

ACHIEVEMENTS DURING 10TH PLAN PERIOD

Tuberculosis Research Centre, Chennai

- With the view to assess the epidemiological impact of DOTS, the DOTS has monitored was for 5 years. The prevalence of disease has shown a decline of 9% among smear positive cases and 11.3% among culture positive cases, demonstrating that DOTS implementation was associated with a more rapid reduction in the prevalence of disease compared to that in the pre-DOTS period.
- The RFLP analysis of *M. tuberculosis* isolates from the DOTS area revealed that 40% of the TB isolates showed a single copy of IS6110. To overcome this limitation an additional probes such as the Direct Repeat (DR) and polymorphic GC repeat sequence (PGRS) probes were used. In addition a spoligotyping is now being used to differentiate specimens.
- The Phase I trial vaccine trial using modified vaccinia Ankara (tbc-m4) to counter the strain of HIV-1, subtype C, the most common variant of the virus found in India had been completed.
- Construction of recombinant BCG-based HIV-1 epitope delivery system has been started.
- A micro array for genes encoding for efflux pumps of *M. tuberculosis* has been developed and novel pumps for drug resistance are being identified.
- Carried out disease burden estimation for tuberculosis which was estimated to be 8.5 million cases of TB in the country.
- Studies to shorten duration of chemotherapy showed that addition of daily ofloxacin could shorten the duration of treatment to four months from current six months.
- A study on drug resistance surveillance in Tiruvallur district showed MDR-TB was less than 2% in newly diagnosed patients.
- Constructed patient care and clinical research facility. (Rs.11.25 crores)
- Established state-of art HIV vaccine trial centre in collaboration with IAVI. The centre conforms to international design standards of such facilities.
- Established an International Centre of Excellence in Research on Infectious and Allergic Diseases in collaboration with NIH.
- Training facilities with latest audio-visual equipments established both at Chennai and Tiruvallur.
- Telecommunication facilities : A State of the Art Digital Exchange with 100 direct incoming lines has been set up as part of infrastructure development. A 1 Mbps Dedicated Leased Line provides high speed internet connectivity to all researchers at the centre. The centre also has developed facilities for audio and videoconferencing with researchers all over the world Information kiosks for patients and researchers have been set up to disseminate information about tuberculosis control.

National JALMA Institute for Leprosy and other Mycobacterial Diseases, Agra

- Clinical samples and strains of drug resistant *M.tuberculosis* have been collected and molecular techniques for detection of drug resistant strains

developed. The types of mutations responsible for drug resistance prevalent in Indian strains of *M.tb.* isolates have been identified. Based on this information, a new rapid molecular method for detection of rifampicin resistance in TB has been developed.

- Chemotherapy trials in MB leprosy using conventional and newer drugs-ofloxacin and minocycline monthly administration has been found to be effective. It is being validated in a field trial at Ghatampur (U.P).
- Long term follow-up in MB leprosy has shown that highly bacillated MB cases of leprosy have a higher risk of getting relapses. These relapses have been observed to be higher in fixed duration treatment as compared to treatment till smear negativity.
- An indigenous DNA chip covering selected genes of *M.leprae* has been developed and novel targets/genes involved in the drug resistance have been identified. Further New immuno-diagnostically relevant protein antigens have been identified.
- Studies are being carried out to develop and apply DNA fingerprinting methods for identifying the differences among isolates of *M.tuberculosis* and have been tested for more than 100 strains from the Institute's repository. The results have been found to be promising.
- A direct *in situ* hybridization and PCR procedure on tissue specimens has been developed which will improve the histopathological diagnosis of leprosy and methods are adaptable to other infectious diseases also.
- Mycobacterial Repository Centre including maintenance of BSL-3 has been established which provide support to a large number of scientists from other institutions during this period.
- BSL-3 laboratory for animal experiments has been established and has already served two major national projects for testing of immunopotentiators/vaccine candidates.
- Relapses in MB leprosy following 2 year MDT long term follow-up has shown that highly bacillated MB cases of leprosy have a higher risk of getting relapses. These relapses have been observed to be higher in fixed duration treatment as compared to treatment till smear negativity.
- Neurophysiological studies on peripheral nerves have identified markers of early nerve damage which will serve as a baseline for future studies. This is being expanded as a comparative study in leprosy, diabetes and alcoholic neuropathies.
- Epidemiological studies in Ghatampur field area have shown pockets of high endemicity in the area which also has wide variation in the incidence of leprosy. Besides, knowing the current status and profile of the disease various interventions have been initiated.
- JALMA Flap for restoration of volume of first web space in muscle atrophy associated with ulnar palsy in leprosy. Its a new surgical procedure developed for restoration of volume of first web space.
- The building of NJIL&OMD caught fire in April 2004. Estimated loss of civil works, consumables, equipments and electrical fixtures was about Rs.5.0 crores. The departments has now become operational.

National Institute of Cholera & Enteric Disease, Kolkata

- The National Institute of Cholera and Enteric Diseases at Kolkata in collaboration with JICA has detected emergence of new infectious enteric agents through molecular surveillance like the pandemic *Vibrio parahaemolyticus* O3:K6 strains, new variants of *Vibrio cholera* and CAL strain of Chinese ADRV strain and CAL C rotavirus strain, and shiga toxin producing *E.coli* (STEC) 0157:H7.
- For the first time a unique Simian retro-virus (SRV) has been identified in Hanuman langur in India.
- Vibrio Phage Reference Laboratory offers referral services in relation to biotyping, serotyping and provides phage typing results to different laboratories inside and outside the country. Phage typing methods used at the Institute can test large numbers of strains rapidly. It is cost-effective, simple and the laboratory method does not require sophisticated instrumentation and therefore can be implemented in all developing countries.
- Intensive search for the enterohaemorrhagic *E.coli* (EHEC) was also initiated in Kolkata from various human and animal sources using a multiplex PCR kit that could detect *stx1*, *stx2* and O157 *rfb* genes. EHEC was reportedly increasing in many developed countries. All the clinical specimens tested for this organism showed low incidence rates (about 1%). However, cow dung samples showed relatively high detection rate (30%).
- All the groups of diarrhoeagenic *Escherichia coli*, 5 species of vibrios, 4 species of aeromonas, 4 species of *Shigella*, 5 species of *Salmonella* and *Klebsiella pneumoniae* are available in the repository.
- Phase I Clinical trial of first live oral recombinant cholera vaccine VA1.3 in Asia has been completed. In Phase II study none developed any diarrhea or shed the vaccine strain or had fever. Planning and preparation of Phase-II and III site completed.
- The soluble antigens of *Entamoeba histolytica* trophozoite were analyzed in detail by biochemical and immunochemical methods. Monoclonal antibodies against highly immunogenic fraction (FI) of *E.histolytica* were raised for quick and reliable diagnosis of *E.histolytica* to *E.dispar*. Antigen coding for specific MAb, which has the ability to differentiate *E.histolytica* to *E.dispar* were purified and characterised.
- Prevalence and significance of cryptosporidium in the causation of acute diarrhoea in hospitalized cases in Kolkata were determined. The findings of this study clearly suggested that cryptosporidium is one of the common parasites causing acute diarrhoea in pediatric age group in Kolkata.
- The sudden emergence of Human Group B (CAL) rotaviruses in Kolkata after several years since the human Group B (ADRV) rotavirus had caused large epidemics of adult gastroenteritis (involving cases in millions) in China was a valuable outcome of an ongoing active surveillance programme for detection of emerging pathogens in diarrhoeal disease.
- Molecular epidemiology of rotavirus infection revealed predominance of G-type 1, followed by G-2 and G-4 with a very high percentage of mixed and non-typeable strains detected from the rotavirus samples of Kolkata,

Bhubaneswar, Chandigarh and Dibrugarh. Moreover, 3 rare G-12 strains were also detected from Kolkata. After sequencing of mixed G- and P-type with G9P, a very rare strain of human Group A rotavirus was detected from Manipur. An in depth molecular analysis of the strain revealed very interesting data that a constellation of 7 out of 8 gene sequenced had more than 95-99% affinity to porcine rotaviruses and was associated with an epidemic of infantile diarrhoea.

- Astroviruses and human Caliciviruses were detected for the first time from eastern India showing clearly that other important viruses besides rotavirus also play an important role in causing diarrhea.
- Zinc supplementation studies conducted in the community showed that the group of children who received zinc supplementation had reduced incidence of diarrhoea as compared to control group and the difference was statistically significant. Moreover, zinc supplementation showed increased gain in body weight in low-birth weight children.
- Two additional buildings have been built at the Infectious Diseases Hospital and B.G. Hospital campus, Kolkata with the funding of ICMR and Japan International Cooperation Agency (JICA) respectively. NICED will undertake a large number of new research activities in these buildings. JICA-NICED building consists of an animal house with the facility of working with infected animals at a negative pressure area. The buildings are equipped with all modern gadgets and sophisticated equipments.

National Institute of Virology, Pune

- In collaboration with RMRC, Port Blair has introduced hepatitis B vaccine in EPI among HBV hyper endemic tribes of Andaman & Nicobar Islands.
- An ELISA based technology for the detection of hepatitis A IgM and total antibodies were transferred to an industry.
- Investigations of outbreaks of encephalitis in Gujarat and Andhra Pradesh resulted in identification of Chandipura virus as the cause of outbreak. Partial genomic sequencing of isolates and clinical samples has been done. Full genome of three CHP virus strains isolated during epidemic has been sequenced. G gene of CHP virus has been cloned and expressed. Real time PCR for quantitation of CHP-RNA has been standardized.
- A field station has been established at Warangal in 2004 for indepth studies on the vectorial and epidemiological aspects of Chandipura virus. Bellary field station was established during 2001-2003 to study the vectorial aspects of JE vector mosquitoes.
- Nipah virus etiology of outbreak of encephalitis in Siliguri district of West Bengal was established in collaboration with CDC, Attanta, USA .
- Hepatitis A was shown to be emerging as an epidemic disease.
- Assisted in investigation of suspected Avian Influenza outbreak
- In depth analysis of association of pre-core mutants and viral genotypes with clinical outcome of HBV infection was completed. Evaluation of combination therapy in chronic hepatitis C Association of HLA with outcome of HCV infection was undertaken.

- Real-time PCR-based quantitation was standardized for HAV, HBV, HCV and HEV.
- Development of animal models for dengue, buffalo pox and Chandipura virus.
- Bangalore Field station is participating in Global Polio eradication program, and the laboratory has consistently been accredited for their performance.
- High titered anti rota colostrums was produced in goat breeds for preparation of colostrums. On the basis of small clinical trial it was observed that Newborn human babies might be fed with immune colostrums within 12 to 24 hrs after birth and/or at the age of 3 to 6 months. This strategy may be useful in preventing animal rotavirus diarrhoea.
- Cryo electron microscope was installed to undertake morphodiagnostic studies on viruses.
- DNA Sequencing, flowcytometry, confocal microscopy and microarray facilities have been established.

Microbial Containment Complex, Pune

- A High Containment Bio-Safety laboratory state-of-the-art biosafety Level – 3+ laboratories has been established.
- A National Virus Repository, has been established where viruses are being archived for further research
- Samples received during outbreaks of Nipah in Siliguri, West Bengal (2001), SARS (2003) and Avian Influenza (2006) were processed at this laboratory.
- Provides training to technical and scientific staff to work on high risk human pathogens, therefore special training modules has been developed by MCC and regular trainings are being provided to generate trained staff for working in High Containment Laboratories.
- The following were initiated
 - Development of National Serum Bank
 - Reagent development for highly pathogenic viruses
 - Investigation of unusual outbreaks
 - Development of modern diagnostic systems for viruses of outbreak potential
 - Development of KFD vaccine using modern approaches
 - Maintenance and operation of containment laboratories

National AIDS Research Institute, Pune

- India's first HIV-1 subtype C vaccine trial was completed at the National AIDS Research Institute at Pune to test the safety and immunogenicity of Adeno-Associated Virus based HIV-1 subtype C prophylactic vaccine.
- Behavioural studies to understand the barriers and incentives to participate in vaccine trials were conducted among high risk groups as well as general population.
- Provided clinical care to HIV-infected persons with high rates of co-infections, e.g., herpes viruses, tuberculosis, gastrointestinal/respiratory pathogens etc. that are widely prevalent in India. Provided

chemoprophylaxis for opportunistic infections to all HIV infected individuals as per our National guidelines.

- Recognized by National AIDS Control Organization of India as an ART treatment center. The Institute has built capacity to undertake clinical trials for anti-HIV drugs. This includes infra-structure development, human resource development, GCP and GCLP training, development of drug resistance testing laboratory and establishment of pharmacy.
- A state of the art laboratory for testing resistance to anti-HIV drugs has been established.
- Initiated programmes to develop a multi-epitope vaccine and a DNA vaccine based on Indian subtype C viruses.
- A clinical study to measure the effectiveness of DOTS in tuberculosis patients with HIV infection has been initiated. Efficacy of regimens under Revised National Tuberculosis Control Programme (RNTCP) in pulmonary tuberculosis patients with HIV infection is being studied in HIV seropositive and HIV seronegative tuberculosis patients. Anti-TB drug resistance is being assayed in TB isolates from HIV infected and HIV uninfected TB patients.
- Vaccine immunogenicity laboratory set up with assistance from IAVI.
- Established Clinical pathology and X-ray facility in the clinic.
- A new library, auditorium, conference hall and training center complex built at the cost of Rs.3.1 cr. is ready for commissioning.

Enterovirus Research Centre, Mumbai

- Acute flaccid poliovirus (AFP) surveillance and eradication of wild poliovirus 2, substantial decrease in number of polio types 1 & 3 cases, southern states made free from poliovirus since 2000, all wild poliovirus from India and Bangladesh characterized and wild poliovirus sequenced.
- Established facilities for molecular epidemiology. VP1 gene of all wild polioviruses isolates since the year 2000 was sequenced for phylogenetic analysis. 14 genetic clusters of wild poliovirus type 1 were identified in 2002 in India. In 2003, only 4 genetic clusters were found. In 2005 wild poliovirus type 1 belonging to only one genetic cluster was predominantly isolated. A decline in the number of genetic clusters indicated elimination of virus transmission chains and thus substantial progress India has made towards polio eradication.
- A new algorithm for reducing time of reporting poliovirus isolation results has been evaluated by EVRC, Mumbai for rapid detection of wild poliovirus in stool samples of AFP cases and to detect, type and differentiate polioviruses using polymerase chain reaction assays within one day after virus culture in continuous cell lines. Preliminary results showed that the new algorithm would provide virological results about 8 days earlier than the present algorithm. Evaluation process also involves applicability of the new algorithm in most laboratories in the WHO Polio Lab Network.
- Enteroviruses in CNS disease - Enteroviruses are one of the main causes of aseptic meningitis in children. However, diagnosis of Enterovirus meningitis is not attempted in most hospitals because of lack

of technology and availability of diagnostic reagents. Patient management is therefore empirical, some times leading to unnecessary use of antibiotics. A PCR base rapid diagnosis test for detecting Enteroviruses in cerebrospinal fluid (CSF) of patients of aseptic meningitis has been established. The diagnostic testing service is offered to the collaborating hospitals in Mumbai.

- Importation of wild poliovirus from India into other countries - International collaboration of WHO Polio Network Laboratories regarding poliovirus sequencing has yielded information of isolation of wild poliovirus of India specific genotype in other countries like China, Bulgaria and Syria.
- Characterization of vaccine-derived polioviruses associated (VDPV) with an outbreak of poliomyelitis in Indonesia - In 2005, poliovirus type 1 isolates obtained from poliomyelitis cases reported in Madura Island, Indonesia were found to be of Sabin vaccine origin. These isolates were characterized by VP1 sequencing and detected an outbreak of circulating VDPV. Comparison of molecular changes in VDPV isolates of different origins will be used to design molecular markers for early detection of VDPV.
- Identification of a new genotype of Enterovirus 71 - Enteroviruses isolated from AFP cases was studied. Enterovirus 71 is known to cause encephalitis and also paralysis very similar to paralytic poliomyelitis. Molecular characterization of EV71 isolates showed one isolate to belong to a new Genotype. Using sequences of this isolate RT-PCR primers were prepared for rapid identification of EV71 isolates.
- Environmental surveillance for wild poliovirus in Mumbai – Explanatory studies done in Environmental monitoring by the centre has demonstrated that it is a very sensitive method of detecting wild poliovirus circulation in any community. Findings showed repeated re-introduction of wild poliovirus strains from Uttar Pradesh and Bihar to Mumbai. The frequency of wild poliovirus detection varied according to the intensity of wild poliovirus activity (number of polio cases) anywhere in the country. Supplementary immunization activities of the polio eradication programme in Mumbai are planned in consideration of the results of this environmental surveillance.
- The building caught fire in April 2006. The total loss was about Rs.4.36 crores. The fire damaged equipments, civil works and electrical fittings. The centre is liming back to normalcy.

ICMR Virus Unit, Kolkata

- Studies on intrafamilial transmission of hepatitis B virus in Calcutta revealed information on transmission pattern in the family, indicating need for an expanded screening Programme.
- Studies on genetic variability of hepatitis B virus in relation to its clinical presentation provided information about the current mutation profile of the virus established and its relation with clinical presentation is in progress.
- In the community based study conducted on hepatitis B virus infection in the general population, risk factors of HBV transmission were established and occult HBV infection in the community detected;

indicating potential risk for transmission through blood banking and unsafe injection practices among donors negative for viral markers.

- In the studies carried out on multiple viral infections in the community (HIV, HBV, HCV, HSV, CMV) risk factors for viral infections were established. Among jail inmates multiple viral infections was higher than general population, especially syphilis and recent HSV infection.

National Institute of Malaria Research, New Delhi

- Two field sites for vaccine trial are being developed as at Rourkela (Orissa) and Jabalpur(M.P.) in a collaborative project with ICGEB and CDC Atlanta respectively.
- A pictorial key for the identification of 58 species of Indian anophelines has been prepared and published.
- A catalogue of the Plasmodium strains in malaria parasite bank giving complete details of the parasite isolates collected and preserved has been published.
- Project on Integrated Disease Vector Control of Malaria provided scientific support in malaria control operations to the National Vector Borne Disease Control Programme through basic and applied research activities. All the field stations functioning under this project continued to interact with respective state health departments in planning and execution of activities to contain the malaria problem. Over the years, various methods of mosquito and malaria control particularly bio-environmental control have been demonstrated in different ecological paradigms.
- Two new field units under IDVC project have been opened at Ranchi and Raipur to cater the need of national Vector Borne Disease Control programme and for local population.
- New tools for malaria control like synthetic pyrethroid for indoor residual spraying, biolarvicides for larval control, larvivorous fish, and insecticide treated mosquito nets, use of blister packs for treatment of malaria cases were evaluated for implementation of the strategies under the Programme.
- The projects on application of remote sensing and GIS in malaria epidemiology have come out with potential for micro-stratification of malarious/non malarious areas at village level. Efforts are being made to operationalization this technology.
- Studies in different paradigms of malaria have revealed the potential of climate and satellite based indicators in development of early warning system.
- A PCR-assays for identification of the members of *An. culicifacies* and *An. fluviatilis* complexes has been successfully completed. A 2-step PCR strategy has been developed for the differentiation of all five members of the *An. culicifacies* complex i.e. species A, B, C, D and E.
- Studies on malaria in pregnancy and infancy have shown that women having malaria during their pregnancy are at great risk particularly during first pregnancy as it may cause cerebral malaria, abortion, still births, anaemia, maternal death and neonatal death. Pregnant women with *falciparum* or *vivax* malaria were significantly more anaemic than non-

infected pregnant women or infected non-pregnant women. Pregnant women are screened regularly, advised for various risk factors and preventive measures. Congenital malaria was also recorded. Among infants, malaria infection was seen in 218 infants. Age specific prevalence revealed that more than 30% of the infants examined at two months of age had documented malaria infection with both *P.vivax* and *P. falciparum*. By one year of age, over all malaria prevalence reached 50% with *P.vivax* (25%) and *P. falciparum* (75%). Follow-up revealed that three infants with *P. falciparum* died in the study cohort.

- Foundation stone of a new building has been laid at Papankalan.
- In order to make Malaria Parasite Bank as self sufficient in cryopreservation of isolates, Liquid Nitrogen Plant has been procured and ready for installation.

Vector Control Research Centre, Pondicherry

- The World Health Organization (WHO) has designated the VCRC as a collaborating Centre for Research and Training in Lymphatic Filariasis and Integrated Methods of Vector Control.
- Studies have shown that the treatment costs incurred by ADL patients range from Rs.1 to Rs.1000 per episode and chronic patients from 1 to Rs 800 and India loses also 1.2 billion man days due to LF .The annual economic loss is estimated to be nearly 1 billion US \$ and is equivalent to 0.65% of GDP.
- In India, during the year 2003, a total of 20 districts implemented the MDA with DEC covering a population of 53.18 million and in 7 districts co-administration of DEC with Albendazole was done covering a population of 18.19 million by ICMR Institutes. The study revealed that Microfilaraemia (prevalence & density) reduced in both the arms as compared to baseline, There appeared to be a slight advantage for the DEC + Albendazole arm in the rate of reduction in antigenaemia. In regard to Ag prevalence there was higher reduction in co-administration arm suggestive of advantage of co administration in reducing emergence of new cases.
- A filariasis risk map has been created based on geo-environmental risk model(GERM) on GIS Platform which was stratified into two spatial entities based on filariasis risk index (FRI) as potentially high risk (FRI \geq 15) and no risk (FRI: \leq 15) areas. The model could be employed for spatial delineation on a macro scale particularly for non risk areas.
- Out of 218 *Bacillus thuringiensis* strains, one strain belonging to serotype H14 (VCRC B17) isolated from soil sample collected in Pondicherry was found to be extremely toxic to mosquito larvae. The spore-toxin complex of Bti was used as the active ingredient and two formulations, a WDP (40%) and a controlled release formulation (CRF) were developed. The WDP at 2.5-5 kg/ha for clear and 5-15 kg/ha for polluted habitats was found to have residual activity for about a week against *Culex quinquefasciatus*. The CRF at 10 kg(ai)/ha was found to have a residual activity for 15 weeks in disused wells against *Cx. quinquefasciatus*. The technology has been licensed to M/s Tuticorin Alikali Chemicals, Chennai.

- *Lymfasim* is a stochastic micro-simulation model, developed in collaboration with the Department of Public Health, Erasmus University Rotterdam, and The Netherlands. The model describes the individual life histories of human and the parasite and simulates the course of prevalence and intensity of infection in a dynamically changing population. Different control strategies can be simulated and optimized for coverage, duration and frequency of treatment, pattern of compliance under chemotherapy, and impact of vector control on the transmission and prevalence of infection. The model parameters have been quantified by simulating the impact of 5-year Integrated Vector Management programme in Pondicherry. The predicted trends showed that at least 13 years of vector control is required to reach zero prevalence of infection. This model has been used for determining the risk of acquiring new infection with different levels of coverage and duration of mass treatment with DE.
- The Probability Matrix was constructed using the relationship between community mf-load (cmfl), vector density and risk of infection index (RII). This matrix can serve as a ready reckoner for deciding intervention strategy depending on vector density and cmfl in an endemic situation. In an endemic area, parasite control should be initiated to bring down the cmfl < 2 and maintain resting density < 30 per man hour by introducing vector control so as to interruption of transmission.
- A grid sampling technique (with grid size of 25X25 Km) using RAP including ICT day blood antigeneamia, covering an area of 200 X 200 Km² spread over 13 districts in four states was developed for Rapid Epidemiological Mapping of Filariasis (REMFI). A sequential application of the RAP (QM followed by PEHW followed by ICT) is recommended for identification of endemic areas. No significant auto-correlation of filariasis prevalence was observed in the study area. This suggests that either absence of spatial pattern or if present, that may capture in grid sizes smaller than 25 Km². QM is cheaper (US \$4) followed by PEHW (US \$6) and ICT (US \$79).

Rajendra Memorial Research Institute for Medical Sciences, Patna

- Conducted successful Clinical trials of oral Miltefosine drug (Phase III & IV) and Paramomycin (Phase III) on kala-azar patients in collaboration with WHO/TDR, iOWH respectively. The first ever oral drug, miltefosine, is highly efficacious (94%) both in hospital and out-door setting without any major side effect, except its possible teratogenic effect. The drug has been approved and registered by the DCGI and is now marketed in the country and may be a good alternative to others injectable drugs at the community level. On the basis of results, the drug is included in the Kala-azar Elimination Programme of the Ministry of Health, Govt. of India. Injectable paromomycin, is also providing to be useful about 95% efficacy rate without any major side effects. These drugs may be of the choice to treat SAG unresponsive cases and VL cases co-infected.
- A direct agglutination test for serodiagnosis of kala-azar was developed. The study revealed that the freeze dried antigen which is stable at 56°C and does not require cold chain (relative to the aqueous antigen) should be used for routine surveillance of Kala-azar cases particularly in field.

- Controlled randomized clinical trial of Amphotericin B as compared to pentamidine in the treatment of antimony unresponsive Kala-azar patients revealed that Amphotericin B has higher cure rate (92%) with less toxic effect as compared to pentamidine.
- To replace fetal calf serum in the media for the primary isolation, cultivation and long term maintenance of *L. donovani* parasites, use of milk from common cattle of developing countries was successfully investigated. This replacement is quite inexpensive and no sophisticated facilities required for its preparation, making it ideal for researchers working in developing countries.
- A study on social and epidemiological aspects of VL in Bihar was carried out with the aim to prepare sites for vaccine trials and to document information on socio-cultural, demographic, epidemiological and entomological aspects of the disease. This study was carried out in 10 villages, covering around 20,000 populations, in Kurhani block of Muzffarpur district.
- Building of a new Tropical Diseases Research Centre, an extension of existing 50-bedded hospital. The preliminary work of site preparation at the construction site has been accomplished.
- Renovation and modernization of laboratories, OPD and Indoor. Creation of Molecular biology and epidemiology department was undertaken.

National Institute of Medical Statistics, New Delhi

Final Evaluation of CARE India's Integrated Nutrition and health project: Quantitative Survey - The survey was carried out in seven States – Andhra Pradesh, Bihar, Madhya Pradesh, Rajasthan, Uttar Pradesh, West Bengal and Orissa. The study showed improvement in antenatal coverage, tetanus toxoid and IFA coverage in pregnant women increase in fully immunized children; increase in pregnant, lactating women and children in age group 6 – 24 months receiving food from Angwadi Workers. All States except Orissa have shown a decline in percentage of malnourished children.

Coverage Evaluation Survey for SNID in Bihar-A multistage cluster sampling evaluation of pulse polio immunization coverage from urban and rural areas of two districts of Bihar was carried out. It was observed that 2% in Bhagalpur and 1% in East Champaran did not receive pulse polio drops; they were concentrated in a few clusters with higher concentration of Scheduled Castes and Muslims.

Survey on Causes of Death in Bihar and Rajasthan- The most common causes of death were infections and parasitic diseases, followed by diseases of respiratory system, etc. Deaths due to diseases of the circulatory system were found to be more common among females and especially among urban females than rural females.

Usage and Acceptability of Indian Systems of medicine and Homoeopathy-The Survey was done in 35 districts and showed that despite good acceptability for AYUSH, it is used mostly for chronic diseases.

An Innovative Study on Awareness about STD/AIDS among truck drivers in India - The study developed BCC model creating awareness on STD and HIV/AIDS and its preventive measures among high risk groups such as truckers, helpers and female sex workers. The baseline and end-line survey revealed appreciable behavioural change in prevention of STD/HIV/AIDS among people under study.

Determination of Risk Factors associated with maternal mortality in JJ Colonies of Municipal Corporation of Delhi - The study revealed that anaemia and unsafe delivery practices coupled with poor socio-economic conditions were potent risk factors associated with maternal death in slums.

Community based study to estimate the prevalence of STD/RTI in urban and rural areas of India- Provided technical support to National AIDS Control Organization for design, sample selection, monitoring and report preparation. The prevalence of STD in rural area was found to be 6.3% in high HIV epidemic zone and 5 per cent in moderate and low HIV epidemic zone.

Data management of analysis of NACOs HIV sentinel surveillance sites data 2002, 2003, 2004.

National Institute of Epidemiology, Chennai

- Conducts a 2-year FETP course with funding from WHO and support from GOI and CDC, USA.
- Phase-I of Aerosol measles vaccine trial completed.
- Carried out feasibility study on administering rabies vaccine through intradermal route.
- Completed construction of the new building for School of Public Health. The building was inaugurated by Hon'ble Minister of Health on 30th October, 2006 and dedicated the School of Public Health to the Nation.

Centre for Research in Medical Entomology, Madurai

- Field tested Pyrethroid-impregnated curtains to prevent transmission of JE virus. A single treatment of curtain with deltamethrin @ 25 mg/m² gave protection against vectors of JEV for about 5-6 months. Children inhabited in the treated huts had 97% protection against mosquito bites, and they received only 0.021 infective bites as compared to 1.137 infective bites in the unprotected huts. The state government adopted this technology in two JE prone PHCs of Cuddalore District.
- This is led to an improved surveillance tool by detection of JEV antigen. A system for monitoring the JEV infection in vector mosquitoes using ELISA on desiccated specimens was established.
- A novel forecasting software tool to predict the outbreak of Japanese encephalitis in Andhra Pradesh - Heuristic Engine (HE) has been used. This software is developed indigenously by the Indian Institute of Chemical Technology, Hyderabad which provides a mechanism whereby large entomological and other associated data can be digitized to project the prospective events of outbreaks.

- ELISA and Toxo-IFA system have been established for detection and isolation of dengue virus infection in vector mosquitoes. Methodologies for detection of all the four dengue serotypes has been developed.
- A patentable mosquito repellent (MosTyag) was developed from an indigenous plant.
- Developed a number of both surveillance and control tools with respect to vectors of JE, dengue and filariasis. Some of the technologies have been transferred to the national (NVBDCP)/State Health (Dept of Public Health & Preventive Medicine, Tamil Nadu) agencies for implementation.
- Developed the Dusk Index as an important parameter of JE surveillance.
- Illustrated keys to species of *Culex* associated with Japanese encephalitis was published.

Regional Medical Research Centre, Port Blair

- A state-of-the art leptospirosis research laboratory including facilities for research using cutting-edge techniques such as molecular biology and biotechnology. Facilities for serological characterization of isolates up to serovar level were established In 2004, the centre was recognized as National Leptospirosis Reference Centre and WHO Collaborating Centre for Diagnosis, Research, Reference and Training in Leptospirosis.
- A Leptospirosis Repository is maintaining leptospiral reference strains as well as isolates obtained from different parts of the country and elsewhere. The reference strains are required for preparing antigens for tests such as Microscopic Agglutination Test.
- Diagnostic for leptospirosis been producing test kits such as IgM ELISA and Latex Agglutination Test develop and supplied to other research centres/hospitals for leptospirosis diagnosis.
- A Microscopic agglutination test has been developed for diagnosis of leptospirosis. The test showed the sensitivity of 86% and specificity of 90%.
- The Centre has been conducting hands-on training workshops on laboratory diagnosis of leptospirosis.
- A study conducted in collaboration of HIV showed very high rates of Hep. B, the results helped the government to introduced Hep. B in the immunization programme in the Andaman Islands.

Regional Medical Research Centre, Bhubaneswar

- Study was carried out on immunological characterization of filarial antigens with potential protective response in endemic population. An aqueous insoluble detergent soluble fraction (Dssd1) was purified from the cattle parasite *Setaria digitata*. The antibody response to this antigenic fraction in human and in mastomys model for experimental filarial infection has been assessed.
- Presence of filarial infection was detected by circulating filarial antigen (CFA) test for presence of Og4C3 antigen in circulation, in children below 15 years. Study indicated that the infection is acquired early in the childhood which progresses to chronic filarial disease in the later phase
- The pathogenetic pathway was determined by using the inflammatory markers like α and IL-6, IL-8 in the chronic filariasis categories like

lymphoedema and hydrocele for diagnosis of infection and morbidity in lymphatic Filariasis.

- Study carried out on the role of IgA in protective immunity in human and experimental filariasis revealed that certain molecule(s) in the range of 66 kDa and 200kDa were found to induce protective IgA in putatively immune subjects. The susceptibility to filarial infections was correlated with decreased induction of filarial specific IgA.
- Therapeutic efficacy of chloroquine against *P. falciparum* malaria was evaluated in a selected district of KBK region indicated high resistance to it. The results have been communicated to the state health department for necessary strategy development in the malaria control programme in this region.
- Micronutrient laboratory was set up.
- New animal house has been constructed for maintaining lab animal like Bal b/c mice, guinea pigs, mastomys mouse for experimentation. Insectorium is being maintained to evaluate insecticides, study vector bionomics, and taxonomy.

Regional Medical Research Centre for Tribals, Jabalpur

- A community based study in tribals of Madhya Pradesh and Orissa showed presence of bacterial enteropathogens in stool samples of children which was typed into various diarrheagenic types using multiplex PCR. Isolated Enteropathogenic E.coli (EaggEC) Enterotoxigenic E.Coli (ETEC) and enteropathogenic E.Coli (EPEC).
- The prevalence of sickle Hb among the SC / ST of M.P. was high (18%) in Nimar area. The prevalence of β -thalassaemia trait was 1.6%.
- By using simple interventions like genetic counseling and folic acid treatment, the number of severe cases of sickle cell disease was reduced by about 70%.
- Malaria in relation to the Heterozygotes of Haemoglobinopathies: The study is in progress and showed the interactions between malaria & haemoglobinopathies. It was observed that malaria was absent in individuals having G-6-PD deficiency.
- Using CFA antigen assay for diagnosis of filarial infection and showed filariasis was a prevalence of 36% in Panna district of MP.

Institute of Cytology and Preventive Oncology, NOIDA

- Undertaking activities on preventive control of major cancer in a community set up using para medical staff and community health workers
- Development of HPV diagnostics for early detection of cervical cancer
- Genetic polymorphism in E6 and E7 Genes of Human Papillomavirus (HPV) Types 16 And 18 in Cervical Cancer
- Biological behavior of human papillomavirus infection of uterine cervix in Indian females
- Molecular markers for the detection and progression of cervical cancer
- Molecular genetic basis of cancer: analysis of genetic alteration and transcriptional profiling of genes during cervical carcinogenesis
- Polymorphism of cytokine gene, Tumor Necrosis Factor α (TNF α) in cervical cancer

- Cyclin D1 gene polymorphism in cervical pre-cancer and cancer
- Genetic polymorphisms and susceptibility to various cancers
- Study of BRCA1, BRCA2 and p53 genes mutations and expression in human breast cancer cells
- Transcription factors AP-1 and NF-kB in breast carcinomas
- Role of Promoter Methylation in the Expression of BRCA1 Gene in breast cancer
- Differential expression profile of Nuclear Factor-Kappa B (NF-kB) in oral cancer tissue
- Role of Transcription Factor Activator Protein-1 (AP-1) in oral carcinogenesis
- Effect of pesticide exposure in causation of cancer in North-East
- Transcriptional regulation of human papillomavirus gene expression in human cervical cancer cells
- Probability models to understand the risk factors and natural history of pre-cancerous and cancerous lesions of uterine cervical cancer
- Cytological diagnosis, menopausal status and hpv infection in postmenopausal women
- Development of prophylactic DNA-based genetic vaccine against human
- Morphological parameters and image cytometry of the fine needle aspirates of histo-pathologically confirmed benign and malignant breast and other lesions papillomavirus type 16 and 18
- Multimodal screening tools for early detection of cervical cancer and precancerous lesions
- Suppression of constitutive activation of host transcription factors, NF-kB and AP-1, in oral cancer by curcumin
- Clinical trial of polyherbal neem cream and tablet- 'praneem' in women with HPV Infection
- Socio-Behavioural Aspects of RTI's and HIV seropositivity including cervical dysplasia
- Breast Cancer: A multidisciplinary study on clinico-epidemiological and psychobehavioural aspects
- A Socio-behavioural study of people living with HIV/AIDS (PLWHA)
- Screening and diagnosis of pap smears as per Bethesda System of classification
- Comprehensive study of carcinoma esophagus at North-East India multidiscipline approach

Desert Medical Research Centre, Jodhpur

- Studies conducted on different bio-ecological aspects of malaria vectors namely occurrence, distribution and behaviour of different mosquito species, their insecticide susceptibility and resistance status and use of GIS techniques in desert areas have formed a firm base for formulating control strategies in a stratified manner under national control programme.
- Blood Glutaraldehyde Gelification Test for diagnosis of pulmonary tuberculosis was observed to be 84% sensitive and 94% specific for diagnosis of pulmonary tuberculosis. This needs to be validated for its

use at peripheral health centers as it does not require sophisticated equipment or highly skilled technical person.

- Dengue Virus isolations showing vertical transmission of virus have been accomplished among *Ae. albopictus* mosquitoes inhabiting tree holes. Since mid-gut proteins are being pursued as markers of vector competence by few workers as contemporary research, our this finding initiates a new direction of thinking, that is, presence of a protective protein makes a species non-vector or refractory and that Absence of this protein makes a species Vector.
- The dengue disease pathogen in Desert and Hilly terrain may be of less sustenance type in nature and occurrence of disease during pre-rains in these settings may be an imported infection, to be confirmed and studied further. An interesting trend is emerging that while etiology of DF is governed more by socio-cultural habits of the inhabitants in water scarce areas of Rajasthan, DHF seems to be the outcome of ecological set up of area where restricted ecological niche such as tree holes sustaining their own viral strain, may serve as determinant or regional risk factor of DHF.
- Inheritance of insecticide resistance in important malaria vector *An. stephensi*, mapping of insecticide resistance among the vectors of malaria and use of ovitraps for the surveillance and control of dengue vector *Ae. aegypti* are the important findings which would form strong basis for the effective implementation of National Vector Borne Disease Control Programme.
- Fully functional laboratories of virology and molecular biology with all required equipments have been developed.
- On-line library with all modern facilities has been developed.
- The centre is computerized with networking facilities. Conference hall for 25 persons having modern audio-visual aids and gadgets has been furnished.

National Institute of Occupational Health, Ahmedabad

- Stabilometry for fundamental understanding of postural control
- Work systems analysis technique, referred to as a multi-method ergonomics review technique (MMERT),
- *Human Exposure to Hot Environment* : The walk-in environmental chamber of the Institute is utilized to evolve criteria for permissible exposure of men and women to hot environment. A biophysical human model developed based on the characteristics in Indian population has many utilities in standardization of the human heat exposure guidelines. A new method of rehydration (ingestion of glycerol-water mix) has been proposed for improving performance in hot environment.

Operational research

- Prevention and Control of Silicosis and Silico-tuberculosis in Agate Industry, Khambhat: The community health center at Khambhat was strengthened by giving new x-ray machine and silicosis cell was established for the benefit of the workers. Based on our findings, agate industry has been declared hazardous process under the Factories Act.
- Occupational Health Problems of Tobacco Harvesters and its Prevention : NIOH reported high prevalence of GTS in the harvesters of all the

varieties of tobacco. Series of field testing yielded that nylon gloves is suitable to bring down nicotine absorption as well as the incidence of GTS. To popularize the use of these gloves awareness programmes were organized with the help of NGOs and Central Tobacco Research Institute in Andhra Pradesh. Bureau of Indian Standards (BIS) has appreciated the use of gloves in preventing GTS and has set up a committee to develop its standards.

- Prevention and Control of Occupational Health Hazards among the Salt Workers Working in Desert Areas of Gujarat and Western Rajasthan.
- Local Exhaust Ventilation System - Reduction of Welders Exposure to Welding Fumes. Two (portable and mobile) local exhaust ventilation (LEV) units were developed and efficacy of this system was tested. About 88% manganese content was reduced from the breathing zone of the welder after introducing local exhaust ventilation system.
- Fish Processing Industry. Fish processing women face occupational health problems due to exposure to extremely cool work environment. The intervention study showed that wearing of gloves improved hand skin temperature and prevented occurrence of cold related skin problems.
- Evaluation of occupational health problems of cycle rickshaw pullers and redesign of cycle rickshaw on ergonomic principles. A patent has been filed for this activity.
- Established Poison Information Centre.
- Effects of Endosulfan on growth and development of children. The study demonstrated the effect of endosulfan on development of male reproductive system, neurobehavioural development, congenital malformations in female children and endocrine disrupting effects in male.
- ROHC (S) building construction completed.
- Modernization of laboratories, namely molecular biology, analytical instrumentation laboratory, pesticides and tobacco analysis laboratories, ergonomics, poison information center, trace metals laboratory.
- Extension of NIOH library building.
- Renovation of canteen and guest house facilities.

Institute of Immunohaematology, Mumbai

Fundamental and strategic research

- Invitro expansion of hemopoietic stem cell using umbilical cord blood 15 times expansion was possible using a combination of early and late acting hemopoietic growth factors.
- Mutation detection in Glanzmann's Thrombosthenia with a view to understand platelet hyperactivity in coronary artery disease. Seven new mutations were detected GPIIIa gene this gives an insight about polymorphisms in different areas of this genes which can lead to platelet hyperactivity.

Product development and evaluation

- Development of Elisa technique for factor VIII inhibitor to be used in pharmaco vigilance study for coagulation factor concentrate.

- Patented technology for thalassemia mutation screening using covalent reverse dot blot hybridization technology.
- Development of monoclonal antibody against blood group B, N and HbF (applied for patent).
- Development of cordocentesis technique for prenatal diagnosis of hemophilia in second trimester.

Genetic disorders

- Jai Vigyan Project on community control on thalassemia gave clear policies on how to control and manage hemoglobinopathies in this country.
- Intervention Programme for sickle cell anaemia in primitive tribes: This project showed low cost intervention in terms of iron supplementation anti-helminthic therapy clearly improves the lives of sickle cell anemia patients in these tribes
- Prenatal diagnosis for hemoglobinopathy has been now a well established programme and is ready to be used by different hospitals in the country for use by the community.
- Hyperhomocysteinaemia was found to be a major problem in coronary disease artery of the young. 60% of this condition is controllable by an affordable oral folic acid therapy.

Health issues of underprivileged sections of society

- Study on G6PD mutation in the tribal population showed several new mutations in India like G6PD Namuro, several mutations were uncharacterized and the work is progressing in this area.

Institute of Pathology, New Delhi

- Autologous skin transplanation: Technique standardized to culture skin biopsy from burns patient for autologous transplantation; clinical trials have been performed
- In-vitro cultivation of differentiated epidermis from human keratinocytes suitable for autologous grafting in burns patients.
- In vitro culture of tumour cells: A model established to evaluate cytotoxicity of immunomodulator & chemotoxic drugs for application intravesically in an attempt to give individualized treatment to bladder cancer patient
- Establishment of mutation database for Indian breast cancer patients
- Two novel genes were identified in Leishmania – Centrin which is growth regulated gene and A1 which is amastigote specific gene
- Development of centrin knockout mutants as potential candidates for vaccine against Leishmaniasis
- Using microarray technology to study gene expression in PKDL. Studies revealed preponderance of surface proteins such as gp63, PSA and Calpain like protein in PKDL. This is the first study implicating factors of parasite origin in PKDL pathogenesis
- Molecular differences were established in parasites of PKDL origin compared to these of KA origin at rRNA locus.
- Developed simple, reliable and economical immunological tests for diagnosis of KA and PKDL. The test include ELISA based on

recombinant and crude antigen as well as Direct Agglutination Test. These tests are currently in use for providing diagnosis in suspected cases

- Detection and localized of antimony in PKDL patients undergoing SAG therapy using EDS micro-analytical studies
- Monoclonal antibodies developed for diagnosing patients with C. trachomatis infection
- Diagnostics developed for chlamydial infection (lower genital tract, CAD) including FISH, Nested PCR
- Mouse model developed for chlamydial salpingitis
- Using of placenta as a model to monitor organic pollutants
- Detection of C.trachomtis by FISH using 16s rRNA probe in clinical samples.
- New state-of-the-art facilities were created for conducting the genomic, molecular and other research studies by the Institute's scientists. Following sophisticated equipments were purchased from extramural/intramural projects: Flow Cytometry lab, Confocal Laser Scanning Microscopy lab, Real Time PCR and DNA Sequencing lab, Microarray Lab.

Regional Medical Research Centre, Belgaum

- Initiated evidence-base knowledge in the area of traditional medicine related to maternal health and childcare.
- Disease survey in the region based on hospital records have been initiated for providing important information on the health status of the local population.
- Data base on ethno medicinal plants from Western Ghats of India is being developed at the centre to document traditional knowledge.
- Established laboratories for phytochemistry, epidemiology and museum of the medicinal plants of the Western Ghats.
- Training in the area of identification of plants and herbarium preparation to graduate and postgraduate students.

National Centre for Laboratory Animal Science, Hyderabad

- The center has bred 1,29,873 animals (rodents and lagomorphs) and supplied 1,08,530. The center also supplied 89 tons of laboratory animal feed.
- Under annual training programmes the centre trained 69 persons in the laboratory animal science and technology. It also conducted short-term training programmes to 106 persons in different aspects of the laboratory animal science. In addition the center also provided onetime training to students of Diploma in Medical Laboratory Technology.
- The centre has developed novel mutant obese rat models for research in obesity and related degenerative disorders. Though there was a trend in the reduced binding of leptin to its receptor in the brain of these animals, the gene sequencing studies showed no alteration in the leptin or its receptor. It was shown that they could be used as models for ageing as they showed increased levels of lipid and protein oxidation with low levels of antioxidant enzymes. These mutants were found to be useful in

evaluating hypolipidemic and hypoglycemic effects of turmeric and curry leaves.

- Animal physiology laboratory was established in the centre
- A state-of-the-art Primate Experimentation Facility was established with mandatory infrastructures like 'environmental enrichment gadgets, X-ray, facilities for quarantine and health monitoring.

Food & Drug Toxicology Research Centre, Hyderabad

- An intervention programme to sensitize the public on rational use of drugs was developed and used to educate the masses on rational practices in drug usage.
- Antimutagenic property of ginger was observed in *in vitro* and *in vivo* studies. Ginger was shown to possess antioxidant property and this could be one of the explanation for its antimutagenic property.

Regional Medical Research Centre, Dibrugarh

- Mapped the mosquito fauna of North-East
- Trained Medical and Paramedical staff of North-Eastern region and Armed forces in malaria diagnosis, treatment and vector biology.
- Developed a module to control malaria in forest and forest fringe setting
- Identified the sibling species of *An. dirus* and genotyped
- Studies on combination drug therapy in drug resistant malaria
- Studies on antimalarial resistance in Arunachal Pradesh
- Developed a diagnostic kit for diagnosis of paragonimiasis
- Developed murine model for Paragonimiasis
- Worked out pathogenesis and pathology of paragonimiasis in experimental animal
- Genotyped *Paragonimus westermani* in India and *Paragonimus heterotremus* in India
- Studies on Paragonimiasis among the tribal of Arunachal Pradesh
- Worked out a module for early warning of JE using GIS/RS
- Developed an electronic data-base for some medicinal plants of Northeast
- Started MSc Biotechnology course in collaboration with Dibrugarh University
- Done molecular characterization of Methicillin resistant staphylococci in Assam
- Established facilities for molecular characterization of *Mycobacterium tuberculosis* and drug resistant *plasmodium falciparum* in Northeast for surveillance at molecular level
- Studied some less familiar food and found iron rich and zinc rich plants
- Established food value of some unconventional food which can be used as food supplement
- Elimination of filariasis from tea tribes of Assam
- Started population genetics work to understand genetic mechanism of hypertension and salt sensitive character
- Started comprehensive studies on oesophageal cancer to understand molecular basis and other factors for familial aggregation of oesophageal cancer

- Started risk factor surveillance of non communicable diseases
- Established 6 cancer Registries in North-East
- Studied Hypertension and CHD among Mizo population
- Studied Morbidity profile in Sikkim

National Institute for Research in Reproductive Health, Mumbai

- The interim analysis of the multicenter study evaluating the safety, efficacy and reversibility of norethisterone enanthate provides very convincing evidences to suggest that the injectable contraceptive norethisterone enanthate could be introduced in the programme, and made widely available.
- Studies carried out at the Institute have shown that by providing appropriate IEC material about emergency contraception (Yuzpe regimen or levonorgestrel) a large percentage of unintended pregnancies can be averted. This IEC material on emergency contraception is being widely used both outside and within the country. In Mumbai, it has been used by the Mumbai Municipal Corporation and throughout the country by Family Planning Association of India.
- A longitudinal study of improving involvement/responsibility of men in Family Welfare has led to the designing an action research to understand the involvement of men in not only family welfare/contraceptive use but also in maternal health, RTI/STIs and HIV/AIDS.
- Men's participation in safe motherhood: A study has been undertaken to identify the facilitating and constraining factors with regard to male involvement in maternal health from the perspectives of men, women and the maternal health care providers. Following this, culturally specific intervention model would be developed to promote better maternal health.
- Technical expertise in DNA sequencing, 2D proteomics and real time PCR has been acquired to run an Advanced Functional Genomics Facility
- In the area of female fertility regulation, a human FSH binding inhibitor (FSHBI) has been identified in the ovarian follicular fluid. FSHBI blocks FSH binding to granulosa cells, suppresses ovulation and induces follicular atresia in rodents and nonhuman primates.
- Efforts were made to study known anti-microbial peptides such as magainin (isolated from frog skin) and nisin (isolated from bacteria *Lactococcus lactis*). The studies conducted so far with the gel formulation of these peptides reveal anti-STI as well as antifertility activities of these compounds. These compounds have been found safe to vaginal epithelium even upon repeated administration with high dose in rabbits. Recently a peptide (SSP-12) having spermicidal and microbicidal activities have been isolated and purified from the hemolymph of Indian mud crab *Scylla serrata*. Tests to check the anti-HIV activity of this peptide are currently underway.
- Four ELISA kits have been developed for estimation of urinary estrone glucuronide, pregnanediol glucuronide, luteinizing hormone and follicle stimulating hormones. The technology developed for these kits has been transferred to industry through Biotech Consortium India Limited.

- The Institute has developed a simple method for the evaluation of sperm quality - Resazurin Reduction Test. The test is based on reduction of resazurin by mitochondrial enzymes of metabolically active sperm cells to resorufin. The test can be performed with relatively small volume of semen and results obtained within a short time interval of one hour.
- In view of the relevance of bone turn-over markers in diagnosis and monitoring the response to treatment in osteoporotic patients, the institute has developed in-house assays for Osteocalcin (OC).
- Chlamydia trachomatis infection and Human papilloma virus are related to pelvic inflammatory disease and cervical cancer respectively. A Polymerase chain reaction (PCR) has been standardized for diagnosis of these infections.
- Programmes on the molecular mechanisms involved in interaction of gonadotropins with its receptors carried out so far have shown the functional relevance of certain specific regions on the ligand as well as on the receptor. The information will be used in developing potent agonists or antagonists of gonadotropins action.
- Several compounds have been tested for general, local, reproductive and developmental toxicity. These compounds include Nisin, a known antimicrobial peptide explored at the institute for its spermicidal and antimicrobial activity against STI/RTI; Basant, developed by Talwar Research Foundation, New Delhi as a microbicide; testosterone Spray developed by CIPLA Pharmaceuticals (Mumbai) for the treatment of infertility in hypogonadal men, and *Pippaliyadi vati*, a potential female contraceptive. In addition, studies investigating toxicological effects of Bisphenol A, (an endocrine disruptor used in the manufacture of polycarbonate plastics, epoxy resins, dental sealant etc) on fertility of male rats was also undertaken.
- Microdeletions in Y chromosomes, anomalies in karyotype and abnormalities in sperm chromatin packaging have been identified as some of the causative factors of infertility in men. Some genetic loci have also been identified in spermatozoa, which when imprinted incorrectly, contribute to early pregnancy loss.
- Studies to understand the role of spermatozoa in transmission of HIV have demonstrated for the first time the presence of CD4 independent 160 kDa HIV binding sperm protein, having a homology with mannos receptor, indicating the existence of an alternate mode of cell-HIV interaction. A differential expression of this protein in sperm samples of individual donors was also observed. These findings will help develop an effective strategy for intervention and/or prevention of HIV transmission through the sexual route.
- Developed an “in-vitro” model to assess the transfer potential of the commonly administered drugs viz. Paracetamol, Aspirin, Rifampicin, Theophylline and Acyclovir in terms of milk/plasma (M/P) ratios. Preliminary results demonstrate a significant association of genetic polymorphisms with metabolizing pattern of the drugs.
- To obtain data on the causes of death, a verbal autopsy was carried out in different parts of Maharashtra and the data obtained is applicable to the entire State.

- In collaboration with the WHO randomized multicentre double blind studies have been conducted at the institute to develop an optimal and effective dosage for first and second trimester abortions and also study the utility of misoprostol as a cervical ripening agent. Studies pursued have revealed that 200 mg of mifepristone is as effective as 600 mg. Misoprostol only regimen is also effective for second trimester termination with vaginal route more effective with least side effects than the oral or sublingual route. Pretreatment of the cervix with misoprostol helps in cervical ripening and eases performing vacuum aspirations.
- Unwanted pregnancies are a reflection of the unmet need for contraception, contraceptive failures and are due to perceived low risk of pregnancy by women. A study pursued in this direction revealed that women from low socioeconomic strata resort to traditional methods like withdrawal, rhythm method or irregular use of condoms resulting in the need for abortion. Nearly one fourth of the pregnancies were preventable with the use of emergency contraception. Creating awareness about the side-effects of induced abortion, thus making them opt for effective contraception rather than rely on abortion to control fertility is a promising intervention strategy.
- A community based intervention project to improve service utilization of adolescents at selected health posts has been operational in collaboration with health department of Municipal Corporation of Greater Mumbai (MCGM). As a part of intervention, Adolescent Friendly Centers have been established at the two health posts of MCGM. The study will demonstrate a model for improving accessibility of sexual and reproductive health services to adolescents within the existing health infrastructure. The model can be adopted by the government in strengthening adolescent health services under the RCH program. In the area of contraception, the study on assessment of knowledge, attitude and felt need for emergency contraception (EC) among adolescents and youth revealed the tremendous need for creating awareness on EC. Accordingly, IEC material on EC has been developed for use by service providers as well as the community.
- Prevalence studies revealed that 30-35% men and women are osteoporotic. However, BMD measurements at the hip, spine and foot were found to be approximately 15% lower than the age matched women in the USA–Hologic database. Osteoporosis at the spine occurs earlier than at the hip and foot. Men are more susceptible to osteoporosis at the forearm. Crosslaps in comparison to osteocalcin is a more sensitive marker for the prediction of bone remodeling in osteoporotic women on therapy.
- Conducted clinical trials to evaluate the safety and efficacy of microbicides such as Praneem Polyherbal Tablet (PPT), Cellulose Sulfate (CS). Phase I and Phase II trials conducted with PPT indicated its safety, efficacy and high acceptability. Similarly, the multicentre randomized, double blind study demonstrated vaginal safety and acceptability of 6% CS gel compared with KY jelly.
- A study was conducted to assess the capacity of primary health care system in a district to manage RTIs. The study has provided pilot information on the necessity of specific training and facility up-gradation

for operationalising RTI services integrated with family welfare services. Subsequently, at the behest of the ministry, Government of India, the institute took up responsibility of developing “National Guidelines for Management of RTIs/STIs” that is envisaged to be incorporated in the RCH-2.

Genetic Research Centre, Mumbai

Validity of expression of FMRP in lymphocytes as a screening test for Fragile X syndrome

The results of our antibody test correlated well with that of southern blots. Sensitivity of the test was 100% and specificity was 97.5%. This test is rapid, simple and cheap, thus making it an ideal choice for screening large groups of male mental retardates as part of the national mental health programme.

Ascertainment of chromosome 22 microdeletion in cases of Non-Syndromic Congenital Heart Disease

Congenital heart disease is a second common birth defect. We investigated a series of 105 cases with isolated cardiac defect. Karyotypic analysis revealed a normal chromosomal complement. However, 6 patients showed microdeletion of chromosome 22 by FISH analysis. FISH technique is more sensitive than classic cytogenetic. This technique will help in genetic counselling and prenatal diagnosis.

Development and validation of ELISA for HbA2- A novel screening method for B-Thalassaemia carrier

The ELISA was developed successfully at Genetic Centre and has great utility in control of B-Thalassaemia in developing countries like India. ELISA is simple, accurate, inexpensive and precise making this test a suitable candidate for transforming into a user friendly kit.

Cryptic chromosomal rearrangement in couples with 3 or more recurrent abortions

1000 couples with 3 or more recurrent abortions were karyotyped after ruling out all other causes of abortions. 18 translocations were identified. 1.8% translocation was common in females while variant i.e. 3.9% were common amongst the males. Sperm FISH for aneuploidies was performed in 50 male partners; 5% aneuploidies were revealed, making this test mandatory for IVF Programmes.

National Institute of Nutrition, Hyderabad

- Micronutrient enriched millet based biscuits were developed by A.P. Foods, Government of Andhra Pradesh, under the technical guidance of NIN, for supplementation as snack food, in addition to MDM among primary school children in the State of Andhra Pradesh.
- The deterministic role of hydrophobicity in chaperone-like activity of α -crystallins (it does not quantitatively correlate with its chaperone function) has been demonstrated. A new assay was developed to study the chaperone-like function of small heat shock proteins including eye lens α -crystallin.

- Fat requirements and identification of proper blends of different vegetable oils to achieve optimal ratio of n-6 & n-3 PUFA for promoting cardiovascular health were achieved.
- Synergistic effects of sesame lignans with vitamin E in both *in vitro* & *in vivo* conditions and increased thermal stability have been established.
- One of the earliest biotechnology products developed in the country i.e Interferon alpha 2B of M/s Shantha Biotech was tested for safety at the Pre-clinical Toxicology Center of the Institute.
- Safety studies were designed for r – DNA Rabies vaccine, which was developed by the IISc Bangalore and produced by Indian Immunologicals, The team found that DNA vaccine plus cell culture vaccine gave the best protective titre. Safety issues of residual DNA was fully addressed using appropriate techniques.
- Histopathology services have been provided to preclinical studies conducted by reputed Institutes / organizations like IICT- CSIR, Dr.Reddy's research, Virchow Biotech, Cadila, Sipra labs and Department of pharmacology KEM hospital
- Genetic polymorphism analysis was done in Andhra population. This revealed the high prevalence of Pro 12 Ala polymorphism.
- A novel function of human resistin as a pro inflammatory molecule was identified. Structural analysis of resistin and adiponectin and their implication in functional role were studied. Transacting factors to regulate resistin were identified and these are shown to be stress regulated.
- Studies demonstrated that turmeric and curcumin (active ingredient of turmeric) delay diabetic cataract in rats and also established modulation of chaperone activity of α -crystallin under diabetic cataract by curcumin. Established that tannoid principles of *Emblica officinalis* exert anticataractogenic potential in ex vivo system by inhibiting aldose reductase.
- Studies conducted at NIN showed that food restriction decreases the aggregation of lens proteins due to various stresses but vitamin restriction increases the aggregation and that Dicarbonyls induce cataractogenesis in organ culture due to altered structure, stability and function of α -crystallin.
- A large intron in the mouse resistin gene was identified which contained *cis* and *trans* acting elements and provided TZD responsiveness.
- A novel method to express recombinant protein in soluble fraction was developed. This will help in expressing and purifying difficult protein in *E.coli*.
- Surveys on diet and nutritional status of population were carried out at district level in Uttar Pradesh and Uttaranchal, to provide information which is essential for policy making, implementation and formulation of strategies to specifically control undernutrition in those states.
- Carried out large-scale community studies, which have confirmed positive impact of Double Fortified Salt on iodine and iron (haemoglobin) status of the community.
- Micronutrient deficiency associated with calorie restriction appeared to negate the beneficial effects of calorie restriction on the subjects'/ animals' antioxidant status.

- A National Facility for Estimation of Vitamin A from Dried Blood Spot was established.

Extramural Research Program

Epidemiology and Communicable Diseases

- In an effort to develop women controlled contraceptive devices a study was initiated by ICMR on development of vaginal microbicides from a food preservative called nisin. The preliminary studies on Nisin peptide have indicated that this compound causes sperm immobilization, noncytotoxic and is expected to be harmless to the vagina. Nisin inhibited the growth of several STI pathogens but not HIV-I and HIV-II.
- Studies carried out in Manipur have shown that most of IDUs belonged to a group of 21-25 years and the preparations of IDUs declined as the age advanced, highest prevalence of HIV was found in 31-40 years age group. About 17% of the IDUs were found to be unemployed and 34% were students which is alarming. Heroin was most commonly used drug (55%) followed by spasmoproxyvon and other narcotic analgesics.
- A multi-centric study conducted on use of “Intradermal rabies vaccines for post-exposure prophylaxis (PEP) of animal bites in India” using four indigenous vaccines (Abhayrab PVRV, Coonoor PVRV, Rabipur PCECV and Vaxirab PDEV) administered intradermally and French PVRV (Aventis) given intramuscularly indicated that all the vaccines given intradermally were safe. Three vaccines i.e. Abhayrab PVRV, Coonoor PVRV, Rabipur PCECV produced immune response above the protective level in all the volunteers and the immune response was sustained till 90 days of follow-up. The response to Vaxirab PDEV was low both in terms of geometric mean values and sero-protection rates. Based on the results of the present study, three vaccines i.e. Abhayrab PVRV, Coonoor PVRV and Rabipur PCECV are recommended for intradermal administration in India. Intradermal administration will be useful in the places catering to large number of patients needing PEP against rabies.
- A national reference centre for Leptospirosis” at RMRC, Port Blair has been set up at RMRC, Port Blair. The leptospira repository developed provides services including diagnostic services, typing of isolates and supply of reference strains, test materials etc. to hospitals and research institutions in India. Microscopic agglutination test (MAT), performed on various samples obtained from these institutions have shown that the most common serovar was Icterohaemorrhagiae, followed by Canicola, Sejroe and Hebdomadis and Autumnalis.
- Evaluation of the role of alpha-tocopherol and oxidant-antioxidant balance in the treatment of bronchial asthma was undertaken at the Vallabhbhai Patel Chest Institute, Delhi. The study showed that both the treatments, inhaled beclomethasone dipropionate (Group A) and inhaled beclomethasone dipropionate supplemented with α -tocopherol (Group B) resulted in significant improvement in symptom status, decreased the occurrence of nocturnal exacerbations, increased the percentage of asymptomatic days and reduced the requirement for rescue salbutamol.

- The interim results of Phase I of the Field Programme for the Epidemiological Studies in Leprosy at Ghatampur s initiated with the objectives of studying the disease profile in the community and also the effect of treatment regimens in the field show that about a quarter of cases were below 15 years of age, half of the cases were aged between 16 to 45 years of age and the remaining quarters were above 45 years of age. Nearly 10% of all the cases were skin-smear positive at the start of treatment.
- Under the Task Force project on H.Pylori, a study carried out at AIIMS; New Delhi to characterize the H.Pylori infection based on Cag A locus, presence of vaculating cyto-toxin gene (VacA) showed that active H.Pylori infection with negative C14 UBT was associated with iron deficiency anemia (OR 4.54, 95% CI 1.8, 11.8); after correcting for age, sex and overcrowding. The multivariate analysis further showed that past H. pylori was independently associated with iron deficiency anemia after correcting for age, sex, mothers education, presence of regular toilet, type of housing, and source of water in subjects from households, which were not overcrowded (OR 0.25 95% CI .22, 2.7). While in urban slum setting the study concluded that over 75% of infants get infected with *H. pylori* as early as 10 weeks of age. With no strong association of maternal and infant infection indicating that infants may be infected from other sources than the mother
- At L.T.M Medical College, Mumbai a study carried out to isolate and identify *Clostridium difficile* (CDAD) in patients with diarrhea, faecal samples of 250 hospitalized children in the age group of 5-12 years who developed diarrhea on receiving antibiotics/ antimetabolites for different medical problems for more than five days duration and fecal samples of 250 age and sex matched controls were studied. Overall positivity of *C. difficile* was 18% in the study group. Among ELISA, tissue culture test, and abdominal pain, severe diarrhea and liquid stool with mucus and blood were more sensitive predictors for CDAD. Patients with fever were statistically significant among patients. Use of cefotaxime and amikacin in combination before admission was statistically significant whereas ampicillin use before admission was not significant in the study. Amongst *Clostridium difficile* diarrhea, 68.89% responded to antibiotics and 31.11% responded to metronidazole.
- Under Task force on RS and GIS, the distribution of Indian anophelines and spatio-temporal evolution of malaria in reference to recent epidemics that occurred in Mewat region, Haryana, Remote Sensing (RS) and Geographical Information System (GIS) were applied in a study carried out by the NIMR, Delhi. Distribution of important malaria vectors namely *Anopheles minimus* and *An. dirus* in north-eastern region of India were mapped to correlate with environmental and ecological parameters. Based on this study, favourable areas (high, medium and low) for each species based on forest cover, temperature, rainfall and altitude were identified. Using GIS in Mewat area 5 malaria paradigms, irrigation, command, catchment, mining, urban and floodprone areas were identified. In entomological surveys, two vector species, *An. stephensi* and *An. culicifacies* were found. The study has thus indicated the hot

pockets need to be monitored regularly. A Geo-environmental risk model (GERM) for predicting filariasis the filarial risk map has been developed and evaluated for its prediction. The model fitted well with filariasis risk areas identified by field surveys and also from antigenemia testing by ICT kits suggesting that the GERM on GIS platform could be employed for spatial delimitation purpose on a macro scale, particularly to identify 'non-risk' areas.

- A study carried out to test the operational feasibility and impact of mass annual single dose DEC or co-administration of Albendazole and DEC for lymphatic filariasis control at district level by VCRC, Pondicherry, and National Institute of Communicable Diseases (NICD), Delhi in Tamil Nadu and Kerala respectively revealed that there are suggestive evidences that DEC + Albendazol co-administration have an edge over DEC alone in reducing the mf levels and antigenemia prevalence. Further the co-administration had an added advantage in reducing the intensity and prevalence of soil transmitted helminthes.
- Phase IV trial conducted in Bihar using oral miltefosine/Impavido showed that it can be safely and effectively used in adult and pediatric patients under out-patient conditions and is considered suitable for its use in the VL control program in an area where the disease is endemic.

Non-communicable Diseases

Mental Health

- A pilot study to assess the mental health effects in populations and available service delivery models in earthquake affected areas of Gujarat was completed. The definitive need to focus on emotional and psychological needs of the disaster affected populations was highlighted. It was observed that communities and populations can and do take care of their emotional and psychological needs with their own resources.
- Mental health needs assessment and service delivery models in tsunami affected population of coastal Tamil Nadu were assessed. The exposed population was found to have higher psychiatric morbidity, but the prevalence of PTSD was lower compared to that reported in studies carried out internationally in disaster situations. Depression and anxiety were most common reaction during first eight months after the disaster.
- A study on "urban mental health problems and service needs" indicated that average service load in the specialist mental health services is largely carried by the Govt. sector (half to two thirds), followed by the private sector (one third to half), with only a small portion by the NGO sector. However, for the primary care general health services, average mental health service load is largely carried by the private sector, with significant contribution from the non-formal service providers, while minimal at government level.

Non-communicable Diseases Surveillance

- A six site feasibility study on surveillance of risk factors for NCDs in the urban, rural and slum population was coordinated using the adapted WHO Stepwise approach. The experience has been utilized to develop the NCD surveillance module under the Integrated Disease Surveillance Program (IDSP).

Gastroenterology

- Non Response to Interferon Therapy in Patients with Chronic Hepatitis C was studied it described the host and viral genetic factors for non-response to interferon therapy in patients with chronic hepatitis C. This is the first study in India which would impact on improving therapy and outcome indicators

Cardiovascular Diseases

- Various components of the “Jai Vigyan Mission Mode Project on Community Control of Rheumatic Fever/Rheumatic Heart Disease in India” project, including the epidemiology, typing of rheumatogenic strains, RF/RHD registries and development of a vaccine against streptococci were developed to provide strategic methodology for control and prevention of rheumatic fever and rheumatic heart diseases in the country.
- A multi-centric hospital based case control study on newly diagnosed ischaemic heart disease (IHD) subjects was initiated at four centers Bangalore, Delhi, Hyderabad and Lucknow, to identify new risk factors for Acute Myocardial Infarction (AMI) and quantify their association with CHD. The study identified factor(s) associated with the risk of IHD.
- Extramural projects a special drive are being supported in North-Eastern Region

Diabetes

- Guidelines on management of type 2 diabetes at primary care level have been developed.

Oncology

- The National Cancer Registry Programme (NCRP) was strengthened by adding continued to provide information on eight new registries
- The cancer atlas project estimated minimum cancer incidence rates for a large number of districts in the country. Study on cancer care patterns has been initiated.
- A seven-month long ICMR-WHO study gathered baseline data on prevalence as well as type and quantum of tobacco use on large representative samples of Uttar Pradesh and Karnataka. Money spent on tobacco, reasons for initiation and quitting tobacco use, attitude of community towards certain legislative measures were also studied.
- Guidelines for management of cancer of buccal mucosa and chronic myeloid leukaemia have been reviewed to assess their appropriateness for India.
- Screening of cancers of cervix, breast and oral cavity has been initiated in three districts of Himachal Pradesh.

Asthma

- A four-centre study on prevalence of asthma showed the prevalence to vary between 1.69% to 3.47% and addressed aetiological issues.

Neurosciences

- An epidemiological study on major neurological disorders was carried out in Kolkata which covered population of 52,377. The results on major neurological disorders were as follows.
- Stroke, high age adjusted prevalence rate (765.6/100,000) was found which compared with the rates documented in western countries. For the first time, it has been possible to document the prospective community based incidence rate of stroke which, when age adjusted was 222/100,000. The 30 days case fatality rate was 36% and residual total disability was 15%.
- Epilepsy : the age adjusted prevalence rate (516.5/100,000) compared well with the mean prevalence rate of other studies from India.
- Movement disorders: it has been possible to document for the first time the prevalence estimate of primary and secondary dystonias (55/100,000) in India. Prevalence of Parkinsonism was 74/100,00, but age specific prevalence showed higher rate with advancement of age, increasing up to 544/100,00 in the age group 70-79 years.
- Mild Cognitive Impairment (MCI) was 6.04% in population aged 50+ years.

Disability

- A task force project was undertaken to study the epidemiology of disability, develop and evaluate strategies for prevention of disability in early childhood utilizing existing channels of health care, social development and principal of community participation. The project has developed a number of modules : (i) module for prevention of disability, (ii) module for screening and identification of disability, (iii) module for rehabilitation, (iv) referral services.

Databases on NCDs

- The multi-centric community based Task Force project on determination of cause –specific mortality using Verbal Autopsy technique carried out household surveys in five states tested a mechanism to improve the death registration system in the country. It has also given data inputs for modeling the signs/ symptoms preceding death due to a particular cause.
- Another study quantified the increasing burden of non-communicable diseases in the country using the information from disparate epidemiological studies.

Basic Medical Sciences

- Modern Drug Development Initiatives : The Pre - Clinical Toxicology Unit set up at NIN, Hyderabad . The Clinical Pharmacology Unit set up at TRC, Chennai in collaboration with Clinical Pharmacology Deptt. of Madras Medical College (MMC), Chennai. Advanced Centre for Research in Clinical Pharmacology of Traditional Medicine set up at Dept. of Clinical Pharmacology, BYL Nair Charitable Hospital and TN Medical College, Mumbai.
- ICMR centre on pharmacological research for drug development in selected traditional remedies set up at Central Drug Research institute

(CDRI), Lucknow pursued specific plant extracts which include Picroliv (hepatoprotective), *Centalla asiatica* (wound healing), *Terminalia chebula* (adaptogenic/antistress)

- Clinical Trial on Vijayasar: Completed a multicentric clinical trial on Vijaysar was initiated at four centres (Chennai, Kottayam, Cuttack) to evaluate its efficacy in newly diagnosed diabetics in a double blind flexible dose study using rastinon as the alternative drug.
- Four compounds from the pulp of *Eugenia jambolana* have been granted Indian and US process patent and has been filed for Indian product patent for hypoglycemic activity. They also lower cholesterol.
- Status report on *Pterocarpus marsupium* (Vijaysar), *Streblus asper* (Shakhotak) and *Saraca indica* (Ashoka) was prepared at the Institute of Himalayan Bioresources Technology, Palampur. The same Institute successfully undertook agrotech studies on cultivation of *Picrorhiza kurroa*.
- Biomedical Ethics
 - The Ethical Guidelines for Biomedical Research on Human Subjects have been drafted for Legislation for placing before the Parliament.
 - Prepared Guidelines for ethical use of Laboratory Animals in medical colleges and coordinated modernization/development of animal facilities of ICMR institutes/centers conforming to INSA/CPCSEA guidelines.
 - Established Bioethics Website (<http://www.icmr.nic.in>)
 - Prepared ethics curriculum for medical schools and universities
 - Conducted training workshops for researchers, sponsors and policymakers in all states of the country
 - Setting up FERCI (Forum for Ethical Review Committee in India)
- Human Genetics
 - The multicentric studies carried out on Handigodu Disease, Sickle Cell Anaemia Thalassaemia which resulted in significant information for the treatment & management of these diseases
 - Short term courses in Genetic Counselling were held at SGPGI, Lucknow to train the medical faculty
 - Mobile workshops for 100 students and 38 teachers in Human Genetics
- Stem Cell Research : Supported following projects umbilical cord stem cell banking, IIT, Mumbai, skeletal muscle stem cells, CCMB, Hyderabad, hepatic stem cells, CRLD& CCMB, Hyderabad, bone marrow and cord stem cells reprogramming to hepatic progenitor cells, National Institute of Immunology & AIIMS, New Delhi, human corneal limbal stem cell, Shankar Netralaya, Chennai, amniotic membrane transplantation in ocular surface disorders, Regional Institute of Ophthalmology, Kolkata. In vitro trans-differentiation of nesting positive cells/stem cells to insulin secreting cells from adult mice pancreatic tissue NIN, Hyderabad

Division of Publication & Information

- The Indian Journal of Medical Research (IJMR) was made available full-text free on the website www.icmr.nic.in from 2004. New sections such

as Editorials, Commentaries, Letter to the Editor have been introduced from January 2004.

- Three special issues of the IJMR, one on Tuberculosis Research (October 2004), another on HIV/AIDS (April 2005), and the third on Leishmaniasis (March 2006) were brought out.
- Two supplements of the IJMR, one on Streptococcus & Streptococcal Research (May 2004) and another including abstracts of papers presented in Symposium on HPV and cervical cancer (February 2005) were brought out.
- Impact factor (IF) of IJMR increased from 0.445 in 2002 to 0.600 in 2004 and to 0.869 in 2005. Outreach of IJMR is increased across the globe as evident from the increasing number of international submissions (25-30% each year) received from various countries.
- A series of four Lancet-ICMR Workshops on Medical Paper Writing for Publication conducted in February 2005 at Vellore, Kolkata, Mumbai and New Delhi. Junior and middle level scientists from medical colleges participated in these workshops. Received very encouraging feed back.
- ICMR Bulletin, ICMR Patrika and Annual Report of the Director-General published
- ICMR Biennium Puraskar on Popular Medical Books in Hindi was initiated for the biennium 2004-05.
- Modernization of ICMR institutes' libraries done.
- ProQuest full text electronic database which contains about 550 + full text medical journals subscribed. The Council has installed only two sites of ProQuest for NICED, Kolkata and NIN, Hyderabad during the year 2002-03 and later, due to increase in demand, four sites more were installed at NJIL & and Other Mycobacterial Diseases, Agra; RMRC, Dibrugarh; ICMR Hqrs, New Delhi; NIMR, Delhi.
- JCCC@ICMR subscribed. JCCC is customized e-journal gateway-cum-database service.
- The ICMR-NIC Centre for Biomedical Information's website has been ranked the top Indian health website by Google since November 2003 and has won several awards for the content as well design. The webpage provides links to the Centre's services in addition it also acts as a portal to National Library of Medicine's (NLM) databases as well as other resources available over the Net. A Meta search tool, MetaMED, was designed to search NLM's PubMed and the Centre's IndMED database in one click.
- medIND database (a full-text version of IndMED journals) was launched in August 2003 at [www.medind.nic.in.\(extramural\)](http://www.medind.nic.in.(extramural))
- A prototype Open Archive, OpenMED@NIC, was launched for Medical and Allied Sciences where authors / owners can self-archive their scientific and technical documents.
- Local area network (LAN) was implemented at the institutes of the ICMR to facilitate internet access and sharing of resources.
- Major upgradations done in ICMR website during X plan.
- Medfree, a database of freeware applications was developed.
- ICMR Grant for Excellent Research Output for ICMR scientists introduced.

- Intellectual Property Rights Policy of the ICMR released in 2002.
- Council's opinion submitted to MOHFW to frame negotiation strategy for GATS & TRIPS.
- A document "Contribution of ICMR in the area of Intellectual Property Rights" brought out in September 2000.
- To enable the ICMR scientists to report new inventions, IPR Unit of the Council has prepared "Employees Invention Report". The report is framed with objective to safeguard the intellectual creation of the scientists of the Council as well as the liabilities of the scientists towards the Council.
- To promote a culture of contract research and consultancy, foster industry academia collaboration and help raise external revenue generation through Guidelines prepared for this purpose by the IPR Unit.
- The Division organized/participated in several important exhibitions to showcase important achievements/contributions/activities of the Council in various fields of biomedical research. For example: *Vigyan Rail Exhibition* organized by the Vigyan Prasar, Department of Science & Technology (DST) and mounted a full coach exhibition depicting Council's achievements, *Vigyan Mail*, operated by the National Council of Science & Technology Communication, DST, and in mega S&T exhibitions, *Pride of India Science Expo* organized as part of successive Annual Sessions of the Indian Science Congress.

Reproductive Health & Nutrition

Contraception

- To improve contraceptive choices, evaluation of monthly injection of Cyclofem indicated that the method was effective, had minimal side effects and a continuation rate of 71 per 100 users at one year.
- Evaluation of levonorgestrel (LNG) 0.75mg given in two doses resulted in LNG being approved by the DCGI as an over-the-counter (OTC) drug and is now a dedicated product for emergency contraception in the National Family Welfare Programme.
- The indigenously developed intravascular injectable male contraceptive RISUG has been tested in limited Phase-III trial and found that RISUG is safe and effective contraceptive for male.
- Medical methods of pregnancy termination were studied using Mifepristone and various types and dosages of prostaglandins. As a result of these studies Mifepristone has been approved to be marketed in the country for pregnancy termination.
- ICMR in collaboration with National Academy of Medical Sciences (NAMS) developed National Guidelines for Accreditation, Supervision and Regulation of ART Clinics in India. The Govt. of India has accepted and approved these guidelines and has circulated to all the State to follow the ART guidelines.
- A Study of Psychosocial, Cultural and Service Factors Affecting Reproductive Morbidity Amongst Rural Women in India highlighted the heavy burden of reproductive morbidities, which is attributable partly to the psychosocial factors and partly to the service related conditions. They

concluded that there is need to improve the availability of services and to provide effective IEC services.

- Six educational modules were developed and education was imparted to the school going adolescent boys and girls (13-17 years) regarding : Growing Up Concerns & nutrition; Reproductive and sexual health & hygiene; Body image & adolescent sexual behavior; Interpersonal & gender relationships; Understanding RTIs/STIs/HIV/AIDS and Life skill development & scholastic achievement.
- In a capacity building project, support was provided to National Neonatal-Perinatal Database network established at the tertiary hospitals to collect data on neonatal-perinatal morbidity and mortality on a standardized protocol developed for this purpose.
- Due to paucity of Indian data an in-depth longitudinal study of cognitive and learning problems in low birth weight neonates was carried out at KEM Hospital, Pune to study the cognitive problems in children with low birth weight (<2000grams). It was found that birth weight was the only biological risk factor influencing IQ at 12 years of age.

Maternal Health

- A community-based task force study was carried out to study the feasibility of administration of oral misoprostol for prevention of PPH by the paramedical worker at PHC level showed a significant reduction in the duration of 3rd stage of labor (7.9 ± 4.2 versus 10.9 ± 4.3 minutes, $p < 0.001$) and the median blood loss after delivery (100 versus 200 ml, $p < 0.001$) in the intervention area. The study concluded that simple interventions can be implemented in peripheral settings to reduce the blood loss during labor. This has significant implications for developing countries with high prevalence of anemia. Misoprostol has thus been introduced in the programme to be administered by Skilled birth attendant for prevention of PPH.
- A critical appraisal of Cesarean Section rates at 30 Medical colleges/Teaching hospitals indicated that the overall rate of cesarean section increased from 21.8 in 1993-94 to 25.4 per cent in 1998-99. There is need for standardized collection of information on all aspects of childbirth to ascertain the incidence and indications of cesarean section nationally and workout better management modalities.

Nutrition

- Established that the approach of administering vitamin A along with immunization is feasible and safe.

International Health Division

During the 10th Plan, the IHD facilitated (with financial support) the organisation of following workshops:

- Indo-German Workshops one each on Bioethics, Environmental Toxicology, Infectious diseases and PET- Radiopharmaceuticals were held in India and Germany.

- Indo-French Workshops on Neurosciences, Ethics & Clinical Research in India & France.
- Indo-US Workshops on various topics of Maternal & Child Health, Occupational & Environmental Health, HIV/AIDS in India and USA.
- Interactive sessions on HMSC approved international projects in different fields of medical research.
- Workshops on competence buildings for developing writing capabilities for researchers in Medical colleges / Research institutions etc. were organised in various parts of the country.
- Indo-Bulgaria Workshop on Medical Sciences.
- Supported the visit of Govt. of India delegates for international meetings in Germany, Italy, France, Cuba, Japan, USA, Canada etc.
- Many important international visits/meetings which were coordinated by IHD (ICMR) during the 10th Plan in consultation with other technical Divisions / Centres include ICMR-INSERM Joint Working Group (JWG) meetings in India & France, Indo-Russian Sub Working Group (SWG), Indo-US Joint Working Group (JWG) and Indo-Bulgarian, Indo-German, Indo-Cuba, Indo-Mozambique, Indo-Canada meetings to develop & finalise the joint collaborative programmes.
- Arranged a number of visits by international scientists / officials / delegates to and from India. A total of 122 visits from foreign countries and 72 visits from India to various countries under various bilateral programmes in the field of biomedical sciences and public health were coordinated during April, 2002 to December, 2005.
- Serves as the Secretariat for the Health Ministry's Screening Committee (HMSC) which considers research proposals involving foreign collaboration and/or assistance. During the period from April, 2002 to March, 2006, 15 meetings of the HMSC were held wherein 242 projects for assistance from / or collaboration with WHO, NIH, Germany, INSERM, Population Council, European Commission, Stanley Foundation, DFID, UNICEF, CONRAD, USAID, Wellcome Trust, JICA, FHI, IVI & various foreign universities & foundations etc. were considered and 188 projects were approved by the Indian side.
- Under the country budget mechanism of WHO for the biennium 2002-2003, 2004-2005 and 2006-2007, financial support was sought for proposals made by ICMR Institutes / Centres, and Headquarters for undertaking certain research projects, organising training programmes, development of guidelines etc. ❀