EXECUTIVE SUMMARY

Cardio-vascular diseases

Studies were initiated to investigate the genetic basis of hypertension in Mizo, Assamese and tea garden workers (TGWs) population of Assam using 3 genetic markers viz. ACE polymorphism, SNPs in hypertensive families, Angiotensin receptor polymorphism. A total of 476 samples (TGW 147, Assamese 36, Mizo 293) were analyzed for biochemical parameters and molecular markers. Values of glucose, cholesterol, triglycerides, LDL, uric acid, albumin and protein were relatively higher in Mizo community. The level of HDL towards protective range was found more in Assamese community. Higher range of blood urea and creatinine level was found in TGW. The deletion polymorphism (DD) of ACE gene was found predominant among the hypertensive Mizos (58.3%) and TGWs (58.1%). The MM homozygous state of Angiotensinogen marker was found predominant among the TGW hypertensives followed by hypertensive Mizos whereas the MT heterozygote type of polymorphism was more prevalent among the Assamese hypertensives. Another study was initiated to study the salt sensitivite phenotypes and gene polymorphisms in essential hypertension in tribal population of Mizoram, tea garden communities of Assam and indigenous Assamese population. During the reporting period a total of 98 probands (TGW 55, Assamese 43) and 73 controls (TGW 30, Assamese 43) were identified and intervention was completed.

Cancers

Population based North-east Cancer Registry Programme covering 43.6 lakh population in 4 states of north-east India showed that the crude incidence rate varied from 46.9 per 100,000 among females in Dibrugarh district to 173.4 among males in Aizawl district. Based on 2003 and 2004 data collected by these registries, cancer of the stomach was the leading site of cancer among males in Mizoram state (AAR 50.6) whereas among females, the leading site of cancer was lung (AAR 24.7). Lung was also the leading site of cancer in both males (AAR 19.0) and females (AAR 16.2) in Imphal West district of Manipur state constituting 20.8% of all cancers in males and 16.1% of all cancers in females. In Sikkim state, cancer of the stomach (AAR 14.2) in males and cancer breast (AAR 13.3) among females were the leading sites. In Kamrup and Dibrugarh districts of Assam, cancer oesophagus in males and breast cancer in females whereas in Silchar district cancer larynx in males (AAR 10.7) and cancer oesophagus in females (AAR 12.1) were the leading sites. Comprehensive study on carcinoma oesophagus using epidemiological and molecular approaches was continued. A total of 209 new histologically confirmed esophageal cancer cases have been recruited in the study. While 36% cases had the history of cancer in their families, 28.0% had oesophageal cancer in their families. Oesophageal and other cancers had occurred in 50.1% of the cases among 1st degree relationship. The crude rates of oesophageal cancer for second degree relationship were lower (0.73%) as compared to that of first degree (2.8%) and spouses
Blood samples from 42 oesophageal cancer patients (11 had family history of cancer) were processed for microsatellite locus polymorphism study using 7 markers. Higher but non-significant allelic alteration was observed in D17S1303, D11S1984 and D3S4545 microsatellite loci. Gene expression study results indicated that genes involved in G-protein coupled receptor activity, anti-apoptosis activity, MAPK signaling pathway, cellular proliferation and calcium-activated potassium channel activity were significantly up-regulated while genes involved in keratinization, structural constituent of cytoskeleton, endopeptidase inhibitor activity, humoral immune response, base-excision repair, and protein biosynthesis were significantly down-regulated. Another study was initiated to investigate the link between high incidence of cancer in north-eastern states of India and use of tobacco, exposure to pesticides and genetic variation including polymorphism/mutations associated with ethnic variation. Epidemiological information 566 cancer cases have been collected and molecular investigations initiated.

Nutrition

An ICMR Task Force study on Sub-clinical Vitamin A deficiency in 6-71 months old children was completed in Assam wherein a total of 1,005 blood samples were collected from Dibrugarh and N. Lakhimpur districts. About one third of the samples (after analyzing 489 serum samples) had retinol less than 20 μg/dl indicating sub clinical Vitamin A deficiency.

Malaria

Therapeutic efficacy of sulfadoxine-pyrimethamine (SP) alone and in combination with artesunate for the treatment of uncomplicated falciparum malaria in 2 CHCs of Indo-Myanmar bordering district of Changlang in Arunachal Pradesh was evaluated. In Miao CHC, adequate clinical and parasitological response (ACPR) was found in 47.6% among SP treated cases whereas in SP+artesunate group, it was 100% . Treatment failure with SP was 52.4% (ETF 40.5%, LCF 11.9%). In Jairampur CHC, ACPR in 36% cases of SP was found and treatment failure was recorded in 64% cases (ETF 24%, LTF 32%, LPF 8%). Among cases treated with SP+artesunate, ACPR was 100%. Work was continued to investigate the Incidence and molecular characterization of G-6-PD deficiency in north-east India during the year. Screening of 3,185 subjects, representing 58 ethnic groups in the states of Assam and Mizoram, revealed 2.9% prevalence of G-6-PD deficiency which was higher in males (4.9%) than females (1.4 %). Molecular analysis of G-6-PD deficient samples showed the presence of G-6-PD Orissa mutation in 32.4% subjects, G-6-PD Kerala-Kalyan mutation in 17.5% subjects while 50.1% subjects did not show presence of any of the 3 common Indian mutations. The in vivo antimalarial activity of one local plant was evaluated against rodent malaria parasite, Plasmodium yoelii in mice model under the project titled Anti-mosquito and anti-malarial activities of some select plants of north-east India. The ED$_{50}$ values for petroleum ether, methanolic-chloroform and methanolic-aqueous root extracts of this plant were found to be 32, 72 and 30 mg/kg body wt. respectively and the test mice treated with the plant extract survived longer in comparison to Control mice. A study on impact of malaria on pregnant women and pregnancy outcome was initiated in 4 malaria endemic sites of Assam. Monitoring and recruitment of cases of pregnant women from the study sites are in progress. Another study was initiated on Sibling species profiling of forest malaria vector Anopheles dirus complex in north-east India. Surveys were undertaken in Mizoram,
Assam and Arunachal Pradesh. Molecular studies revealed the presence of only 1 species i.e. An. baimaii (formerly known as species D) of the An. dirus complex so far in the areas surveyed.

**Filariasis**

The work on Integrated filariasis control involving the effect of single annual dose of mass DEC therapy and vector control measures on transmission of lymphatic filariasis in a tea garden setup was continued. After the sixth round of mass DEC therapy, the mf rate dropped down from the initial prevalence of 10.3% to a negligible level (0.4%) along with very significant drop in vector infection rates in the study population. DEC was well accepted in the study population.

**Trematode infections**

Study on Molecular characterization and infrapopulation differentiation of Paragonimus in NE India was continued during the year. Phylogenetic analysis of the second internal transcribed spacer (ITS2) of nuclear ribosomal DNA (rDNA) revealed that human paragonimiasis in Arunachal Pradesh is due to P. heterotremus. Chest X-ray of P. heterotremus infected patients revealed that air space consolidation (75%) was the most dominant pulmonary lesion followed by cavitary lesions (14.7%), mediastenal adenopathy (11.8%), nodular lesions (4.4%) and patchy ground-glass opacity (4.4%).

**Japanese encephalitis & West Nile virus**

Study was initiated on Molecular epidemiology and immune response against JE virus strains in north-east India to genotype the circulating JE virus strains and to analyse anti-JE virus antibody response in clinical and sub clinical JE infections. Along with it a new study to find out the prevalence of West Nile virus activity and to incriminate its mosquito vector species in Assam was initiated.

**Influenza**

Under the project Multi-site monitoring of human influenza virus in India a total of 317 nasal/throat samples were collected for isolation and characterization of the prevalent human influenza strains in Dibrugarh district. A total of 6 isolations of H1N1 virus were made during the year.

**HIV/AIDS and Drug Abuse**

Work was continued on the mapping, size estimation and integrated behavioural and biological assessment for HIV/AIDS in Manipur and Nagaland covering 5 districts in these 2 states. Respondent Driven Sampling method was used to collect behavioural and biological data among IDUs in Manipur and among IDUs and FSWs in Nagaland with an estimated sample size of 400 for each target groups in each district. Behavioural and biological data collection and laboratory testing have been completed. Simultaneously the Phase I of the ICMR Task Force project entitled Studies on HIV/AIDS and Drug Abuse in Mizoram and Nagaland was continued. The prevalence of HIV, HCV and HBsAg (Australia antigen) among the injection drug users in Mizoram was found 15.3 %, 70.1 %, and 6.2 % respectively with significantly higher (P=0.047) prevalence of HIV among female IDUs (24.4%) than males (12.1%). In Nagaland, the prevalence of HIV, HCV & HBsAg among the IDUs was found 6.7 %, 37.8 %, & 4.2 % respectively. Work on HBV,
HIV genotyping/ subtyping for B, C, CRF 01- AE, CRF 07-BC, CRF 08-BC subtypes genotyping was initiated which resulted in detection of Genotype C of Hepatitis B for the first time from northeast India.

**Bacterial infections**

Work was continued on *Molecular epidemiology of tuberculosis in select populations of north-east India*. Out of 334 sputum samples collected from the suspected TB patients in Assam, Meghalaya Arunachal Pradesh and Nagaland, 133 were found positives for AFB on direct smear. The drug susceptibility profiling of 12 isolates of *M. tuberculosis* revealed that 9 strains were susceptible to rifampicin, streptomycin and isoniazid by proportion method; 2 strains (1 each from Dibrugarh and Guwahati), were MDR-TB, and 4 strains were susceptible to all the 5 antibiotics tested. A total of 16 among the AFB positive cultures were confirmed belonging to *Mycobacterium tuberculosis* complex based on biochemical tests and amplification of hsp 65 gene region and restriction digestion with enzymes Bst EII and Hae III.

**Malaria outbreak investigations**

Wide spread malaria outbreaks occurred in Assam during April-June 2006 causing heavy morbidity and mortality. This outbreak was investigated in districts Golaghat and North Lakhimpur of Assam and Tirap district of Arunachal Pradesh. An attempt was made to understand the genesis of these out breaks and suitable remedial measures were communicated to the state health authorities.