

DETAILS FOR ONE TIME UPGRADATION OF THE ICMR'S INSTITUTES

The Performance Appraisal Board had observed that the ICMR needs to be modernized and restructured if it is to be at the forefront of health research. The infrastructure needs of the ICMR have been examined in the context of modernization and up-gradation especially at the level of the institutes. To achieve this a modernization plan has been developed after assessing the current infrastructure and outlining the future needs. This is resonant with the projected activities of the ICMR over the next Plan period. To cater to the needs for immediate future a modernization package has been developed for a one-time grant of Rs.300 crores.

1. Tuberculosis Research Centre, Chennai

TOTAL BUDGET : Rs.21.00 Crores

Creation of a genomics and proteomics centre and a state of the art molecular biology laboratory by upgrading and modernizing the existing immunology and molecular biology laboratories (Rs.10 Cr)

The current immunology and molecular biology laboratories are located in small cramped rooms on the 3rd floor of the laboratory building of TRC. These laboratories were created by utilizing existing rooms that were not originally meant to be laboratory space. Further the equipment in these laboratories have outlived their utility. It is proposed to modernize these laboratories to house a genomics and proteomics centre and a state of the art molecular biology facility that will meet international standards. The laboratories will be redesigned to provide increased floor space by merging several smaller laboratory rooms and installing new equipment (sequencing, genomic and proteomic stations and bioinformatics laboratories) required for modern molecular biology studies that will allow cutting edge science to be carried out in this laboratory.

Relocating and modernizing the animal house facility (Rs.5 Cr)

An animal house that housed small animals required for experimental TB work at was recently dismantled due to multiple reasons and the space made available was used to house the ICMR-TRC-NIH facility. Currently all the animal experiments of the centre are being carried out at other institutes. It is proposed to relocate the animal house at a suitable site at one of the campuses of the TRC. The proposed facility will be designed to meet global standards for animal houses and will be fully equipped to carry out critical laboratory experiments that are required for TB drug and vaccine development.

Improved waste management system at TRC (Rs.1.5 Cr)

The number of clinic and laboratory facilities at the Centre has increased several folds during the last decade. However, the waste disposal system has not been modernized and as a result is currently at the risk of breaking down. In addition, the system needs to be modernized to conform to GCP guidelines that include segregation of waste, pre-treatment prior to disposal and strict adherence to the guidelines prescribed by BARC for the disposal of radioactive waste. It is proposed to redesign the entire waste management system at the Centre and develop an integrated modern waste disposal system that meets all laboratory regulatory and civic requirements.

Up-gradation of data management and information centres (Rs. 1.5 Cr)

The Centre has a large network of computers and a compact library and information centre. The network of computers has been built using multiple resources and therefore is a mix of several generations of computers and printers. Similarly, the library houses both print and electronic collections of books and periodicals. It is proposed to develop an integrated network of computers and storage devices that will address the needs of the Centre over the next 10 years. Simultaneously it is proposed to develop the current library and information centre into a modern dissemination site that will provide information on TB research and control to readers and visitors from all over the world.

Mycobacterial Repository (Rs 3.00 Cr)

The Repository has networked several medical and research institutions across the country and has been fulfilling the following main objectives:

- Collection of mycobacteria (well characterized isolates of *M.tuberculosis* and other mycobacteria have been collected from different parts of the country)
- Supply of reference and well characterized strains (since inception the centre has served more than several scientists working on different projects)
- Characterization of mycobacterial isolates (the centre is providing referral services to different scientists)
- Epidemiological characterization of mycobacterial strains (multicentric studies on transmission of tuberculosis are being undertaken)
- Training of manpower (large number of scientists and other workers have been trained)

The repository needs continuous maintenance, updating and expansion.

2. National JALMA Institute for Leprosy and Other Mycobacterial Diseases, Agra

TOTAL BUDGET : Rs.14.50 Crores

The specific modernization/renovation work and approx. budget are indicated below:

BSL-II Laboratory (Rs.1.00 Cr)

The Institute has been involved in the tuberculosis research in a big way and a large number of specimens from the field areas and the institute are processed. The BSL-II laboratory constructed in 1990 by mere wooden partitioning needs to be modernized for accurate control of the air handling. The biosafety cabinet and other equipments are more than 15 years old. There is one small BSL-III lab for handling drug resistant and other specialized work but that remains heavily booked and is not available for processing of clinical specimens quite often. For the optimal functioning of the Institute for different studies, it is necessary to modernize and renovate the BSL-II lab where specimens with lesser danger could be handled. The existing space where BSL-II lab is located will be used for this purpose.

OPD and clinical laboratories (Rs.0.90Cr)

This wing needs to be urgently renovated for providing adequate space to the clinical labs, proper air handling to reduce the infections, modular furniture for optimal functioning and storage, replacement of the current highly inflammable roof/replacement of the old electrical wiring and fixtures to avoid any fire outbreak new drainage system and fire detection control system etc. Various fixtures are very old and there is no fire detection system. Thus from the point of view of safety and optimal functioning, this wing needs to be renovated with appropriate fixtures.

Renovation / Modernization of Operation Theatre (Rs.0.60 Cr)

The ceiling, drainage system and other fixtures of the Operation theatre need to be changed as these are nearly 40 yrs old. For optimal functioning, it is necessary to modernize/renovate the Operation Theatre.

Renovation / Modernization of Inpatient Ward (Rs.1.00 Cr)

The inpatient ward of the institute is again 40 yrs old. The air handling system and other fixtures need to be replaced so as to make the ward safe from the point of view of the air borne infections. In future, the ward will be used for selected number of leprosy cases (for medical and surgical reasons) for tuberculosis patients who will be admitted for emergencies and observation like treatment of MDR, HIV infected patients etc. While the institute proposes to start the HIV - AIDS treatment in collaboration with local medical college, tuberculosis in- patient management in collaboration with medical college and TB Demonstration Centre and State institutions, it will be important to have our own facility and trained manpower for specific needs. The area of the ward needs to be expanded and facility modernized according to safety guidelines for the optimal functioning of the Institute.

Extension/ Renovation/ Modernization of Animal House (Rs.0.80 Cr)

For the proper functioning, the Animal House needs to be upgraded with proper space and the facilities for the animals as per the current guidelines. As the Animal experiments are very important for leprosy and mycobacterial research, addition of one more floor and renovation of the existing building is important.

Upgradation of Hostel (Rs 3.00 Cr)

The Institute is undertaking Human Resource Activities in the form of research and guidance to young students and scientists (MSc, PhD, MD, etc.). The guesthouse constructed by the Japanese has to accommodate large number of visitors. Small hostel is able to accommodate 5-10 students. In view of the increasing demand, the present hostel needs to be renovated and extended by addition of two-storied building with 50 rooms as a part of one-time modernization of the Institute.

Structural Biology (Rs 3.00 Cr)

The Institute has well developed Microarray and Polemics laboratories. The Institute has developed Ingram DNA Chip's and needs to develop a structural biology laboratory to maintain its personal Biology.

High throughput sequencer (Rs 3.00 Cr)

The Institute plan to set up a high thoughtful sequencing faculty to take up priorities in seprning of conflict genome of same of mysecterical strain for shifting their comparative genomics.

Mycobacterial Repository (Rs 3.00 Cr)

The Repository was established in 1995.

The Repository has networked 38 medical institutions across the country and has been fulfilling the following main objectives:

- Collection of mycobacteria (more than 2500 well characterized isolates of *M.tuberculosis* and other mycobacteria have been collected from different parts of the country)
- Supply of reference and well characterized strains (since inception the centre has served more than 100 scientists working on different projects)
- Characterization of mycobacterial isolates (the centre is providing referral services to different scientists)
- Epidemiological characterization of mycobacterial strains (multicentric studies on transmission of tuberculosis are being undertaken)
- Training of manpower (large number of scientists and other workers have been trained)

The repository needs continuous maintenance, updating and expansion.

3. National Institute of Cholera & Enteric Diseases, Kolkata

TOTAL BUDGET : Rs.29.00 Crores

Structural and Computational Biology (Rs 8.00 Cr)

In the recent past, the institute has made significant contributions towards understanding the molecular mechanism of action of bacterial toxins, adhesins and related virulence factors. However, such studies are still largely confined to low resolution analysis of solution and morphological properties of biomolecules, viz. exclusion chromatography, sedimentation, electron microscopy, primarily due to lack of facilities. The institute should develop facilities for high-resolution studies of solution properties, e.g. fluorescence spectrophotometry, circular dichroism spectropolarimetry, microcalorimetry etc.

Research in computational biology would include sequence alignment, gene finding, genome assembly, protein structure alignment, protein structure prediction, prediction of gene expression and protein-protein interactions. Hypothesis-driven investigation of a specific biological problem using computers would be carried out with experimental and simulated data, with the primary goal of discovery and the advancement of biological knowledge.

Genomics centre (Rs 4.00 Cr)

High throughput DNA sequencing facility will aim to sequence the genomes of different emerging and re-emerging pathogenic organisms relevant to human health. The genome sequence from EST sequencing through comparative genomic sequencing, to fully finished genomes will be made available to the researchers immediately through the Division of Bioinformatics.

Establishment of Division of Bioinformatics (Rs 3.00 Cr)

Bioinformatics is a field which uses computers to store and analyze molecular biological information. Bioinformatics can then solve problems of molecular biology, predict structures, and even simulate macromolecules. Bioinformatics may be used to describe the computers for the purpose of molecular biological work. The most well known application of bioinformatics is sequence analysis. In sequence analysis, DNA sequences of various organisms are stored in databases for easy retrieval and comparison. Computers are also used to collect and store broader data about species. This information can be used for a number of applications, including tracking changes in populations and biomes. There are many other applications of bioinformatics, including predicting entire protein strands, learning how genes express themselves in various species, and building complex models of entire cells. As computing power increases and our databases of genetic and molecular information expand, the realm of bioinformatics is sure to grow and change drastically, allowing us to build models of incredible complexity and utility.

Researchers have to study the genetic sequence of various organisms for which they take help of the Basic Local Alignment Search Tool (BLAST) of Medline. However, this is also not sufficient for research. Since the institute has no Bioinformatics Division, the scientists usually face immense trouble in doing sequence analysis, analyzing protein strands of various organisms etc. Hence, a separate division of Bioinformatics is required for this institute as the volume of research is increasing day by day.

Student Hostel cum Guest House (Rs 13.00 Cr)

Large number of students coming from different parts of India for their Ph.D. work and summer training programme. Institute does not have the accommodation facility for these students. Furthermore, the scientists from all over India as well as from abroad are attending this institute for training purposes. Institute like to have the accommodation facility for the students and scientists for which a new building will be required.

Strengthening of the Diarrhoeal Disease repository (Rs 3.00 Cr)

NICED is stocking all the important strains isolated from the acute diarrhoea patients admitted in the ID Hospital or B. C. Roy Memorial Hospital for children in Calcutta. In addition, this Institute is receiving many strains of enteric bacteria for identification and characterization. All these strains are also stored in the repository. Currently, all the groups of diarrhoeagenic *Escherichia coli*, 5 species of vibrios, 4 species of aeromonads, 4 species of *Shigella*, 5 species of *Salmonella* and *Klebsiella pneumoniae* are stocked in the Division of microbiology. Continuous cultures of protozoans such as *Entamoeba histolytica*, *E. dispar*, *Giardia lamblia*, *Cryptosporidium parvum* are also maintained. The repository needs continuous maintenance, updating and expansion.

4. National Institute of Virology, Pune

TOTAL BUDGET : Rs.6.92 Crores

Upgradation of electron microscopy for developing diagnostic facility for infectious diseases

Over the last decade, electron microscopy as a science has evolved from a primarily basic research tool to a powerful, indispensable and analytical research component of modern virology and infectious disease research. The application includes broad interdisciplinary areas ranging from rapid virus morphodiagnosis to pathogenesis research and drug development through integrated cryo-electron microscopy data. The use of electron microscopy as a frontline-weapon in virus discovery and combating emerging viral infections, has been globally proved in the recent past.

In India, the National Institute of Virology (ICMR), Pune, pioneered the electron microscopy applications in virology research since 1978 with genuine research contributions that made landmarks in global virology research. These include discovery of the Hepatitis E virus; morphology and pathogenesis of arboviruses; rapid immunoelectron microscopy application in diagnostic virology, developing the nation's first fully integrated cryo-electron microscopy resource in 2000; identifying the Chandipura virus as an emerging human encephalitis virus and becoming India's only electron microscopy laboratory as a part of the global network of EM labs in rapid response situations. The electron microscope is also an integrated component of rapid response in biosecurity environment and therefore it is mandatory to have a state-of-art national EM diagnostic facility like NIV to also assist multi-agency technical and human resource development in this area a key national resource and a Centre of Excellence.

Specific objectives

- Develop as a Key National Resource & Reference EM Lab in diagnostic electron microscopy of infectious diseases including human resource development and application research.
- Integrate a National EM Support Platform for industry for EM based quality control and other applications to the developing biotechnology, pharma and allied sectors through state-of-art consultancies including human resource development.

As a facility for morphodiagnosis of infectious diseases, Electron Microscopy has major applications that may be summarized as follows:

Act as a National Resource & Reference base for EM applications in infectious diseases. The major component of this activity would be to provide rapid virus morphodiagnosis in specimens referred to the facility that would include negative staining protocols and high-resolution transmission EM. A well-developed and internationally accredited Virus Morphodiagnosis Program networked with the Robert Koch Institute, Berlin, Germany, is currently ongoing, that caters to both in-house and research needs of other scientists from the country. Additional state-of-art virus EM protocols like immuno-EM;

analysis of ultrathin sections are also part of the state-of-art protocol development already available with the facility. Such applications are crucial for rapid detection of suspected etiologic agents during outbreak investigations.

Virus EM-Image Database Development is another unique and very important asset of the facility and the Institute *per se*. Currently, more than 2000 electron micrographs of different virus are available with the EM facility that can be used to develop an unique Virus-Image reference database, a crucial reference facility for other researchers in virus morphology and identification areas. This database can be made into a stand-alone on-line image reference facility through web-based applications.

Develop Cryo-Electron Microscopy programs in collaboration with other agencies/ researchers & industry at a national level for specific drug development programs.

Human Resource Development act as a base to train and cultivate future talents through specialized state-of-art training courses and workshops in the application of EM in infectious disease research.

Proposed Budget

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|---|-------------|
| • Scanning Electron Microscope with environmental | |
| • chamber & EDAX | : 110 lacks |
| • Sputter coater and critical point drier | : 15 lacks |
| • Atomic force microscope | : 100 lacks |
| • 200 KV FEG CC corrected TEM | : 200 lacks |

Justifications

- Essential analytical EM for rapid imaging of environmental samples, biological specimens in native form and surface topography in infected cells
- Essential specimen prep equipment for ESEM analysis
- Essential for in vivo imaging of virus cell interaction
- Essential for 3D tomography, nano technology drug discovery and single particle reconstruction studies

Consumable items & Contingency (Rs 0.17 Cr)

Development of a Bioinformatics Facility (Rs 2.50 Cr)

The exponential growth in Biological databases and predictive methods for datamining over the last decade has made Bioinformatics a powerful tool and hence an integral part of biological research. Further, the high through-put sequencing of genomes of important model organisms including the human genome and bacterial as well as viral pathogens has formed the basis for the development of so called 'Bioinformatics Information Systems'. Structural bioinformatics is a vital component of such systems since it is known that the tertiary (3D) structure of a protein is more conserved than the sequence and contains the essential information for understanding the biological function of the protein. Such structural information about viral proteins and application of genome analysis tools is critical to further efforts to design drugs and vaccines.

- To develop as a core facility at the Institute for molecular modelling, molecular dynamics simulation studies along with genome and immunome analysis facilities for application research.
- To train manpower to the effective and proper use of the various bioinformatics tools.
- Provide a platform for collaborative research projects with research institutes in the country and also global partnerships.
- Development of a viral Bioinformatics Information system in the form of a database as a rich national resource.

Towards the development as a core facility at the Institute: standardization of the molecular modelling and molecular dynamics protocols would be undertaken. This

would include development of models for the protein structures corresponding to the wild type and mutant viral protein sequences of various Indian strains for the selected viruses. The developed models will be used to explain the virulent and non-virulent forms in terms of structural variations and subsequent modifications in crucial properties such as antibody binding sites, structure of conformational epitopes etc. Further docking studies for antigen-antibody interactions, design of immunogens etc would be carried out to help development of vaccines. So also, prediction of possible targets for the design of anti-virals/ inhibitors would form a part of the studies. The results of the studies would thus facilitate and validate wet-lab experimental studies.

Development of a viral genomics database-cum-workbench for comparative genomics and proteomics

This activity aims at developing a database that organizes the sequence level information (inclusive of proteins, genes and genomes) for various viral families. Data mining tools for sequence alignment, whole genome comparison, phylogeny, gene finding, epitope prediction etc. would be embedded into the database to carry out studies of interest. The database would include experimental structures from the PDB and so also theoretical models generated by using automated modeling pipeline servers (SWISS MODEL, MODPIPE). This integration of the bioinformatics data into a centralized repository would form a rich resource and form a vital knowledge-base enabling comparison with the data of strains existing in India and other parts of the world.

Training other researchers to make use of the molecular modeling facilities for their research work.

Formulation of collaborative research programs with Institutes at the state, national as well as International level for development of drugs and vaccines.

5. Microbial Containment Complex, Pune

TOTAL BUDGET : Rs.11.85 Crores

Virus repository facility

During last five decades NIV has isolated many viruses from humans, animals, arthropods, many of them are new to science. These viruses are National treasures as they depict the changes and adaptations of these viruses over last five decades. The usefulness of these virus stocks has been proven time and again as a resource to track the changes in currently circulating viruses, to analyze emerging and re-emerging viruses. Recent examples of these are Chandipura virus and Influenza virus. These viruses are being maintained by respective scientists at the departmental level. It is necessary to centralize the entire stock of viruses for posterity and national treasure. A well-equipped virus repository is essentially needed to store and maintain the stocks of virus strains isolated and procured by NIV. This would also serve as National repository of viruses isolated by other agencies all over India.

Specific objectives

- To establish virus repository as a National resource for cataloguing, storing and characterizing viruses of Human Public Health importance.
- To develop reagents and methodologies for detection and characterization of viruses.
- To serve as a nodal agency for procurement, storing and characterization of viruses of human public health importance.

Act as a National Resource & Reference base for viruses of Public health Importance

NIV has collection of nearly 1500 virus strains belonging to 30 families, 24 of these are new to science. Strains of Japanese encephalitis, West Nile, Dengue, Kyasanur Forest disease virus, Chandipura, Influenza etc. collected over 50 years from various regions of India.

These are maintained as stocks of viruses in individual departments. These viruses are needed to track the history and evolution of viruses over the years. Cataloguing these viruses and preparation of stocks would form as a national resource

To develop a facility for storing and retrieval of viruses and reagents

Virus stocks are stored as frozen stocks at -70°C in freezers or as stocks in liquid Nitrogen. For long-term storage, it is necessary to build a separate facility building that would have its own freezing machinery to maintain -70 °C, -20 °C and -196 °C at various levels. The facility would thus be designed as a customized facility. The facility would also store reagents and sera needed for characterization of these viruses. The facility would be developed with up to date retrieval system to minimize human intervention and would also serve as security barrier.

To develop methodologies and reagents for detection and characterization of viruses.

It is necessary to characterize viruses to their strain level. As many of the viruses are new to science, immunological and molecular characterization of these viruses is necessary for placing them in appropriate families and finding out their relationship with other viruses. The work on characterization would be entrusted to individual groups. These groups would develop molecular and immunological markers for characterization of viruses in repository. This would be achieved by sequencing of the key portions of virus genome and studying reactivity with polyclonal and monoclonal antibodies. Individual groups would then deposit these sequences, primers, polyclonal and monoclonal antibodies at the Virus repository.

Act as key Human Resource Development Base

The work on preparation of stocks, characterization of these viruses using molecular and immunological tools would require considerable manpower. This would give opportunity to develop a Human resource development base for fresh graduates from various parts of India. The methodologies would thus create a manpower trained in handling the viruses and in using various techniques in characterization of viruses.

Construction of Virus repository facility	: Rs.800 lakhs
Freezers -70 °C X 10	: Rs.070 lakhs
Molecular biology equipments X 10	: Rs.100 lakhs
Sequencer	: Rs.070 lakhs
Real Time PCR facility	: Rs.020 lakhs
Consumable items & Contingency	: Rs.125 lakhs

Justification

- The facility would be designed to store virus stocks at -196°, -70° and -20°C with computerized storage and retrieval system Equipped with power generators
- For storage of virus stocks and reagents at individual departments
- Individual groups would be entrusted with developing and generating information on each virus strain at molecular level.
- As a common dedicated facility for sequencing of virus genome of viruses stored at virus repository
- For development of real time PCR probes and methodologies

6. National AIDS Research Institute, Pune

TOTAL BUDGET : Rs.12.02 Crores

Renovation of Laboratories and Clinic at Bhosari (Rs 3.00 Cr)

With commissioning of the new Library, Auditorium and Training block, space in the old building will be re-allocated with clinic located in 1025 sq meters in the ground floor and Laboratories in approximately 2500 sq meters in the first and second floor. This will provide us the opportunity for the renovation of the laboratories and clinic to provide access control,

appropriate flooring and lighting, safety features and furniture. The overall outlay for this work is expected to be 3 Crores.

Modernization of Freezer Rooms (Rs 0.50 Cr)

NARI is having 6 nos. of walk in -20° freezer rooms for storage of plasma, serum samples and reagents. These -20° freezer room are working since more than 14 years, and recently under breakdown due to wear and tear. The average life of the plant is around 15 years; which were installed in 1992. These plants are designed for hot water defrosting. The refrigerant R-22 gas in the plant is costlier and will be banned in near future by the environment department. Hence, it is essential to modernize 6 freezer rooms with air-cooled condensing system and freezer gas.

Modernization of Central Air conditioning system (Rs 0.25 Cr)

The existing Central AIR condition system with 240-ton capacity is old and breakdowns are common due to passage of 14 years. Consequently, the maintenance of air conditioning system is high and it is uneconomical to run this system. Therefore, it is proposed to install sophisticated package type units that consume less electricity. The new unit proposed is of Voltas make compact unit or similar configuration.

Data and Sample Archiving Facility (Rs 1.00 Cr)

The major research focus of the Institute is likely to be continued to be the clinical trials. Documentation is very important aspect of clinical trials and it is necessary that the trial related documents need to be kept secure not only for the period of trial but for several years after the trial. Secondly, a large number of studies undertaken by NARI result in collection of biological samples. The biological samples are precious and need to be stored very carefully. At present there is no facility to store samples. It is envisaged that a sample repository is established to house samples stored at -20°C , -70°C and in Liquid Nitrogen as recommended. A separate building with state of the art facilities and back up power supply is proposed.

Strengthening of repository (Rs 3.00 Cr)

The HIV Repository is created to help such scientists interested in pursuing their research in the field of HIV/AIDS but have no access to viruses. It is expected to fulfil the need for easy access to authentic, well characterized HIV strains isolated from HIV-1 or HIV-2 infected individuals in India. By making, these strains available to various scientists' considerable scientific progress will be made, eventually leading to defining certain policies for control of this disease. Efforts are being made to collect a large variety of samples.

Expansion of this collection will be an ongoing exercise. Newer and scientifically more challenging strains e.g. inter-subtype recombinants, will be added to this repository, as and when isolated. The repository needs continuous maintenance, updating and expansion.

7. Enterovirus Research Centre, Mumbai

TOTAL BUDGET : Rs.11.00 Crores

Polio Containment Laboratory, Pashan, Pune (Rs 11.0 Cr)

Enterovirus Research Centre proposes to create a BSL-3 facility for poliovirus research to be continued during the last phase of polio eradication and post-eradication years to ensure that eradication is complete and that facilities are available for laboratory investigations in case of any unforeseen emergency in future.

Polio eradication is now in its last phase of completion. It is scientifically relevant that infectious agents that are no longer endemic in the community are handled in laboratories having higher bio-safety levels.

The present laboratories of ERC meet the Bio-safety Level 2 required for handling poliovirus infected materials (accredited by the WHO). As polio eradication is reached in near future, laboratories handling wild poliovirus infected materials and storing such material establish Bio-safety level-3 laboratory facility.

World Health Organization has designated the ERC as a Global Specialized Laboratory for Polio. The Centre receives poliovirus samples from neighbouring countries in addition to all poliovirus isolates from Indian laboratories for detailed molecular characterization and strain bank. These isolates require storage and handling under containment specific BSL-3 laboratory facilities. ERC will continue research on polio until polio vaccination is discontinued globally. Moreover, ERC will continue to monitor “poliovirus” in cases of acute flaccid paralysis and the environmental waters for many years after certification of polio eradication for confirmation of absence of wild poliovirus and vaccine-derived (neurovirulent) poliovirus and to ensure complete eradication of poliovirus.

BSL-3 laboratories are designed to prevent/minimize chances of accidental exposure of laboratory personnel and also the environment to the infectious agents. BSL-3 therefore forms a specialized laboratory facility having HVAC with directional airflow, HEPA filtered air exhausts, strictly monitored access to viruses and laboratory and specialized training in laboratory work as well as facility maintenance.

8. VIRUS UNIT, Kolkata

TOTAL BUDGET : Rs.3.00 Crores

Construction of new building

The ICMR Virus Unit, Calcutta is presently housing in the premises in a floor of ID & BG Hospital, Government of West Bengal. Due to emergence and re-emergence of several viral infection and increased activities of the ICMR Virus Unit the present premises is insufficient and need to be shifted to its own establishment. A new two-storied building with a land (30 cottah) for future expansion is to be constructed to meet its current requirement. This needs to be furnished to make it optimally functional.

9. National Institute of Malaria Research, Delhi

TOTAL BUDGET : Rs.32.58 Crores

Genomics and Bioinformatics Activities (Rs 10.66 Cr)

Ever since the whole genome sequences of the three organisms (Anopheles, Plasmodium and Humans) are available at the public domain, interest in Genomic research has been increased among scientists of malaria research. Furthermore, recently developed statistical-mathematical approaches to analyze the huge genome sequence data through computational approaches have also attracted interdisciplinary researchers to turn their focus into this field. In biomedical field of research, such as malaria, the field of Genomics and Bioinformatics is especially important, as such studies will reflect the genetic mechanism of not only the individual organisms involved but also it is possible to decipher host-pathogen, host-vector and pathogen-vector interaction mechanisms. Understanding of such mechanisms would definitely lead to devise control strategies of malaria. Keeping in these new areas into consideration, scientists of our Institute have taken steps to develop the existing Genomics and Bioinformatics facilities. At present, we have a small molecular biology laboratory with an old model of single-capillary DNA sequencer and DNA synthesizer, which are inadequate to meet the demands of the scientific work on Genomics and Bioinformatics. Some of these equipments in the laboratory are old and obsolete. Furthermore, we need other new equipments that would be of use in different fields

involving Genomics. The Institute also is planning to sequence the whole genome of the most common Indian malaria vector, *Anopheles culicifacies*. Apart from this, the scientists are planning for expression studies of the genes of interest in malaria vectors, parasites and humans. On the face of rapid advancements in the field of both Genomics and Bioinformatics, the up gradation of the existing small Genomics facilities and mostly purchase of new additional equipments are required. We also need to develop our existing computational biological units with high-end computers and related software.

Proteomics Activities (Rs 9.00 Cr)

Gene network techniques holds promise of providing a conceptual framework for analyzing the profusion of biological data being generated on potential drug targets and providing insights into the understanding of biological regulatory mechanisms of malaria. Drug target identification, host parasite interactions involves acquiring a molecular level understanding of the disease state and includes gene sequences, protein structures, protein interactions and metabolic pathways, as proteins are principal targets of drug discovery. Proteomics has unique and significant advantages as an important complement to a genomic approach. High-throughout proteomics, identifying potentially hundreds to thousands of protein expression changes in model systems following perturbations by drugs or disease, lends itself to target identification in drug discovery. Protein- protein interactions are the basis of drug target identifications. Protein interaction maps can reveal novel pathways and functional annotations of uncharacterized proteins Therefore, scientists at NIMR have been working for identifying protein -protein interactions that can provide insights into the mechanisms/functions of important genes to elucidate relevant pathways and facilitate the identification of potential drug or intervention targets. Powerful bioinformatics software may then enable rapid interpretation accelerating functional assignments and drug target discovery.

At present we have only make shift arrangements for Protein Biochemistry laboratory with only HPLC and some electrophoreses technology for charaterization of enzymes and proteins. These facilities are highly inadequate to meet the demands of the scientists working in the field of proteomics. Most of the equipments are old and outdated and need urgent replacements/upgradations. Furthermore, we are in need of new equipments that would be useful in various aspects of protein analysis. We have plans for host parasite interaction studies, parasite vector innate immunity studies, potential novel drug target identifications, expression studies of interest in vectors and parasites. A promising strategy is to examine the functionality of different genes impact of its inhibition and activation on multiple signaling pathways On the whole, rapid modernization in the field of proteomics requires purchase of new equipments and upgradation of existing facilities

Molecular Biology Activities (Rs 10.00 Cr)

There has been tremendous advancement in the knowledge and techniques in the field of molecular biology during recent years. This necessitated NIMR to strengthen molecular biology unit. In this direction, NIMR has already taken initiative to develop manpower resource by getting scientists trained and recruiting hard-core molecular biologist. Presently our laboratory is not well equipped for performing most of the molecular biology-experiments; as a result, scientists are compelled to collaborate with other laboratories to use their laboratory resources. The strengthening of molecular biology laboratory is foremost requirement of NIMR as because molecular biological tools are essential in many of the studies in diverse fields such as Vector Biology, Parasite-Biology, Host-Parasite Interactions, Immunology, Epidemiology etc. The major areas where the molecular tools are being used in NIMR are: understanding molecular basis of mosquito-immune system against Plasmodia so as to develop of transgenic mosquito for genetic control of malaria, molecular basis of insecticide resistance in mosquito and drug resistance in malaria parasites, development of diagnostic tool for the identification of malaria vectors particularly sibling species of major malaria vectors and closely related species, population genetic analysis of major genetic divergence and evolutionary history of major malaria vectors and parasites.

Strengthening of Malarial Repository (Rs 3.00 Cr)

The Malaria Parasite Bank was established by Malaria Research Centre (MRC), Delhi, in 1992. The repository needs continuous maintenance, updating and expansion. The bank already has a large collection of malaria parasites. Expansion of this collection is an ongoing exercise. The parasite repository makes available characterized species and strains of parasites, different stages of parasites, culture supernatant, etc. for various parasitological, pharmacological, immunobiological, biochemical and molecular biological studies. In addition to the human malaria parasites (*P. falciparum*, *P. vivax* and *P. malariae*) collected from different parts of India, the bank is also maintaining different species of rodent, avian and simian malaria parasites. The parasites are being used in various collaborative studies and are being supplied to various research organizations, universities and medical colleges all over India.

10. Vector Control Research Centre, Pondicherry

TOTAL BUDGET : Rs.7.85 Crores

Centre for Application of Remote Sensing and GIS for modeling vector borne disease transmission dynamics (Rs 1.00 Cr)

A Centre for Application of Remote Sensing and GIS for modeling vector borne disease transmission dynamics at VCRC has been proposed. This will function in close collaboration with other ICMR institutes, National Remote Sensing Agency (NRSA), ISRO, Hyderabad, National Vector Borne Disease Control Programme (NVBDCP) and the Directorate of Health Services of all states and UTs in India.

To develop the logistics for control/elimination programme for VBDs, it is essential to identify the areas potential for the transmission of VBDs. Based on the parameters underlying the transmission dynamics, appropriate model could be developed on GIS platform. The estimated cost for laboratory space and other infrastructure including the geo-environmental and RS image data is Rs. 100 lakhs. Once the model is perfected, it will be useful for forecasting the trend in disease epidemics and thereby facilitate the decision making process for the control of VBDs.

Advanced Centre for the Genomics, which requires modernization/upgradation of the existing facilities and acquire appropriate equipments (Rs 1.80 Cr)

The unit proposes to take up new work in the frontier areas of molecular biology and immunology of filariasis and arboviruses such functional genomics and proteomics of filariasis, malaria and dengue. This work is expected to generate leads for the development of newer diagnostics, drugs and morbidity prevention tools. It will also involve investigations on vector, parasite and symbiont interactions. Recent clinical and community trials have reported that a proportion of individuals retain mf even after DEC treatment, which indicates that there exists heterogeneity in response to DEC treatment. The unit has proposed to study this problem through pharmacogenomics approach. Most of the genetic variations are attributed to the single nucleotide polymorphisms. The validation of these results will be done through the genotyping of the SNPs in the genes coding for the enzymes responsible for action of DEC. Clinical manifestations are the major causes of social and economic burden of lymphatic filariasis. As acute lymphatic pathology is followed by the pathogenesis of chronic condition, immunization of all microfilaraemic patients will be a better strategy to prevent the acute attack and further progression of the disease. Group A streptococcal infections have been reported to be the cause for pathogenesis of acute lymphatic attack. Hence, the development of streptococcal vaccine against acute lymphatic pathology is proposed. Also proposed is the identification of biomarkers through studies on the global differential expression of genes in diseased and normal individuals for lymphatic filariasis and dengue. Identification of Genetic risk factors in diseases will help in the developing morbidity prevention strategies and will be taken up with respect to filariasis and dengue. In order to carry out these studies it is propose to modernize/upgrade the existing facilities and

acquire appropriate equipments (Proteomics, cell sorter, biosafety labs and supporting facilities) at a cost of Rs. 180.00 lakhs.

Taxonomic reference centre for mosquitoes and other insects of medical importance (with facilities for DNA bar-coding, population genetics and phylogenetic studies and other facilities to undertake studies on vector biology and insecticide resistance) (Rs 1.50 Cr)

The unit is embarking on new areas of research in order to address issues related to mosquito taxonomy such as DNA bar coding, population genetics and phylogenetic analysis. Insecticide resistance is a burning problem and needs to be addressed with information on its prevalence in different malarious areas, which calls for high throughput and sensitive techniques for detection. The unit also proposes to undertake basic studies on the mechanisms of insecticide resistance and adopt more sophisticated methodologies for rearing and colonizing various species of mosquitoes. Currently, the centre has a large collection of mosquitoes belonging to several genera and species from different parts of the country, which are housed in an ordinary laboratory and needs to be accommodated in environmentally controlled facility. In order to establish all these facilities, a sum of Rs. 150 lakhs is proposed.

To establish a Dengue Referral Centre - virus isolation, genotyping and molecular epidemiology (Rs 1.66 Cr)

In view of the increased occurrence of Dengue epidemics in different parts of the country, it is proposed to establish a Dengue Referral Centre at VCRC. Such a centre requires establishment of state of art facilities to undertake virus isolation, genotyping and molecular epidemiology. In order to establish such a facility, a sum of Rs. 166 lakhs is proposed as budget.

Centre for Advanced Research in Health Economics to focus on the cost-benefit/cost-effectiveness of medical intervention in public health (Rs 0.50 Cr)

The unit proposes to set up a Centre for Advanced Research in Health Economics, for VBDs. This is in view of the fact that the VBDs put a tremendous pressure on the health and health budget of the country. Hence, there is a need to work out the cost-benefit/cost-effectiveness of medical intervention in public health and also carry out research to address various methodological issues in the field of disease burden estimation. This is also in view of the fact that the performance appraisal board of ICMR has recommended to increase the council's capacity to develop project proposal based on economic and social analysis. The centre proposes to establish information base and generate expertise in this field. To establish this centre, a budget of Rs. 50 lakhs is proposed.

Modernization of laboratories and upgradation of major and minor equipment to undertake work on biocontrol agents (Rs 0.75 Cr)

Identification and development of biocontrol agents for mosquitoes has been the focus of this unit. Currently the unit has extended its research activities towards the interaction of the parasites with the vectors, especially the molecular interaction between these two partners. Intensive studies on the identification of the toxins of the new biocontrol agents and their mode of action as also the humoral immune response of mosquitoes against the parasite have been taken up. In view of this the laboratories and major and minor equipments existing in the laboratory currently have to be modernized and upgraded. In order to carry out this modernization a sum of Rs. 75 lakhs is proposed.

A modern laboratory for drug development for vector borne diseases (Rs 0.64 Cr)

In this unit it is proposed to carry out new projects for the synthesizing structurally analogous compounds based on the lead molecule(s) towards the development of newer vector/parasite control agents. A modern laboratory for drug development with research tables equipped with water, compressor, vacuum, gas connection with racks for storing

chemicals with wooden/glass cup-boards for protecting the gadgets, chemical proof floor, walls and ceiling is required. In addition, a separate modern laboratory for keeping all sensitive equipment over wooden research tables with drawers for keeping spares/chemicals for operating such equipment is necessary. Therefore an additional funding to the tune of Rs. 64 lakhs is requested.

11. Rajendra Memorial Research Institute of Medical Sciences, Patna

TOTAL BUDGET : Rs.2.02 Crores

Upgradation of Animal House (Rs.1.00 Cr)

The existing animal house is running in Block "A" building of the Institute, which was constructed for other purposes, not for Animal House. This block is very small and does not meet the proper guidelines of the Animal House Plan. Keeping in view the mega, macro, micro environment of a standard Animal house, it is proposed to construct a new well furnished and equipped standard Animal house for proper maintenance of animal's health and hygiene.

The foundation of new laboratory facility of this institute will help the scientists to work on different pathogens in animal models for better understanding of pathogenesis of diseases. Division will maintain immuno compromise animals like RAG-Mice etc., germ free (Gnotobiotic), SPF – animals and knock out (Transgenic) Mice.

Maintenance and breeding of Immunocompromised mice such as SCID, RAG , Nude etc.

SCID: Severe Combined Immunodeficiency (SCID) is a primary immune deficiency. The defining characteristic is usually a severe defect in both the T- & B-lymphocyte systems. It will help us to work on immunological project

RAG mice are deficient in the recombinase-activating gene 2 and cannot make mature T or B cells due to an inability to form V(D)J rearrangements although they do produce small numbers of CD4⁺CD8⁺ thymocytes. The *Rag2* /*TCRB* model can be useful in studying T cell differentiation, lineage commitment and the role of the TCRB chain in the mediation of development signals in these pathways

Nude: The nude mouse gets its name because it has no hair. But far more interesting, it is also born without a thymus. These traits result when the mouse is homozygous for a recessive mutant gene designated *nu*. Because it lacks a thymus, nude mice cannot generate mature T lymphocytes. Therefore they are unable to mount most types of immune responses.

Not only have nude mice answered many questions in immunology, but their ability to maintain human tissue have made them useful tools for investigating

Development of Germ free Mice : Often in biomedical research it is necessary to study the effects of a single micro-organism in animals, or to completely eliminate variables caused by the dynamic micro flora present in barrier maintained mice. For researchers conducting gnotobiotic studies, needed to maintain these delicate animal models.

Development of knockout mice/transgenic mice : Development, maintenance and breeding of knockout / Transgenic Mice. Knockout mice contain the same, artificially introduced mutation in every cell, abolishing the activity of a preselected gene. The resulting mutant phenotype (appearance, biochemical characteristics, behaviour etc.) may provide some indication of the gene's normal role in the mouse, and by extrapolation, in human beings. Knockout mouse models are widely used to study human diseases caused by the loss of gene function. Knockout mice are produced by a technique called gene targeting. This is the

replacement of one gene sequence, the sequence resident in the mouse genome, with a related sequence that has been modified in the laboratory to contain a mutation.

The replacement occurs by a process called homologous recombination, where two very similar DNA sequences line up next to each other and exchange parts.

Gene targeting is carried out in mouse embryonic stem cells (ES cells). These cells are derived from a very early (usually male) mouse embryo and can therefore differentiate into all types of cell when introduced into another embryo. The aim is to get the modified ES cells to contribute to the germ line, which gives rise to sperm. Some sperm are produced that carry the desired mutation, and if these fertilize a normal egg, mice develop with one copy of the mutated gene in every cell.

Modernization of Library and Information center and Software packages (Rs.1.02 Cr)

- Extension of existing networking facility with leased line connectivity and Facility for Full Text Online Journal Database.
- Reader's Desktop PC with accessories
- Heavy duty multipurposes photocopier supported by N/W card.
- Color – 1
- B/W – 1
- MEDLINE CD Server
- Electronic Display Notice Board for Books and Journal etc.
- SPSS software
- Foxpro Software
- Library Automation System
- Office Automation System

The existing facility of 60-nodes is not suffice to cater the need of all divisions and section, hence keeping in view the upgradation existing and construction of new facilities, it is planned to extend the node connection every year as per the need. For fast internet access, it is proposed to take up Leased line connectivity. Full Text Online Journal Database will cater the need of scientists working on new and advanced technologies.

Reader's desk top PC with internet connection is required to cater the need of visiting as well as institutional readers. Heavy duty multipurpose photocopier with N/W connection will facilitate the scientists and office personnel to get the Xerox of necessary official documents, journal and articles etc. easily.

More and more volume of books of journals will serve the scientists to keep pace with the latest research.

The library has MEDLINE database since 1966 – 2004. By installation of MEDLINE CD Server, the scientists can access the database through networking. The Books' CDs can also be downloaded in the server for their online access. Electronic display notice board can be used to instantly retrieve the information regarding physical availability of Journal and books etc. in the library

SPSS is essential to efficiently analyze the data collected under various intramural as well as extramural studies. FoxPro will help as easy and user friendly tool for data entry, analysis and programming. For automation of Library, Office, Accounts and Central Store inventory, some ready made automation software are required.

12. National Institute of Medical Statistics, New Delhi

TOTAL BUDGET : Rs.2.66 Crores

High through put transmission of data (Rs 1.10 Cr)

- **Equipments for video connectivity and data flow**

Institute deals with the application of statistics in the area of bio-medical and bio-behavioural

research. It extends statistical support to design and analysis of clinical trials, epidemiology and population research, viz. infectious diseases with particular reference to HIV, nutrition, reproductive and child health, morbidity, mortality and population dynamics, cancer epidemiology, IDSP-NCD risk factors etc. It acts as technical backstopping for the evaluation of national programmes carried out by the Ministry of Health & Family Welfare and other line departments. Hence it is desirable to have equipments for video connectivity and data flow to end users.

- **Web based data management system**

A web based data management system is required to monitor various vaccine trials in the country.

- **Development of Human Resource Centre**

- Development of Human Resource Centre aims at promoting latest bio statistical methodologies into practice with the mandate to bring latest Bio statistical methodologies into practice.
- The provision of training to personnel of various institutions involved in biomedical and clinical research is another major thrust area of the institute.

- **Establishment of Convention Centre**

The institute frequently organizes national and international meetings and conferences. Hence, there is a need to have its own convention centre with state of the art facilities.

- **Establishment of International Hostel for Trainees**

Training to PG students of different universities has been the regular programme. The Institute has also been organizing training on statistical methods in biomedical research to the fellows from India as well as abroad under the WHO fellowships. Scientists working in the field of biomedical and health research often visit the institute seeking advice on various statistical issues as well as data analysis. It is therefore essential to have an international for the participants.

- **Infrastructure for Health Information System**

ICMR deals with various communicable and non-communicable diseases as well as various reproductive health issues. Since NIMS is the sole institute to deal with statistical analysis of data and has been on board to advise the Ministry of Health & family Welfare for the development of health information system, it intends to develop a cell on health information system at the Institute. Suitable infrastructure for the same is therefore essential.

Data Storage(Rs 0.66 Cr)

- **Data mining/ware housing soft-wares/Statistical soft-wares**

As the Institute deals with the data sets of large scale surveys and vaccine trials, it is desirable to have a state of the art ware housing/data mining soft-ware and statistical soft-wares for advance data analysis.

- **Audio visual facility**

The institute organizes training workshops and conferences. It requires sophisticated audio-visual facility.

- **Plasma Screen**

Plasma screens are the new facilities that would be required for quick dissemination of the activities and research of the Institute.

Linkages with major ICMR Institutes (Rs 0.90 Cr)

- **Satellite/RF Connectivity for wider area network**

Being the only National Institute of Medical Statistics in India, it is desirable to have independent powerful satellite or RF connectivity for wider area network.

- **National Clinical Trials Registry**

The Institute has initiated National Clinical Trials Registry (NCTR) with specific goal to establish a web based primary register for registering all clinical trials being conducted in the country. It is being developed in such a way that it is compatible with the international standards and has its own specific numbering scheme to identify individual register entries. It would ensure that all clinical trials conducted in India are publicly declared and identifiable

and a minimum set of information of all clinical trials is freely available to physicians, health researchers, academicians, pharmaceutical industries as well as the common man.

- **Wing for the IDSP-NCD Survey**

The Institute has been identified as a National Nodal Agency for developing the survey methodology, statistical methods to estimate the prevalence and distribution of NCD risk factors in different States/Regions of India. It would establish a database and monitor trends of important risk factors related to non-communicable disease over a period of time help in evolving strategies and interventions of identified risk factors to reduce the burden of non-communicable diseases. The Institute will need the financial support for trained manpower, training of existing scientists, procurement of advance software and equipments to carry out the above said research activities.

- **Wing for Cancer Registry**

Cancer Registries have been set up at different centres in India under National Cancer Registry Program (NCRP) of Indian Council of Medical research in order to assess the magnitude of cancer. It has generated large volume of data helping to steer national cancer Control Program of India. The Institute proposes to set up an analytic wing of data repository of cancer registry which would monitor the data capture and monitoring of inflow of data of hospital and population based registry.

13. National Institute of Epidemiology, Chennai

TOTAL BUDGET : Rs.2.55 Crores

Public Health Laboratory (*Rs 0.57 Cr*)

Human resources development in Epidemiology is one of the important mandates of the National Institute of Epidemiology (NIE). NIE is keen on establishing surveillance system in some specified areas. The Institute has its own field practice area of 500,000 populations and considering to expand its activities in two adjacent districts.

Surveillance comprises of two components, namely,

- i. reporting clinical disease and syndromes – morbidity and mortality
- ii. laboratory based surveillance

It is mandatory that an epidemiology training centre should have a core laboratory, which should meet the public health needs to sustain training activities. As a public health laboratory, the activities would include epidemic preparedness and response and routine surveillance of water and food borne diseases, water quality assessment (both chemical and bacteriological).

With respect to additional facilities such as laboratory for vector identification and characterization and higher levels of investigations, the Institute has established linkages with various ICMR Institutions.

Existing facilities:

The laboratory is equipped to undertake routine clinical biochemical investigations and direct skin smear microscopy. It has basic infrastructure and facilities to carry out research activities pertaining to epidemiology of leprosy and HIV serology.

The laboratory also has limited capacity for carrying out epidemiological investigations and has potential to serve as a public health laboratory.

The existing laboratory with limited inputs is proposed to be up-graded to a public health laboratory. The laboratory requires additional staff – one research officer, two technical officers, and one lab technician to take the additional workload. Additional equipment, reagents and chemicals are required. Safety kits for protection of personnel and kits for proper packaging of specimens are needed. The budget needed for procuring the necessary equipment, reagents, infrastructure development for the up-gradation of the existing laboratory is appended.

Proposal for Developing Demonstration Unit for Public Health Surveillance System (Rs 0.45 Cr)

India is at a stage of epidemiological transition. It may be very difficult to duplicate a programme on surveillance. There is a need to integrate both communicable and non-communicable disease information in the surveillance programme for the future. There are different surveillance systems at varying degrees of development and effective in different parts of India. The existing systems vary in methodology, scope and objectives. The existing surveillance systems are plagued with lack of uniformity in the use of case definitions, lack of regularity of reports, often no action is taken promptly based on reports. To develop a vibrant high quality public health surveillance system in India, there is a need for the Institute to develop a model for public health surveillance system to be adopted by other agencies. Secondly, NIE being a training institute for Field Epidemiology in India, developing public health surveillance system to impart practical training to the future epidemiologists is important.

To reduce morbidity and mortality of communicable and non-communicable diseases.

Objectives:

- To detect epidemics early and guide or organize timely disease control measures.
- To monitor disease trends.
- To monitor the impact of health programmes.
- To watch for emergence of emerging and re-emerging diseases.
- To predict/forecast epidemics.
- To provide information for policymaking.
- To suggest further research.

Establishing an epidemic investigation/containment task force (Rs 0.44 Cr)

The number of outbreaks of communicable diseases has been increasing in the recent years. There may be several reasons for this: the increased rapidity of national and international travel and extensive deforestation and irrigation works, explosive urbanization, overcrowding associated with poor sanitary conditions. In India, epidemiological services developed as an integral part of national disease control programme. But, existing network of health infrastructure from community to state level is not very effective. Epidemics often remain undetected or are detected very late, when epidemics are on the decline. Accuracy, completeness and timeliness of epidemic investigation in terms of epidemic emergency are the need of the hour. It is therefore proposed to set up a 'Epidemic Investigation / Containment Task Force at the National Institute of Epidemiology to act as nodal agency for future epidemic investigations in our country.

Purpose:

- Rapid assessment of reality of epidemic
- Formulation of provisional hypothesis of origin
- Organization and providing expertise for investigations
- Providing information for control measures to State health authorities.
- Documentation of knowledge on epidemics
- Preparation of modules for training public health officials.

The computer facilities of the Institute contribute immensely in the statistical computation and analysis of the data pertaining to the various surveys and studies that are undertaken. With the advent of more and more powerful personal computers as well as user friendly software packages for many of the general and common applications, the use of the computer for preparation of training / presentation materials, for secretarial, accounts and administrative works have been taken advantage of. The concept of a centralized computer room wherein all computer processing takes place is being replaced by the provision of computer facilities at the work table of the concerned staff.

At NIE, a start has been made in this direction by providing computer facilities for the staff at the rank of Assistant Director and above. It is proposed to extend these facilities to the level

of Research Officer and above. For this purpose 6 (six) computer systems in the level of Pentium IV at an approximate cost of the 4 lakhs may be acquired.

The Institute conducts training courses in the fields of epidemiology, controlled clinical trials and bio-statistics for persons in the field of public health and medical research and for post-graduate medical students. It is proposed to introduce CBT methodologies for these courses. This would allow the participants to study the subjects of their interests at their own pace as well as free them from the constraints of fixed time schedules to flexible timings. An exclusive computer laboratory is necessary for implementation of these methodologies. This laboratory must be equipped with multimedia computer systems, printer, reprographic facilities. Considering the number of students that are accepted in a batch at least 10 multimedia computer system may have to be acquired to start with. The cost to be incurred on this account is estimated at Rs. 9 lakhs approximately.

For the creation of new data files, stand-alone personal computers are being used. Though such systems may meet the requirements of medium sized data files, they are found to pose problems in the case of large sized data bases, by way of repetitive merge and back up operations that may have to be performed. For mass data file creation, a server with dummy nodes may be more suitable. A server system with 6 dummy nodes may be acquired at an approximate cost of Rs. 5 lakhs.

With the rate of obsolescence of the electronic equipments being high, it is imperative that NIE replaces the old computer systems with the latest ones. Failure to do so may result in problems of incompatibility of hardware and software and also of the non-availability of spare parts, in the events of hardware failures. In this category, there are 13 computer system in the range of PC AT 386/486 which needs to be replaced. The estimated expenditure to be incurred on this account is approximately Rs. 8 lakhs.

As regards the computer printers, many of the printers have become old and some models have already become obsolete. For large volume printout, there is only one heavy duty printer, which is inadequate. Hence, one heavy duty printer must be acquired and a few dot matrix printers need to be replaced. For this purpose approximately Rs. 2 lakhs may be required.

The Institute is involved in GIS applications. For dealing with map data a need for a plotter-HP and scanner- A3-2400DPI is acutely felt. Rs. 2.5 lakhs may be needed for acquiring the plotter and scanner.

Though achievement of a 'paperless' office is a goal, from past experience it may be noted that the confidence in adopting such a technology is still to be built up and resorting to hard copy printouts is still to be borne with. Moreover, the general office procedures require hard copies. Thus, laser printer with minimum configuration may have to be provided to each of the staff having a personal computer at his / her work table. About 15 medium level laser printers may be acquired at an approximate cost of Rs. 3 lakhs.

Computer network connectivity points may be provided in all work places of NIE, so that computer systems may be connected into a network. This will enable resource sharing, as well as communications. The possibility of expanding the internet facilities which are available in the library may have to be explored, for which such a network connectivity is a base.

Incorporating the state-of-art features of the computer systems, advanced software packages in the areas of statistics, geographical information system, library maintenance systems are available. So also are available, the upgraded versions of older software package. Need for statistical software package like SUDAAN, S-PLUS and GLIM are being felt. For GIS application, map info professional version 6.5 may be acquired. Funds for acquiring these packages must be allocated. Rs. 3 lakhs may be allocated for the purchase of softwares.

It is observed that the electricity supply problem tends to become more acute with each year. This being a vital source for functioning of all the equipments / systems, it is important that a good supply of electric power is ensured. For this purpose it is essential that a suitable power generator is acquired. Rs. 3 lakhs may be allocated for this purpose.

With the purchase of computer systems, support systems such as UPS, table top UPS, computer tables and chairs have to be purchased. Rs. 4 lakhs may be allocated for this purpose.

Epidemiological Network (Rs 0.55 Cr)

There are several institutions involved in epidemiological research. Epidemiology divisions / departments are existing in most of the Institutions in our country. These departments provide the link between public health needs and research efforts. Availability of these disease or discipline-specific epidemiologic facilities in various parts of the country is an unique strength. All these divisions will stand to benefit by close interlinking. Understanding of each other's activities will lead to know the strengths and weaknesses of individual divisions and they will thus complement and supplement each other. Generally, removing these epidemiology divisions from their parent institutions to develop an epidemiology institute will not be advisable, but functional liasoning with the National Institute of Epidemiology should be developed.

Joint scientific activities through workshops / seminars can be organised for the epidemiology divisions. These activities can be taken up by rotation in different institutes in different parts of the country. This opportunity can be utilised for extension education, CME activities, as well as for public awareness and social actions.

Interlinking of the epidemiology divisions will help in developing a broad base of expertise and faculty members to meet specific training requirements in epidemiology in different areas.

To develop this linkage effectively, modern electronic media will play a major role. Such electronic networking will facilitate rapid flow of information and liasoning. It will be ultimately very economical on several counts. Use of various databases would be possible at different institutions, softwares can be accessed more efficiently and at a much lesser cost.

14. Centre for Research in Medical Entomology, Madurai

TOTAL BUDGET : Rs.3.60 Crores

Animal House

An animal house is a necessity for the Centre. The CRME has already made a research proposal to the ICMR, which has also approved this. The costs involved (approx. 3.6 Crore), however, may now be considered for granting to the Centre within the 11th Plan budget, in addition to the budget given below.

- To create infrastructure facilities at CRME, Madurai for Animal House maintenance for production of JE/Dengue – antigen – mouse brain.
- To carry out permitted animal experiments (a) raising of immune sera.
- To generate hybridoma for monoclonal antibody (MAB) production
- against JE and dengue viruses.

Animal house will be established fulfilling the following criteria to maintain mice colonies, rats, rabbits, guinea pigs, monkeys, chicken, goose and mosquitoes. The animal house will be suited away from the laboratory or in a location separate from the laboratory which is reasonably free of smoke and noise and will have sufficient place for service units.

15. Regional Medical Research Centre, Port Blair

TOTAL BUDGET : Rs. 5.0 Crores

Animal house (Rs 2.00 Cr)

Although, while constructing the present building of the Centre, a provision was made for animal house, it was later dropped due to paucity of funds. Till now it was not a major problem, as the Centre had undertaken only very little research using laboratory animals. However, a proposal for establish facilities for production of monoclonal antibodies against leptospires has been mooted. This work needs laboratory animals as bulk production of MCAs is done by inducing as cities in animals. Therefore, developing animal house facility is essential for further research activities of the Centre.

Production facilities for monoclonals (Rs 2.00 Cr)

Serological characterization of leptospirosis is done using a test called Cross Absorption Agglutination Test (CAAT), which is very cumbersome and time consuming. An alternative is to use panels of monoclonal antibodies that are capable of discriminating between different serovars of each serogroup. To effectively do this, a large panel of several hundred MCAs will be required. It will be difficult task to develop these MCAs in-house. Recently, the Royal Tropical Institute (KIT), Amsterdam, the Netherlands showed interest to transfer more than 200 clones of hybridomas producing monoclonal antibodies against leptospires developed by them to RMRC, Port Blair. Setting up the facility for production of monoclonal antibodies using these clones will not only help to supply these MCAs to other institutes but also will be useful for further research characterization of the isolates and future studies exploring the use of monoclonals for the development of diagnostics. As a WHO Collaborating Centre for Leptospirosis and National Leptospirosis Reference Centre, there is a need for the Centre to establish this facility. The importance of establishing this facility at the Centre becomes manifolds, particularly in view of the availability of the already developed clones, which will do away with the tedious job of developing the clones in-house and the enormous amount of money needed to do so.

National Leptospira Repository (Rs 1.00 Cr)

The Centre already has a leptospira repository which maintains hundreds of strains of leptospires. It is proposed to upgrade this as a National Leptospira Repository. Since the recovery rate is low if the strains are stored frozen, it is necessary to repeatedly subculture these strains. Maintaining these strains are important for leptospirosis diagnosis but also for characterizing strains and developing diagnostics. Setting up a National Repository will involve additional manpower as well as procuring some equipment such as large-capacity BOD incubators.

16. Regional Medical Research Centres, Bhubneswar

TOTAL BUDGET : Rs. 2.00 Crores

Microbiology laboratory to make BSL-2 & BSL-3 lab facility (Rs 1.50 Cr)

As per the objective, the centre is undertaking various investigations from time to time. Diarrhoeal disorders put a significant threat in this region, where the centre has contributed remarkable work for more than a decade. Besides diarrhoeal disorders, anthrax is also reported from different part of Orissa. Viral diseases also put equal threat in this region. The present infrastructure has 400 square feet on the 2nd floor. This place can be utilized for the development of BSL-3 laboratory. This lab. will be utilized for handling pathogenic bacteria like , Bacillus anthracis , influenza viruses etc .

E – Library (Rs. 0.50 Cr)

An electronic library is a heterogeneous system in which information is available in hard copy, on magnetic tape and discs, CD-ROMs and videodiscs, and also from online sources like online database, open access publications, e- journals/e- books etc. Storage and copying of information are done either by downloading or by printing from a master file. Such libraries can provide very diverse information. A digital library facilitates quicker handling of information. Digital libraries are as important for communications and collaboration as for information seeking activities.

Digitizing as a means of preservation is quite beneficial. Convenience is also a benefit. Users can retrieve digitized books in seconds by searching for words, phrases, images or ideas. Most of the world's leading publishers have electronic journal (e-journal) access services at present. Many S&T libraries subscribe to the full text versions of e-journals covering a large number of publishers and Societies. INSDOC, the apex institution for Information System and Services under CSIR runs a Digital Library. ICMR has already taken steps for information sharing service in ICMR libraries with the collaboration of M/s Informatics India Ltd. through JCCC@ICMR

Most of our ICMR libraries are now providing E- mail facilities to its scientists/researchers and many scholars have e-mail accounts. Communication and data transfer or interchange has become easy with the help of Internet and email attachments. The concept of e-learning can be incorporated into a digital library system. Hence, there is essential need to establish e-based library have to cater to all readers which is a updated version based on recent technology to facilitate all readers and users.

17. Regional Medical Research Centre for Tribals, Jabalpur

TOTAL BUDGET : Rs. 1.29 Crores

Students & Scientist (Rs 0.69 Cr)

The center is working in close collaboration with various national and international institutes as well as agencies. The centre is a collaborating partner with CDC, Atlanta, More house School of Medicine, Boston University, Liverpool School of Tropical Medicine, U.K. and CDC, KEMRI, Kenya. Additionally, there is a WHO funded collaborative project with TRC Chennai and several other studies funded by USAID, UNICEF, NACO etc.

In connection with the projects, about 300 scientists / students including about 75 from outside India visit RMRCT Jabalpur per year. The guest house of RMRCT accommodates only 4 persons at a time. During last three years, we had 25 foreign collaborators and 10 foreign student for PH D or project work. The collaboration with various international institutes is on increase.

In 11th plan, we also intend to start national and international training programmes in genetic disorders, nutritional disorders, STDs, AIDS, vector borne diseases and water borne diseases prevalent in tribal populations.

Therefore, we require an international hostel to accommodate about 20 participants, national and international faculties and guests invited for training programmes.

There are some quarters lying vacant in the campus, the main reason being construction of own houses by the employees as well as relative hike in the HRA. Hence, we propose to convert two blocks into the international guest house. We only need to furnish them and also provide modern amenities like provision of internet, telephone etc.

Animal House (Rs 0.60 Cr)

The centre is engaged in few animal studies like toxigenicity studies as well as entomological studies to maintain insectory. Presently, the animal house is in rudimentary

state and it needs to be reconstructed/renovated according to the guidelines of the 'Committee for the Purpose of Control and Supervision of Experiments on Animals'.

Animal House is required for basic research, clinical trials, to do various toxigenicity studies, pathogen city studies. It will also enable us to study the natural history of various disorders. We will also be able to do phase I trials of various vaccines and drugs.

Furthermore, an animal house is an essential part of insectory. Rabbits are required for giving feeds to mosquitoes.

In addition, the animal house will work as an in vivo system and will be useful for propagation of organisms especially viruses, raising immune sera for immunological tests, studies on selection of animal model for viruses, vaccine studies related to tolerance, immune response study and challenge study. We will also be able to do various immunological assays in vivo, conventional tests like haemagglutination test and complement fixation tests and pharmacokinetic assays

The Scientific advisory committee of RMRCT has also strongly recommended the reconstruction/renovation of an animal house in 2004 as well as 2006.

18. Institute of Cytology and Preventive Oncology, NOIDA

TOTAL BUDGET : Rs. 7.00 crores

HPV vaccine lab with BSL III/IV facility

Although there is an HPV vaccine now available for the prevention of cervical cancer, the top most cancer in Indian women, this prophylactic subunit vaccine is very expensive and hence not suitable for India. ICPO is involved in generation of second generation DNA-based HPV vaccine. Preliminary activities in this regards have been initiated. Since the HPV is infectious to humans and is a known carcinogen, it requires specialized containment facilities both for laboratory and for animal testing.

Proteomic facility

In recent years, functional genomics has emerged as one of the most important area in understanding the process of cancer development. Both genomics and proteomics are essentially required to complement the functional genomics. Recently we have developed a microarray facility which with available resources complements the genomics studies. However, to study the protein expression and identification of novel protein(s) associated with cancer development, we require a strong proteomics facility which is lacking in the institute.

Central Tissue Culture Facility

Most of the cancer cell signaling, molecular biology, pharmacology and toxicology work requires good tissue/cell culture facility. Currently we have a small facility for tissue/cell culture. Development of a centralized tissue/cell culture facility will be immensely required for providing support to several scientists for carrying out various in vitro experiments, maintaining existing cell lines, development of primary cell cultures and new cancer cell lines etc.

Animal house furnishing with Animal cage isolators

Program for development of DNA-based HPV vaccine essentially requires development of cervical cancer disease model and animal testing of the vaccine. In addition, several other cancer research activities require a good animal house facility. The small animal house facility available at present with the institute is not sufficient to support these programs. It is, therefore, essentially required to be expanded with necessary modern equipments, fixtures and furniture to carry out modern cancer research including animal trials for vaccine and novel drugs.

Upgradation of DNA Sequencing facility

Presently, we have a single capillary automatic DNA sequencer which is now getting old with weakened laser accompanied with gradual loss of alignments due to extensive use and regular wear and tears. This facility is essentially required to perform mutation and polymorphism studies in several research projects of the institute.

Bioinformatics and drug designing software and tools

ICPO is in the process of developing a new division to promote research in the area of Bioinformatics and Drug Designing as these are the frontier and most essential fields for targeted drug-designing and functional understanding of human genome and individualized cancer therapy. To establish this facility various softwares and other designing tools will be essentially required.

Library modernization including online subscription of journals

There is no good library facility in and around Noida and our existing library has subscription to very few journals and those also are subscribed only in hard prints and there are only few specialized journals available through JCCC. Currently, most of the journals are online and online subscription to these journal with facility to access electronically in the library and at individual scientists work area will be tremendously improve the library performance and service.

Small animal imaging facility

The facility is essentially required to determine the course of tumor-specific targeting of various experimental drugs and is very helpful in vivo imaging of tumor lesions. The facility will be essentially required during development of animal models for cervical carcinogenesis. This facility is not available in any institute in Delhi/Noida.

Up-gradation of existing computer and networking facilities

Currently, the institute is running with individual data management facility using Microsoft Excel. In order to match other international institutions, ICPO requires it own customized data management system. In addition, currently available statistical software needs to be upgraded to improve data analysis and productivity. With ever increasing advancement in computing technology and increase in data size, there is an urgent need to upgrade various computers and the network of the institute for better performance.

Upgradation of existing radioactive facility

Various experiments in molecular oncology and molecular genetics require handling of radioisotopes. Currently, we have earmarked a specified area which has an extremely basic radioactive facility and urgently needs upgradation into a specialized working environment with radiation safety hoods, Radiation-protective gears, specialized freezers for storage of radioactivity, radiation detection and containment gadgets to minimize and monitor the exposure to radioactivity and biohazard material.

19. Regional Medical Research Centre, Dibrugarh

TOTAL BUDGET : Rs.5.50 Crores

Establishment of Animal facility for NE region (*Rs 4.00 Cr*)

North-eastern region is lacking in proper animal facility to cater to the need of vast demand for experimental animals. Animal experimentation is an integral part of bio-medical research. For this good quality, animals of pure breed and line are essential. Though there are several medical colleges as well as few research Institutes in this region, yet the animal facility has not developed in this region. All the time this center has to depend on NIN or CDRI for animals. Besides the problem of transportation, acclimatization of animal takes long time and many a times they die either in transit or within few days of arrival. So, creation of full fledged and ideal animal facility that can support breeding and experimentation in this region

is essential. As a research centre, RMRC, Dibrugarh is the most suitable place for developing such a facility

Scanning Electron Microscope(Rs 1.00 Cr)

Electron microscopy is an essential and important tool for research especially detailed ultrastructural study of microorganisms, tissues and vectors. In the whole of NE region of India there is only one scanning electron microscope available at Shillong which is at a distance of about 600 Kms. From the centre. Moreover, the existing facility at Shillong is overloaded and takes lot of time to process the material for this reason. Therefore, it is proposed to install a scanning electron microscope at RMRC, Dibrugarh.

BACTEC system(Rs 0.50 Cr)

RMRC, Dibrugarh has initiated molecular epidemiology of tuberculosis in NE region. Due to the high prevalence, research on HIV and tuberculosis in this part of the country has become a priority. BACTEC, the bacterial identification system, is especially required for identification and sensitivity of Mycobacterium tuberculosis. Normally with traditional methods isolation and drug, testing for tuberculosis takes more than a month. With this system, this time will be greatly reduced.

20. Desert Medical Research Centre, Jodhpur

TOTAL BUDGET : Rs.3.00 Crores

The DMRC was established in 1984. Since then the Centre has been mainly engaged in conducting in-depth studies on the field epidemiological aspects of different health related problems in arid areas of Rajasthan. The work related to the establishment of the laboratories, equipped with modern tools and equipment could not be facilitated due to the priorities on other aspects in general and lack of space in particular. Now as the new laboratory cum administrative building of the centre is coming up soon, the up gradation of all the existing laboratories, equipped with all modern and latest equipment would be required on priority basis to support the basic, clinical and operational research utilizing modern biotechnological tools of genomics, proteomics and bioinformatics to strengthen studies in relation to disease vectors, pathogens, human elements involved and environmental factors for communicable and non-communicable diseases. The proposed upgradation equipment would certainly help the Centre to enhance the quality of research utilizing the most recent and reliable tools and maintaining the international standards of research in the field of proteomic mapping and characterization of proteome map of relevant body fluid of health individual and alterations during chronic life-style diseases to understand pathogenesis and complications for identification of potential points of intervention. Genomics and proteomics of disease agents of malaria, dengue, tuberculosis, disease vectors and creation of sample repository to support genomics and proteomics will be useful in understanding the etiology of communicable and life-style diseases.

21. National Institute of Occupational Health, Ahmedabad

TOTAL BUDGET : Rs.24.4 crores

Tobacco Research Laboratory (Rs 5.50 Cr)

The setting up of Tobacco Research Lab is an essential prerequisite for the effective implementation of the Tobacco legislation in India similar to the existing Tobacco analysis laboratory in developed countries. NIOH has expertise to analyze the tobacco constituents from various tobacco products.

- To estimate nicotine, cotinine, tar, CO and tobacco specific nitrosamines from the tobacco smoke and tobacco products. And biomarkers of tobacco exposure.

- Strengthen national tobacco control surveillance system to monitor the national tobacco epidemic and advance research to promote effective tobacco control programs.
- To provide the technical expertise for effective implementation of the tobacco legislation by estimating various biomarkers of tobacco exposure.

Pesticide Toxicology Laboratory (Rs 0.75 Cr)

There is a need to establish a laboratory with state of art facility for pesticide analysis with strong and rigid quality assurance program. This is essentially needed to conform the International standards to promote the development of quality and reliable data. This would help in strengthening the network of the laboratories of the country in which initially the harmonization of methodologies with quality assurance could be taken up on priority to obtain reliable residue data, and respective risk assessment. NIOH, Ahmedabad may act as a nodal reference center in this regard in a way to find remedial measures to redress the problem at national level. The objectives of the proposed pesticide research laboratory are (i) to built capacity for reliable pesticide residue data generation; and (ii) *recommend appropriate intervention strategies due to pesticide exposure in community through food chain*. The Laboratory would function as a Nodal Reference Lab on Pesticide Residues with quality assurance.

Molecular Biology Unit (Rs 7.00 Cr)

Traditionally, occupational exposure assessments have focused on air borne exposures in the workplace. Biomarkers of exposures are complement to air monitoring especially when the agent has multiple routes of exposure. They also provide confirmation of exposure when work environment assessments are difficult. Biomarkers of effect can serve as early indicator of disease risk and biomarkers of susceptibility indicate individual variation in risk due to exposure. Thus, biomarkers offer the potential to accomplish more integrated exposure assessment. The molecular biology Unit would under take studies related to :

- Molecular Epidemiology in Relation to Environmental Cancer
- Genomics and Proteomics
Gene and protein expression studies in relation to environmental and occupational exposures (toxicants). The studies involved in proteomics will be able to study the impact of environmental toxicants on the gene and further its expression in the form of proteins, therefore it will be possible to study the impact of toxicant in an expressed protein form as well as to identify the genes which are being knocked due to the toxicants.
- Toxico Genomics

The primary goal of toxicological investigations is to assess the effect of environmental exposures on the health status of exposed animals or human. The conventional toxicology is not able to understand the molecular mechanisms of toxicity or gain inside into the pathogenesis and progression of diseases.

The goals of toxicogenomics will be Identify and characterize source of variation in the gene expression experiments and establish standard protocols; evaluate toxicants specific pattern of gene expression; elucidate molecular mechanism of cellular responses to environmental agents; develop gene expression based biomarkers of human exposure; study of toxicological effects of chemical mixtures; evaluate toxicological dose response behavior and high - low dose specific response; gene expression and proteomics data.

Poison Information Centre (Rs 3.85 Cr)

Pesticide poisonings contribute to the largest numbers of acute poisonings in India and cost of managing these cases is very high. Majority of the poisoning cases are managed without any proper guidelines. The functions of Poison Information Center include providing (i) information and guidance to the public and healthcare professionals, (ii) environmental risks of chemicals and safe levels of chemicals in food and at the workplace, (ii) laboratory analytical services for quick identification of toxicants, (iv) services in the handling of chemical disasters by providing appropriate information at the time of accident and by taking part in contingency planning, (v) play role in the prevention of poisoning through

toxicovigilance and keeping a close watch on toxic risks in the community, (vi) educational and awareness programmes for the high risk groups such as workers, school children and parents can also help in prevention of poisoning due to chemicals in the workplace, at home, in schools etc, and (vii) a source of human toxicology data. Research related to clinical toxicology of toxicants can be undertaken by the Poison Centers.

Cognitive Science Laboratory (Rs 1.80 Cr)

Cognitive science is the interdisciplinary area of study concerning human health and behaviour in evaluating interactive human and systems interfaces. A new professional group has been emerged as “usability professionals”, who essentially evaluate and assess human functions and behaviour in complex tasks and operators.

The NIOH proposes to reinforce its basic infrastructure and develop an independent cognitive science laboratory with additional resource inputs. We need to identify the problems of misfit to the technology and re-engineer better fitting solutions by studying the cognitive aspects to achieve better and safer work environment. The attempt will explore the satisfaction, reliability and performance in human-system interrelation. Besides, the likely effects of various agents on chemicals, etc on the neurobehaviour will be extensively studied through advanced electrophysiological and neurophysiological emphasis.

Advanced Facility For Early Detection Of Occupational Diseases (Rs 5.50 Cr)

The majority of the occupational diseases usually are untreatable and prevention is the only modality available for their effective control. Early detection is therefore vital for the management of the occupational diseases. The pre-primary prevention in occupational diseases is effected by engineering solutions and primary level of prevention is achieved by hygienic practices, which tackle high-level exposures. Low-level exposures are best handled as secondary prevention practices, which entail early detection of structural and functional derangements. Pathological changes start with the onset of exposure in question. These changes are not discernable as they are at functional, microcirculation and tissue levels. These changes need to be documented with precision and specificity. Majority of the conventional technologies require a stationary laboratory setup. The epidemiological studies on occupational diseases are usually carried out in different parts of the country and often in the remote areas.

Advanced technologies are available and can be deployed for efficient tackling of the occupational health problems.

22. Institute of Immunohaematology, Mumbai

TOTAL BUDGET : Rs. 9.05 crores

Micro Array Station (Rs 1.00 Cr)

This will be very useful for gene expression, profiling of a large number of genes in a single RNA sample in hematologic malignancies and hemoglobinopathies and or SNP and multiple mutation analysis in different hematological disorders.

Full Proteomics Station (Rs 1.00 Cr)

2D electrophoresis and MALDI – TOF will help us to establish protein expression studies. This will be initially used for red cell enzymopathies like pyruvate kinase deficiency where the expression of different proteins will be studied. Once established this technology will be applied to other areas of interest to this institute in different hematological disorders

High throughput DNA sequencing (Rs 1.00 Cr)

The requirement for DNA sequencing at this Institute is gradually increasing for identification of unknown mutations in different hereditary hematological disorders like the hemoglobinopathies, hemophilias, platelet disorders and also for genotyping analysis for

polymorphism studies, chimersim analysis and quantitative fluorescence (QF) PCR analysis for fetal diagnosis of chromosomal abnormalities and other single gene disorders.

Stem Cell laboratory (Rs 6.06 Cr)

Establishment of culture room facility: Required for carrying out all the culture experiments.

Bio safety cabinet : Required to carry out culture work

CO₂ and O₂ incubator: Required for the culture work.

Inverted microscope with phase contrast facility with micromanipulator and imaging system : Essential for the assessment of the cultured cells and high quality imaging and analysis of the cultured cells

Flowcytometer: 14 parameter flowcytometer with sorting facilities is essential for the characterization of variety of cells, characterization of various hematological disorders

Confocal microscope: Required for the characterization of the stem cells.

Nephelometer: Required for measurement of the variety of biochemical parameters including serum immunoglobulin levels, serum Ferritin levels and variety of other parameters important required for assessment of hematological disorders and monitoring the patients after bone marrow transplantation.

Electron microscope: Required for the assessment of ultrastructural changes within the stem cells. It is also very important tool for diagnosis of other hematological disorders and viral infections

23. Institute of Pathology, New Delhi

TOTAL BUDGET : Rs.5.71 Crores

Adult Stem Cell Biology(Rs. 1.06 crores)

The aim of the proposed facility is to bio-engineer tissues/cells originating from adult skin stem cells for their application in burns and various skin lesions like vitiligo etc. The facility would allow us to implement our ongoing projects on application of cultured epidermal sheets in burns and our recent initiative on application of two types tissue engineered cells, 'pure' melanocytes and epithelial reconstructs consisting of both melanocytes and keratinocytes, in patients with generalized stable vitiligo. These methods of autologous grafting of the cultured tissues/cells has been successfully applied and adopted in many burns/dermatology divisions across several countries. Hence, there is a high scope of clinical applicability of bio-engineered tissue/cells in the developing countries like India where the casualties due to burns are very high and dermal lesions like vitiligo have high socio-psychological impact.

Somatic cell therapies involving bio-engineering techniques for human applications require quality and safety in order to safeguard public health. The internationally acceptable norm for all laboratories where cells for transplantation are cultured, is the independent BL-3 type culture facility with controlled temperature and humidity, air conditioning system equipped with filters like HEPA / ULPA allowing a control of environmental contaminations. Such facilities, termed as Clean Rooms, would have controlled negative pressure in the culturing areas and controlled positive pressure in the filter zones.

Proteomic laboratory (Rs. 2.60 Cr)

Institute of Pathology has well established facility for doing genomic studies, however, most of the studies have completed the genetic phase and are now progressing to the next phase for confirming the observations by Proteomic analysis. Hence, proteomic laboratory is essential with required equipments and trained personnel. Proteomics involves the systematic study of proteins in order to provide a comprehensive view of the structure,

function and regulation of biological systems. Advances in instrumentation and methodologies have fueled an expansion of the scope of biological studies from simple biochemical analysis of single proteins to measurements of complex protein mixtures. Proteomics is rapidly becoming an essential component of biological research. Coupled with advances in bio-informatics, this approach to comprehensively describing biological systems will undoubtedly have a major impact on our understanding of the phenotypes of both normal and diseased cells.

Initially, Proteomics focused on the generation of protein maps using two-dimensional PAGE. The field has since expanded to include not only protein expression profiling, but also the analysis of post-translational modifications and protein-protein interactions. Protein expression, or the quantitative measurement of the global levels of proteins, may still be done with two-dimensional gels, however, mass spectrometry has been incorporated to increase sensitivity, specificity and to provide results in a high-throughput format. A variety of platforms are available to conduct protein expression studies and this site provides links to these resources.

The study of protein-protein interactions has been revolutionized by the development of protein microarrays. Analogous to DNA microarrays, these biochips are printed with antibodies or proteins and probed with a complex protein mixture. The intensity or identity of the resulting protein-protein interactions may be detected by fluorescence imaging or mass spectrometry. Other protein capture methods may be used in place of arrays, including the yeast two-hybrid system or the isolation of proteins/protein complexes by affinity chromatography or other separation techniques.

Accordingly, it is proposed to develop Proteomics Laboratory with the broad objective to strive to keep the analytical technology for protein and peptide characterization at a 'cutting-edge' status so that the different divisions of the Institute are well positioned to rapidly identify new molecules of biological importance. Undoubtedly, such new technology will help in achieving our goal of providing effective treatments for cancers and breakthrough in infectious diseases.

The objectives of the Proteomics Laboratory shall be to:

- Identify new proteins that are important in cell growth and function,
- Dissect the intracellular responses to growth factors.
- To improve our understanding of the structure - function relationships of proteins that are relevant to the cancer process.

Following major equipments would be required for developing this facility:

- Protein Identification
 - MALDI-MS and MS/MS analysis included 70 lakhs
 - Mascot 10 lakhs
 - Denovo peptide sequencing 65 lakhs
- 2D Gel Electrophoresis 35 lakhs
 - Large, 24 x 24 cm gels
 - Analysis with Phoretix 2D Evolution software 10 lakhs
 - DIGE labeling
- Shotgun Proteomics
 - 2D-LC-MS 70 lakhs

Animal House with GLP accreditation(Rs..0.50 Cr)

The Animal House Facility in Institute of Pathology, houses small animals and caters the Institute's scientists. The Institute is further planning to develop Pre-Clinical Toxicology Unit. Therefore, it is proposed to upgrade the existing Animal House Facility as per GLP norms to facilitate animal related research involving infectious agents, etc.

Cytogenetics(Rs.0.50 Cr)

The importance of cytogenetic and molecular genetic changes in cancer diagnostics has long been recognized. In particular, chromosomal translocations have an established role in diagnosis, prognosis, and prediction of response to treatment in hematologic malignancies.

Today some leukemias are classified according to cytogenetic changes. Characterized translocations have provided instrumental clues to understanding of molecular mechanisms of cancer, which in turn have enabled development of molecularly targeted treatments. Not only in hematologic malignancies but also in neurogenic tumors and other carcinomas numerous diagnostically, prognostically, predictively and therapeutically important genetic changes have been described over the past few years, and novel genetic markers are discovered at a rapidly growing rate. New methods and characterized specific genetic markers have opened a new era for diagnosis and treatment and also in detection of minimal residual cells.

Clonal chromosomal aberrations identified by various banding techniques had been reported in more than 47,000 human neoplasms. An increasing number of the acquired abnormalities have now also been studied by various fluorescence in situ hybridization techniques, which have provided a new and powerful tool to identify abnormal chromosomes and to visualize very small rearrangements that escape detection by conventional chromosome banding. The new techniques have also added a further sophistication to the analyses in that breakpoints in structural aberrations can be delineated within specific genes. Furthermore, an ever increasing number of breakpoints of the cancer-associated chromosome abnormalities have been characterized at the molecular level, and the combined efforts of cytogeneticists and molecular geneticists over the past two decades have led to the identification of large number of genes rearrangement as a consequence of chromosome aberrations in neoplasia.

Cytogenetic and molecular genetic analysis has been an integral part of laboratories that are working on cancer biology. The infrastructure for establishment of this facility will require a high end microscope, software for analyzing the karyotype. In addition, FISH probes will be required for carrying out the work.

Preclinical Toxicology Unit (Rs. 1.05 Cr)

Institute of Pathology has basic infrastructure facility for histopathology, molecular biology immunotoxicity and electron microscopy. A Cytogenetics laboratory is also being planned. Further, the Institute has plans to upgrade IOP Animal House Facility as per GLP norms so that together, they can serve as Pre-Clinical Toxicology (PCT) Unit. The PCT Unit will help in doing various toxicological, toxic kinetics and safety related experiments by the Institute's scientists and also for drugs/molecules received from scientists of other and Institutes. The PCT Unit will thus act as a nodal agency for testing these products in smaller animals. Stringent guidelines as per Standard Operative Procedures (SOPs) will be followed for testing these compounds/preparations in order to maintain quality control. The staff involved in PCT testing will be trained in the related areas of study.

24. Regional Medical Research Centre, Belgaum

TOTAL BUDGET : Rs.10.00 Crores

Medicinal plants extraction/ Quality control and standardization of medicinal plants

Herbal medicine/plants with medicinal value are used throughout the world. Although the use of medicinal plants is increasing in developed world as nutraceuticals/supplement to modern medicine, global acceptance of herbal medicine requires strict quality control and standardization of medicinal plants. Hence, it is essential to establish the laboratory facilities to extract and evaluate the quality of medicinal plants/Herbal formulation by using modern techniques and applying suitable standards. Therefore, for Medicinal plants extraction/ Quality control and standardization laboratory, it is essential to have state-of-art facility with equipments like Gas Liquid Chromatography (GLC), High Performance Liquid Chromatography (HPLC), Thin Layer Chromatography Unit (TLC), Infrared Spectroscopy (IR), Mass Spectrometer (MS), Nuclear Magnetic Resonance (NMR), Ultracentrifuge, Refract meter, Flurometer, Polarometer, Flame Photometer etc.

Further, it is also important to set up a quality assurance laboratory for extraction and preparation of herbal medicines such as Ghrita, Arista and Asava, Bhasma, Vati, Choorna, Paka, Leha, Avaleha etc. It is also proposed to take up the studies on their biological activity and mode of action. The equipments like Vibratory sifters, Comminuting mill, Fluid bed driers/ Coaters, Blenders, Tablet punching machine, Pulverizes, Capsule filling machine etc are to be procured for this purpose.

This facility will help in development, testing and quality control of medicinal plants and newer drugs in the ISM & H.

Plant biotechnology and Fingerprinting

Main objectives of setting up this facility are for

I. Conservation of RET plant species:

a. Establishment of Gene bank:

Many of the medicinal plants are becoming rare, endangered and threatened due to overexploitation. The *ex situ* conservation of all the plant species is practically not possible. Plant biotechnology is the alternative way of *in situ* conservation of rare plants. Establishment of Genome Bank is proposed, in which the isolated plant germ plasm will be stored *in situ* and made available for further research and regeneration.

b. *In vitro* propagation by plant tissue culture:

It is proposed to set up a plant tissue culture wing in the biotechnology unit to propagate the RET medicinal plants *in vitro*. Various plant parts of the RET plants are used as explants and cultured plants will be hardened, acclimatized and re-introduced to the field.

II. Proper identification of disputed medicinal plants :

The proper identification of several plant species, both in Ayurveda and traditional medicine is often difficult because of similarities between two or more plants along with their overlapping local and Sanskrit names. For instance, 'Ekanayakam' is one of the valuable plants used in traditional medicine, which is confused between *Salacia prionitis* and *Caesaria esculanta*. The correct identification, in such cases, can be achieved through DNA fingerprinting.

III. Management of Adulteration:

Adulteration in the raw drugs is one of the major problems affecting the scientific advancement and global acceptance of traditional medicine as well as batch to batch variation. The plant parts such as root bark and leaves of one plant can be easily adulterated with the other, as they look alike and difficult to separate by morphological characters. DNA fingerprinting will be helpful in such cases to detect the adulterant (s).

Molecular biology unit

Belgaum and surrounding regions have been experiencing epidemics of several communicable diseases such as malaria, JE, Dengue, and are endemic for lymphatic filariasis, apart from enteric diseases. The basic needs towards tackling these problems are to ensure the availability of efficient and cheaper diagnostics that can be used in the peripheral areas, and drugs/vaccines that can eliminate the infection and reduce morbidity/mortality. The centre is mandated to work towards these goals in order to address the issues concerning the region. Therefore, the centre will focus towards developing molecular and immunological diagnostics marker for disease development with respect to communicable diseases, as also non-communicable diseases. This will contribute to characterization, detection and diagnosis of existing infections and will help in surveillance program. Further, this will strengthen and generate research capabilities and help in human resource development.

Recent developments in the field of molecular biology and genomics of human, pathogen and parasites, and also proteomics has opened up new area of targeted drug discovery. Work on these lines will be initiated at the Centre to utilize the vast bioinformatics knowledge and tools to identify drug targets for different parasitic/pathogenic diseases. Such targets will be developed through cloning and expression strategies and then utilized

for identifying lead molecules from sources of traditional medicine; initial computational simulation protocol, followed by validation in in-vitro systems. This information will be of immense value in the area of bioinformatics and would be useful to researchers, policy managers, pharmaceutical industries etc.

Museum of Medicinal Plants

A Museum of Medicinal Plants of the Western Ghats has already been established at RMRC, Belgaum campus. However, this needs lot of inputs to develop it in to international standards. It is also proposed to establish a pharmacognosy laboratory in the museum for quality testing as well as quality control of raw drugs and medicinal plant materials.

Therefore, for all these activities cited above, Regional Medical Research Centre, Belgaum need one time up gradation grant for establishing these facilities.

25. National Institute of Nutrition, Hyderabad

TOTAL BUDGET : Rs.26.50 Crores

Schemes for maximizing benefits including upgradation, modernization and replacement are required for departments of Food Science, Modern biology, Micronutrients, Endocrinology, Lipid chemistry, Extension and Training division etc. to meet challenges of newer developments in the field of nutrition.

Laboratory

- Basement parking & laboratory
- EM + Food Services
- GF & GM & IEC
- Modern Biology

Schemes for maximizing benefits including upgradation, modernization and replacement are required for departments of Food Science, Modern biology, Micronutrients, Endocrinology, Lipid chemistry, Extension and Training division etc. to meet challenges of newer developments in the field of nutrition. Upgradation, extension and creation of laboratory facilities in various divisions to meet international standards in research.

26. National Institute for Research in Reproductive Health, Mumbai

TOTAL BUDGET : Rs 25.5 crores

The Institute was established in 1970 and its research mandate included development and testing of contraceptives, and offering family planning services. More recently, the research agenda of the Institute has been expanded. High priority is being given to implement the following strategic issues: develop more effective and safer fertility regulating technologies; develop safer medical methods for pregnancy termination; detection, diagnosis and treatment of RTIs STIs including HIV/AIDS; assisted reproductive technologies, adolescent reproductive health ,make pregnancy safer; child health and development; menopause; and infertility. The need for services as a part of the research programs on infertility needs to be initiated to understand the genomic causes of infertility, as a joint effort between the clinical and basic scientist. In addition, research programmes in emerging areas such as stem cell, transgenics, proteomics have also been initiated. These programmes require state-of-the-art sophisticated technologies.

Moreover, until recently, limited finances were available to procure new equipment and for their maintenance, and some of the equipment purchased during early 1990 or earlier need

to be replaced. This together with the concomitant increase in research faculty and Ph.D. students necessitates a one-time grant for upgrading the currently available infrastructure:

Replacement of old outdated and unserviceable equipment (Rs 6.50 Cr)

It includes the equipment purchased during early 1990 or earlier and are either obsolete or are unserviceable, such as Liquid scintillation counter, Gamma counter, Lyophilizers, Spectrophotometers, DNA sequencer, Multistep purification system, Water purification systems.

Stem Cell Biology (Rs 3.00 Cr)

Research programmes have been initiated with the following objectives: (i) to derive human embryonic stem (ES) cell lines in xeno-free environment and also by somatic cell nuclear transfer to avoid immune rejection at the time of therapy, (ii) carry out lineage specific germ cells etc., (iii) use ES cells as an in vitro model to carry out screening and (iv) study developmental toxicity of various 'lead' drugs. This necessitates equipment for a state of the art culture facility and long term storage facilities.

Transgenic Facility (Rs. 3.00 Cr)

The institute needs to generate genetically modified animals for various programmes. This programme requires special experimental facility including individually ventilated caged to ensure contamination free environment and appropriate diagnostic facility.

Structural Biology (Rs. 3.50 Cr)

The main aim of this programme is to delineate the functional domain and bionutrization epitopes of protein involved in various reproductive processes. This facility would require high through put synthesizing and sequencing facility.

Bioinformatics (Rs. 1.50 Cr)

The Institute has identified a number of molecules which need to be characterized. Bioinformatic facility is essential to identify and characterize novel genes, proteins, predict their structure and function determine protein-protein interaction, nucleic acid interaction in silico using bioinformatic tools. This would require software and high through computational facilities.

Reproductive and Genetic Toxicology (Rs. 1.50 Cr)

The facility will evaluate new drugs, vaccines, environmental agents for their safety and effects if any on the genetic or reproductive systems on the individual and its progeny. To carry out these evaluations special animal house facilities and genetic diagnostics testing of fertility in the peri and postnatal period.

High Throughput DNA sequencer (Rs. 3.50 Cr)

This facility is essential for the new initiative including HIV testing assessing male and female fertility, RTI at the genomic level. Available of the sequencer will strengthen the ongoing activity.

Assisted Reproductive Technologies (Rs. 3.00 Cr)

Infertility and reproductive disorders are major concerns of reproductive health. One of the major programme of the institute includes research on identifying and treatment of genetic causes of infertility. Hence, the need to establish the ARTs and offer services to infertile couples. This will also help establishing genetic causes of infertility.

27. National National Centre for Laboratory Animal Sciences, Hyderabad

TOTAL BUDGET : Rs.8.00 Crores

- Additional floor 920 sq mt Civil Electrical and air conditioning (Rs.3 crores)

- Cages and racks for housing the animals(Rs.2 crores)
- Cage washing machine with rack(Rs.1 crores)
- New Hostel Area 400 sq. meters(Rs.2 crores)

Schemes for maximising benefits including upgradation, modernisation and replacement: The food safety and drug evaluation labs need to be upgraded and modernised in order to get accreditation and GLP compliance certification. The existing setup for Preclinical Toxicology needs to be expanded to meet the growing demand. Establishment of genotoxicology, immunotoxicology and heavy metal analysis divisions and upgradation of center for advanced research are the need of the hour.

Modernization of the housing facilities: In order to improve the micro and macro environment, it is proposed to replace the existing polypropylene cages for mice and rats with transparent filter top ultra modern individual ventilated cages (IVC) having the facility to handle independently as an isolator and maintain animals under filtered air atmosphere with automatic watering facility.

Modernization of the laboratories: It is proposed to establish a full fledged genetic monitoring, feed monitoring laboratories with the purchase of additional equipment like feed analyzer, molecular biology equipment including RTPCR machine etc. and modernize with modular furniture.

Strengthening of washing area: In order to streamline the washing, sterilization, additional sterilizers of higher capacity and an automatic cage washing machine have been proposed.

Establishment of feed sterilization and packing: With the available facility, the Centre is now supplying nearly 14,000 kgs of animal feed to various institutions including the requirements of the Centre. Currently the sterilization process is undertaken with autoclave that has some disadvantages of taking more time for dehydration before transshipment. In order to improve the quality and hygiene during transshipment it is now proposed to establish the feed packing area with a gamma radiation mediated sterilization facility and an automatic filling and vacuum packing machine.

Import of new strains: Apart from the existing species and strains of animals available in the facility, additional new strains like spontaneously hypertensive rats, Lewis rats, Copenhagen rats and need based transgenic animals will be obtained after the completion of modernization of the buildings and the following funds are required for obtaining of breeding nuclei of new mouse and rat strains.

Computerization of the facility: Keeping in view of the requirements of the international norms, following the accreditation of the facility it is mandatory to make computerization of the records pertaining to the animal breeding and experimentation in the animal house. It has been proposed to develop software and networking system for this purpose during the 11th plan period.

Other services required: It has been proposed to purchase 3 vehicles one for animal transportation provided with additional features like racks inside the vehicle with A/c facility and the second one for transporting feed. One additional vehicle will be purchased to meet the needs of the staff.

Internalization of the extramural facility: The centre has been partially supported with funds from Department of Biotechnology from VIII plan period onwards. During the X plan period a sum of Rs 4.50 crores has been allocated. In addition as a part of one time, grant the department has also provided Rs. 4.14 crores under "Support for small laboratory animal facility for Biomedical Research" for upgradation of the facility during the X plan period. In order to continue the activities of the centre as a contingency measures in the event of DBT withdrawal of extending financial support during the XI plan period the centre needs an additional sum of Rs. 5.5 crores.

28. Food and Drug Toxicology Research Centre, Hyderabad

TOTAL BUDGET : Rs.3.00 Crores

- Fluorescent Microscope with image analysis, accessories (Rs.15 lakhs)
- Graphite furnace Atomic absorption spectroscope (Rs.25 lakhs)
- Flash Chromatography (Rs.40 lakhs)
- Telemetry (Rs.90 lakhs)
- HPTLC(Rs.15 lakhs)
- GCMS(Rs.80 lakhs)
- GLC with TEA detector (Rs.35 lakhs)

29. Genetic Research Centre, Mumbai

TOTAL BUDGET : Rs.3.50 Crores

In accordance with the mandate of Genetic Research Centre the scientists at GRC are engaged in research schemes with the aim to prevent birth defects and to develop simple test for screening of common genetic disorders. The clinical research at the GRC focuses on congenital birth defects, prenatal diagnosis, and hematological disorder thalassaemia. The centre runs a state of the art genetic counselling clinic. The clinical geneticist has 28 years experience in counselling. This is offered free of cost. The tests carried out are karyotyping, fluorescent in situ hybridisation, comparative genomic hybridisation, m-FISH and Sperm FISH. The centre needs to expand its clinical facilities by setting up a minor operation theatre, for procedures like chorion biopsy and amniocentesis. In addition, a 3D live ultrasound facility to detect malformation syndromes for accurate genetic counselling. To undertake this wide spectrum of research in prenatal diagnosis and preimplantation genetic diagnosis modernization of the infrastructure is required.

Funds requirements for One time Upgradation of Infrastructure (in crores)

S.No	Centres	Amount
1	<i>Tuberculosis Research Centre, Chennai</i>	21.00
2	<i>National JALMA Institute for Leprosy & other Mycobacterial Diseases, Agra</i>	14.50
3	<i>National Institute of Cholera & Enteric Diseases, Kolkata</i>	29.00
4	<i>National Institute of Virology, Pune</i>	6.92
5	<i>Microbial Containment Complex, Pune</i>	11.85
6	<i>National AIDS Research Institute, Pune</i>	12.02
7	<i>Enterovirus Research Centre, Mumbai</i>	11.00
8	<i>ICMR Virus Unit, Kolkata</i>	3.00
9	<i>National Institute of Malaria Research , Delhi</i>	32.58
10	<i>Vector Control Research Centre, Pondicherry</i>	7.85
11	<i>Rajendra Memorial Research Institute of Medical Sciences, Patna</i>	2.02
12	<i>National Institute of Medical Statistics, New Delhi</i>	2.66
13	<i>National Institute of Epidemiology, Chennai</i>	2.55
14	<i>Centre for Research in Medical Entomology, Maduari</i>	3.60
15	<i>Regional Medical Research Centre, Port Blair</i>	5.00
16	<i>Regional Medical Research Centres, Bhubneswar</i>	2.00
17	<i>Regional Medical Research Centre for Tribals, Jabalpur</i>	1.29
18	<i>Institute of Cytology and Preventive Oncology, NOIDA</i>	7.00
19	<i>Regional Medical Research Centres, Dibrugarh</i>	5.50
20	<i>Desert Medical Research Centre, Jodhpur</i>	3.00
21	<i>National Institute of Occupational Health, Ahmedabad</i>	24.40
22	<i>Institute of Immunohaematology, Mumbai</i>	9.05
23	<i>Institute of Pathology, New Delhi</i>	5.71
24	<i>Regional Medical Research Centre, Belgaum</i>	10.00
25	<i>National Institute of Nutrition, Hyderabad</i>	26.50
26	<i>National Institute for Research in Reproductive Health, Mumbai</i>	25.50
27	<i>National Centre for Laboratory Animal Sciences, Hyderabad</i>	8.00
28	<i>Food and Drug Toxicology Research Centre, Hyderabad</i>	3.00
29	<i>Genetic Research Centre, Mumbai</i>	3.50
Total		300.00

