were obtained to detect type of NCC lesion (solitary or multiple cystic and active, calcified or mixed). ELISA and Western blotting for detection of IgG antibodies against human cysticercosis was developed using cystic fluid of locally available strains of T. solium metacestodes as source of antigen.

Fig-19: CT Scan of Brain Showing Features of Neurocysticercosis
CT brain revealed cystic lesions in 73.2% (n =138) NCC suspects. Majority of the lesion were solitary cystic in nature (67.3%, n =101). Only 33.7% (n =101) cases had multiple cystic lesions (Fig-19). Ten serum samples collected from healthy individuals without any symptoms of NCC/ Epilepsy were used as negative control. ELISA was performed on 174 samples whereas western blotting was carried out for 80 samples. All cases having multiple cystic lesions (active & mixed) were detected by ELISA (IgG) and western blotting (n =25 for ELISA, n =12 for western blotting) using cystic fluid (Fig-20).

![Fig-20: Western blot results of a patient having neurocysticercosis](image)

Only 25% (n=8) cases having multiple (calcified) lesions tested positive by ELISA whereas with western blotting, 57.1% (n = 7) cases tested positive. Among NCC suspects having active solitary lesion only 40% (n =45) were positive by ELISA, however, 84% (n =25%) of these cases could be detected by western blotting (Fig-23). ELISA was able to detect 30.4% (n =23) cases among NCC suspects having solitary calcified lesion, whereas western blotting tested positive in 40% (n =10) cases. The sensitivity, specificity, positive and negative predictive values of the indigenously developed ELISA and western blotting for NCC cases by multiple and solitary lesion is being evaluated.

![Fig-23: Schematic representation of western blot findings of neurocysticercosis cases](image)
(iii) BACTERIAL AND OTHER VIRAL DISEASES
(A) INFLUENZA VIRUS

Project-22: Multi-site monitoring of human influenza virus in India

Investigators: Dr. J. Mahanta, Dr. D. Biswas
Duration: 5 Years (September 2004 – September 2009)
Funding: Extramural (WHO-CDC-ICMR)

An Influenza Surveillance Centre, a part of the overall network in India, has been functioning in Dibrugarh since 2004. During the year, 691 nasal/throat swab samples (males 344, females 347) were collected from 3 PHCs and a referral hospital in Dibrugarh. Of these 670 samples were inoculated into the MDCK cell lines and the harvested samples were subjected to HA test. The HA positive samples were further tested through HAI test. A total of 28 influenza viruses have been isolated since the inception of the study (Table-8).

Table-8: Year and age group wise isolations of human influenza viruses

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<th>6-12 yrs</th>
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<td>-</td>
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*Submitted to NIV, Pune for confirmation

The meteorological data (Fig-24) was recorded daily to correlate it with isolation of virus.

![Fig-24](image-url)
(B) HSV-2 VIRUS

Project- 23 : To assess the sero-prevalence of HSV-2 in pregnant women in north-eastern states

<table>
<thead>
<tr>
<th>Investigators</th>
<th>Dr. D. Biswas, Dr. J. Mahanta (RMRC, Dib); Dr. L. Saikia (AMC, Dib); Dr. A.K. Brogen (RIMS, Manipur); Dr. E. Zomawia (Civil Hospital, Aizawl); Dr. L. Jampa (DHS, Arunachal); DR. K. Walia (ICMR, Delhi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>2(1/2) Years (Jan 2007- July 2009)</td>
</tr>
<tr>
<td>Funding</td>
<td>ICMR (EM)</td>
</tr>
</tbody>
</table>

Sero-prevalence of HSV-2 in pregnant women was studied in the 5 north-eastern states. During the year, 709 serum samples as well as vaginal swabs on filter paper were collected from the pregnant women attending antenatal clinics. Of these, 209 samples were tested for HSV-2 IgG (Focus Diagnostic EIA kit) and all the 709 samples were tested for Syphilis (RPR) and PCR for HSV-2. A total of 19 (9.1\%) samples showed positive reaction for IgG HSV-2, 1 (0.14\%) for RPR test and 43 (6.1\%) were positive for HSV-2 PCR (Table-9). Further laboratory tests and data analysis is in progress.

Table-9: HSV2 and syphilis (RPR) seroprevalence in the five NE states

<table>
<thead>
<tr>
<th>State</th>
<th>Samples collected</th>
<th>IgG HSV-2</th>
<th>Syphilis (RPR)</th>
<th>PCR HSV-2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Tested</td>
<td>Positive</td>
<td>Tested</td>
</tr>
<tr>
<td>Assam</td>
<td>34</td>
<td>15</td>
<td>0</td>
<td>34</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>135</td>
<td>46</td>
<td>3 (6.5%)</td>
<td>135</td>
</tr>
<tr>
<td>Manipur</td>
<td>104</td>
<td>53</td>
<td>3 (5.6%)</td>
<td>104</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>339</td>
<td>60</td>
<td>9 (15.0%)</td>
<td>339</td>
</tr>
<tr>
<td>Mizoram</td>
<td>97</td>
<td>35</td>
<td>4 (11.4%)</td>
<td>97</td>
</tr>
<tr>
<td>Total</td>
<td>709</td>
<td>209</td>
<td>19 (9.1%)</td>
<td>709</td>
</tr>
</tbody>
</table>

(C) MEASLES VIRUS

Project- 24 : Molecular epidemiology of measles in north-east region of India

<table>
<thead>
<tr>
<th>Investigators</th>
<th>Dr. J. Mahanta, Dr. D. Biswas (RMRC, Dib); Dr. N. S. Wairagkar (NIV, Pune)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration</td>
<td>3 Years (Dec 2007- Nov 2010)</td>
</tr>
<tr>
<td>Funding</td>
<td>ICMR (EM)</td>
</tr>
</tbody>
</table>

Molecular epidemiology of measles in the north-east region of India is being studied by establishing sentinel surveillance network of paediatricians and medical institutions. Investigations of representative outbreaks and sporadic cases of measles, virus isolations and establishment of sequence database of measles virus are other activities in this project.
During the year, eight measles cases were investigated in Dibrugarh district and all were found positive for measles IgM antibodies. During the year, a total of 69 samples from suspected measles cases were collected in the 5 north-eastern states through the established network of doctors and paediatricians for measles investigation. Of these, 17 were found positive in IgM ELISA for measles (Table-10). Investigation of an outbreak of measles in Sikkim state yielded 9 IgM ELISA positives of which 7 were genotyped as D4 (6) and D8 (1). The D4 genotype from northeast region depicted close homology with D4 of Montreal Canada (isolated in 1989) while the D8 genotype showed close homology with D8 of Manchester, UK based on N & H genes of measles virus.

Table-10: Seroprevalence of measles in north-eastern states

<table>
<thead>
<tr>
<th>State</th>
<th>Serum collected</th>
<th>IgM ELISA done</th>
<th>IgM Positive</th>
<th>Genotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assam</td>
<td>20</td>
<td>18</td>
<td>1 (5.5%)</td>
<td>Under process</td>
</tr>
<tr>
<td>Arunachal Pradesh</td>
<td>15</td>
<td>15</td>
<td>5 (33.3%)</td>
<td>Under process</td>
</tr>
<tr>
<td>Sikkim</td>
<td>22</td>
<td>22</td>
<td>9 (40.9%)</td>
<td>D4 (6), D8 (1)</td>
</tr>
<tr>
<td>Meghalaya</td>
<td>02</td>
<td>02</td>
<td>2 (100%)</td>
<td>Under process</td>
</tr>
<tr>
<td>Nagaland</td>
<td>10</td>
<td>10</td>
<td>0</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>69</strong></td>
<td><strong>67</strong></td>
<td><strong>17 (25.4%)</strong></td>
<td><strong>D4(6), D8(1)</strong></td>
</tr>
</tbody>
</table>

(D) HIV VIRUS

Project- 25: Molecular charactereristics of HIV virus in India (RO3)

Investigators: Dr. J. Mahanta, Dr. G. K. Medhi (RMRC, Dib); Dr. R.S. Paranjape (NARI, Pune)
Duration: 2 Years (Dec 2008 – Nov 2010)
Funding: Extramural (NIH-RO3)

This study is a part of multicentric effort to investigate the detailed molecular characteristics of circulating HIV viruses in diverse risk groups across geographical regions of India. HIV epidemic in NE region is predominantly transmitted through injecting drug use (IDU), hence, the study is aiming to identify HIV infections among Intra-venous drug users (IVDU) from north-east Indian states and to undertake detailed molecular epidemiologic studies to characterize the viruses circulating in these areas so as to understand the complexity and distribution of subtypes and recombinant strains. The targeted sample size is 1,500 cases which is likely to provide 350 positive samples for the analysis. During the year, the preparations for data collection in Manipur was done. The questionnaire development, recruitment and training was completed. A stakeholder meeting was conducted for getting support from the stakeholders of the project.
Project-26: Mapping, size estimation and Integrated Bio-Behavioural Assessment (IBBA) of HIV/AIDS in the high prevalence settings of India

Investigators: Dr. J. Mahanta, Dr. G. K. Medhi (RMRC, Dib); NARI, Pune; Family Health International; RIMS, Imphal; Kripa Foundation, Kohima

Duration: 5 Years (2005-2010)
Funding: Extramural (BMGF)

This study under the Avahan India AIDS Initiative measured the major outcomes and impact of the interventions project in Manipur and Nagaland states by collecting behavioural and biological trend data in Injecting Drug Users (IDUs) and Female Sex Workers (FSWs). The first round of survey was conducted in 2006 in two districts each of Manipur (Bishenpur and Churachandpur) and Nagaland (Wokha and Phek). Blood serum from 426 FSWs (from Nagaland) and dry blood spot (DBS) from 1,699 IDUs (from Nagaland and Manipur both) were collected. The sero-incidence of HIV infection was estimated using BED-CEIA test to identify early HIV infection among those who were found to be reactive to anti-HIV antibody tests. The assay was done in HIV subtype C prevalent in India. Highest incidence of HIV infection was observed among FSW group. Among the IDUs, incidence rate was the highest in Bishnupur district, followed by Churachandpur.
RESEARCH WORK

(iv) MISCELLANEOUS STUDIES
(A) Screening of synthetic/plant products for antimalarial activity

Investigators: Dr. Anil Prakash, Dr. D. R. Bhattacharyya, Dr. P. K. Mohapatra

Following the signing of an MOU between RMRC, Dibrugarh and the Department of Pharmaceutical Sciences, Dibrugarh University (DU) for the screening of antimosquito/antimalarial activity of synthetic compounds/botanical products, a total of 28 compounds submitted by DU were screened for in vitro antimalarial activity against *Plasmodium falciparum* and 1 compound for mosquito repellent activity. Another MOU for antimalarial screening was signed between NEIST, Jorhat and RMRC, Dibrugarh.

(B) Investigation of diarrhoeal disease outbreak in a tea garden of Sibsagar district, Assam

Investigators: Dr. B.J. Borkakoty, Dr. D. Biswas

An outbreak of diarrhoeal disease was investigated in Hingrijan tea garden, Sibsagar district, Assam having a population around 5,500. Between August 24 and September 9, 2008, a total of 303 cases of acute diarrhoea and dehydration in all age groups were reported with 6 deaths in this garden. Majority of the cases were reported from the Worker’s colony situated along a stream. The living conditions in this colony were unhygienic, drainage system poor and a couple of hand-pumps were the only source of drinking water. Most of the households did not have latrine and the practice of open field defecation was rampant. Majority of the existing latrines in the area did not have proper cover over the septic tanks. Three water samples from the hand pumps and 32 rectal swabs from the hospitalized acute diarrhoea cases were collected. *Vibrio cholerae* 01 El Tor, inaba from 10 samples was isolated. Sensitivity pattern showed that except trimethoprim, organisms were sensitive to ampicillin, ciprofloxacin, tetracycline, amikacin, amoxyclav, ceftriaxone and azithromycin. All the 3 collected water samples were found to have faecal contamination.

(C) Avian Influenza outbreak investigation

Investigators: Dr. D. Biswas, Dr. B. J. Borkakoty

Centre assisted the Govt of India in investigating and containing the Bird Flu outbreak in Assam during Nov / Dec, 2008 and Jan, 2009. As the members of the Rapid Response Team, scientists of the Centre visited different affected localities in Kamrup and Baksa districts to investigate health status of the poultry handlers, their contacts and reports of poultry death, if any, etc. Localities reporting confirmed poultry deaths due to H5N1 virus were also visited. Public awareness camps were held and trainings of health staff were organized. During the outbreak, 22 avian samples were collected of which 2 poultry cloacal swabs were found positive for H5N1 in Kamrup district. (Table-11).
Table-11 : Avian samples collected and examined for avian influenza during the bird flu outbreak in Assam

<table>
<thead>
<tr>
<th>Sl no</th>
<th>No. samples</th>
<th>Collection date</th>
<th>Sample type</th>
<th>Place</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>7</td>
<td>05.12.08</td>
<td>Bird dropping</td>
<td>Deepor Beel, Kamrup</td>
<td>Neg</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>05.12.08</td>
<td>Bird dropping</td>
<td>Gandhmow water body, Kamrup</td>
<td>Neg</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>05.12.08</td>
<td>Duck cloacal swab</td>
<td>Rani patgaon, Kamrup</td>
<td>Neg</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
<td>05.12.08</td>
<td>Poultry cloacal swab</td>
<td>Rani patgaon, Kamrup</td>
<td>Pos</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
<td>18.12.08</td>
<td>Duck cloacal swab</td>
<td>Chiring gaon, Dibrugarh</td>
<td>Neg</td>
</tr>
<tr>
<td>6</td>
<td>3</td>
<td>18.12.08</td>
<td>Poultry cloacal swab</td>
<td>Chiring gaon, Dibrugarh</td>
<td>Neg</td>
</tr>
<tr>
<td>7</td>
<td>1</td>
<td>18.12.08</td>
<td>Poultry fecal sample</td>
<td>Chiring gaon, Dibrugarh</td>
<td>Neg</td>
</tr>
</tbody>
</table>

(D) Evaluation of microfilaria prevalence after Mass Drug Administration (MDA) Programme for the Elimination of Lymphatic Filariasis in Assam

Investigator : Dr. A. M. Khan

Annual mass drug administration of DEC is being undertaken in Assam by the State Health Authorities since 2004 for the elimination of lymphatic filariasis. On being requested by NVBDCP, Delhi microfilaria prevalence rates were assessed by night blood survey in sentinel as well as randomly selected sites in Dibrugarh, Sibsagar and Dhemaji districts. In Dibrugarh district, a total of 3,890 blood slides were collected from 4 sentinel and 4 random locations detecting 92 mf positive subjects (mf rate 2.4%). In Sibsagar district, a total of 3,379 blood slides were collected of which 100 (mf rate 3.0%) were found positive. In Dhemaji district, a total of 2,877 blood slides were collected from 7 sites (4 sentinel, 3 random) of which only 1 slide (mf rate 0.03%) was found positive.

(E) Follow up investigation of Kala-Azar in Assam

Investigator : Dr. A. M. Khan

During February 2008, eighteen Kala-azar positive cases through rK39 strip test were detected by the Centre in the village Chapaidang, district Kamrup Metro, Assam. Subsequently, a follow-up investigation covering few more villages within 5 km radius of Chapaidang village was taken up which resulted in detection of another 80 rK39 positive cases (56 males, 24 females). As many as 21 (26.3%) positive cases were below the age of 15
and rest (73.7%) were above 15 years of age. Two of the rK39 positive cases, which underwent bone marrow biopsy, were found positive for LD bodies. Entomological surveys revealed the presence of *Phlebotomus argentipes* sandfly. Appropriate vector control measures such as DDT spraying and distribution of insecticide treated bed nets in the affected areas along with the treatment of positive cases were suggested to the state health authorities.
INSTITUTIONAL FACILITIES
1. Malaria clinic

A view of the malaria clinic in the centre

Centre offers the facility of diagnosis and treatment of malaria through an OPD clinic. During the year, 10 persons reported in the clinic for blood examination of which 2 were found positive for malaria, 1 each for *P. falciparum* and *P. vivax*.

2. Computer facility

A view of the central computer server room

Network connectivity has been extended to all PCs in the laboratory and administrative blocks of the Centre. Few more desktop PCs and a server with up-to-date hardware configuration were procured during the year to support the proposed Bioinformatics laboratory in the centre. Videoconferencing equipments were also procured and being installed. Efforts are on to upgrade the existing VSAT facility of the centre. Regular monitoring of the LAN and VSAT activity was carried out from the server room to keep all the connected PCs virus free and to maintain the intranet and internet activities of the institute. Security updates of antivirus server and domain server, configuration of ISA server, assisting scientific and administrative staff in preparation of various reports, scientific
presentations, documents, accounts statements etc. were the other routine activities of the section.

3. Publication and Informatics section

A view of the library

Library and Information section of the Centre has got a vast collection of books, journals, databases, reports etc. on various biomedical subjects. During the year the library subscribed 47 foreign and 26 Indian journals and added 86 new books raising its total book holding to 2,076. Library continued providing reference services, on-line literature search through internet. The databases like Proquest, JCCC@ICMR, ERMED (http://nmlermed.in), the full text online IP based databases, etc. were provided to the scientists of the Centre. In addition, some of the high impact journals such as NEJM, BMJ, Lancet etc. were also accessed by the scientists from the respective web sites through ICMR E-Journal consortia. Further, activities like facilitating the publication of research papers in different journals, abstracting, photocopying of scientific articles/documents, newspaper clipping of health news were continued by the library.

4. Animal House

A view of the golden hamster colony

Animal facility of the Centre is registered with the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Chennai under registration
no 73/1999/CPCSEA. A Veterinarian of the Centre routinely monitors the health of all animals and look after the maintenance of all animals as per CPCSEA guidelines. The stock position of various laboratory animals in the animal house as on 31.03.2009 is given in Table-12. During the period under report, 2,027 mice, 82 rats, 2 rabbits, 7 guinea pigs, 5 sheep, 2 geese and 1 duck were issued to the scientists of this centre for various experiments. Further, 12.5 ml of guinea pig, 841 ml of sheep and 61.6 ml of goose blood was supplied for animal experimentation.

**Table-12: Stock position of various laboratory animals maintained in the Animal House**

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Species</th>
<th>Total stock</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Swiss albino Mice</td>
<td>1257</td>
</tr>
<tr>
<td>2</td>
<td>Wistar Rat</td>
<td>462</td>
</tr>
<tr>
<td>3</td>
<td>Syrian Hamster</td>
<td>52</td>
</tr>
<tr>
<td>4</td>
<td>Guinea pig</td>
<td>31</td>
</tr>
<tr>
<td>5</td>
<td>Rabbit</td>
<td>68</td>
</tr>
<tr>
<td>6</td>
<td>Sheep</td>
<td>13</td>
</tr>
<tr>
<td>7</td>
<td>Goose</td>
<td>02</td>
</tr>
<tr>
<td>8</td>
<td>Duck</td>
<td>01</td>
</tr>
</tbody>
</table>

5. Mosquito Insectory

![A view of the mosquito insectory](image)

Four species of mosquitoes *viz.*, *Anopheles stephensi*, *Aedes aegypti*, *Culex quinquefasciatus* and *Toxorhynchites splendens* were colonized round the year in the mosquito colony of the centre.
HUMAN RESOURCE DEVELOPMENT
(a) Trainings/Workshops/Seminars organized by the centre

(i) Workshop on Research Project and Paper Writing

In a series of workshops to mark the completion of the 25 years of the establishment of Regional Medical Research Centre, NE, Dibrugarh, a workshop on bio-medical communication titled “ICMR Workshop on Research Project and Paper Writing” was held at North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), Shillong on 4-5 April, 2008. This Workshop was attended by 34 participants comprising of young and middle level faculty and researchers from the academic and research institutions of the north-eastern states. Mr. Manas Choudhuri, Hon’ble Minister of Higher Education, Information and Public Relation, Govt. of Meghalaya graced the inaugural function as the Chief Guest. Several highly experienced faculty members from different parts of the country joined the Workshop to train the young minds in the art of formulating viable research projects having potential of attracting funding from national and international agencies and to teach the tricks of effective communication of their research findings in peer reviewed journals.

(ii) Workshop on Integrated Disease Surveillance Programme & Epidemic Preparedness

Three workshops for doctors and policy makers under the project entitled Integrated Disease Surveillance Programme & Epidemic Preparedness were held at Dibrugarh w.e.f 21-25th April, 2008 for Assam, at Agartala w.e.f. 27-29 January, 2009 for Tripura and at Gangtok w.e.f 9-13 March, 2009 for Sikkim. A total of 22 participants from Assam, 25 from Tripura and 26 from Sikkim belonging to state health services participated in these workshops and were trained for Integrated Disease Surveillance Programme following WHO IDSP modules.
(iii) International Symposium on Newer Frontiers in Biomedical Research

As a concluding event of the Silver Jubilee celebrations of the Regional Medical Research Centre, NE, Dibrugarh an International Symposium on Newer Frontiers in Biomedical Research was organized in Dibrugarh on 28-29 June, 2008. The Symposium brought together some of the highly acclaimed national and international scientists, scholars and researchers working in various fields of infectious and non-infectious diseases and provided opportunity for interpersonal interactions, exchanging the expertise, scientific deliberations and updating the knowledge among the participants. The Symposium, attended by over 200 participants, primarily covered six areas viz. Cancers, Haemoglobinopathies, Cardio-vascular diseases, Mosquito-borne diseases, Viral diseases and Trematode infections and consisted of invited guest lectures by the reputed scientists of India and abroad. In addition, young scientists were encouraged to present their research work in free oral paper and poster presentations. A total of 29 papers were presented-8 oral and 21 as posters.

Inauguration of the Symposium

Dr. Catherine Walton delivering lecture

A view of the audience

Cultural show

Glimpses of the International Symposium on Newer frontiers in Biomedical Research
(iv) Workshop on Respondent Driven Sampling Method (RDS) in IBBA

A workshop was organized by the centre during 2-3 June, 2008 at Hotel Brahmaputra, Guwahati for sharing the experience of unique sampling method adopted in the Integrated Bio-behavioural Assessment (IBBA) study undertaken in the north-eastern states and Maharashtra. The Workshop aimed to disseminate lessons learnt from three different states of Manipur, Nagaland and Maharashtra in implementing IBBA using RDS as a sampling methodology. Apart from participants from the implementing agencies and methodology experts, interested participants from different organizations wishing to learn the method joined the Workshop. The Workshop covered presentations made by various experts to find alternate ways of data analysis to overcome the limitations of RDSAT analysis. Deliberations during the Workshop culminated in the formulation of a document on RDS method which will be helpful in implementing RDS method in future.

(v) Workshop for Stakeholders in Molecular Characteristics of HIV Virus in India (RO3) Project

A workshop was held on 2nd August, 2008 at Imphal, Manipur to mobilize the support of NGOs and other organizations in implementing the NIH supported project Molecular characteristics of HIV virus in India in Manipur. The Workshop was attended by 25 participants from different NGOs, MSACS and other organizations. The presentation on the objectives of the project, methodology and likely benefits to the community was followed by discussion clarifying various doubts of the participants. All the participants agreed to provide whole hearted support for successful implementation of the project.

(vi) Trainings of Malaria Technical Supervisors

To strengthen supportive supervision and micro-monitoring for malaria prevention and control at sub district level, a new cadre of Malaria Technical Supervisor (MTS) has been created by the Govt of India in about 200 malaria endemic districts (under Global Fund supported Intensified Malaria Control Project) in 10 states viz. 7 NE states, Jharkhand, Orissa and West Bengal. The MTS is a vital link between community and the primary health care as far as malaria control is concerned and is required to supervise the grass root level implementation of the malaria programme activities. RMRC, Dibrugarh was entrusted with the responsibility of training about 100 newly appointed MTSs in the 7 north-eastern states by the National Vector Borne Disease Control Programme (NVBDCP). In this backdrop, 3 training programmes, each spanning 10 working days, and covering 28 MTSs from the states of Meghalaya, Mizoram and Nagaland (1/9/2008 to 12/9/2008), 19 MTSs from from Arunachal Pradesh and Tripura (3/11/2008 to 14/11/2008) and 32 MTSs from Assam (24/11/2008 to 5/12/2008) were organized at the Centre. During these training programmes the participants were taught basics of malaria disease, its transmission and control with special emphasis on operational aspects of malaria control. Besides lectures and practical hands-on-training, participants were exposed to actual field conditions to learn monitoring and supervision of various activities of malaria control programme at village, sub centre and PHC levels.
(vii) WHO in-country Fellowship Training Programme in Malariology

The 21-days training for Laboratory Technicians in Malariology for WHO in-country Fellows under 2008-2009 biennium was organized at Regional Medical Research Centre (RMRC), Dibrugarh during 2-27 February, 2009. A total of 6 Fellows attended this training. Though the primary emphasis of the training was on malaria, malaria diagnosis and malaria control, Fellows were also oriented to other mosquito borne diseases such as filariasis, Japanese encephalitis and dengue. The Fellows were exposed to the basics as well as modern and molecular techniques of malaria diagnosis, vector incrimination and other entomological techniques. The training programme was broadly kept under the ambit of National Vector Borne Disease Control Programme, however, orientation was given to the Fellows on modern advancements and research in the field of mosquito borne diseases. A balanced representation of theoretical and practical aspects was given in the programme enabling Fellows to learn theory as well as practice various techniques.
b) Ph.D./M.D. Programme

The Centre has been extending guidance and laboratory facilities to the students pursuing Ph.D./MD thesis work. Following students pursued their Ph.D. degree in the centre during the year:

<table>
<thead>
<tr>
<th>Name</th>
<th>Research Topic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Ranadeep Gogoi</td>
<td>A study on the red blood cell (RBC) membrane protein abnormalities with haemoglobin E (Hb E)</td>
</tr>
<tr>
<td>Ms. Rinchella Bhutia</td>
<td>Direct detection of rpo mutation in sputum smear as a marker of rifampicin resistance under DOTS in Sikkim</td>
</tr>
<tr>
<td>Ms. Karma Gurmey Dolma</td>
<td>A study on default, failure and relapse cases of pulmonary tuberculosis in adult population of Sikkim, India</td>
</tr>
<tr>
<td>Mridul Malakar</td>
<td>Dietary risk factors and genetic polymorphisms of stomach cancer in Mizoram</td>
</tr>
<tr>
<td>Triyam Bakesh</td>
<td>Studies on drug sensitivity pattern and molecular characterization of</td>
</tr>
</tbody>
</table>
Mohanty  
*Mycobacterium tuberculosis* isolates in tea garden communities of Assam

Devojit Kumar Sarma  
Molecular population genetic studies on *Anopheles dirus* (Diptera: culicidae) complex malaria vector mosquitoes in North East India

Priyanka Sankarishan  
Study on genetic risk factors of hypertension with special reference to polymorphism of ACE and eNOS in tea garden communities of Assam

Jani Borah  
Genetic heterogenicity and transmission dynamics of Japanese Encephalitis virus in endemic areas of Assam

Pritom Chowdhury  
Studies on the genotype of West Nile virus (WNV) prevailing in Assam with particular reference to envelope and premembrane glycoproteins

(c) Teaching programmes

**M.Sc. (Biotechnology)**

M.Sc. (Biotechnology) programme of Dibrugarh University continued in collaboration with the centre. All the practicals and some part of theory classes were held in the Centre. Second batch of 15 students passed out in January 2009.

**M.Sc. (Bioinformatics)**

The centre in collaboration with Dibrugarh University started M. Sc. (Bioinformatics) course. This is a four semester post graduate degree course with yearly intake of 15 students. All the practicals and some part of the theory classes were held in the Centre. First batch of 15 students passed out in January 2009.

(d) Achievements / Awards /Honours received by the scientists/staff

1. One patent application “*A Herbal Antiplasmodial Agent*” (no. 315/DEL/2008) was filed at Delhi patent office
CENTRE’S FOUNDATION DAY

Regional Medical Research Centre, NE Dibrugarh, celebrated its Foundation Day on 12th July 2008. Prof. Hira Lal Duorah, Ex Vice Chancellor, Guwahati University and a noted Physicist was the Chief Guest in this function. Prof Duorah delivered the Foundation Day Oration on Astrobiology. Mrs. Kalpana Duorah, another renowned astrophysicist, was the Guest of Honour on this occasion. Staff of centre and their family members had an unique opportunity to interact with the two prominent scientists and to have informal discussion. Foundation day oration by Prof. Duorah was followed by a simple but impressive ceremony wherein six staff members namely, Mr. R. K. Dutta, Mr. Pradip Gogoi, Mr. Horen Gogoi, Mr. Pradeep Gohain, Mr. Gopal Sharma and Mr. Teg Bahadur Pun were felicitated for completing 25 years of spotless service to the Centre. The Foundation day celebrations ended with a cultural programme by the residents of the RMRC, Campus.


**Research work abstracted**


5. G. K. Medhi, J. Mahanta. *Impact of education and income on pulmonary tuberculosis (PTB) among adult tea garden workers of Assam.* Accepted in 13th International Conference of Infectious Diseases (19-22 June, 2008) held at Kuala Lampur, Malaysia


Scientific Conferences/Meetings/Trainings/Workshops attended
Dr. J. Mahanta, Director

1. Steering Committee Meeting of NCRP (17 April, 2008) at ICMR Hqts

2. Lesson Learnt Workshop of Respondent Driven Sampling method in IBBA (2-3 June, 2008) organized by RMRC, Dibrugarh at Guwahati

3. International Symposium on Newer Frontiers in Biomedical Research (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

4. XVII International AIDS Conference (3-8 August, 2008) held in Mexico City, South America. Presented 2 posters entitled (i) Co transmission of HIV, HBV and HCV infection in female sex workers of India and (ii) Risk behaviours of injection drug users for HIV, HCV and HBV infection in Northeast India

5. Meeting of North East Project Review Committee (12 August, 2008) at ICMR Hqts, New Delhi

6. XVII International Conference on Tropical Medicine and Malaria (29 September – 3 October, 2008) held in Juju Island, Korea. Chaired the session on Emerging Parasitic Diseases and delivered the Key Note address entitled “Paragonimus and Paragonimiasis in India: Development in Diagnostics”

7. 96th ICMR Day celebrations (5 October, 2008) at ICMR Hqts., New Delhi

8. Symposium on Influenza and Bird flu (11 November, 2009) at ICMR Hqts., New Delhi

9. Meeting of Population Based Cancer Registry Programme (27-28 December, 2008) at Guwahati

10. Meeting of North East Project Review Committee (5th January, 2009) at ICMR Hqts, New Delhi

11. IBBA meeting (11 February, 2009) at Mumbai

12. Seventh meeting of the Project Advisory Committee meeting in Health Sciences (27-28 March, 2009) of the Department of S & T, Govt of India at Mumbai

Dr. P. K. Mohapatra, Scientist E

1. International Symposium on Newer Frontiers in Biomedical Research (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee
2. **WHO Dissemination Workshop of Clinical Trails Registry-India** (18 August, 2008) organized by National Institute of Medical Statistics at Kolkata

**Dr. P. Dutta, Scientist E**

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

**Dr. Anil Prakash, Scientist E**

1. Invited lecture on *Malaria: Epidemiology and Control in North-east India* in CME programme (10-4-2008) for the Tea Garden Medical Officers organized by Assam Branch of Indian Tea Association (ABITA) Zone I at Chalkhowa, Dibrugarh

2. Invited lecture on *The Second Internal Transcribed Spacer of Nuclear Ribosomal DNA Based Species profiling of Anopheles dirus and Anopheles minimus complexes in North-east India* in Multi-colloquial Brain Storming Meeting on Vector Borne Diseases: Using Innovative Control Measures” (10-11 May, 2008) organized by Centre for Research in Medical Entomology, Madurai

3. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

4. Meeting of Expert Group for Finalization of MTS Module (4-7 August, 2008) organized by National Vector Borne Disease Control Programme (NVBDCP) at Delhi

5. Meeting of North East Project Review Committee (12 August, 2008) at ICMR Hqts, New Delhi

6. WHO/TDR sponsored *Training Course on Laboratory Biosafety and Biosecurity aspects in relation to Genetically Modified Vectors (GMV) for Disease Control* (3-7 December, 2008) held at University of Bamako, Mali (West Africa)

7. Invited lecture on *Malaria Profile in North-east India* in Silver Jubilee Celebrations & Alumni Meet 2008 (28 December, 2008) organized by Department of Pharmaceutical Sciences, Dibrugarh University

**Dr. P. K. Chelleng, Scientist D**

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee
Dr. S. K. Sharma, Scientist D

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

Dr. K. Narain, Scientist D

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver JubileeXVII


Dr. A. M. Khan, Scientist D

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

2. Resource person in the *Workshop cum Training on MDA and Lymphatic Filariasis* (5 September, 2008), organized by Directorate of Health Services, Govt. of Assam at Guwahati

3. Resource person in the *Workshop cum Training on MDA and Lymphatic Filariasis* (24 September, 2008), organized by Directorate of Health Services, Govt. of Assam at Dibrugarh

4. 20th *National Congress of Parasitology* (3-4 November, 2008) organized by North Eastern Hill University, Shillong. Presented a paper entitled *Lymphatic filariasis elimination : Night blood survey and annual MDA programme*

Dr. D. Biswas, Scientist D

1. Resource person in the *Workshop on Integrated Disease Surveillance Programme & Epidemic* (21-25 April, 2008) organized by RMRC, Dibrugarh

2. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

3. *The Emory University Onsite BSL-3 safety (25 hours) Training* (9-13 February, 2009) held at NIV, Pune
Dr. H. K. Das, Scientist C

1. WHO & UNFPA sponsored *Training Course on Programming for HIV/AIDS & Reproductive Health of Young People in South Asia* (5-16 May, 2008) held at Indian Institute of Health Management & Research, Jaipur (India)

2. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at RMRC (ICMR), Dibrugarh (Assam)

3. *WHO Dissemination Workshop of Clinical Trials Registry-India* (18 August, 2008) organized by National Institute of Medical Statistics at Kolkata

4. 23rd Annual Conference of Assam state branch of the Indian Academy of Paediatrics (18-19 October, 2008) held at Assam Medical College, Dibrugarh

5. Meeting of National Technical Advisory Committee on Diabetes (6 November, 2008) held at Madras Diabetes Research Foundation, Chennai


Dr. D. R. Bhattacharyya, Scientist C

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

Dr. S. A. Khan, Scientist C

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee


3. Meeting on case-control study of Japanese encephalitis in India to ascertain JE vaccine efficacy (24 February, 2009) held at Nirman Bhawan, New Delhi

Dr. G. K. Medhi, Scientist C

2. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee

3. Stakeholders Meeting in connection with the project *Molecular Characteristics of HIV virus in India (RO3)* (2 August, 2008) organized by RMRC, Dibrugarh at Imphal, Manipur

4. Meeting of clinical investigators of the project *Epidemiology of Musculoskeletal Conditions in India* (12-13 August, 2008) at Jodhpur

5. National Seminar on *Ageing in India with special reference to North East India* (1-2 October, 2008) at Shillong. Presented a paper entitled *A study on Basic Activity of Daily Living (BADL) and Instrumental Activity of Daily Living (IADL) among Rural Elderly of Assam*


**Dr. P. K. Bora, Scientist C**

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee


3. Review Committee meeting of the project *Establishment of RF/RHD registry at Dibrugarh* (7th January, 2009) at ICMR Hqts., Delhi

**Dr. R. K. Phukan, Scientist C**

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee


3. Project review meeting related to *Understanding the role of Tobacco habits & Pesticides use in occurrence of cancer in North Eastern Region of India* (22-23 January, 2009) held at RMRC, Dibrugarh
Dr. K. Rekha Devi, Scientist C

1. Availed *RONPOKU International Fellowship 2008* for 3 months (1 June – 31 August, 2008) sponsored by Japan Society for Promotion of Sciences (JSPS) at Japan

2. *XVII International Conference on Tropical Medicine and Malaria* (29 September – 3 October, 2008) held in Juju Island, Korea. Presented a paper entitled *Molecular diversity of Mycobacterium tuberculosis from tuberculosis patients of north-eastern region of India*

3. *The Emory University Onsite BSL-3 safety (25 hours) Training* (9-13 February, 2009) held at NIV, Pune

4. *Workshop on Clinical Data Management* (23–28 February, 2009) held at NIRRH, Mumbai

Dr. B. J. Borkakoty, Scientist C

1. Resource Person in the *Workshop on Integrated Disease Surveillance Programme & Epidemic* (21-25 April, 2008) organized by RMRC, Dibrugarh

2. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee


4. Resource Person in Medical Officer’s Meeting, Dibrugarh district (15 December, 2008). Delivered a lecture on *Avian Influenza virology, diagnosis and SOP*

Dr. Utpala Devi, Scientist B

1. *International Symposium on Newer Frontiers in Biomedical Research* (28-29 June, 2008) held at Regional Medical Research Centre, NE (ICMR), Dibrugarh to commemorate its Silver Jubilee


Mr. R. K. Dutta, Administrative Officer

1. *Administrative meeting on Revised Recruitment Rules 2008 of ICMR Technical (Research & Maintenance) cadre* (2 June, 2008) at NIN, Hyderabad
Mr. M. Chetia, Laboratory Technician

1. Administrative meeting on Revised Recruitment Rules 2008 of ICMR Technical (Research & Maintenance) cadre (2 June, 2008) at NIN, Hyderabad
INSTITUTIONAL COMMITTEES
21st Scientific Advisory Committee

1. Prof. S. Majumdar, Vice Chancellor, University of Health Sciences, Kolkata ……Chairperson
2. Dr. Bela Shah, Scientist G & Chief, NCD, ICMR, New Delhi ……Member
3. Dr. T. R. Borbora, Principal, Assam Medical College, Dibrugarh ……Member
4. Prof. M. Behari, Head, Neurology, AIIMS, Delhi ……Member
5. Dr. P. R. Narayana, Director, TRC, Chennai ……Member
6. Dr. A. N. Bhisey, Mumbai ……Member
7. Dr. R. S. Paranjape, Director, NARI, Pune ……Member
8. Dr. A. P. Dash, Director, NIMR, Delhi ……Member
9. Dr. A. C. Mishra, Director, NIV, Pune ……Member
10. Dr. Brinelle D’Souza, School of Social Work, TIFR, Mumbai …… Member
11. Prof. Nancy Malla, Deptt of Parasitology, PGIMER, Chandigarh …… Member
12. Prof. H. C. Kalita, Head (Cardiology), AMC, Dibrugarh ……Special Invitee
13. Dr. K. C. Bhattacharyya, Director, NESAC, Shillong ……Special Invitee
14. Director, Health Services, Govt. of Tripura ……Special Invitee
15. Dr. R. S. Dhaliwal, ADG, ICMR …… Special Invitee
   Prog. Officer for RMRC, Dibrugarh
16. Dr. J. Mahanta, Director, RMRC, Dibrugarh ……Member Secretary

Institutional Ethics Committee

Chairperson : Dr. (Mrs) N. Dutta, Ex Head, Pathology, Assam Medical College
Member Secretary : Dr. A. M. Khan, Scientist D, RMRC, Dibrugarh
Members : Dr. J. Mahanta, Director, RMRC, Dibrugarh
           : Dr. (Mrs) S. Das, Prof, Pharmacology, Assam Medical College
           : Dr. D. K. Patgiri, Prof, Paediatrics, Assam Medical College
           : Dr. B. N. Borthakur, Prof, Sociology, Dibrugarh University
           : Km. B. K. Vinita, Director, Prajapita Brahma Kumari’s Ishwariya Vishwa-Vidyalaya
           : Mr. D. Saikia, Retd. District and Session Judge

Animal Ethical Committee

Chairperson : Prof. D. Chaliha, Retd. Principal, DHSK College, Dibrugarh
Member Secretary : Dr. A. M. Khan, Scientist D, RMRC, Dibrugarh
Members : Dr. (Mrs.) S. Das, Assam Medical College (Renowned Scientist)
          : Dr. H. C. Barua (Veterinary Specialist)
          : Dr. H. K. Das, Scientist C, RMRC, Dib (Biological Scientist)
          : Dr. K. Rekha Devi, Scientist C, RMRC, Dib (I/C Animal House)
          : Mr. A. C. Bora (Representative of General Public)
          : Mr. Suresh Pathak, Advocate (Nominee of CPCSEA)
Technical Committee

Chairperson : Dr. D. Patgiri, Professor, Paediatrics, AMCH, Dibrugarh
Member Secretary : Dr. P. Dutta, Scientist E, RMRC, Dibrugarh
Members : Dr. H. C. Kalita, Professor, Cardiology, AMCH, Dibrugarh
: Dr. P. K. Gogoi, Professor, Chemistry, Dibrugarh University
: Mr. R. K. Dutta, AO, RMRC, Dibrugarh
: Nominated subject specialist

Building Committee

Chairperson : Dr. P. K. Mohapatra, Scientist E
Member Secretary : Dr. P. Dutta, Scientist E
Members : Executive Engineer, Building Div, Assam PWD
: Dr. D. Biswas, Scientist D
: Mr. R. K. Dutta, AO
: Mr. M. C. Acharyya, AAO

Maintenance Committee

Chairperson : Dr. Anil Prakash, Scientist E
Member Secretary : Dr. A. M. Khan, Scientist D
Members : Dr. S. K. Sharma, Scientist D
: Mr. R. K. Dutta, AO
: Mr. M. C. Acharyya, AAO

Transport Committee

Chairperson : Dr. P. K. Mohapatra, Scientist E
Member Secretary : Dr. P. Dutta, Scientist E & Vehicle I/C
Members : Dr. S. A. Khan, Scientist C
: Mr. A. C. Bora, PS to Director
: Mr. P. C. Gohain, Driver (Spl Grade)

Publication Committee

Chairperson : Dr. J. Mahanta, Director
Member Secretary : Dr. P. K. Mohapatra, Scientist E
Members : Dr. P. Dutta, Scientist E
: Dr. Anil Prakash, Scientist E
: Dr. S. K. Sharma, Scientist D
Official Language Implementation Committee

Chairperson : Dr. J. Mahanta, Director
Member Secretary : Dr. A. M. Khan, Scientist D
Members : Dr. P. K. Mohapatra, Scientist E
          : Dr. Anil Prakash, Scientist E

Medical Reimbursement Committee

Chairperson : Dr. P. K. Chelleng, Scientist D
Member Secretary : Dr. P. K. Bora, Scientist C
Members : Dr. D. Biswas, Scientist D
          : Dr. H. K. Das, Scientist C
          : Dr. G. K. Medhi, Scientist C

Campus Security/Sanitation/House keeping committee

Chairperson : Dr. Anil Prakash, Scientist E
Member Secretary : Mr. R. K. Dutta, AO
Members : Dr. S. K. Sharma, Scientist D
          : Dr. A. M. Khan, Scientist D
          : Mr. A. C. Borah, PS to Director
          : Mr. P. C. Moran, Head Watchman

Equipment Maintenance Committee

Chairperson : Dr. K. Narain, Scientist D
Member Secretary : Dr. S. K. Sharma, Scientist D
Members : Dr. A. M. Khan Scientist D (I/C Maintenance)
          : Dr. K. Rekha Devi, Scientist C
          : Mr. S. K. Goswami, DEO

Horticulture Committee

Chairperson : Dr. P. Dutta, Scientist E
Member Secretary : Mr. B. K. Goswami, TA
Members : Dr. S. A. Khan, Scientist C
          : Mr. A. C. Borah, PS to Director
          : Mr. M. Chetia, LT
**Safety Committee**

Chairperson : Dr. Anil Prakash, Scientist E  
Member Secretary : Dr. S. K. Sharma, Scientist D  
Members : Dr. P. Dutta, Scientist E  
          : Dr. P. K. Mohapatra, Scientist E  
          : Dr. P. K. Chelleng, Scientist D  
          : Dr. K. Narain, Scientist D  
          : Mr. R. K. Dutta, AO

**Research Review Committee**

Chairperson : Dr. J. Mahanta, Director  
Member Secretary : Dr. P. K. Mohapatra, Scientist E  
Members : Dr. P. Dutta, Scientist E  
          : Dr. Anil Prakash, Scientist E  
          : Dr. P. K. Chelleng, Scientist D  
          : Dr. K. Narain, Scientist D

**Condemnation Committee**

Chairperson : Dr. Anil Prakash, Scientist E  
Member Secretary : Dr. S. K. Sharma, Scientist D  
Members : Dr. D. Biswas, Scientist C  
          : Mr. R. K. Dutta, AO  
          : Dr. P. Gogoi, Assistant

**Procurement Committee**

Chairperson : Dr. P. Dutta, Scientist E  
Member Secretary : Dr. R. K. Phukan, Scientist C (Stores Officer)  
Members : Dr. P. K. Mohapatra, Scientist E  
          : Mr. R. K. Dutta, AO  
          : Dr. S. K. Sharma, Scientist D (Nominee of the Director)
DISTINGUISHED VISITORS DURING THE YEAR

1. Dr. Catherine Walton, University of Manchester, UK
2. Dr. Yoon Kong, Subgunkwan University, Korea
3. Dr. S. Fuchareon, Mahidol University, Thailand
4. Dr. David Blair, James Cook University, Australia
5. Dr. D. A. Gadkari, Emeritus Scientist, NIV, Pune
6. Dr. Deepika Mohanty, Ex Director, IIH, Mumbai
7. Dr. Raj Tandon, Sitaram Bharatia Institute of Science & Technology, New Delhi
8. Dr. A. N. Bhisey, Mumbai
9. Dr. Shubhada Chiplunkar, ACTREC, Mumbai
10. Dr. Anita S. Desai, NIMHANS, Bangalore
11. Dr. M. A. Quadar Pasha, Institute of Genomics, Delhi
12. Dr. R. C. Mahajan, Advisor ECD, ICMR, Chandigarh
13. Dr. P. G. Rao, Director, NEIST, Jorhat
14. Dr. R. S. Paranjape, Director, NARI, Pune
15. Dr. S. K. Kar, Director, RMRC, Bhubaneswar
16. Dr. J. S. Samantray, AIIMS, New Delhi
17. Dr. D. P. Sarkar, Delhi University, Delhi
18. Mr. Sanjiv Datta, Financial Advisor, ICMR, New Delhi
19. Dr. M. M. Deka, Vice Chancellor, Dibrugarh University
20. Dr. H. L. Dowrah, Ex Vice Chancellor, Guwahati University, Guwahati